

Operating the Schommer Observatory 0.5-m Telescope

Weather

The telescope must not be exposed to inclement weather; it is an expensive precision instrument that can be damaged by thoughtless use. In the following conditions the dome may not be opened, or must be closed immediately if it is open:

- Rain, snow, fog, or threat of precipitation
- High humidity, above 95% relative humidity on the electronic hygrometer
- High winds, indicated by vibration of the dome
- Blowing sand, dust, or grit

Before Observing

If the air in the dome is at a temperature different from the outside, convection currents will arise that significantly degrade the seeing. The exhaust fan on the dome can quickly exchange the air in the dome with the outside air and help minimize this problem. Plug the fan in and turn it on high. Be careful to keep hands, hair, clothing, etc. out of the fan blades! Also make sure that there are no loose papers or other articles that can be blown around inside the dome. Make sure that you turn the fan off, unplug it, and store the cable inside the fan enclosure before you attempt to rotate the dome.

Starting Up

1. Power up: Turn on the Bisque TCS controller on the side of the telescope; after a brief initialization you should hear two beep tones (one for each axis) and the two blue LEDs should light. Turn on the focus encoder readout on the observing desk. Startup the computer if necessary. Log into the PC as user "ph344" (password "orion").
2. Open the dome: Raise the dome slit cover with the left lever on the control box. There is a sliding plate below the lever that only allows it to be turned one way – if you cannot make the motor run, slide this plate to the other side. Let the cover open all the way, until it shuts off automatically, then return the control lever to the vertical position. Unplug the cable for the dome slit motor and hang it through the cable tie on the dome. The dome rotation is interlocked with this cable, so the dome will not rotate until the cable is unplugged. If you have not yet done so, unplug the exhaust fan power cable and store it in the fan enclosure. The lower dome slit drop-out may be opened with the manual crank; this is only essential if you are observing objects near the horizon, but opening it may help move more air through the dome to equilibrate temperatures. (On the other hand, if it is moderately windy, you may want to keep the lower slit closed for comfort.)
3. Uncover the telescope: Be careful when moving the telescope with the cover on – it is unbalanced (top-heavy) and will fall (slowly) toward the horizontal. Hold on to

the telescope tube until the cover is removed. The telescope is balanced with the cover removed. Bring the telescope horizontal and remove the cover (carefully). You will need to release the two clips holding the cover on. Store the cover along the dome wall. While the telescope is horizontal, remove the cover from the finder telescope also. Tip the telescope back to the vertical, and set it to the home position by double clicking the button on the end of the joystick. When you hear two sets of three beeps, the telescope is at the home position. By hand point the telescope to the zenith, as indicated by the two bubble levels attached to the telescope support saddle. It is important to have the telescope pointing vertically when it is in the home position, so that the computer can control it accurately.

4. Select the desired observing mode: There is a rotating bar on the side of the red box attached to the back of the mirror cell, with a black screw head that indicates either “visual” or “CCD” mode. Make sure that the instrument selector is in “visual” mode for looking through the telescope or in “CCD” mode for taking pictures or spectra with the CCD cameras. To change mode:
 - a. Remove the two thumb screws on either end of the rotating bar.
 - b. Slide and rotate the bar to the desired position.
 - c. Re-install the thumb screws. (Tighten snugly, but do not over-tighten.)
5. Start the telescope control programs: Double click on “T-Point” icon and then on “The Sky” icon on the Windows desktop. From the “Telescope” pull-down menu, issue the command “Establish Link” (or click on the green telescope button on the toolbar.)

Observing

1. Dome Rotation: The rotation motor is interlocked and will not operate while the dome slit cable is plugged in. The dome rotation control is the right-hand lever on the control box, and it works backwards: push the lever right to rotate the dome left, etc. Be very careful when rotating the dome not to injure people or hit the observing ladder with the protruding crank handle or fan enclosure! Also keep hands, hair, and clothing away from the dome rotation motor.
2. Coordinates: You will have to synchronize the computer and telescope (once) to allow automatic pointing. If the telescope was properly aligned to the zenith at the home position, you should be able to find a synchronizing star under computer control. Click on a bright star in the computer display, and slew to it by clicking on the green telescope icon in the object pop-up window. Use the joystick control to center the star in the finder, then in the main telescope eyepiece. When the telescope is pointing accurately to the star, select the “telescope” tab in the object pop-up window and press the “Sync Scope” button. T-Point warns you about losing accuracy, but select the “Sync Anyway” option. Thereafter, do not move the telescope by hand, or you will have to re-initialize the coordinates. It is a good idea to immediately slew (see the Pointing section below) to another bright nearby star to check that everything is working properly.

3. Pointing: Once the coordinates are initialized, it is easiest to point the telescope to new objects by using the computer. Click on the desired object on the display (or use the “Find” menu). When the window for that object pops up, click on the green telescope (slew) button at the bottom and the computer will move the telescope to the object. Wait for the slew to finish before trying to move the telescope with the joystick. When slewing over large distances or looking for a faint object, it is wise to first set on a nearby bright star and re-sync the coordinates. To stop a slew in progress, click on the stop button in the slew pop-up window.
4. Hand Paddle: The telescope pointing is adjusted with a joystick hand controller. The further you push the joystick in a particular direction, the faster the telescope moves. Beware of the button on the end of the joystick – double clicking it will send the telescope to the home position! The switch on the hand controller turns on a red LED that can be useful for reading notes, etc.
5. Eyepieces: The eyepieces are stored in the drawer in the observing desk. Take care when handling the eyepieces not to drop them or to put fingerprints on the optical surfaces. The 55 mm eyepiece should always be used with the extender tube, making it approximately parfocal with the other eyepieces. The 38 mm and 26 mm eyepieces need no extenders or adapters. The 20 mm, 15 mm, and 10 mm eyepieces use the 1.25-inch adapter.
6. Focusing: The telescope is focused by moving the secondary mirror. The focus is controlled with switches on the observing consol. Turn on the focuser power with the on-off switch and select the direction of motion and speed with the other two switches. Press and hold the push button to run the focuser. The green numeric readout shows the secondary position. For visual observing, set the secondary focus to 6.000 mm, and use the manual focus adjustments on the eyepiece tube. For the CCD camera and spectrograph all focusing is done with the secondary; an approximate focus value is 7.500 mm.
7. Software: *The Sky* program has a large number of options, settings, and display modes. Most are relatively obvious in their operation. Most importantly, note that you can limit the brightness of objects displayed using the “display explorer” under the “View” menu. If all else fails, read the on-line help files!

Shutting Down

1. Home the telescope, then tip it to the horizontal position and put the covers back on the telescope and finder. Point the telescope back to the zenith, and then home it once again.
2. Close the lower dome slit if it is open.
3. Rotate the dome until the slit motor cable is near the control box. Plug in the slit motor and close the dome slit. Make sure that the outer lip of the cover comes down over the dropout. It may be necessary to use the hand crank to keep the dropout snugged up as the cover finishes closing. If you cannot turn the lever in the correct direction to close the dome, remember to slide the metal locking plate below the lever to the other side.

4. Shut down all running programs on the control computer. Turn off the Bisque TCS controller and the focus encoder display. (If you were using the CCDs, turn off their power.) We usually leave the computer running. If you do shut it down, be sure to do so correctly – don't just turn off the power!
5. Fill out the observing logbook, and note any problems that you have had with the equipment.
6. Please be sure that the dome lights are out and the door locked when you leave.