

# 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, indicated by moisture condensing on metal surfaces in the dome
- 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.

## Moving the Telescope

Except in emergencies, you should never move the telescope by hand. Always use the joystick controller to move the telescope. There is a slip clutch on each axis between the telescope and the gears and motors. If you move the telescope manually, the clutch slips and the computer no longer knows where the telescope is pointed. You then have to point to a known star and re-synchronize the telescope and computer – something that you would rather avoid. It also makes it much more convenient for the next user if you leave the telescope synchronized.

## Starting Up

1. Power up: Turn on the Bisque TCS controller on the side of the telescope and the focus encoder readout on the observing desk. Startup the computer if necessary. Log into the PC as user “ph344” (password “orion”). On the telescope joystick, double click the button to home the telescope.
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: Use the joystick controller to 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.
4. There is an instrument mode selector knob on the bottom of the black instrument box attached to the back of the mirror cell. Make sure that the instrument selector is in “visual” mode for looking through the telescope or in “instrument” mode for taking pictures or spectra with the CCD cameras. To change mode:
  - a. Point the telescope to the zenith
  - b. Remove the two thumb screws on either side of the eyepiece tube
  - c. Carefully rotate the mode selector knob to the desired position.
  - d. Re-install the two 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: If the previous user properly shut down the telescope, and no one has moved it manually, then the computer will know where the telescope is pointing. If not, you will have to synchronize the computer and telescope: use the joystick control to point the telescope to a bright star, identify and click on the star in the computer display, and press the “Sync Scope” button on the window that pops up (you will need to select the telescope tab). (If T-Point warns you about losing accuracy, select the “Sync Anyway” option.) Thereafter, do not slew 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. Do not use the hand paddle until the telescope starts tracking the object. 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. **Focusing:** The telescope is focused by moving the secondary mirror. The focus is controlled with three buttons on the small flat wireless hand paddle. Button 5 toggles between high and low speeds. Button 6 toggles the direction of focus motion. Button 8 moves the focus. The green numeric readout shows the secondary position. The best focus for visual observing is near 3.5 mm on the encoder; the best focus for the CCD camera and spectrograph is near +11 mm.
6. **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; for effective use in our skies, set the stellar magnitude limit to 3 or 4. If all else fails, read the on-line help files!

## Shutting Down

1. Use the joystick to bring the telescope to the horizontal position, and then put the covers back on the telescope and finder. Use the “Park” function on the Telescope/Options menu to return the telescope to its normal parking position and to turn off the tracking.
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.