



# NexStar® SE

## INSTRUCTION MANUAL

Model #11068- NexStar 6 SE

Model #11069- NexStar 8 SE

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INTRODUCTION

Congratulations on your purchase of the Celestron NexStar SE! This revolutionary telescope has ushered in a whole new generation of computer-automated technology. Intuitive and user-friendly, NexStar SE is up and running after locating just three bright objects in the night sky. It's the perfect combination of power and portability. If you are new to astronomy, you may wish to start by using the NexStar SE's built-in Sky Tour feature, which commands the NexStar to find the most interesting objects currently visible and automatically slew to each one. If you are an experienced amateur, you will appreciate the telescope's comprehensive database of over 40,000 celestial objects, including customized lists of all the best deep-sky objects, bright double stars and variable stars. No matter your experience level, NexStar SE will reveal the wonders of the Universe to you and your friends.

Some of the NexStar SE's many standard features include:

- Incredible 5°/second slew speed.
- Fully enclosed motors and optical encoders for position location.
- NexStar+ hand control built into the side of the fork arm.
- Storage for programmable user defined objects.
- Many other high-performance features!

NexStar SE's deluxe features combined with Celestron's legendary optical standards give amateur astronomers one of the most sophisticated and easy-to-use telescopes available on the market today.

Take time to read through this manual before embarking on your journey through the Universe. It may take a few observing sessions to become familiar with your NexStar SE, so keep this manual handy until you have fully mastered your telescope's operation. The NexStar+ hand control has built-in instructions that guide you through the alignment procedures, so you can have the telescope up and running in minutes. Use this manual in conjunction with the hand control's on-screen instructions.

Your NexStar SE telescope will give you years of fun and rewarding observations. However, there are a few things to consider before using your telescope to ensure your safety and protect your equipment.

SOLAR WARNING



- Never look directly at the Sun with the naked eye or with a telescope (unless you have the proper solar filter). Permanent and irreversible eye damage may result.
- Never use your telescope to project an image of the Sun onto any surface. Internal heat build-up can damage the telescope and any accessories attached to it.
- Never use an eyepiece solar filter or a Herschel wedge. Internal heat build-up inside the telescope can cause these devices to crack or break, allowing unfiltered sunlight to pass through to the eye.
- Never leave the telescope unsupervised. Make sure an adult who is familiar with the correct operating procedures is with your telescope at all times, especially when children are present.

WHAT'S IN THE BOX



Fig. 1 NexStar 8SE Shown

1	Optical Tube
2	Dovetail Bar
3	Liquid Crystal Display
4	NexStar+ Hand Control
5	Fork Arm Mount
6	Power Connection
7	Tripod Mounting Plate
8	Tripod
9	Accessory Tray/Leg Brace
10	StarPointer Red Dot finderscope
11	Eyepiece
12	Star Diagonal
13	Focuser Knob
14	Battery Compartment
15	On/Off Switch

PARTS LIST

The NexStar SE comes partially pre-assembled so it can be up and running in a matter of minutes. The telescope is conveniently packaged in one reusable shipping carton that contains all the following accessories:

- 25mm eyepiece – 1.25"
- Star diagonal – 1.25"
- StarPointer red dot finderscope
- Adjustable steel tripod
- NexStar+ computerized hand control
- 13mm open-end wrench for upper tripod leg tightening (if needed)

APPS AND PROGRAMS

- Starry Night Special Edition astronomy software – Free download: [celestron.com/astronomy-software/se](http://celestron.com/astronomy-software/se)
- SkyPortal App – Free download: [celestron.com/pages/skyportal-mobile-app](http://celestron.com/pages/skyportal-mobile-app)



Celestron SkyPortal Powered by SkySafari™ (available for iOS and Android), is a planetarium app that can help you locate and identify celestial objects currently visible from your exact location. Give it a try!

# ASSEMBLING THE NEXSTAR SE

Start by removing the telescope from its shipping carton and setting the round base of the mount on a flat surface. It is best to carry the telescope by holding it from the lower portion of the fork arm and the bottom of the base. Remove all the accessories from their individual boxes. Save all the containers so that they can be used to transport the telescope later. Before the batteries can be installed, the telescope tube should be positioned parallel to the ground. To do this, gently rotate the front of the tube upwards.

**WARNING:** While the tube can be slowly raised by hand, the telescope base should never be moved in azimuth by hand.

## POWERING THE NEXSTAR SE

You can power your NexStar SE with eight AA batteries (not included), an optional 12v AC adapter, or any of Celestron's PowerTank external power sources. The battery compartment is in the center of the telescope's base.

To power the telescope with AA batteries:

1. Remove the battery cover from the center of the base by gently lifting on the round portion of the cover.
2. Insert the batteries into the battery compartment on the base.
3. Reattach the battery compartment door by gently pushing down on the cover until it snaps into place.
4. Turn on the power by flipping the on/off switch, located on the base of the fork arm, to the "ON" position.



Fig. 2

## THE HAND CONTROL

You'll find the NexStar+ hand control on the side of the fork arm. You can remove it from its cradle for handheld use or use it while attached to the fork. The hand control attaches to the fork arm by resting on two posts on the bottom of the hand control cradle, and a clip inside the fork arm. To remove the hand control from the fork arm cradle, gently lift the hand control upwards and pull out.

Once the telescope is powered on, you can use the hand control to move the optical tube in altitude (up and down) and azimuth (side to side) by pressing the directional arrow buttons.

Next, we'll attach the included visual accessories to the telescope.

## VISUAL ACCESSORIES

### THE STAR DIAGONAL

The star diagonal diverts the light at a right angle from the light path of the telescope. This allows you to observe in positions that are more comfortable than if you were to look straight through.

To attach the star diagonal:

1. Turn the thumbscrew on the visual back so that the screw clears the opening on the visual back.
2. Slide the chrome barrel of the star diagonal into the opening.
3. Tighten the thumbscrew on the visual back to hold the star diagonal in place. Do not overtighten.

If you wish to change the orientation of the star diagonal, loosen the thumbscrew on the visual back until the star diagonal rotates freely. Rotate the diagonal to the desired position and tighten the thumbscrew.



Fig. 3

### THE EYEPIECE

The eyepiece, or ocular, is the optical element that magnifies the image focused by the telescope. The eyepiece can either fit into the visual back directly or into the star diagonal.

To install the eyepiece:

1. Loosen the thumbscrew on the star diagonal so that the screw clears the opening on the star diagonal.
2. Slide the chrome barrel of the eyepiece into the star diagonal opening.
3. Tighten the thumbscrew on the star diagonal to hold the eyepiece in place.

Eyepieces are commonly referred to by focal length and barrel diameter. The focal length of each eyepiece is printed on the eyepiece barrel. The longer the focal length (i.e., the larger the number), the lower the eyepiece's power or magnification is. The shorter the focal length (i.e., the smaller the number), the higher the magnification is. Generally, you will use low-to-moderate power when viewing. To determine an eyepiece's power when used with your telescope, use this simple equation: Focal Length of Telescope ÷ Focal Length of eyepiece = Magnification. For example, if your telescope has a focal length of 700mm and you are using an eyepiece with a 25mm focal length, your equation will look like this: 700mm ÷ 25mm =28X. For more information, go to [celestron.com](http://celestron.com).

The NexStar SE series uses eyepieces with industry-standard 1.25" barrel diameters. You may also use eyepieces with a 2" diameter, but you'll need an optional 2" star diagonal.

### THE STARPOINTER RED DOT FINDERSCOPE

Your NexStar SE telescope includes a StarPointer red dot finderscope. The StarPointer is a zero-magnification pointing tool that uses a coated glass window to superimpose the image of a small red dot onto the night sky. The red dot is produced by a light-emitting diode (LED), not a laser beam, so it and cannot damage the glass window or your eye. It is equipped with a variable brightness control, two axes alignment control and a quick-release dovetail mounting bracket. Before you can use the StarPointer, it must be installed on the telescope tube and properly aligned.

To install the StarPointer finderscope:

1. Loosen the two mounting screws near the bottom of the finderscope.
2. Locate the dovetail mounting bracket on the rear cell of the optical tube.
3. Slide the base of the finderscope over the dovetail mounting bracket.
4. Tighten the screws to secure the finderscope in place.

Your StarPointer red dot finderscope is shipped with a clear plastic tab between the lithium battery (CR2032) and the contact to prevent the battery from accidentally being discharged during shipment. Pull this tab out before using your finderscope.

ADJUSTING THE OPTICAL TUBE

The NexStar SE dovetail quick-release bracket allows you to adjust the optical tube for proper balancing or to remove the tube for storage. To adjust or remove the tube from the base, simply loosen the quick-release clamp knob and slide the tube back towards the rear cell of the tube. Hold the tube firmly when mounting or dismounting and ensure the dovetail clamp is tight before releasing the tube.

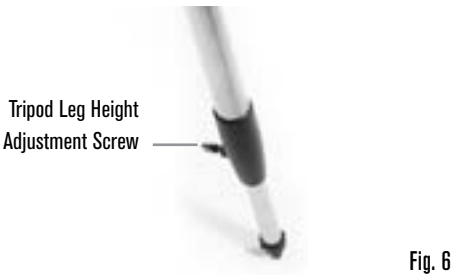


ATTACHING THE NEXSTAR TO THE TRIPOD

The Celestron NexStar tripod is a sturdy, heavy-duty base for your NexStar 6SE or 8SE. This tripod can go anywhere, from your backyard to a remote observing site. The tripod comes completely assembled and only needs to have the center leg accessory tray attached.

To set up the tripod:

1. Hold the tripod with the tripod head up, away from the ground.
2. Pull the 3 tripod legs apart until they are fully extended and place the tripod on the ground.
3. Remove the leg brace locking knob and slide the accessory tray onto the center support rod (figure 5).
4. Align the 3 arms of the accessory tray with the inside curve of each tripod leg.
5. Reinstall and tighten the leg brace locking knob until the accessory tray arms are pressed firmly against each leg and the legs are supported.
6. The tripod should now stand firmly on its 3 legs. You are now ready to adjust the height.
7. Locate the tripod leg height adjustment screw on the inside of each tripod leg (figure 6).
8. Loosen each screw and raise the tripod to adjust to the desired height for each leg.
9. Place the included bubble level (figure 5) on the top of the tripod mounting plate to help fine tune your adjustments and ensure the tripod is level.
10. When you are satisfied, tighten the leg height adjustment screws.



11. Next, attach the assembled telescope and mount to the tripod. Start by setting the base of the telescope on the tripod mounting plate so that the hole in the center of the mount base aligns with the positioning pin on top of the tripod (figure 7).
12. Rotate the telescope mount so the 3 feet align with the 3 recesses on the tripod mounting plate.
13. Tighten the captive mounting bolts (figure 5) attached to the underside of the tripod mounting plate until the telescope mount is firmly secured against the tripod mounting plate.

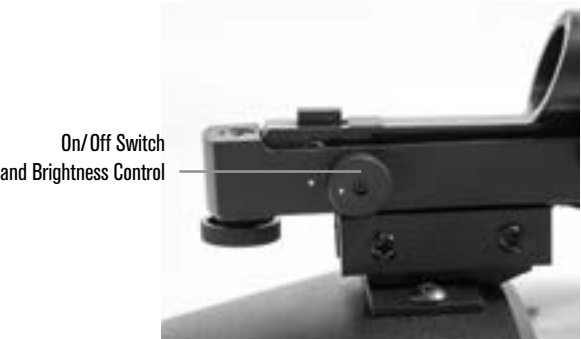
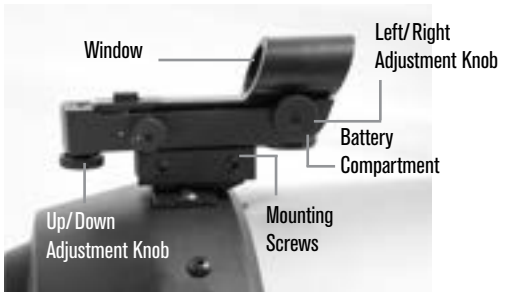


ALIGNING THE STARPOINTER FINDERSCOPE

The first time you assemble your telescope, you will need to align the StarPointer with the main optics of the telescope. Although this step can be done at night, it is significantly easier during the day. Once you have completed the finderscope alignment, you should not have to repeat this step unless the finderscope is bumped, dropped, or removed.

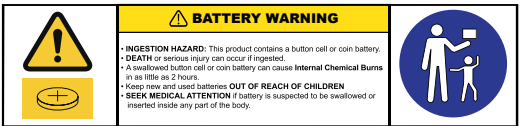
To align the finderscope:

1. Take the telescope outside during the day. Using your naked eye, find an easily recognizable object, such as a streetlight, car license plate, or tall tree. The further away the object, the better. The minimum recommended distance is one quarter mile.
2. Remove the main dust cover from the telescope and install your 25mm eyepiece and star diagonal as described above.  
**NOTE:** Always use your longest focal length (lowest power) eyepiece when aligning the finderscope.
3. Turn power on to the mount and move the telescope left and right or up and down so that it is roughly pointing toward the object you chose in step 1.
4. Look through the telescope and move the telescope until the object you chose lies in the center of the view. If the image is blurry, gently turn the focus knobs until it comes into sharp focus.
5. Turn on the finderscope by rotating the power switch knob clockwise as far as it will go.
6. With your head positioned about a foot behind the finderscope, look through the round window and locate the red dot. It will probably be close to, but not on top of, the object you see when you are looking through the eyepiece.
7. Without moving the telescope, adjust the two knobs on the side and underneath the finderscope until the red dot appears over the same object you are observing in the eyepiece. One knob controls the left-right motion of the dot, while the other controls the up-down motion.



Next, choose some other distant targets to practice aiming your telescope. Look through the StarPointer finderscope window and place the red dot on the target you are trying to view. Then verify that it is in the eyepiece of the scope.

**NOTE:** Be sure to turn off the StarPointer finderscope when not in use to conserve battery power.



YOUR NEXSTAR SE IS NOW READY TO EXPLORE THE UNIVERSE!



GETTING STARTED- USING THE NEXSTAR+ HAND CONTROL

Your NexStar telescope is equipped with the NexStar+ hand control. The hand control features a USB connector so you can link it to your PC to perform firmware updates or control the telescope via your computer.

MAKE SURE YOU HAVE THE LATEST FIRMWARE

To update the firmware, simply plug a mini USB cable (not included) into the port on the bottom of the hand control, and plug the other end into an available USB port on your PC. Run Celestron Firmware Manager (CFM), available for free from the support section on [Celestron.com](#). For details, go to APPENDIX C on page 34 of this document. Below is a brief description of the individual components of the NexStar+ hand control.

1. **LIQUID CRYSTAL DISPLAY (LCD) WINDOW:** Features red backlighting for comfortable nighttime viewing of telescope information and scrolling text. (Be sure to remove the clear protective tape from the screen before use.)
2. **ALIGN:** Instructs the telescope to begin the default alignment procedure. It is also used to select star or object as an alignment position.
3. **DIRECTION KEYS:** Allow you to manually slew your telescope in any direction.
4. **CATALOG KEYS:** Allow direct access to each of the main catalogs in the database of thousands of objects. Your telescope contains the following catalogs:
  - **Solar System** – All 7 planets in our Solar System plus the Moon, Sun and Pluto
  - **Stars** – Custom lists of all the brightest stars, double stars, variable stars, constellations and asterisms
  - **Deep Sky** – Custom lists of all the best galaxies, nebulae and clusters, the complete Messier catalog, and select NGC objects.
5. **IDENTIFY:** Searches your telescope's database and displays the name and offset distances to the nearest matching objects.
6. **MENU:** Displays setup and utilities functions, such as tracking rate, user-defined objects, and others.
7. **OPTION (CELESTRON LOGO):** Works similar to the SHIFT key on a keyboard and can be used in combination with other keys to access more advanced features and functions.
8. **ENTER:** Allows you to select any of your telescope's functions, accept entered parameters, and slew the telescope to displayed objects.
9. **BACK:** Takes you out of the current menu and display the previous level of the menu path. Press BACK repeatedly to get back to a main menu or erase data entered by mistake.
10. **SKY TOUR:** Activates the tour mode, which seeks out all of the best objects in the sky and automatically slews your telescope to those objects.
11. **SCROLL KEYS:** Scroll UP and DOWN within any of the menu lists. A double arrow symbol on the right side of the LCD indicates that the scroll keys can be used to view additional information. The buttons have an angled shape to make it easier to press the correct button without looking.
12. **MOTOR SPEED:** Allows you to change the motor's speed when the direction keys are pressed.

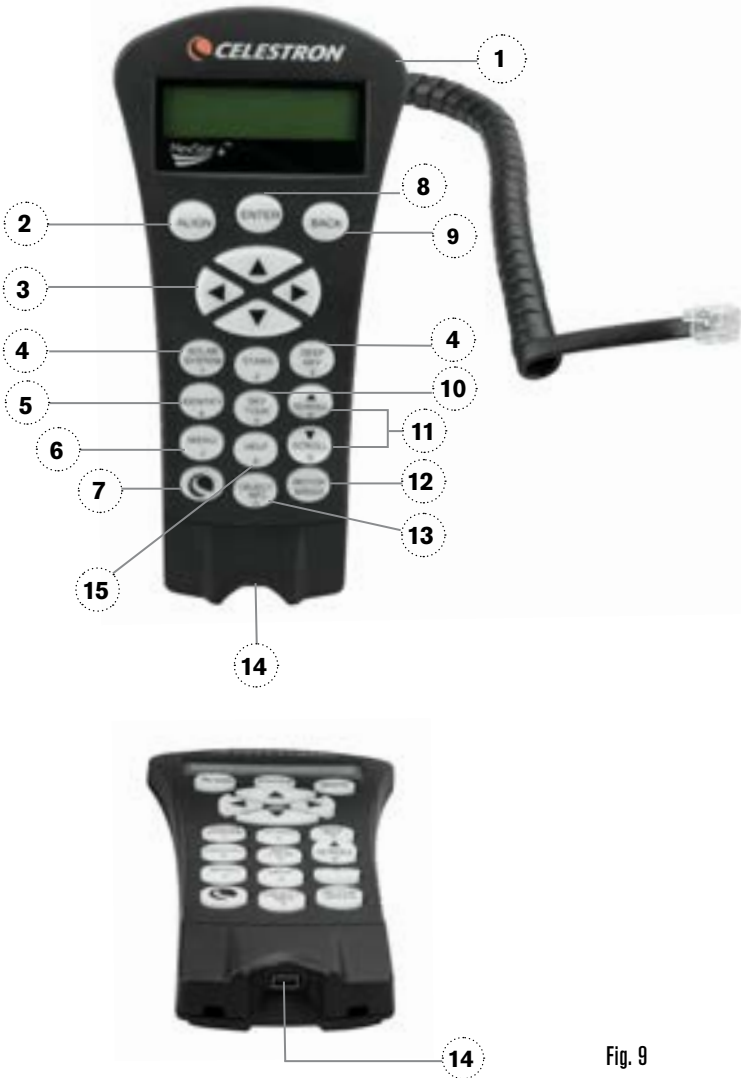


Fig. 9

13. **OBJECT INFO:** Displays coordinates and valuable information about objects selected from your telescope's database.
14. **MINI USB PORT (cable not included):** Links to PC to control you telescope via your desktop computer or perform firmware updates.
15. **HELP MENU:** In future firmware updates, this button will offer troubleshooting tips. For your convenience, it currently functions as a shortcut to the Messier catalog.

SELECTING AN OBJECT

Once the telescope is properly aligned, you can choose an object from any of the catalogs in the NexStar+ hand control's database. The hand control has a key designated for each category of objects in its database— Solar System objects, Stars and Deep Sky objects.

- **Solar System** – The Solar System catalog will display all of the planets (and Moon) in our Solar System that are currently visible in the sky. To allow the Sun to be displayed as an option in the database, see Allow Sun option in the Database Setup section of the manual.
- **Stars** – The Stars catalog displays custom lists of all the brightest stars, double (binary) stars, variable stars, constellations and selected asterisms.
- **Deep Sky** – The Deep Sky catalog displays a list of all of the best Galaxies, Nebulae and Clusters, as well as the complete Messier and select NGC objects. There is also an alphabetical list of all deep sky objects in order by their common name.

Use the SCROLL keys to scroll through the catalogs to find the object you wish to view. When scrolling through a long list of objects, holding down either the UP or DOWN key will allow you to scroll through the catalog at a rapid speed.

SLEWING TO AN OBJECT

Once the desired object is displayed on the hand control screen, you have two options:

- Press the **OBJECT INFO Key**. This will give you useful information about the selected object such as magnitude, constellation and extended information about the most popular objects.
  - o Use the **UP/DOWN** arrow buttons to scroll through the displayed object info.
  - o Use the **BACK** button to return to the object database.
- **Press the ENTER Key**. This will automatically slew the telescope to the coordinates of the object displayed on the hand control. While the telescope is slewing to the object, the user can still access many of the hand control functions (such as displaying information about the object).

**NOTE:** The Messier, NGC and SAO catalogs require the user to enter a numeric designation. Once you have selected the appropriate catalog button and selected the Messier, NGC or SAO catalog, you will see a flashing cursor indicating you are in numeric entry mode.

Enter the catalog number for the object you want to view. Press **ENTER** to slew to the object, or hold the **OPTION** button (the Celestron logo) and press **OBJECT INFO** to see information about the object you selected.

**CAUTION:** Never slew the telescope when someone is looking into the eyepiece. The telescope can move rapidly and may hit the observer.

MOTOR SPEED BUTTON

The MOTOR SPEED button allows you to instantly change the speed rate of the motors from from a high-speed slew rate to a precise

guiding rate and anywhere in between. Each rate corresponds to a number on the hand control key pad. The number 9 button is the fastest rate and is used for slewing between objects and locating alignment stars. The number 1 button on the hand control is the slowest rate (half sidereal) and can be used for accurate centering of objects in the eyepiece.

- To change the speed of the motors:
- Press the MOTOR SPEED key on the hand control. The LCD will display the current motor speed
  - Press the number on the hand control that corresponds to the desired speed

The hand control has a "double button" feature that allows you to instantly speed up the motors without having to choose a speed. To use this feature, simply press the arrow button that corresponds to the direction that you want to move the telescope. While holding that button down, press the opposite direction button. This will increase the speed to the maximum slew rate.

When using the hand control's up and down direction buttons, the slower slew rates (6 and lower) move the motors in the opposite direction than the faster slew rates (7- 9). The hand control is configured this way so that an object will move in the appropriate direction when looking into the eyepiece (i.e. pressing the UP arrow button will move the star upwards in the field of view of the eyepiece). However, if any of the slower slew rates (rate 6 and below) are used to center an object in the StarPointer, you may need to press the opposite directional button to make the telescope move in the desired direction.

THE HAND CONTROL MENU

The "Hand Control" menu allows you to customize certain features of the NexStar+ hand control. To access this menu, press the MENU button and use the scroll buttons to select "Hand Control." Then press ENTER. Use the scroll buttons to select from the following options:

- **Lights Control:** Independently adjust the brightness of the keypad and the LCD.
- **Scrolling Menu:** Adjust how fast words move across the face of the LCD.
- **Toggle Bold Font:** Change the format of the font displayed on the LCD from normal to boldface.
- **Set Contrast:** Use the scroll keys to adjust the contrast of the LCD.
- **Set Language:** Change the displayed language on the LCD.

**NOTE:** The Set Language feature may also appear the first time you use your new hand control. You may also initiate it at any time by holding down the Option button (the Celestron logo) for 10 seconds while powering up the telescope.

# OVERVIEW OF POPULAR ALIGNMENT METHODS

## SKYALIGN

SkyAlign is the easiest way to get your NexStar aligned and ready to observe. Even if you do not know a single star in the sky, the NexStar+ hand control will have you aligned in minutes by asking for basic information like the date, time and location. Then simply point the telescope at any three bright celestial objects. You don't need to know the names of the objects. They can be stars, planets, or even the Moon. Once SkyAlign is complete, the telescope is ready to find and track any of the objects in its database.



To watch *How to use Sky Align to Align your Telescope*, click on the image above

Before you begin SkyAlign, set up your telescope in an outside location with all its accessories (eyepiece, diagonal and finderscope) attached and the lens cover removed. Make sure that the tripod is leveled. To begin:

1. Power on the telescope by flipping the switch located at the base of the fork arm.
2. Press ENTER to choose *SkyAlign*. Pressing ALIGN will bypass the other alignment options and the scrolling text and automatically begin SkyAlign.
3. Press ENTER again and the hand control will default to the time setting. Press BACK to temporarily bypass this setting. The hand control display will then ask for the following time/site information:

### LOCATION

- Use the SCROLL UP and SCROLL DOWN buttons to select City Database or Custom Site. City Database will allow you to select the closest city to your observing site from a list of either international or U.S. location. Custom Site allows you to enter the exact longitude and latitude of your observing site. Your location will be saved in the hand control's memory and automatically displayed the next time you align. To choose a location city, select City Database and press ENTER.
- The hand control will allow you to choose from either U.S. or international locations. For a listing of U.S. locations by state and then by city, press ENTER while United States is displayed. For international locations, use the SCROLL UP or SCROLL DOWN buttons to select International and press ENTER.
- Use the SCROLL UP and SCROLL DOWN buttons to choose your current state (or country if International locations was selected) from the alphabetical listing and press ENTER.
- Use the SCROLL UP and SCROLL DOWN buttons to choose the closest city to your location from the list and press ENTER.
- Alternately, if you know your observing sites exact coordinates you can achieve greater alignment accuracy by entering your local coordinates using the Custom Site option.
- Once the location is established, the display will ask the current time.

### TIME

- Enter the current time in your time zone. You can enter either the local time (i.e. 8:00), or you can enter military time (i.e. 20:00).
- Select PM or AM. (If military time was entered, the hand control will bypass this step.)
- Choose Standard time or Daylight Saving time by using the SCROLL UP and SCROLL DOWN buttons to toggle between options.
- Select the time zone that you are observing from. Again, use the SCROLL UP and SCROLL DOWN buttons to scroll through the choices. For time zone information, refer to the Time Zone map in the appendix of this manual.

### DATE

- Enter the month, day, and year of your observing session. The display will read: mm/dd/yy.

**NOTE:** If you make a mistake when entering information into the hand control, the BACK button will act as a backspace so that you can re-enter information.

**HINT:** The next time you align your telescope, the hand control will automatically display the last location (either a city or coordinates) that was entered. Press ENTER to accept these parameters if they still apply. Press the BACK button to select a new city location or coordinates.

4. Next, use the arrow buttons on the hand control to slew the telescope towards any bright celestial object in the sky. Align the object with the red dot of the finderscope and press ENTER.
5. If the finderscope has been properly aligned with the telescope tube, the alignment star should now be visible inside the field of view of the eyepiece. The hand control will prompt you to precisely center the bright alignment star in the center of the eyepiece and press the ALIGN button. This will accept the star as the first alignment position. There is no need to adjust the slewing rate of the motors after each alignment step. The NexStar+ automatically selects the best slewing rate for aligning objects in both the finderscope and the eyepiece.
6. For the second alignment object, choose a bright star or planet as far as possible from the first alignment object. Once again, use the arrow buttons to center the object in the finderscope and press ENTER. Once centered in the eyepiece, press ALIGN.
7. Repeat the process for the third alignment star. When the telescope has been aligned to the final stars, the display will read "Match Confirmed". Press BACK to display the names of the three bright objects you aligned to, or press ENTER to accept these three objects for alignment. You are now ready to find your first object.

### TIPS FOR USING SKYALIGN

Remember the following alignment guidelines to make using SkyAlign as simple and accurate as possible.

- Level the tripod before you begin alignment. The time/site information along with a level tripod will help the telescope better predict the available bright stars and planets that are above the horizon.
- Select alignment stars that are as far apart in the sky as possible. For best results, make sure that the third alignment star does not lie in a straight line between the first two stars. This may result in a failed alignment.
- Don't worry about confusing planets for stars when selecting alignment objects. SkyAlign works with the four brightest planets (Venus, Jupiter, Saturn and Mars) and the Moon. In addition to the planets, the hand control has more than 80 bright alignment stars to choose from (down to 2.5 magnitude).
- In rare instances, SkyAlign may not be able to determine which three alignment objects were selected. This can happen when a bright planet or the Moon passes near one of the brighter stars. In situations like these, it is best to try to again and avoid aligning to either of these objects.
- When centering the objects, slew the telescope with the same final movements as the direction of the GoTo approach. For example, if the scope normally finishes a GoTo with the front of the scope moving right and up, center all three alignment objects in the eyepiece using the right and up arrow buttons last. (The up/down arrows reverse at slew rates of 6 or lower). Approaching the star from this direction will eliminate much of the backlash between the gears and provide the most accurate alignment possible. The default approach will be up and right on a first alignment or after a factory reset.
- Defocusing the image during alignment can make it easier to determine the center of the eyepiece. With a bright star defocused to about the apparent size of a small coin, the edges of the circle can be adjusted through the motor controls until they are equidistant from the edges of the eyepiece.

## AUTO TWO-STAR ALIGN

Auto Two-Star Align requires all the same time/site information as SkyAlign. Once you enter this information, NexStar will prompt you to select and point the telescope at one known star in the sky. The NexStar SE now has all the information it needs to automatically choose a second star that will assure the best possible alignment. Once selected, the telescope will automatically slew to that second alignment star to complete the alignment.

With the NexStar SE set up outside with its accessories attached and the tripod leveled, follow these steps to perform an Auto Two-Star Align:

1. Once the telescope is powered on, press ENTER to begin alignment.
2. Use the SCROLL UP and SCROLL DOWN buttons to select *Auto Two-Star Align*. Press ENTER.
3. The hand control will display the last time and location information that was entered into the hand control. Press ENTER to accept the current information or press BACK to manually edit the information (see SkyAlign section on page 10 for detailed instruction on entering time/site information).

4. The display will now prompt you to select a bright star from the displayed list on the hand control. Use the SCROLL UP and SCROLL DOWN buttons to scroll to view your options. Then, select the desired star and press ENTER.
5. Use the arrow buttons to slew the telescope to the star you selected. Center the star in the finderscope and press ENTER. Next, center the star in the eyepiece and press ALIGN.
6. Next, the hand control will automatically display the most suitable second alignment star that is above the horizon. Press ENTER to automatically slew the telescope to the displayed star. If, for some reason, you do not wish to select this star (perhaps it is behind a tree or building), you can either:
  - Press the BACK button to display the next most suitable star for alignment.
  - Use the SCROLL UP and SCROLL DOWN buttons to manually select any star you wish from the entire list of available stars.

Once the telescope finishes slewing, the display will ask you to use the arrow buttons to center align the selected star in the red dot finderscope. Once this is done, press ENTER. The display will then instruct you to center the star in the field of view of the eyepiece. When the star is centered, press ALIGN to accept this star as your second alignment star. When the telescope has been aligned to both stars the display will read "Align Success." You are now ready to find your first object.

## TWO-STAR ALIGN

With the two-star alignment method, the NexStar SE requires the user to know the positions of two bright stars in order to accurately align the telescope with the sky and begin finding objects. Here is an overview of the two-star alignment procedure:

1. Once the telescope is powered on, use the SCROLL UP and SCROLL DOWN buttons to select *Two-Star Align*. Press ENTER.
2. The hand control will display the last time and location information that was entered into the hand control. Press ENTER to accept the current information or press BACK to manually edit the information (see SkyAlign section on page 10 for detailed instruction on entering time/site information).
3. The SELECT STAR 1 message will appear in the top row of the display. Use the SCROLL UP and SCROLL DOWN buttons to choose the star you wish to use as the first alignment star. Press ENTER.
4. The hand control will then prompt you to center the alignment star you selected. Use the direction arrow buttons to slew the telescope to the alignment star and carefully center the star in the finderscope. Press ENTER when the object is centered.
5. Then, center the star in the eyepiece. Press ALIGN.

**HINT:** In order to accurately center the alignment star in the eyepiece, you may wish to decrease the slew rate of the motors for fine centering. You can do this by pressing the MOTOR SPEED button on the hand control and selecting the number that corresponds to the speed you desire (9 = fastest, 1 = slowest).

6. The hand control will then prompt you to select and center a second alignment star. Press ENTER when this star is centered in the finderscope. Next, center the star in the eyepiece. Use the same motor slew directions and GoTo approach angle as noted previously. Press the ALIGN button. It is best to choose alignment stars that are a good distance away from one another. Stars that are at least 40° to 60° apart will give you a more accurate alignment than stars that are closer to each other.

Once the second star alignment is completed, the display will read "Align Successful", and you should hear the tracking motors turn on and begin to track.

## ONE-STAR ALIGN

One-Star Align requires you to input all the same information as you would for the Two-Star Align procedure. However, instead of slewing to two alignment stars for centering and alignment, the NexStar uses only one star to model the sky based on the information given. This will allow you to roughly slew to the coordinates of bright objects like the moon and planets and gives the NexStar SE the information it needs to track objects in altazimuth in any part of the sky.

One-Star Align is not meant to accurately locate small or faint deep-sky objects or to track objects accurately for photography. To use One-Star Align:

1. Once the telescope is powered on, use the SCROLL UP and SCROLL DOWN buttons to select *One-Star Align*. Press ENTER.
2. The hand control will display the last time and location information that was entered into the hand control. Press ENTER to accept the current information or press BACK to manually edit the information (see SkyAlign section on page 10 for detailed instruction on entering time/site information).
3. The SELECT STAR 1 message will appear in the top row of the display. Use the SCROLL UP and SCROLL DOWN buttons to choose the star you wish to use as the first alignment star. Press ENTER.
4. The hand control will then prompt you to center the alignment star you selected. Use the direction arrow buttons to slew the telescope to the alignment star. Carefully center the star in the finderscope. Press ENTER.
5. Then, center the star in the eyepiece. Press ALIGN.
6. Once in position, the NexStar SE will model the sky based on this information and display "Align Successful".

## SOLAR SYSTEM ALIGN

Solar System Align is designed to provide excellent tracking and GoTo performance by using solar system objects (the Sun, Moon and planets) to align the telescope with the sky. Solar System Align is a great way to align your telescope for daytime viewing and a quick way to align the telescope for basic nighttime observing.



**WARNING:** Never look directly at the Sun with the naked eye or with a telescope (unless you have the proper solar filter). Permanent and irreversible eye damage may result.

To perform a Solar System Align:

1. Once the telescope is powered on, use the SCROLL UP and SCROLL DOWN buttons to select *Solar System Align*. Press ENTER.
- The hand control will display the last time and location information that was entered into the hand control. Press ENTER to accept the current information or press BACK to manually edit the information (see SkyAlign section on page 10 for detailed instruction on entering time/site information).
2. The SELECT OBJECT message will appear in the top row of the display. Use the SCROLL UP and SCROLL DOWN buttons to chose a Solar System object (a planet, the Moon, etc.) to use for alignment. Press ENTER.
3. The hand control will then prompt you to use the direction arrow buttons to slew the telescope to the alignment object and carefully center it in the finderscope. Press ENTER when centered.
4. Then center the object in the eyepiece. Press ALIGN.

Once in position, the NexStar SE will model the sky based on this information and display "Align Successful."



TIPS FOR USING SOLAR SYSTEM ALIGN

**NOTE:** For safety purposes, the Sun will not be displayed in any of the hand control's customer object lists unless it is enabled from the Utilities Menu. To allow the Sun to be displayed on the hand control, follow these steps:

1. Press the BACK button until the display reads "NexStar SE."
2. Press the MENU button and use the SCROLL UP and SCROLL DOWN buttons to select the Utilities Menu. Press ENTER.
3. Use the SCROL UP and SCROLL DOWN buttons to select Sun Menu and press ENTER.
4. Press ENTER again to allow the Sun to appear on the hand control display.

The Sun can be removed from the display using the same procedure.

SOLAR WARNING



- Never look directly at the Sun with the naked eye or with a telescope (unless you have the proper solar filter). Permanent and irreversible eye damage may result.
- Never use your telescope to project an image of the Sun onto any surface. Internal heat build-up can damage the telescope and any accessories attached to it.
- Never use an eyepiece solar filter or a Herschel wedge. Internal heat build-up inside the telescope can cause these devices to crack or break, allowing unfiltered sunlight to pass through to the eye.
- Never leave the telescope unsupervised. Make sure an adult who is familiar with the correct operating procedures is with your telescope at all times, especially when children are present.

SYNC

The Sync feature can improve your telescope's pointing accuracy in a specific region of the sky. Sync is a very useful feature when used in conjunction with the Constellation Tour and Identify features, in which you will be exploring smaller areas of the sky. To Sync on an object:

1. Select a desired star (or object) from the STARS or DEEP SKY database and slew to it.
2. Once the object is centered in the eyepiece, press the BACK button until you arrive at the main menu.
3. When the display reads "NexStar SE," press the ALIGN button on the hand control.
4. Use the SCROLL UP and SCROLL DOWN buttons and select the Sync option. Press ENTER.
5. Align the Sync object in the center of the finderscope. Press ENTER.
6. Carefully center the object in the eyepiece. Press ALIGN.

Your telescope's pointing accuracy will now be improved in that area of the sky.

UNDO SYNC

A Sync can negatively affect your pointing accuracy in other parts of the sky, so it may be necessary to 'Un-Sync" your telescope when you would like to exploring areas of the sky beyond the initial Sync area. An Undo Sync will restore the pointing of your telescope to its original alignment. Additionally, if you wish to add calibration stars or re-alignment stars, you will be asked to Undo Sync before you proceed.

USING A WEDGE WITH EQ NORTH/EQ SOUTH ALIGNMENT

EQ North and EQ South Alignments allow you to polar align the telescope when using an optional equatorial wedge. Like the altazimuth alignments described earlier, the equatorial alignments give you the choice of performing an AutoAlign, Two-Star Align, One-Star Align, or Solar System Align. For help in polar aligning your NexStar SE, see the Polar Align section later in this manual (page 17).

EQ AUTO ALIGN

The EQ AutoAlign uses all the same time/site information as the alt-az alignments. However, it also requires you to position the tube so that the altitude index markers are aligned (see figure 10), and then rotate the telescope base until the tube is pointed towards the meridian (see figure 11). Based on this information, the NexStar SE will automatically slew to two selected alignment stars to be centered and aligned. To use EQ AutoAlign:

1. Once the telescope is powered on, use the SCROLL UP and SCROLL DOWN buttons to select EQ North or EQ South Align. Press ENTER.
2. The hand control will display the last time and location information that was entered into the hand control. Press ENTER to accept the current information or press BACK to manually edit the information (see SkyAlign section on page 10 for detailed instruction on entering time/site information).
3. The hand control screen will display Set Alt to Index. Use the up and down arrow buttons to move the telescope tube upwards until the altitude index markers are aligned. The altitude index markers are located at the top of the fork arm (see figure 10).
4. Next, the hand control screen will display Find Meridian. Use the left and right arrow buttons to move the telescope base until the optical tube is pointing towards the meridian.
5. Based on this information, the hand controller will automatically display the most suitable alignment stars that are above the horizon. Press ENTER to automatically slew the telescope to the displayed star. If, for some reason, you do not wish to select one of these stars (perhaps it is behind a tree or building), you can either:
  - Press the BACK button to display the next most suitable star for alignment.
  - Use the SCROLL UP and SCROLL DOWN buttons to manually select any star you wish from the entire list of available stars.
6. The hand control will then prompt you to use the direction arrow buttons to slew the telescope to the alignment object. Carefully center it in the finderscope and press ENTER.
7. Center the object in the eyepiece and press ALIGN.
8. The telescope will automatically slew to a second alignment star. Repeat steps 7 and 8 to complete the alignment.



Fig. 10

## EQ TWO-STAR ALIGN

The EQ Two-Star Align follows most of the same steps as the alt-az Two-Star Align. This alignment method does not require the user to align the altitude index markers or point towards the meridian, but it does require the user to locate and align the telescope on two bright stars. When selecting alignment stars, it is best to choose stars that:

- Have a large separation in azimuth AND
- Are either both positive or both negative in declination.

Following these two guidelines will result in a more accurate EQ Two-Star alignment.

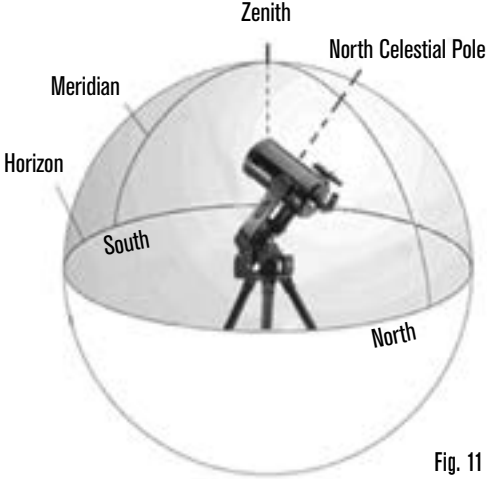


Fig. 11

## EQ ONE-STAR ALIGN

EQ One-Star Align operates much the same way as EQ Two-Star Align. However, it only relies on the alignment of a single star to align the telescope.

## EQ SOLAR SYSTEM ALIGN

EQ Solar System Align allows you to use only one Solar System object to equatorially align the telescope for daytime use.

## ALIGNMENT STARS

Alignment stars allow you to replace any of the stars you used in your original alignment with new stars or celestial objects. This will improve the pointing accuracy of your telescope without having to re-enter information.

To replace an existing alignment star with a new alignment star:

1. Select the desired star (or object) from the STARS or DEEP SKY database and slew to it.
2. Once centered, press the BACK button until you arrive at the main menu.
3. When the display reads "NexStar SE," press the ALIGN button on the hand control.
4. Use the SCROLL UP and SCROLL DOWN buttons and select *Alignment Stars*. Press ENTER.
5. The display will then ask you which alignment star you want to replace. Use the SCROLL UP and SCROLL DOWN buttons to select the correct star and press ENTER. It is usually best to replace the star closest to the new object in the sky. This will ensure that your alignment stars are properly spaced across the sky.
6. Align the new star in the center of the finderscope. Press ENTER.
7. Carefully center the object in the eyepiece. Press ALIGN.

## POLAR ALIGN

The Polar Align feature requires the NexStar SE to be mounted on the optional polar wedge. The Polar Align procedure guides you through the polar alignment technique.

## POLAR ALIGNMENT (WITH OPTIONAL WEDGE)

The simplest way to perform a basic polar alignment with your NexStar SE is to angle the tilt plate on the equatorial wedge accessory so that the fork arm (or polar axis) is pointed towards the star Polaris. For help in locating Polaris, refer to the Finding the North Celestial Pole section below. To polar align your NexStar SE:

1. Level the tripod and position it so the wedge plate is facing north or south depending on your hemisphere.
2. Loosen the latitude adjustment lock on the wedge.
3. Slowly tilt the telescope north (or south) until the scale on the latitude adjustment is equal to the latitude of your observing location. For example, if using your telescope from Los Angeles, you would set the scale to 34 degrees.
- NOTE:** To view your current latitude, select *View Time-Site menu* feature after completing a successful alignment.
4. Once in position, securely tighten the latitude adjustment lock to hold the telescope in place
5. Adjust the tripod so the fork arm is roughly pointing toward Polaris.

You are now ready to complete an EQ North (South) Alignment to begin finding celestial objects.



Fig. 12

The NexStar has two equatorial wedge alignment modes (one for the northern hemisphere and one for the southern) that will help you polar align your telescope when using an optional equatorial wedge. After performing the rough alignment described above, complete the alignment by pressing the hand controller ALIGN button and scrolling to the appropriate EQ North or EQ South alignment option. Press ENTER and follow the screen prompts.

## OBSERVING

Now that the telescope is properly aligned, you can choose an object from any of the catalogs in the NexStar+ hand control's database.

## SELECTING AN OBJECT

### STARS, DEEP SKY, SKY TOUR BUTTONS

There are two ways to select objects from the database—scrolling through the named object lists and entering object numbers:

- Pressing the SOLAR SYSTEM button will allow you to use the SCROLL UP and SCROLL DOWN buttons to scroll through and select the seven planets, the Sun, the Moon, and Pluto. Press OBJECT INFO to access detailed information about the selected object. Press ENTER to slew to it.
- Press the STARS button and use the SCROLL UP and SCROLL DOWN buttons to access the Constellations, Double Stars, Named Stars, SAO, Variable Stars, and Asterisms catalogs. After selecting any one of these options you may use the SCROLL UP and SCROLL DOWN buttons to display an alphabetical list of objects.
- Pressing the DEEP SKY button will allow you to SCROLL UP and SCROLL DOWN to access the Named Objects, NGC, Abell, Caldwell, CCD Objects, IC, and Messier catalogs. Press ENTER to select the displayed catalog. Use the SCROLL UP and SCROLL DOWN buttons to scroll through the catalog.

SLEWING TO AN OBJECT

**NOTE:** *Never slew the telescope when someone is looking into the eyepiece. The telescope can move at fast slew speeds and hit an observer in the eye.*

Once the desired object is displayed on the hand control screen, you have two options:

- Press the OBJECT INFO button. This will give you useful information about the selected object such as magnitude, constellation and fascinating facts about many of the objects.
- Press the ENTER button. This will automatically slew the telescope to the object. While the telescope is slewing, you can still access many of the hand control functions, such as OBJECT INFO.

**NOTE:** *If you attempt to slew to an object below the horizon, the hand control will display a message that you have selected an object outside of your slew limits (see Slew Limits on page 20).*

- Press BACK to go back and select a new object.
- Press ENTER to ignore the message and continue the slew. The hand control will only display objects that are below the horizon if the Filter Limits are set below 0° in altitude. See Filter Limits in the Utility Feature section (page 20) for more information on setting the filter limits.

Object information can be obtained without doing a star alignment. After the telescope is powered on, pressing the SOLAR SYSTEM, STARS, or DEEP SKY button allows you to scroll through object lists or enter catalog numbers and view the object information.

SKY TOUR BUTTON

The NexStar SE includes a tour feature that allows you to view a curated list of the most interesting objects currently visible based on your exact date, time, and location information. The automatic tour will only display objects within your set filter limits. To activate the tour mode, press the SKY TOUR button on the hand control.

- To view information and data about the displayed object, press the OBJECT INFO button.
- To slew to the object, press ENTER.
- To see the next tour object, press the SCROLL DOWN button.

THE CONSTELLATION OPTION

In addition to the SKY TOUR, the NexStar SE telescope has a Constellation Tour that allows the user to take a tour of all the best objects within a constellation. Press the STARS button and scroll to the Constellation option. Press ENTER and scroll to the desired constellation. The display will only show constellations that are currently above the horizon. Once you have selected a constellation, you can choose from any of the database object catalogs to produce a list of all the available objects in that constellation.

- To see details and data about the selected object, press OBJECT INFO.
- To slew to the object, press ENTER.
- To see the next tour object, press BACK, then SCROLL DOWN.

When entering the number of an SAO star, you are only required to enter the first four digits of the object's six-digit SAO number. Once you have entered the first four digits, the hand control will automatically list all the available SAO objects beginning with those numbers. This allows you to scroll through only the SAO stars in the database.

For example, in searching for the SAO star 40186 (Capella), the first four digits would be "0401." Entering this number will display the closest match from the SAO stars available in the database. From there, you can scroll down the list and select the desired object.

You may also access a specific catalog object directly using the numeric keypad to type in that object's catalog number. The Messier and Caldwell objects have three-digit catalog numbers while the NGC, IC, and Abell objects have four-digit catalog numbers. If the catalog number for the desired Messier or Caldwell object is lower than 100, or is the catalog number for the desired NGC, IC, or Abell object is lower than 1000, the keypad entry must be prefixed with the proper number of zeros to make a complete three- or four-digit catalog number. For instance, if in the Messier catalog you desire the Crab Nebula, enter "001" or for the Orion Nebula, enter "042."

Holding down the SCROLL UP or SCROLL DOWN button allows you to scroll through the catalog at a rapid speed.

MENU BUTTON

The NexStar+ hand control contains many user-defined setup functions designed to give you more control over the telescope's many advanced features. You can access all the setup and utility features by pressing the MENU button and scrolling through the options:

**TRACKING MODE:** Once the telescope is aligned, the tracking motors will automatically turn on and begin tracking the sky. However, tracking can be turned off for terrestrial use:

**ALT-AZ:** This is the default tracking mode. It is used when the telescope is placed on a flat surface or tripod without the use of an equatorial wedge. The telescope must be aligned before it can track in alt-az.

**EQ NORTH:** This mode is used to track the sky when the telescope is polar aligned using an equatorial wedge in the Northern Hemisphere.

**EQ SOUTH:** This mode is used to track the sky when the telescope is polar aligned using an equatorial wedge in the Southern Hemisphere.

**OFF:** When using the telescope for terrestrial (land) observation, the tracking can be turned off completely.

**TRACKING RATE:** In addition to being able to move the telescope with the hand control buttons, the telescope will continually track a celestial object as it moves across the night sky. The tracking rate can be changed depending on what type of object is being observed:

**SIDEREAL:** This rate compensates for the rotation of the earth by moving the telescope at the same rate as the earth's rotation, but in the opposite direction. When the telescope is polar aligned, this can be accomplished by moving the telescope in Right Ascension only. When mounted in alt-az mode, the telescope must make corrections in both altitude and azimuth to follow given Right Ascension and declination location in the sky.

**LUNAR:** Used for tracking the Moon when observing the lunar landscape.

**SOLAR:** Used for tracking the Sun when solar observing using a proper solar filter.

**VIEW TIME-SITE:** View Time-Site will display the last saved time and longitude/latitude entered in the hand control.

**HAND CONTROL:** These options allow you to configure the hand control display to suit your personal comfort.

**LIGHT CONTROL:** This feature allows you to scroll between keypad brightness and display brightness. Use the SCROLL UP and SCROLL DOWN buttons to adjust the brightness of each to your comfort level.

**SCROLLING MENU:** Speed up the scrolling text by pressing the SCROLL UP button or slow down the scrolling text by pressing the SCROLL DOWN button.

**TOGGLE BOLD FONT:** Press ENTER to toggle between standard or bold display characters.

**SET CONTRAST:** Press the SCROLL UP and SCROLL DOWN keys to increase or decrease the display contrast.

**SET LANGUAGE:** Press the SCROLL UP or SCROLL DOWN buttons to select the display language.



**SCOPE SETUP:** These options allow you to define the mount’s operating parameters to achieve optimum performance.

**SETUP TIME-SITE:** These options allow you to customize the NexStar display by changing time and location parameters (such as time zone and daylight saving time).

**ANTI-BACKLASH:** All mechanical gears require 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 the hand control arrow buttons are pressed when reversing directions. The size of the 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. The NexStar SE’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 telescope.

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 it is too large, you will see the object overshoot when you change directions, which will make it hard to center objects in the eyepiece. Gear backlash compensation is required only for visual usage, and maybe 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, press the MENU button, scroll to SCOPE SETUP and press ENTER. Now scroll down to the ANTI-BACKLASH option and press ENTER. Enter a value from 0-99 for both azimuth and altitude directions and press ENTER after each one to save these values. The hand control will remember these values and use them each time you turn the telescope on until the values are changed.

**SLEW LIMITS:** This option allows you to define how far the telescope can slew in altitude without displaying a warning message. The slew limits prevent the telescope tube from slewing to an object below the horizon and can be customized to suit your equipment setup. If you are using a large eyepiece, 2" diagonal, or camera on the rear of the telescope, you may need to adjust the slew limits to prevent the rear accessories from striking the base of the telescope mount.

For example, if you would like to slew to an object that is close to the zenith but you have a large camera attached that prevents the telescope from pointing straight up, you can set the maximum altitude to 80 or 85 degrees to prevent the tube from ever pointing straight up and the camera from striking your mount.

**FILTER LIMITS:** When an alignment is complete, the hand controller automatically knows which celestial objects are above the horizon. As a result, when scrolling through the database lists (or selecting the Tour function), the NexStar hand control will display only those objects that are known to be above the horizon when you are observing. You can customize the object database by selecting altitude limits that are appropriate for your location and situation. For example, if you are observing from a mountainous location where the horizon is partially obscured, you can set your minimum altitude limit to +20°. This will ensure that the hand control only displays objects that are higher in altitude than 20°.

**Observing Tip:** *If you want to explore the complete database, set the maximum altitude limit to 90° and the minimum limit to -90°. This will display every object in the database lists regardless of whether it is visible in the sky from your location.*

**DIRECTION BUTTONS:** The direction a star moves in the eyepiece varies depending on the optical accessories you are using. This can create confusion when guiding on a star using an off-axis guider versus a straight through guide scope. To compensate for this, the direction of the drive control arrow buttons can be changed. To reverse the direction arrow button logic of the hand control, press the MENU button and scroll to SCOPE SET-UP and press ENTER. Scroll to DIRECTION BUTTON and press ENTER to view options for AZM (azimuth). Press ENTER again to display the current logic state. Use the SCROLL UP or SCROLL DOWN button to toggle between Normal and Reverse. Press ENTER to accept the choice. Press BACK followed by either the SCROLL UP or SCROLL DOWN button to access the ALT (altitude) option. Press ENTER, then use either SCROLL button to select the desired logic state. Press ENTER to accept the choice. The Direction buttons will only change the eyepiece rates (rate 1-6) and will not affect the slew rates (rate 7-9).

**GOTO APPROACH:** Use this setting to change the direction of the telescope’s approach when slewing to an object. This allows you to minimize the effects of backlash. For example, 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 opposite direction as the load pulling on the scope. Similarly, if you are using the telescope while polar aligned, you would want to set the azimuth approach to the direction that allows the scope to compensate for different load level on the motors and gears when pointing in different parts of the sky.

To change the GoTo approach direction, simply choose GoTo Approach from the Scope Setup menu, select either Altitude or Azimuth approach, choose positive or negative, and press ENTER.

**AUTOGUIDE RATES:** This option allows you to set an autoguide rate as a percentage of sidereal rate. This is helpful when calibrating your telescope to a CCD autoguider for long exposure photography.

**CORDWRAP:** Cordwrap safeguards against the telescope slewing more than 360° in azimuth and wrapping accessory or power cables around the base of the telescope. This is useful any time that cables are plugged into the base of the telescope. By default, the cord wrap feature is turned off when the telescope is aligned in altazimuth and turned on when aligned on a wedge.

**UTILITIES:** The Utilities menu presents options that allow easier operation and updating of the NexStar SE mount.

**GPS ON/OFF :** This menu allows you to turn the GPS module on or off when using the optional SkySync GPS accessory. When aligning the telescope, the NexStar SE still receives information, such as the current time, from the optional GPS accessory. If you want to use the hand control database to find the coordinates of a celestial object for a future date, you would need to turn the GPS module off in order to manually enter a date and time other than the present.

**FACTORY SETTING:** If you want to reset the NexStar hand control to its original factory setting, use this option. Parameters such as backlash compensation values, initial date and time, longitude/latitude, slew limits, and filter limits will all be reset. However, stored parameters such as user-defined objects will remain saved even when Factory Settings is selected. The hand control will ask you to press the “0” key before returning to the factory default setting.

**VERSION:** Selecting this option will allow you to see the version number of the hand control software.

**GET AXIS POSITION:** This option displays the relative altitude and azimuth for the current position of the telescope.

**GOTO AXIS POSITION:** This option allows you to enter a specific altitude and azimuth position and slew to it.

**HIBERNATE:** Hibernate allows the NexStar SE to be completely powered down and still retain its alignment when turned back on. This not only saves power but is ideal for those that have their telescopes permanently mounted or leave their telescope in one location for long periods of time, such as an observatory. To place your telescope in Hibernate mode:

- Select Hibernate from the Utility Menu.
- Move the telescope to a desire position and press ENTER.
- Power off the telescope. Remember to never move your telescope manually while in Hibernate mode.

Once the telescope is powered on again the display will read “Wake Up.” After pressing ENTER, you have the option of scrolling through the time/site information to confirm the current settings. Press ENTER to wake up the telescope.

**HINT:** *Pressing UNDO at the Wake Up screen allows you to explore many of the features of the hand control without waking the telescope up from hibernate mode. To wake up the telescope after UNDO has been pressed, select Hibernate from the Utility menu and press ENTER. Do not use the direction buttons to move the telescope while in hibernate mode.*



**SUN MENU:** For safety purposes, the Sun will not be displayed as a database object unless it is first enabled. The enable the Sun, go to the Sun Menu and press ENTER. The Sun will now be displayed in the Planets catalog as can be used as an alignment object when using the Solar System Alignment method. To remove the Sun from displaying on the hand control, once again select the Sun Menu from the Utilities Menu and press ENTER.

**CALIBRATE GOTO:** GoTo calibration is a useful tool when attaching heavy visual or photographic accessories to the telescope. GoTo Calibration calculates the distance and time it takes for the mount to complete its final slow GoTo when slewing to an object. Changing the balance of the telescope can prolong the time it takes to complete the final slew. GoTo Calibration considers any slight imbalances and changes the final GoTo distance to compensate.

**SET MOUNT POSITION:** The Set Mount Position menu can help you recover an alignment in cases where the telescope or tripod has been manually moved. For instance, you might use this feature if you need to adjust the level of the tripod by raising or lowering the tripod legs. After the mount has been moved, simply slew to a bright star and center it in the eyepiece, then select Set Mount Position from the Utilities menu. Since the telescope has been moved, the pointing accuracy will be diminished, but now you can slew to a new set of alignment stars and replace any of the original alignment stars with new stars. This will help you avoid having to start the alignment process over from the beginning.

**USER OBJECTS:** The NexStar SE can store over 100 different user-defined objects in its memory. The objects can be daytime land objects or an interesting celestial object that you discover that is not included in the regular database. There are several ways to save an object to memory depending on what type of object it is.

**GOTO SKY OBJECT:** To go to any of the user-defined objects in the database, scroll down to or enter the number of the object you wish to view, and press ENTER. The NexStar SE will automatically retrieve and display the coordinates before slewing to the object.

**SAVE SKY OBJECT:** The NexStar SE stores celestial objects to its database by saving its right ascension and declination in the sky. This way, the same object can be found each time the telescope is aligned. Once a desired object is centered in the eyepiece, simply scroll to the “SAVE SKY OBJ” command and press ENTER. The display will ask you to enter a number between 1-99 to identify the object. Press ENTER again to save this object to the database.

**SAVE DATABASE (DB) OBJECT:** This feature allows you to create your own custom tour of database objects by allowing you to record the current position of the telescope and save the name of the object by selecting it from any one of the database catalogs. You can then access these objects by selecting GoTo Sky Object.

**ENTER R.A./DEC:** You can store a specific set of coordinates for an object just by entering the R.A. and declination for that object. Scroll to the “ENTER RA-DEC” command and press ENTER. The display will then ask you to enter the R.A. first, and then the declination for your object.

**SAVE LAND OBJECT:** The NexStar SE can be used as a spotting scope on terrestrial objects. Fixed land objects can be stored by saving their altitude and azimuth relative to the location of the telescope at the time of observing. Since these objects are relative to the location of the telescope, they are only valid for that exact location. To save land objects, center the desired object in the eyepiece. Scroll down to the “SAVE LAND OBJ” command and press ENTER. The display will ask you to enter a number between 1-9 to identify the object. Press ENTER again to save this object to the database.

**GOTO LAND OBJECT:** To go to any of the user-defined objects stored in the database, scroll to GoTo Land Obj, enter the number of the object you wish to select, and press ENTER. The NexStar SE will automatically retrieve and display the coordinates before slewing to the object.

To replace the contents of any of the user-defined objects, simply save a new object using one of the existing identification numbers; NexStar SE will replace the previous user-defined object with the new one.

**GET R.A./DEC:** This option displays the right ascension and declination for the current position of the telescope.

**GOTO R.A./ DEC:** This option allows you to input a specific R.A. and declination and slew to it.

**IDENTIFY:** Identify Mode will search any of the NexStar+ database catalogs or lists and display the name and offset distances to the nearest matching objects. This feature can serve two purposes. First, it can be used to identify an unknown object in the field of view of your eyepiece.

Additionally, Identify Mode can be used to find other celestial objects that are close to the objects you are currently observing. For example, if your telescope is pointed at the brightest star in the constellation Lyra, choosing Identify and then searching the Named Star catalog will no doubt return the star Vega as the star you are observing. However, by selecting Identify and searching by the Named Object or Messier catalogs, the hand control will let you know that the Ring Nebula (M57) is approximately 6° from your current position. Searching the Double Star catalog will reveal that Epsilon Lyrae is only 1° away from Vega. To use the Identify feature:

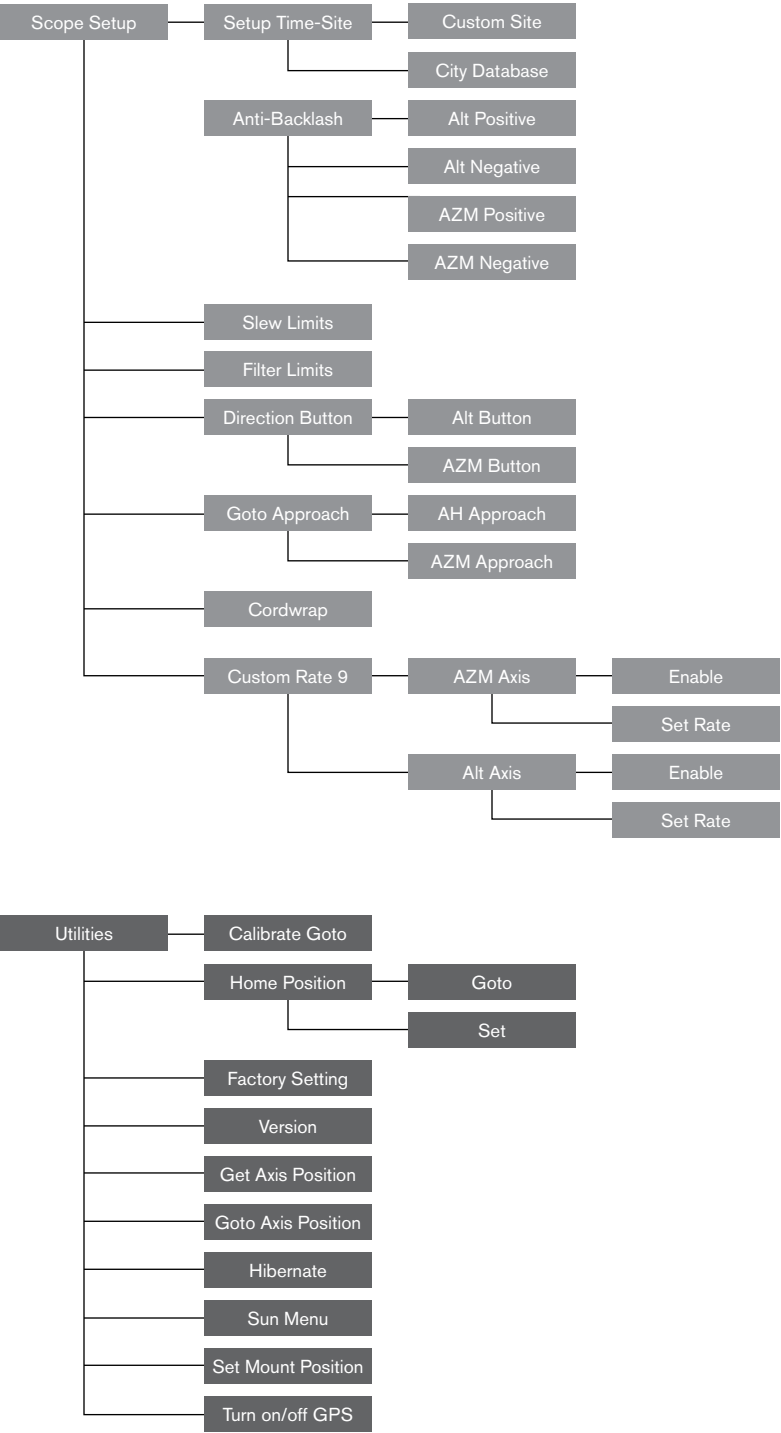
- Press the Menu button and select the Identify option.
- Use the SCROLL UP and SCROLL DOWN buttons to select the catalog that you would like to search.
- Press ENTER to begin the search.

**NOTE:** *Some of the databases contain thousands of objects and can therefore take a minute or two to return the closest object.*

**PRECISE GOTO:** The NexStar SE has a precise GoTo function that can assist in finding extremely faint objects and centering objects closer to the center of the field of view for high power viewing or astrophotography. Precise GoTo automatically seeks out the closest bright star to the desired object and asks you to carefully center it in the eyepiece. The hand control then calculates the small difference between its GoTo position and its centered position. Using this offset, the telescope will then slew to the desired object with enhanced accuracy. To use Precise GoTo:

1. Press the MENU button and use the SCROLL UP and SCROLL DOWN buttons to scroll to Precise GoTo. Choose Database to select the object that you want to observe from any of the database catalogs listed or choose RA/DEC to enter a set of celestial coordinates that you wish to slew to.
2. Once the desired object is selected, the hand control will seek out and display the closest bright star to your desired object. Press ENTER to slew to the bright alignment star.
3. Use the direction buttons to carefully center the alignment star in the eyepiece.
4. Press ENTER to slew to the desired object.

ADVANCED MENU TREE



DIRECTION BUTTONS

The NexStar SE has four direction arrow buttons in the center of the hand control that control the telescope motion in altitude (up and down) and azimuth (left and right). The telescope can be controlled at nine different speed rates.

1 = .5x	6 = 64x
2 = 1x	7 = 1° / sec
3 = 4x	8 = 3° / sec
4 = 8x	9 = 5° / sec
5 = 16x	

Nine Available Slew Speeds

Fig. 13

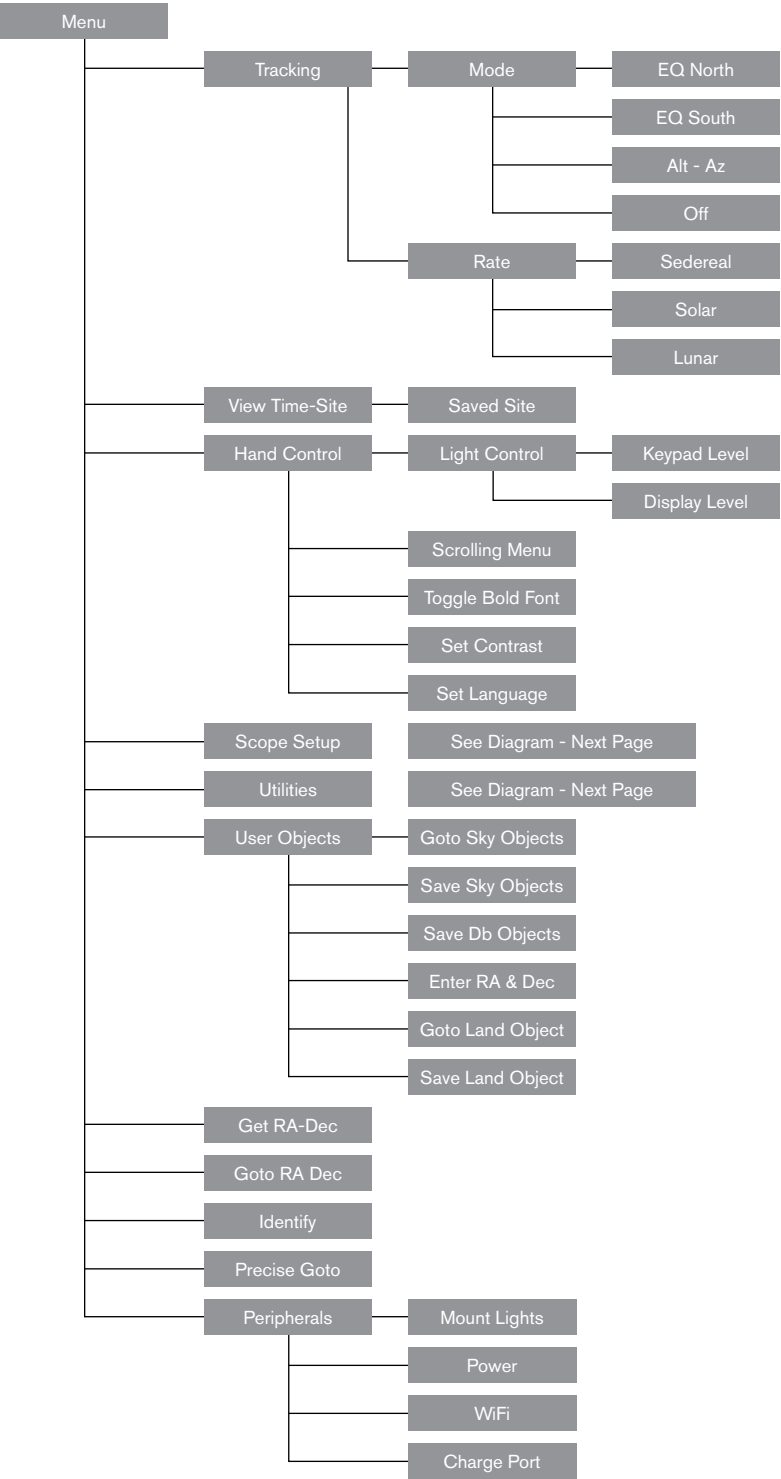
MOTOR SPEED BUTTON

Pressing the MOTOR SPEED button allows you to instantly change the speed of the motors from a high-speed slew rate to a precise guiding rate and anywhere in between. Each rate corresponds to a number on the hand control keypad. The number 9 is the fastest rate and is used for slewing between objects and locating alignment stars. The number 1 on the hand control is the slowest rate (.5x sidereal) and can be used for accurate centering of objects in the eyepiece. To change the speed rate of the motors:

- Press the MOTOR SPEED button on the hand control. The LCD will display the current speed rate.
- Press the number on the hand control that corresponds to the desired speed.

The hand control has a “double button” feature that allows you to instantly speed up the motors without having to choose a speed rate. To use this feature, simply press the arrow button that corresponds to the direction that you want to move the telescope. While holding that button down, press the opposite directional button. This will increase the speed to the maximum slew rate.

NEXSTAR+ HAND CONTROL FOR NEXSTAR SE MENU TREE



PHOTOGRAPHY WITH NEXSTAR SE

After looking at the night sky for a while, you may want to try photographing it. In addition to the specific accessories required for celestial photography, there is the need for a camera—but not just any camera. The camera does not have to have many of the features offered on today’s state-of-the-art equipment. For example, you don’t need auto focus capability or mirror lock up. Here are the mandatory features a camera needs for celestial photography. First, a “B” setting that allows for time exposures. This excludes point-and-shoot cameras and limits the selection to DSLR cameras, the most common type of camera on the market today.

Second, the “B” or manual setting should NOT run off the battery. Many new electronic cameras use the battery to keep the shutter open during time exposures. Once the batteries are drained, usually after a few minutes, the shutter closes, whether you were finished with the exposure or not. Look for a camera that has a manual shutter when operating in the time exposure mode. Olympus, Nikon, Minolta, Pentax, Canon and others have made such camera bodies.

The camera must have interchangeable lenses so you can attach it to the telescope and so you can use a variety of lenses for piggyback photography. If you can’t find a new camera, you can purchase a used camera body that is not 100-percent functional. The light meter, for example, does not have to be operational since you will be determining the exposure length manually.

You also need a cable release with a locking function to hold the shutter open while you do other things. Mechanical and air release models are available.

ATTACHING A CAMERA TO THE NEXSTAR SE

Attaching a DSLR camera to the NexStar requires the use of the optional T-adapter (#93633-A) and a T-ring specific to the brand of camera being used. See Celestron.com for choices. To attach the photographic accessories:

- 1. Remove the visual back from the rear cell.
- 2. Thread the T-adapter securely onto the rear cell of the telescope.
- 3. Thread the T-ring onto the exposed end of the T-adapter.
- 4. Remove any lens from the body of your camera.
- 5. Attach the camera body to the T-ring by aligning the dot on the side of the T-ring with the dot on the camera body and twisting.
- 6. Adjust the slew limits to prevent these accessories from hitting the fork arm or base during operation.

**NOTE:** Smartphone cameras can easily be attached to a NexStar telescope using the NexYZ 3-Axis Smartphone Adapter. See the NeXYZ and other accessories at [celestron.com](http://celestron.com).



Fig. 14

AUTOGUIDING

The Nexstar 6SE and 8SE include a port labelled “AutoGuide” next to the AUX port on the base of the fork arm. This is an advanced feature only intended for long-exposure astrophotography with the optional EQ wedge. The previous steps for wedge alignment should be completed before connecting and using an autoguider camera.

- 1. You will need a suitable autoguiding camera with a 6 pin ST-4 “phone jack” cable.
- 2. This camera will need to attach to the rear of the telescope with an optional off-axis guider or to a small optional guide scope attached via a dovetail rail to either side of the OTA.
- 3. Adjust the slew limits to prevent these accessories from hitting the fork arm or base during operation.

**WARNING:** This port is not wired the same as an AUX port. Plugging in accessories such as the SkyPortal WiFi Module, SkySync GPS, or others into this port risks damaging the accessory and the telescope’s internal electronics. Never plug anything except a 6 pin ST4-style auto guider cable into this port.

FINDING THE CELESTIAL NORTH POLE

In each hemisphere, there is a point in the sky around which all the other stars appear to rotate. These points are called the celestial poles and are named for the hemisphere in which they reside. For example, in the northern hemisphere all stars move around the north celestial pole. When the telescope’s polar axis is pointed at the celestial pole, it is parallel to the Earth’s rotational axis.

Many methods of polar alignment require that you know how to find the celestial pole by identifying stars in the area. For those in the northern hemisphere, finding the celestial pole is not difficult. Fortunately, we have a naked eye star less than a degree away. This star, Polaris, is the end star in the handle of the Little Dipper.

Since the Little Dipper (technically called Ursa Minor) is not one of the brightest constellations in the sky, it may be difficult to locate from urban areas. If this is the case, use the two end stars in the bowl of the Big Dipper (the pointer stars). Draw an imaginary line through them toward the Little Dipper. They point to Polaris (see figure 15). The position of the Big Dipper changes during the year and throughout the course of the night (see figure 15). When the Big Dipper is low in the sky (i.e., near the horizon), it may be difficult to locate. During these times, look for Cassiopeia instead (see figure 16). Observers in the southern hemisphere are not as fortunate; the stars around the south celestial pole are not nearly as bright as those around the north. The closest star that is relatively bright is Sigma Octantis. This star is just within naked eye limit (magnitude 5.5) and lies about 59 arc minutes from the pole.

**DEFINITION:** The north celestial pole is the point in the northern hemisphere around which all stars appear to rotate. The counterpart in the southern hemisphere is referred to as the south celestial pole.



Fig. 15

The position of the Big Dipper changes throughout the year and the night

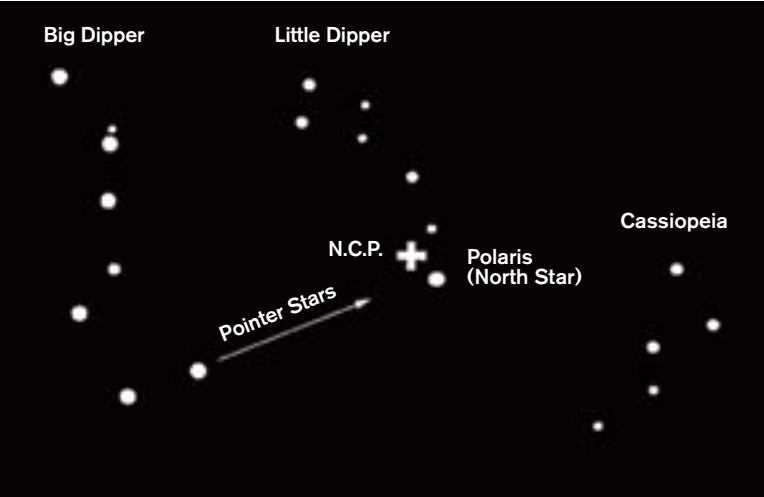


Fig. 16

The two stars in the front of the bowl of the Big Dipper point to Polaris which is less than one degree from the true (north) celestial pole. Cassiopeia, the “W” shaped constellation, is on the opposite side of the pole from the Big Dipper. The North Celestial Pole (N.C.P.) is marked by the “+” sign.



# TELESCOPE MAINTENANCE

Your NexStar SE telescope requires little maintenance. There are a few things to remember that will ensure your telescope performs at its best.

## DEW PREVENTION

Schmidt-Cassegrain telescopes are especially susceptible to condensation forming on the front corrector lens because the glass is immediately exposed to the outside air, just like the windshield on your car. If the temperature outside drops below the dew point, dew may form on the corrector within minutes.

The easiest way to prevent dew is to add an optional dew shield, available from Celestron, which shrouds the corrector and keeps the air immediately surrounding the corrector slightly warmer than the ambient temperature. If conditions are more severe, a dew heater can be added to apply slight heat to the corrector lens to keep it dry all night.

If dew has already formed on the corrector, point the telescope downward and allow the telescope to dry. You can also use a hair dryer to heat the corrector and evaporate the moisture to dry the telescope.

Dew does not harm the telescope, but can lead to faster dust buildup. You should only cap the telescope when it's dry. Do not store the telescope if covered in dew. Allow the telescope to dry first.

## CARE AND CLEANING OF THE OPTICS

Occasionally, dust and/or moisture may build up on the corrector plate of your telescope. Special care should be taken when cleaning any instrument so as not to damage the optics.

If dust has built up on the corrector plate, remove it with a brush (made of camel's hair) or a can of pressurized air. Spray at an angle to the lens for approximately two to four seconds. Then, use an optical cleaning solution and white tissue paper to remove any remaining debris. Apply the solution to the tissue and then apply the tissue paper to the lens. Low pressure strokes should go from the center of the corrector to the outer portion. Do NOT rub in circles!

You can use a commercially made lens cleaner or mix your own. A good cleaning solution is isopropyl alcohol mixed with distilled water. The solution should be 60% isopropyl alcohol and 40% distilled water. Or, liquid dish soap diluted with water (a couple of drops per one quart of water) can be used.

If moisture condenses on the inside of the corrector, remove the accessories from the rear cell of the telescope. Place the telescope in a dust-free environment and point it down. This will remove the moisture from the telescope tube.

To minimize the need to clean your telescope, replace all lens covers once you have finished using it. Since the rear cell is NOT sealed, the cover should be placed over the opening when not in use. This will prevent contaminants from entering the optical tube.

Internal adjustments and cleaning should be done only by the Celestron repair department. If your telescope is in need of internal cleaning, please call the factory for a return authorization number and price quote.

## COLLIMATION

The optical performance of your telescope is directly related to its collimation. Collimation is the alignment of the optical system. Your Schmidt-Cassegrain telescope was collimated at the factory after it was completely assembled. However, the telescope may have to be collimated after it's transported. The only optical element that may need to be adjusted, or is possible, is the tilt of the secondary mirror.

To check the collimation of your telescope, you will need a light source. A bright star near the zenith is ideal since there is a minimal amount of atmospheric distortion. Make sure that tracking is on so that you won't have to manually track the star. Or, if you do not want to power up your telescope, you can use Polaris. Its position relative to the celestial pole means that it moves very little thus eliminating the need to manually track it.

Before you begin the collimation process, be sure that your telescope is in thermal equilibrium with the surroundings. Allow 45 minutes for the telescope to reach equilibrium if you move it between large temperature extremes.

To verify collimation, view a star near the zenith. Use a medium to high power eyepiece. It is important to center a star in the center of the field to judge collimation. Slowly move in and out of focus and judge the symmetry of the star. If you see a systematic skewing of the star to one side, then re-collimation is needed.

To accomplish this, you need to adjust the secondary collimation screw(s) that move the star across the field toward the direction of the skewed light. These screws are located on the secondary mirror holder.

**NOTE:** Make only small 1/6 to 1/8 adjustments to the collimation screws and re-center the star by moving the scope before making any improvements or before making further adjustments.

1. While looking through a medium to high power eyepiece, de-focus a bright star until a ring pattern with a dark shadow appears. Center the de-focused star and notice in which direction the central shadow is skewed.



Secondary Mirror Collimation Adjustment Screws

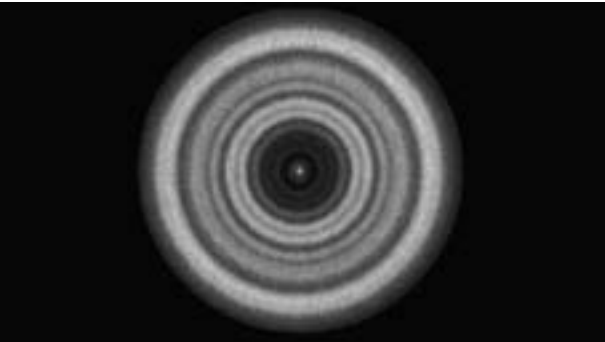


Even though the star pattern appears the same on both sides of focus, they are asymmetric. The dark obstruction is skewed off to the left side of the diffraction pattern indicating poor collimation.

2. Place your finger along the edge of the front cell of the telescope (be careful not to touch the corrector plate), pointing towards the collimation screws. The shadow of your finger should be visible when looking into the eyepiece. Rotate your finger around the tube edge until its shadow is seen closest to the narrowest portion of the rings (i.e., the same direction in which the central shadow is skewed)
3. Locate the collimation screw closest to where your finger is positioned. This will be the collimation screw you will need to adjust first. (If your finger is positioned exactly between two of the collimation screws, then you will need to adjust the screw opposite where your finger is located).
4. Use the hand control buttons to move the de-focused star image to the edge of the field of view in the same direction that the central obstruction of the star image is skewed.
5. While looking through the eyepiece, use an Phillips head screw driver to turn the collimation screw you located in step 2 and 3. Usually a tenth of a turn is enough to notice a change in collimation. If the star image moves out of the field of view in the direction that the central shadow is skewed, than you are turning the collimation screw the wrong way. Turn the screw in the opposite direction, so that the star image is moving towards the center of the field of view.
6. If while turning you notice that the screws get very loose, then simply tighten the other two screws by the same amount. Conversely, if the collimation screw gets too tight, then loosen the other two screws by the same amount.
7. Once the star image is in the center of the field of view, check to see if the rings are concentric. If the central obstruction is still skewed in the same direction, then continue turning the screw(s) in the same direction. If you find that the ring pattern is skewed in a different direction, than simply repeat steps 2 through 6 as described above for the new direction.

Perfect collimation will yield a star image very symmetrical just inside and outside of focus. In addition, perfect collimation delivers the optimal optical performance specifications that your telescope is built to achieve.

If seeing (i.e., air steadiness) is turbulent, collimation is difficult to judge. Wait until a better night if it is turbulent or aim to a steadier part of the sky. Stars in a steady part of the sky will be still, not twinkling.



A collimated telescope should appear symmetrical with the central obstruction centered in the star's diffraction pattern.

APPENDIX A: SPECIFICATIONS

Technical Specifications		
	NexStar 6SE (#11068)	NexStar 8SE (#11069)
Design	Schmidt Cassegrain Optical Design	Schmidt Cassegrain Optical Design
Aperture	6 in (150mm)	8 in (200mm)
Focal length	60 in (1500mm)	80 in (2032mm)
F/ratio of the optical system	10	10
Primary mirror: Diameter coatings	150mm Starbright XLT®	200mm Starbright XLT®
Secondary mirror spot size	2.2-inch	2.5-inch
Secondary obstruction	37% by diameter; 14% by area	35% by diameter; 12% by area
Corrector plate: Material coatings	Optical Quality Crown Glass Starbright XLT®	Optical Quality Crown Glass Starbright XLT®
Highest useful magnification	354x	480x
Lowest useful magnification (7mm exit pupil)	21x	29x
Resolution: Rayleigh criterion dawes limit	.92 arc seconds .77 arc seconds	.68 arc seconds .57 arc seconds
Light gathering power	459x unaided eye	843x unaided eye
Near focus standard eyepiece or camera	~ 20 feet	~ 25 feet
Field of view: Standard eyepiece	.8°	.64°
Linear field of view (at 1000 yds)	42 feet	33.6 feet
Magnification: Standard eyepiece	60x	81x
Optical tube length	16 inches	17 inches
Weight of telescope	21 lbs	24 lbs
Weight of tripod	9 lbs	9 lbs
Input Voltage	12 V DC Nominal	12 V DC Nominal
Batteries Required	8-AA Alkaline (not included)	8-AA Alkaline (not included)
Power Supply Requirements	12 VDC-750 mA (Tip positive)	12 VDC-750 mA (Tip positive)

Mechanical Specifications	
Motor: Type resolution	DC Servo motors with encoders, both axes .26 arc sec
Slew speeds	Nine slew speeds: 5° /sec, 3° /sec, 1°/sec, .5/sec, 32x, 16x, 8x, 4x, 2x
Hand control	Double line, 16-character Liquid Crystal Display 19 fiber optic backlit LED buttons
Fork arm	Cast aluminum, with integrated hand control receptacle

Software Specifications	
Software precision	16-bit, 20 arc sec. calculations
Ports	USB communication port on hand control
Tracking rates	Sidereal, Solar, Lunar and King
Tracking modes	Alt-Az, EQ North & EQ South
Alignment Procedures	SkyAlign, Auto Two-Star, Two-Star, One-Star, Solar System Align
Database	200 user defined programmable object. Enhanced information on over 200 objects.
Total object database	+40,000

APPENDIX B: USB CONNECTION

Using Celestron's free CPWI telescope control software or Celestron's Starry Night Special Edition software, you can control your NexStar SE telescope with a computer via USB. There is a USB Mini B connector at the base of the hand control, which is the same USB connection on Canon digital Rebel cameras. The NexStar SE telescope can also be controlled via USB using other popular astronomy software programs. You will also use the hand control's USB port when updating the hand control with new firmware.

# APPENDIX C: UPDATING THE HAND CONTROL'S FIRMWARE

As part of Celestron's ongoing product enhancement program, periodic updates for the NexStar+ hand control firmware are available. To check the firmware version currently installed on your hand control, press MENU>UTILITIES>VERSION.

To find the latest hand control firmware, go to: <https://www.celestron.com/pages/firmware-update-history>

- Scroll to NexStar + Hand Controller. If the latest version is higher than the one present in the hand control, you can perform the following procedure to ensure the best performance from your telescope.
- To update the hand controller firmware, you'll need to install the program that does the firmware updating on your computer. Go to: <https://www.celestron.com/pages/drivers-and-software>
- Click DOWNLOAD CELESTRON FIRMWARE MANAGER (CFM).
- Unzip all the components in the download file and install the Firmware Manager.
- CFM uses Java (download the latest from [www.java.com](http://www.java.com)) to work on Windows, macOS, and Linux.

You'll also need to connect your computer to the USB port at the base of the hand control. This USB port is an interface to the serial connection within the hand control. In most cases, once you connect your PC/laptop to the hand control, a driver will be automatically loaded. If a serial port is not present upon performing the firmware update process listed below, you should manually load the driver. The adapter inside the hand control uses a Prolific PL2303 chipset. You can search the Prolific website for the driver, here: <http://prolificusa.com/pl-2303hx-drivers/>

To update your hand controller to the latest firmware version:

- Connect the hand controller to the telescope mount
- Connect your hand controller to your computer using a USB cable.

**NOTE:** Do not use any additional cabling to connect to an AUX port for updating firmware. It is better to directly connect the hand control to the mount and connect the computer to the hand control. If you are using a computer with power-down or power-saving options or programmed anti-virus scans, disable these options so they don't interrupt the update, which can damage the hand control or motor boards.

- Keep the power to the telescope turned off.
- Simultaneously hold down the Celestron Logo and Menu buttons on the hand control.
- While still pressing the Logo and Menu buttons, turn on the telescope power.
- Upon power up, release the buttons. You should now see a hand controller message displaying Boot Loader Serial User Keypad Entry. Your hand controller is now ready to be programmed using the Celestron Firmware Manager.
- Open the CFM program by double-clicking the CFM icon. There might be two CFM icons installed—only one will open the orange CFM program window
- The Firmware Manager will automatically connect to your telescope. This may take a few moments. The top section of CFM will then state it has identified your telescope.
- CFM will automatically download all packages (firmware) listed in the center section of the Firmware Manager screen.
- Once the download is complete, click the Update button in the bottom section of the Firmware Manager screen to load the firmware into the hand control.

After you finish updating your hand control, check that the reprogramming has worked.

- Turn the power off, then on again.
- Go to MENU>UTILITIES>VERSION. The top line should say HC X.XX, where X.XX is the firmware version you chose as the update.



[celestron.com/pages/warranty](https://www.celestron.com/pages/warranty)