Fick Observing Manual for Newtonian CCD Imaging

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Background: The *Andor* CCD is used at the Newtonian focus of the Fick 24-inch telescope. After passing through some corrective optics, the beam has a focal ratio of $f/4.2$ at the CCD. The image scale at the CCD is about one arc second per pixel. A pellicle reflects about 10% of the light to an *SBIG ST5* CCD autoguider camera located at a right angle relative to the *Andor* CCD camera. The *Andor* CCD camera head is sealed and a high vacuum is maintained within. Multistage thermoelectric cooling allows the camera to reach an operating temperature of -70ºC in cool seasons, but it requires the use of the fluid coolant in the summer months to reach the same temperature.

(If you are viewing this manual on a computer, you might consider increasing the magnification to see additional details on the equipment and computer screen shots.)

Setup instructions:

Steps 1 to 12 can be done before it gets dark enough to observe.

1) Upon arrival turn on the air conditioning/heating as the case may be. In the summer the control room should be about 78º F; in the winter set it to 68º F. You may want to open the covers on the windows.
2) Turn on the monitor that displays the video camera aimed at the South wall arrows. Open the South wall; stop when the arrows match. Then, open the roof. Stop when the roof and North wall are nearly flush. Do not trust the limit switches for the roof and wall! Turn off the video monitor when finished opening up.

![South Wall and Roof Controls](image)

(Note: This is a good position to leave the slide selector in when not in use.)

3) Go out to the telescope and remove the cover just inside the Newtonian port. Open the mirror covers. Uncover the two finder scopes if needed. If the black cloth is on the Newtonian port optics, remove.

4) Turn on the power switch on the power strip by the East side of the pier. Turn on the coolant fluid pump if necessary. Turn on the Andor CCD power supply on the floor near the North side of the pier.

5) Plug in the STV all-sky camera power cord and uncover the camera. Turn on the power to the telescope video camera (by the North wall). Plug in the dome lights using the "dome lights - flat lamps" power cord.
6) Make certain all the ladders and power cords are positioned to allow for free motion of the telescope.

7) Back in the observing room, we need to start turning on the equipment that takes the longest time to reach operating status. In order, these are the Andor, ST5, and STV CCD coolers. We will do quick starts of these units and return to them later to finish the setups. First, power up the Andor CCD controller computer. Start the Andor software. Turn on the camera cooling by clicking on the box on the lower right of the window. Set the temperature to -70º C.

8) Power up the ST5 autoguider control computer and monitor. Type “ccd” to start the ST5 controller software. Under the “camera” menu, select “setup”. Set the temperature to about -25º C below the dome air temperature. Note the cooling current. If it gets above 99% you might have to increase the temperature.

9) On the left side of the control room power up the P5-166 PC on the rack. This runs the Guide 8.0 star-charting program and controls the STV all-sky camera. Start the STV software. Set the cooling to the STV using the "setup" and "parameter" buttons. The STV can be cooled to about -15º C below the dome air temperature. Note the cooling current. If it gets above 99% you might have to increase the temperature. Start the Guide 8.0 software.

10) Turn on the power to the Newtonian control console above the P5-166 PC monitor. This unit reads three telescope temperatures (*-1.0°F), controls the positions of the xyz
(focus-RA-Dec) translator of the *ST5* autoguider and the dark slide at the input to the Newtonian port. Open the dark slide with the toggle switch (hold for about 15 seconds until the light goes from yellow to green).

11) Now on to the *DFM* console. Make certain the telescope drive power switches are off. Turn on the main telescope power. Turn on the *DFM* computer immediately below the *DFM* console. Then, turn on the three switches on the lower left of the console. Make sure the "object-list - *The Sky*" switch is in the "object-list" position and the "East-West" switch should be in the "East" position.

12) Power up the "object lists" computer above the *DFM* console. Start *DOS* and then type ‘sxz’. This will list bright stars near the zenith. One of these stars can be highlighted and the "s" key will transfer the coordinates to the *DFM* computer.
Once it gets dark,

13) Turn on the video monitor for the telescope monitoring camera.
14) Turn on the STV all-sky camera display monitor (settings described below).
15) Click “Image” in the STV software to start acquisition. The software will first acquire a dark frame, and then it will start acquiring images continuously.
16) Close the window blind in the observing room.
17) Check to see if the Andor CCD temperature has reached -70º C.

You are now ready to observe!