The Role of the Technical Representative

- The Technical Representative (or TR) is responsible for leading and ensuring the safety of activities onstage during the **Get-in** and **Get-out** of a production.
    - A production's get-in runs from the beginning of their technical work onstage until a member of management signs off the stage as safe for rehearsal and performance. At this point responsibility for the safety of activities onstage passes to the Stage Manager.
    - A production's get-out runs from the end of their last performance until the stage is signed off by a member of management at the end of their get-out.
- This means that the TR on stage at any time is responsible for ensuring all set construction, lighting and rigging in progress at that time is safe and will remain so for the duration of the run.
- The TR is also responsible for ensuring they leave the stage and lighting rig in a safe state for other Theatre users over the course of the run.
- The TR is responsible for following any mitigations outlined in the show's risk assessments pertaining to hazards produced by the production's set or lighting rig, or the process of assembling them.
- The TR is responsible for reporting any accidents, injuries, or near misses to management as soon as possible.
- A production may have multiple approved TRs, but only one is acting TR at a time. This is to allow TRs breaks. One other TR, usually the lighting TR, may lead work in the Lighting Bridges while another TR is onstage.
- All TRs are assigned on a show by show basis in the show folder, and should be familiar with any mitigations specified in Sections 2 and 3 of the production risk assessment. Being TR trained does not mean you can assume TR responsibilities on a show you are not signed off on.
- During the Get-in, the following should never occur onstage without a TR present:
    1. Reloading or changing the weight on any counterweight bar or in any counterweight cradle.
    2. Any hemp flying.
    3. Opening the traps in the stage floor (a member of management must also be present)
    4. The construction of set and lighting objects with mitigations specified in the show's risk assessment.

Training of Stagehands

- The TR is responsible for training stagehands on how to use the following systems in the theatre (the TR is also responsible for ensuring this training is recorded in Section 6 of the show folder):
    1. **Counterweights Operation**
    2. **Counterweights Loading**
    3. **Rigging and patching of electric equipment** (e.g. lanterns and speakers)
- The TR is responsible for informing stagehands of the risks produced by **working at height** and by **manual handling**, though this does not need to be recorded in the show folder.
- After a show any trainings recorded in Section 6 are transferred to a central database and last for one year. You are only required to train stagehands on things they do not have current training in.

Working at Height

Using Galleries

- Avoid leaning over railings, or standing on anything that would raise them above the railing while on the platform.
- When climbing ladders to galleries, the user should have both hands free so they can maintain three points of contact with the ladder.
    - If items need to be transported to the galleries, there are pulleys and cradles present for this purpose.
- Only one person should use a ladder at a time. Users should not stand below another user as they climb.

Loose Items at Height

- When at height all tools should be attached by a lanyard to either a belt or to gallery railings.
- No loose items should be left on surfaces.
- Any items in loose pockets should be left at the base of each ladder.
- No hard hats should be worn at height, except for those with chinstraps.

Hardhats

- Hardhats should always be worn during Get-ins when flying, either of hemps or counterweights, is taking place, or work is occurring above stage.

Stage Ladders (a.k.a. 'Zarges')

- Ladder users should check the ladder for obvious faults before use. Notably: does it have all its feet, does the side-bar(s) lock in place, is the webbing present and intact.
- Zarges ladders should have the side bars fastened across before climbing.
- The centre of gravity of the user and anything they are carrying should be kept inside the footprint of the ladder.
- Three points of contact should be maintained at all times when climbing the ladder.
    - Where it is not possible to always maintain a handhold (e.g. when carrying items up a ladder) the user should ensure that they make a third point of contact by keeping your body in good contact with the ladder and not overreaching to either side. This means you must be standing on a low enough rung for the ladder to come up to your chest.
- Ladders should not be erected on uneven, sloped, or slippery surfaces.
- No item heavier than 10kg should be carried up a ladder.
- Ladders should always be footed when a ladder user is carrying an item. Those footing ladders must wear hardhats.

Manual Handling

- **Approach manual handling using the TILE method:**
  - **Task** – minimise how much lifting the task needs, can any lifting equipment be used to make it easier.
  - **Individual** – be aware of different peoples' differences in physical strength, height and reach. Be aware if someone is straining to carry and reassign tasks appropriately.
  - **Load** – can anything be done to reduce the load is being carried
  - **Environment** – ensure the route you are going to carry the item is clear and that it is your most direct route.
- Keep back straight when lifting, get your centre of gravity as close to the object as possible, and lift from your knees.

- **Be aware we have the following lifting equipment available for use:**
  - **Wheel boards** – useful for moving heavy items on level surfaces

  - **Sack Trucks** – useful for moving very heavy box items on level surfaces without needing to lift them onto a wheel board

  - **The Passenger Lift** – the front of house lift is helpful for moving heavy objects from ground floor to stage.
  - **Trap Flying** – a winch mechanism that lifts items from the scene pit up to stage. This requires management operation so make sure to mark if you are planning to trap fly in your show documentation.

Counterweights Operation

Gallery Access

- Keep the gallery clear of obstructions and trip hazards. Cables and ropes should be coiled and taped neatly against the PS railings.
- When you are on the gallery you are working at height – all tools should have lanyards attached to either your belt or the gallery and no loose items should be left on any surface.
- Your escape route is down the ladder and across stage. Your nearest fire extinguisher is at the upstage end of the gallery.

Before Flying

- Ensure that cables and ropes attached to a bar will not snag as it flies. Particularly with lighting bars.
- Make sure any brail lines applied to a bar are released before flying it.
- If a rope is very tight below the brake and loose above it, or vice versa, take care: the counterweight may be out of balance. Double check what you're doing before releasing the brake.
- Check that the counterweight cradle is in its rails. If not, stop using it and contact management.
- If a counterweight appears to have significant unexpected resistance or makes a loud unexpected sound, stop using it and contact management.
- Be aware that C1 does not fly to full height because of the patchbay access gantry. Make sure you have released C1's brail lines before bringing the bar in.
- All flying not during a performance should take place while there is quiet onstage and while stage users are wearing hardhats.

Flying

- Flying procedure:
  1. **If not during a performance:** only fly a bar in or out when instructed to do so by the TR.
     If during a performance: only fly a bar in or out when instructed to do so by the DSM either over cans, or via cuelight.
  2. **If not during a performance**, call out what you are going to do. Calls should follow the format: Heads/Chins onstage, Counterweight Number, a description of what is on bar, and what the bar is doing, e.g. flying in, flying out, moving in grid.
  3. Unbrake the counterweight set.
  4. To fly a bar in (down) pull the rope down; to fly a bar out (up) pull the rope up.
  5. When the bar is at the height you want, brake the bar and call 'Braked'. **Never leave a counterweight set unbraked and unattended.**
- Watch the bar at all times while flying it if possible.
- Stop flying the bar if instructed to do so by any stage user.
- If you ever feel you are being lifted upward off the ground by the rope, release the rope and brake the counterweight set immediately.

Flying during performances

- Familiarise yourself with what is on each bar and the cue sheet in advance.
- Cast and crew onstage should be briefed before flying takes place and any sequences should be carefully rehearsed, e.g. in a tech rehearsal.
- Keep an open microphone so that communication is easy.
- All live flying should use 'deads' (pre-defined heights for a bar to fly to) marked with tape. All deads should be removed at the end of a show.

Counterweights Loading

Gallery Access

- Keep the gallery clear of obstructions and trip hazards. All weights should be stacked neatly against the PS railing.
- Each weight weighs 10kg. Each produces 5kg of lift on the bar.
- When you are on the gallery you are working at height – all tools should have lanyards attached to either your belt or the gallery and no loose items should be left on any surface.
- Your escape route is down the ladder to counterweights, down the ladder to stage, and across stage.
- Do not stack weights in the area marked with white tape by the trap door.

Before Loading

- Ensure the counterweights gallery is clear around the cradle you are loading.
- Ensure the trap door to the gallery is closed before loading.
- Only ever load when instructed to do so by a TR who is onstage.
- Ensure that all stage users (except for those in the PS wing) are wearing hardhats before loading.
- Loading should always take place in quiet conditions so that there is a clear line of communication between the TR and loading gallery.
- If the TR tells you to stop at any point while loading stop immediately.
- Never remove the base weights in the cradle (those below the yellow weight).
- Never load more than 50 weights (500kg) into a cradle.
- Bars that are in for loading should never be cradle heavy. When loading, ensure that the bar you are loading has sufficient weight on it before starting to load the cradle. When unloading, ensure that you have fully unloaded a cradle before starting to remove weight from the bar. Stage weights should be added to the bar using chains to assist keeping it bar heavy during loading/unloading. Remove these before flying the bar.

Loading Procedure

1. Receive instructions from TR. This should be expressed as “Load counterweight X to Base +Y”, where Y is the number of weights to add above the yellow base weight.
2. Confirm the instructions you have received by repeating the call back to the TR. **Check that you have the counterweight number and number of weights correct.**
3. Check with your TR that the counterweight gallery is clear of people, and the area of stage from the OP edge of the pros arch to the OP wall is clear of people. This is often abbreviated to the call ‘Am I clear?’
4. Carefully load or unload the counterweight to the specified amount. To load safely:
    a. Lift one weight, and kneel beside the counterweight cradle.
    b. Rotate the weight 90 degrees so its shortest edge is oriented upwards (its smallest face should be facing towards you).
    c. Slide the weight through the long vertical gap in the front of the cradle until it rests on the weight inside.
    d. Move one hand so it reaches around the side of the cradle and grips the counterweight from on top. (Make sure you still hold onto the weight with one hand during this).
    e. Carefully rotate the counterweight until it is parallel to the weights in the cradle.
    f. Lower the weight into the cradle.
5. To unload perform the same procedure in reverse, making sure to keep both your hands on one side of the control rope.
6. Call down to stage to confirm what you have done. Make sure to call the counterweight number and how many weights above base it now has in its cradle.

Flying Set

Dynamic Loads

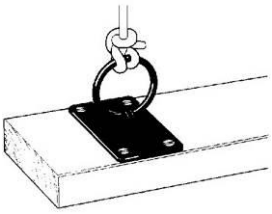
- During some Counterweight use, e.g. rigging a lighting bar, the full load of the rigged items is always on the bar. This means the cradle can easily be loaded to balance the bar's weight and flown evenly throughout the fly tower. As the weight on the bar does not change, we call this a static load.
- However, some loads change during flight as some of their weight is taken by the floor when fully flown in. E.g. most of a curtain's weight is taken by the floor when fully in as it rests on it, but as it is flown out, more of the curtain's weight is taken by the counterweight system until the curtain no longer touches the floor, at which point its full weight is taken by the counterweight. As this weight changes as the bar rises, we call it a dynamic load.
- Counterweights with dynamic loads should always be loaded to balance the full weight of the rigged item (i.e. when the bar is fully flown) as this means they are in weight for the duration of the production and can be flown smoothly during performance.
- Dynamic loads need to be treated with caution as flying them requires deliberately flying a bar temporarily cradle-heavy. In some cases this is not a problem as the amount of weight on the bar is low enough that the counterweight operator can control the ascent on their own.
- For large dynamic loads, however, a technique called **overhauling** should be employed.

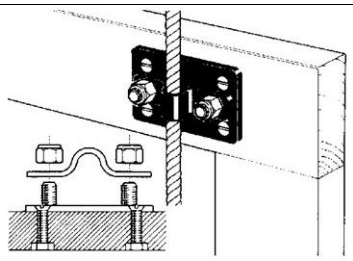
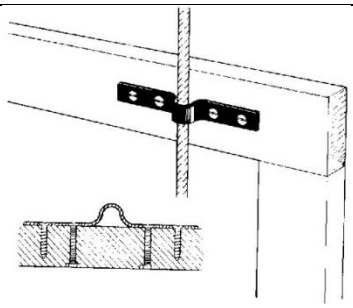
Overhauling

- Overhauling is the process of putting hauling ropes over a bar and then having stage users pull on or hang on them to add more weight to the bar during its ascent. As the bar rises and more of the weight of the item is taken by the bar, the overhaulers apply less force to it, until the item is off the floor at which point the hauling ropes can be removed.
- Overhauling should always be coordinated by the TR.
- Everyone onstage during overhauling should wear hard hats.
- The stage should be silent during overhauling to ensure easy communication between counterweight op and stage.
- The hauling ropes should always be put on the inside of the counterweight bar's wires, so they cannot slip off.
- The number of stagehands needed for overhauling varies, but a good rule of thumb is one person for every eight weights, plus one (possibly the TR) to assist with removing stage weights from the bar. There should never be fewer than two people overhauling (with a hauling rope each) at a time.
- Everyone involved in hauling should be instructed on what they need to do. Importantly they should be told not to release the hauling ropes unless instructed.

- Overhauling procedure:
    1. TR ensures that the bar has sufficient stage weights hung on either side of the bar.
    2. TR instructs loading gallery to load the cradle to the rigged item's full weight when flown.
    3. Once loaded to the correct weight, TR instructs hauling ropes to be placed over the bar (on the inside of the bar's fixed flying wires), and stagehands to station themselves two per hauling rope (one either side of the bar).
    4. TR instructs hauler stagehands to apply their weight to the rope.
    5. TR instructs other stagehands to remove the stage weights from either side of the bar.
    6. TR instructs counterweight operator to release the brake and carefully allow the counterweight to fly up slowly.
    7. TR monitors the process, instructing the hauler stagehands to apply more or less weight as it rises. If the item begins to move very quickly upwards, the counterweight operator should be ready to brake the counterweight at the TR's instruction or their own discretion.
    8. Once it is fully flown, the TR instructs the counterweight op to test if the item is in weight. If it is in weight, the item is successfully flown and haulers can be removed.
    9. If it is not in weight, the bar should be returned to stage using the hauling ropes, and the number of weights in the cradle adjusted accordingly. Then the flying process should be repeated.
- During this process the TR should not be involved in hauling, but should be able to watch the process and instruct or stop it as necessary.

FLYING ATTACHMENTS

Picture	Name	Use
Flown Item Attachments		
	Flying irons	• Screws into flown item and uses a metal lip to support weight of flown items. • Suitable for heavier items.
	Ring Plates	• Screws into flown item to support weight of flown items. • Only suitable for light items. • Where possible use a flying iron instead.
Connectors		
	Shackles (various sizes)	• To connect flying components together
	Caribiners	• To connect flying components together • Allows them to be detached pretty easily
	KONG Frogs	• To connect flying components together • Allows them to be detached and reattached very easily.
Wire		
	Flying wires	• Run from flown item to flying bar. • Available in different colour-coded lengths.
	Turnbuckles (a.k.a. strainers)	• Can adjust the length between the two loops by turning them. • Used to adjust the length of a flywire without derigging it. Particularly useful

Wire holders		
	Grummets	• Screws into flown item • To hold flying wires against tall flown items (e.g. flats) to prevent the top of the item falling forwards
	Klummets	• Screws into flown item • To hold flying wires against tall flown items (e.g. flats) to prevent the top of the item falling forwards
Bar Attachments		
	Bar straps	• Wrap around a bar to allow flying wires to hang from it.

Rigging Electrical Equipment

Rigging Electrical Equipment

- All rigged items require two points of attachment: a primary and secondary point of attachment. The primary point of attachment is usually a hook clamp, the secondary is usually a 'safety chain'.
- **Before rigging an item, you should check that the bolt attaching the primary attachment to the item is secure, and that the item has a secondary.**
- **Additionally, check that any plugs or cables running to the item are not damaged – you should not be able to see any coloured wires inside the black cable sheathing.** If they are damaged, take that item out of service and leave it beside the Technical Office with a note saying what is wrong with it.
- Before rigging an item, check that the green sticker signifying its last electrical (or 'PAT') test is within date. If it is not, take this item out of service as with exposed wiring above.
- Then:
    1. Hook the primary attachment over the rigging bar and tighten the wing bolt as tight as you can by hand.
    2. Loop the secondary attachment around the rigging bar and attach the carbine hook to the safety bond, so it forms a loop around the bar that passes through the rigged object.
        - If you are rigging a light make sure the secondary passes through its 'yoke'.
    3. Lastly, connect any electrical cabling to sockets or extension leads.
- This order is important so that the item doesn't fall while you are attaching the cabling.

Lighting Bridges

Access to the Bridges

- Do not lean out of the bridge, or sit on the edge of the bridge. Always keep your centre of gravity within the bridge's walkway.
- Keep the bridge tidy and clear of obstructions and trip hazards. In particular cables should be left so they do not impede walkway.
- **You must** safety chain any lanterns left unrigged on the bridges to the railing at the back of the bridge.
- Rigging should only take place under full white workers.
- Wherever possible passing lights up and down from the roof void catwalk should be done with the assistance of a second person.
- When working on the bridges you are at height, so usual working at height guidance applies (e.g. tools on lanyards, no loose items on surfaces or in loose pockets).

Rigging on the Bridges

- The front half of the auditorium should be kept empty while any rigging overhead is occurring. You should set up warning signs at row I on both sides of the auditorium and by the PS auditorium entrance to advise users not to enter.
- Rigging any objects in excess of 15kg in weight onto the bar should not be done without additional risk assessment. Notably a second person or a pulley system should be used to assist.
- Any non-standard rigging, i.e. rigging that does not attach directly to the bridge rigging bar, must be approved by management following the completion of a risk assessment.
- When rigging lanterns you should either:
    1. If the safety chain is long enough, attach it to the rigging rail before rigging the lantern using the hook clamp.
    2. If the safety is not long enough, use two hands to firmly hold the lantern while hanging it on the rail, and keep one hand on it while tightening the wing bolt.
- Where possible insert any gel or frost into the front of the lantern before it is rigged to avoid reaching out over the auditorium.

Followspotting

- Followspot operators should never lean out of the bridges to guide their followspots. They should remain behind the rigging railing at all times. **Followspot scopes are available to assist with this – ask the Technical Manager**.
- **Absolutely no loose items are permitted to be on the bridge while the house is open**. Any items in loose pockets should be removed and placed into the boxes provided.