PROCEDURES FOR USING THE HISTORIC BRASHEAR 12" INCH REFRACTOR

Welcome to the historic Observatory at the University of Illinois and the Brashear 12- inch refractor. Please follow these procedures when operating this irreplaceable instrument.

There are six cardinal rules that must be observed each time you use the telescope:

❶ When opening or closing the dome slit cover, BOTH lens caps MUST BE ON

❷ Use ONLY the RED knobs to move the telescope.
Do NOT push or pull on ANY OTHER PART OF THE TELESCOPE!

❸ NEVER LET THE COUNTERWEIGHTS GET ABOVE TELESCOPE TUBE.

❹ When turning on the clock drive motor VISUALLY confirm that the motor is running.
NOTE PLACARD REGARDING MOTOR FAILURE TO START ON NORTH SIDE OF PIER.
CONTINUE TO MONITOR MOTOR OPERATION.

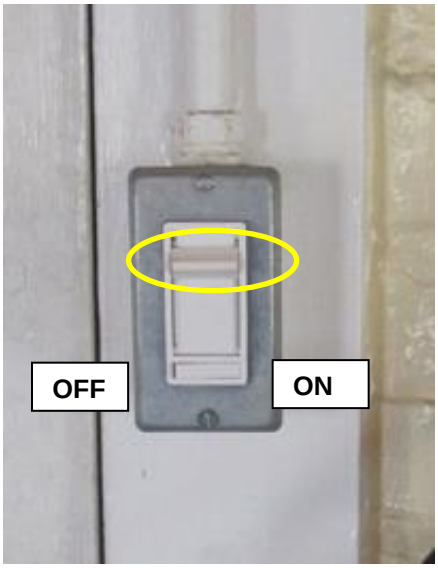
❺ Never leave the telescope unattended with the clock drive motor running.

❻ Before leaving the dome for the night reconfirm that each item
on the closing checklist has been completed.

I. Opening and Preparing to observe

Depending on how your card is marked, you will check out one of two key sets from the Astronomy Office. The CLUB key set has three keys. The key marked with OS opens the north outside door of the Observatory; the key marked 27 - 28 unlocks the Club Room, (Rm 28); the third key (AAAA3) unlocks the dome. The TA key set has two keys. The key marked with OS opens the north outside door of the Observatory; the key marked (AAAA1A) unlocks the dome, 124, 128, and the south outside door. **It is good practice to keep the keys in your pocket**. Once inside the building, make sure that the exterior doors are locked shut unless you are expecting or want visitors. **NOTE:** When you come in the north door it will either be unlocked (no key needed) or locked (key needed.) YOU CANNOT actually lock or unlock the door. A night watchman does that around 5:00 pm M - F. The OS key only allows you to enter but does not change the status of the lock itself.

The following items are listed in an efficient sequence. It is recommended that you use this order until you become more familiar with the equipment.



1. Upon entering the dome, check around dome for current condition. <u>If you are new to using the telescope the best way to do this is to verify that all the items on the CLOSING checklist have been completed</u>. If you find anything out of order please note it in your logbook entry.

NOTE: Check the **MESSAGE BOARD** for amendments to this document or temporary conditions

NOTE: The dome lights are operated by the dimmer switch next to the entry door. To turn the lights ON, press the right side of the toggle switch at the bottom; control the brightness with the slider. (Yellow oval)

2. SIGN IN and begin the LOGBOOK entry!
At minimum, please enter **your name,** the **time you arrive** and the **time you depart**, and **any issues** noted from your inspection in item # 1. . Any other items (what you viewed, seeing conditions, friends' names, etc. are up to you.)

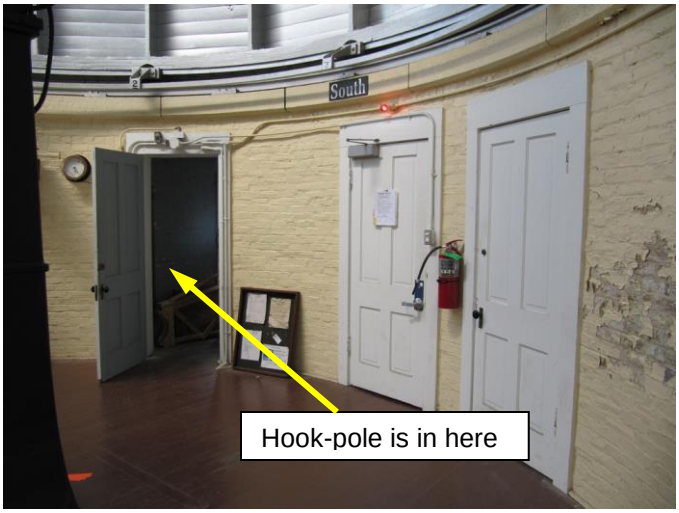
3. OPEN the NORTH BALCONY DOOR, THE DOME SLIT, WINDOWS, adjust SHADES.
This allows the dome interior to come to equilibrium with the outside.

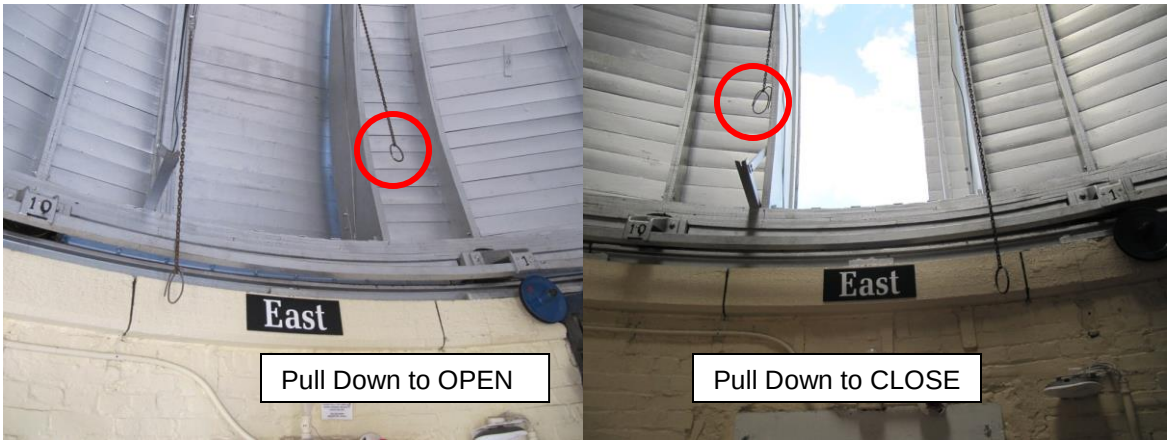


North Balcony Door. There are two deadbolt type locks on this door. When locked, the old one (near the door knob) should be in the approximate 5:00 / 11:00 o'clock position (see RED line) Both the old one and the new one (near the top of the door) are shown locked here. Both should be locked when you arrive and relocked when you leave.

The Dome Slit Cover. Open slit with a hook-pole located in 201 (the closet shown with the door open in the picture below.) Unfasten the ring from the retaining slot on the left side of the slit by pulling down and slightly out. Then pull down on the ring on the right side. If this is difficult, leave a note in the logbook so that it can be fixed. Please hang the pole in the closet after EACH use. Do NOT leave it hanging on the ring or just standing against the wall somewhere.

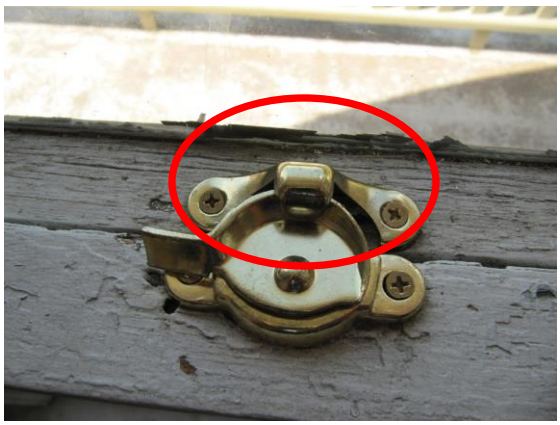
Maximum wind to open slit: 35 mph.





Dome Slit cover shown CLOSED, but NOT latched (on left) OPEN (on right)

The Windows. Open windows as desired. If it is breezy, you may choose not to open all the windows.



Shown locked; note lock “hood" over arc.

It is suggested that you KEEP THE INSIDE ACCESS DOOR CLOSED to prevent drafts and turbulence in the dome.

The Shades. If the window is closed, you may leave the shade down. If you open a window, however, you need to raise that shade so that it does not blow in the wind. Simply lift the shade and insert one end of the dowel into one of the eyelets and then slide the other end into the other eyelet. Try not to wrinkle the shade material.

CLOSED

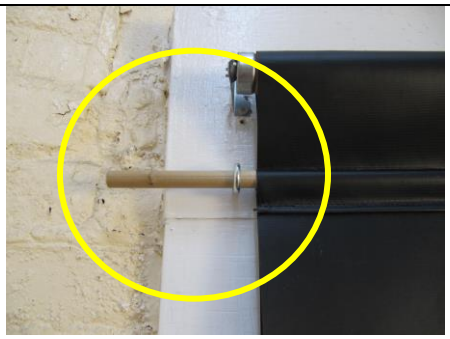


Fig. 2

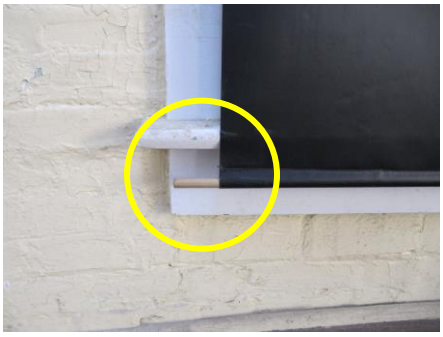


Fig 1

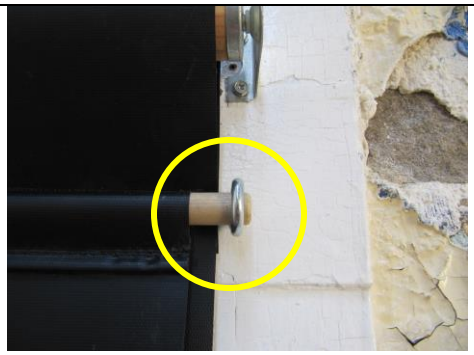


Fig. 3

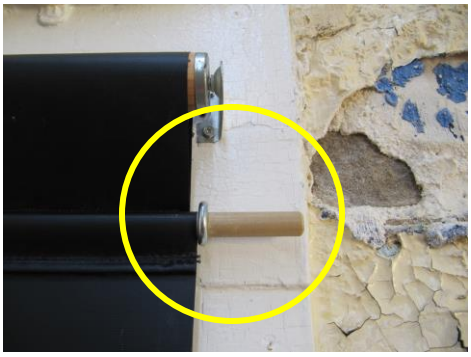


Fig. 4

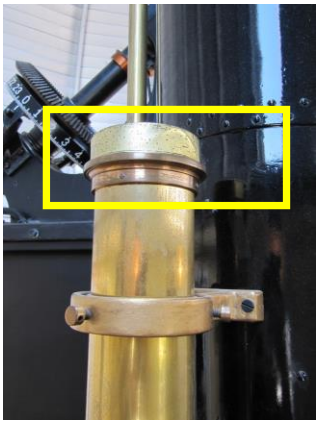
OPEN

Now is a good time to collect the eyepieces if you haven't already got them.
The dome can be coming to equilibrium while you are gone.

4. REMOVE THE FINDER SCOPE CAP.
Do **NOT** jump to reach it; use a chair or stool if necessary.

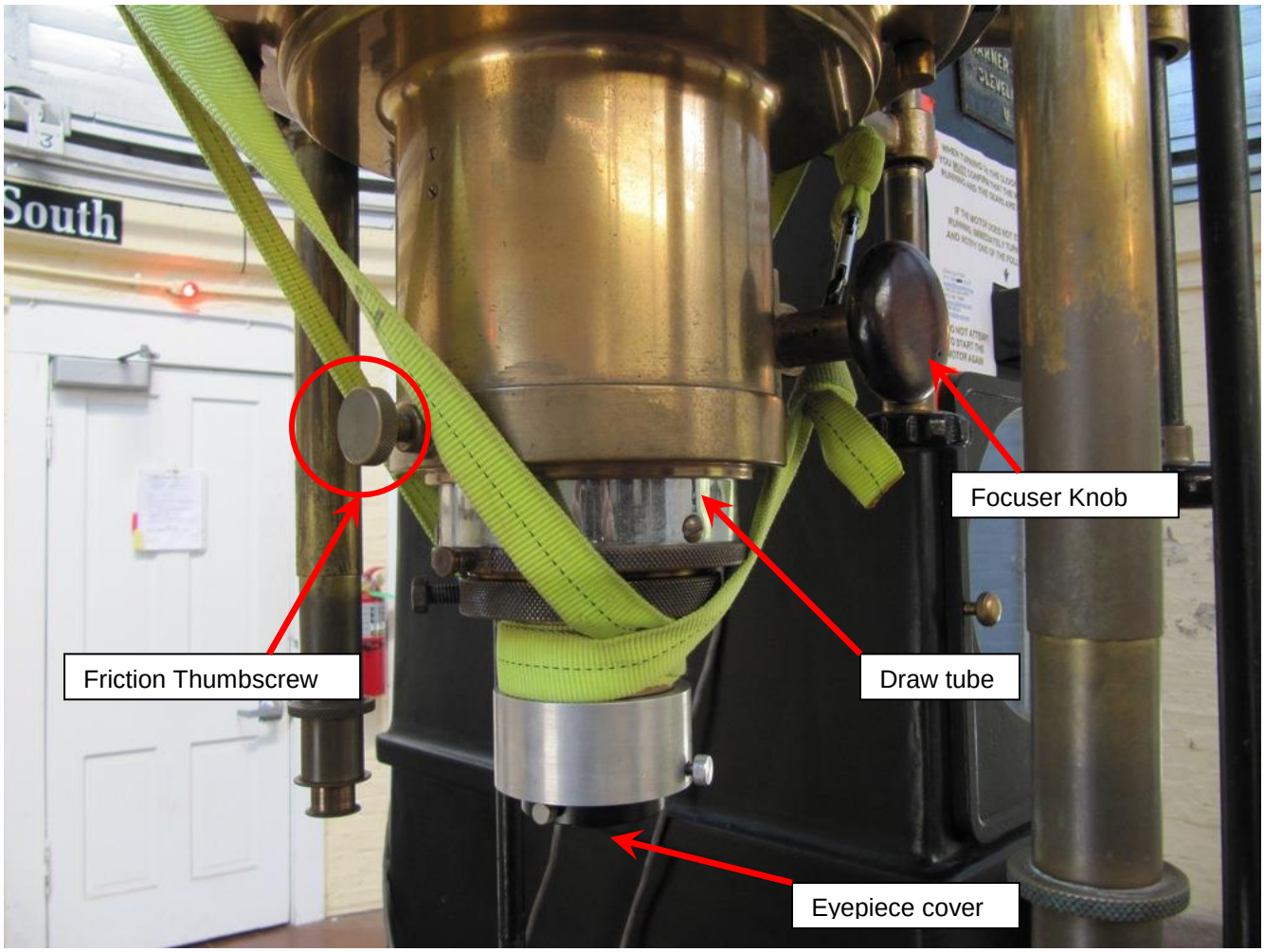
Grasp both sides and gently twist and lift.

When reinstalling the finder scope cap make sure it is pressed down level so that it sits squarely on the scope as shown.



5. REMOVE THE YELLOW FOCUSER SUPPORT SLING. Lift the silver drawtube to the full "UP" position and **GENTLY** tighten the Focuser Friction Thumbscrew. Tighten only until the tube does not move and no more. Do NOT overtighten. Remove the yellow storage sling by unclipping the carabiner. [If necessary, refer to the separate instruction sheet.]

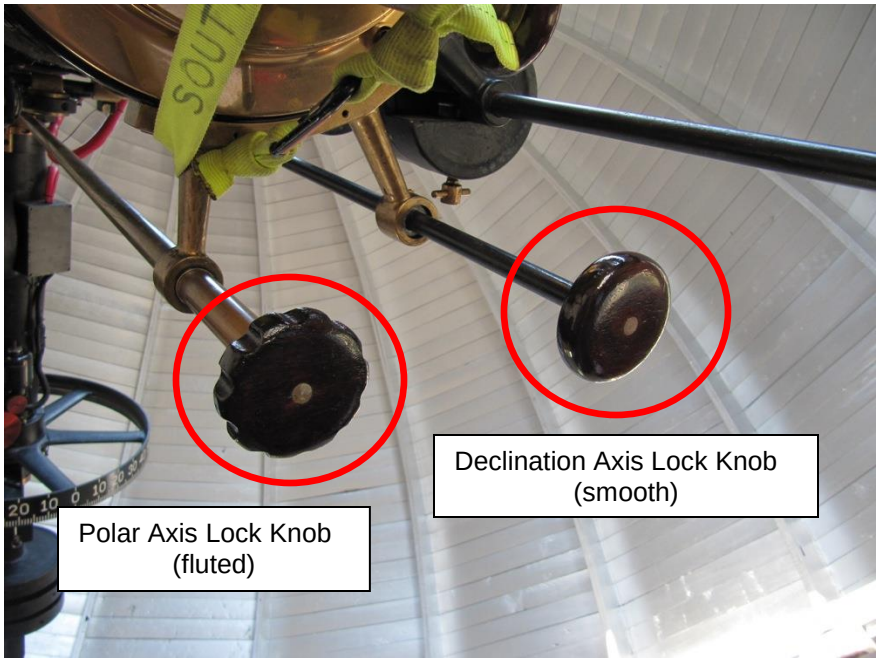
Study the installation so that you can properly reinstall it at the end of your session.



6. Check the balance of the telescope:

A) Unlock the telescope by turning the two locking knobs COUNTER CLOCKWISE as viewed from the eyepiece end of the telescope. For the (smooth) Declination axis lock, turn the knob ONLY until you feel it release; turn the (fluted) Polar axis lock turn the knob ALL THE WAY to its stop.

B) Check to see that the telescope is properly balanced by firmly pushing the telescope (away from the pier) and allowing it to react. It SHOULD COME TO REST on its own. If it does not, you may have to lock one of the axes while rotating around the other axis. Most of the time you should not have to relock axes until you are ready to track an object for viewing.

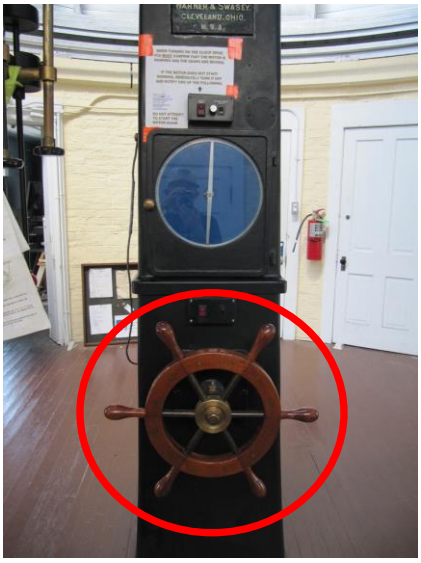


7. REMOVING THE PRIMARY LENS CAP.

Move the telescope to approximately 0 declination. If the telescope is UNBALANCED, lock the Declination knob.

Using the ship's wheel on the north side of the pier, rotate the telescope clockwise (westward) until the lens cap is within reach. Remove the lens cap by gripping both sides firmly and pulling evenly

Set pointer at 0 degrees.

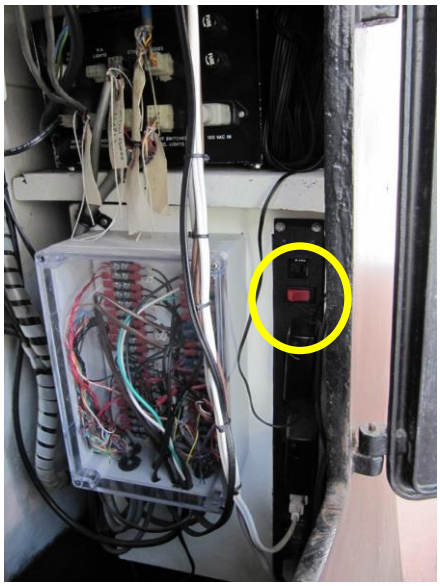


Turn wheel clockwise

Grasp opposite edges, wiggle and pull

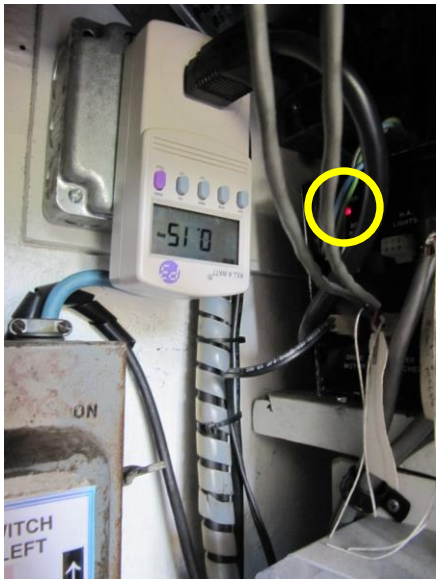
STORE BOTH LENS CAPS INTERIOR SIDE DOWN.

8. TURN ON THE POWER FOR THE TELESCOPE AND DOME. Find the door on the lower west side of pier. Open the hatch and locate the **RED** rocker switch on the power strip just inside the opening on the RIGHT. Turn this switch on. The switch and two other RED LEDS will illuminate. Also a small RED LED in the upper left corner of the pier will illuminate when the power is ON.



The red rocker switch

Three red lights



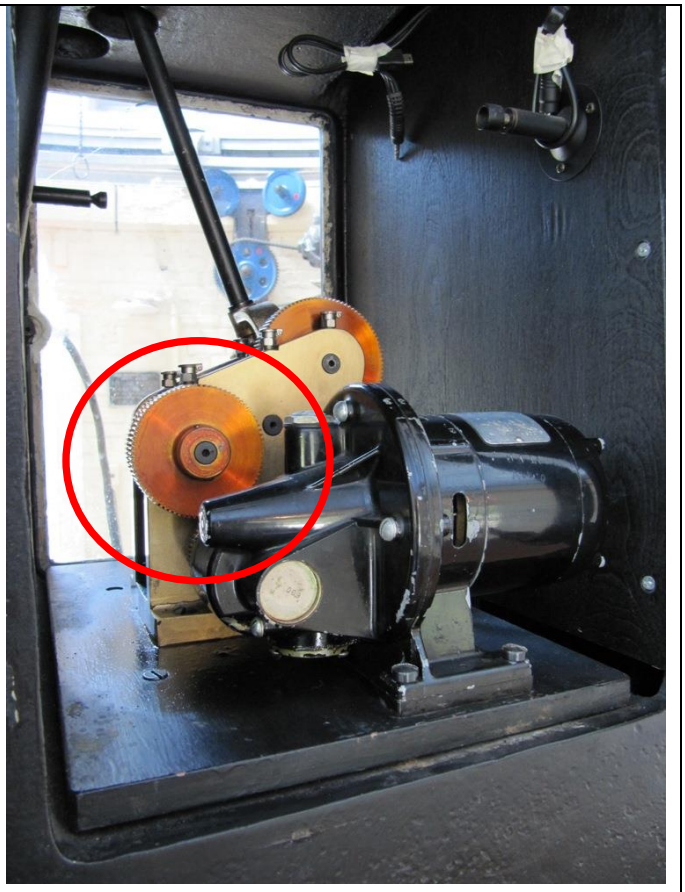
LED in corner

Make sure you count a total of four red lights before proceeding.

9. TURN ON THE DRIVE MOTOR (RED SWITCH) AND SETTING CIRCLE LIGHTS (BLACK SWITCH)

The two switches are located on the north side of the pier ABOVE the Sidereal Time dial

You **MUST watch the gear** in the **RED** circle **as you turn on the clock drive.** If it does **NOT** start immediately when you turn the switch on **TURN THE SWITCH OFF. YOUR SESSION IS OVER.** Report the problem to one of the EMERGENCY CONTACTS at the end of this document.



II. Using the Telescope to Observe

The CLUB eyepieces are stored in a plastic case in the basement Club Room (room 28), in the gray standing cabinet. Eyepieces for TA use are in room 124. Use care when changing them. Some of the eyepieces do not fit very tightly.

NEVER TOUCH OR CLEAN ANY OPTICAL SURFACE

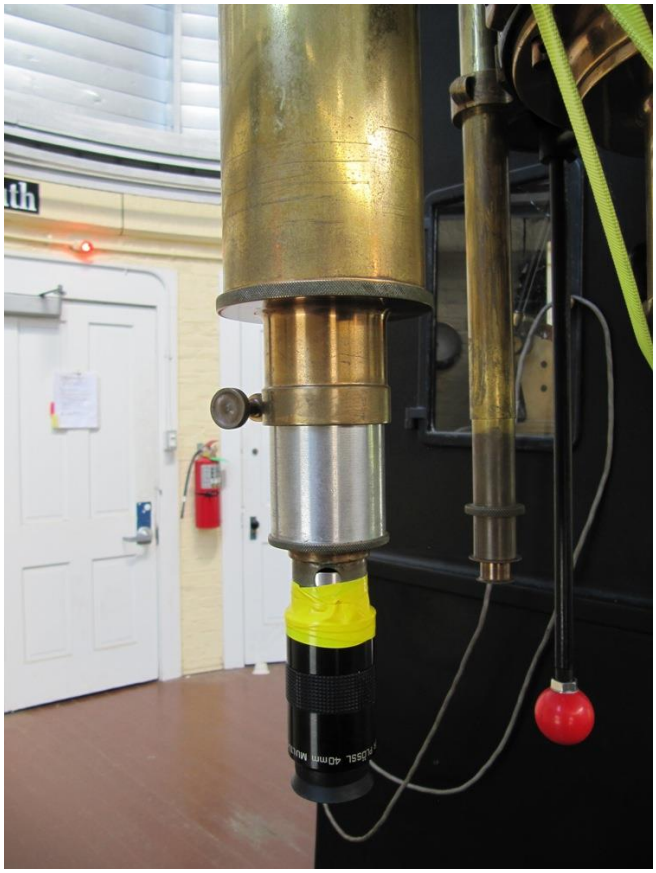
▶ **It is important to remember to UNLOCK the telescope before moving it and lock it again once the object has been located. Attempting to move the telescope with the axes locked can damage the clock drive gear train!!**

▶ **Always be aware of balance when releasing the telescope. If it becomes unbalanced, it could move by itself and hit the pier. Using a heavy eyepiece can, for example, cause a slight imbalance that might require locking an axis at times.**

▶ **Do not attempt to rebalance the telescope by moving any counterweights.**

▶ **NOTE: The telescope is nearly impossible to move near declinations +90; move it to +40 first.**

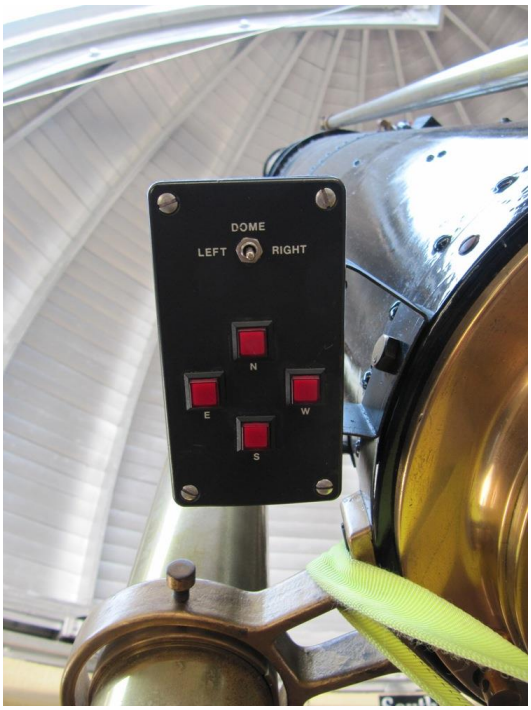
See the following pictures for additional information and assistance.

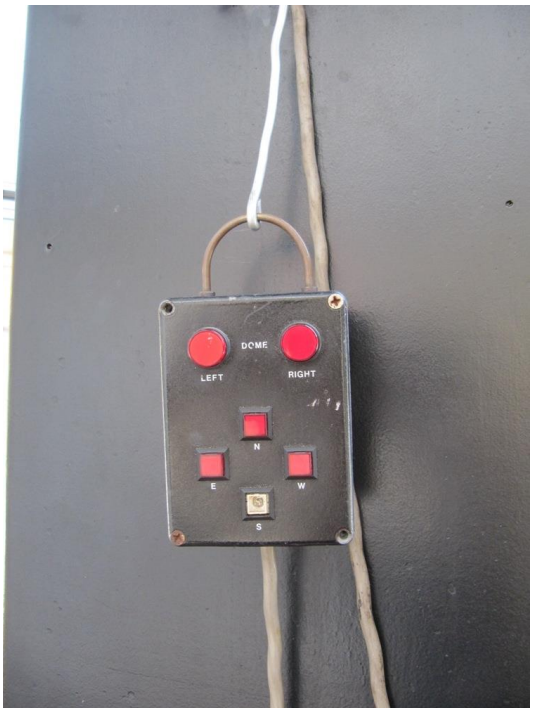


The finder scope eyepiece and one of the red knobs used to move the telescope.

The observer's "chair." To raise the chair, push the chair up. To lower the chair, while sitting on the chair pull DOWN on the rope at your LEFT side.

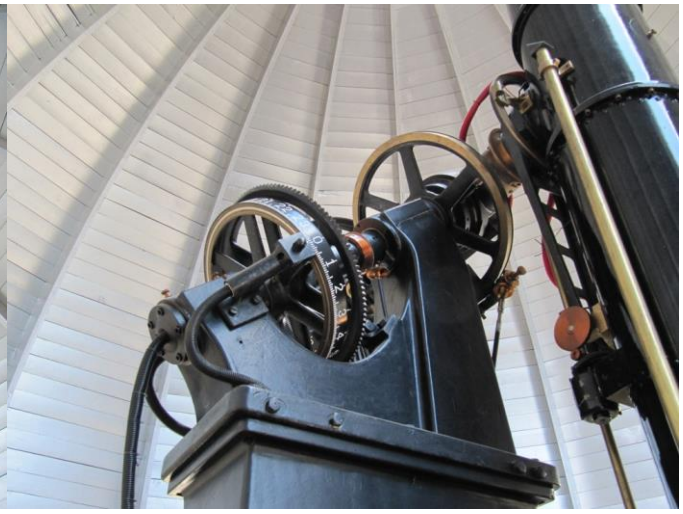
Avoid positioning the observer’s chair directly under the dome drive cable rail.
There are places where the chair and the rail make contact.





Control boxes. The one on the left is near the eyepiece; the one on the right is on a long cord. Square buttons are for fine adjustment. The toggle switch and round buttons control the dome.

The Declination Axis and Setting Circle



The Polar Axis and Setting Circle
(Hour Angle)

--- USER'S TIP ---

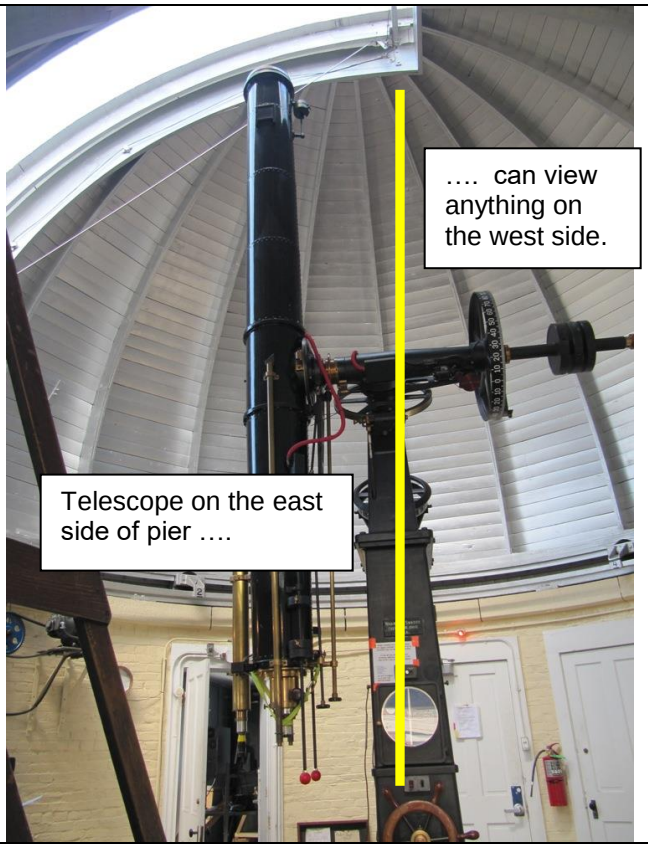
Because of the current issues with the Declination Axis binding, the following procedure is STRONGLY ENCOURAGED. Regardless of the target object, be it faint deep space object or the moon, **preset and lock the declination while the Declination Axis is in the horizontal position**, i. e. counterweights and telescope level. Note: The current declination can be obtained for most objects with an internet access. Once this is done, move the telescope as required around the polar shaft. By doing this, you will be fairly accurately pointing at the target and the Dec Axle stiffness will still be mild. You can now unlock the Dec to make small adjustments before it tightens up. If the Dec Axle becomes very stiff, return the Dec Axle to the horizontal (counterweights and telescope level) and start over. Use this procedure with the telescope on either side of the pier

III The “ROLL-OVER” PROCEDURE:

When is it necessary to do a “roll over”? You need to do a “roll over” when the object you want to look at is on the same side of the pier as the telescope. Put another way, the telescope must always be on the side of the pier opposite the object you are viewing.

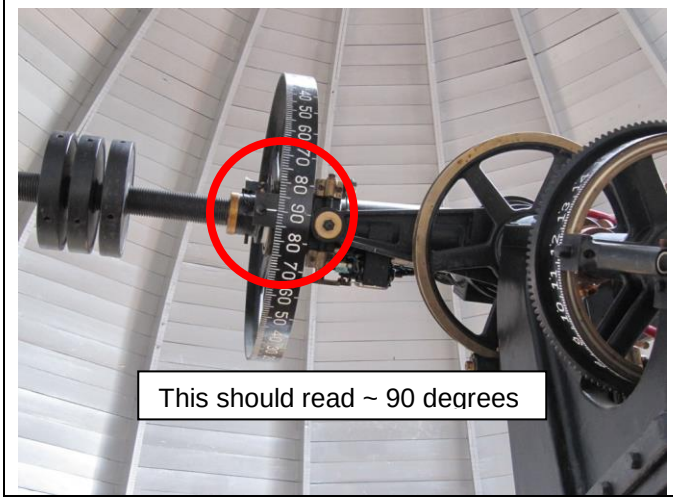
So for the telescope positioned as shown at the right, the telescope could view any object in the western (right) side of the pier.

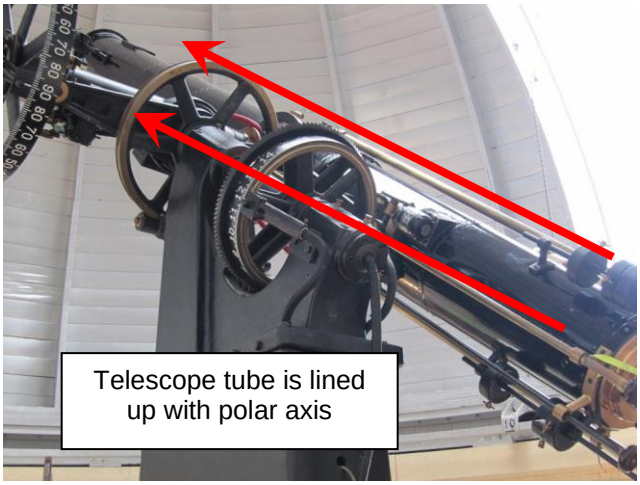
But if you wish to view something in the east hemisphere (left of the red line,) you need to do a "roll over."



How to do he “ROLL-OVER” PROCEDURE:

1. Begin with the telescope in the vertical position as shown in the picture, above.
2. Using the RED handles, move the eyepiece end of the telescope toward the south until the declination reads approximately 90 degrees. (See left picture below.) The telescope should now be parallel to the slanting polar axis and pointing north. (See RED arrows in right picture below.)





3. **ROTATE THE TELESCOPE OVER THE PIER** by turning the captain's wheel clockwise. Move the telescope slowly and watch what you're doing. As long as the telescope remains balanced you do not need to lock either axis. If it is not balanced, you will want to lock the declination (smooth knob) during this part.

Ready to roll from east to west

Rollover complete

4. Use the RED handles to move the telescope to the desired position on the west side of the pier.

5. When finished observing on the west side of the pier, **REVERSE THE PREVIOUS STEPS** to return the telescope to the other side.

IV. Closing Procedure- BEFORE LEAVING THE DOME

1. Turn the **clock drive and setting circle lights off** (North side pier)

2. Replace the primary lens cap. (See **#7** in the "opening" section)

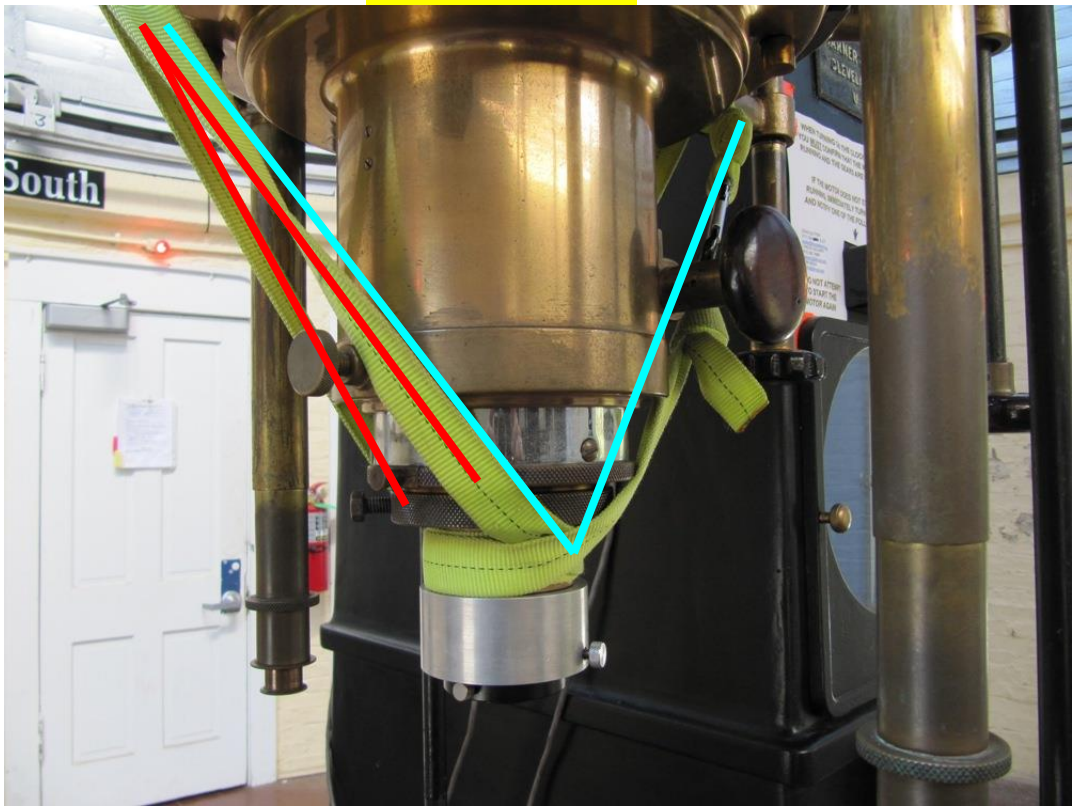
3. Return the telescope to the vertical position on the **EAST** side of the pier and **LOCK** the knobs. (Hour angle = 0, declination = 40)

4. Insert eyepiece cover.

5. Put the finder scope lens cap back on.

6. Attach the yellow focuser support sling. [See picture below.
If necessary, refer to the separate instruction sheet.]

IT IS IMPORTANT TO ATTACH THE SLING PROPERLY SO AS TO NOT TORQUE OR PULL ON THE FOCUSER.



Note the narrow inverted [RED] "V" and the wide [BLUE] "V"
to help you recognize the proper position.

7. Move dome to face **east, close the slit**, secure the chain in the slot, and put the hook back in closet.

NOTE: When properly tensioned the **three** white chain links should be just **BELOW** the chain lock slot. You will have to pull the chain down and twist/ rotate the proper link into the slot

8. Turn off the main power. (**RED** rocker switch in side west side of pier)

9. Close and lock the north balcony door; close and lock the windows. You may leave the shades up or down but you **MUST** confirm the windows are **LOCKED.**

10. Complete the logbook entry. Objects observed, problems with the telescope or equipment. **REPORT MAJOR EQUIPMENT PROBLEMS** to one of the people listed on the north side of the pier or one of the officers.

11. Turn off the lights in the dome.

AFTER LEAVING THE DOME

12. Close and lock the dome door. The lock allows the door to remain unlocked during use. Therefore make sure it is locked when you leave.

13. Turn off the RED stairway lights. ➔

14. Return eyepieces all equipment to the proper places.

15. Be sure the outside door is locked.

16. Turn the keys into the Astronomy Department by 11:00 a.m. the following business day.

--- EMERGENCY CONTACTS ---

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