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2. Multiply the weights by the longitudinal, transverse and vertical CGs to obtain moments.
3. Total the weight and moment columns.
4. Divide each total moment by the total weight to obtain the final CGs for this condition.
5. The total weight corresponds to Displacement on the Table of Hydrostatic Properties. Find the closest match in the correct column.
6. Read across on the same line to find mean draft, LCB, KML, and KMT. Enter these numbers in the Loading Condition Form.
7. Follow the instructions on the Afloat Calculation Form to determine the actual KG of the condition.
8. From the Maximum Allowable KG Curve, find the KG value that corresponds to the mean draft and enter it. Complete the calculations to determine trim, heel and jacking loads per leg.
9. Copy the weights and moments to the Elevated Calculation Form.
10. Follow the instructions on the form to calculate the load on each leg.
11. Sign, date and file the forms.

IN NO CASE SHALL THE TOTAL WEIGHT BE PERMITTED TO CREATE A DRAFT IN EXCESS OF THE ALLOWABLE LOADLINE OR EXCEED THE LIMITS OF THE APPROVED KG CURVE.

4.5 AFLOAT LOADING FORM

Insert form

4.6 ELEVATED LOADING FORM

Insert form

4.7 INSTRUCTIONS FOR PRE-TESTING THE SOIL

1. If the bottom is known to be soft or no data is available, it is possible to "pre-test" the soil with the hull in the water.
2. Touch down the legs and jack up until about 1' of the hull is still in the water.
3. Copy the weights, longitudinal moments, and transverse moments from the Loading Form.
4. Relocate the deck load, if necessary, to the best positions for elevated operations.

DO NOT EXCEED THE JACKING LIMIT PER LEG.

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5. Keep the load distributed as evenly as possible on the 3 legs.
6. Keep the hull level and wait 20 – 30 minutes after all settling has stopped.

4.8 INSTRUCTIONS FOR PRELOADING

7. Copy the weights, longitudinal moments, and transverse moments from the Afloat Calculation Form.
8. Relocate the deck load, if necessary, to the best positions for elevated operations.
9. Load each leg to the required load for the anticipated wave height.

DO NOT EXCEED THE HOLDING LIMIT PER LEG.

10. Keep the load distributed as evenly as possible on the 3 legs.
11. Keep the hull level and wait **at least one hour** after all settling has stopped. Vessel Master may decide to hold the preload longer if conditions warrant.
12. Once settling has stopped, **dump all seawater (preload and ballast tanks)** before jacking up to working air gap.

4.9 INSTRUCTIONS FOR ELEVATED OPERATIONS

1. Copy the weights, longitudinal moments, and transverse moments from the Loading Form.
2. Relocate the deck load, if necessary, to the best positions for elevated operations.

DO NOT EXCEED THE HOLDING LIMIT PER LEG.

3. Keep the load distributed as evenly as possible on the 3 legs.

4.10 SAMPLE CALCULATION – AFLOAT WITH MINIMUM VARIABLE**Insert form****4.11 SAMPLE CALCULATION – ELEVATED WITH MINIMUM VARIABLE AND PRELOAD****Insert form****4.12 SAMPLE CALCULATION – AFLOAT WITH MAXIMUM VARIABLE****Insert form****4.13 SAMPLE CALCULATION – ELEVATED WITH MAXIMUM VARIABLE AND PRELOAD****Insert form****4.14 TABLE OF HYDROSTATIC PROPERTIES****Insert form**

5. MOVING THE VESSEL

If possible, moves should always be conducted when good weather and calm seas are predicted for the **duration of the move**.

5.1 SAFETY OF ONBOARD PERSONNEL

Vessel Master shall ensure that all identified risks to vessel and onboard personnel are reduced to the lowest possible level prior to the move.

5.1.1 Underway

- Personnel shall remain inside the quarters unless specifically authorized by the Vessel Master to perform a duty outside the quarters (i.e. check the engine room).
- In the event that a crewmember is instructed to work outside the quarters while the vessel is underway, said crewmember shall wear a life jacket and the appropriate personal protective equipment at all times.
- Movement throughout the quarters shall be held to a minimum while the vessel is underway.
- No person shall enter the pilothouse without prior approval from the Vessel Master.

5.1.2 Jacking Operations

During jacking operations, all onboard personnel shall observe the following safety requirements:

- Report to the uppermost deck with life jacket properly donned. Remain there until advised to stand down by the Vessel Master.
- Jacking Up Operations:
 - ◇ Remain on uppermost deck until the Vessel Master has indicated that it is safe to proceed with work activity (during preloading operations, follow the instructions of the Vessel Master).
 - ◇ No person shall enter the work area – or instruct anyone else to enter the work area – without prior approval of the Vessel Master.
- Jacking Down Operations:
 - ◇ Remain on the uppermost deck until advised to stand down by the Vessel Master.
 - ◇ When advised to stand down by the Vessel Master, follow the underway safety instructions above.

5.2 LOADING & SECURING CARGO

5.2.1 Responsibility

Vessel Master is at all times responsible for the placement and securing of cargo carried onboard the vessel.

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- ◇ Vessel Master shall continue to monitor the situation. Keep the Port Captain informed as to details and location of the vessel.
- ◇ Crewmembers shall stand by to assist the Vessel Master as needed.

5.6 COMING ON LOCATION

Vessel Master shall:

- Consider wind and current when making final approach to location.
- Exercise caution when maneuvering with the legs lowered. **DO NOT DRAG THE PADS.** Dragging a pad could cause a leg to bend or break, while pivoting on a grounded pad could damage the rack and/or pinions.
- Exercise caution if the location has a **hard bottom**. In which case, it is recommended that the maximum combined sea (total of maximum swell height and maximum wave height) not exceed 3 feet.

5.7 JACKING UP ON LOCATION**5.7.1 Emergency Instructions**

- See **Section 7 Loss of Power to Jacking System**
- See **Section 7 Punch Through**

5.7.2 Safety Precautions

Vessel Master shall:

- Pay special attention to roll and pitch if the bottom must be engaged during darkness (due to the lack of a horizon).
- Never leave the jacking controls unattended while jacking is in progress.
- Ensure that legs and pinions have been properly greased.
- Check and confirm communications with the engine room.
- Ensure that all onboard personnel are at their stations with lifejackets properly donned.
- Ensure that jacking engines and generators are operational and functioning properly.
- Until Jacking operation is completed:
 - ◇ Equipment on deck shall remain secured.
 - ◇ Doors (except pilothouse) and hatches shall remain closed and dogged.
 - ◇ Pilothouse doors shall remain open.
 - ◇ Personnel shall remain on the pilothouse deck wearing life jackets.



5.7.3 Jacking Up to Preload Level

Vessel Master shall:

1. Energize jacking control and commence lowering the legs. Lower the legs simultaneously.
2. Observe pressure gauges. Pressure will increase as pads make contact with bottom. Once the legs touch bottom, use individual leg jacking control to keep the hull level.
3. Should one pad penetrate more than the others--STOP JACKING. Jack one leg at a time until vessel is back to level.
4. After all three pads have engaged the seabed, and the hull is leveled out, wait for the vessel to settle down, approximately 5 minutes.
5. Check pressure gauges.

ELEVATE THE HULL APPROXIMATELY 1 FOOT ABOVE THE ANTICIPATED WAVE CREST TO PRELOAD. DO NOT LET THE WAVES HIT THE HULL DURING PRELOADING.

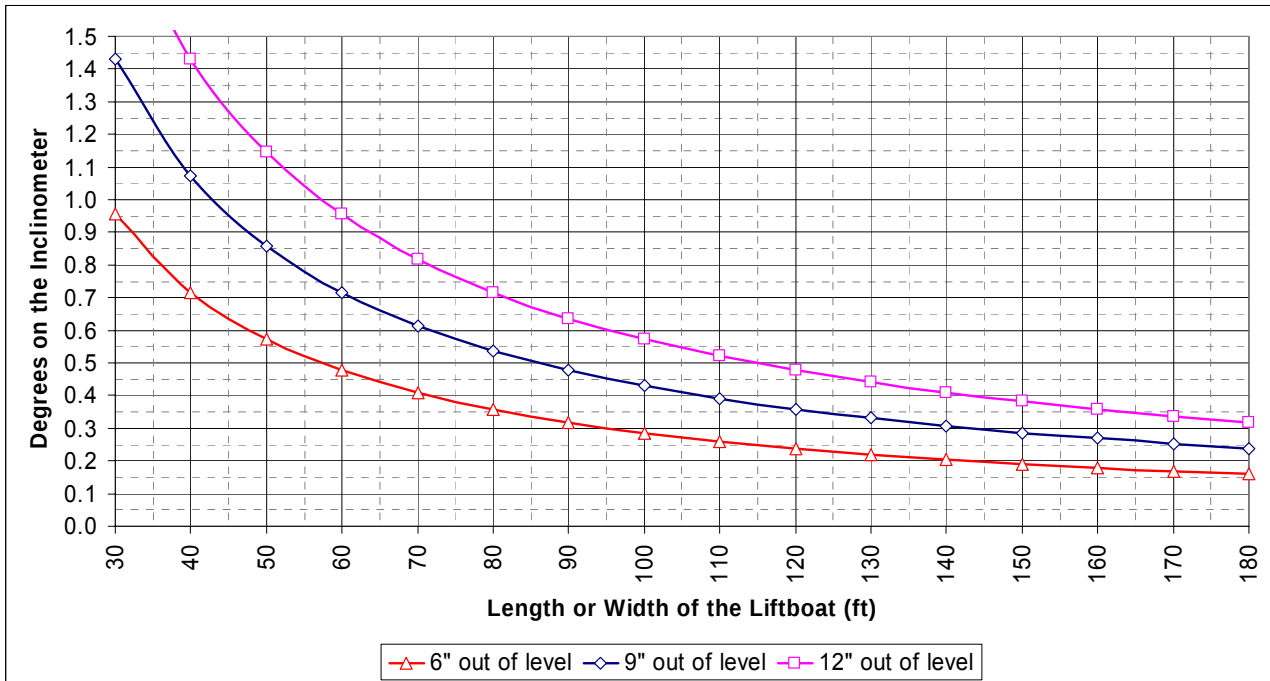
5.7.4 Preloading

Vessel Master shall:

1. Keep the hull leveled out (one foot above the water). **Remain constantly alert for rapid or uneven settling.**
2. If the vessel develops a list, slowly lower the high side of the vessel and correct the list.

While preloading, do not let the heel or trim exceed 6" out of level without correction.

Figure 5-1 Elevated Level Limit



- When using a bubble inclinometer to check the level of the vessel elevated, refer to **Figure 5-1 Elevated Level Limit**. If the transverse inclinometer exceeds the curve at the width of the hull, the liftboat is out of level more than 6". If the longitudinal inclinometer exceeds the curve at the length of the hull, the liftboat is out of level more than 6".

Continuous or excessive settling usually indicates a soil failure problem, such as scouring; in which case, Vessel Master shall consider further preloading or moving the vessel.

- Remember that residual water counts as VDL. **For example: three (3) inches of water in the bilges will weigh approximately 1 ST, and six (6) inches will weigh approximately 2 ST.**

5.7.5 Jacking Up to Elevated Level

Vessel Master shall:

- Ensure that the dump valves have been closed (if vessel is so equipped). Finish the stability calculations as required. Check the weights and CGs before elevating the hull.
- If all is satisfactory, ensure that all onboard personnel are at their jacking stations with lifejackets properly donned and prepare to jack up.
- Jack up to the desired air gap, keeping the hull leveled out (*jack down on the high side*) all the way.
- When satisfied that the vessel is level and stable (*no further penetrations*) shut down the jacking equipment and authorize normal work operations to begin.

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- ◇ Check the filters
- ◇ Check the engines, motors and pumps
- 3. When all is satisfactory, restart the engines and load them properly.
- 4. Check with the Port Captain as needed.
- 5. Conduct an accident debriefing / safety meeting.
- 6. Prepare an incident report.

7.5 PUNCH THROUGH

To minimize the possibility of equipment damage and injury to personnel, Vessel Master shall elevate the hull approximately 1 foot above the surface of the water to preload.

Punch through occurs when a thin layer of strong seabed overlies a weaker layer of soil, and a pad(s) suddenly breaks through into the weaker layer and begins to sink. The pad will continue to sink until stopped by adequate resistance at a deeper penetration or by increased buoyancy when the hull enters the water. This sudden penetration can cause a sharp inclination of the vessel, resulting in leg fracture, structure distortion or worse.

Generally speaking, there are two types of punch through: one that occurs during preload operations; and one that occurs after the vessel has been jacked up for some time. In either instance, once the vessel has stabilized after punch through, Vessel Master shall take immediate corrective actions.

7.5.1 Punch Through While Preloading

If punch through should occur while in the process of preloading, once the vessel has stabilized the Vessel Master shall:

1. Bring the vessel to a horizontal position by lowering the high side, paying close attention to the legs and jacking equipment for possible malfunction.
2. Visually Inspect legs and jacking equipment for obvious damage.
3. Check voids for water and, if circumstances permit, pump the tanks empty.
4. Consult with the Port Captain for assessment of damage and a further course of action.
5. Conduct an accident debriefing / safety meeting.
6. Prepare an incident report.

7.5.2 Punch Through While Elevated

If punch through should occur after the hull has been jacked up for some time, once the vessel has stabilized the Vessel Master shall:

1. If possible, bring the vessel to a horizontal position by jacking down the other two legs. **Pay close attention to the jacking equipment and legs for possible malfunction.**

2. Visually Inspect legs and jacking equipment for obvious damage.
3. Consult with the Port Captain for assessment of damage and a further course of action.
4. Conduct an accident debriefing / safety meeting.
5. Prepare an incident report.

7.6 DAMAGE TO A HULL COMPARTMENT

7.6.1 Collision and External Damage

The vessel is designed to withstand severe damage and the resulting high angles of heel and trim. However, high angles of heel and trim only increase the danger of shifting weight, so it is imperative to bring the vessel back to an acceptable heel and trim as quickly as possible.

Damage control procedures set in concrete would be impractical to say the least. The correct action in one case could be detrimental in another. However, four basic action steps are relevant (1 thru 4 below) in all cases of damage:

1. Determine the extent of the damage.
 - ◇ Once damage occurs, the Vessel Master shall sound the appropriate alarm and muster personnel. Ensure that all persons onboard are accounted for.
 - ◇ Determine which compartments are affected and the cause of flooding.
 - ◇ Notify the Port Captain as soon as possible.
2. Control and minimize flooding.
 - ◇ Seal off the compartment(s) being flooded. Close down all access doors, ventilation trunks, and bilge/ballast lines serving the affected compartment(s).
 - ◇ Ensure that all other watertight closures from the main deck down are closed and secured.
3. If possible, jack up.
 - ◇ Jack the hull completely out of the water, if possible.
 - ◇ Or jack the hull partially out of the water, if possible.
4. If jacking up is not possible, return the hull to an acceptable heel and trim. These are the available options. Vessel Master is expected to understand how the damaged vessel will react when any one of the following options (or combination of options) is executed:
 - ◇ Ensure that flooding has been controlled.
 - ◇ Lower the leg nearest the damaged compartment. This will increase buoyancy in way of the leg and reduce the vessel's VCG.
 - ◇ Dump potable water or ballast nearest the damage, if possible
 - ◇ Cross-cradle the crane boom nearest the damage.
 - ◇ Transfer potable water opposite the damage, if possible.
 - ◇ Shift deck load away from the damage, if possible.
 - ◇ Counterballast opposite the damage (consider only as a last resort).