

Mt. Stony Brook Meade 14-inch Set Up and Operations Manual

Anja von der Linden

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This document provides instructions on how to set up and operate the Meade 14-inch telescope atop Mt. Stony Brook.

1 Checklist

Make sure that you have all of the equipment you need to perform observations:

- laptop running Cartes du Ciel and SiTechExe
- power supply for laptop
- USB cable to connect laptop to telescope mount
- manuals for the telescope, the mount, and the software
- eyepieces (if conducting eyepiece observations)

If conducting CCD observations, then bring:

- large briefcase with SBIG STL-1001e CCD camera and accessories

If conducting spectroscopy, then bring:

- briefcase with SBIG ST402ME CCD camera and accessories
- spectrograph
- Orion StarShoot guider camera (with USB cable)
- arc lamps (Neon and Mercury) and power source / extension cable
- cooling power source

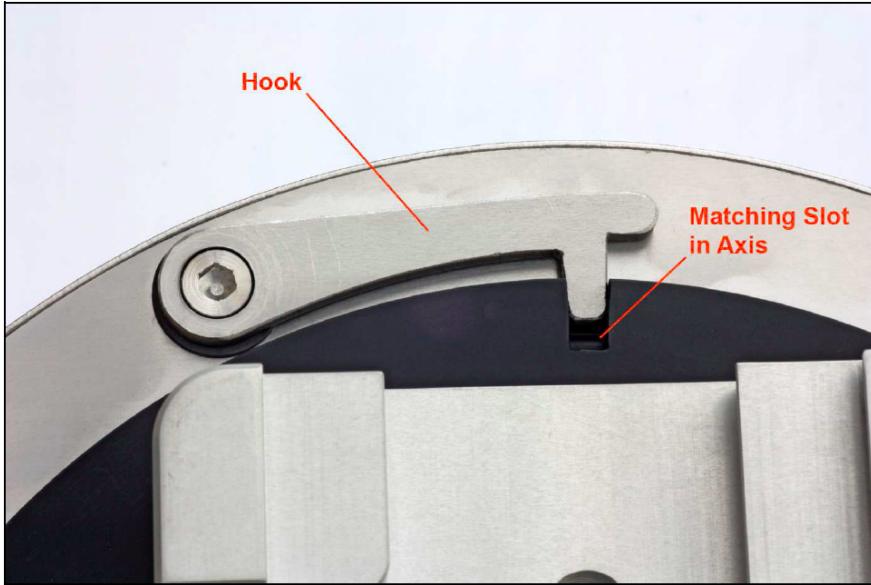


Figure 1: The mount has two of these “hooks” that are used to lock the axes when not in use. Figure from Mesu 200 Mount Quick Guide.

2 Dome Start-Up

1. **DO NOT OPEN THE DOME IF IT IS RAINING, SNOWING, OR IF THERE ARE STRONG WINDS.**
2. Open both doors, use rope to keep them open in order to cool down the dome. If wind is coming through one door, close that door.
3. Switch on the power to the dome drives: big ON / OFF handle on northern inside wall of the dome.
4. Use the dome remote to open the top shutter: press ”start”, then ”open top shutter”.
5. Use the dome remote to open the lower shutter: press ”start”, then ”open lower shutter”. Press ”stop” before the lower shutter is all the way open to avoid tangling its cable.

3 Telescope Start-Up

1. Remove the dust cover from the telescope.
2. After the top dome shutter has opened completely, remove the cap from the front of the telescope, as well as caps from the finder scope, eyepiece holder etc.
3. Attach your observing equipment. To do so:
 - (a) Make sure both the R.A. and Dec. axes are locked with the two “hooks”, see Fig. 1.

Table 1: The positions of small counterweights needed to balance the telescope for different equipment choices. “FS side” refers to the bar attached closest to the FinderScope. The largest counterweights are 3kg, the intermediate ones are 2kg, and the smallest ones are 1 kg. See Fig. 2 for an illustration.

Equipment	FS side, front	FS side, back	non-FS side, front	non-FS side, back
Eyepiece	2 kg	3 kg	2 kg	3 kg
MallinCam	2 kg	3 kg	2 kg	3 kg
STL-1001E	3 kg	-	3 kg	-
Spectrograph	3 kg	-	3 kg	-

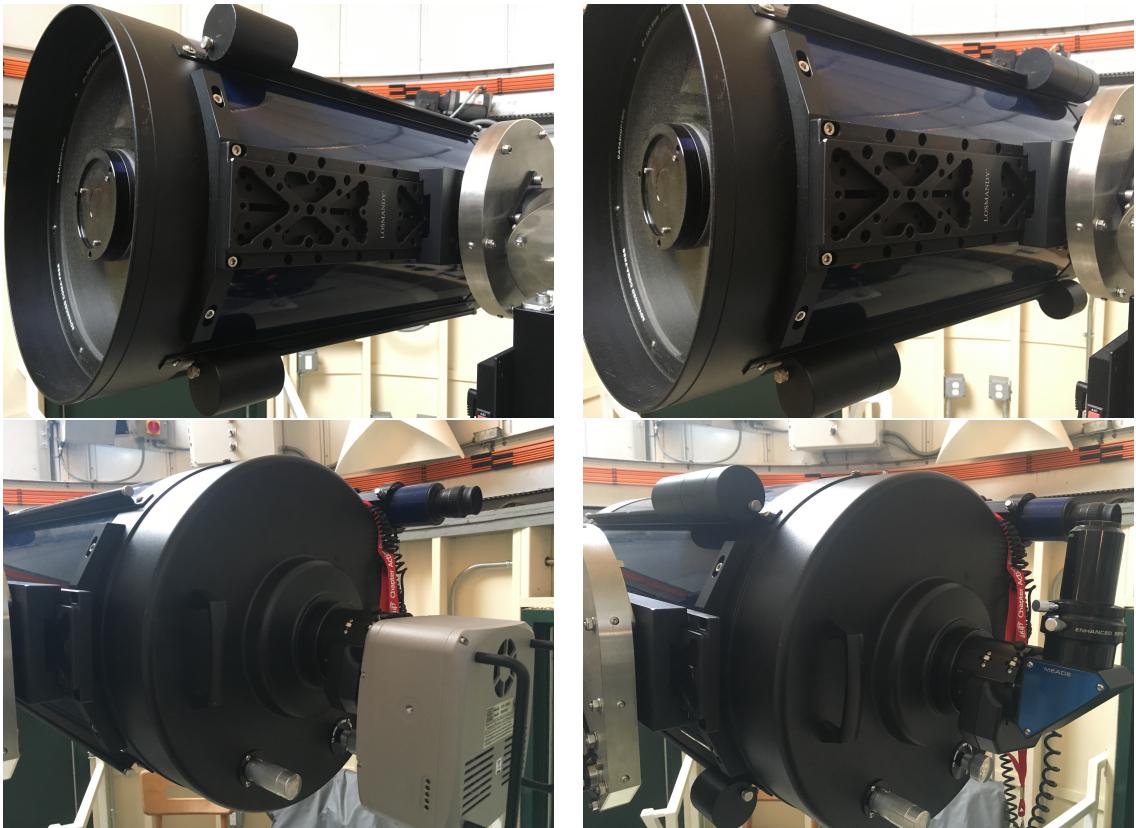


Figure 2: Top left: the counterweights at the front of the telescope positioned for observing with the STL-1001E CCD camera, or the spectrograph. Bottom left: the counterweights at the back of the telescope positioned for observing with the STL-1001E CCD camera, or the spectrograph. Top right: the counterweights at the front of the telescope positioned for observing with eyepieces or with MallinCam. Bottom right: the counterweights at the back of the telescope positioned for observing with eyepieces or with MallinCam.

- (b) Attach the observing equipment (eyepiece holder or SLT-1001e or spectrograph + ST402ME camera).
 - (c) **Move the counterweights to the indicated positions.** (see Tab. 1 and Fig. 2).
4. Retrieve the power supply for the telescope mount (stored in the wall cabinet), and plug in the mount (use the outlet on the telescope pier). Turn on the mount (red switch on the mount controller).
5. **Unlock the two hooks.**

4 Controlling the Telescope with the Handpad

Do not move the telescope by “hand”. This will lose the encoders to lose the information of where the telescope is pointing. The only time it is permissible to move the telescope by hand is if something went wrong, e.g. the telescope moved because it was unbalanced.

The telescope can be slewed with the handpad (Fig. 3), which you’ll find velcro-ed to the pier. To do so, press the direction keys. The central “SPD” button can be used to change the slew speed. LEDs on the mount control indicate the currently selected speed: red is the fastest, yellow the intermediate, and green the slowest setting.

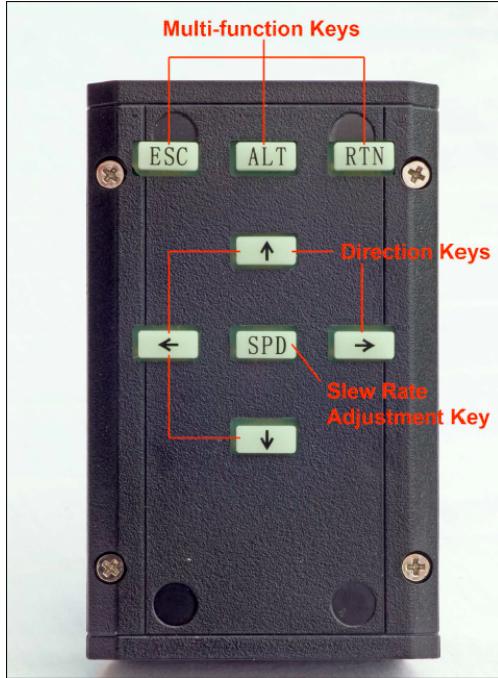


Figure 3: The handpad used for manual mount control. There are 3 speed settings; the one currently in use is indicated by an LED on the mount controller (not shown). Figure from Mesu 200 Mount Quick Guide.

5 Controlling the Telescope with the Laptop – Set-Up

1. **Make sure that the laptop time is correct.** If the laptop shows the wrong time,

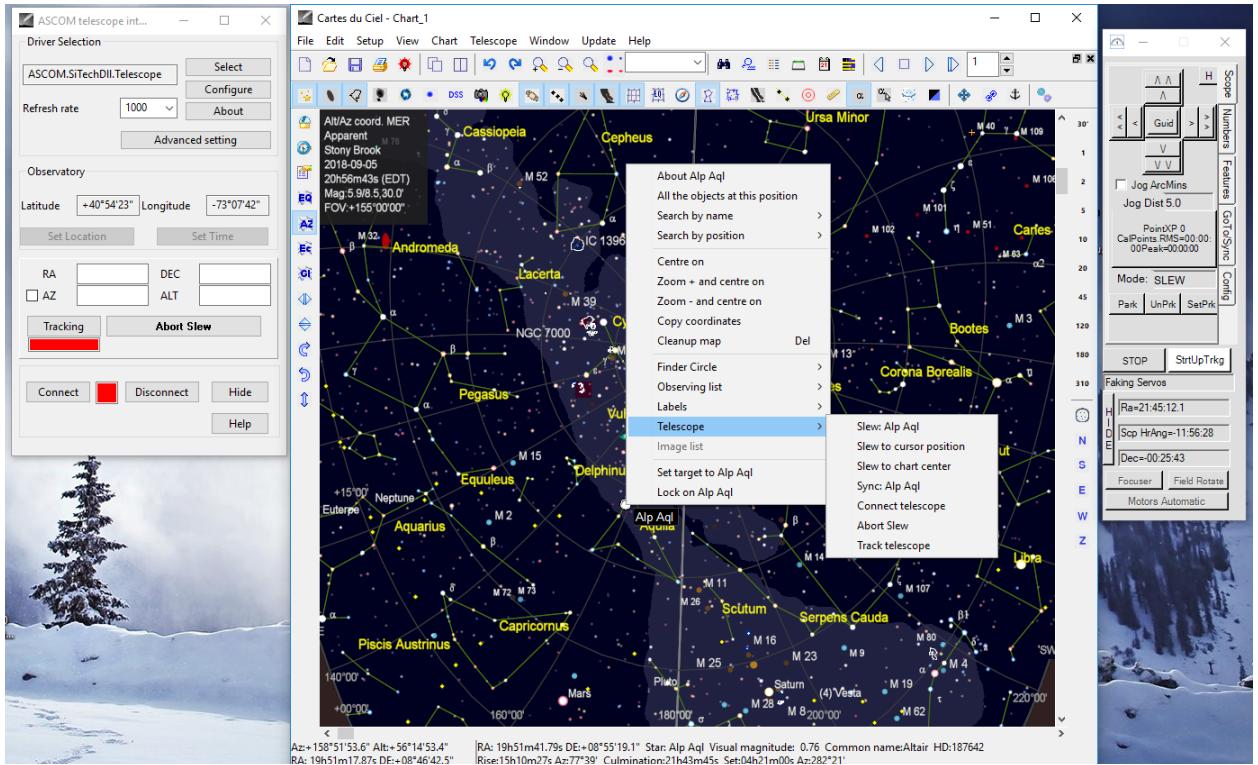


Figure 4: Screenshot of using CdC and SiTechExe to control the mount. Left panel: GUI that opens up after you select “Telescope” → “Connect Telescope” in CdC. Note the “Connect” button and indicator, as well as the “Tracking” indicator. Middle panel: main CdC screen. The menu shown is after right-clicking Altair. Note the “Slew Alp Aql” and “Sync Alp Aql” buttons. Right panel: the main SiTech GUI. This will open up automatically after you click “Connect” in the panel shown on the left here. Note the “Park” and “Unpark” buttons, the “STOP” and “Start” tracking buttons.

make sure to connect it to the network with the ethernet cable on the pier; this should trigger the time to update. If necessary, set the time by hand.

2. Attach the USB cable from the mount controller to the laptop.
3. Open Cartes du Ciel (CdC).
4. In the *Telescope* menu, select *Connect Telescope*. In the GUI that opens up, click *Connect*.
5. This should prompt the box next to the *Connect* button to turn green, and the SiTech GUI to open up.
6. Un-park the telescope (click the *UnPrk* button in the SiTech GUI).
7. If the *Tracking* box is still red, press *Start* in the SiTech GUI.
8. Check that in the middle box of the *Scope* tab in SiTech GUI, the number after “PointXP” is larger than 0. If it is 0, follow the instructions in the Troubleshooting section (Sect. 10 in this manual) to load the pointing model.
9. Select a bright, currently well visible star in CdC and not too far from the celestial equator ($|{\rm Dec.}| \lesssim 30^\circ$), right-click it and select *Slew (star name)*.
10. Wait for the telescope to slew to the target. Move the dome accordingly.
11. **IF** the star is not at the center of the FOV in the eyepiece / the CCD camera, right-click the star in CdC, select *Sync (star name)*, and select *Offset Init* in the GUI that then appears.
12. While you’re at it, use the bright star to focus the main mirror of the telescope. Unlock the primary mirror, then use the focus knob to move the primary mirror up and down. Once focused, re-lock the mirror.

6 GoTo pointing

The telescope’s pointing can be controlled with SiTechExe or CdC. If you want to point to a well-known object, it is simplest to use CdC. Select the object on the sky chart, right-click it, and then select *Slew (object)*.

To acquire an object by its R.A. / Dec. coordinates, SiTechExe is the much more precise method. In the SiTechExe window (right-most panel in Fig. 4), use the “GoTo/Sync” tab to input the coordinates. **Make sure to select the J2000 radio button!** Note that the coordinates that both SiTech and CdC display are in the *current epoch*, i.e. they typically differ from J2000 coordinates by a few arcminutes.

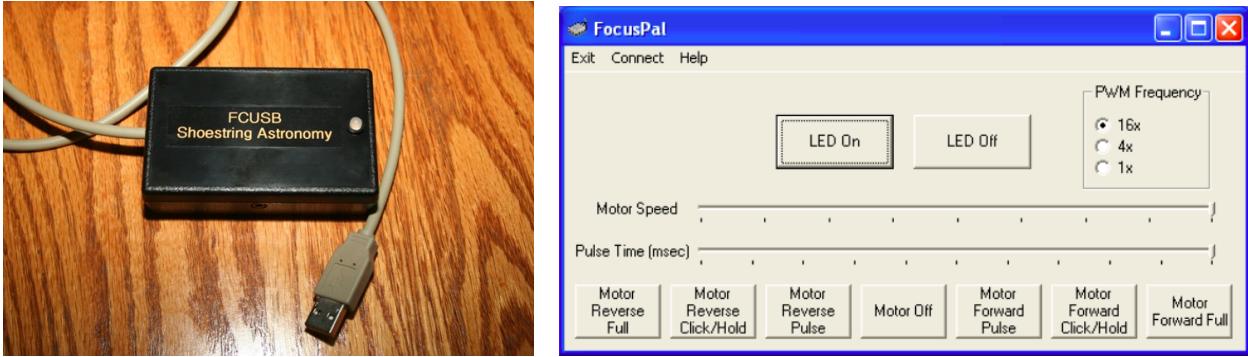


Figure 5: Left: the “ShoeString” focus motor controller. The controller needs to be plugged into the laptop, and the cable from the focuser (back of the telescope) needs to be plugged into the controller. Right: the “FocusPal” interface. From <http://www.store.shoestringastronomy.com>.

7 Fine-tuning the focus (only for CCD / spectrograph observations)

The telescope has a micro-focuser that can be used to fine-tune the focus. It can be controlled from the laptop through the “ShoeString” Focus Motor Controller. Plug the controller into a USB port on the laptop, and the cable from the microfocuser into the controller. Open the program “FocusPal”. In CCDSoft, make sure you have the FocusTool running, reading out a small subset around a reasonably bright star, with a short exposure time (< 1s). While observing the image in CCDSoft, change the focus position using the “Motor Reverse Click/Hold” and “Motor Forward Click/Hold” buttons. Figure out in which direction the focus gets better. Move in that position until the focus becomes worse, then go back to the position of best focus. When you’re happy with the focus, you can detach the focus controller.

8 Meridian Flips

On a German Equatorial Mount, the telescope is on one side of the mount, and the counterweights on the other. The telescope should be “up”. Tracking an object that crosses the meridian will cause the telescope to move “down”. In that case, the pointing needs to be “flipped”, i.e. the telescope will move to the western side of the mount.

The Mesu mount will do the meridian flip automatically for GoTo operations. It is currently configured to track 1h past the meridian. However, when observing an object for a long time, you need to tell the mount when to do the meridian flip. To do so, select the “Features” tab in the SiTechExe GUI, and click on “GEM flip”. While the mount is flipping, make sure that all cables attached to the telescope can freely move (note: the CCD camera should be plugged into the second outlet on the telescope pier to facilitate this). If you need to stop the flip because cables are becoming tangled, push any of the directions button on the handpad.

9 Shut-Down Procedure

1. Move the telescope to the **Park** position by clicking **Park** in the SiTechExe GUI. This should also turn off the tracking; if not, click **Stop** in the SiTechExe GUI.
2. Lock the two hooks. It may be necessary to tweak the telescope position with the handpad. If so, click “SetPrk” in SiTechExe after locking the two hooks.
3. Turn off the mount controller (red button). Un-plug the power supply and store it in the wall cabinet.
4. Detach the observing equipment. Return the counterweights to the “eyepiece” position.
5. Replace the telescope front cap, as well as finderscope and eyepiece caps.
6. Cover the telescope with the grey canvas cover.
7. Rotate the dome so that the dome slit is over the entrance door.
8. Close the lower dome shutter.
9. Close the top dome shutter.
10. Shut off the power to the dome.
11. Collect the CCD, laptop, eyepieces, manuals, your personal belongings, and any trash before leaving.
12. Turn off all lights and close both doors.
13. **Fill out the end-of-night report** at
https://github.com/anjavd1/PHY517_AST443/wiki/End-of-night-report .
14. **If any problems were encountered with the telescope or with the CCD** during the night, notify Prof. von der Linden.

10 Troubleshooting

Telescope does not point correctly

Most pointing issues can be fixed with the following:

1. Disconnect the telescope in CdC, turn off the mount, and manually move the telescope to the **Park** position.
2. Follow the start-up procedure to connect the telescope and **UnPark** the mount (Sect. 5). (Make sure to check the laptop time in the process!)

The pointing model is loaded when you **UnPrk** the telescope. If, for some reason, it did not load (“PointXP 0” on the middle button in the *Scope* tab in the SiTech GUI):

1. Press the PointXP button, click on “Load CalStar File (with terms)”, and then select the file “CalStars_2018-08-28.PXP”. PointXP should then update to 28.
2. If this does not work, you can still use the telescope, just expect the pointing to be less accurate. Please note this in the end-of-night report.

Telescope stops tracking

1. Check whether either of the hooks accidentally locked the respective axis. If so, unlock it, and tighten the nut underneath the hook to prevent this from happening again. Return the telescope to the park position using the handpanel. Make sure to then “unpark” it in SiTechExe.
2. Check whether the telescope has run into the R.A. limit on the western side of the mount. This will happen if you don’t do a GEM flip on time. Use the handpanel to move the telescope to a later R.A. position, re-start the tracking, align on a bright star, and do a GEM flip before re-acquiring your target.
3. Check whether the telescope is balanced. To do so, return it to the park position, engage the hooks, and turn off the mount. Release the Declination hook, and move the telescope up and down by hand. Adjust the small counterweights on the telescope tube until it is balanced. Re-lock the declination axis, and un-lock the right ascension axis. Move the telescope by hand, and adjust the large counterweights (opposite the telescope) until it is balanced. Return the telescope to the park position using the handpanel. Make sure to then **UnPrk** it in SiTechExe.

Finderscope is not aligned with the telescope

The telescope cover quite frequently knocks the finderscope out of alignment. If you need to use the finderscope (e.g. for spectroscopy), you can re-align it with the following:

1. Bring the box of eyepieces, and set up the telescope with the eyepiece with the *longest* focal length (lowest magnification).
2. Point to a bright object (planet or bright star), and center it in the field of view (FOV) of the telescope. If the object is not in FOV of the eyepiece, you can probably find it by “sighting” along the telescope tube.
3. While viewing through the finderscope, adjust the small screws of the finderscope bracket until the object is centered (i.e. disappears) behind the crosshairs.
4. Insert a higher magnification eyepiece, re-center the object as necessary, and repeat adjusting the finderscope

References

- Richards, Steve: *MESU 200 Mount: A Quick Guide to Installation v1.0* August 2014
- Wahl, Matthew and Metchev, Stan: *Mt. Stony Brook Meade 14-inch Set Up and Operations Manual* March 2010