A quick guide to using the 16” Meade Schmidt-Cassegrain Telescope

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STARTING UP THE TELESCOPE

1. As you make your way from the first floor of the Observatory Building up towards the roof level, halfway up the stairs there is a metal cabinet. Inside the cabinet are orange toolboxes. Get the toolbox labeled 16” Telescope Accessories and bring it with you up to the dome. That toolbox contains almost everything you’ll need. Place the tool box on the roof of the warm room, i.e., don’t put it on the floor of the observing platform or, worse, on the railing around the platform.

2. As you enter the dome, turn on the dome motor power box on your right. The on-off lever is on side of the box, “up” is ON, and “down” is OFF. CAUTION: The lever is spring loaded so be careful not to pinch your fingers when turning it on and off. When you leave the dome at the end of the night, be sure this power is switched off.

3. Turn off the ultra sonic bird/squirrel repeller by unplugging the black plug that’s in the socket located at eye-level just underneath the observing platform and next to the warm room. Be sure to plug it back in when you leave at the end of the night.

4. While you’re in this location, plug in the white power cord that supplies the red stair lights, which make it easier to negotiate the stairs to the observing platform. You may want to turn these off later if you need to reduce extraneous light during observations.

5. Next, open the dome shutter. Go to the top of the platform stairs and remove the large white rope from its holders. Then, from the floor of the dome, use this rope to open the shutter. Immediately put the rope back up onto its holders; otherwise, it can easily catch on something when the dome is rotating. CAUTION: If the humidity is very high DO NOT open the shutter. You can check the humidity by going outside and touching any metal object. If it feels moist, it is too humid to use the telescope. Frustratingly, this can happen when the sky is perfectly clear; however, operating the telescope under these conditions can result in moisture condensing on the telescope and its correcting lens, potentially causing damage to the telescope.

6. Delicately remove the plastic dust cover from the telescope. Care should be taken not to jerk the telescope during this process, which can result in excess stress on the telescope drive gears and lead to alignment problems. Store the dust cover out of the way on the roof of the warm room.

7. Gently remove the large lens cover from the front of telescope, again being careful not to apply undue force. Also remove the small lens cap from the finder scope. Stow both of these, open side down, somewhere out of the way on the warm room roof.

8. Plug the keypad (see Figure 1) into the appropriate socket on the telescope control panel.

9. Plug the power supply cable into the input DC power socket on the telescope control panel. CAUTION: Do this BEFORE plugging the power supply into the outlet on the floor near the telescope pier.

10. Attach the diagonal prism to the back of the telescope (see Figure 2). CAUTION: The nut should be snug but not overly tight. Over-tightening of these fine threads can result in a situation where the prism is locked on the telescope and can’t be removed. Also be careful not to cross-thread the nut when tightening it, a common problem with fine threads.

11. Insert the 1” eyepiece into the diagonal prism and tighten the eyepiece screw (see Figure 3).
12. Finally, turn on the telescope power by flipping the appropriate switch on the telescope panel. Then wait for the system to boot up and display “Telescope” on the keypad.
ALIGNING THE FINDER, FOCUSING, AND ADJUSTING THE POINTING

1. If the finding scope is not aligned with the main telescope you will have to do so. This part is done by eye. If the alignment is not too bad, point the telescope toward a bright star so that it is in the field of view of the guide scope. Note: The telescope is moved using the $N \ S \ E \ W$ keys on the keypad. The $SLEW, \ FIND, \ CNTR, \ and \ GUIDE$ keys adjust the speed of the telescope motion. Now place the star in the center of the field of view of the main telescope. If the star is not in the field of view of the main telescope you’ll have to move the telescope until it is. This is can be done by trial and error, i.e., by moving the telescope slowly in all directions. Alternatively, you can sight along two aligned screws on the telescope tube to locate the star. In fact, this is what you must do in the case that the finder scope and main telescope are way out of alignment. With a little practice, you can become proficient at locating the star in the field of view of the eyepiece of the main telescope. After centering the star, adjust the finder scope by loosening and tightening the screws near the eyepiece end so that the bright star is at the center of the crosshair. If the image of the star in the main telescope is out of focus (looks like a bright donut), you should focus the telescope as described below and then return to aligning the finding scope.

Note: The dome does not move automatically. You have to move the dome so that it does not obscure the telescope. To make sure this is so, sight along both sides of the telescope tube to make sure it is well within the shutter. You will have to check on this on the order of every 10 or 15 minutes and every time you move to a new object.

2. After finding a bright star, you will undoubtedly have to focus the telescope. The focusing knob operates by moving the primary mirror of the telescope. If you change from turning the focus knob clockwise to counter-clockwise, the position of an object in the field of view changes, so much in fact, that it can move out of the field of view. The best way to proceed is always focus by moving the knob clockwise. If you’re on the wrong side of the focus, this requires that you turn the knob many counter-clockwise turns to get on the other side of the focus. Then proceed with focusing by turning the focus knob clockwise. Note that there is inertia in the focusing mechanism, so that if you approach the focus point rapidly, the focus will continue to drift for a few seconds so that the telescope will drift out of focus. Therefore, always approach the focus point slowly.

3. “Pointing” is a term used to describe how you direct the telescope to a particular object. This requires that you calibrate the telescope by pointing to two (or more) stars of known position. The “sky map” is useful for finding which stars you can use to align the scope. Page 28 of the telescope manual (in the warm room) gives a list of the bright stars and their respective $star \ numbers$. Note the RA and Dec of these stars and then consult the sky map in order pick stars that are currently visible. Move the telescope so that one of these stars is in the center of the field of view. Press the STAR key (the #6 key) on the Meade keypad, type in the $number$ of the bright star on which you’re centered, and then press the ENTER key. The keypad will display information about the star. Check to make sure it’s the star you want. If so, $press \ and \ hold$ the ENTER key until the keypad beeps and indicates “coordinates matched”. The telescope has now been aligned to this star. Now choose another bright star from the manual. Again press the STAR key, type the number of the star, and press (but don’t hold) ENTER. Then press the GO TO key. The telescope automatically slews to this new star. Proceed to center the star in the field of view (using the $N \ S \ E$
W keys) and then **press and hold** ENTER. You have now calibrated telescope pointing on two known stars. This should be good enough to point to objects anywhere in the sky; however, once you moved to any object who’s coordinates are stored in the telescope, it’s a good idea to center the object and then **press and hold** ENTER to further update the pointing.

In addition to the the STAR key there is an M key for Messier Objects, and a CNGC key for New General Catalog objects. It is also possible to direct the telescope to point to any RA and Dec. The MODE button will cycle the keypad screen through various menu items, one of which is the RA and Dec of the scope. Pressing the GO TO button will show a blinking cursor over the beginning of the RA. You then simply use the number pad to type in the new RA. Then hit ENTER which will take you to the Dec. Proceed to type in the desired Dec (you must move the cursor left if you wish to change the sign of the dec between +/- which is done by the up/down arrows). After everything is typed in, hitting ENTER one more time will make the telescope slew to the coordinates you’ve entered.

**SHUTTING DOWN FOR THE NIGHT**

After observing, follow these steps in shutting down for the night.

1. Move the telescope to its park position, pointing due south at a Dec of 0 degrees.
2. Turn the power off on the telescope control panel.
3. Unplug the power supply from the outlet on the floor: **CAUTION:** Do this before unplugging the power supply from the telescope control panel.
4. Unplug the power supply from the telescope control panel and put the supply in the orange box.
5. Unplug the keypad from the telescope control panel and put it in the orange box.
6. Remove the eyepiece from the diagonal prism and remove the diagonal prism from the telescope. Put them both in the orange box.
7. Put plastic cap on the output telescope port (where the diagonal prism was attached).
8. Put the large lens cover back on the telescope and the lens cap on the finding scope.
9. Replace the plastic dust cover on the telescope again being careful not to torque the telescope.
10. Move the dome to its park position by lining up the piece of masking tape on the dome and wall. The shutter will be facing East.
11. Close the dome using the large white rope. Make sure the dome is completely closed.
12. Unplug the white cord powering the red stair lights.
13. Plug in the bird/squirrel repeller.

14. Turn off the dome power (be careful of your fingers).

15. Make sure all the lights in the dome are off and the door locked.

16. Return the orange box to its place in the metal cabinet.

17. Make sure the door at the bottom of the stairs is locked.