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# Packing the MagAO-X Table at LCO for Shipment

XWCL

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This procedure describes how to pack MagAO-X optical table for shipment.

Estimated Time to Complete: 2 hrs

This document can be downloaded as a PDF: [Instrument Rack Packing at LCO](#)

## 1 Initial Conditions

- The optical table is in the cleanroom, on the handling cart, fully disconnected from the control electronics.

## 2 Preparations

- Secure all optics for transport.
- Check that all components on table are securely fastened.
- Install dessicant.
- Shrink-wrap the instrument.
- Install the reflective blanket for solar shielding.

### 3 Prepare the Box.

- Move the empty box and shipping frame into the unpacking room with the forklift, placing it on 4 furniture dollies.



*The instrument box is brought to the unpacking area with the forklift.*



*The instrument box being set down on dollies with the fork lift. Note the placement and orientation of the dollies.*

- Move the box towards the inside garage door, and stage 4 more dollies to accept the lid.



*Box in position to have the lid removed.*

- Remove the front panel from the box, place out of the way (e.g. outside).
- Remove all bolts holding the lid to the pallet
- Place the straight extension on the lifting fixture, and place it in the box-lid position.
- Attach the lifting fixture to the lid.
- Lift the lid with the crane, and set it down on the dollies.



*Box lid off, on dollies.*

- Move the pallet into the cleanroom to make room to maneuver the lid.
- Then move the lid out of the way, e.g. outside on the lift.

## 4 Installing The Instrument On The Frame

- Move the pallet and frame towards the front of the unpacking room.
- Bring the instrument and cart out of the cleanroom.

**NOTE: position the cart so that the taller heavier side of the instrument will set down on the side of the frame with the most wire-rope isolators.**

- Install the scale between the load spreader and the crane, and place the lifting fixture in the instrument+cart position.
- Install the triangle stabilizing rope ratchets, leaving them loose.



*Preparation of the lifting fixture.*

- With the crane, carefully position the load spreader over the table.

**NOTE: be sure to guide both ends of the load spreader so it does not contact the instrument**

- Attach the load spreader to the cart. Two shackles are used to extend the length. The hooks should be placed opening up.



*Use two shackles for correct length.*



*Hooks must open up on the cart to get the correct length.*

- Lift the instrument+cart, which weigh **1920 lbs**, until all 4 wheels are off the ground. If it is out of balance, it will be necessary to manually correct.



*Lifting the instrument on its cart.*

- Adjust the load spread to find the best balance.
- Tighten the triangle stabilizing rope ratchets.
- With a person on each end stabilizing using the cart handles, lift the instrument to sufficient height to clear the shipping frame.
- Carefully roll the pallet and frame under the instrument
- Lower the instrument slowly to just touch the frame, but do not unload the crane.



*The instrument on the frame.*

- While the instrument is still supported by the crane, start bolts at each corner to guide the instrument down.
- Lower the instrument until half the weight is off the crane.
- Start all bolts, including installation of the Emerson Clamp base plates.
- Fully lower the instrument, such that the crane is still supporting the cart weight of **320 lbs**
- Tighten all bolts holding the instrument to the shipping frame.





*Tightening the bolts.*

- Remove the 8 bolts holding the cart to the table.
- Lower the cart so that it rests on the pallet.



*The cart lowered onto the pallet.*

- Disassemble the cart, moving the pieces to storage area.
- Install the Emerson Clamps.
- Arm all drop-n-tells, and install the data loggers.

## 5 Install the Lid and Door

- Move the pallet and instrument on the dollies back into the cleanroom to make space for the lid
- Bring the lid back into the unpacking area and position it to be lifted on. The open side goes towards the MagAO-X label on the instrument.
- Put the load spreader back in the position to balance the lid, and attach it with the crane to the lid.
- Lift the lid, and roll the instrument under the box.
- Set the lid down on the pallet



*MagAO-X on the shipping frame inside the box.*

- Install the bolts along the bottom of the lid, securing it to the pallet.
- Bring the front door panel back inside, and lift it into position.
- Bolt the lid on.
- Remove the lifting eyes from the box lid and stow them on the lower left inspection panel.