

# Observing Procedure for C11 GPS

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## Preparation

### ***Customize observing list***

You can install a list of up to 25 custom objects in the telescope database ahead of time, so that you will have them ready when you start your viewing session. Use a planisphere or computer program to select objects that will be well above the horizon during your planned viewing date and time.

1. Prepare a numbered list of 25 or fewer celestial objects with their R.A. and Dec. (Don't forget to specify North or South Dec.)
2. Unlock and open the telescope enclosure, plug in and turn on the telescope. (You will need a building key that opens the doors to the roof of Broida Hall. The telescope is in an enclosure at the south end of the deck at the west side of the roof.) The control will display "NexStar GPS."
3. Press "Enter" and select "Quick Align." Press "Enter." Use arrow buttons to point north and level. Press "Enter" when done. Enter time, Standard or Daylight, zone, date, longitude, latitude (119° 50' 35" West, 34° 24' 51" North), each followed by "Enter." To accept defaults, just press "Enter." When you have entered all values, the control will display "NexStar Ready."
4. Press "Menu," and then "Down" several times, until the control displays "User Objects," and then press "Enter."
5. Press "Down" several times, until the control displays "Enter RA & Dec," and then press "Enter." The display will show the number of the object (1-25) and its R.A.
6. Use "Up" and "Down" buttons to select one of the 25 user objects. Press "Enter" to begin modifying the coordinates. Enter the R.A. (hh mm.m), and then press "Enter." Then replace Dec. and press "Enter." Display will momentarily show "Saved Sky Object #," where "#" is the number of the object you selected.
7. Use "Up" or "Down" to select next the object in your list.
8. Repeat steps 5 through 7 for each remaining object in your list.
9. Press "Undo" several times until the display reads "NexStar Ready."
10. Use the arrow buttons to return the telescope to its stored position.
11. Turn off the telescope and return it to its original stored condition.

## **Setting up**

### ***Equipment***

The NexStar 11-GPS telescope is mounted in a secure enclosure on a tripod at the south end of the deck on the roof of Broida Hall. **Important:** In order to get to the telescope enclosure, you will need a building key that opens the doors to the roof.

Inside the enclosure you should find the following items:

1. C11 GPS telescope
2. Finder scope mounted in bracket and attached to telescope
3. Dust caps installed on the objective and eyepiece of the finder scope, and on the rear cell and entrance aperture of the main scope
4. A power strip
5. An orange extension cord
6. C11 GPS power adapter
7. Plastic tub containing the “visual back” optical adapter, star diagonal and three eyepieces (10-mm Plössl, 25-mm super-modified achromat and 40-mm Plössl)
8. Power supply for the telescope tube heater. The heater, which is for preventing dew from condensing on the telescope, should be wrapped around the telescope tube.

It will be useful, if not necessary, to bring a flashlight with you to use during setup and the viewing session.

### ***Procedure***

1. Unlock the combination locks securing the latches on the telescope enclosure, remove them and open the latches.
2. Swing the front cover of the enclosure down and let it hang.
3. Carefully swing the top of the enclosure backwards and down, and rest it on the deck.
4. Loosen the altitude clutch, elevate the telescope to a horizontal position, with the finder scope on top, and lock the clutch.
5. Loosen the azimuth clutch, rotate the telescope so that it is pointing north (or somewhere near north) and lock the clutch.
6. Make sure the finder scope is securely attached to its bracket:
  - The registration pins and setscrew should be properly inserted in their respective indentations, and the thumbscrew should be finger tight.
  - The rubber O-ring should be seated in the groove around the finder scope tube, and it should be firmly seated in the rear loop of the bracket.
  - The alignment screws should be finger tight to keep the finder from moving out of alignment. Don't turn the screws if you want to retain collimation with the main scope from the last session.
7. Remove the dust caps from the finder scope.
8. Remove the dust caps from the main scope.
9. Take the “visual back” optical adapter with star diagonal from the storage tub and, making sure that the screw holding the star diagonal in the visual back is secure, install it on the rear cell of the main scope.
10. Remove the dust cover from the star diagonal and put it in the storage tub.

11. Install the eyepiece into the star diagonal, and rotate the setscrews finger tight, so the eyepiece won't fall out. If there were dust covers on the eyepiece, put them in the plastic tub.
12. Make sure the telescope power switch is turned OFF.
13. Connect the power strip to the orange extension cord, and connect the extension cord to a building power socket. Make sure the power strip is OFF.
14. Plug the C11 power adapter into the power strip. If it is not already connected to the telescope, connect it to the telescope.
15. Turn on the power strip, and then turn on the telescope (the hand controller will light up and display "NexStar GPS").
16. Press "Enter." Then press the "Down" button until the controller displays "Auto Align," and then press "Enter" again. The controller should display "Point Tube North and Level."
17. Press the "Rate" button. A number between 1 and 9 should appear in the upper right corner of the controller display. Press "9" if the value isn't 9 already.
18. Use the arrow buttons to move the telescope until it points north and level. You can use the lines of the deck (and the location of Polaris) to find north. Use the alignment marks on top of the yoke to determine when the tube is level. Press "Enter."
19. The controller display will ask for the current time. If the time is different from what is on the display, enter the current local time, and then press "Enter."
20. If you used 12-hour time instead of 24-hour time, the controller will ask for AM or PM. Use the "Up" or "Down" keys to select the appropriate value, and then press "Enter."
21. Select "Standard Time" or "Daylight Savings Time" with the "Up" or "Down" keys, and then press "Enter."
22. Select the time zone by means of the "Up" and "Down" keys, and then press "Enter."
23. Enter the date, and then press "Enter."
24. Enter the longitude and latitude of your observing location, and then press "Enter." If the default values are  $119^{\circ} 50' 35''$  West and  $34^{\circ} 24' 51''$  North, then just press "Enter."
25. The telescope will automatically slew to the first alignment star. As it moves, a pinwheel will rotate in the upper right corner of the display. Then the display will ask you to center the star in the FINDER (not the main scope). Use the arrow keys while you look through the finder, and place the star at the center of the finder's crosshairs. When it is centered, press "Enter." If the star is obstructed by an object (like the building) press "Undo" to abort the use of this star and go to another star.
26. The display will ask you to center the star in the main scope. Use the arrow keys while you look through the main eyepiece, and place the star in the center of the field of view. You may need to focus the telescope by means of the focus knob. When the star is centered, press "Align."
27. The telescope will slew to the second alignment star. Repeat the previous two steps to align with this star. When you are done, the display should read "Align Success." If it reads "Align Failed," it will try to have you re-align the last star. If that doesn't work, then press "Undo" to have two new alignment stars chosen.
28. Check that the finder scope is collimated with the main scope. The last alignment star should be centered in both scopes. If not, center the star in the main scope with the arrow buttons. Then adjust the position of the star in the finder scope by moving the setscrews, keeping them moderately tight by moving all the screws back and forth to take up any slack. (This is best learned under supervision.)
29. The display should read "NexStar Ready," and you should now be ready to observe.

## **Observing**

Caution your guests not to touch the optical elements of either the finder or the main scope. Show them how to focus the main scope with the focus knob.

To use your custom list of objects:

1. If the controller display is not showing “NexStar Ready,” press the “Undo” button until it does, and then press the “Menu” button.
2. Press the “Up” or “Down” button until the controller displays “User Objects,” and then press “Enter.”
3. Select “Goto Sky Object” with the “Up” and “Down” buttons and press “Enter.”
4. Use the “Up” and “Down” buttons to select the number of the object from your custom list, and then press “Enter.” The controller will display the coordinates. Press “Enter” to slew to the object. (If the object is below the horizon, the display will read “Slew Limit Warn,” and you must press “Undo” to recover.)
5. Repeat for each object on your list.

To use the built-in tour of observable objects:

1. Press the “Undo” button until the controller displays “NexStar Ready,” and then press the “Tour” button.
2. Select an object by pressing the “Up” key until you find something interesting.
3. For information about the object, press the “Info” key.
4. To slew to the selected object, press the “Enter” key.
5. Press the “Undo” key as necessary to get back to the level of selecting your object.

You can gain access to other lists of objects with the following keys, similar to the “Tour” key:

- “M” – Messier objects.
- “NGC” – Deep sky objects from the Revised New General Catalog.
- “STAR” – Brightest stars from the Smithsonian Astrophysical Observatory catalog.
- “CALD” – Objects from the Caldwell catalog of the best NGC and IC objects.
- “PLANET” – Planets currently visible from your location.
- “LIST” – Other lists, including Named Stars, Named Objects, Double Stars, Variable Stars, Asterisms, CCD Objects, IC Objects, and Abell Objects.

## **Putting away**

1. Turn off the telescope.
2. Turn off the power strip.
3. Disconnect the C11 power adapter, and set it in the enclosure.
4. Disconnect the extension cord and power strip.
5. Slightly loosen the eyepiece setscrews, remove the eyepiece, replace any dust covers, and stow it in the plastic tub.
6. Unscrew the “Visual Back” optical adapter, with the star diagonal attached. Remove it with the star diagonal, replace its dust cover and stow it in the plastic tub.
7. Replace the dust cover on the rear cell.
8. Taking care not to push the finder scope loose from its bracket, install the dust caps on both ends of the finder scope. Install the dust cap on the entrance aperture of the telescope.

9. While holding the telescope by its rear handle, unlock both the altitude and azimuth clutches. Point the telescope down towards its base, and rotate the yoke so that its arms and the finder scope will clear the sides of the enclosure. Tighten the clutches enough to hold the telescope in position, but do not fully lock them.
10. Making sure that there is nothing in the way of the cover or the seals, swing the enclosure cover up and over the telescope until it rests squarely on the base, and close the latches at either side.
11. Stow the power strip and extension cord inside the enclosure.
12. Screw the cover onto the plastic tub and stow it inside the enclosure.
13. Swing up the front panel of the enclosure, close the two latches, and replace and lock the combination locks.
14. Check the area with a flashlight to make sure you haven't forgotten anything.
15. If you've turned on the light attached to the electrical box, turn it off.
16. Make sure that the cover to the electrical box is closed and latched.
17. Return equipment not normally stored in the telescope enclosure to its original location.
- 18. Make sure to close the roof door(s) behind you, and to lock and close the door to the telescope closet if you've used anything from that room.**