



CPWI

TELESCOPE CONTROL SOFTWARE
INSTRUCTION MANUAL



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Introduction

Welcome to Celestron PWI (CPWI)! This program allows you to align your Celestron computerized mount, slew to celestial objects, and access many other features directly from your computer. CPWI is equipped with a planetarium SkyViewer, which makes it easy to search for objects and navigate the night sky. You can also use the software to align the mount using the optional StarSense AutoAlign accessory, and even perform an All-Star Polar Alignment directly within CPWI.

Before you get started, please review the PC System Requirements and list of Compatible Celestron Mounts below to ensure your equipment is compatible with CPWI.

PC System Requirements

- Windows 7, 8, or 10 operating system
- PC equipped with USB 2.0 or 3.0 Type A ports (only for cable connection). All of these cables are generic and can be purchased from any supplier. Choose the cable that corresponds best with your mount from the options below.

1. For CGX and CGX-L mounts: USB 2.0 cable (male type A to male type B)

2. For telescopes with the newer NexStar+ or StarSense hand controls with a Mini USB port at the bottom: Mini USB 2.0 cable (male type A to male Mini-B)

3. For older NexStar+ or StarSense hand controls with a serial port at the bottom: USB to serial (male type A to female RS-232 | male RS-232 to serial)

NOTE: The RS-232 cables can be found on the Celestron website. Search for item #18775 and item #93920. This option requires a two cable connection.

- An internet connection is required to enable location settings and the online object database, or to auto-update drivers for the cables mentioned above
- 24 MB of hard drive storage and 100 MB of memory
- Screen resolution of 1024 x 768 or higher is recommended
- A wireless network connection (i.e. WiFi) signal if you are using a WiFi-enabled telescope or connecting via the SkyPortal WiFi Module #93973

Compatible Celestron Mounts

CPWI is compatible with all new Celestron computerized telescopes equipped with the NexStar+ hand control, StarSense hand control, or integrated WiFi (such as NexStar Evolution and Astro Fi). Please see the full list of compatible telescope mounts below to confirm your mount is compatible with CPWI.

- | | | |
|---------------|--------------|---------------------|
| • Advanced GT | • CGEM II | • LCM |
| • Advanced VX | • CGEM DX | • NexStar Evolution |
| • Astro Fi | • CGX | • NexStar SE |
| • CGE | • CGX-L | • NexStar SLT |
| • CGE PRO | • CPC | • SkyProdigy |
| • CGEM | • CPC Deluxe | |

Optional Accessories

- SkyPortal WiFi Module
- StarSense AutoAlign
- SkySync GPS
- Celestron Focus Motor
- Autoguider for PEC training

NOTE: Some Celestron mounts may not have enough AUX ports to accommodate these optional accessories. If you need additional AUX ports, please see item #93919 Aux Port Splitter on the Celestron.com website. Do not connect multiple AUX Splitters to each other, as resistance and power loss may result, which will impact the performance of the mount and the connected accessories.

Installing the Software

1. On the Celestron PWI webpage, find and select the ["Download CPWI Software HERE"](#) hyperlink to begin downloading CPWI.
2. Open the Setup_CPWI.exe download file and follow the onscreen steps.
3. Run the application and proceed to install CPWI.

Telescope Setup with an EQ Mount

If you are using an equatorial mount, the mount's RA and Dec axes should be at the index marks or homed, depending on your mount, and roughly polar aligned prior to using the CPWI software. Once roughly polar aligned, you can begin aligning the telescope. Once the alignment is complete, you can use All-Star Polar Alignment (ASPA) to accurately polar align the mount. Later in this manual, you'll find detailed instructions on ASPA.



Telescope Setup with an Alt/Az Mount

The optical tube on your Alt/Az telescope should be roughly level to the ground pointing due north.

NOTE: All users should point the telescope north, regardless of whether they are in the Northern or Southern Hemisphere.



For Northern and Southern Hemisphere users

Telescope Setup with an Alt/Az Mount on a Wedge

If you are using an Alt/Az mount with an equatorial wedge, the optical tube must be at the altitude index mark pointing south if you are in the Northern Hemisphere. If you are in the Southern Hemisphere, your optical tube should be at the index mark pointing north. Be sure you have the mount roughly polar aligned before starting an alignment in CPWI.



Northern Hemisphere



Southern Hemisphere

Connecting your Computer to your Mount

There are three ways you can connect your computer to your mount.

1. Connecting via USB (CGX / CGX-L mounts only)

You will need a USB 2.0 Male Type A to Male Type B cable. Plug the Male Type A connector into the computer and plug in the Male Type B connector into the USB port on the mount.

NOTE: USB 3.0 Type B cables are **NOT** compatible with CGX mounts; the 3.0 Type B connector is bigger and will not physically plug into the mount.

NOTE: If you are using the optional Celestron Focus Motor and it is connected to the mount's AUX port, then it is possible to connect via USB to the mount through the focus motor's USB port.



2. Connecting via Hand Control

You can connect to the mount using the port at the bottom of the Celestron hand control. Newer NexStar+ and StarSense hand controls have a Mini USB port at the bottom, while older NexStar+ and StarSense hand controls have a serial port at the bottom.

- i. For newer hand controls with Mini USB port, you will need a Mini USB cable (Male Type A to Male Mini B).
- ii. Older hand controls with serial port will need the RS-232 cable combination listed in the system requirements above. Connect the RS-232 ports together from each cable, then take the USB end of the cable and plug it into the computer. Next, take the serial end of the cable and plug it into the bottom of the hand control.



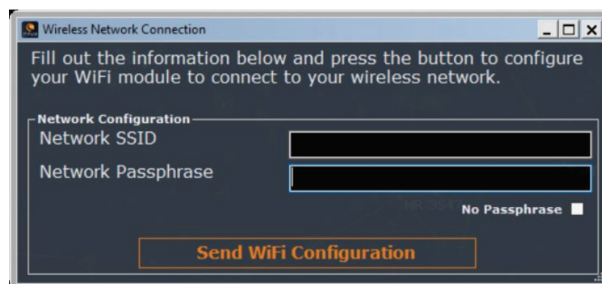
3. Connecting via WiFi

If you are using the SkyPortal WiFi module or if your mount has internal WiFi, there are two ways you can connect via WiFi: Direct Connect mode or Access Point mode. Direct Connect mode is meant for close range wireless control. This is only ideal if you are physically near the telescope with your computer (within 10-20 feet). Access Point mode is meant for remote wireless control. This is useful for backyard or remote observatories where the direct wireless connection won't suffice for a long-range WiFi connection. Unlike Direct Connect mode, Access Point mode allows you to connect to the internet and use CPWI to wirelessly control your telescope at the same time.

If your mount does not have integrated WiFi, start by plugging the SkyPortal WiFi module into an AUX port on the mount. If you are using a Celestron mount with WiFi, the module is not needed.

Direct Connect – Set the WiFi module switch to the Direct Connect position. Go to the wireless network settings on your computer and connect to the WiFi module. It will be identified as "Celestron-____". Once connected, you are ready to open CPWI and connect to the WiFi module directly.

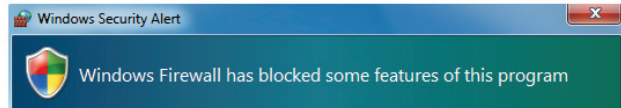
Access Point – To use access mode, you will first need to connect to the WiFi module in Direct Connect mode to enter your home network SSID and password. To do this, first, set the WiFi module switch to the Direct Connect position. Go to the wireless network settings on your computer and connect to the WiFi module. It will be identified as "Celestron-____". Once connected, open CPWI, and select "Start" from the opening screen. Next, go to the Utilities menu on the left side of the screen, and select "WiFi WLAN Config...". A pop-up window will appear, and you can enter your home network SSID and password here. When completed, press "Send WiFi Configuration", and this data will be stored in the WiFi module.



Next, set the WiFi module switch to the Access Point position. Power the module off, then on again. Go to the wireless network settings on your computer and connect to your home network. You are now ready to open CPWI and connect to the WiFi module through your home network.

NOTE: Please refer to your Celestron telescope or WiFi module manual for more information on Direct Connect and Access Point switch position.

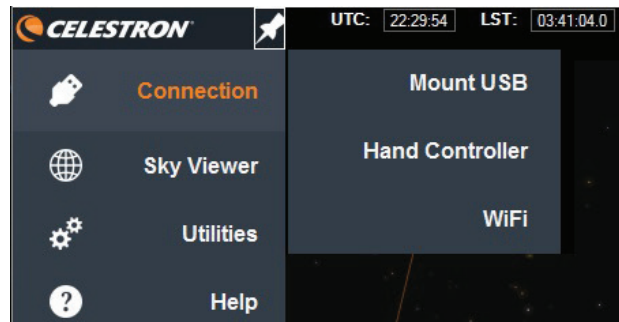
NOTE: For Access Point WiFi connection, you will get a warning from Windows Defender Firewall about some features being blocked for CPWI. To allow Access Point to work, you will need to select all the networks. Make sure the “public networks” and “private networks” boxes are checked. If “domain networks” appears, make sure that box is checked as well, then select “Allow Access”.



Connecting CPWI to your Mount

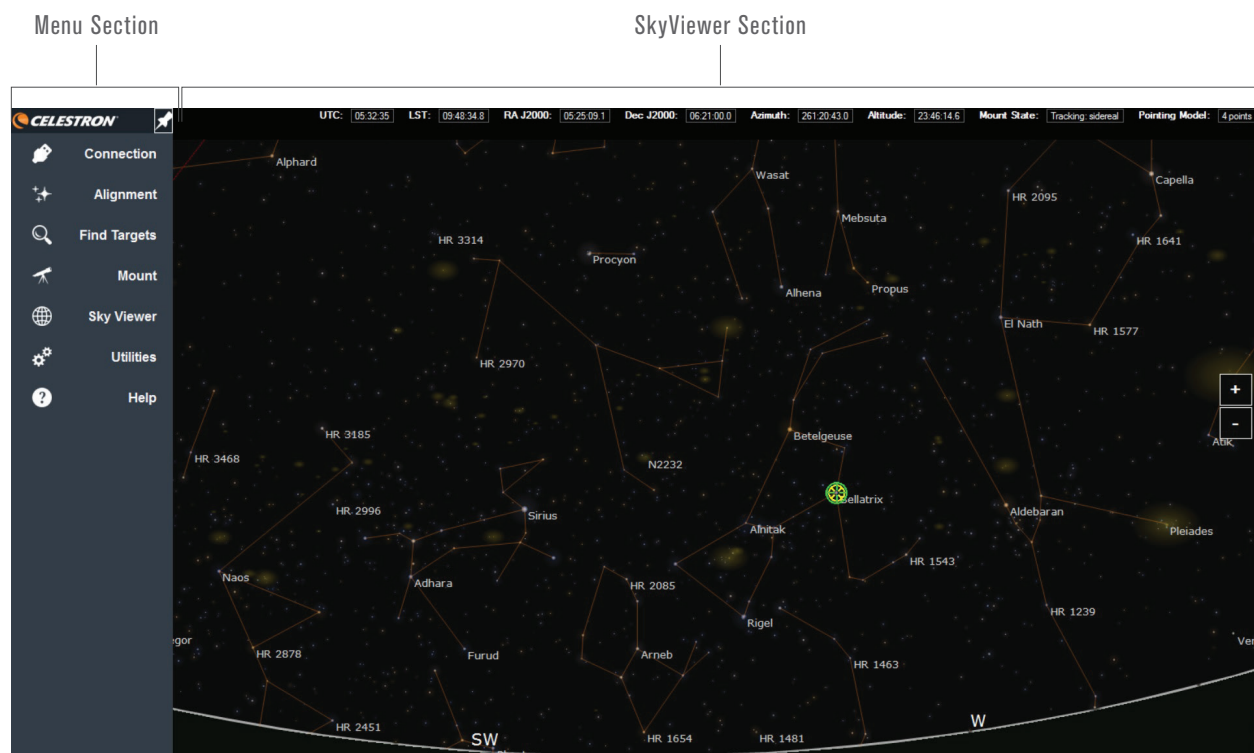
When you first open CPWI, an introduction window will pop up. Select “Start,” and CWPI will appear on screen.

You'll find the connection options in the Connection selection in the Menu. If you are connecting directly to the mount's PC port (CGX and CGX-L only), select “Mount USB.” If you are connecting to the mount through its hand control, select “Hand Controller.” If you are connecting via WiFi, select “WiFi.” CPWI should connect to your mount. You are now ready for alignment with the night sky.



CPWI Overview

When you open CPWI, there are two main sections you can control, the SkyViewer Section and the Menu Section.



1. SkyViewer Section

In the **SkyViewer** section, shown in the screenshot above, you can use your cursor to click and drag the model of the night sky to move it and see what stars are currently visible. This is also where you can manually search for stars, deep sky objects, or constellations. Zoom in or out of the SkyViewer by scrolling the mouse or selecting the + or - buttons on the right side of the screen. Select an object by clicking on it.

In the top left corner of the program, locate the “SkyViewer” drop-down menu. Here is where you can enable, disable, or adjust certain features that will be displayed in the SkyViewer. You can adjust SkyViewer to only show specific types of celestial objects, or you can choose to show them all.

2. Menu Section

The **Menu** section is on the left-hand side of the screen. There are initially four sub-menus:

Connection - This is where you start to establish a connection between CPWI and your telescope mount.

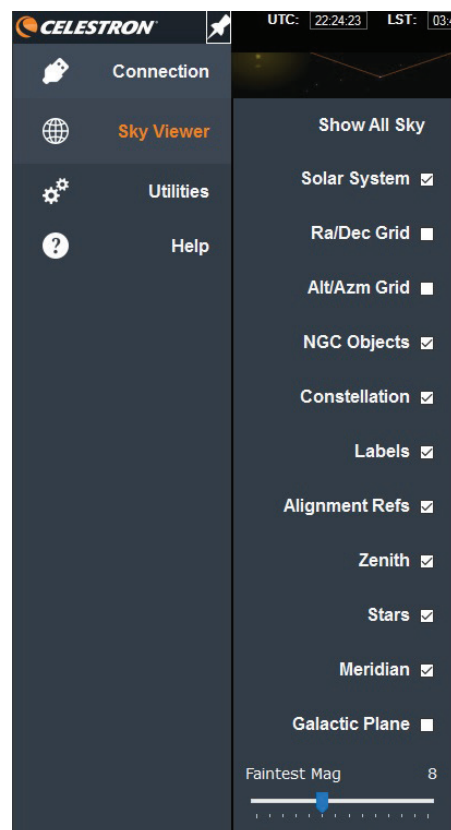
SkyViewer - As mentioned previously, this is where you can adjust the display parameters of the SkyViewer.

Utilities - This provides access to advanced functionality.

Help - This provides help with understanding the pointing model details and also provides detailed version history information.

Use the pin icon (located above the Menu section) to hide the Menu. To have the Menu reappear, click on the edge of the pin icon that can still be seen on screen.

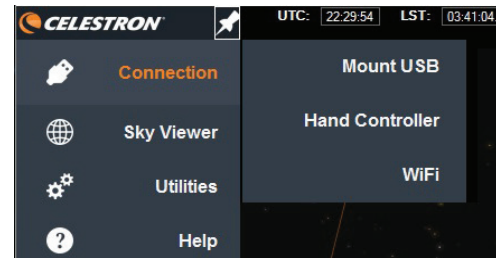
At the top of the screen, you will find the Data bar. This section displays current information at a glance, including universal time (UTC), local time (LST), pointing coordinates (in RA/Dec and Alt/Az coordinates), mount status, and number of alignment references in the pointing model.



Aligning the Mount

First, connect to the telescope mount using any one of the connection methods previously outlined. If you have other Celestron accessories you want to use with the mount that work with CPWI, they must be connected to an AUX port prior to powering on the mount. (More on using these optional accessories appears later in the manual.) Select a connection option—USB (CGX and CGX-L mounts only), hand control, or WiFi—and the Select an Alignment Method window will appear.

Before beginning an alignment, check the information in the Alignment Method pop-up window to make sure it matches your current observing time and location.



If you need to edit your location, select Change Location. A Location Settings window will pop up. You can either manually enter your location or use Google Maps to get your exact GPS coordinates. Using Google Maps requires an internet connection. If you are connecting to your telescope via WiFi in Direct Connect mode, you will not be able to use this feature.

Review Time and Location

2 km NE from Los Angeles,
California, United States of America

Latitude: N 34° 00' 00.0"

Longitude: W 118° 09' 36.0"

Local time: Wednesday, 08 April 2020 15:34:41

Timezone: (UTC-08:00) Pacific Time (US Canada)

Change Location...

Change Time...

Select an Alignment Method

Manual Alignment

Quick Align

Last Alignment

Load Alignment

If you use Google Maps, simply select a location on the map and a pop-up window will provide you with the coordinates. You can then send the coordinates to CPWI.

The time is pulled from your computer and shouldn't need to be changed, unless your computer's time is wrong. If needed, update it to correct the time for CPWI by selecting **Change Time**.

If you are manually searching for a location within CPWI's database and your local city does not show up, use the next closest city in the database. We recommend acquiring GPS coordinates in advance whenever possible.

After checking your time and location settings, select “Manual Alignment” from the Alignment Methods. If your mount has manual clutch knobs, make sure they are locked prior to alignment; if you subsequently loosen the manual clutch knobs, the mount will lose its alignment and will need to be re-aligned.

If your mount has home switches, a Home Switches box will pop up and allow you to begin by slewing the mount to its home position.

If you have an AZ mount, then there will be a "Wedge Enabled" checkbox. If you have your AZ mount on an equatorial wedge, make sure this option is selected.

The screenshot shows the SkyView software interface. At the top, a status bar displays the following information:

- UTC: [23.04.54]
- LST: [04.22.55.2]
- RA J2000: [23.19.52.8]
- Dec J2000: [89.53.56.0]
- Azimuth: [00.00.00.0]
- Altitude: [34.00.00.0]
- Mount State: [Tracking sidereal]
- Pointing Model: [0 points]

The main window displays a star chart with several stars labeled, including Alpheratz, Scheat, Schedar, Alderamin, Deneb, HR 7940, HR 7528, and Polaris. A red circle highlights the star Alpheratz.

At the bottom, there are two panels:

- Select Target:** This panel contains the instruction "Select a target by clicking an object in the SkyViewer and then click 'Goto'" and a button labeled "Goto Alpheratz".
- Pointing Model Information:** This panel contains a table with columns #, RA, Dec, Enc0, Enc1, LST, and Error. The table is currently empty.

Select a star on the screen by clicking it. CPWI will highlight bright alignment stars that are well-positioned in the sky as suggestions, but you can choose any star that you can easily identify in the sky. Next, click GoTo on the Select Target screen. The mount will automatically slew toward the selected object. If you polar aligned your EQ mount (or AZ mount with EQ wedge) or started in the "level-North" position for your AZ mount, then the telescope should point close to the selected object. Otherwise, the telescope will likely not be pointing near the selected object.

Next, use the manual Slew Controls to center the selected object in the telescope's field of view.

Adjust the RATE for different motor speeds. Rates 1-6 are useful for centering in the telescope and finderscope. Rates 6-9 are useful for high-speed slewing and aren't recommended for centering. Selecting the dots in the corners of the Slew Controls will slew both axes at the same time. Also, when the Slew Controls window is on screen and selected, you can use the arrow keys on your keyboard to slew the telescope.

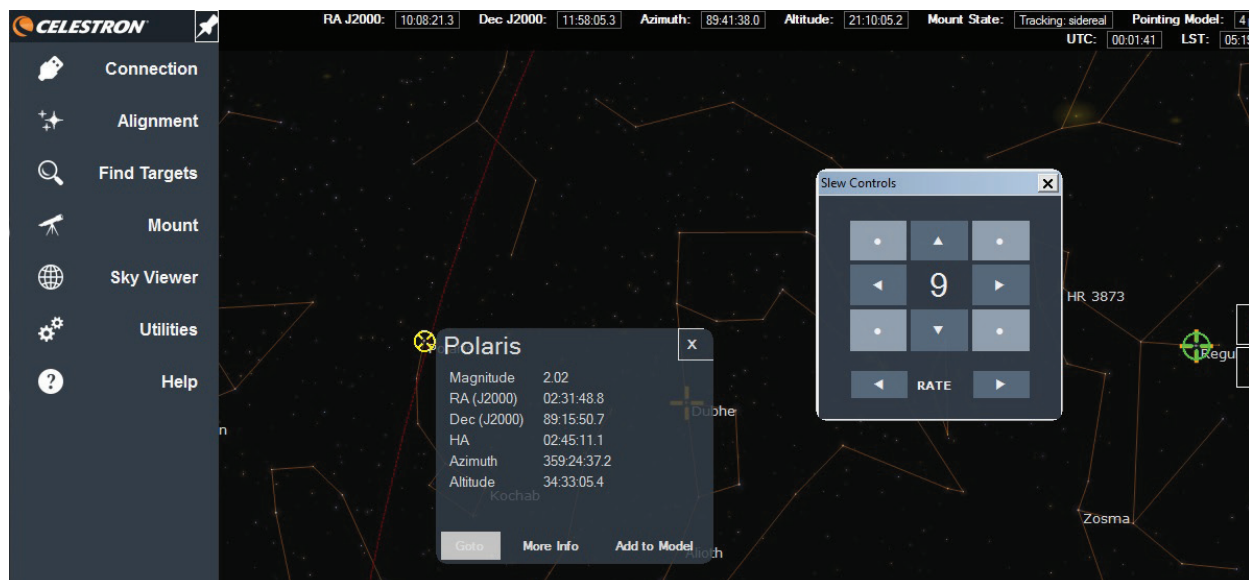
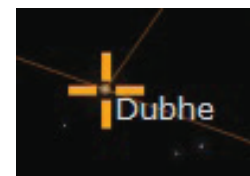
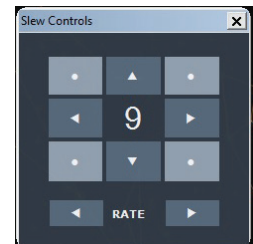
Centering objects will be easiest if you first center them in your (aligned) finderscope, and then center them in your telescope's field of view. Once the object is centered in the telescope's field of view, press "Centered" in the Center Target window. The object will now become an alignment point for the mount model created by CPWI, and you will see this indicated as a "1" in "Pointing Model" in the Data bar at the top of the screen. The object location in the SkyViewer will also now be marked with a cross, this indicates that the object has been used as an alignment reference.

You will then be prompted to select another object in the SkyViewer, and you will repeat the process of selecting an object, having the telescope GoTo the object's approximate position, and using the Slew Controls to center the object in the telescope's field of view.

IMPORTANT NOTE: Whenever you center an object for alignment, make sure to always use the Up and Right direction buttons for the final slew commands. This will minimize the effect of gear backlash to obtain the most accurate mount model.

To get a good mount model, we recommend using at least 4 alignment points, with each point in a different quadrant of the sky. Use CPWI's suggested alignment stars to get a good selection of stars across the sky. After you have aligned on 4 stars, click "Finish" in the Select Target window.

You can add additional alignment references at any time by clicking on a star, selecting GoTo from the object's pop-up window, centering it in the telescope's field of view using the manual Slew Controls, and then selecting "Add to Model" from the object's pop-up window.



You can also add additional alignment points by selecting "Add Reference(s)" from the Alignment section in the Menu on the left.

If you are using an AZ mount and have completed the alignment, you are ready to use CPWI. If you are using an EQ mount (or AZ mount on an EQ wedge) and have completed the alignment, we recommend completing an All-Star Polar Alignment for final setup.

All-Star Polar Alignment (ASPA) for EQ Setups

CPWI and the mount are now aligned to the night sky, but the EQ mount may not be accurately polar aligned. Celestron's proprietary All-Star Polar Alignment procedure (ASPA) can help correct equatorial mount's polar alignment quickly and easily. To perform an ASPA in CPWI, you must have at least 3 alignment points in your alignment model. (In the Data bar at the top of the screen, "Pointing Model" should indicate at least 3 points.)

After a successful 3-point (or more) alignment is completed, CPWI will automatically ask if you want to perform an All-Star Polar Alignment. Otherwise, you can select "Perform ASPA" from the Alignment section in the Menu. You will receive a notification if you need more alignment points to complete an ASPA.

Once you select All-Star Polar Alignment, you will see the All-Star Polar Alignment window.

The All-Star Polar Alignment window is divided into two main sections. The left section, titled "All-Star Polar Alignment", features the ASPA logo and displays the current alignment errors: "Error East: 53' 51\"" and "Error South: 22' 6\"". At the bottom of this section are "Next" and "Cancel" buttons. The right section, titled "Pointing Model Information", contains a table with the following data:

#	RA	Dec	Enc0	Enc1	LST	Error
☒ 1	14:50:42.4	74:09:20.2	51:25:39.8	74:05:57.1	06:16:04.2	8"
☒ 2	12:54:02.0	55:57:34.9	80:25:57.6	55:52:11.2	06:16:26.0	5"
☒ 3	00:40:30.7	56:32:13.3	83:47:00.7	123:20:52.9	06:16:58.2	4"
☒ 4	03:24:19.6	49:51:39.5	43:30:34.2	129:27:01.8	06:17:25.6	3"

Below the table, the "RMS Error" is shown as 5", and "Total Points" as 4 / 4. The "Polar Error East" is 53' 51" and the "Polar Error South" is 22' 6".

Your polar alignment error will be displayed. Take note of the displayed error if needed, then click Next.

Select a star for ASPA from the SkyViewer. If you are in the Northern Hemisphere, you should select a star on the southern horizon. Southern Hemisphere users should select stars on the northern horizon. Do not use any stars directly overhead near zenith, directly east or west at any elevation above the horizon, or near the North Pole for Northern Hemisphere users or South Pole for Southern Hemisphere users. Once you have found a star for ASPA, select it, then select GoTo in the ASPA pop-up window.

Center the selected star in the eyepiece (or camera) using the onscreen slew controls. Once the star is centered in the field of view, press the "Centered" box in the ASPA window. (NOTE: Remember to finish centering with the UP and RIGHT direction keys for best polar alignment accuracy.) The mount will then slew to the position the star should be if the mount were perfectly polar aligned. If the mount is very far from being polar aligned, then the star may no longer even be in the field of view! In this case, you will need to use the finderscope to find the star. Now, use the mount's altitude and azimuth polar alignment adjustment knobs to re-center the star in the eyepiece's field of view.

Polar alignment is now complete. If you want to check your results, re-align the mount in CPWI by selecting Delete Alignment from the Alignment section of the Menu, then select Perform Alignment. After realigning, check your polar align error by performing ASPA again to review your results. At this point, you can either exit ASPA and start using CPWI, or perform another ASPA if you'd like. The second time you do an ASPA, the mount's polar alignment adjustment knobs should need minimal—if any—adjustment.

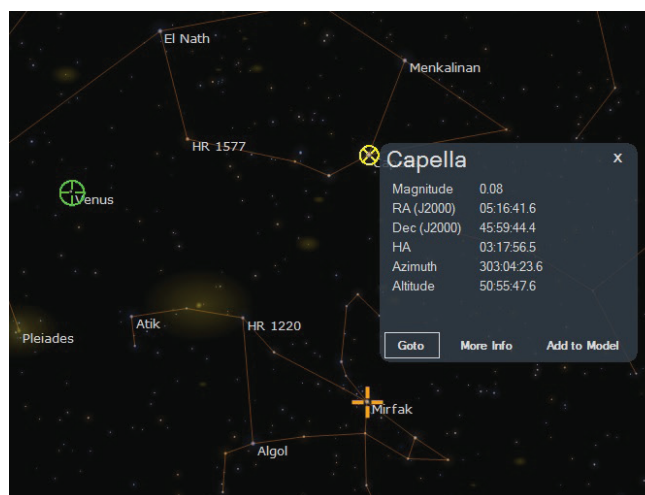
Once you have completed one ASPA after initial Alignment, you are ready to use CPWI to control your Celestron telescope.

Slewing to an Object

To select your desired object in the SkyViewer, use your cursor to click and drag to navigate the planetarium. Once you find the object you want to slew to, click on it. A Target window will pop up. Select GoTo. The telescope will then slew to the object you have chosen. The object should be in the field of view of the telescope.

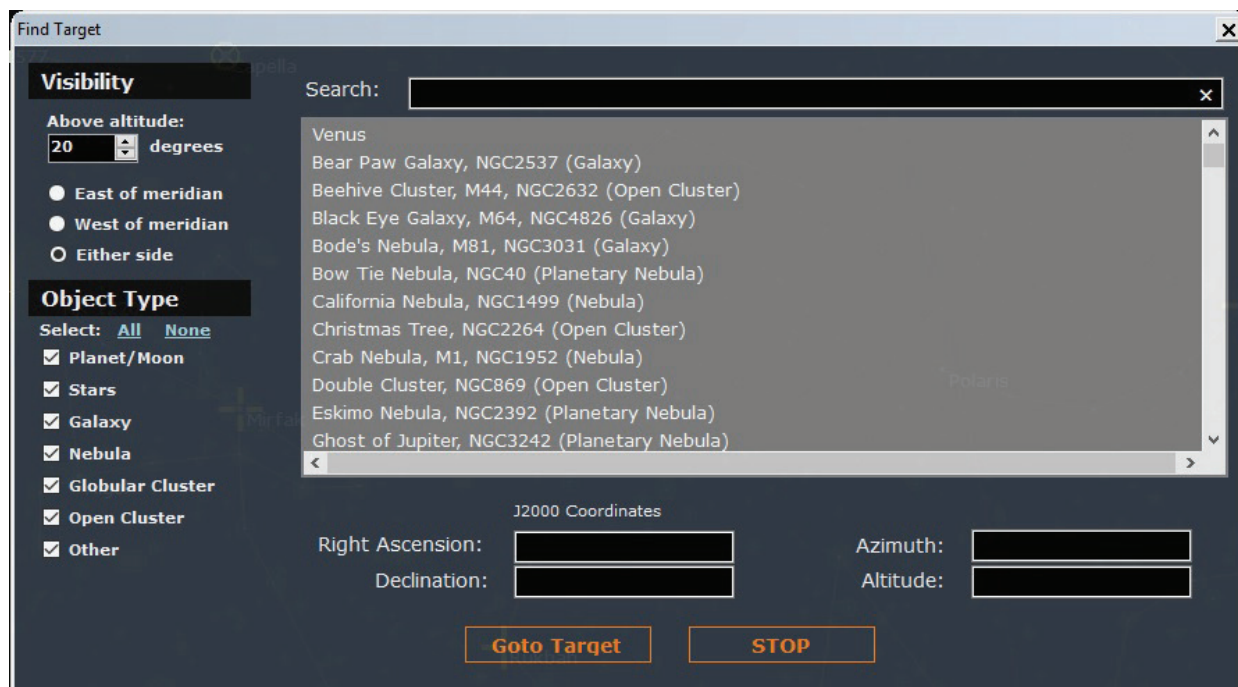
When you select an object in the SkyViewer, you also have the option to select Info. If you are connected to the internet, clicking Info will take you online to where you can learn more information about the object. If you are connected via WiFi in direct connect mode, you will not be able to use this feature, since your computer is connected directly to the WiFi module.

The telescope's current position is indicated by the green crosshair in the SkyViewer. Slewing the telescope in CPWI will move the green crosshair in real time as you slew. When you make a selection in the SkyViewer, a yellow crosshair will appear over the object.



Finding Targets

You can also search for objects using the Find Targets selection from the Menu. Selecting “Local Database” will bring up the Find Target window.



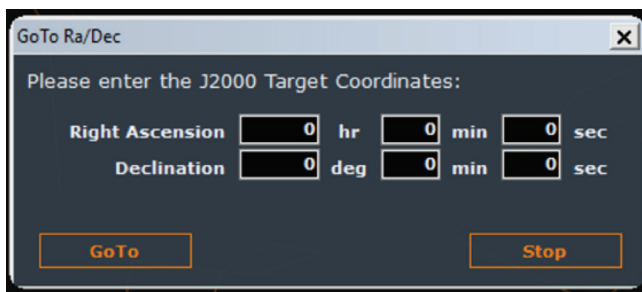
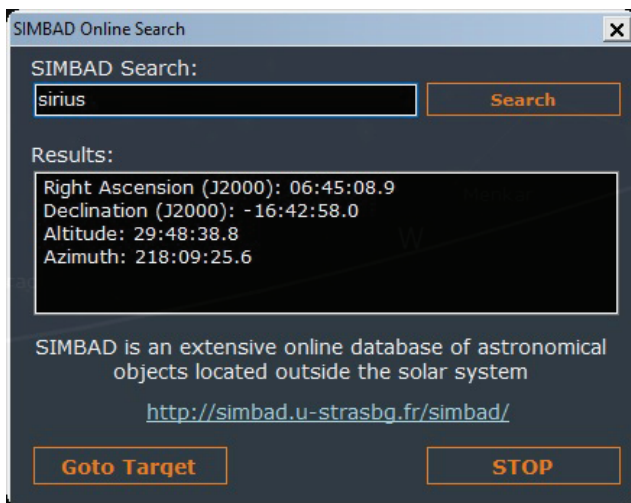
You can use the Visibility and Object Type filters on the left side of the window to narrow down the list of objects to choose from. You can select an object by choosing it from the list. Alternatively, you can search for objects in the list by name by using the Search bar at the top of the screen. (Tip: If using the Search bar, make sure all the Object Type boxes are selected. Otherwise, your object may not appear if it is an excluded object type.) The RA/Dec and Alt/Az coordinates for the selected object will be displayed in the window. To slew the telescope to the selected object, select GoTo Target. To abort the slew and stop the mount, press STOP.

If you select “SIMBAD Online” from the Find Targets section of the Menu, then the SIMBAD Online Search window will appear.

Using the SIMBAD Online Search window requires an internet connection. If you are connected to the mount via WiFi direct connection (rather than networked in “access point mode”), you won’t be able to use the SIMBAD Online Search functionality.

Type the name of any object in the SIMBAD Search field, and press Search. If a result is found, it will be displayed. You can then slew directly to the object’s location (if above the horizon) by pressing GoTo Target. If you want to abort the slew in-progress, press STOP. The mount will stop moving.

If you already know the RA/Dec coordinates of the target you are trying to find, you can enter in the coordinates directly by choosing “GoTo RA/Dec” from the Find Targets section of the Menu. Once the coordinates are entered into the Go To Ra/Dec window that appears, simply click “GoTo”, and CPWI will slew the telescope so it is pointed at the entered coordinates. Click “Stop” to abort a slew in progress.



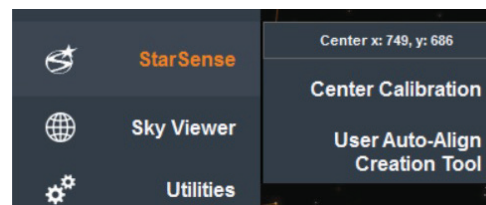
Aligning with the StarSense AutoAlign Accessory

Before you begin, attach the StarSense camera to the telescope tube. See the StarSense AutoAlign manual for more information on how to do this. Attach the AUX cable from the StarSense camera to an AUX port on your Celestron mount.

Make sure you have everything connected to the appropriate AUX ports before powering on the mount.

- If you are connecting via USB (CGX and CGX-L mounts only), simply plug in the USB Type B 2.0 cable from your PC to the mount, with the StarSense camera connected to an AUX port.
- If you are connecting via hand control, plug the StarSense hand control into an AUX port on the mount and plug in the appropriate cables, previously outlined in the manual, from your PC to your hand control.
- If you are connecting via WiFi, plug in the SkyPortal WiFi module if your mount does not have internal WiFi. Make sure the WiFi switch is in the correct position, as previously outlined in this manual.

After CPWI is opened and connected to the mount, CPWI will automatically search for the StarSense AutoAlign accessory. Once found, you will see the StarSense selection in the Menu:



Before aligning using StarSense, the StarSense camera must be calibrated to the telescope optical tube.

Calibrating the StarSense

Calibration aligns the center of the StarSense camera's field of view with the center of the telescope's field of view. This usually only needs to be done once, unless the telescope is handled roughly during transportation. If you have previously center calibrated the StarSense camera to your telescope using the hand control or the SkyPortal app, you don't need to do it again with CPWI.

Before initiating a StarSense center calibration, make sure you have the mount homed or at index marks. Alt/Az mounts should be pointing roughly North with the optical tube level, and EQ mounts should be roughly polar aligned. Next, select "Center Calibration" from the StarSense section in the Menu.

You will be prompted to select a star in the SkyViewer, and then GoTo the star. Then, use the onscreen slew controls to center the star in the telescope's eyepiece. If the star is not in the telescope's field of view, use the telescope's finderscope to find and center the star in the telescope.

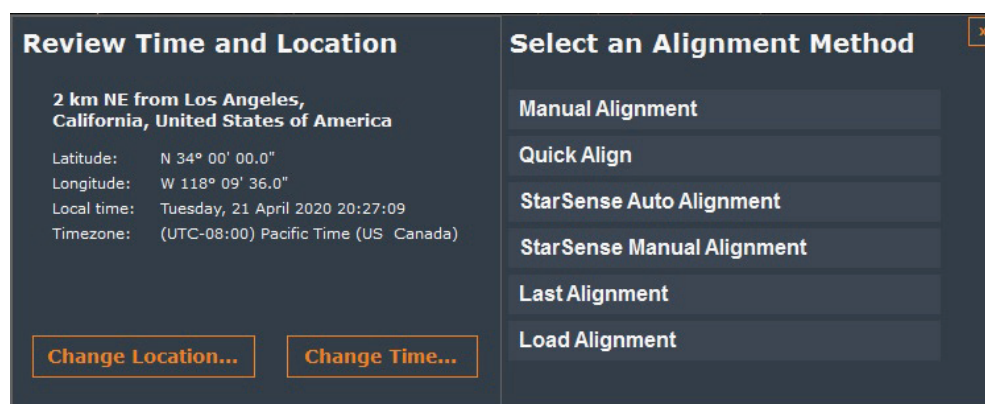
NOTE: It is highly recommended that you use an aligned finderscope during this step, since the mount is not yet accurately aligned to the sky.

Remember to use the UP and RIGHT slew commands to finish centering the star to provide the best pointing accuracy.

Once the star is centered in the telescope's field of view, click "Centered" in the Center Target window. The StarSense camera will then take an image of that section of the sky to determine its position and the position of the centered star. If the calibration is successful, the Calibration window will notify that the calibration was successful. If the calibration is not successful, you will be prompted to select another star to begin the center calibration process again.

StarSense Auto Alignment

Once the StarSense camera is center calibrated to the telescope, you're now ready to perform a StarSense automatic alignment. Select "Perform Alignment" from the Alignment selection in the Menu. When StarSense is connected, you'll notice two additional alignment methods in the "Select an Alignment Method" pop-up window: StarSense Auto Alignment and StarSense Manual Alignment.



Select "StarSense Auto Alignment". If the mount has home switches or sensors, CPWI will automatically move the mount to the home position. Otherwise, make sure you have the mount homed or at index marks. Alt/Az mounts should be pointing roughly north with the optical tube level, and EQ mounts should be roughly polar aligned.

If you have not yet calibrated the StarSense camera, you can click “Calibrate” in the StarSense Automatic window. Otherwise, click “Ready”, and the following options will appear:

StarSense Automatic

Use Default 4 Points

Custom Points

Load Custom Points

Cancel

Pointing Model Information

#	RA	Dec	Enc0	Enc1	LST	Error

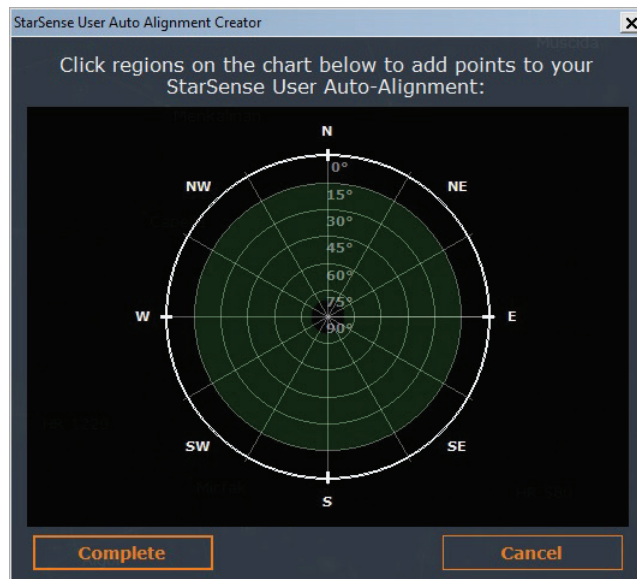
RMS Error0"
Polar Error WestUnknown
Total Points0 / 0
Polar Error NorthUnknown

Suggestion: Add 2 more points east of the meridian and 2 more points west of the meridian

Select “Use Default 4 Points,” and the StarSense Auto Alignment process will begin. The mount will then automatically slew around the sky. The StarSense camera will capture 4 images in different areas of the sky to complete the alignment. This takes two to three minutes. If there are parts of the sky where the StarSense camera’s view is obstructed (i.e. by nearby objects like buildings or trees), StarSense will continue to slew around the sky until it can capture at least 4 images of clear sky. Once completed, you will receive an “Alignment Complete!” message, and you are now aligned and ready to observe using CPWI.

If you want to choose where in the sky the mount will slew to obtain alignment references, select “Custom Points”. This also allows more than 4 alignment points to be used in the Auto-Alignment. Once selected, the StarSense User Auto Alignment Creator window will appear.

Use this window to select regions of sky that have a clear view from your location. 0° denotes the horizon, while 90° is zenith. Select at least 4 points. You can choose more than 4 points; this will add additional alignment references to the mount model. More reference points will provide better pointing (and tracking) accuracy across the entire sky but will take more time to complete. There will generally be little benefit from selecting more than 10 alignment points. After you have selected the alignment points, select "Complete." A pop-up window will appear and ask if you want to save your user auto-alignment references points. Select "Yes" if you want to use the chosen alignment points for future use, and you'll be prompted for a file location on your computer to save the file. You can use this file later by selecting "Load Custom Points" from the StarSense Automatic window.



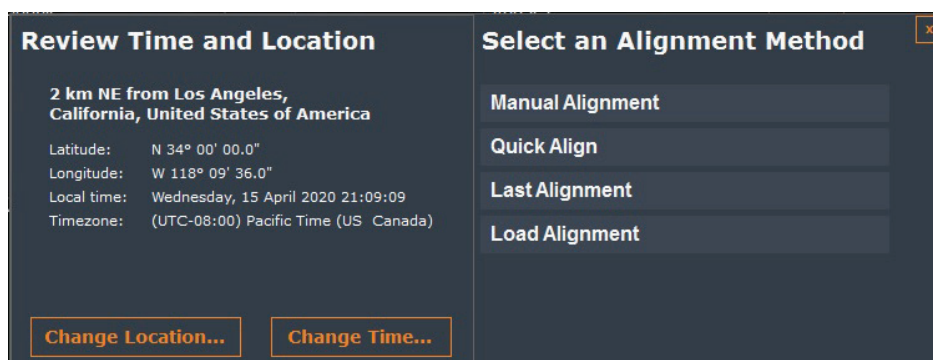
StarSense Manual Alignment

StarSense Auto Alignment is about as hands-off as it gets, but it also has its limitations. Depending on your location, sections of the sky may be blocked by a tree, building, or mountaintop. StarSense is unaware of these natural limitations and may slew to sections of the sky that are obstructed from the StarSense camera's field of view. This is OK because StarSense will automatically keep scanning the sky until it finds a clear view, but it causes the alignment to take longer. To speed up the process, consider using StarSense Manual Alignment if your observing location has many areas of obstructed sky.

You can perform a StarSense Manual Alignment by selecting “Perform Alignment” from the Alignment section of the Menu, and then selecting “StarSense Manual Alignment” from the Select an Alignment Method window. If the mount has home switches or sensors, CPWI will automatically move the mount to the home position. Otherwise, make sure you have the mount homed or at index marks. Alt/Az mounts should be pointing roughly north with the optical tube level, and EQ mounts should be roughly polar aligned. If you have not yet calibrated the StarSense camera, you can click “Calibrate” in the StarSense Automatic window. Otherwise, click “Ready,” and the Select Capture Point window will appear along with the Slew Controls window. Now, use the slew controls to manually slew the mount to a region of sky that has a clear view from your location. Then, click “Solve Here” from the Select Capture Point window. The StarSense camera will take an image and plate-solve it to create an alignment point. Repeat this process at least 3 additional times to obtain at least 4 alignment points. The telescope is now aligned and ready to be used with CPWI. You can repeat this process more than 4 times to obtain even greater pointing accuracy. For best results across the entire sky, use alignment points that are widely spaced apart.

Other Alignment Methods

After initially connecting the mount to CPWI, the Select an Alignment Method window appears. The Manual Alignment selection has been discussed previously in this manual. Here, we will review the other alignment methods that can be selected from this window.



Quick Align (EQ mounts only)

This is a “zero star” alignment – this alignment method relies on the accurate initial positioning of the mount. The EQ mount must be in the “home” position (i.e. counterweight shaft pointing straight down with the telescope tube parallel to the RA axis) and must be accurately polar aligned.

This alignment method is typically used for telescopes that are housed in an observatory, where the polar alignment is accurate and the mount is not moved. If the mount has home sensors, like the CGX and CGX-L mounts, then you can use this option for a remote alignment. Otherwise, you will typically find better pointing accuracy using the Manual Alignment selection.

Last Alignment

After you perform a manual alignment, the data is automatically saved. If you have not moved the mount since the last time you used it, you can select “Last Alignment”, and CPWI will use the data from the previous manual alignment. Then, to have an accurate alignment to the current night sky, all you need to do is select “Sync on Object” from the Alignment section of the Menu. The Select Target window will appear. Select an object in the SkyViewer, GoTo the object, center it with the onscreen slew controls, then click “Centered.” The last alignment should now be accurate to the sky.

Load Alignment

You can save a manual alignment by selecting “Save Alignment” from the Alignment section of the Menu. If you have saved an alignment previously, then you can use it by choosing “Load Alignment” from the Alignment Methods. The mount will need to be in the home position initially. If you have an EQ mount with home switches, like the CGX or CGX-L, the mount can be automatically slewed to the home position. You will be asked for the file location of the saved alignment. Once the alignment is loaded, you will be prompted to sync on a star. The Select Target window will appear. Select an object in the SkyViewer, GoTo the object, center it with the onscreen slew controls, then click “Centered.” The loaded alignment should now be accurate to the current sky.

Using the Celestron Focus Motor

With the Celestron Focus Motor attached to your Celestron telescope and connected to an AUX port on the mount, connect to CPWI. CPWI will automatically search for the Celestron Focus Motor. Once found, you will now see the Focuser section in the Menu:

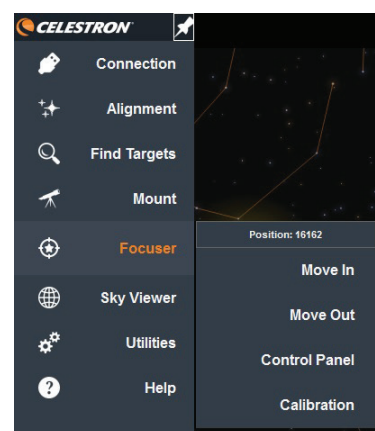
If you have not yet calibrated the Celestron Focus Motor to your telescope optical tube, start by selecting “Calibration” from the Focuser section in the Menu.

NOTE: If you have already calibrated the Focus Motor using the hand control, you don't need to do it again when using CPWI.

Then, click “Begin” from the Focuser Calibration pop-up window. The calibration process finds the inward and outward limits to the focuser mechanical travel and provides indexing so you can return to specific focuser positions. (The inward focus limit is index mark “0,” and each CCW rotation of the focuser knob adds 1000 counts.) The calibration process takes several minutes to complete, as the Focus Motor needs to move through the entire range of focuser motion. Click “Force Stop” to abort the Focus Motor calibration process, if needed.

Once calibration is complete, you can find the current focuser position at the top of the Focuser selection from the Menu. The motor will now stop before it reaches the inward and outward limits of focuser travel. Recalibrating your Celestron Focus Motor is required any time you remove it from the telescope optical tube.

For quick focusing, you can use the “Move In” and “Move Out” commands from the Focuser section in the Menu. Selecting “Move In” will move the primary mirror away from the Schmidt corrector at the fastest rate (rate 3), while selecting “Move Out” will move

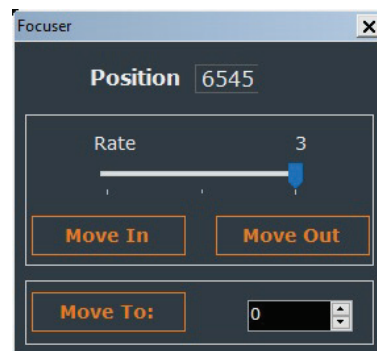


the primary mirror toward the Schmidt corrector at the fastest rate. You can monitor the focuser index position just above the “Move In” and “Move Out” commands to determine where you currently are in the focuser’s travel range.

For most precise focusing, select “Control Panel” from the Focuser section in the Menu. The Focuser pop-up window will appear.

Use the Rate slider to select the Focus Motor speed rate. Selecting rate 1 rotates the focus knob at 8°/second, rate 2 rotates the focus knob at 32°/second, and rate 3 rotates the focus knob at 128°/second. Choose rate 1 for fine focusing. To move the focuser inwards (i.e. primary mirror moves away from Schmidt corrector), click “Move In.” To move the focuser outwards (i.e. primary moves towards the Schmidt corrector), click “Move Out.” You can monitor the current focuser index position in the Focuser pop-up window. To return to a specific focuser index position, enter the position into the box on the bottom right of the window, and then click “Move To.” This is convenient if you already know the specific focuser index position that focuses your setup. The next time you observe, you can enter this focuser position, click “Move To,” and the telescope should be in good focus.

Refer to the online instruction manual at celestron.com for more information on the Celestron Focus Motor.



Using a Celestron GPS Accessory

With the Celestron SkySync GPS (or the older CN16 GPS) accessory connected to an AUX port on the mount, connect to CPWI. CPWI will automatically search for the GPS accessory. Once found, you will see the GPS section in the Menu. Once the GPS accessory satellite links and is ready to be used, select GPS, and you will be able to see your latitude and longitude coordinates as reported by the GPS accessory. CPWI will now use the location data provided by the GPS accessory. You can see this information when you perform an alignment in the “Review Time and Location” area of the Select an Alignment Method window. To disable the use of the GPS location data for the alignment, deselect the “Enable GPS” checkbox in the “Review Time and Location” area.

Menu Options

In this section, we will review the more detailed functionality that can be accessed from the different sections of the Menu on the left side of the screen once connected to the mount.

Connection

This is where it all starts. Select “Mount USB,” “Hand Controller,” or “WiFi” as indicated previously in this manual to connect CPWI to the mount and start an observing session. Once connected, you can select “Disconnect” to disconnect CPWI from your mount.

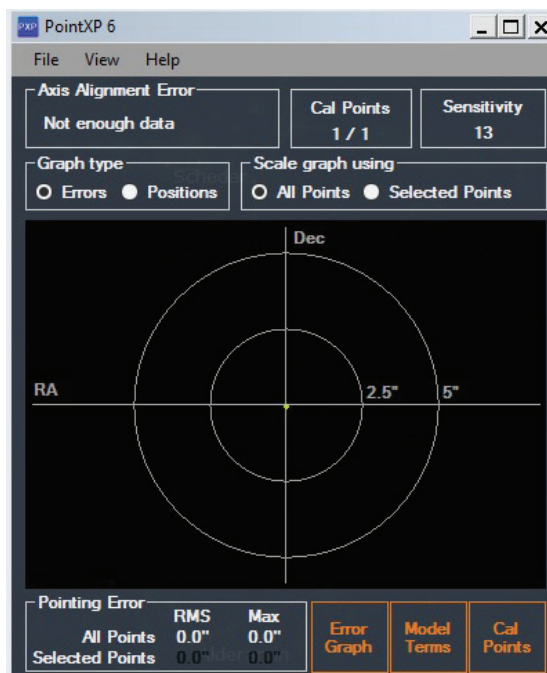
Alignment

View Pointing Model – Selecting this will open up the PointXP 6 window.

Here you can find detailed information about the current mount alignment model. For a detailed YouTube video discussion of this window, refer to the Pointing Model Help in the Help section of the Menu (requires internet connection). You can also access this video by selecting Help from the options at the top of the PointXP 6 window. For a simplified user interface to the current mount alignment model, select “Add Reference(s)” from the Alignment section of the Menu (see below).

Perform ASPA - Discussed previously in this manual, this selection achieves accurate polar aligning of EQ mounts (including AZ mounts on EQ wedges).

Add References - Allows additional alignment reference points to be added to the mount model. If you notice your mount’s pointing accuracy is not quite as accurate as you would like in certain areas of the sky, add a pointing reference (i.e. star) in that area of sky to increase pointing accuracy. You can also add any object to the mount model by clicking on it in the SkyViewer and then clicking “Add to Model” from the object information pop-up window.



When Add References is selected, the Pointing Model Information window will appear.

Select Target

Select a target by clicking an object in the SkyViewer and then click 'Goto'

Finish

Pointing Model Information

#	RA	Dec	Enc0	Enc1	LST	Error
☒ 1	12:54:02.0	55:57:34.9	59:37:12.7	56:03:45.7	04:52:25.3	1"
☒ 2	11:03:43.7	61:45:01.6	87:04:05.0	61:41:26.9	04:52:54.0	4"
☒ 3	21:18:35.1	62:35:09.0	113:00:34.9	117:17:36.4	04:53:26.7	3"
☒ 4	00:40:10.2	56:34:08.3	62:08:45.0	123:28:10.9	04:53:52.6	0"
☒ 5	02:50:15.2	55:51:20.3	107:05:13.9	124:01:32.8	10:02:32.6	2"

RMS Error 2"

Polar Error West 26' 47"

Total Points 5 / 5

Polar Error North 10' 31"

Each alignment reference currently in the mount model will be displayed. Besides adding additional alignment references to the mount model to increase accuracy, you can also try disabling any alignment points currently in the model that appear to be creating significant error. Do this by unchecking the checkbox to the left of each alignment reference. You can then look at the RMS Error displayed at the bottom of the window; if the number gets smaller, then disabling that alignment reference helped the model.

NOTE: For EQ mounts, if disabling an alignment reference leaves less than two alignment references on one side of the meridian, the Pointing Model Information box will recommend using another alignment reference on that side of the meridian.

You can also see the polar alignment error calculated from the mount model at the bottom of the window. If the polar alignment error is more than a couple of arcminutes, considering using the "Perform ASPA" option in the Alignment section of the Menu. If StarSense AutoAlign is connected, selecting Add References will also initiate a StarSense manual alignment. Follow the onscreen instructions in the "Select Capture Point" section of the Pointing Model Information window."

Sync on Object – This short procedure is required after a "Load Alignment" and "Last Alignment." Refer to "Load Alignment" and "Last Alignment" under the "Other Alignment Methods" section of this manual.

Save Alignment - Allows you to save an alignment to a file location on your computer so that it can be loaded in the future using the "Load Alignment" alignment method option.

Save Alignment and Park Mount – Automatically saves the current alignment (same as "Last Alignment") and prompts to slew the mount to a "park" position so the mount can be powered off in that position. You can then slew the mount using the onscreen slew controls to any preferred position, then disconnect the mount when instructed by CPWI. CPWI will remember the previous park position, and you can choose to automatically slew to this same park position the next time the mount is parked. (The initial default park position for EQ mounts is with the OTA on the east side of the mount pointing downwards. For AZ mounts, the initial default park position is with the OTA level and pointing North.) Save Alignment and Park Mount is typically performed when the telescope system is in a permanent or semi-permanent installation, like a backyard observatory. This way, the telescope can be stored in a preferred position, and still be aligned the next time it is used. The next time CPWI is connected it will automatically ask to "Un-Park" the mount, and the mount will be ready to be used. (NOTE: You are not required to Sync on Object after un-parking the mount.)

Delete Alignment - Deletes the current alignment. To use the mount after deleting the alignment, a new alignment will need to be performed or loaded.

Find Targets

The functionality for this section was discussed previously in this manual.

Mount

Stop Mount - Selecting this option stops the mount from moving. This can be very useful in preventing crashes, if you see the telescope is going to slew into something.

Slew Controls - This selection quickly displays the manual slew controls on screen.

Configure Mount – This selection allows changing various mount parameters. After making changes here, click "Accept" to save the changes. To return to previous settings, click "Reset."

- **Custom Rate 9** -This selection allows you to vary the speed rate for the fastest slew rate (i.e. Rate 9).

NOTE: Setting Rate 9 above the default setting may cause a decrease in motor performance for some setups.

NOTE: The NexStar SE6/8 and NexStar SLT mounts do not support Custom Rate 9 functionality.

Mount Configuration

Custom Rate 9

☐ Enable Rate (deg/sec): 4.0

Backlash

RA (0-99) 0

DEC (0-99) 0

RA Slewlimits

☒ Enable

East (deg) -20

West (deg) -20

AutoGuider Rates

RA (0-99) 97

DEC (0-99) 97

Tracking

Rate: SIDEREAL

☐ Ra + Dec Tracking

Reset

Accept

- **Backlash** - This selection allows you to set the backlash compensation for each of the mount's axes of motion. Mechanical gears have a certain amount of backlash or play between the gears. This play is evident in the amount of time it takes for a star to move in the eyepiece when reversing slew directions. The amount of gear backlash is constant, so with the slower slewing rates, it will take longer for the star to move in the eyepiece when reversing directions. CPWI's anti-backlash feature allows you to compensate for backlash by inputting a value that quickly rewinds the motors just enough to eliminate the play between gears. The amount of gear backlash is different in each mount, so you will need to experiment to determine the best value for your mount. Most mounts work best with values between 30 and 70. It is generally better to have a value that is too small than too large. If the value is too large, you will see the object overshoot when you change directions, which will make it hard to center objects in the field of view.

NOTE: Gear backlash compensation is only recommended for visual use and may be counterproductive when used during astrophotography. When tracking is enabled, the mount will be moving in one or both axes. Pressing a direction button opposite to the direction of tracking will cause the gear backlash compensation to activate twice; once when you push the direction button, and again when you release it and tracking resumes.)

To set the anti-backlash value, enter a value from 0-99 for both RA and Dec (or AZ and ALT). CPWI will remember these values and use them each time you turn the telescope on until the values are changed. If you do not want to use any backlash compensation, make sure the value for each axis is 0.

- **RA Slewlimits (EQ mounts only)** - This selection allows you to set how far beyond, or how far before, the meridian the mount will slew in RA before requiring a meridian flip. This functionality is especially useful during astroimaging, as you may want to track an object through the meridian for as long as your mount allows before performing a flip. To use the RA Slewlimits, first select the "Enable" checkbox, then set the limits for East of the meridian and West of the meridian. Negative numbers indicate the number of degrees past the meridian. The limit is -20° since most Celestron EQ mounts cannot slew further than 20° past the meridian due to mechanical limitations. A positive number indicates a meridian flip will occur before the mount reaches the meridian. +40° before the meridian is the maximum value allowed. (NOTE: It is important to know the mechanical limits to motion past the meridian for your mount before these limits are entered, otherwise you may reach the mechanical limit before the software slew limit, which may cause you to need to realign the mount.) (NOTE: AZ mounts on EQ wedges do not have a limitation on how far past the meridian they can slew.)
- **Altitude Slewlimits (AZ mounts only)** - This selection allows you to define the allowable slew range in the altitude axis. This can be useful for preventing accessories attached to the rear cell of the mount from hitting the base of the mount when the telescope is pointing straight up. To use the altitude slewlimits, first check the "Enable" box. Then, set the lower limit and upper limit to the altitude slew range (0° is the horizon, 90° is zenith).
- **AutoGuider Rates** - This selection allows you to set the autoguiding rate as a percentage of sidereal rate. This is helpful when calibrating your telescope to an autoguiding camera for long exposure astroimaging.
- **Tracking** - Choose from sidereal, solar, or lunar rates. The current tracking rate selected will appear in the "Mount State" section of the Data bar at the top of the screen. For EQ mounts, you can also activate tracking in both axes by selecting the "Ra + Dec Tracking" checkbox. This can be useful to use if your polar alignment isn't very good.
- **PEC** - Enables PEC playback for mounts that support it. (See Train PEC below.)
- **Meridian Sweep (EQ mounts only)** - This function instructs the mount how to respond to GoTo commands when slewing to objects that are near the meridian. It can be used to prevent unwanted meridian flips. Meridian Sweep allows the telescope tube to remain on a desired side of the mount after slewing to the object. (NOTE: If the RA Slewlimits are enabled, they will provide a limit to how far past the meridian the mount can go until a meridian flip is performed.) (NOTE: AZ mounts on an equatorial wedge do not require this function, as they do not need to perform a meridian flip.)

Once enabled by selecting the "Enable" checkbox, there are three options:

- **Favor East** - If the target object is accessible from both sides of the mount, selecting "Favor East" instructs the mount to GoTo to the object as if it were on the east side of the meridian. The optical tube will then be positioned on the west side of the mount and pointing east.
- **Favor West** - If the target object is accessible from both sides of the mount, selecting "Favor West" instructs the mount to GoTo to the object as if it were on the west side of the meridian. The optical tube will then be positioned on the east side of the mount and pointing west.
- **Favor Current** - Selecting "Favor Current" instructs the mount to favor whichever side the mount is currently on when slewing to objects close to the meridian.

The "Angle" selection box allows you to choose how far past the meridian the mount can slew during a GoTo command before the meridian flip is performed. Make sure the number you enter in this box is less than any negative slew limit if RA Slewlimits are enabled. If RA Slewlimits are not enabled, then make sure the "Angle" is less than the number of degrees that your mount can move past the meridian before mechanical interferences occur.

- **GoTo Approach Direction** - Use this setting to change the direction of the mount's final approach when slewing to an object. You can change the approach direction for each axis of the mount. For EQ mounts, RA positive means the mount

approaches from east to west, while RA negative means the mount approaches west to east. DEC positive means the mount approaches from south to north, while DEC negative means the mount approaches from north to south.

For AZ mounts, azimuth positive means the mount approaches from clockwise, while azimuth negative means the mount approaches from counter-clockwise. Altitude positive means the mount approaches down to up, while altitude negative means the mount approaches up to down.

This functionality allows you to minimize the effects of backlash. For example, for AZ mounts, if your telescope is back heavy from using heavy optical or photographic accessories, you would want to set your altitude approach to the negative direction. This would ensure that the telescope always approaches an object from the direction opposite the load pulling on the scope.

- **Cordwrap (AZ mounts only)** – This function prevents the power cable from wrapping around the mount when slewing in azimuth. When “Enable Cordwrap Here” is clicked, the cordwrap position will be set at 180° away in azimuth from the current mount position. The mount will not slew past the cordwrap position in one direction, rather it will reverse direction and approach the object from “the long way around” in azimuth to prevent the power cable from wrapping around the mount. To disable the cordwrap functionality, click “Disable Cordwrap”.

Train PEC - Errors are inherent in all worm gears. Periodic Error Correction (PEC) improves the tracking accuracy of the RA motor drive by reducing the amplitude of your mount’s particular worm gear errors. Not all Celestron mounts support PEC. Train PEC will not appear as a selection if your mount doesn’t support it.

Using PEC is a three-step process. First, the mount needs to find the worm gear “index position” so it has a starting point reference when playing back the recorded error. Next, you must autoguide your mount’s tracking using an autoguiding camera (i.e. an “autoguider”) for at least 10 minutes – about the time it takes for a full rotation of the worm gear. During this time, the mount records the corrections made by the autoguider; this is the “Train PEC” process. This “teaches” the periodic error characteristics of the worm gear to the mount. The periodic error of the worm gear drive is then stored in memory. The final step is to playback the periodic error corrections made during the training process during regular tracking. This will greatly reduce the overall tracking error in the system. PEC is intended for advanced astrophotography and will still usually require autoguiding during imaging when used. However, the autoguider will no longer need to make large amplitude tracking error corrections, ensuring pinpoint stars in the final image.

To train PEC, first make sure the telescope has been accurately polar aligned. We recommend using the All-Star Polar Alignment (ASPA) functionality described earlier in this manual. Once polar aligned, follow these steps:

1. Find a bright star relatively close to the object you want to image.
2. Insert the autoguiding camera into the eyepiece holder of your telescope and connect the camera to your computer. Orient the autoguider so that one axis of the sensor is parallel to the declination axis while the other is parallel to the R.A. axis.
3. Focus the telescope so the stars in the autoguider are in sharp focus on your computer screen.
4. Connect the autoguider’s guiding output port to the autoguider port on the mount’s electronics panel using an ST-4 compatible autoguider cable.
5. Confirm that the autoguider is working to guide the mount.
6. To begin recording the drive’s periodic error, select “Train PEC” from the Utilities section of the Menu. Click on “Begin PEC Training.” The first time each observing session that PEC training or playback is selected, the worm gear must first rotate to its index position. If the worm gear rotation moves your guide star outside the field of view of the autoguider, the guide star will need to be re-centered before the recording begins. In some instances, it may be necessary to restart PEC recording after the worm gear has found its index. Do this by clicking “Cancel PEC Training” and then click on “Begin PEC Training” again.
7. After 10 minutes, PEC Training will automatically stop recording. PEC will now be active (i.e. PEC playback is now on). Click on “No, Stop training PEC” in the pop-up window to finish. If you would like to redo the PEC Training, click on “Yes, Stop PEC Playback.” You can repeat the entire process; the previously recorded PEC data will be replaced with the new PEC data.

You are now ready to image using PEC. If you would like to disable PEC playback, then “Configure Mount” from the Mount section of the Menu and deselect the “Enable PEC playback” box in the PEC area of the Mount Configuration window. Does the PEC function make unguided astroimaging possible? Yes and no. For shorter exposures with shorter focal length telescopes, the answer is yes. However, even with PEC, autoguiding is still mandatory for long exposure deep sky astroimaging with longer focal length telescopes.

GoTo Home – For mounts that have home position sensors, like the CGX and CGX-L mounts, selecting this automatically slews the mount to the home position.

Disable Tracking – Selecting this option turns off tracking. Once turned off, it will state “Stopped” in the Mount State section of the Data bar at the top of the screen. To turn tracking back on, select Enable Tracking.

SkyViewer

The functionality for this selection was discussed previously in this manual. Please see page 6.

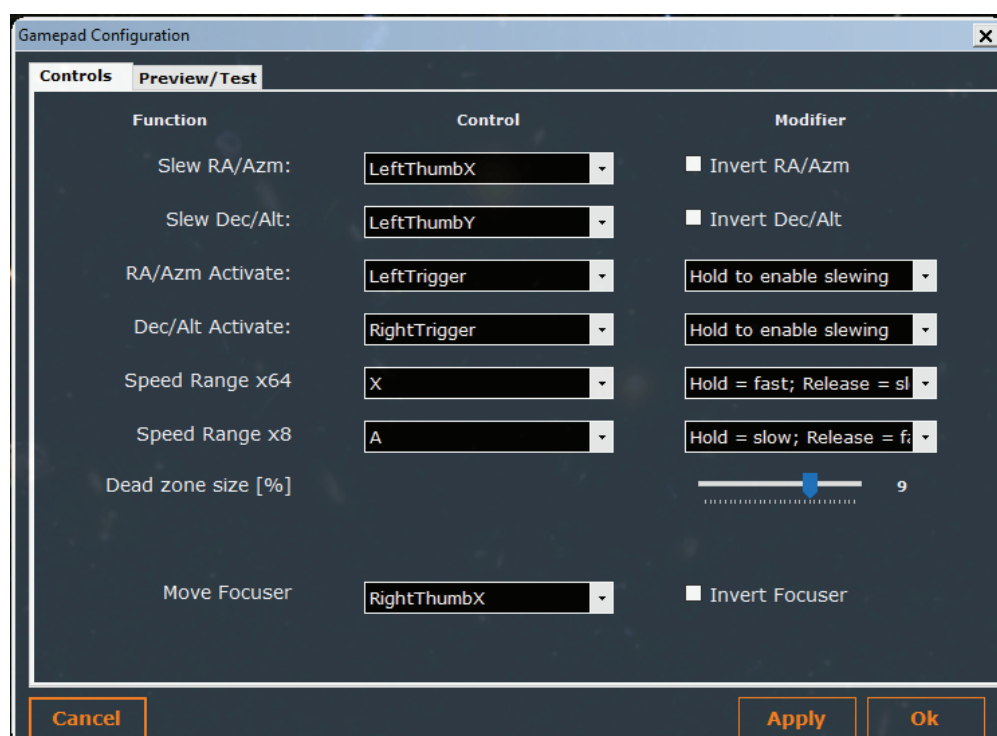
Utilities

Connect StarSense – Prompts CPWI to find and connect to the StarSense AutoAlign accessory. If the StarSense camera is already connected to the mount upon initial connection to CPWI, this command is not necessary since CPWI will automatically find and connect to StarSense AutoAlign.

Connect Focuser– Prompts CPWI to find and connect to the Celestron Focus Motor. If the Celestron Focus Motor is already connected to the mount upon initial connection to CPWI, this command is not necessary since CPWI will automatically find and connect to the focus motor.

Connect GPS – Prompts CPWI to find and connect to the Celestron SkySync GPS (or the older CN16 GPS). If the Celestron GPS accessory is already connected to the mount upon initial connection to CPWI, this command is not necessary since CPWI will automatically find and connect to the GPS accessory.

Gamepad Setup-- If you have a PC Gamepad that supports XInput, then you can use it to control the mount. You can also use it to control the optional Celestron Focus Motor. Selecting "Gamepad Setup" will cause the Gamepad Configuration window to appear.



Use the drop-down menu under the Control column to define how each function is controlled by the Gamepad. For the "Slew RA/Azm", "Slew Dec/Alt", and "Move Focuser" functions, these will typically be controlled by the Gamepad joysticks. If you want to reverse the directions of the joysticks for any of these commands, select the "Invert" checkbox in the Modifier column. For the "RA/Azm Activate" and "Dec/Alt Activate" functions, these will typically be controlled by the Gamepad buttons (or triggers). These "activate" controls only allow the joysticks to work to slew the mount when the button is pressed, this prevents any accidental slewing if the joysticks are accidentally moved. In the Modifier column, you can use the drop-down menu to reverse the polarity of the buttons – the mount will only move if the buttons are not pressed. Mouse over each selection in the window for more information.

There is one base speed range and two Speed Range "boost" functions which boost the range by 8x and/or 64x respectively. These boost functions can work in tandem, and by default both speed boosts are active when the buttons are released and deactivated when you press the buttons. The polarity of these buttons can be reversed using the selections in the Modifier column. This allows you to choose any of the four overlapping ranges as the "preferred" range that operates when no button is pressed. The table below indicates the speed ranges and the equivalent hand control MOTOR SPEED rates.

	Speed Range	Hand Control Motor Speed Equivalent
Base	1 arcsec/sec to 1 arcmin/sec	rate 0 to rate 3
x8 Active	8 arcsec/sec to 8 arcmin/sec	rate 1 to rate 5
x64 Active	1 arcsec/sec to 1 deg/sec	rate 3 to rate 7
x8 Active and x64 Active	1 arcsec/sec to 4 deg/sec*	rate 5 to rate 9*

* up to max speed of mount

Most consumer-grade joysticks do not return to exactly zero when they are released. It is therefore common for control software to ignore inputs less than a certain value. This region is the “dead zone” and is defined in CPWI as a percentage deflection of the joystick. Below this setting, inputs will be ignored and treated as zero deflection. The default setting is 10%; if you find that your mount has a tendency to keep slewing after you release the joystick, then you should increase the “Dead zone size” setting. (Note: The Preview / Test tab shows the percentage reading from the joystick after the dead zone correction has been applied, this number should always return to zero when you release the joystick.)

Once you have configured the Gamepad, click “Apply”.

At the top of the Gamepad Configuration window you will see a Preview/Test tab. Selecting this tab will allow you to check the functionality of your Gamepad by confirming its commands are being received by CPWI.

WiFi WLAN Config - This is used to establish a WiFi connection in “access point” mode. This is described in the “Connecting CPWI to Your Mount” section of this manual.

Hot Keys - Selecting this makes the Hot Keys window appear. This gives a handy primer for all the hot key combinations available in CPWI.

Help

Pointing Model Help - If you are connected to the internet, selecting this will bring up a YouTube video that provides a detailed primer for the mount modeling used in CPWI. It also gives detailed descriptions of the options found in the PointXP 6 window.

Version History - Selecting this will provide detailed release notes for each version release of CPWI.

About - Selecting this gives the version number of current CPWI version installed and also gives credits and acknowledgments.

ASCOM Commands Through CPWI

CPWI supports ASCOM commands from third-party software to control the connected Celestron mount and Celestron Focus Motor. This is done with custom ASCOM drivers built into CPWI. To use CPWI's ASCOM drivers, first connect CPWI to your mount (and focus motor) as you normally would. Then, from the third-party software, select “CPWI” or “CPWI Focuser” to connect to the mount or focus motor through CPWI.

NOTE: The CPWI ASCOM drivers are automatically installed during CPWI software installation if and only if the ASCOM platform is already installed on the PC. So, install the ASCOM platform on your PC before you install CPWI, or else it will not work. The ASCOM platform download can be found at <https://ascom-standards.org/Downloads/Index.htm>.

Hot Keys	
Keys	Command
Up	Slew up
Down	Slew down
Left	Slew left
Right	Slew right
D9	Set Rate to 9
D8	Set Rate to 8
D7	Set Rate to 7
D6	Set Rate to 6
D5	Set Rate to 5
D4	Set Rate to 4
D3	Set Rate to 3
D2	Set Rate to 2
D1	Set Rate to 1
S	Stop Mount
Z	Focuser move out
X	Focuser move in
D3 + CTRL	Focuser Rate 3
D2 + CTRL	Focuser Rate 2
D1 + CTRL	Focuser Rate 1

Celestron PWI was co-developed by PlaneWave Instruments and Celestron.

Please check the CPWI support page for any changes or updates to the CPWI software.