Alignment Troubleshooting

- Fully extend tripod legs - use lens shelf to ensure tripod legs are fully extended and cannot collapse
- Level tripod
- Make sure correct mount firmware is installed - should say NexStar SE (alt-az) not AdvancedGT (equatorial)
- Ensure location is set correctly, check the longitude and latitude of your location to verify
    1. Press menu when you turn on the telescope
    2. Scroll to Scope Setup
    3. Select Setup Time-Site
    4. If location needs to be changed, continue with the next steps, if not, you're good to go!
    5. Press Back $\times 4$
    6. Once you see City Database, select the appropriate city
    7. If you need to make a custom site, scroll to Custom Site and enter longitude and latitude
- Use alignment method appropriate for Alt-Az mount - don't use any alignment methods that start with EQ
- Choose alignment stars that form a large triangle
- For fine adjustment of centering of alignment stars, approach in same direction as slew direction for each star

Alignment Procedure

In order for the NexStar to accurately point to objects in the sky, it must first be aligned to known positions (stars) in the sky. With this information, the telescope can create a model of the sky, which it uses to locate any object with known coordinates. There are many ways to align the NexStar with the sky depending on what information the user is able to provide: **SkyAlign** uses your current date, time and city to create an accurate model of the sky. Then the user can simply point the telescope to any three bright celestial objects to accurately align the telescope with the sky. **Auto Two-Star Align** will ask the user to choose and center the first alignment star, then the NexStar will automatically select and slew to a second star for alignment. **Two-Star Alignment** requires the user to identify and manually slew the telescope to the two alignment stars. **One-Star Align** is the same as Two-Star Align however only requires you to align to one known star. Although not as accurate as the other alignment methods, One- Star Align is the quickest way to find and track bright planets and objects in Altazimuth mode. **Solar System Align** will display a list of visible daytime objects (planets and the moon) available to align the telescope. Each alignment method is discussed in detail below.

Sky Align

Sky Align 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 will have you aligned in minutes by asking for basic information like the date, time and location. Then you simply need to aim the telescope to any three bright celestial objects in the sky. Since Sky Align requires no knowledge of the night sky it is not necessary to know the name of the stars at which you are aiming. You may even select a planet or the moon. The NexStar is then ready to start finding and tracking any of the objects in its object database. Before the telescope is ready to be aligned, it should be set up in an outside location with all accessories (eyepiece, diagonal and finderscope) attached and lens cover removed. Also make sure that the tripod is leveled as described in the Assembly section of the manual. To begin Sky Align:

1. Power on the NexStar by flipping the switch located at the base of the fork are to the on position.

2. Press ENTER to choose Sky Align. Pressing the ALIGN key will bypass the other alignment options and the scrolling text and automatically begins Sky Align.

3. The hand control display will then ask for the following time/site information:

   Location - The NexStar will display a list of cities to choose from. Choose the city from the database that is closest to your current observing site. The city you choose will be remembered in the hand controls memory so that it will be automatically displayed the next time an alignment is done. Alternatively, if you know the exact longitude and latitude of your observing site, it can be entered directly into the hand control and remembered for future use as well. To choose a location city:

   - ☐ Use the Up and Down scroll keys to choose between City Database and 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. 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 Up or Down scroll key to select International and press ENTER.
   - ☐ Use the Up and Down Scroll buttons to choose your current state (or country if International locations was selected) from the alphabetical listing and press ENTER.
   - ☐ Use the Up and Down Scroll buttons to choose the closest city to your location from the displayed list and press ENTER.

   Time - Enter the current time for your area. 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 between Standard time or Daylight Savings time. Use the Up and Down scroll buttons (10) to toggle between options.
   - ☐ Select the time zone that you are observing from. Again, use the Up and Down buttons (10) 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.

   Helpful Hints

   - If the wrong information has been input into the hand control, the UNDO button will act as a backspace allowing the user to re-enter information.
   - The next time that your NexStar is aligned, the hand control will automatically display the last location (either a city or longitude/latitude) that was entered. Press ENTER to accept these parameters if they still apply. Pressing the UNDO button will allow you to go back and select a new city location or longitude/latitude.

4. Use the arrow buttons on the hand control to slew (move) 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 ask that you 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 button to center the object in the finderscope and press ENTER. Then once centered in the eyepiece press the ALIGN button.

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 UNDO 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 Sky Align

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

- Be sure to 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.

- Remember to 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.

- Dont worry about confusing planets for stars when selecting alignment objects. SkyAlign works with the four brightest planets (Venus, Jupiter, Saturn and Mars) as well as the Moon. In addition to the planets, the hand control has over 80 bright alignment stars to choose from (down to 2.5 magnitude).

- Rarely SkyAlign will not be able to determine what three alignment objects were centered. This sometime happens when a bright planet or the Moon passes near one of the brighter stars. In situations like these it is best to try to avoid aligning to either object if possible.

- Be sure to center the objects 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, you should center all three alignment objects in the eyepiece using the right and up arrow buttons (the up/down arrows reverse at slew rates of 6 or lower). Approaching the star from this direction when looking through the eyepiece will eliminate much of the backlash between the gears and assure the most accurate alignment possible.

Auto Two-Star Align

As with Sky Align, Auto Two-Star Align requires you to enter all the necessary time/site information as before. Once this information is entered, NexStar will prompt you to select and point the telescope at one known star in the sky. The NexStar 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 set up outside with all accessories attached and the tripod leveled, follow the steps below to align the telescope:

1. Once the NexStar is powered on , Press ENTER to begin alignment.

2. Use the Up and Down scroll keys (10) to select Auto Two-Star Align and press ENTER.

3. The hand control will display the last time and location information that was entered into the hand control. Use the Up and Down buttons to scroll through the information. Press ENTER to accept the current information or press UNDO to manually edit the information (see Sky Align section 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 Up and Down buttons (6 and 9 on the keypad) to scroll to the desired star and then 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. Finally, center the star in the eyepiece and press ALIGN.

6. Based on this information, the NexStar 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 UNDO button to display the next most suitable star for alignment.
    - Use the UP and DOWN scroll buttons to manually select any star you wish from the entire list of available stars.

Once finished slewing, the display will ask you to use the arrow buttons to align the selected star with the red dot of the finderscope. Once centered in the finder, 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, and you are now ready to find your first object.

Two Star Alignment

With the two-star alignment method, the NexStar 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 NexStar is powered on, use the Up and Down scroll keys (10) to select Two-Star Align, and press ENTER.

2. Press ENTER to accept the time/site information displayed on the display, or press UNDO to enter new information.

3. The SELECT STAR 1 message will appear in the top row of the display. Use the Up and Down scroll keys (10) to select the star you wish to use for the first alignment star. Press ENTER.

4. NexStar then asks you to center in the eyepiece 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 centered.

5. Then, center the star in the eyepiece and press ALIGN.

    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. This is done by pressing the RATE key (11) on the hand controller then selecting the number that corresponds to the speed you desire. (9 = fastest , 1 = slowest).

6. NexStar will then ask you to select and center a second alignment star and press the ALIGN key. It is best to choose alignment stars that are a good distance away from one another. Stars that are at least 40o to 60o apart from each other will give you a more accurate alignment than stars that are close to each other.

Once the second star alignment is completed properly, 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 the information needed to track objects in altazimuth in any part of the sky. One-Star Align is not meant to be used to accurately locate small or faint deep-sky objects or to track objects accurately for photography.

To use One-Star Align:

1. Select One-Star Align from the alignment options.
2. Press ENTER to accept the time/site information displayed on the display, or press UNDO to enter new information.
3. The SELECT STAR 1 message will appear in the top row of the display. Use the Up and Down scroll keys (10) to select the star you wish to use for the first alignment star. Press ENTER.
4. NexStar then asks you to center in the eyepiece 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 centered.
5. Then, center the star in the eyepiece and press ALIGN.
6. Once in position, the NexStar will model the sky based on this information and display Align Successful.

Note: Once a One-Star Alignment has been done, you can use the Re-alignment feature (later in this section) to improve your telescopes pointing accuracy.

Solar System Align

Solar System Align is designed to provide excellent tracking and GoTo performance by using solar system objects (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 as well as a quick way to align the telescope for night time observing.

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.

1. Select Solar System Align from the alignment options.
2. Press ENTER to accept the time/site information displayed on the display, or press UNDO to enter new information.
3. The SELECT OBJECT message will appear in the top row of the display. Use the Up and Down scroll keys (10) to select the daytime object (planet, moon etc) you wish to align. Press ENTER.
4. NexStar then asks you to center in the eyepiece the alignment object you selected. Use the direction arrow buttons to slew the telescope to the alignment object and carefully center it in the finderscope. Press ENTER when centered.
5. Then, center the object in the eyepiece and press ALIGN.

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

Tips for Using Solar System Align

- For safety purposes, the Sun will not be displayed in any of the hand controls customer object lists unless it is enabled from the Utilities Menu. To allow the Sun to be displayed on the hand control, do the following:

1. Press the UNDO button until the display reads NexStar SE
2. Press the MENU button and use the Up and Down keys to select the Utilities menu. Press ENTER. Use the UP and Down keys to select Sun Menu and press ENTER.
3. Press ENTER again to allow the Sun to appear on the hand control display.

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