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# Removing MagAO-X from the Telescope

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This procedure describes how to remove the MagAO-X instrument on the Magellan Clay Telescope.

Estimated Time to Complete: 2 hours

This document can be downloaded as a PDF: [Removing MagAO-X from the Telescope](#)

## 1 Initial Conditions

- [ ] Instrument on Magellan Clay Nasmyth Platform, operating.

## 2 Preparations

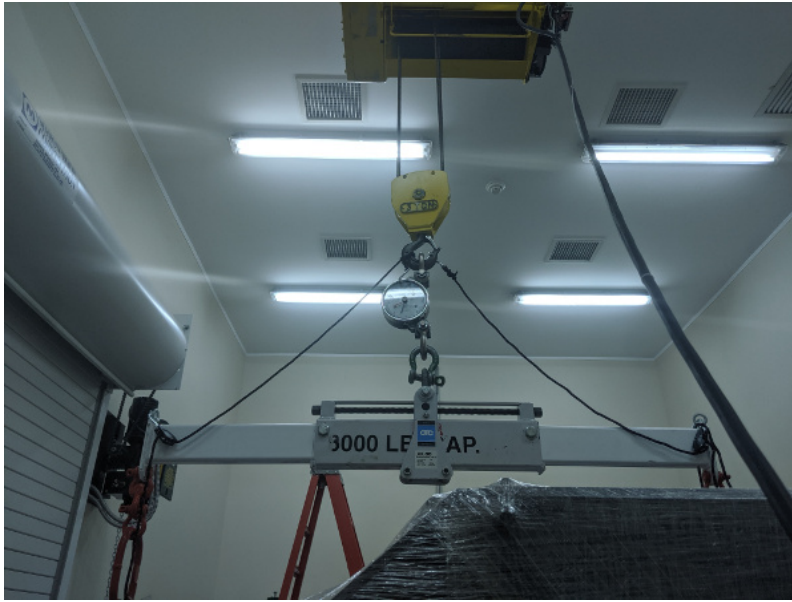
- [ ] Shutdown MagAO-X
- [ ] Turn off table legs and remove air connection
- [ ] Remove all cables
  - See detailed procedure for removing 2K DM cables
- [ ] Electronics Rack
  - [ ] Ensure that roll-out shelves are restrained

- ☐ Close and lock doors
- ☐ Tape keys down
- ☐ Instrument
  - ☐ Remove eyepiece
  - ☐ Remove bumpers and pusher hardware
  - ☐ Turn off blower, and remove hose
  - ☐ Tape over any exposed holes (from cables, etc)
  - ☐ Secure any loose cables
  - ☐ Shrink wrap the instrument
  - ☐ Install solar blanked over shrink wrap
- ☐ Cart and Rigging
  - ☐ Verify all cart hardware is in-hand
  - ☐ Verify two wire harnesses are in hand
  - ☐ Partially assemble cart, leaving one long side off
  - ☐ Store cart out of the way so table can roll into unpacking area

### 3 Rig Onto Cart

- ☐ Position the telescope so that the elevator has access to the NASE platform
- ☐ Lower table legs onto the casters by turning the 16 leveling bolts, and remove the metal pads
- ☐ Roll the instrument away from the telescope
 

**NOTE:** At least 4 people required, 2 to push, 2 to hold the cleanroom sides open
- ☐ Move the cart, currently with 3 sides, around the legs
  - **CAUTION:** be careful to not bump the legs with the cart
- ☐ Attach the 4th side of the cart
- ☐ Ensure that the 8 large bolts on the cart are snug but not tight
- ☐ Attach the lifting wire-harness to each side of the cart
- ☐ Attach the load spreader with straight extensions to the crane, using a crane scale



*The load spreader attached to the crane for lifting the cart*

- ☐ Place the load spreader in the center position (the cart is symmetric)
- ☐ Lift the load spreader, and position it over the instrument
- ☐ Being careful to not bump the instrument, lower the load spreader and attach the lifting harness D rings. Use 2x shackles to extend the length to reach the cart on the floor.



*Lifting harnesses attached with shackle extensions*

- [ ] Position a person at each corner of the cart
- CAUTION:** Do not allow the cart to bump the legs or the table uncontrolled
- [ ] Slowly lift the cart (**320 lbs**) until it is touching the bottom of the table



*The cart being lifted to the bottom of the table.*

- [ ] Install the 8 bolts attaching the cart to the table. Loosen bolts on the cart as needed.
- [ ] Once the cart is bolted to the table bottom, while **320 lbs** is still on the crane, tighten all cart bolts. Do not over-tighten, make 1/4 turn after the washers are no longer free. This is to avoid excessive stress on the table.
- [ ] Install the triangle stabilizing ropes between the crane hook and the lifting fixture IAW the below figure. Tighten, but do not cause them to pick the load.



*The triangle stabilizing ropes should be tight, but not become the lifting point for the load.*

**CAUTION:** be sure that the load spread does not hit the cart when being repositioned.

- [ ] Reposition the load spreader center to the instrument + cart position marked on it.
- [ ] Ensure that there is room to move the legs out from under the table, opening the garage door into the cleanroom if necessary.

- ☐ Position a person at each corner of the cart to stabilize it during the lift.
- ☐ Position two people to remove the legs from under the table
- ☐ Lift the table off the legs. The weight of the table + cart is **1920 lbs**
- ☐ Move the legs out from under the table.



*The cart and instrument ready to be set down on the wheels, with legs out of the way.*

- ☐ Set the cart down on its wheels.
- ☐ Move MagAO-X onto the elevator, and remove from the dome
- ☐ When cart is on concrete outside Clay, move very slowly to avoid excessive vibration



## 4 Transport MagAO-X To The Clean room

- ☐ Ensure that the lift gate at the summit has been adjusted for slow smooth operation as is done for the asm
- ☐ Push MagAO-X onto the lift-gate
- ☐ Raise the lift-gate to the height of the flatbed truck
- ☐ Move MagAO-X onto the truck, using the come-along



*MagAO-X will be loaded at the telescope using the lift gate, adjusted for slow operation as it is for the ASM.*

- ☐ Secure the instrument by strapping the cart down at 4 points as illustrated in the below figure.



*MagAO-X will be strapped to the Isuzu similarly to how the ASM is transported.*

- ☐ Slowly drive the truck to the cleanroom

- [ ] Back the flatbed truck up to the lift gate.
- [ ] Next, using the come-along, carefully move MagAO-X onto the lift gate.
- [ ] If the legs were not moved, return to the with the flatbed and move the legs to the telescope.

## 5 Install MagAO-X On The Platform

## 6 Transport Electronics

- [ ] remove the earthquake bar
- [ ] Move the rack to the lift gate, and load it on the pickup.
- [ ] place foam between the rack side and the truck to protect cable connectors



*The electronics rack has many delicate connectors on the side.*

- [ ] strap the rack securely to the truck





*The rack on a truck for transport.*

- ☐ drive the truck to the cleanroom
- ☐ unload the rack using the lift gate

## **7 Remove AOC from Control Room**

- ☐ power down AOC
- ☐ remove monitors and pack
- ☐ move AOC to cleanroom.