

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Main Menu

This is the main menu where all other functions can be navigated from:

The Top box has 2 messages lines that displays the current status in the top and the previous in the second line. This sometimes changes when other functions are being preformed also, such as "GOTO'S".

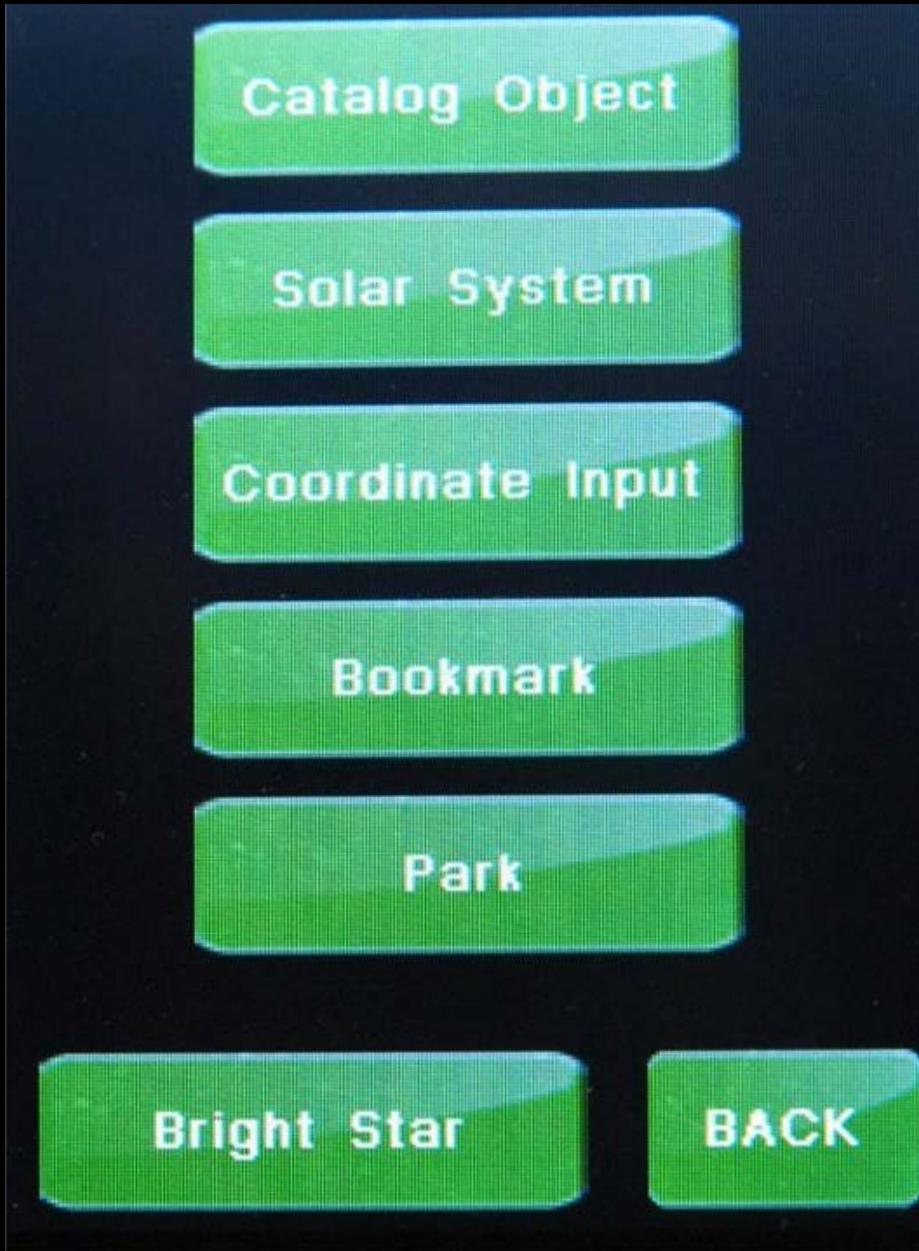
The four diamond buttons are movement buttons. The top and bottom button are for the Dec, and the left and right button are for RA. They will move the mount at the speed selected by the speed button on the lower left. This button will take you through Slew, Move, Center and Guide speeds, and then back to Slew.

Now the direction buttons have two modes of operation. If you push down and slide your finger off the button the mount will keep moving in the direction of the button until you press it again. If you press and hold, and then let go without sliding your finger off, it works like a normal button. Since the graphics screen is not multi-touch, if you use the finger slide off method, and touch the opposite button, the mount will speed up. The speeds are in the same order as the speed button.

The Menu button will take you to MainSelectionMenu. The "GOTO" button will take you to the Goto menu where you select a Catalog, The Solar System, Coordinate input, Do a bookmark, or Park the mount.

The buttons on the back of the hand controller work like the buttons do on the Gemini-1, and are multi-touch.

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Main Goto Menu

Main Goto Menu.

You can go to the list of catalogs stored in the hand controller,

The Solar System selection screen,

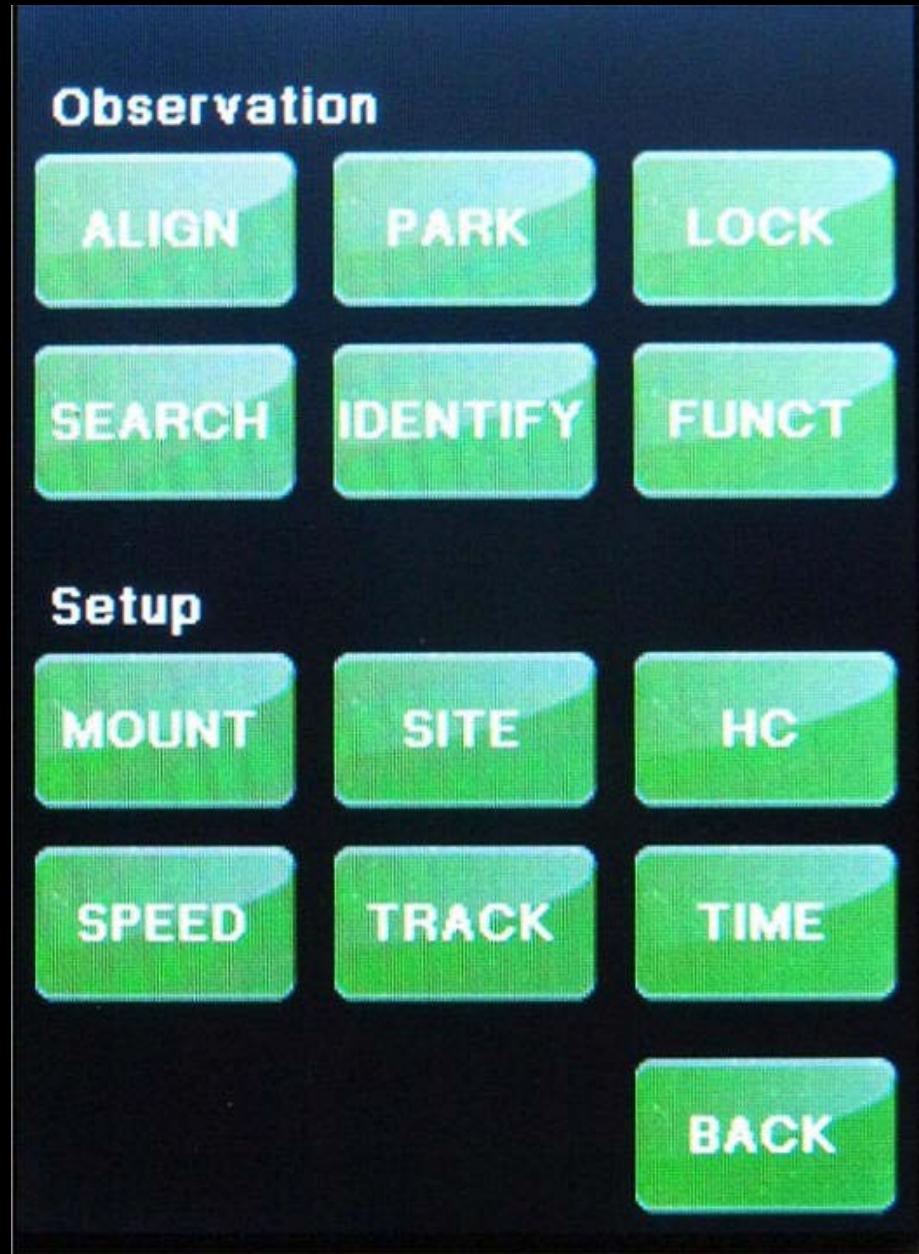
The coordinate Input screen,

The Bookmark screen,

and the Park mount screen from this menu.

There is also a Bright Star button that will take you directly to the BSL catalog.

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Selection Menu

This is the main selection screen menu.

Each of the selections on the screen may have one or more sub-menu.

We will go to the hand-controller menu items next.

Clicking on the HC button on the left will take you to that menu.

However all buttons work.

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GOTO Bookmark

This menu will let you create custom bookmarks that you can save and return too.

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Park Menu

This menu provides 3 park positions and the capability to stop tracking and start tracking.

The Park at CWD (counter weight down) will park the mount where it was positioned when you first turned it on. It assumes this is the CWD position. You use this startup position for COLD STARTS and WARM STARTS. If you have already built a model, you will need to go to a star, center it, and do a SYNCHRONIZE so that the telescope really knows where it is.

Once you set a HOME position, you can park at that HOME position and start up by using a WARM RESTART from that position. No SYNCHRONIZE is needed assuming you have already built a model.

You can stop tracking by using the Sleep Telescope button and start tracking again by using the Wakeup Telescope button. Note: the latest version of this function has been changed into one button that changes between Sleep Telescope and Wakeup Telescope.

There has been added a Part at Zenith button. This parks the telescope straight up. This could be used to talk flats.

I will try and get a new image up soon.

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+2	Aldebaran α TAU	57
-2	Alphard α HYA	32
+1	Betelgeuse α ORI	61
+1	Capella α AUR	69
+7	Caph β CAS	24
+0	Castor α GEM	78
-4	Denebola β LEO	18
-3	Dubhe α UMa	40

This menu shows you the Bright Star Catalog without having to go through the catalogs selection menu. Clicking on any of the stars will do a "GOTO Command" to that Star. Only stars above the horizon are shown.

The number to the left of the name is the hour angle of that star.

The number to the right is the Dec angle of that star.

The back button takes you all the way back to the main menu.

DOWN

UP

BACK

Goto Bright Star selection

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Object Name:

HC RA/DEC

Right Ascension:

13:02:44

Declination:

+10:53:43

JD2000



Flip



Go To

BACK

Goto Coordinates

This is the coordinate entry screen. Enter the RA and Dec in hours:minutes:seconds format and hit GOTO. The GOTO button is not active in this demo.

On the Object Name, you can give these coordinates a custom name.

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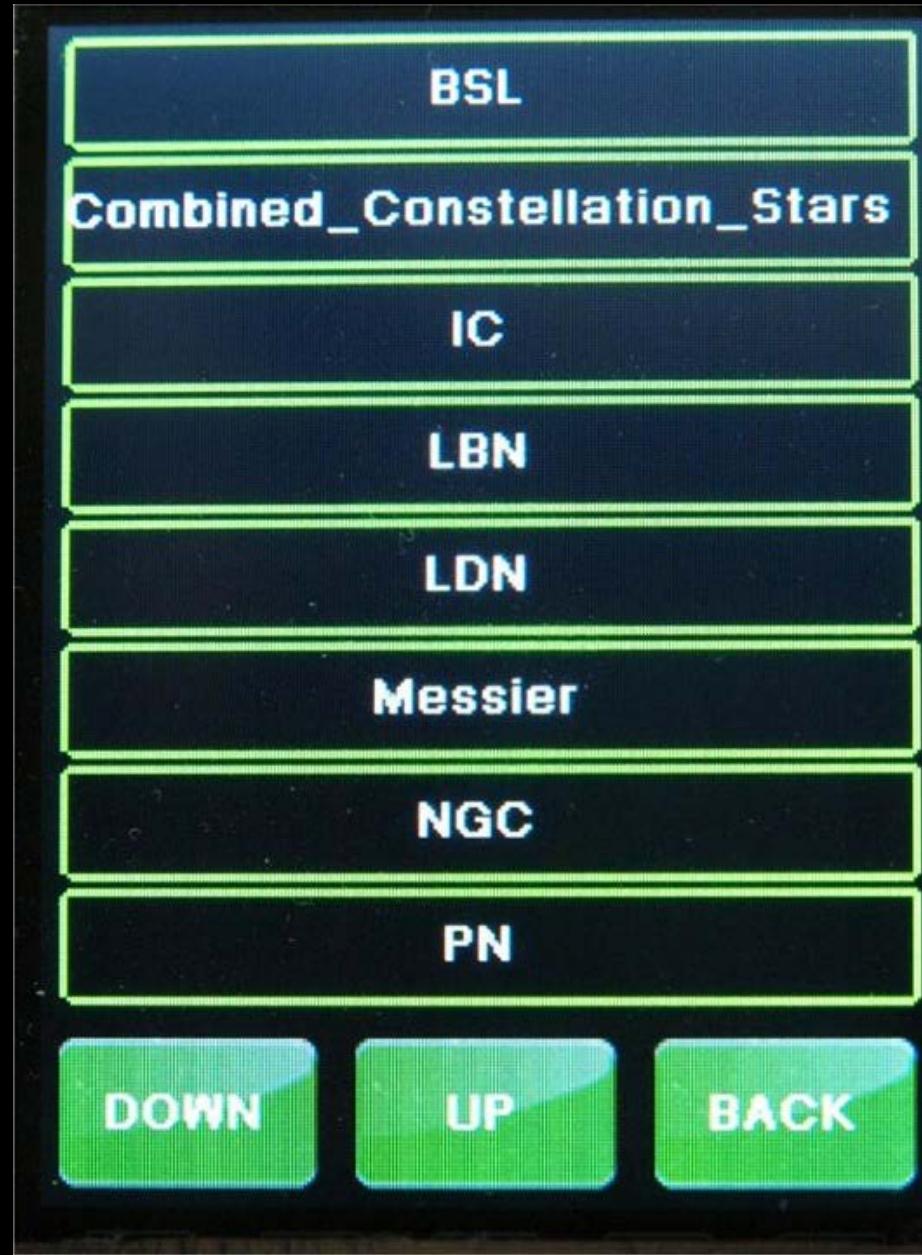
Solar System Menu

This is the solar system menu. Notice that some of the buttons are shown in white with the text in black. This is not what you will see. That text will also be in white. I put it in black so that you can tell what the buttons are for. The white button and white text indicates that these items are not visible at this time.

In this menu only the Moon, Mars and Jupiter are visible. Clicking on one of them would take you to the normal "GOTO" menu (not demonstrated at this time)

Only the back button works for this Demo.

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This is a list of the Catalogs contained in the hand controller. It is by no means the complete list of catalogs. For this interactive demo, we are only going to the BSL (Bright Star List), so click in that square to continue.

You can also use the up and down buttons to scroll the list of catalogs.

Catalog List

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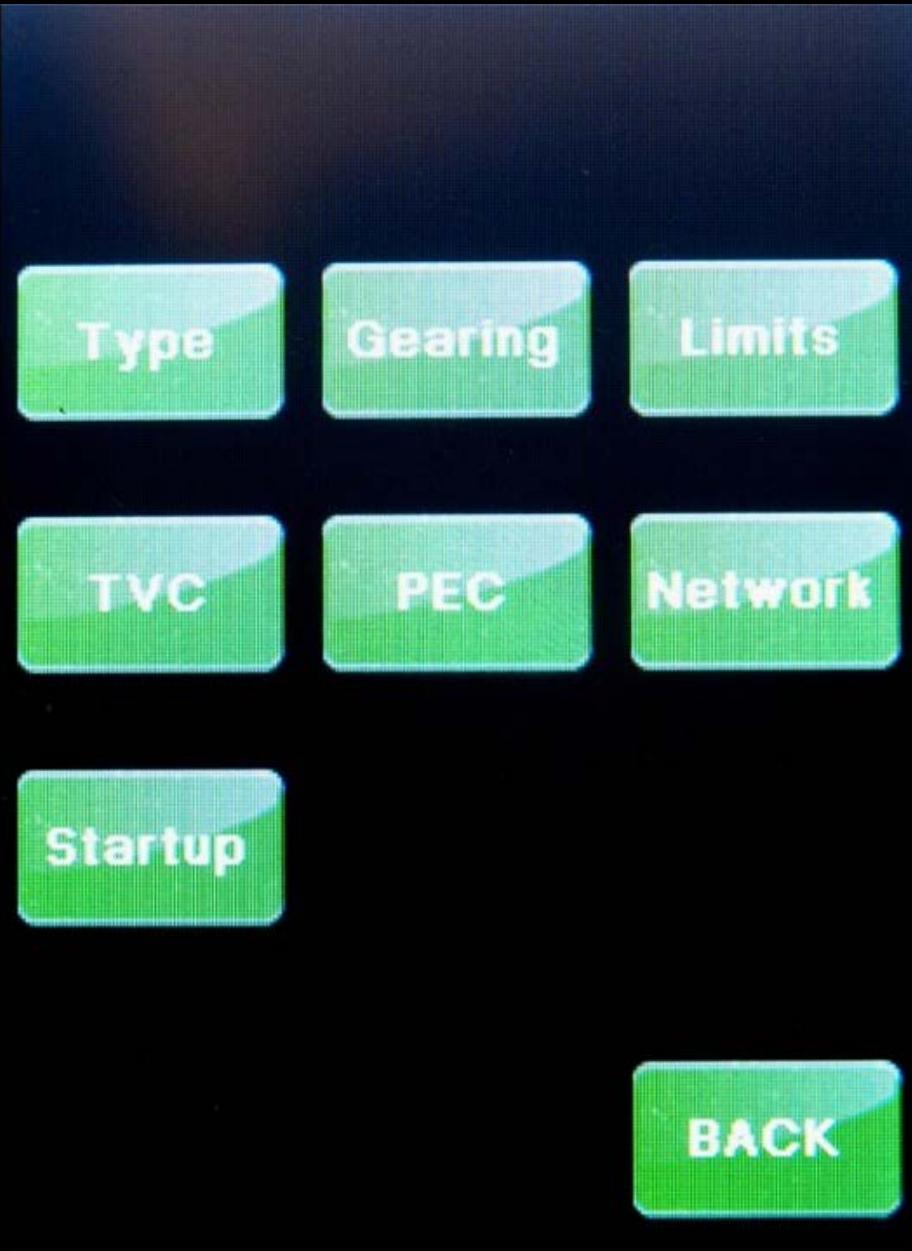
These two menus are the alignment control menus.

You can "GOTO" a bright star, Do an alignment, Synchronize the mount to a star, Check the Model Parameters, Undo the last alignment star, Completely Reset the model to none, Store a current model onto the micro-SDcard, Reload a stored model from the micro-SDcard, Do a Polar Align Assist if no model is stored, and Do a Polar Axis Correction if a model does exist.

There are other menus that provide some of the functions of this menu, such as the main menu.

The Alignment and Synchronize buttons expects you to already be pointing to a bright star.

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Mount Menu

From this menu is where you start all the mount parameters.

Type - select your mount type.

Gearing - if you have a custom mount this is where you set your gear ratios.

Limits - This is where you set your mount limits.

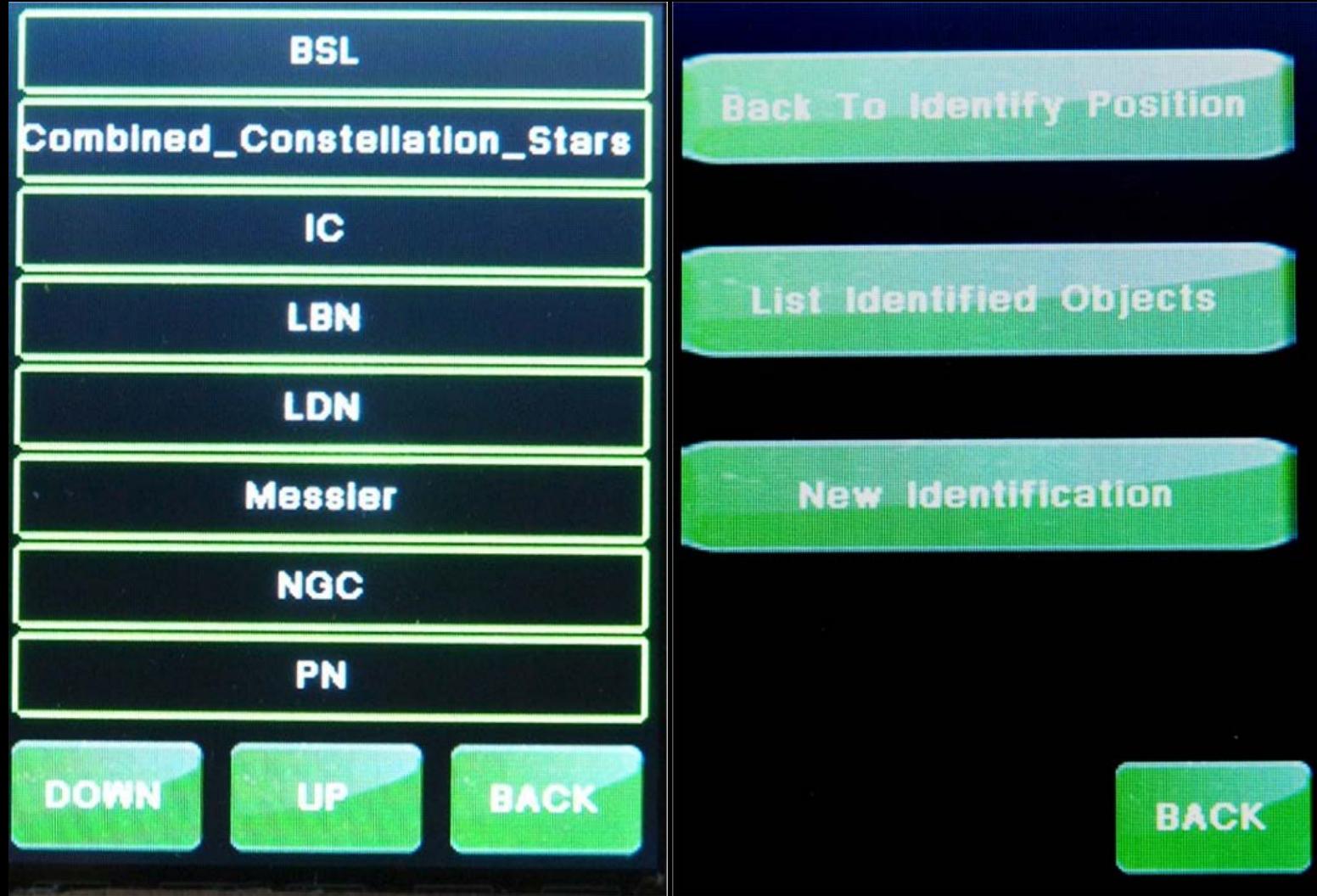
TVC - this is where you set the Dec backlash compensation.

PEC - This is where you can compensate for periodic error of the worm gear.

Network - This is where you set up your network setting.

Startup - this is where you setup the default startup mode.

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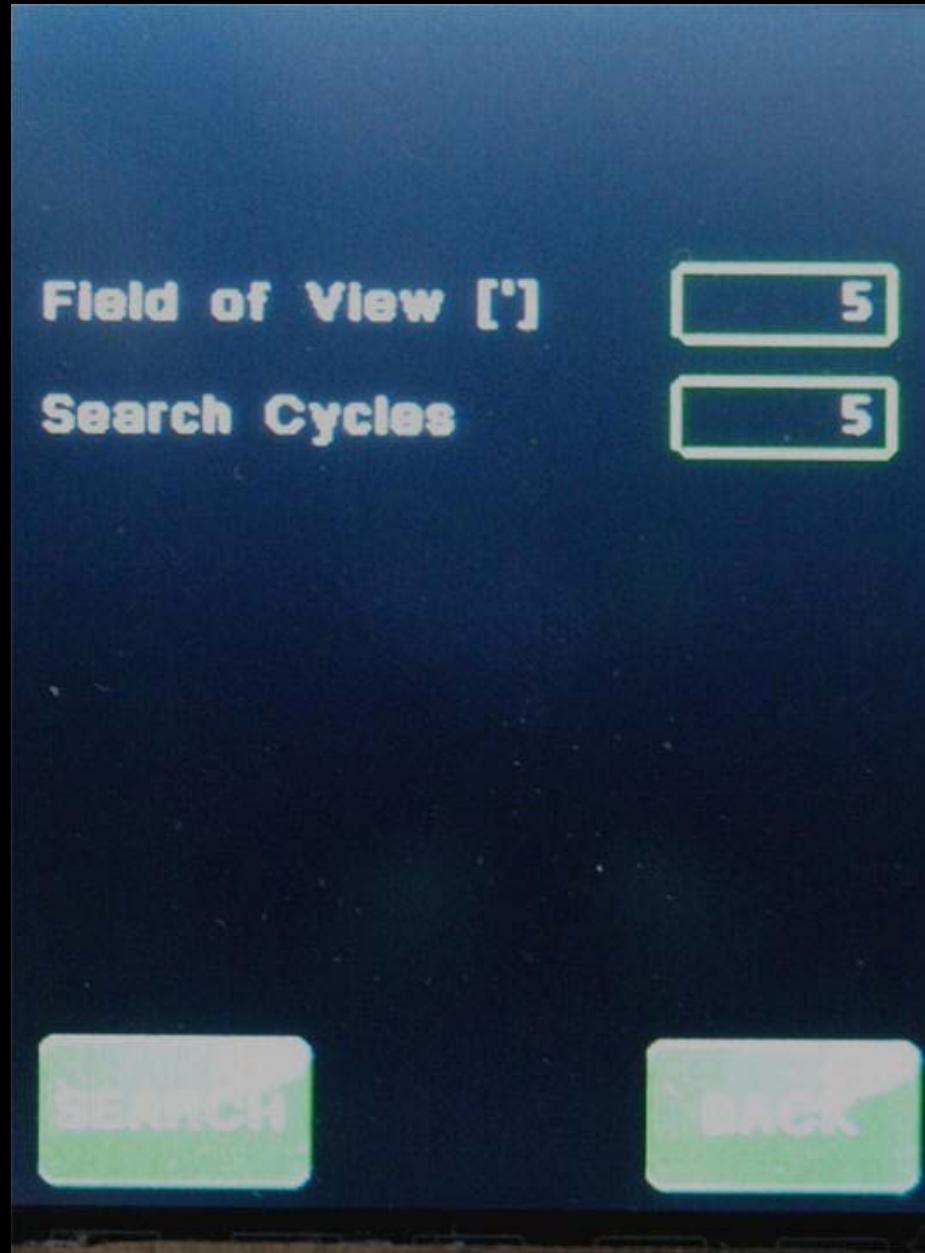
This 2 menus identifies up to ten celestial objects that lie within a range of about 10 degrees from where the telescope is currently pointing.

The left menu lets you select the catalog from which the stars will be identified from, and the right menu will let you go between objects that have been identified.

Those objects nearest the central axis are listed first, and the selection is refined as you designate the object's catalog, type, and maximum magnitude (These latter items appear in the menu tree as submenus of each other).

You can scroll through the list of identified objects with the Up and Down buttons. As each object is displayed, it becomes the "selected object," with coordinates and data available in the information buffer.

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Search Menu

This menu allows you to search around where the mount is pointing. The field of view is in arc seconds, and the search cycles is how many times the mount will make a circle at the arc seconds of deviation from center.

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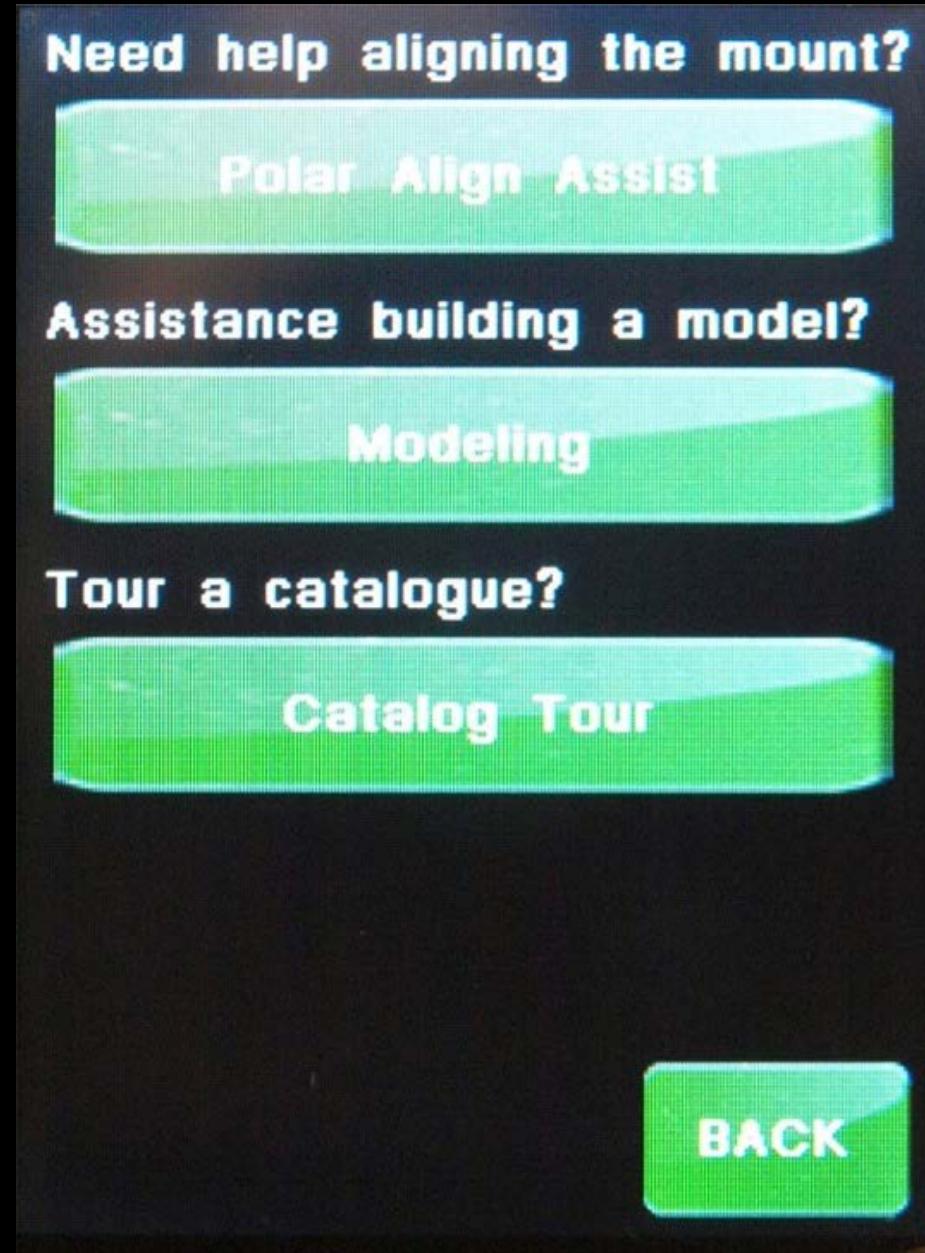


Fig 10 - you can also get to this screen from Menu--> Funct

Before using this menu, I suggest that you set your [safety limits](#).

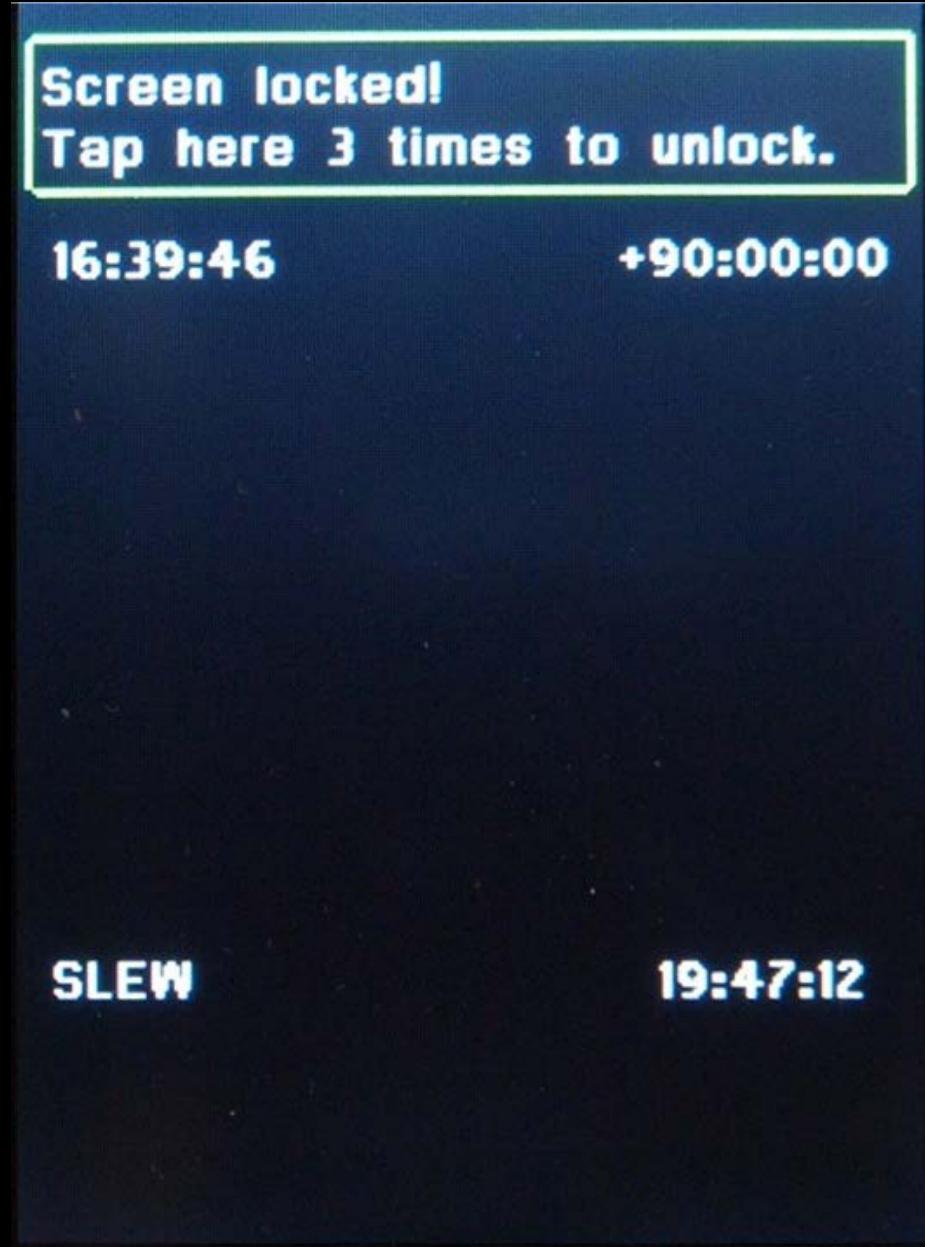
We are going to select modeling from this screen. The Polar Align Assist has to be done before a model is built. It will help you get within about 1 to 2 degrees of the pole.

The catalog tour lets you tour catalog objects that are above the horizon.

Please select Modeling.

Some misconceptions about modeling. Modeling helps to provide better tracking: Nope this is wrong. Modeling only helps provide for better GO-TO's. The only thing that really helps accurate tracking is a excellent Polar alignment. If your polar alignment is dead on, and your time, time zone offset, latitude and longitude are dead on, then the G2 should provide accurate tracking, but of course other factors such as gear slop, mount imperfections, balance imperfections, and atmospheric refraction can cause tracking errors, you might not see perfect tracking.

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Screen Locked

The Screen Locked screen. This screen locks the graphics screen, so that if you are using the tactile buttons, you do not accidentally push on one of the graphics screen buttons.

Tap in the upper box 3 times to return to the normal graphics screen.

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Hand Controller Setting

This menu has the Language, Display, SD Card, Buttons, and Mode selection sub-menus.

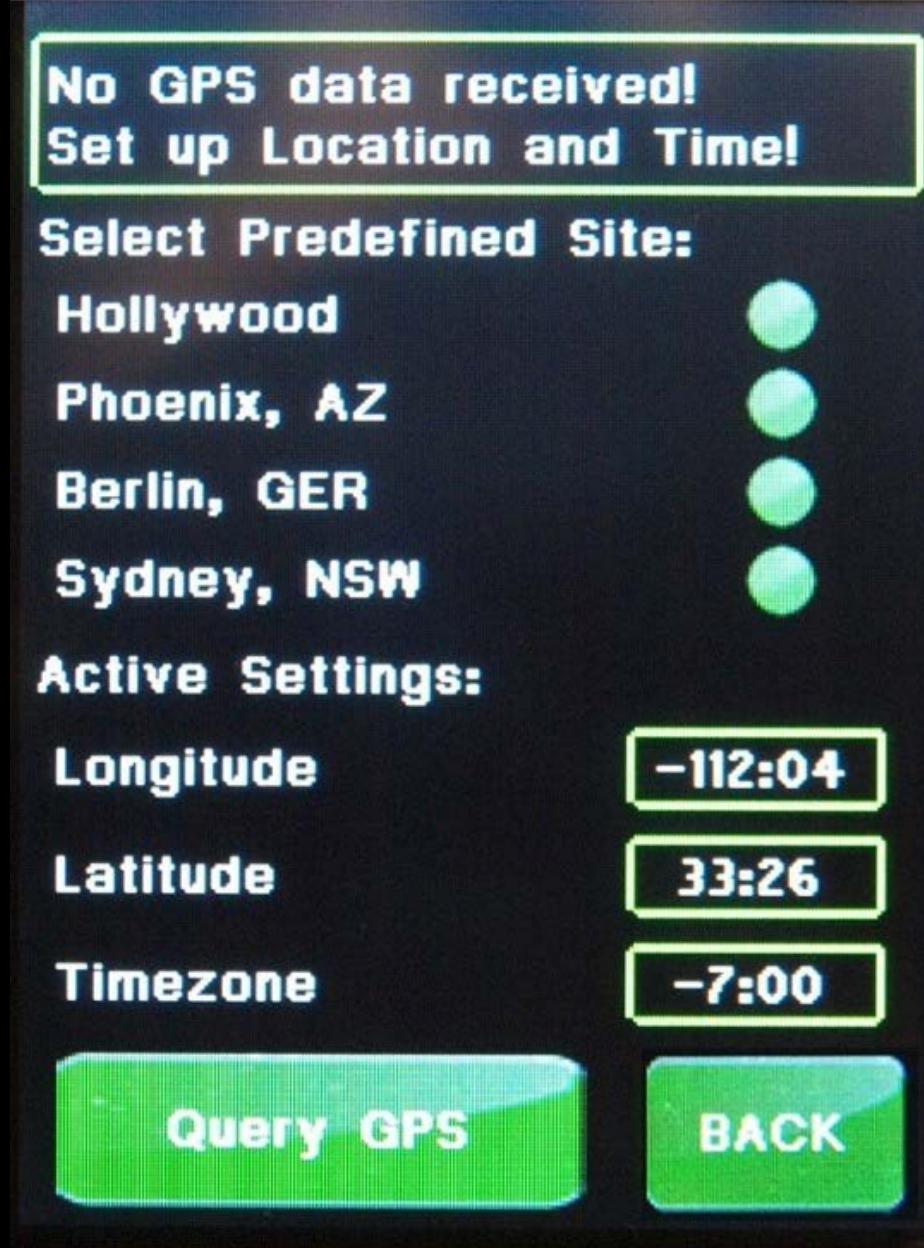
We will do each menu in the order above.

Clicking on one of the button on the left will take you to that menu.

The back button will take you to the previous menu.

The Store Settings button stores all the setting you made from the sub-menus of this menu.

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Site Menu

You have to enter your coordinates into the latitude and longitude, don't worry about the offset, we will do that on the next screen. If you select the different locations, you can see the sign change on the display. Notice that the Longitude is Negative in the USA and Positive in Europe

Touch in the Longitude box. When you do the next screen Fig 4 will come up.

Do what is indicated in Fig 4. After that you will be brought back to this screen.

Touch in the Latitude box, You will be taken to a screen similar to Fig 5.

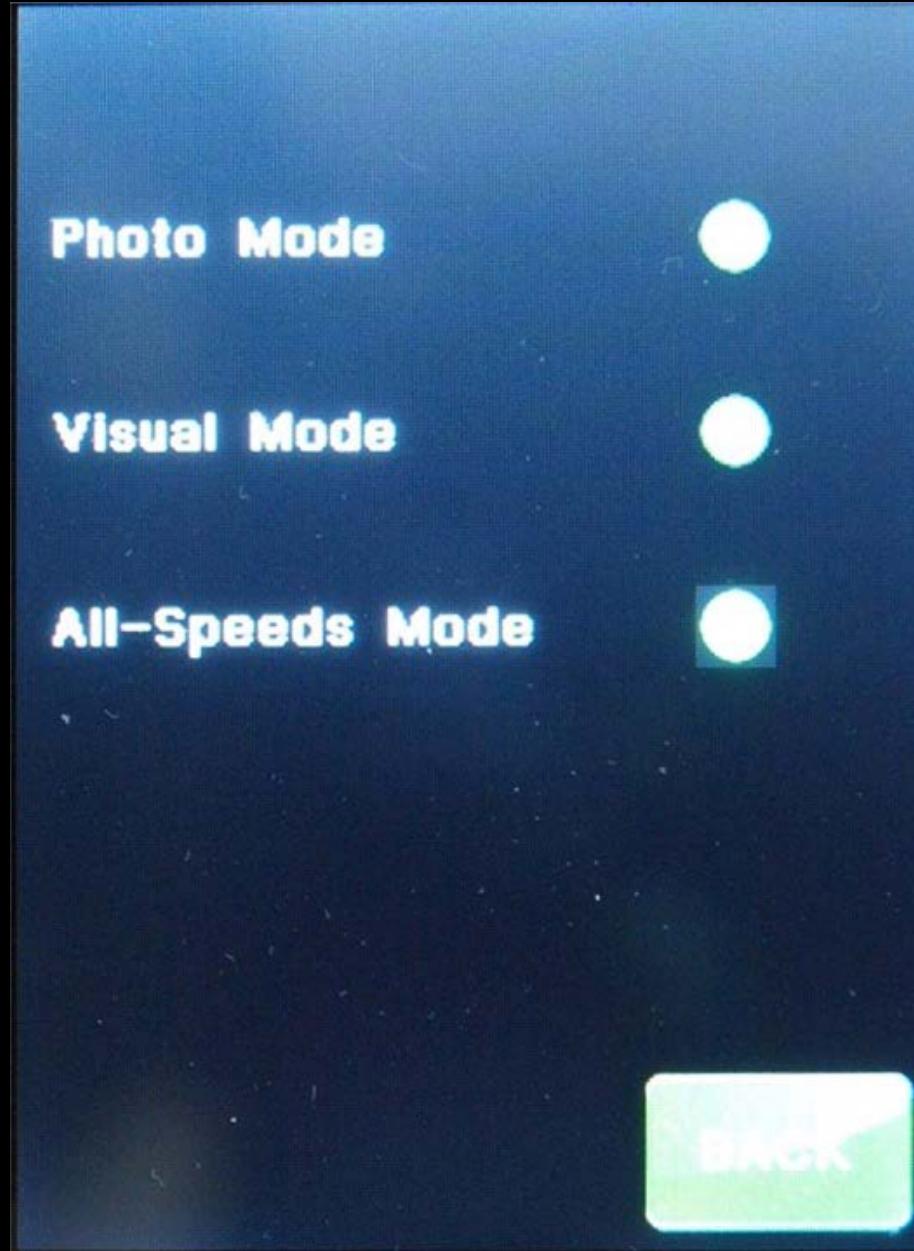
After filling out that screen you will be brought back here again.

Hit the Next button. You will be taken to a screen similar to Fig 6.

Note: the Hemisphere is selected totally by the sign of the Latitude in the Gemini-2. Positive for Northern Hemisphere and negative for Southern Hemisphere. It was the same in the Gemini-1 also. No switches to change at all.

The Query GPS button will have the Gemini-2 try and get the GPS coordinates from a GPS unit hooked to Serial Port 1. The speed of this port defaults to 4800 baud for GPS use. Its speed is set in the Web interface under Serial Tab.

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This menu lets you select the speed that the buttons on the back (tactile) work in. These buttons works in one of three modes: the Visual Mode, the Photo Mode and the All Speeds Mode.

You can move both axes simultaneously in all 3 modes. You select the mode by use of this menu. Like some other settings, it is remembered permanently and will be in effect even after powering off and on again.

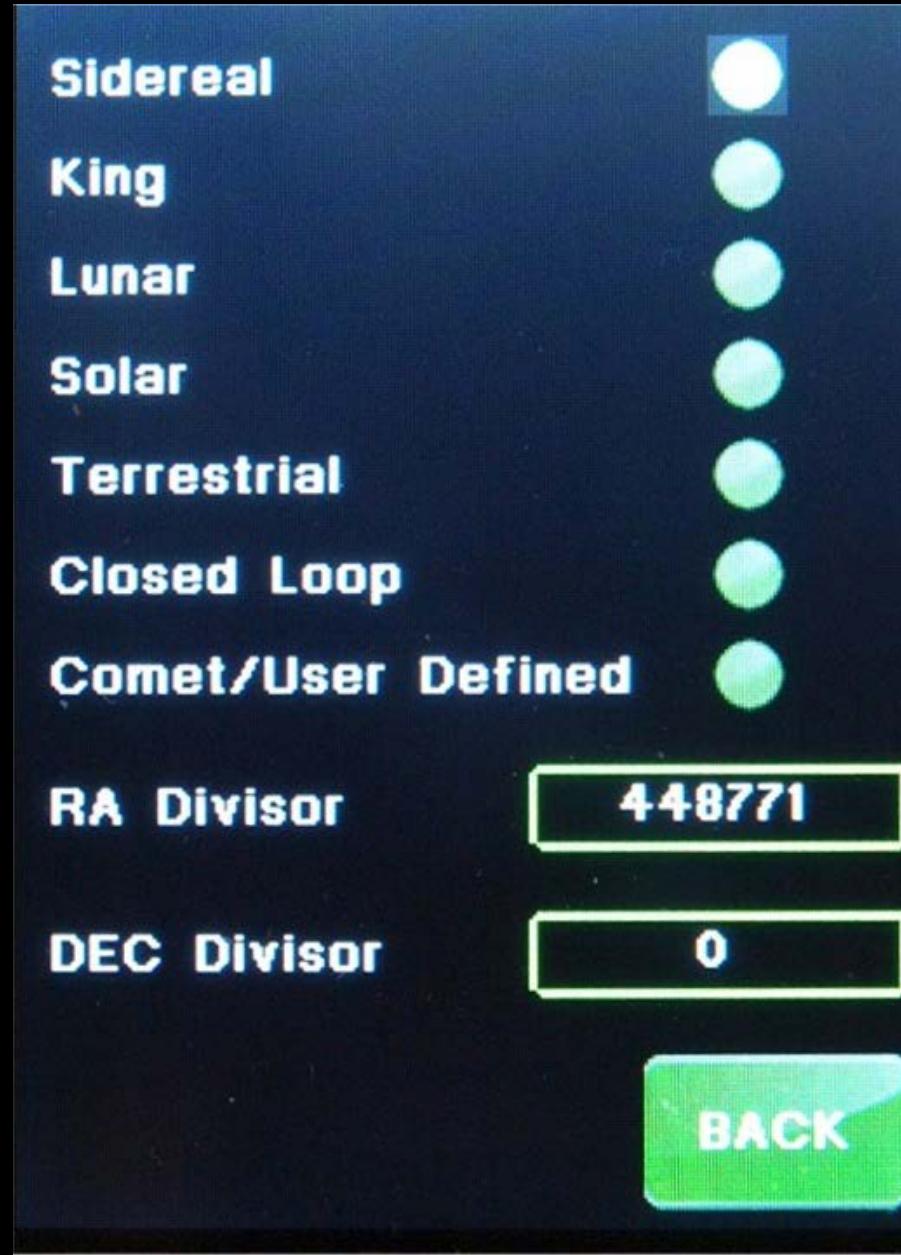
The Visual Mode In visual mode, the Guiding Speed is not available. When you press a button, the telescope moves at Centering Speed. Momentarily pushing the opposite button (tactile buttons only) lets the system accelerate to the manual slewing speed. If you are moving both axes, both will speed up. Ramping up and down in speed occurs independently for both axes. This mode is intended for visual observing and for looking up objects. The autoguider port is not active in this mode.

The Photo Mode In Photo Mode, Guiding Speed is the principal speed, so pressing a Hand Controller directional button moves the telescope at the selected Guiding Speed; Slewing Speed is not available. Acceleration to Centering Speed is available in four stages (to allow easy centering of an object in the field of view or on a CCD chip) by pressing the opposite tactile button while Gemini is guiding: Pressing the opposite button once changes to 1/8 of Centering Speed to allow fine centering of the target. Then, after about 2 seconds, the speed will increase to 1/4 Centering Speed, after another 2 seconds to 1/2 Centering Speed, and finally to full Centering Speed.

Pressing the opposite button twice changes to full Centering Speed immediately. If you want to guide a photograph manually, you may plug a Standard (not Deluxe) Hand Controller into Gemini's autoguider port. This way you are sure that you cannot accidentally move the scope at centering speed while guiding. The LED on the standard Hand Controller will not be illuminated when plugged into the autoguider port.

The All Speeds Mode In this mode, all speeds are available, from Guiding Speed to Slewing Speed, by using the opposite-button trick. You can use this mode, for example, while drift aligning, when you need very fine centering of a star at the crosshairs and a fast move from the meridian to the eastern or western horizon. However, for normal observing, you'll probably select either the Visual or Photo Mode.

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This is where you can set the tracking speed.

The RA and Dec Divisor can be changed to provide a custom tracking speed if necessary.

1. **Telescope Speeds:** Gemini allows tracking in 6 speeds: Sidereal, Lunar, Solar, Adaptive King Rate, Closed Loop, Comet/User Defined, and Terrestrial (tracking turned off). In addition, the Hand Controller permits the user to move the telescope in both RA and Dec in 3 speeds that are established in the setup menu: Guiding, Centering, and Slewing. The user can also perform go to movements of the telescope at a separate speed that is also established in the Web Mount setup menu. When a "GOTO" operation occurs, the telescope moves at "GOTO" Speed, and then slows down to Centering Speed as it approaches its target. Telescope parking is a separate command that disables tracking and moves the mount to a predetermined Home position – by default, counterweight down with the telescope pointing to Celestial North. Finally, all telescope movement stops and an alarm sounds when the mount slews to either its Eastern or Western safety limit. A warning also sounds when the mount approaches its Western limit while tracking.

2. **Sidereal Speed:** Sidereal rate is simply the rate that compensates for the Earth's motion relative to the celestial sphere. It keeps the mount pointed at a constant RA and Dec. coordinate in the sky and will probably be the rate that you use the vast majority of the time. With sidereal tracking selected, the telescope makes one revolution per sidereal day (86164.0905 seconds). Note: The sidereal rate assumes that your mount is

accurately polar aligned.

3. **None/Terrestrial Speed:** This rate turns tracking off completely and allows you to observe stationary objects such as points on land, or geosynchronous satellites. It is also useful for keeping the telescope from exceeding its safety limits when the Gemini must be left on for extended periods of time between observations.
4. **Lunar and Solar Tracking Speed:** Neither the lunar nor solar tracking rates is constant. Since the orbits of Earth and Moon are slightly elliptical, the apparent speed of Moon and Sun will change. When you select the lunar or solar tracking rates, the tracking speed will be calculated based on the actual position and the position one hour later. Because the Moon orbits the Earth, its RA and Dec. change during the course of the night. The lunar tracking rate compensates for the RA component of that change; there is no compensation for the changes in Dec. While sidereal rate can certainly be used for visual lunar observing, the lunar rate will do a better job keeping the Moon centered in the telescope's field of view. Since the Moon is relatively near the Earth, even the location on Earth where you are observing must be taken into account. The lunar tracking rate therefore takes the parallax into account by calculating topocentric instead of geocentric positions. Gemini computes the tracking rates by calculating the current position of the Sun or Moon and the position one hour later. While the tracking rate for the (distant) Sun will not change much during an observing session, the tracking rate for the Moon might vary significantly as its parallax changes moving from the horizon to higher elevations and vice-versa. You can reselect the lunar tracking rate periodically throughout the observing session to

allow Gemini to recalculate the correct rate as needed. Because the Earth is orbiting the Sun, the Sun's RA and Dec. do change during the course of the day, but much more slowly than the Moon's. The solar tracking rate again compensates for the RA component of that change, but not for the Dec. Since the difference between solar and sidereal rate is only about 4 minutes a day, you will see little difference between the two over a short period of time.

5. Adaptive King Tracking Speed: In the absence of the Earth's atmosphere, sidereal rate tracking would be all that is needed to accurately track objects with fixed RA and Dec. coordinates (any object outside the solar system). However, because the Earth's atmosphere refracts (bends) light, it complicates the situation. The light from an object close to the horizon must pass through more atmosphere than an object higher in the sky. It is therefore subject to more refraction, causing the object to appear to be slightly higher in the sky than it actually is. This is called refraction. As the object climbs higher in the sky, it is subject to less and less refraction, and catches up with its refracted image. This means that objects appear to move at a rate slightly slower than sidereal rate when they are close to the horizon. Several methods have been devised to compensate for this effect called "differential refraction."

The King method (published 1931 by Edward Skinner King) helps to avoid star trailing in photographs caused by differential refraction. Differential refraction may especially affect wide field photographs with long exposures.

King proposed two measures:

- Offsetting the polar axis slightly towards the zenith, and
- Adjusting the tracking rate.

The values necessary to accomplish this depend on the geographical coordinates of the observing site and the declination of the object being photographed. Gemini's Adaptive King rate tracking varies the tracking speed to match the required value for the selected object's declination. The user must offset the elevation of the polar axis himself.

6. Closed Loop Tracking Speed: The preceding discussion of tracking rates assumes that the mount is accurately polar aligned, allowing tracking to be accomplished using only the RA motor. However, for visual observing sessions, there is no need for extremely accurate polar alignment. By selecting Closed Loop tracking, Gemini can accurately track an object even if polar alignment is off several degrees in any direction. Gemini does this by comparing the coordinates of the object being tracked with the actual coordinates of the telescope. If the coordinates do not match, Gemini makes slow corrections in both RA and Dec. axes to point the telescope back at the object. This process of compare and correct is done about 22 times per second. Although Closed Loop tracking will keep an object centered for a long time, it is not a substitute for a good polar alignment – especially if you intend to photograph extended objects. A misaligned polar axis will lead to field rotation, an effect where objects in the field of view will rotate around the center. However, after having done a good polar alignment, Closed Loop tracking can be used to photograph slow moving objects, such as minor planets or comets. This can work even if the object moves at a varying speed, by repeatedly sending actual coordinates to the Gemini using a computer. Because Gemini uses modeling parameters to calculate coordinates, Closed Loop tracking is only available after a pointing model has been established.

7. Comet/User Tracking Speed: This rate is very complex and a separate web page will be generated for it.

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Time Set Menu

Here is where you enter your date and time, and your time zone offset. The time is entered in local military time format. IE 1:00 PM would be 13:00:00, The date and time will be converted to UTC time and date internal for use.

You will use figures 7, 8 and 9 to do that. Touching on each entry on the screen on the left will take you to one of the below screens on your hand controller. Lets do date, offset and then time in that order. Once all are entered you will come back here and hit the Set button and then the next button. Note that the time you set in figure 8 below, will not take effect until you hit the set button on this screen.

After you have finished with Figures 6, 7 and 8, hit the set button, then hit Next. Fig 9 should appear. If it does not then from the main screen, hit menu -->Funct

The Time just above the Next button is the calculated Sidereal time. If you would like to make sure it is correct go to [Local Apparent Sidereal time](#) and enter your longitude. It will show your sidereal time and you can compare them to make sure everything is correct.

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This is the screen where you enter your Right Ascension or Declination Enter them in Hours : Minutes : Seconds

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Fig Main Menu

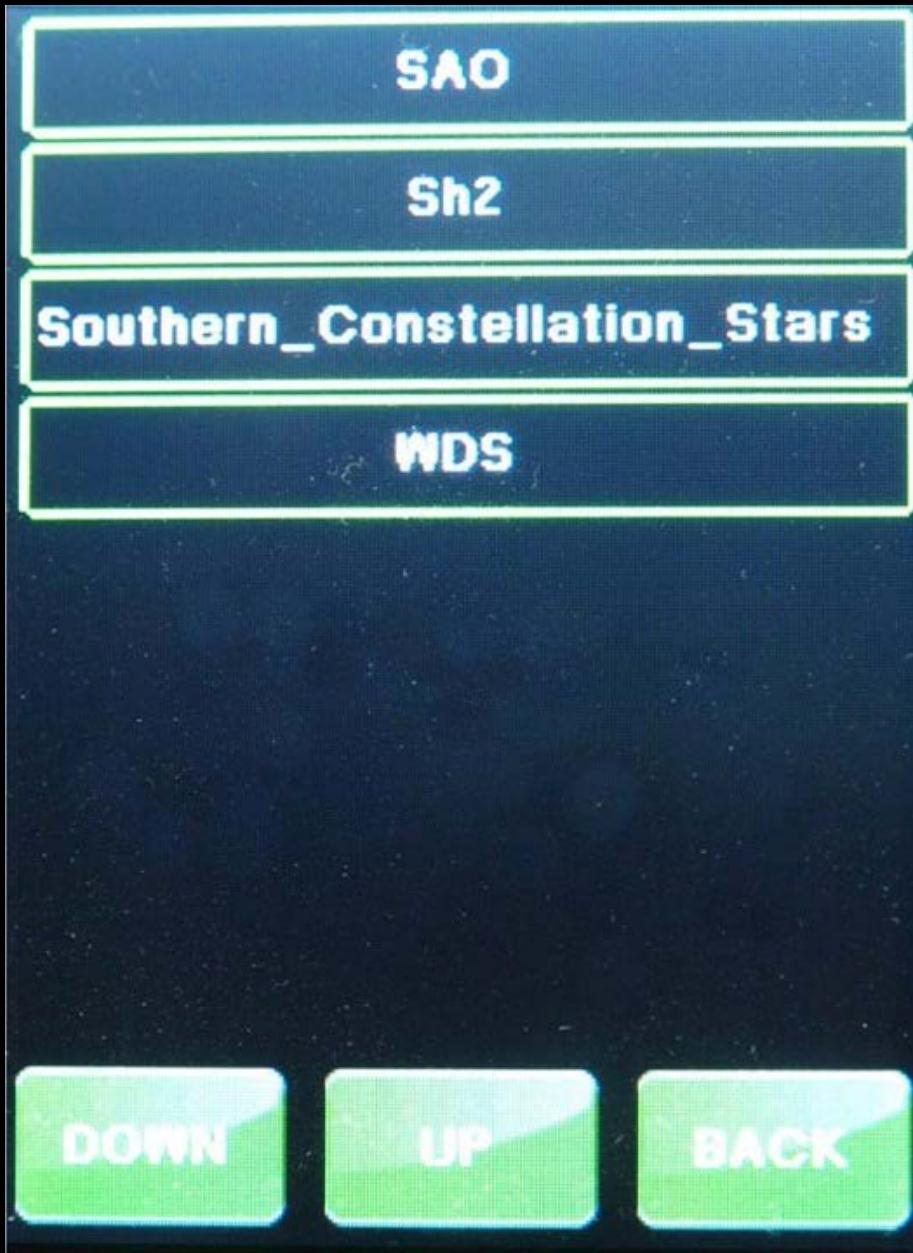
The name of the stars are selected alphabetically. We are going to enter a V to see if we can go to Vega. Hold down the UVW key till a V appears. You can enter as many letters as you want.

We hit "ENT" to go to a star starting in this case with a V.

This screen has no way to get to the previous screen. You would have to hit "ENT", and then on the next screen use the back button, which will take you back to the main "GOTO" screen.

The Del key only deletes entered letters/numbers.

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p

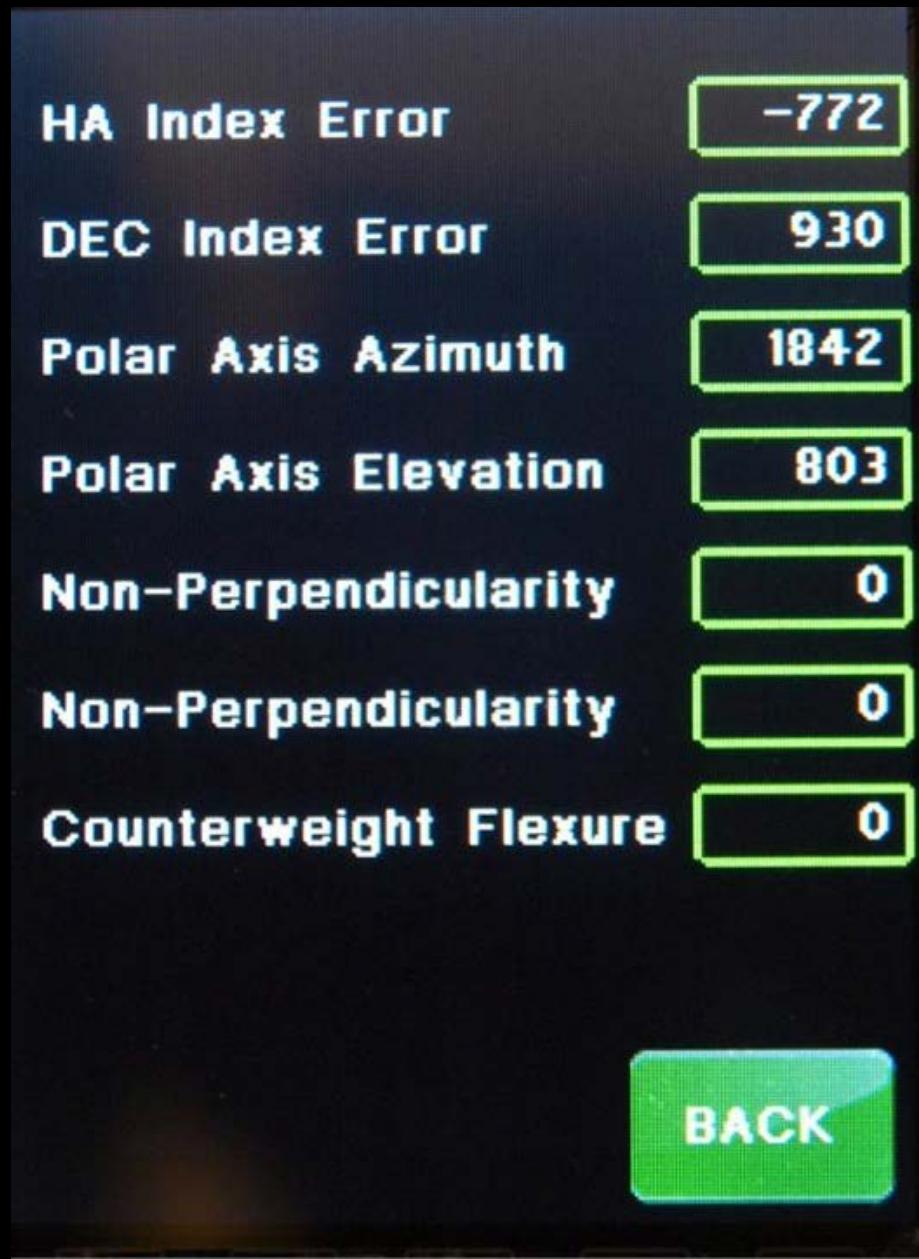
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Fig Main Menu

This screen shows the mount alignment parameters that the current model has.

To select between models to see the other model, you have to use the web interface modeling page and select either model 1 (east) or model 2 (west).

The math behind calculating these errors:
1st alignments set the index parameters ID, IH.

2nd..5th alignments calculate MA, ME additionally.

6th..9th alignment add CH and NP non-perpendicularity parameters to the model.

From 10th alignment up counterweight flexure DAF is added.

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Polar Align Correct

Please center the object
using Az and/or El knobs!

Done!

Press Done to start
building a new model.

BACK

vertical you are going to have a hard time seeing through an eyepiece.

Fig 20 PAC - This is the PAC or Polar Align Correct menu. It will only show up after a model is built. Using it will wipe out any model your built.

In using the alignment script, pay attention to when you have a star that is nearly straight up in the sky. Ideally, you'll want one that is a little south (if you happen to be in the northern hemisphere) or vice versa if you're in the southern hemisphere. That'll put it near that intersection.

When you come to this page from any other location, the star that the telescope was pointed at, is what you are going to re-center on. The telescope will move off of that object by the amount of Polar Error that it has calculated from doing an alignment.

You can do the PAC on any target once the button shows up in the startup. You'll just get better results using a target near that intersection.

The centering will be done using the Alt and AZ adjustment on the mount --- not using the slew controls on the directional paddle.

Take your time and be patient!

Note that once you've hit the "done" button, the PAC alignment will discard the previously built pointing model, so you'll start over again, and take you back to the main menu. The suggestion is to do the PAC twice to get good results.

Also I would suggest that you use a camera and software that provides cross-hairs to do this alignment with. With the telescope pointed almost

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Polar Align Assist

Choose First Star

Choose Second Star

Iterate

BACK

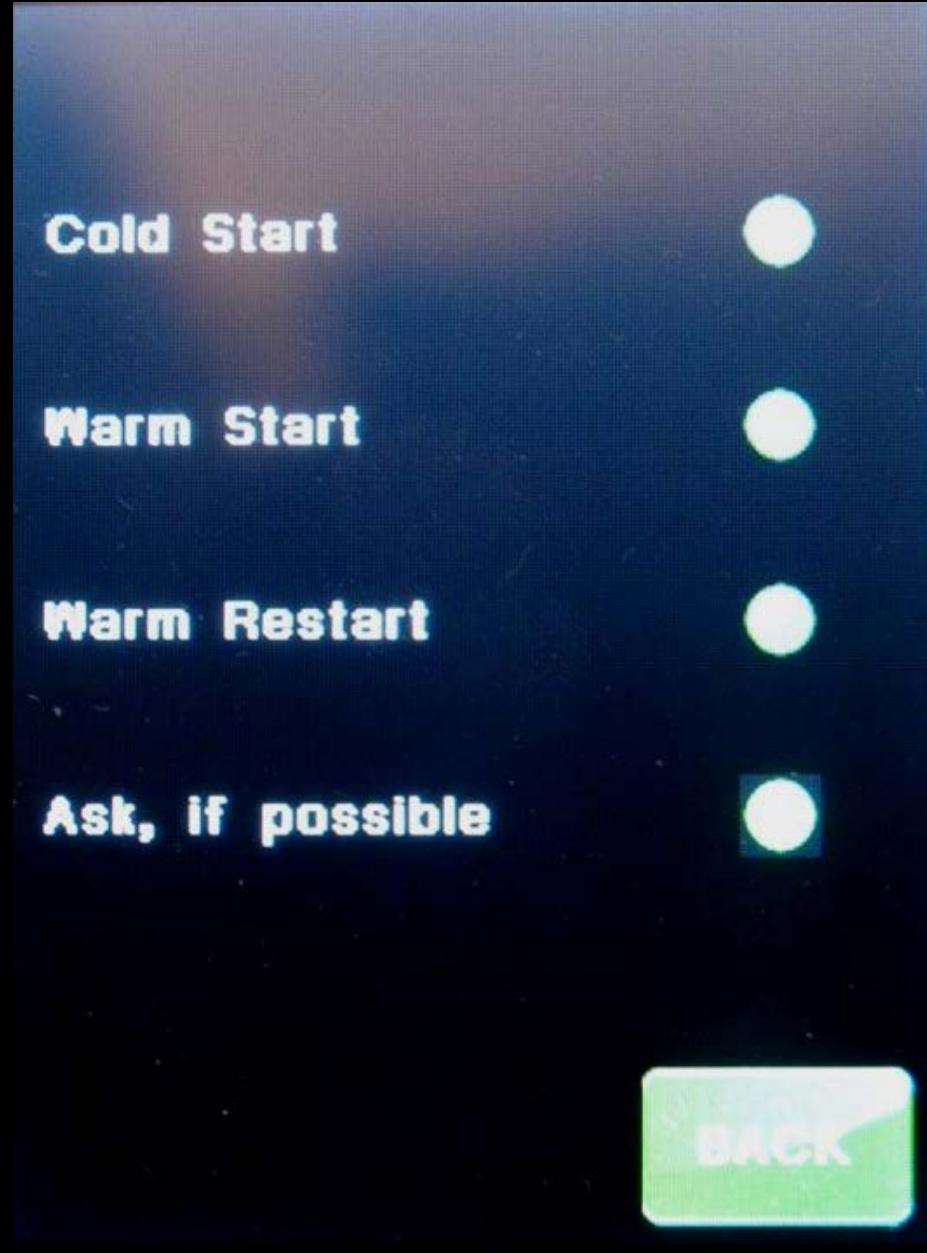
This routine is designed to help get the mount polar aligned to within one degree of either the north or south pole. This routine will take at least 3 iterations to get as close as a polar scope can get you. YOU CANNOT HAVE A MODEL BUILT AND EXPECT THIS ROUTINE TO WORK. Do it after doing a cold start.

1. It is very important that you do as accurate a Counter-Weight-Down, and Pointing the Dec to the pole as you can before powering on the Gemini-2. This will help this alignment be more accurate.
2. After you have cold started select "Menu"-->"Align -->more.. -->Polar Align Assist" menu item.
3. You will be in the menu of Choose First Star, Choose Second star and Iterate.
4. You will need to select 2 stars for this alignment process. The first one should be near the celestial equator (Dec. near 0) and within about 20° of the eastern or western horizon (about + or - six hours east or west). The other star should be near the meridian (such as Polaris in the northern hemisphere).
5. Use the UP and Down buttons to scroll through the list of stars and select the first one by using the selecting it. Once again the Gemini-2 will display the Choose first star, Choose Second Star, and Iterate.
6. Choose the second star and select a star from the menu of stars. Scroll through the list and select the second star. The menu will again return to the Choose First Star, Choose Second star and Iterate menu.
7. Select the Iterate button and the mount will slew to the first star. Once it reaches the star, "center object" will appear on the display. If the star is the one near the meridian, center the star only using the mount's elevation adjustment knob (ignore azimuth).

azimuth). If it is in the western or eastern part of the sky, center the star using only the mount's azimuth adjustment knob (ignore elevation).

8. Press the Iterate button and the telescope will slew to the other star. Center it using the procedure described above. Repeat this about 3 times, each time pressing the Iterate button to slew back and forth between the two stars. When you are finished, press the Back button.
9. You can expect to get to within one degree of the pole using this method. IMPORTANT: Because this method depends on the mount pointing to where the stars should be if the mount were polar aligned, you cannot use this function if modeling parameters have already been calculated. You should only use it after a Cold Start before you do any Alignments, or immediately after selecting the "Reset Alignment" menu item.
10. Lets get started, Hit Choose First Star.

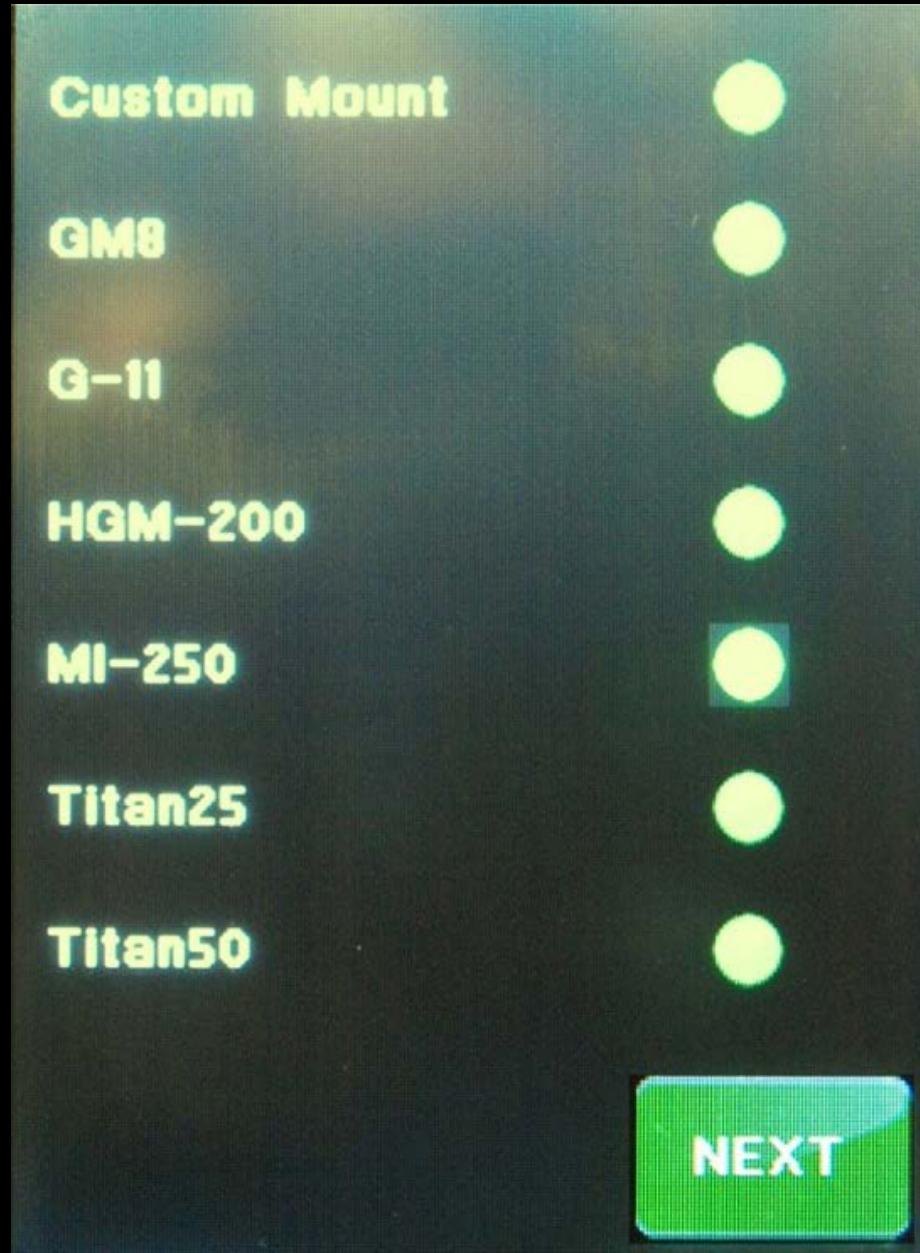
Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



This is where you can set the default startup mode. If you select "Ask, if Possible" then the Gemini-2 will prompt you for the startup mode, unless it determines a Cold Start is the only possible mode.

Startup Mode Menu

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



This menu is where you select your mount type.
The default is Titan25.

However Titan25 mounts are no longer being sold
as new mounts.

You would select your mount type then hit next.

Fig Main Menu

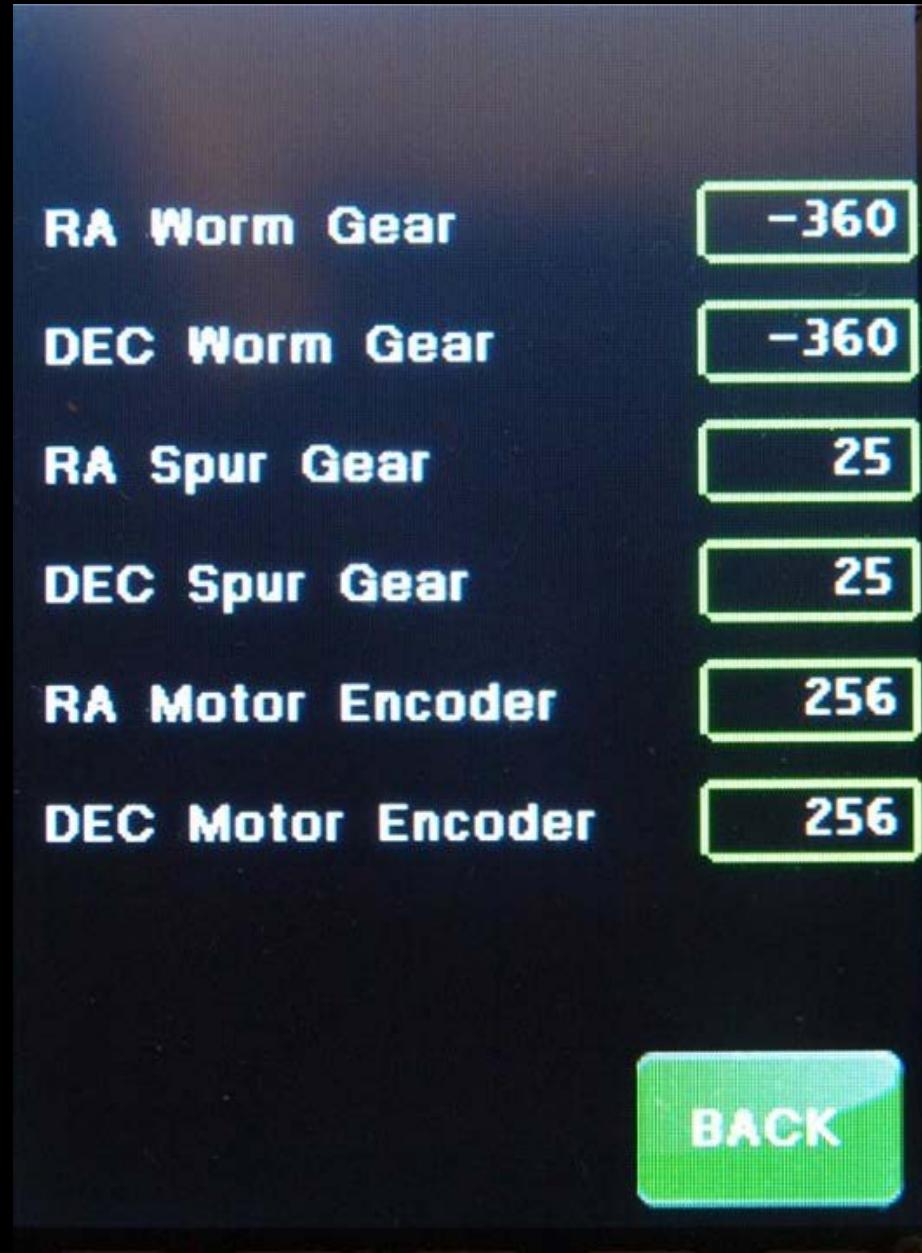
Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



TVC Menu

TVC Menu is used to set the Dec backlash compensation

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Custom Gearing

See the [default setting page](#) for the gear ratios used in each mount type.

Custom Gearing

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Network Setting

Network Setting menu

This is where you can set up your network setting. It is also where you will see what the Gemini has set the IP address to if you are using DHCP setting. Notice that in the picture at the left that the IP address is 192.168.0.150, this is not the default IP address of 192.168.0.111, because it was set by DHCP. There is a web page that describes how to setup and connect your Gemini to your computer. See [Connecting to the Ethernet port](#).

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

Safety Limits

Set Limit Here!

Eastern Position:

114:00

Western Position:

123:00

Western GoTo Limit:

2:30

This is the Safety Limit setting screen. It is described on the [Limits web page](#).

BACK

Safety Limits

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Fig 11

This is the Semi Automatic Modeling Function.

It will automatically pick a star that should be above the horizon and on the east side. (it probably will not be the same star shown in the menu on the left.) If you do not want the star it picks simply hit the East button and it will pick another.

If you want to do a star on the West, just hit the West button. (Note: if you hit the west button and the mount thinks it can reach it without doing a meridian flip, it will try and go to it without the flip. You really need to make sure that your limits are set. If they are not, then the mount could hit and do damage to your telescope or mount.

See Menu-->Mount--Limits)

Also stars on the west side that are close to the meridian can be added to the East model. If the mount does not pass 90 degrees Dec (IE do a meridian flip, then you are still building a model on the east. The same holds true when going from a model being built on the west to the east. This is actually designed this way to help refine each model as you move from east to west or west to east.

If you are happy with the star it selects, then hit "GOTO". This will make the mount go to the star selected and then figure 11 will appear.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

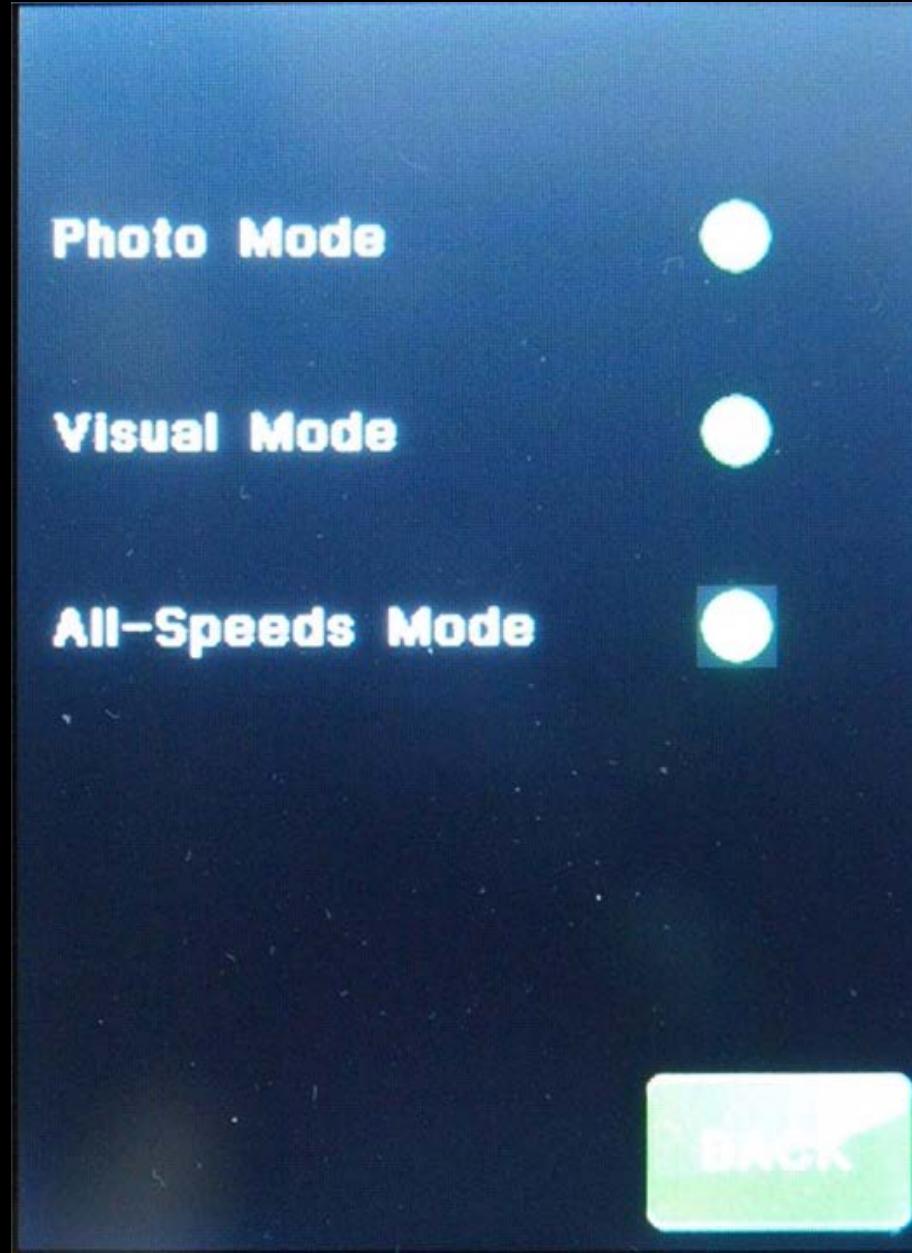


Fig 7 This menu lets you select the speed that the buttons on the back (tactile) work in. These buttons works in one of three modes: the Visual Mode, the Photo Mode and the All Speeds Mode.

You can move both axes simultaneously in all 3 modes. You select the mode by use of this menu. Like some other settings, it is remembered permanently and will be in effect even after powering off and on again.

The Visual Mode In visual mode, the Guiding Speed is not available. When you press a button, the telescope moves at Centering Speed. Momentarily pushing the opposite button (tactile buttons only) lets the system accelerate to the manual slewing speed. If you are moving both axes, both will speed up. Ramping up and down in speed occurs independently for both axes. This mode is intended for visual observing and for looking up objects. The autoguider port is not active in this mode.

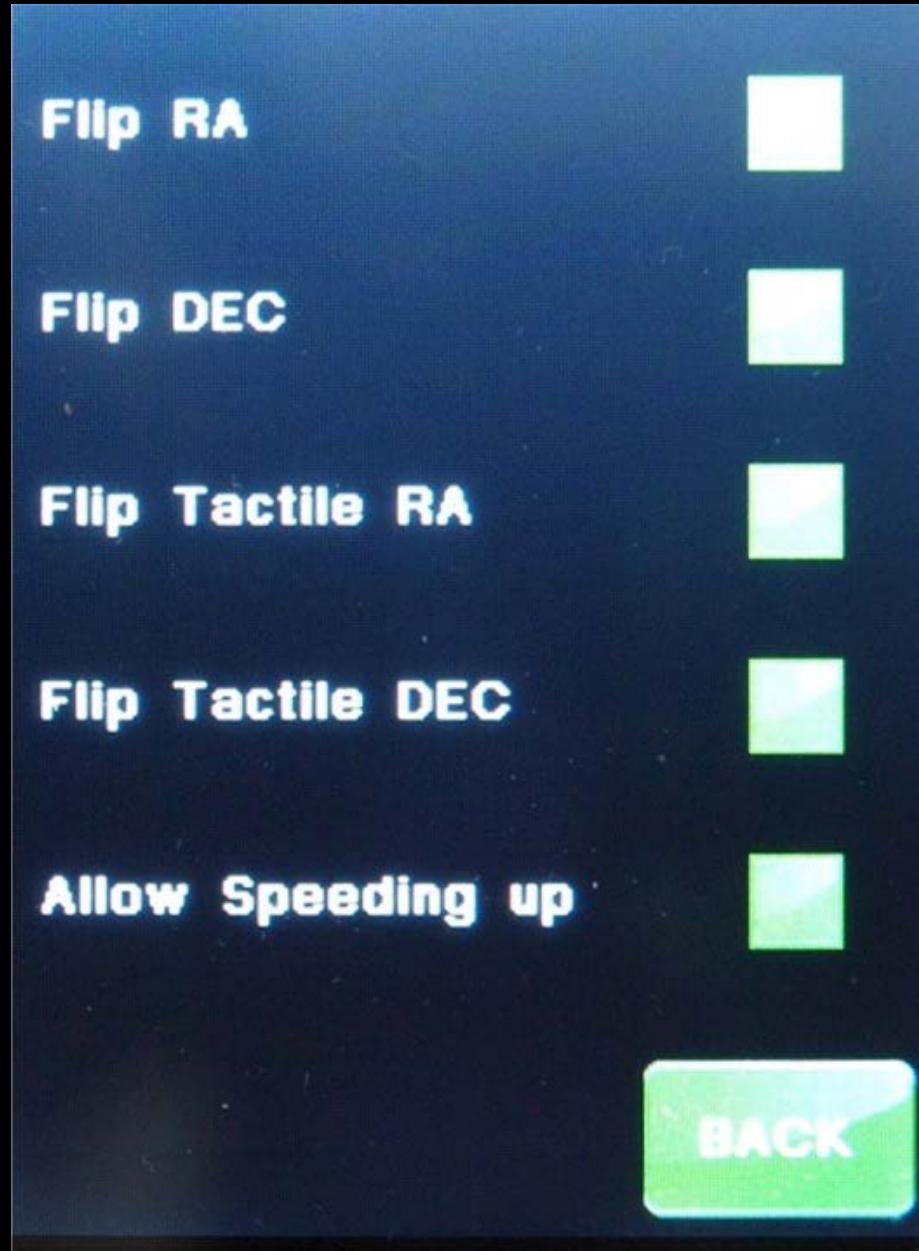
The Photo Mode In Photo Mode, Guiding Speed is the principal speed, so pressing a Hand Controller directional button moves the telescope at the selected Guiding Speed; Slewing Speed is not available. Acceleration to Centering Speed is available in four stages (to allow easy centering of an object in the field of view or on a CCD chip) by pressing the opposite tactile button while Gemini is guiding: Pressing the opposite button once changes to 1/8 of Centering Speed to allow fine centering of the target. Then, after about 2 seconds, the speed will increase to 1/4 Centering Speed, after another 2 seconds to 1/2 Centering Speed, and finally to full Centering Speed.

Pressing the opposite button twice changes to full

Centering Speed immediately. If you want to guide a photograph manually, you may plug a Standard (not Deluxe) Hand Controller into Gemini's autoguider port. This way you are sure that you cannot accidentally move the scope at centering speed while guiding. The LED on the standard Hand Controller will not be illuminated when plugged into the autoguider port.

The All Speeds Mode In this mode, all speeds are available, from Guiding Speed to Slewing Speed, by using the opposite-button trick. You can use this mode, for example, while drift aligning, when you need very fine centering of a star at the crosshairs and a fast move from the meridian to the eastern or western horizon. However, for normal observing, you'll probably select either the Visual or Photo Mode.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

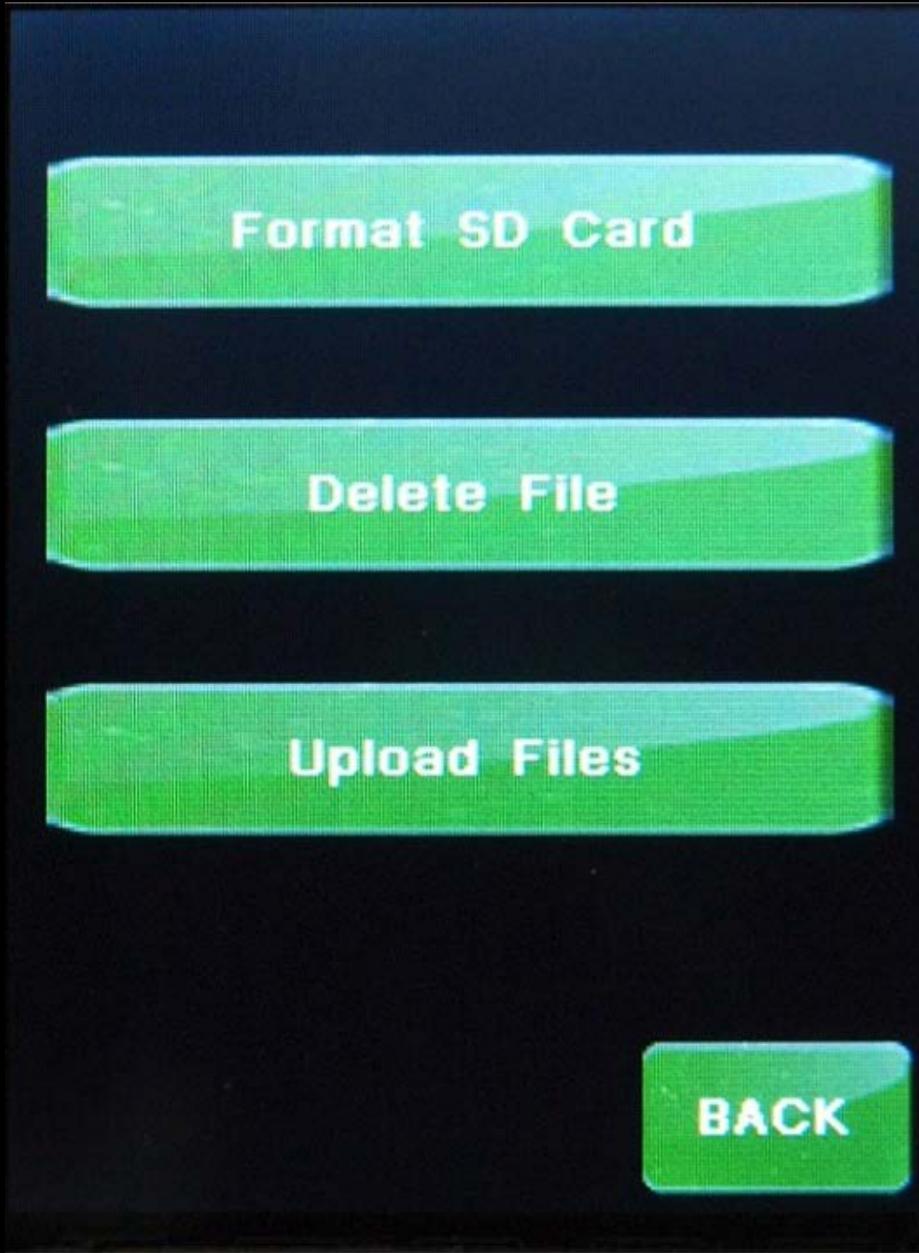


Buttons Flip

[an error occurred while processing this directive]

This menu lets you swap the buttons on the front and on the back of the hand controller. The buttons on the back are called tactile buttons.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Micro-SDcard

This menu will let you format the micro-SDcard in the hand-controller, Delete files from it, or upload files to it.

The Format selection will completely wipe out the micro-SDcard of all its files. Once that is done, you can reload the files by putting them in the HCfirmware directory of the main units micro-SDcard, and then hitting Upload Files. When you select format SD card another screen will come up asking if you are sure, No or Yes.

The Delete File button will bring up the list of catalogs and any other file stored in the catalog directories. You can only delete whole catalogs, not the individual entries in them.

You can also use this Upload Files to upload additional catalogs to the hand controller. You can create your own custom catalogs and upload them this way. The easiest way to do this is use the Windows File Explorer in an FTP mode. Do this by typing <ftp://admin@gemini> into the file manager bar at the top of Windows explorer. (not an Internet browser) If you have your Gemini-2 connected to your computer via Ethernet, then you should see the contents of the [G2 main micro-SDcard contents](#).

YOU CANNOT USE THIS UPLOAD FILES FUNCTION TO DO A FIRMWARE UPDATE.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Display

This screen allows you to select the screen color you want to view the hand controller in. If the adaptive color check-box is checked, then the screen will change color automatically. Here is how it does that:

The color change is only done at startup. The altitude of the sun is calculated. Above horizon screen will be green, down to 10 degrees below horizon blue. Below 10 degrees, the color that was saved will be used. So your site and time have to be set correctly for this to happen.

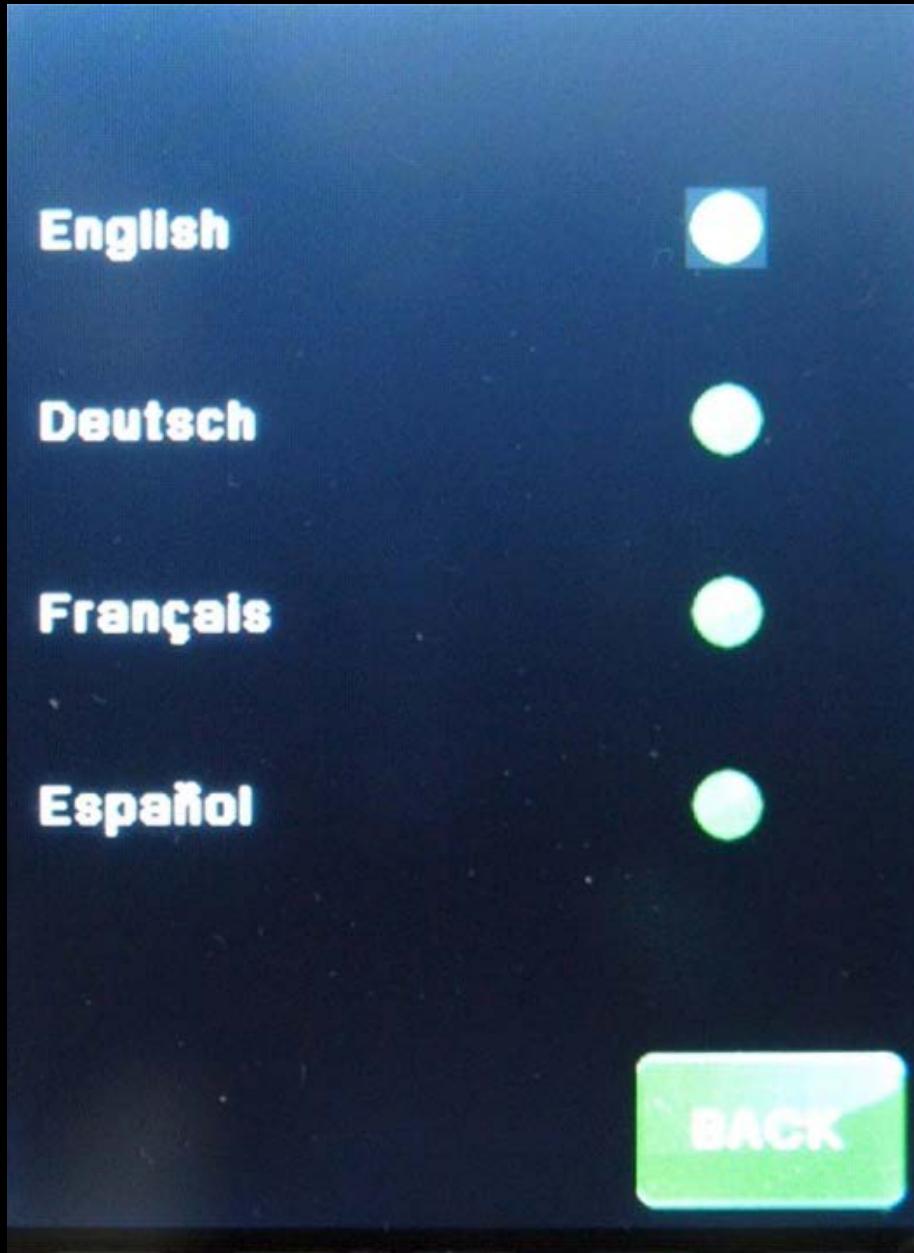
If the adaptive color is unchecked, the screen will startup in whatever color is checked.

The nighttime mode screen uses X to indicate a button push. This is because the screen is so dark that a change in highlights cannot be distinguished.

The Dim button will dim the display in 8 Steps. When not in the brightest setting a BRIGHT button will also be shown.

There is a chart on how the screen reacts on the [default setting page](#)

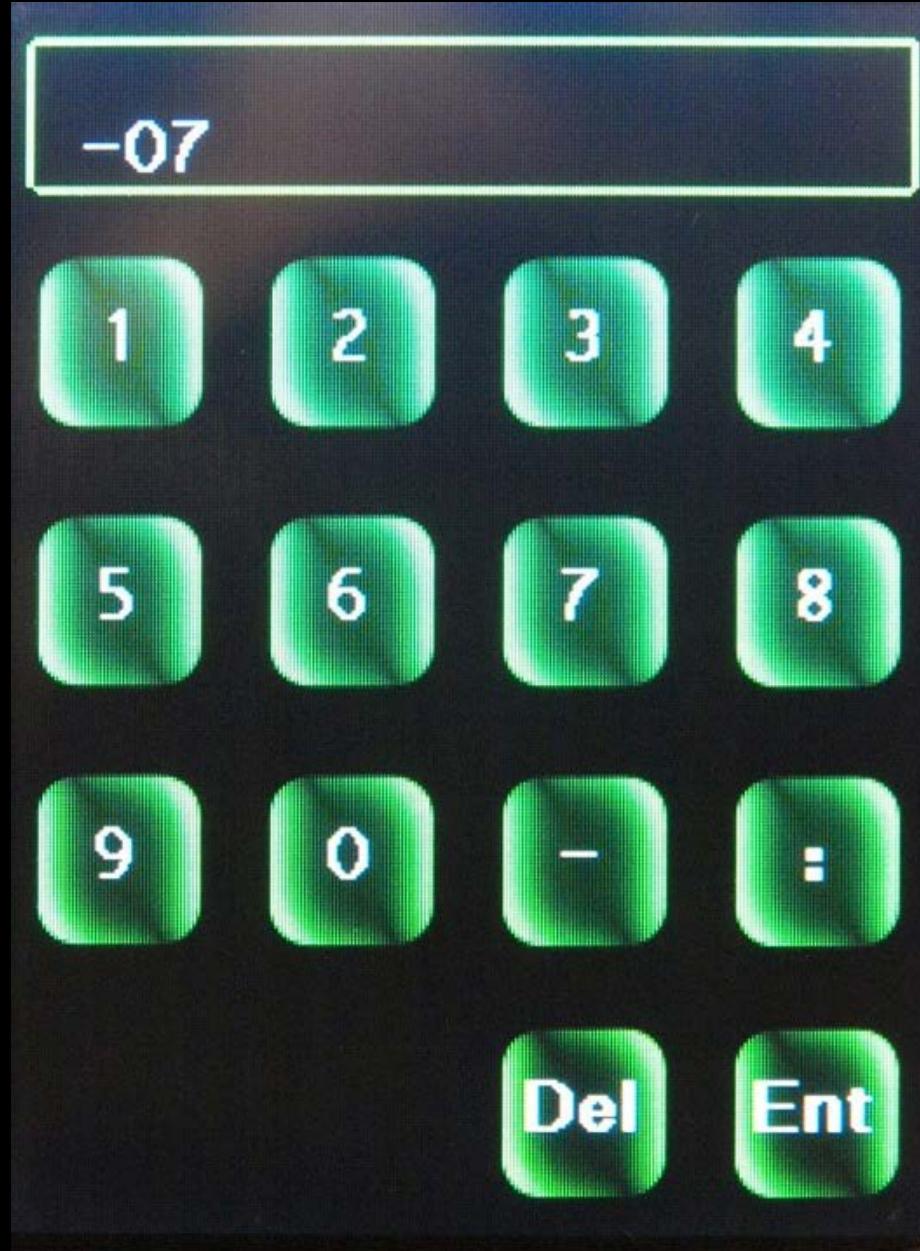
Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Language Selection

Here you can select from English, Deursch (German), Francais (French) and Espanol (Spanish) languages.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



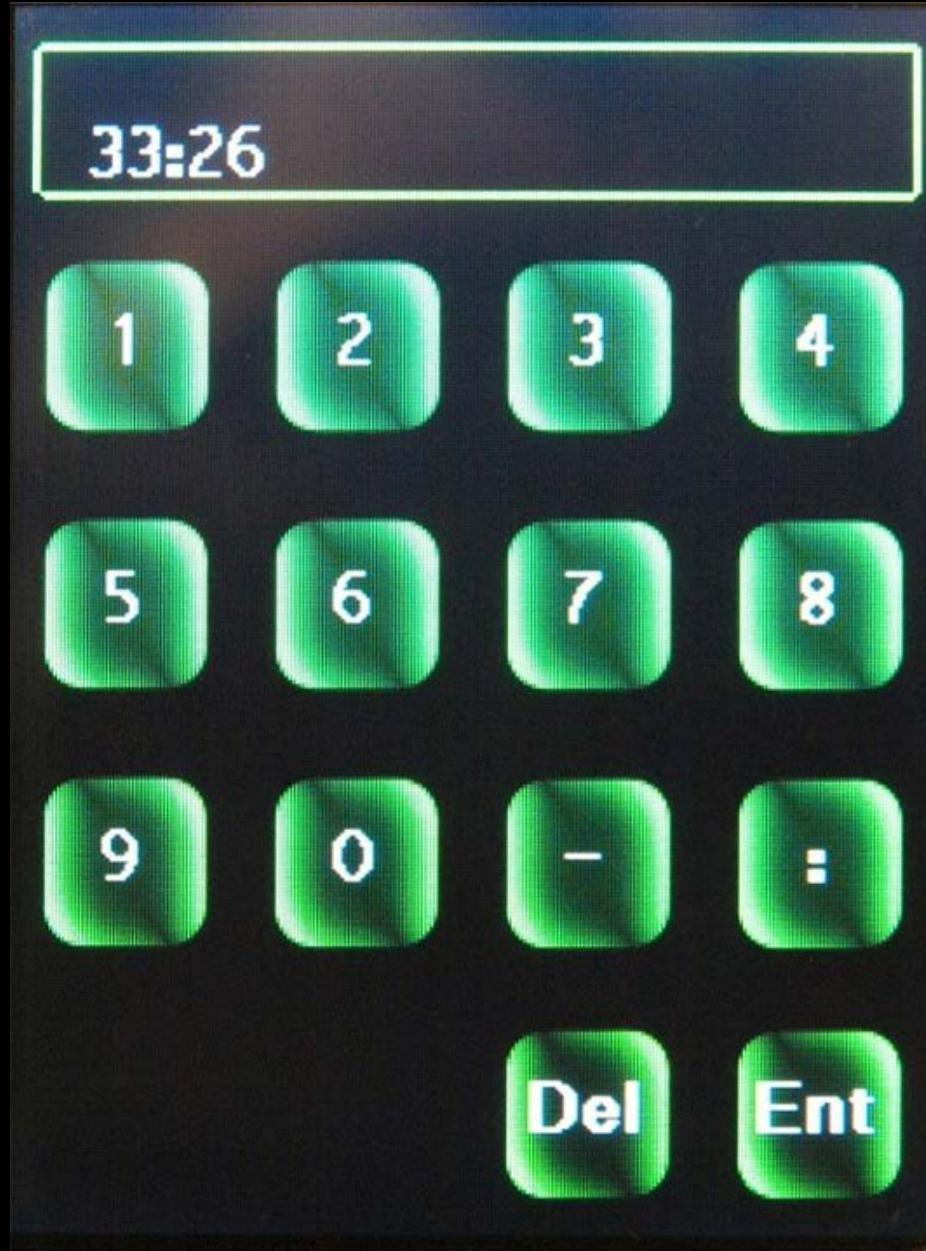
Time Zone Offset

Here is where you set your time zone offset from UTC. Note: you do have to compensate for daylight saving time in this offset. Positive offsets do not need a leading zero if they are only one digit. The Gemini 2 will take care of that. Notice offsets West of UTC is negative, and East is positive.

The date, time and this offset is used to compute the correct UTC time and date for the Gemini-2 to calculate all of the star locations, along with your latitude and longitude. The more accurate you can set the time, the more accurate your first star go to will be. Once you align on your first star, then the Gemini-2 will make corrections from that star, and any more stars you align on.

Hit "ENT" and go back to fig 6

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Latitude

This is where you enter Latitude. Latitude is positive for the northern hemisphere and negative for the southern hemisphere. You enter degrees and minutes just like you did for the Longitude.

After you enter latitude hit "ENT", you will be taken back to the site menu.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



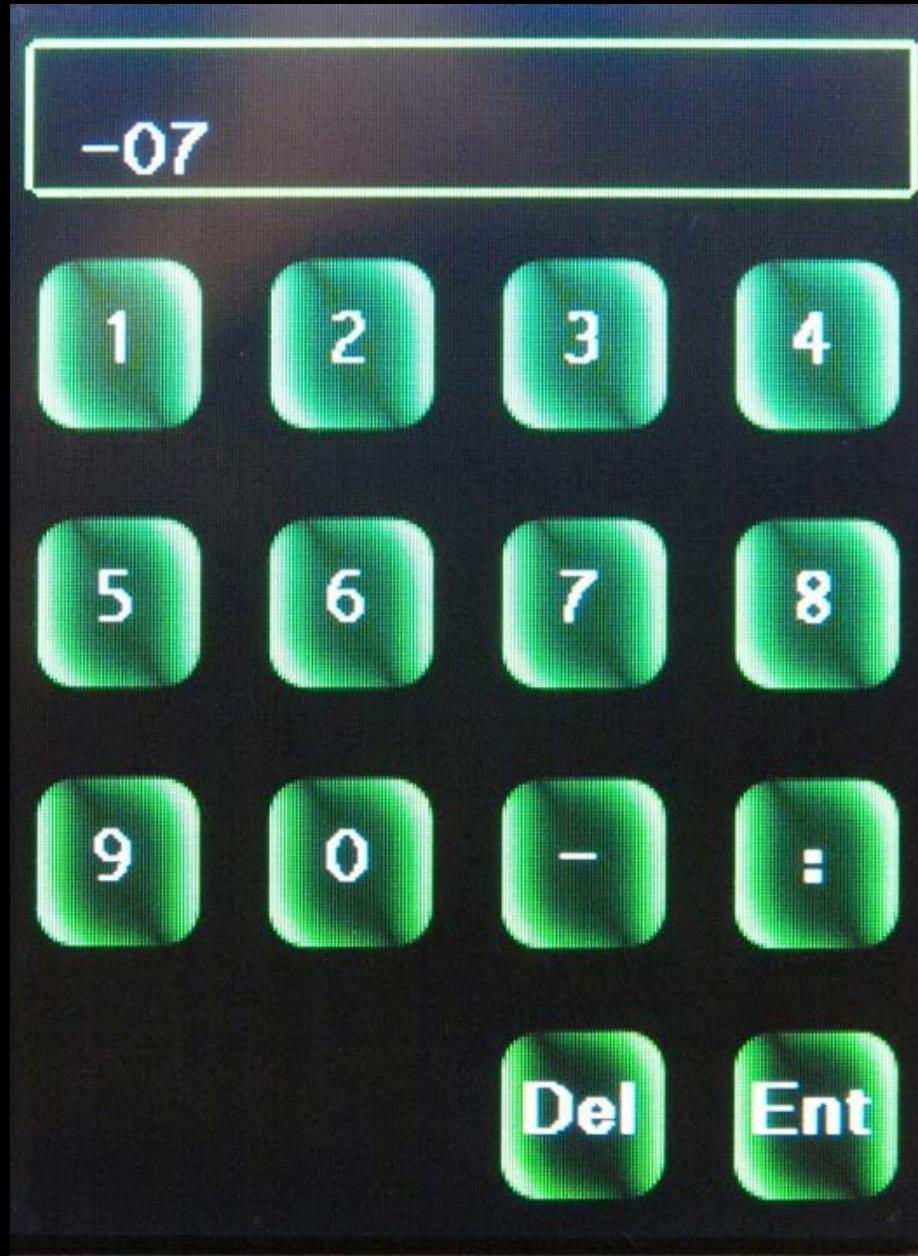
Longitude

If you touch in the top where the -112:04 is displayed, it will go blank. You can now enter the new Longitude. You only enter degrees and minutes. This entry screen will not take seconds, so round the minutes to the nearest minute. PLEASE NOTE: the minutes are from 0 to 59. This is not a decimal part of the degrees. IE: the -112:04 is equal to -112.0667 degrees.

You will use an figure 4a screen to enter the Latitude of your observing site.

Please note that these entries do not modify the permanent setting. If you press on any of the sites in figure 3 above, you will loose these setting.

Hit the "ENT" key, and you will be taken back to Fig 3. Hit in the Latitude box, and you will get a entry screen similar to Figure 5.

Interactive Hand-Controller Menus

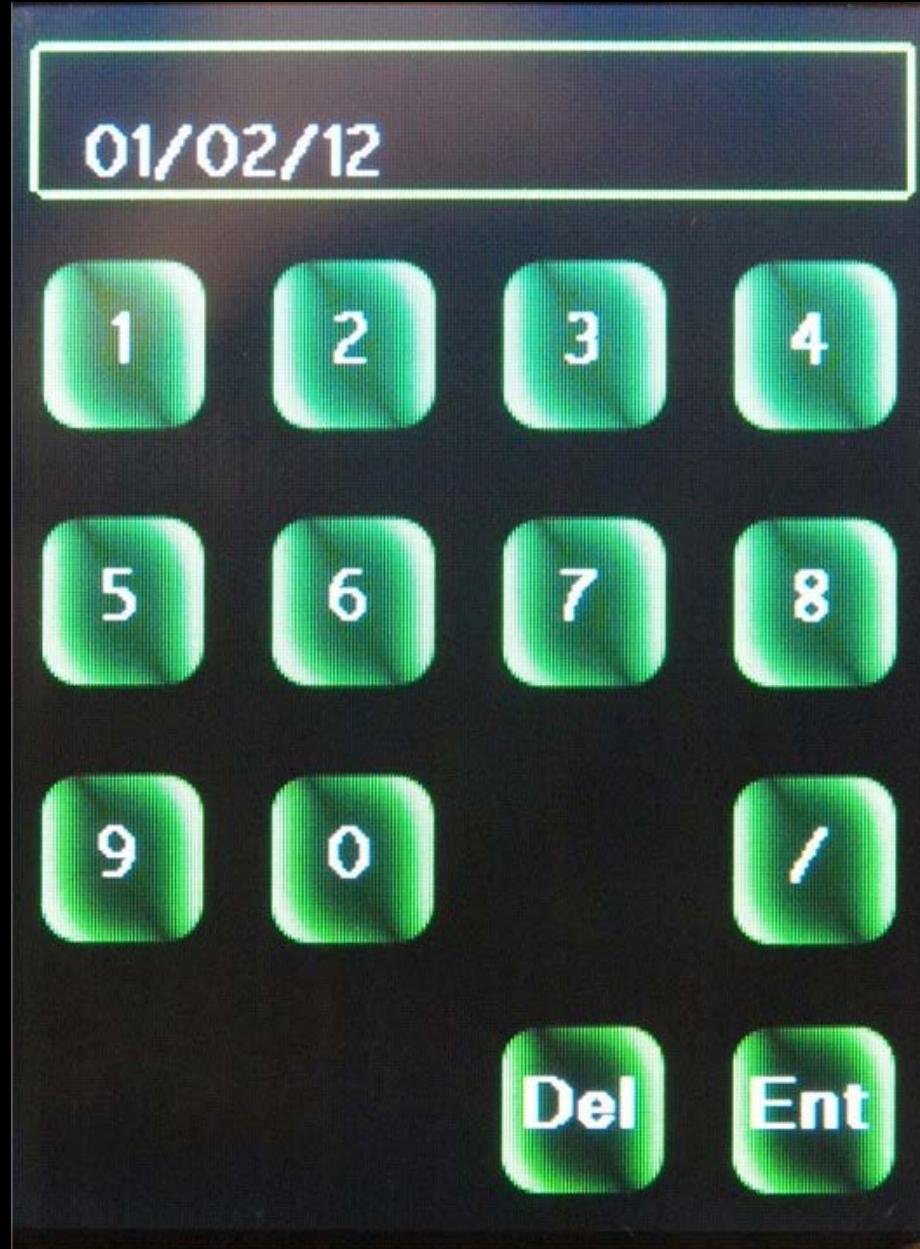
Time Zone Offset

Here is where you set your time zone offset from UTC. Note: you do have to compensate for daylight saving time in this offset. Positive offsets do not need a leading zero if they are only one digit. The Gemini 2 will take care of that. Notice offsets West of UTC is negative, and East is positive.

The date, time and this offset is used to compute the correct UTC time and date for the Gemini-2 to calculate all of the star locations, along with your latitude and longitude. The more accurate you can set the time, the more accurate your first star "GOTO" will be. Once you align on your first star, then the Gemini-2 will make corrections from that star, and any more stars you align on.

Hit "EMT" and go back to the previous menu.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



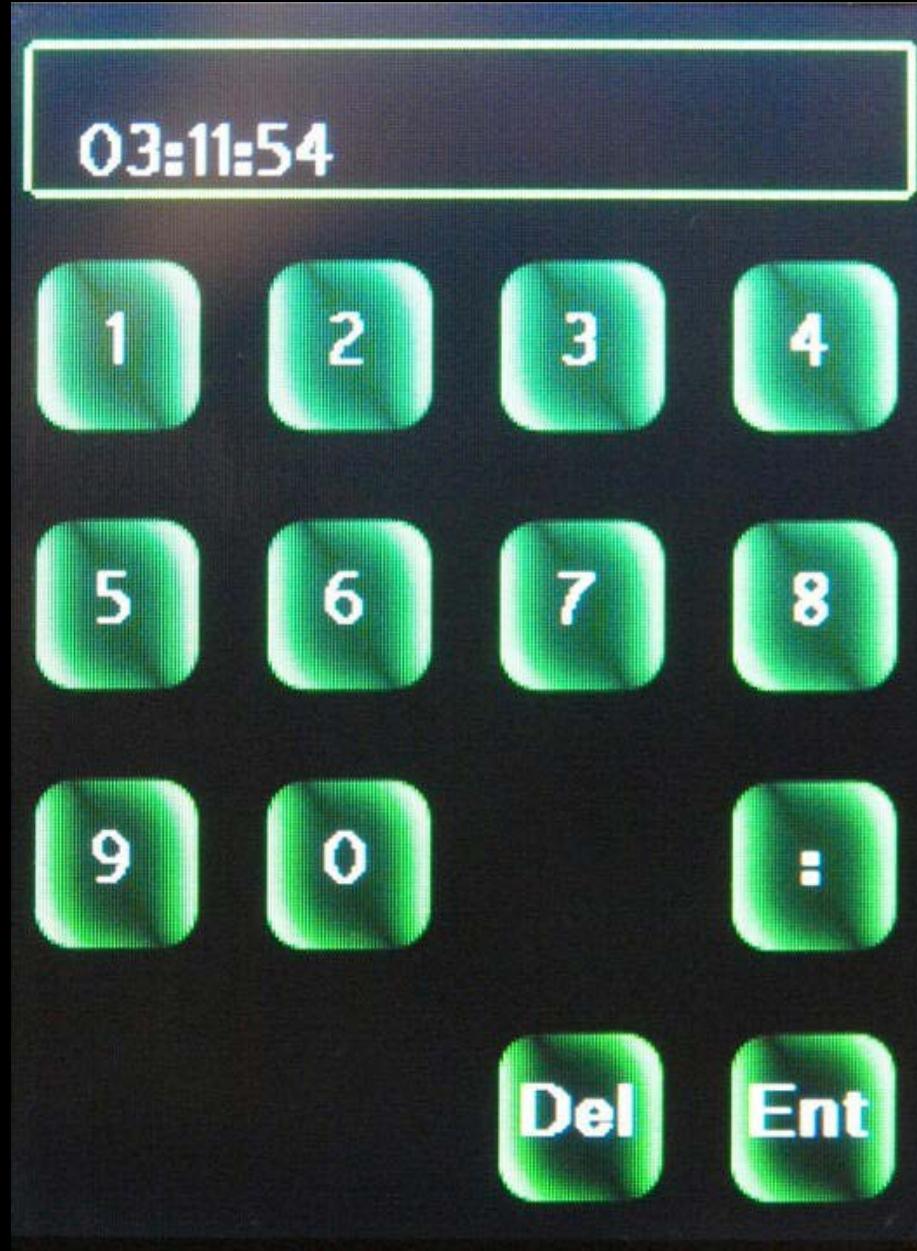
Local Civil Date

This is the date setting screen. You set your local civil date. It is in Month (two digits) / Date (two digits) and / year (two digits).

You can get away with a single digit for the month, and the day, but not the year.

Hit "ENT" and go back to fig 6

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



This is the screen where you enter your current local time. Enter your time in 24 hour format. Put a : between the Hours : Minutes : Seconds

I normally enter the time at least 30 seconds in the future. This gives me time to get back to Fig 6 (hit "Ent" to go to fig 6) and then hit the Set button on figure 6 at the correct time.

Enter Local Civil Time

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

Object Name:

Vega α Lyr

Object Information:

No information available!

Right Ascension:

18:36:55

Declination:

+38:47:00

JD2000



Flip



Below Horizon!

GoTo

NEXT

BACK

Goto Vega

It just happens that the Vega screen was selected.

But notice the message "Below Horizon!"

There is a check box for JD2000, it is recommend that you keep this checked.

The Flip box if checked will let the mount try and flip to reach the target. It does not enforce a flip, but if the mount can do a flip and reach the target safely, then it will.

If the only way the mount can reach the target safely is to do a flip, it will, even if the Flip box is not checked.

Since Vega is below the Horizon, lets hit the next button and see if there are any more stars that started with a V.

Hit the NEXT button.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



The first one should be near the celestial equator (Dec. near 0) and within about 20° of the eastern or western horizon (about + or - six hours east or west).

I don't see one I like for this demo so hit the down button and lets look further

looking for first star

*Courtesy of Gemini-2.com**This is some of the default setting on the Gemini-2*[Return to Custom Gearing Page](#)

This is the default Gearing settings for the different types of mounts, in the Gemini-2

	Titan 50	Titan 25	G11	MI-250	G8	HGM200
RA Worm	-270	-270	360	-360	180	-360
Dec worm	-250	-270	360	-360	180	-360
RA Spur Gear	50	25	25	25	25	25
DEC Spur Gear	50	25	25	25	25	25
RA Motor Encoder	256	256	256	256	256	256
Dec Motor Encoder	256	256	256	256	256	256

[Return to HC Color Page](#)

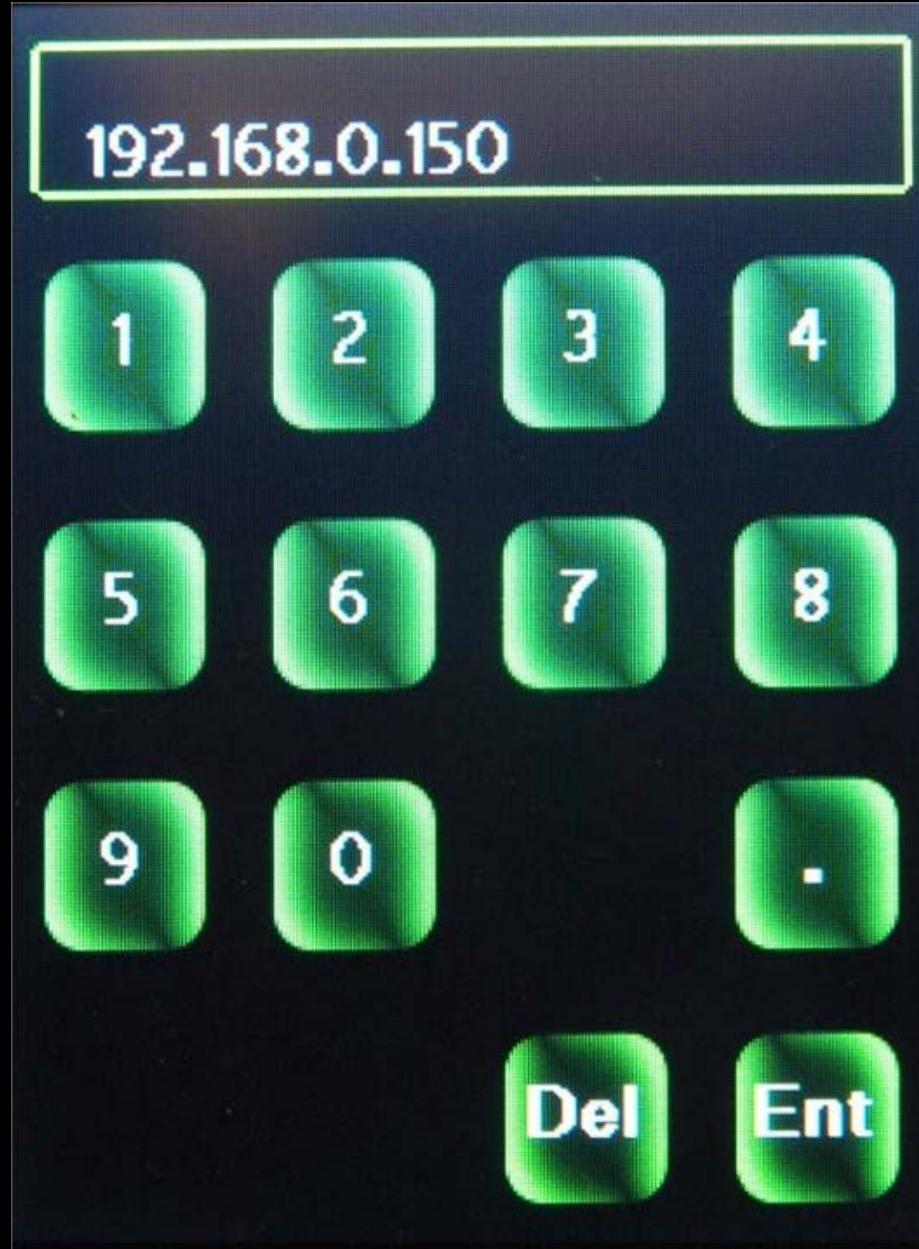
How the color setting react in Gemini-2 hand controller

Adaptive Color Checked*	Startup Daytime	Startup Sunset	Startup Night
Daytime mode selected	Green	Green	Green
Dawn mode selected	Green	Blue	Blue
Nighttime mode selected	Green	Blue	Red
Adaptive color Not Selected			
Daytime mode selected	Green	Green	Green
Dawn mode selected	Blue	Blue	Blue
Night time mode selected	Red	Red	Red

*If Adaptive color is selected + Daytime Mode Selected, and the Gemini is started up before Sunset, it will turn blue at shortly after sunset, and then red later in the night.

If Adaptive color is selected + Dawn Mode Selected, and the Gemini is started up after Sunset, it will start blue and, and then red later in the night.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



IP Setting menu

You can set the desired IP address that you want the Gemini-2 to use to connect to your computer with. The default is 192.168.0.111

A similar menu (not shown) is used to set the netmask. In just about all cases the netmask should be set to 255.255.255.0

Connecting to Web interface of Gemini 2 - Courtesy of Gemini-2.com[Return to Network Menu](#)

This guide will help you connect using the Ethernet connection to your Gemini 2.

Connecting to a Network:

Gemini 2 firmware can be updated using a built-in web interface. In order to use the web interface, you will need to make a network connection between Gemini and your computer. There are two basic ways to do this:

1. [The Direct method](#). This method uses a Ethernet cable directly between you computer and the Gemini-2. A hub might also be inserted into this method. Note: A hub does not provide and method of changing IP addresses.
2. Using a router. This is called [Network with DHCP](#). I find this the easiest method. The router can assign the Gemini-2 an IP address, as long as the base subnet address of the router is in the [Http://192.168.0.xxx](http://192.168.0.xxx) range. If it is not, then you will have to manually change the Gemini-2 IP address to match the routers base subnet address.

The Direct Method:

This is most easily done using a cross-over Ethernet cable directly between Gemini's Ethernet connector and your computer's network connector. Alternatively, you can use an Ethernet hub (not a router) and standard cables between Gemini and the hub and between your computer and the hub.

IP Address: In order to successfully communicate with your computer over the network, the Gemini 2 unit must have an IP address on the same subnet as the computer. There are several ways to do this depending on how you connect Gemini to a network. The following sections describe these methods.

If you use a cross-over Ethernet cable to directly connect your computer to Gemini, you'll need to assign both the computer's Ethernet port and Gemini to IP addresses on the same subnet by hand. This assumes that your computer is not running a DHCP server on the network port. By default, if Gemini doesn't get an IP address assigned by DHCP, it will use its stored value (192.168.0.111) by default).

1. Use a cross-over cable to connect Gemini 2's Ethernet port to an Ethernet port on your computer
2. Use the appropriate tools on your computer to assign a static IP address to the computer's Ethernet port. Use either my [instructions for Windows 7 and XP](#) or these ([How-To Geek has a web page telling how to assign a static address in a computer](#).) The address should be in the form 192.168.0.xxx where xxx is any number between 2 and 255 except 111. Set the subnet mask to 255.255.255.0. Set the default gateway to 192.168.0.1
On Windows, you can do this from the control panel. Look for an option to change network connections. Refer to your OS documentation for specific instructions.
3. Power on Gemini and attempt to access the web server at <http://Gemini> or <http://192.168.0.111>. If this doesn't work, use the hand controller menu to ensure that Gemini's IP address is <http://192.168.0.111> by selecting the menu->mount->network options. If it is not set to that address, you can either change your computer's IP address to match Gemini's subnet or you can change Gemini's IP address to <http://192.168.0.111> (preferred).
4. Gemini uses NetBIOS name resolution so that you don't need to type the IP address into your browser. If you haven't already done so, enter <http://gemini> in your browser to access the web server. The username is "admin" and the default password is blank. Here us an example of the login screen (with the user name already added):
5. If the steps in step 4 above do not work, you may need to enable NetBIOS over TCIP. The

sets are listed at the bottom of this page.



Fig 1

Network with DHCP:

Supports (typical configuration for most home networks with a router): If you are connecting Gemini to an existing network through a switch, hub, router or wireless adapter, and there is a DHCP server on the network, use this procedure. Gemini will be assigned an IP address by the DHCP server. It is important that your computer also be set to either use DHCP to get an IP address, or use a static IP address on the same subnet.

1. Connect the Gemini 2 unit to the existing network through a hub, switch, router or wireless adapter.
2. Power Gemini on. It is important that you do this only after you've connected the network cable so that it can communicate with the DHCP server.
3. Make sure your computer is set to receive an IP address from DHCP. Each operating system does this in a different way, so refer to your OS documentation.
4. Gemini uses NetBIOS name resolution so that you don't need to type the IP address into your browser. Enter <http://gemini> in your browser to access the web server. The username is "admin" and the default password is blank.
5. You may optionally configure your DHCP server to assign a specific address to Gemini so that you can always access it using the same IP address. See the documentation for your DHCP server for details how to do this. Note: your DHCP server is often built into your internet router.

Network without DHCP Support:

You may also have an existing network that does not use a DHCP server to assign IP addresses. Such a network may be using IP auto configuration or static IP addresses in all of your machines.

1. Connect the Gemini 2 unit to the existing network through a hub, switch, router or wireless adapter.
2. Power Gemini on.
3. Power your computer on, if it is not on already. Look to see what IP address is assigned to the Ethernet port on your computer. Each OS has a different way to do this, so refer to your OS documentation. On most versions of Windows, you can type "ipconfig" in a command prompt to see the IP address.
4. Use the hand controller menu->mount->network buttons to access Gemini's IP address. Uncheck the DP checkbox. Click on the IP address field and change it to an IP address on the same subnet as your computer. For example, if your computer's IP address is 169.254.36.12, you should set Gemini's address to 169.254.36.xxx where xxx is a number between 1 and 254 other than 12. You should also ensure that you do not set Gemini's IP address to be the same as any other node on the network.
5. Gemini uses NetBIOS name resolution so that you don't need to type the IP address into your browser. Enter <http://gemini> in your browser to access the web server. The username is "admin" and the default password is blank. Note: Firmware versions after Feb 10, 2011 behave as described above. Versions between Feb 6th and Feb 10th don't support NetBIOS name resolution, so you must type the Gemini's IP address in your browser rather than using the hostname "Gemini." Versions previous to Feb 6th do not support DHCP and must be configured as if you are using a cross-over cable or network without DHCP server as described above. Versions between Jan 23rd and Feb 6th use 192.168.0.111 as the IP address, and version prior to Jan 23, 2011 use 192.168.0.100.

Enabling NetBIOS over TCIP for Local Network:

NetBIOS is what will allow you to use the <http://gemini> name to connect to the Gemini-2.

Some Windows 7 systems do not have NetBIOS enabled.

Note: Normally the default setting on Windows assumes the following: "Use NetBIOS setting from the DHCP server."

However, if a static IP address is used or the DHCP server does not provide NetBIOS setting, then enable NetBIOS over TCIP"

This is how you enable NetBIOS over TCP/IP:

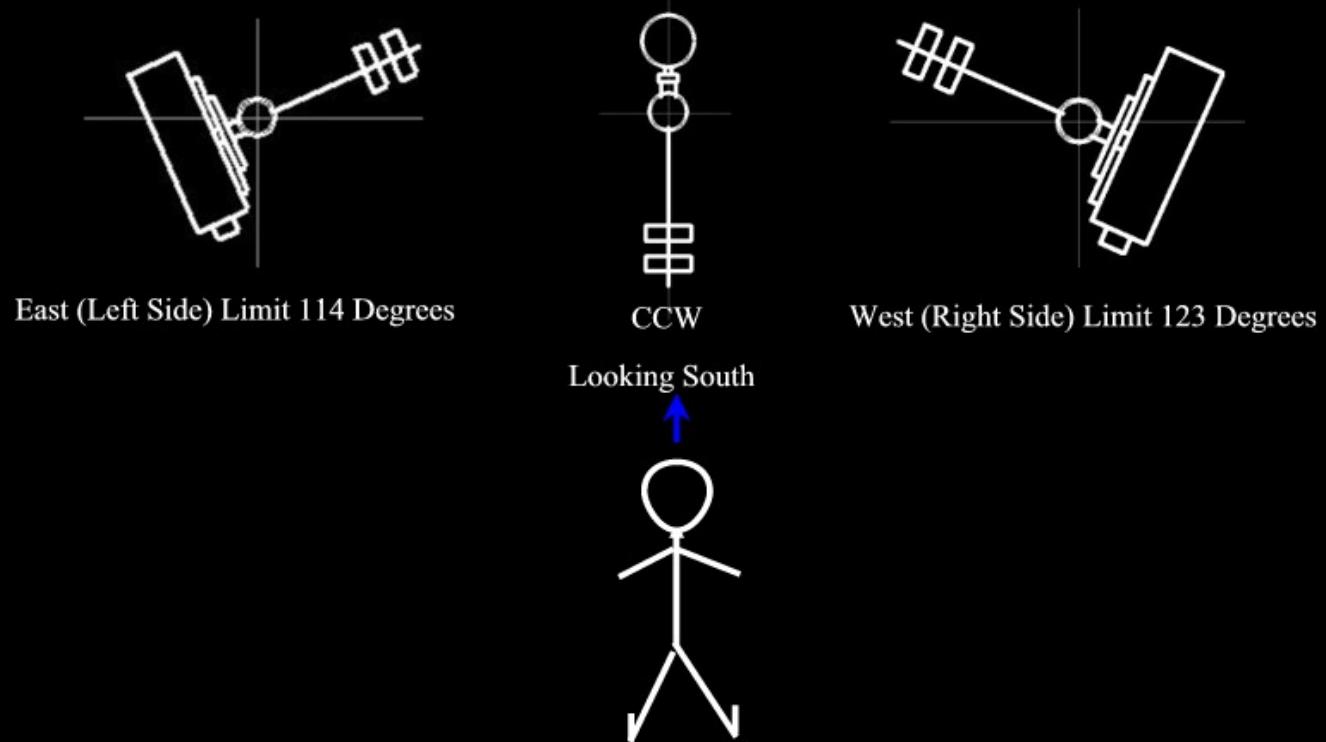
To enable NetBIOS over TCP/IP on Windows 7:

1. Click **Start**, and then click **Network**. (click Start, type **ncpa.cpl** into the search box for Windows 7 or Vista, hit ENTER).
2. Click on the **Network and Sharing Center**
3. Click Manage Network Connections.
4. Right click on the Local Area Connection select **Properties**.
5. Select **Internet Protocol version 4 (TCP/IPv4)**
6. Click the **Advanced** button under the General tab.
7. Click the **WINS** tab.
8. Click **Enable NetBIOS Over TCP/IP**.
9. Click OK and Exit the settings.

[Return to HC Safety Limits Menu](#)

Northern Hemisphere

Limits in Northern Hemisphere



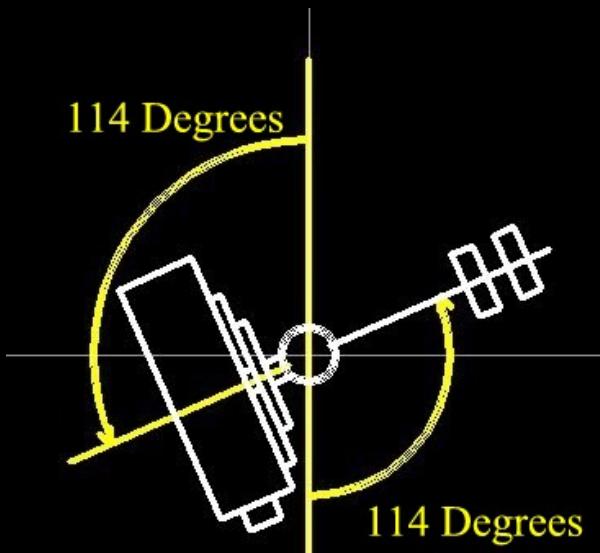
You are standing in front of the telescope with your back towards North

The center image has the telescope pointed towards North

The image on the left has the telescope Skyward

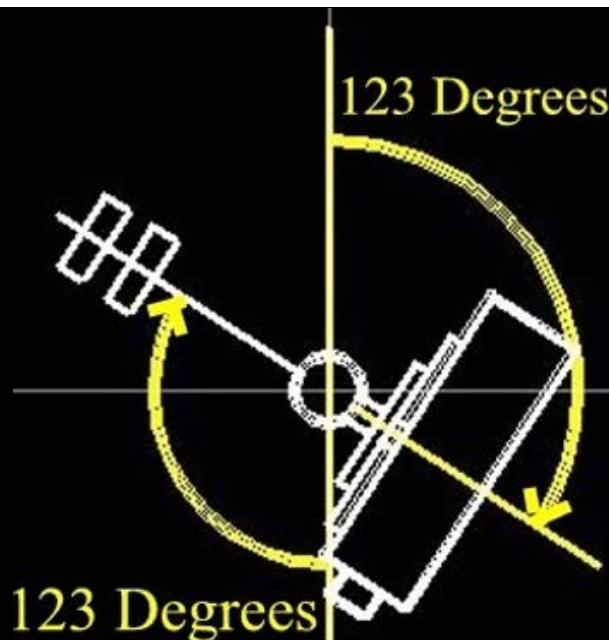
The image on the right has the telescope pointed skywards

Fig 1. Click on image for larger image.



East (Left Side) 114D
North Hemisphere

Figure 2



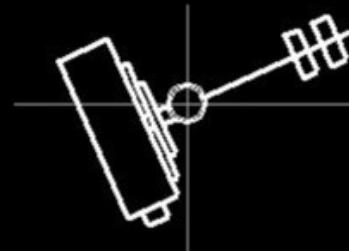
West (Right Side) 123D
Northern Hemisphere

Figure 3

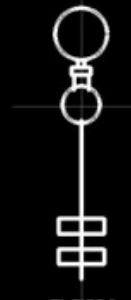
Fig 1 and Fig 4 show the relationship of the different in limits between the northern hemisphere and the southern hemisphere. The Limits are switched between the hemispheres as far as east and west is concerned, but stay the same for left and right. Left and Right is determined by standing in front of the telescope with you back to your respective pole. In figures 2, 3 and 5, 6, you see the angles that are default for the G8,G11, Titan and Titan 50. The MI-250 angles are different, and should be 95 for the Left limit and 92 degrees for the Right limit. Note: the Hemisphere is selected totally by the sign of the Latitude in the Gemini-2. Positive for Northern Hemisphere and negative for Southern Hemisphere. It was the same in the Gemini-1 also. No switches to change at all.

Southern Hemisphere

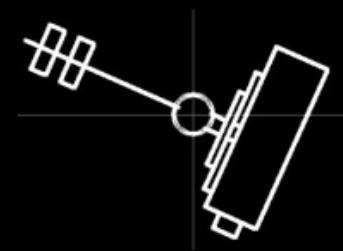
Limits in Southern Hemisphere



West (Left Side) Limit 114 Degrees



CCW



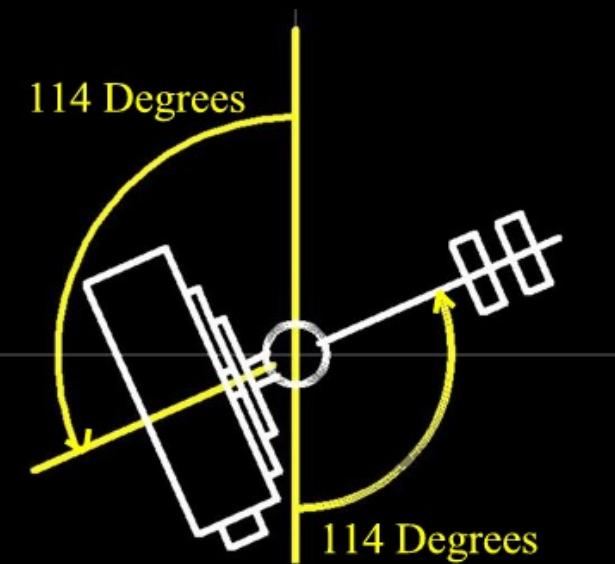
East (Right Side) Limit 123 Degrees

Looking North

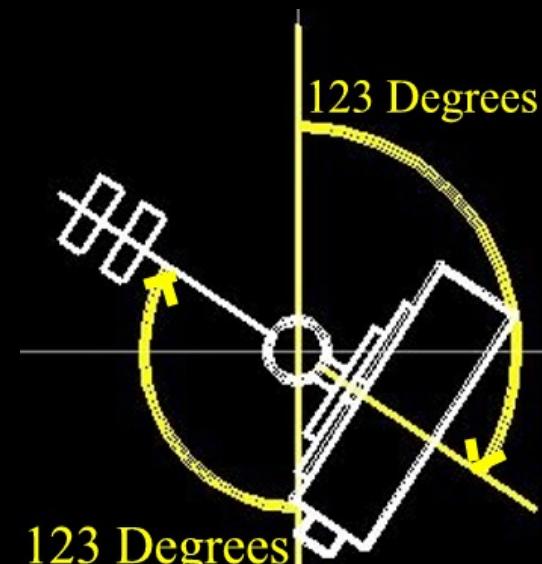


You are standing in front of the telescope with your back towards South
The center image has the telescope pointed towards South
The image on the left has the telescope Skyward
The image on the right has the telescope pointed skyward

Fig 4. Click on image for larger image.



West (Left Side) 114D
Southern Hemisphere



East (Right Side) 123D
Southern Hemisphere

Figure 5

Figure 6

Safety Limits			
Left Safety Limit	114°00'	Right Safety Limit	123°00'
Left Safety Limit Step Position	1411200	Right Safety Limit Step Position	273600
Western GoTo Limit	2°30'	Western GoTo Limit Step Position	285600
<input type="button" value="Set Safety Limits"/> <input type="button" value="Undo"/>			

Fig 7

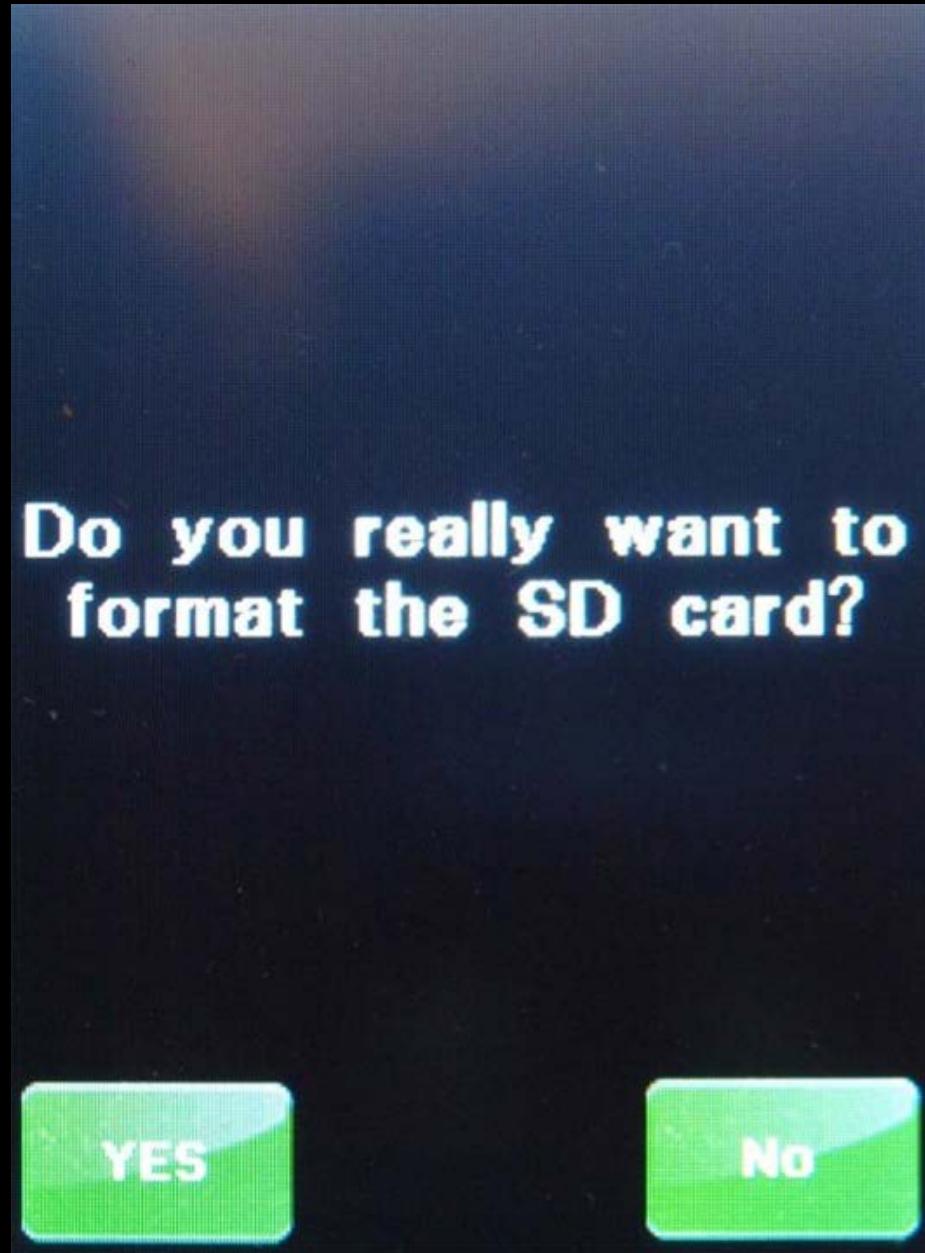
Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



After the go to is finished and you receive the message "Goto done: --- Center Object, press Goto" use the arrow buttons on the front or back of the hand controller to center the star in the eyepiece. (If you also have a classic hand controller attached, you can also use that.)

After centering the star, hit "GOTO".

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



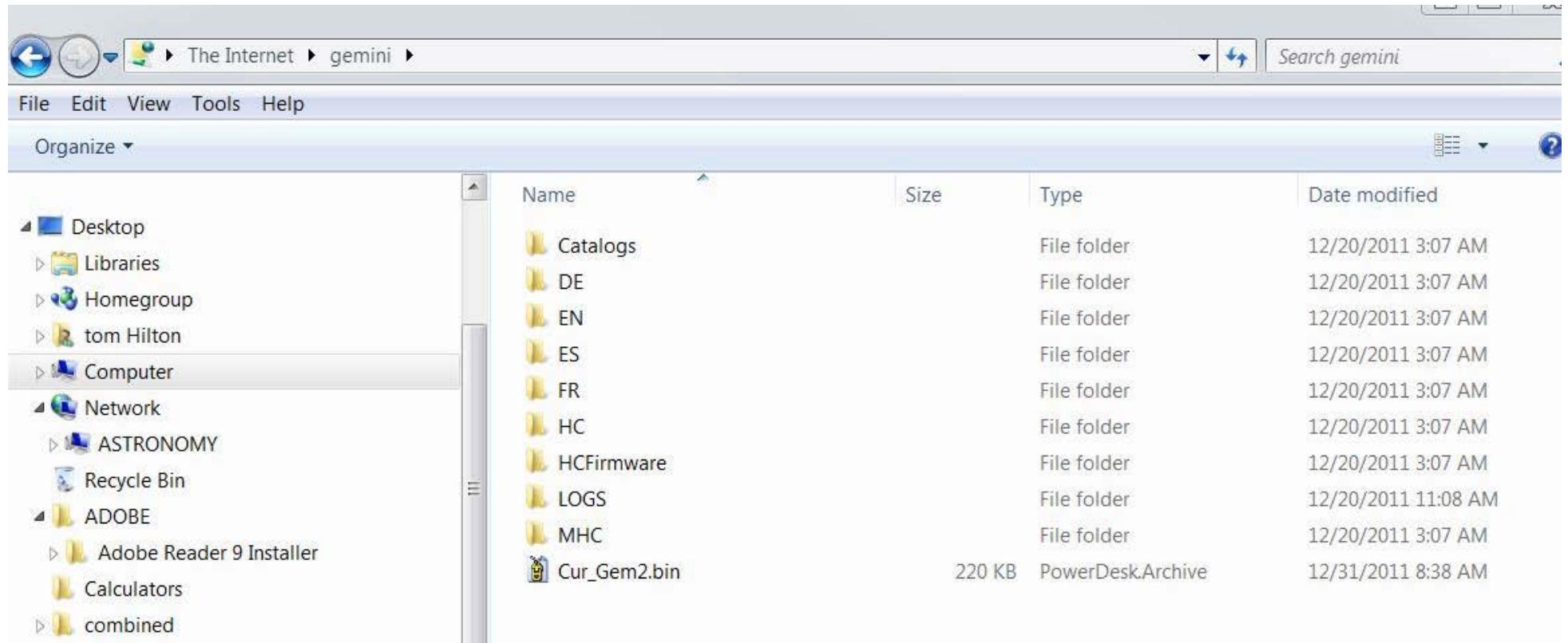
Format Yes No

Format Yes? No?

If you press YES, the micro-SDcard in the hand controller will be formatted, and the directory structure will be put back. However none of the files will be put back.

You can restore the catalogs by putting them in the HCfirmware directory of the micro-SDcard in the main Gemini-2 unit. You can also put the GemLogo.b16 file in the same directory, and it will also be uploaded to the correct location.

You would then use the Upload Files command from the SD card menu, to cause all the files in the HCfirmware directory to be uploaded to the hand controller.



Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

Object Name:
Vindemiatrix Vir

Object Information:

No information available!

Right Ascension:

13:02:09

Declination:

+10:57:32

JD2000



Flip



GoTo

NEXT

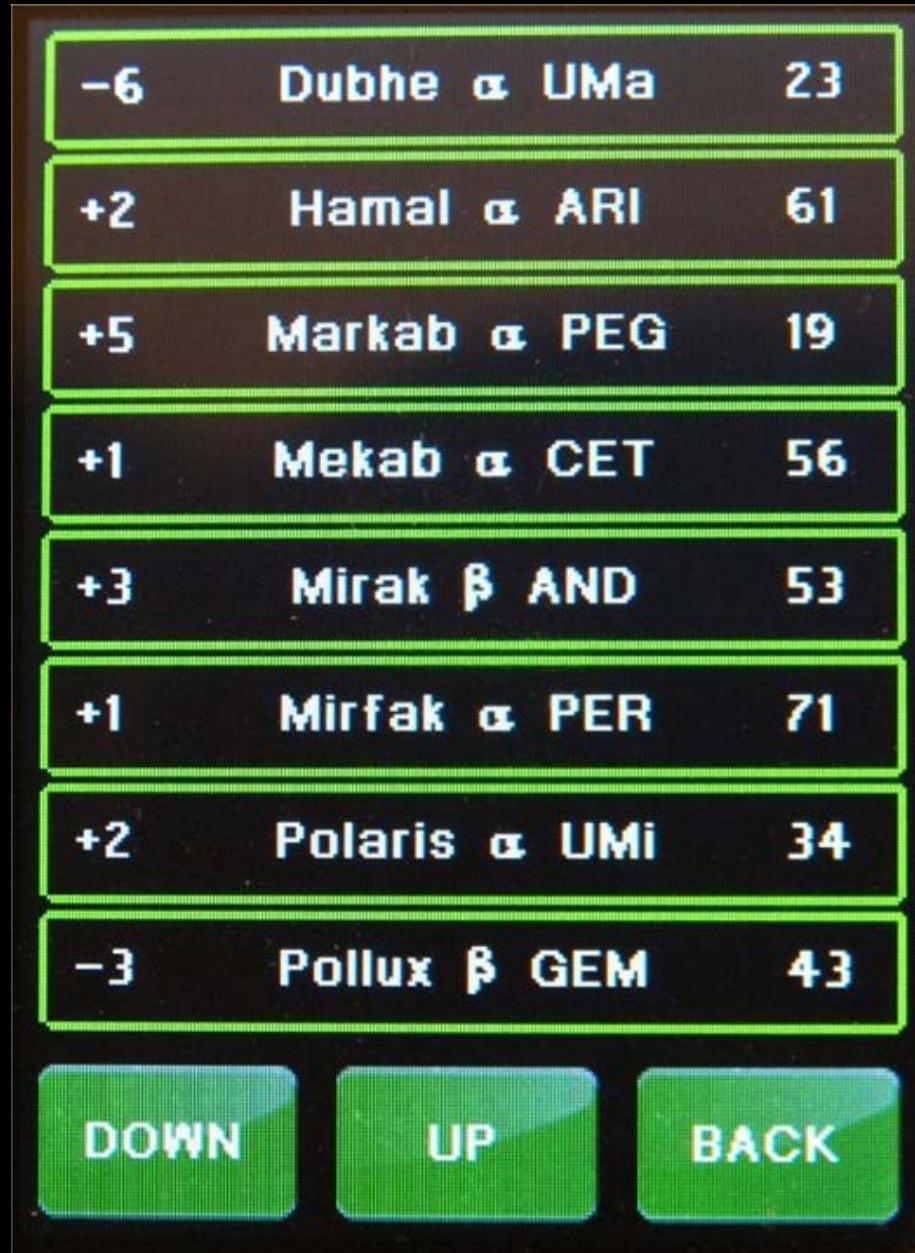
BACK

Well there is another star that starts with a V in the list. "Vindemiatrix"

Lets select the "GOTO" button.

Goto Vindemiatrix

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Select First Star

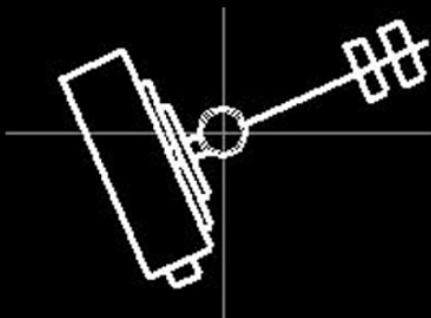
The first one should be near the celestial equator (Dec. near 0) and within about 20° of the eastern or western horizon (about + or - six hours east or west).

I choose Dubne for my first star so for this demo please click on Dubne.

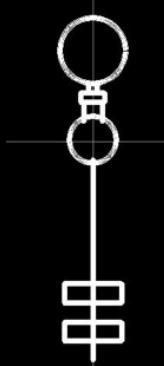
Notice the numbers on the left are the hour angles of the RA and the numbers on the right are the Dec in degrees.

Southern Hemisphere

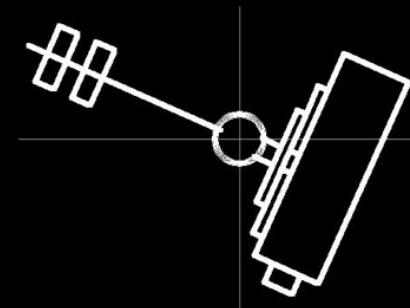
Limits in Southern Hemisphere



West (Left Side) Limit 114 Degrees

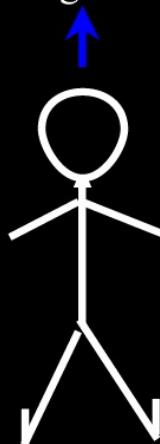


CCW



East (Right Side) Limit 123 Degrees

Looking North



You are standing in front of the telescope with your back towards South
The center image has the telescope pointed towards South
The image on the left has the telescope Skyward
The image on the right has the telescope pointed skyward

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



You will hit align if this star is acceptable. If not just hit East or West to go to the next selection. Hitting Align will also take you to the next selection.

The reset is to clear the last star added to the alignment.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



Goto Vindematrix

Goto Vindematrix is done.

To go to more stars you would hit the Goto and repeat the process.

I suggest hitting Goto and we will explore the next menu option.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

Polar Align Assist

Choose First Star

Choose Second Star

Iterate

BACK

Polar Align Assist

We now have to choose the second star. So hit Choose Second Star.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



This is the start of adding the second star to the alignment.

If this star is acceptable, hit "GOTO", otherwise hit East or West to select the next star.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

+0	Aldebaran α TAU	72
+4	Algenib γ PER	33
+4	Alpheratz α AND	39
-1	Betelgeuse α ORI	54
+0	Capella α AUR	72
+4	Caph β CAS	43
-2	Castor α GEM	47
+3	Diphda β CET	18

The other star should be near the meridian (such as Polaris in the northern hemisphere).

I am going to choose Capella, so for this demo click on Capella.

DOWN

UP

BACK

Select second star

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



The mount has moved to this star, center it using the hand pad and then hit "GOTO".

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

Polar Align Assist

Choose First Star

Choose Second Star

Iterate

BACK

Polar Align Assist

Now that we have picked 2 stars hit Iterate. The routine will first show a "GOTO" menu, going to the first star you picked. and then will show the next menu.

Hit Iterate.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



You will hit align if this star is acceptable. If not just hit East or West to go to the next selection. Hitting Align will also take you to the next selection.

You have finished adding the second star.

Fig 16

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

Polar Align Assist

**Please center the object
using Az and/or El knobs!**

**Use Az knob near the meridian,
El knob near East/West!**

Iterate

BACK

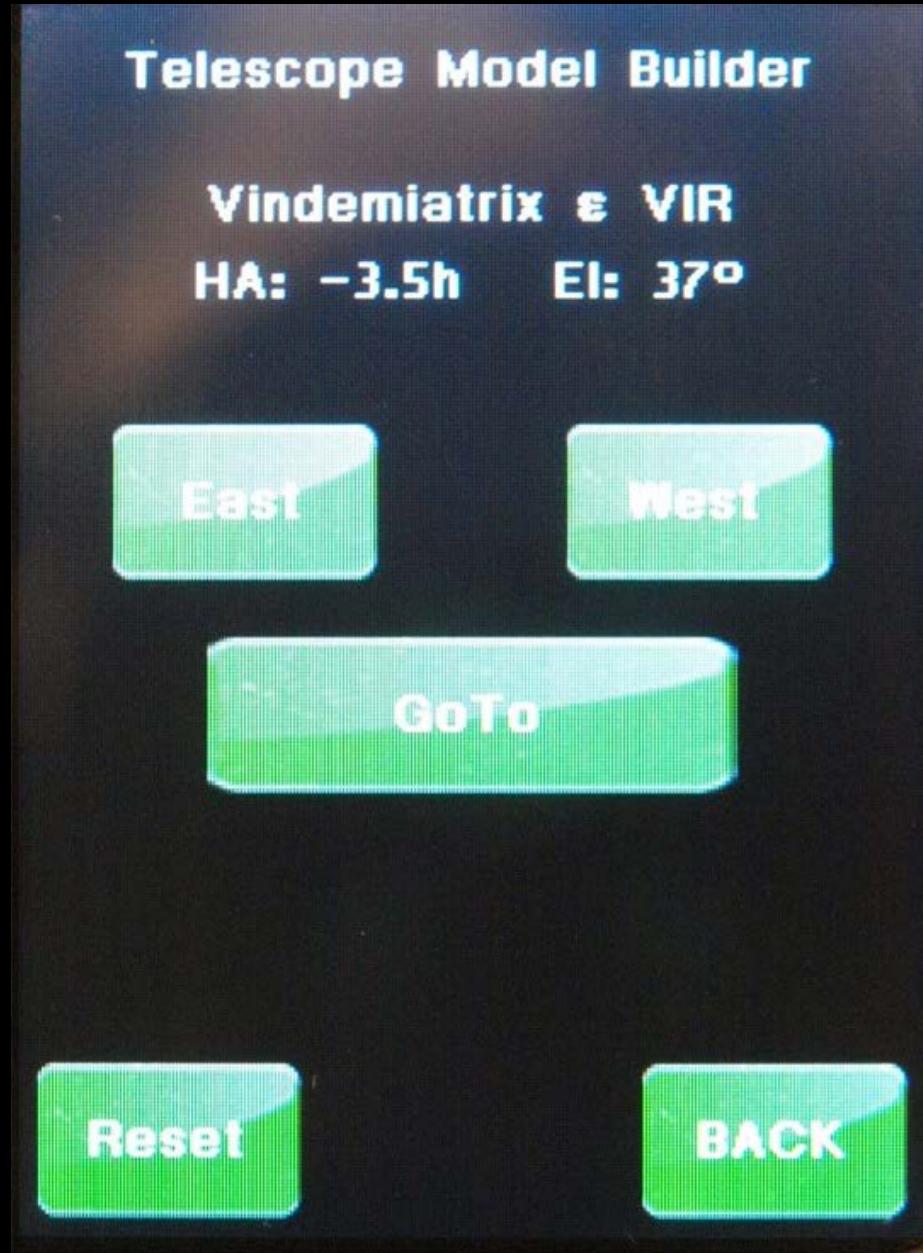
Center First Star

Please follow the instruction and center the first star.

Once you have centered the star, then hit Iterate. It will take you to the next star, and then show a menu just like this one.

Please hit Iterate

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



This is the start of adding the third star to the alignment.

If this star is acceptable, hit "GOTO", otherwise hit East or West to select the next star.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com

Polar Align Assist

**Please center the object
using Az and/or El knobs!**

**Use Az knob near the meridian,
El knob near East/West!**

Iterate

BACK

Center Second Star

Please follow the instruction and center the second star.

Now you really want to do this routine about 3 times to get within 1 degree of the pole. Each time you should get closer.

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



The mount has moved to this star, center it using the hand pad and then hit "GOTO".

Fig 18

Interactive Hand-Controller Menus - click on green button to navigate - Courtesy of Gemini-2.com



When the addition menu selection "PAC" shows up, that indicated that the mount has calculated a model good enough to try and do a Polar Align Correction. A Polar Align Correction will provide a even more accurate alignment of the mount to the pole. Usually within several minutes or seconds, depending on how accurate your alignment was. The PAC button will continue to show up on successive stars as long as you do not change models. Note, if you do the Polar Align Correction, this will wipe out alignment you just did, and you will have to do it again. But since you are now even better polar aligned, it should be a better alignment. The PAC button will continue to show up on successive stars as long as you do not change models.

You can continue adding more stars to the alignment, or switch to doing stars on the west side. For the most accurate alignment you need to do at least 6 stars on each side. It is a good idea to have at least one star on the opposite side in each of the 2 models, IE: 5 stars from the east and one from the west in the East model, and 5 stars from the west and 1 from the east in the West model.

The next page shows the PAC menu.