



Instruction Manual



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1. Usage of HUBO-i

1.1 Functions

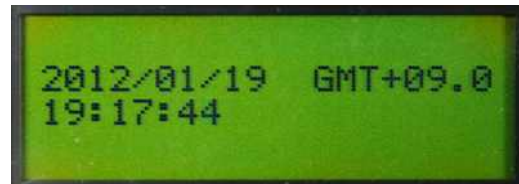
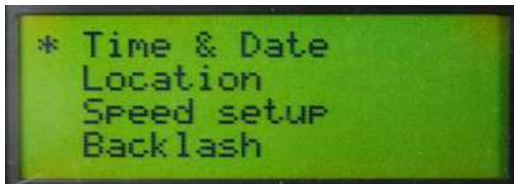


- | | | |
|----------------|---|---|
| ① LCD | — | shows information of operation |
| ② Speed lights | — | show the slew speed |
| ③ PREV | — | checks the previous information |
| ④ NEXT | — | checks the next information |
| ⑤ Arrow keys | — | slews the telescope up, down, left, and right |
| | — | flips the data list |
| ⑥ ESC | — | gets you out of the menu |
| ⑦ ENT. | — | selects the menu |
| | — | Setting and Sync when pressed and held |
| ⑧ Number keys | — | inputs numbers |
| | — | each key has its function |

2. Settings

2.1 Setting Time

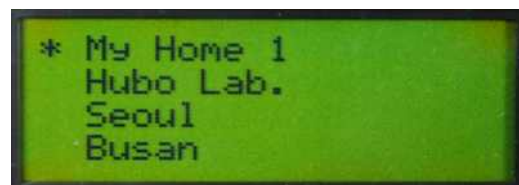
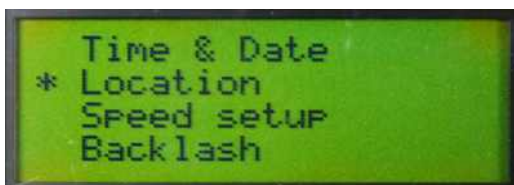
- This sets the current time. Input the accurate time for accurate Goto.



Press and hold ⇒ Select "Time & Date" with Arrow keys ⇒
⇒ Press and hold ⇒ Set up the current time with Arrow keys and Number keys ⇒ (completed)

2.2 Setting Site

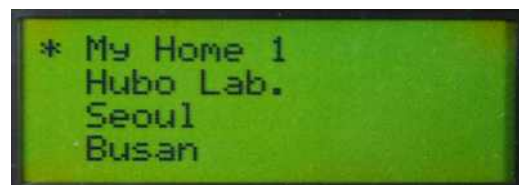
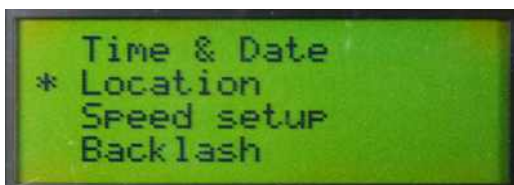
- This sets up the observation site. Select one of the registered sites.

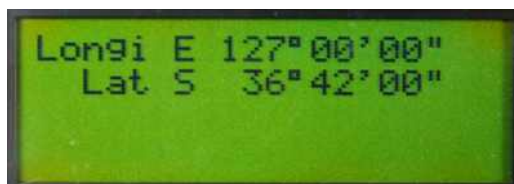


Press and hold ⇒ Select "Location" with Arrow keys ⇒ ⇒
Select a site with Arrow keys ⇒ ⇒ (completed)

2.3 Setting Latitude and Longitude

- This sets latitude and longitude of the observation site. You can register your usual site.





Press and hold ⇒ Select "Location" with Arrow keys ⇒ ⇒

Select a site with Arrow keys ⇒ ⇒ Press and hold ⇒

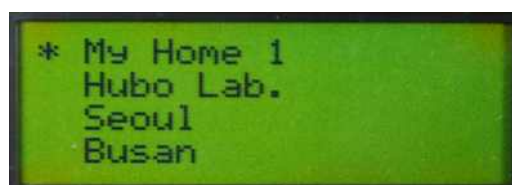
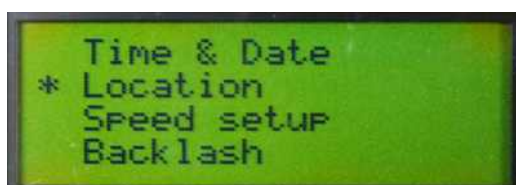
Input new latitude and longitude with Arrow keys and Number keys ⇒ ⇒

(completed)

tip. Use key and key for changing N, E, W, S of latitude and longitude.

6.4 Changing the Name of Site

- This changes the name of the registered site.



Press and hold ⇒ Select "Location" with Arrow keys ⇒ ⇒

Select a site with Arrow keys ⇒ Press and hold ⇒

Change the name with Arrow keys ⇒ (completed)

3. Goto

3.1 Turning on the Equatorial Mount

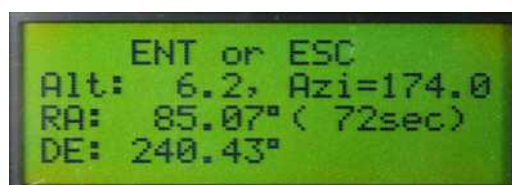
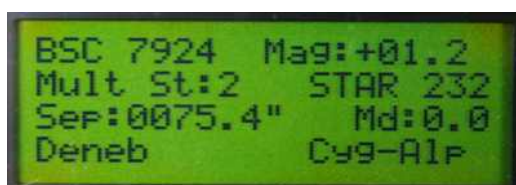
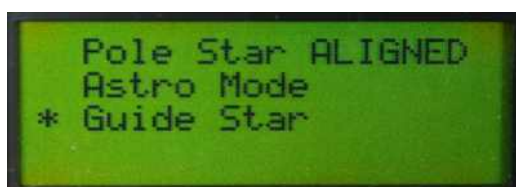
- Set the optical tube face west horizontally and turn on Morning calm. As you do this more precisely, the accuracy of initial Goto will be improved.

3.2 Aligning

- This procedure is training HUBO-i about the location of the alignment star for Goto. As you align more precisely, the accuracy of Goto will be improved. You may want to use the high power eyepiece magnifying more than 200X with crosshairs.

3.2.1 Goto the Alignment Star

- Goto a star for aligning.



⇒ Select "Guide Star" with Arrow keys ⇒ ⇒

Select the alignment star with Arrow keys ⇒ ⇒ ⇒

(completed)

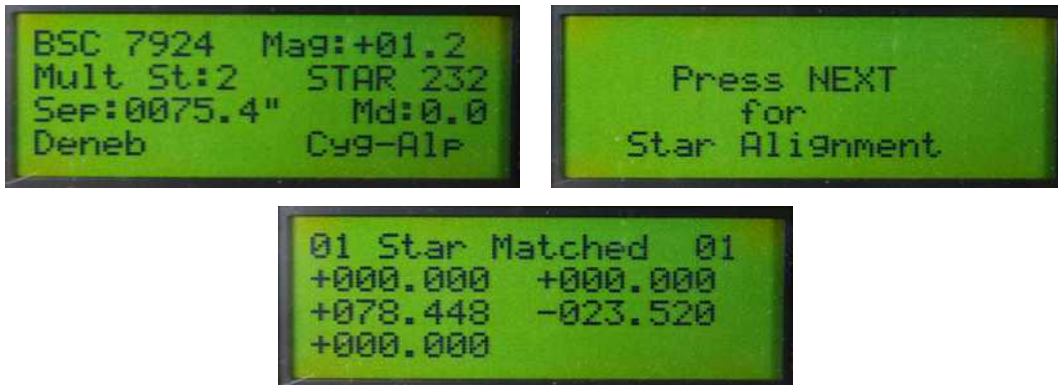
tip. Guide Star shows the current observable guide stars.

tip. Don't get out of the menu after Goto because centering needs to be done.

tip. Goto screen shows the time you need for Goto. During Goto, the remaining time is showed in real time.

3.2.2 Alignment Star Sync

- This procedure is training HUBO-i by centering the star you selected at 7.2.1.



Press Arrow keys to center the star ⇒ Press and hold ⇒

(completed)

tip. Place the star in the center of the view accurately by adjusting slew speed with key and key.

3.2.3 Repeat Aligning

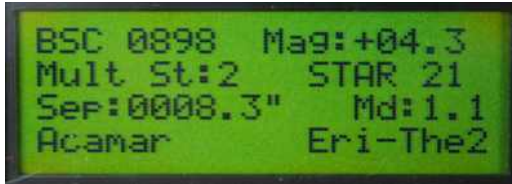
- Repeat 7.2.1. and 7.2.2. More than 3-star aligning is possible. The more stars, the more accurate Goto. More than 3-star aligning is recommended.

3.3 Goto

3.3.1 Goto the Stars

- You can goto the stars.





⇒ Select "Common Name" with Arrow keys ⇒ ⇒

Select the name of the star to observe with Arrow keys ⇒ ⇒

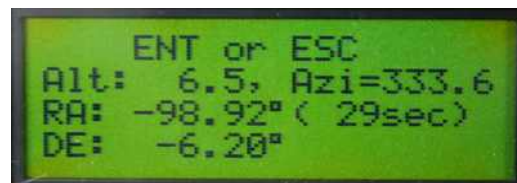
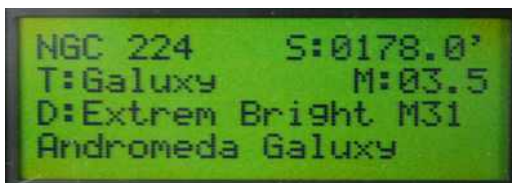
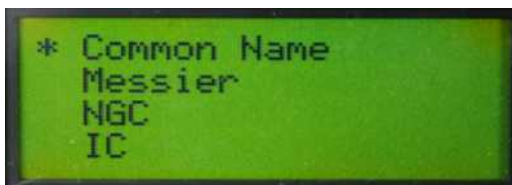
⇒ (completed)

tip. Other than Common Name, there are Star Name, Star Number, BSC Number, SAO Number, HR Number and Guide Star.

tip. When button is pressed one more time, Goto becomes reverse mode. This makes the object which is about to pass the meridian look like it has passed. Misuse may cause a collision between the telescope and tripod(or pier). Please be careful.

3.3.2 Goto the Deep Sky

- You can goto the nebulae, clusters and galaxies.



⇒ Select "Common Name" with Arrow keys ⇒ ⇒

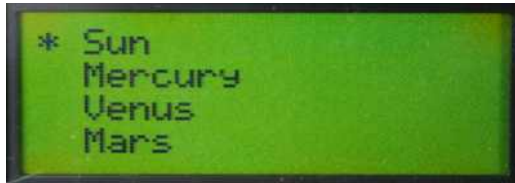
Select the name of the object to observe with Arrow keys ⇒ ⇒

⇒ (completed)

tip. Other than Common Name, there are Messier Number, NGC Number and IC Number.

3.3.3 Goto the Planets, Moon and Sun

- You can goto the planets, Moon and Sun.

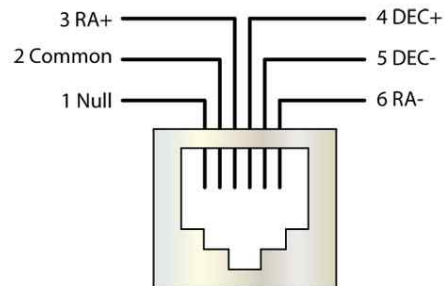


⇒ Select the name of the object to observe with Arrow keys ⇒

⇒ ⇒ (completed)

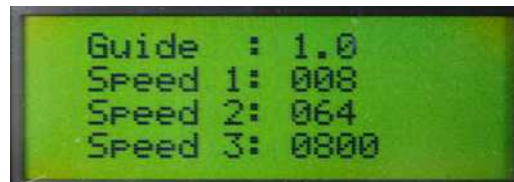
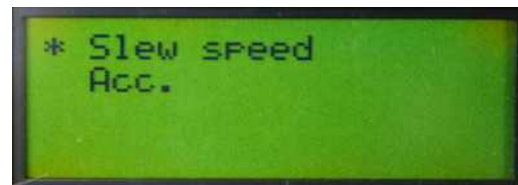
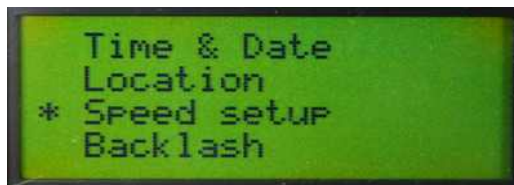
4. Autoguide

4.1 Pin Arranging of Autoguide



4.2 Changing Speed of Autoguide

- This changes the speed of autoguide.



Press and hold ENT. ⇒ Select "Speed setup" with Arrow keys ⇒

⇒ Select "Slw speed" with Arrow keys ⇒ ⇒ Press and hold

⇒ Change the speed of "Guide" with Arrow keys and keypad ⇒ ⇒

(completed)

tip. The speed of 0.5X ~ 1X is recommended.

4.3 Troubleshooting and Tips

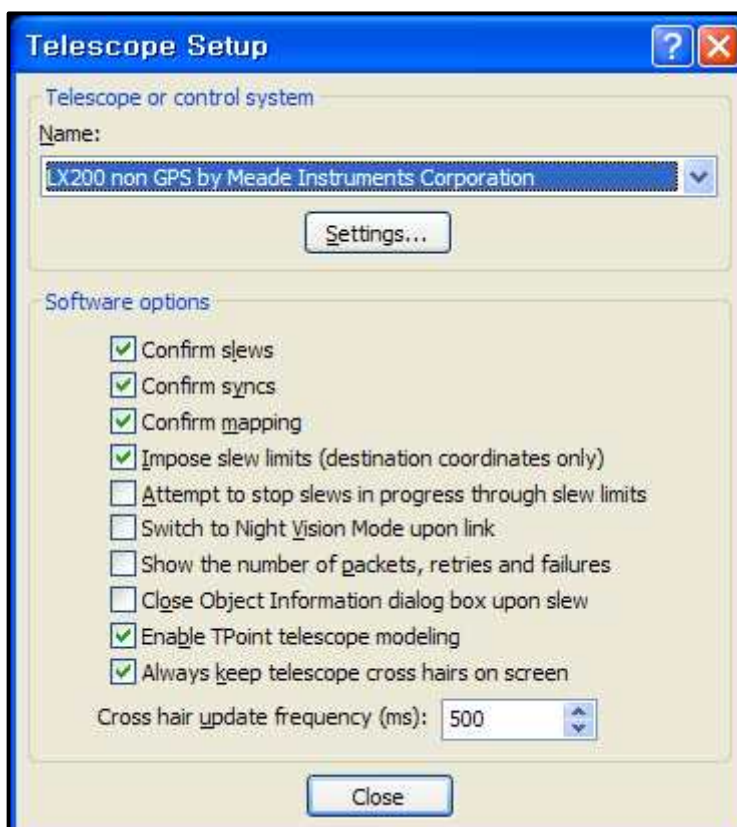
- Loading over weight on the mount decreases the precision of autoguide.
- Accurate balancing of RA/DEC axis increases the precision of autoguide.
- Accurate polar alignment increases the precision of autoguide.

Polar alignment by Drift Method is recommended.

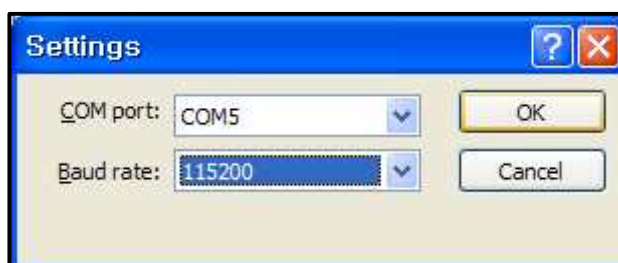
- Cables attached to telescope and camera have an influence to autoguide. Set them right not to interrupt slewing of the telescope.

5. Connecting a PC

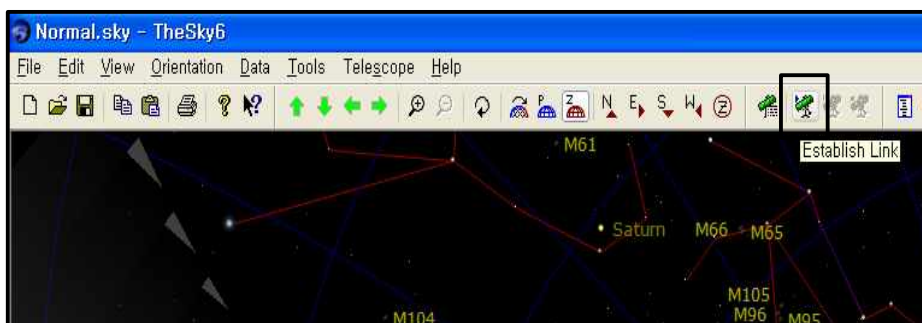
- The Sky can control the mount by connecting a PC to HUBO-i.
- Connect
 Connect HUBO-i controller to a PC with a USB cable.
 Run The Sky, get in Telescope Setup menu, and set up like below:



Select Setting and set up the COM port and Baud rate like below:
 Baud rate is 115200.

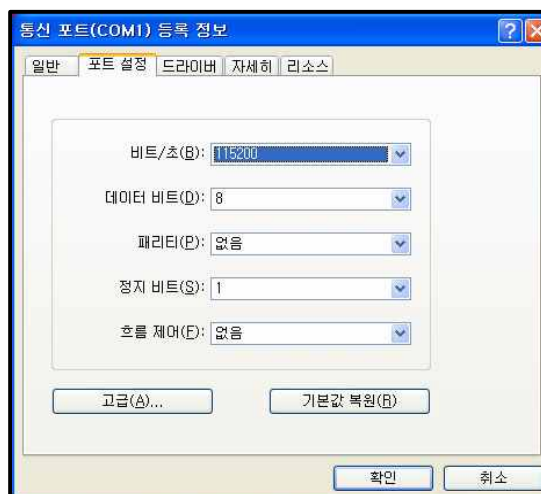
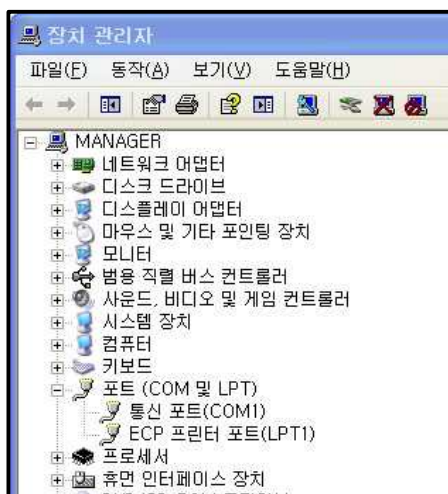


Select Telescope - Link - Establish at The Sky and connect HUBO-i.



- info

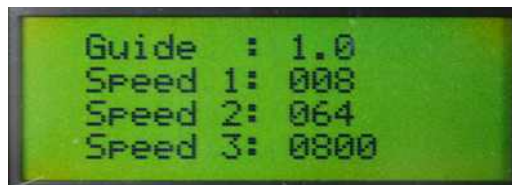
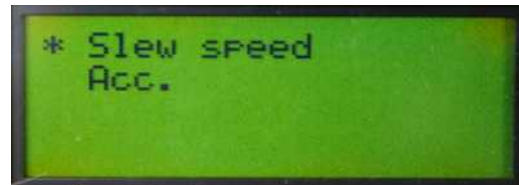
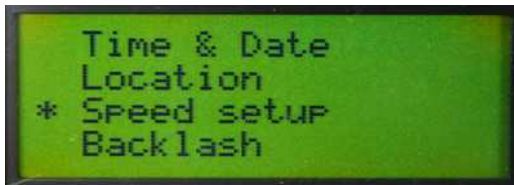
You can check the COM port at My computer - Control Panel - Device Manger - Port.



6. Other Functions

6.1 Speed setup

• This sets the slew speed and acceleration of the mount. There are 4 slew speeds.



Press and hold ⇒ Select "Speed setup" with Arrow keys ⇒ ⇒

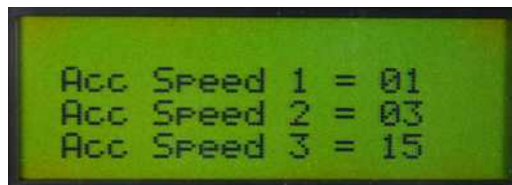
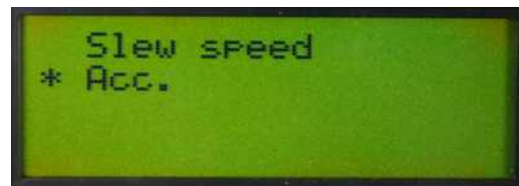
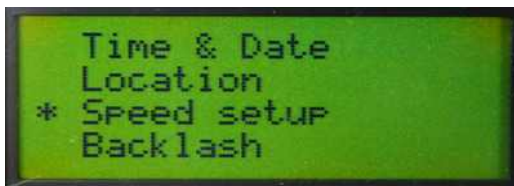
Select "Slew speed" with Arrow keys ⇒ ⇒ Press and hold ⇒

Set up the slew speed with Arrow keys and Number keys ⇒ (completed)

tip. Goto is carried out at speed 3.

tip. Too high slew speed decreases the precision of Goto.

tip. The speed under 1000X is recommended.



Press and hold ⇒ elect "Speed setup" with Arrow keys ⇒ ⇒

Select "Acc." with Arrow keys ⇒ ⇒ Press and hold ⇒ Set up

the acceleration with Arrow keys and Number keys ⇒ (completed)

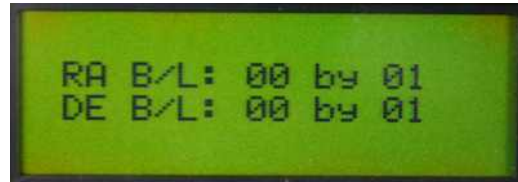
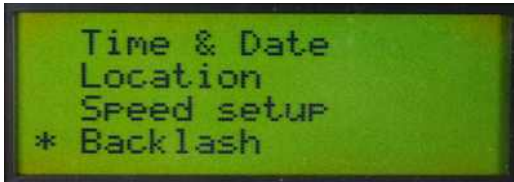
tip. The bigger the number, the less time is taken for acceleration.

tip. You can choose from 1 to 99 and 15 is recommended for Speed 3.

tip. The guide speed doesn't apply the acceleration.

6.2 Backlash

- This corrects the backlash of the worm gear. You can set up the time and speed.



Press and hold ⇒ Select "Backlash" with Arrow keys ⇒ ⇒

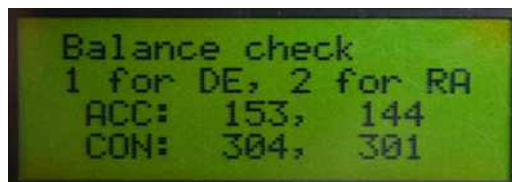
Press and hold ⇒ Input the correction value with Arrow keys and Number keys ⇒ (completed)

tip. Input "correction time by correction speed".

tip. You may not want to do this when astrophotographing because the backlash varies as the balance and the direction of the object.

6.3 Balance

- This shows the condition of RA / DEC axis balance numerically. The numbers are the amount of voltage and current to the motor. They are used for accurate balancing, especially for autoguide when astrophotographing.



Press and hold ⇒ Select "Balance" with Arrow keys (completed)

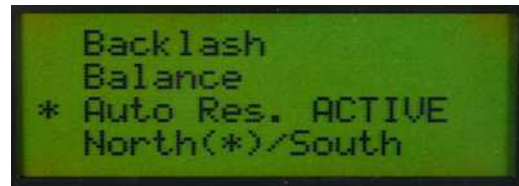
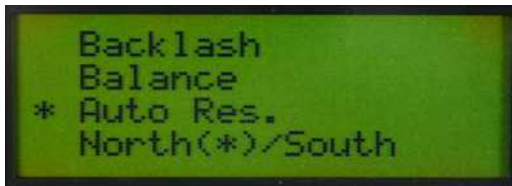
is for DEC axis, is for RA axis.

tip. Balance until the figures of ACC and CON become close.

tip. It is accurate condition when the difference is under 10%.

6.4 Auto Resume

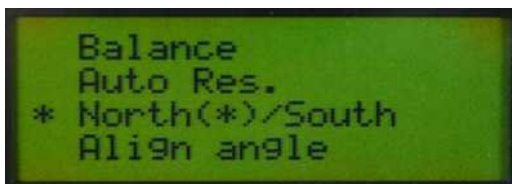
- This saves the information from alignment even if the mount is powered off. In the fixed location, you don't have to align everytime because Auto Resume helps you remember the first alignment semi-permanently. When aligning with Auto Resume is on, just correct the RA / DEC axis.



Press and hold ⇒ Select "Auto Res." with Arrow keys ⇒
(completed)

6.5 North/South

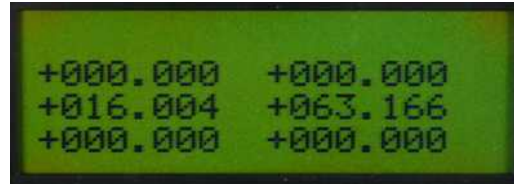
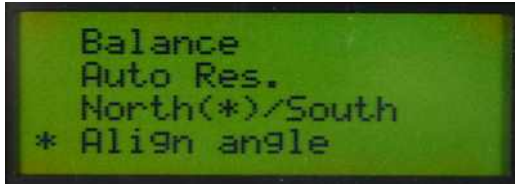
- You can choose northern or southern hemisphere. When using Morning calm in the northern hemisphere, choose North(*)/South. In the southern hemisphere, choose North/South(*)



Press and hold ⇒ Select "North(*)/South" with Arrow keys ⇒
 toggles "North" and "South" (completed)

6.6 Align angle

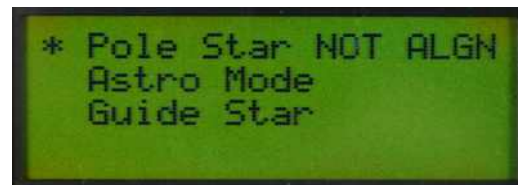
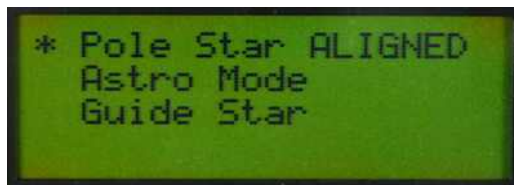
- You can check out the Align data. The data based on Sync shows how much the polar alignment and tube alignment are twisted.



Press and hold ⇒ Select "Align angle" with Arrow keys ⇒ (completed)

6.7 Pole Star Aligned / Pole Star Not Aligned

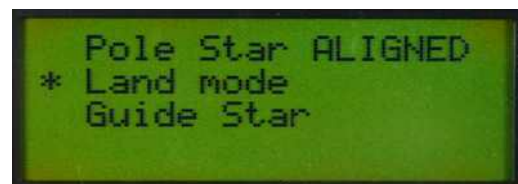
- This activates / inactivates the correction of twisted polar axis. When you have aligned the polar axis of the mount, select Pole Star Aligned. Then, only the RA axis slews when you track like a normal equatorial mount. If you have not aligned the polar axis, select Pole Star Not Aligned. At this mode, the DEC axis of the mount also slews to track the object accurately.



⇒ Select "Pole Star Aligned" with Arrow keys ⇒ toggles "Pole Star Aligned" and "Pole Star NOT Aligned" (completed)

6.8 Astro Mode / Land Mode

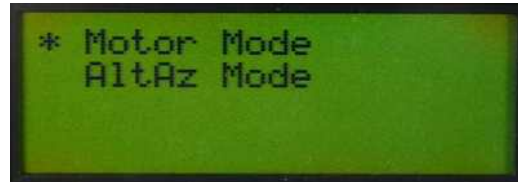
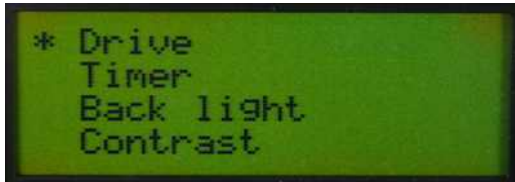
- You can choose the mode for astronomy observation or land observation. The RA axis doesn't track at Land Mode.



⇒ Select "Astro Mode" with Arrow keys ⇒ toggles "Astro Mode" and "Land Mode" (completed)

6.9 Drive

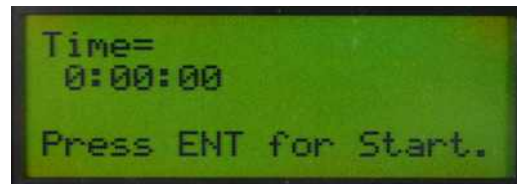
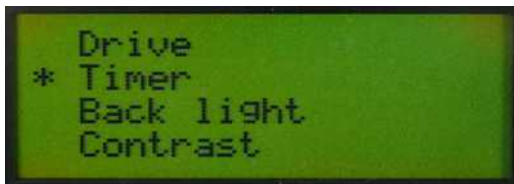
- You can choose equatorial mount mode or altazimuth mount mode. When you goto at altazimuth mount mode, the mount moves vertically and horizontally.



⇒ Select "Driver" with Arrow keys ⇒ ⇒ 방향키를 눌러서
 Select "Motor Mode" or "AltAz Mode" with Arrow keys ⇒ (completed)

6.10 Timer

- You can measure the time with start / end function and this can also be a countdown timer. This is useful for functions such as astrophotography.

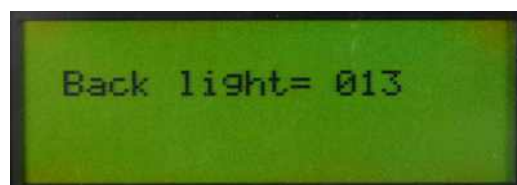
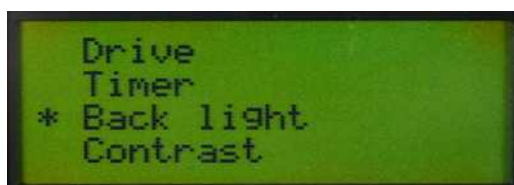


⇒ Select "Menu" with Arrow keys ⇒ (completed)

Press then start / end. Press and hold ENT. then the time is set up.

6.11 Back light

- You can adjust the brightness of LCD. You may want to lower the back light to keep your adjustment to the darkness at visual observation.

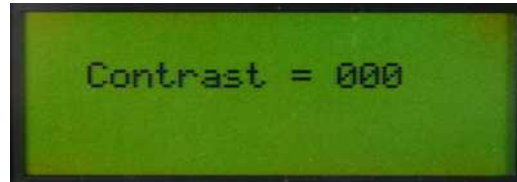
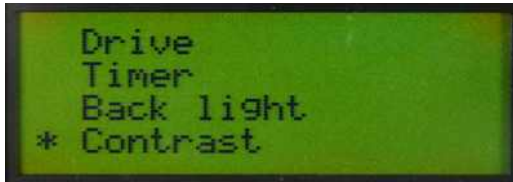


⇒ Select "Back light" with Arrow keys ⇒ ⇒ Adjust the
 brightness with Arrow keys. (completed)

tip. You can choose the brightness between 0 and 13.

6.12 Contrast

- You can adjust the contrast of LCD. The higher contrast, the darker background.



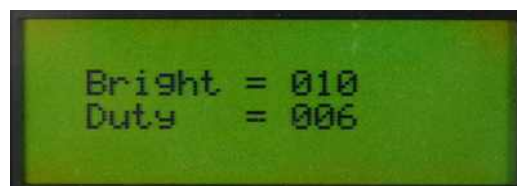
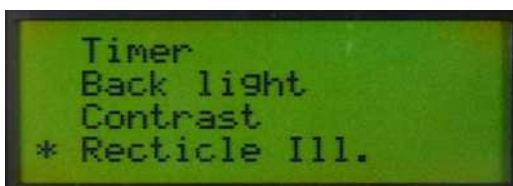
7 MENU ⇒ Select "Contrast" with Arrow keys ⇒ ENT. ⇒ Adjust the contrast with Arrow keys. (completed)

tip. You can choose the contrast between 0 and 20.

tip. High contrast can prevent LCD from getting slow at the low temperature.

6.13 Reticle III.

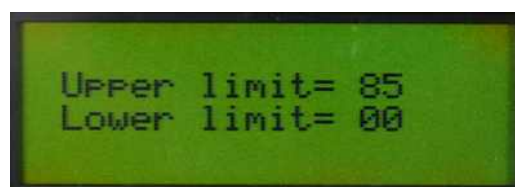
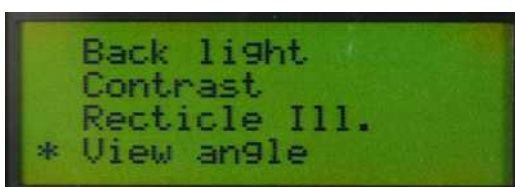
- You can set up the brightness and time of reticle LED in the polar alignment scope. It doesn't work when you use batteries, but works when the motor drive powers the LED.



7 MENU ⇒ Select "Reticle 3" with Arrow keys ⇒ ENT. ⇒ Press and hold ENT. ⇒ Input with Arrow keys and Number keys ⇒ ENT. (completed)

6.14 View angle

- This sets up the altitude limit when you goto the object. This can prevent the collision between optical tube and pier(or tripod).



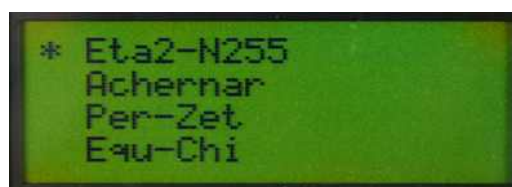
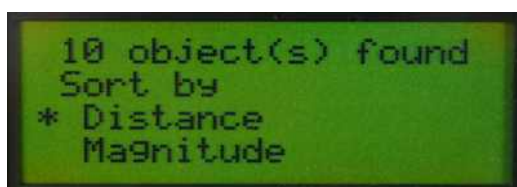
7 MENU ⇒ Select "View angle" with Arrow keys ⇒ **ENT.** ⇒ Press and hold **ENT.** ⇒ Select with Arrow keys and Number keys ⇒ **ENT.** (completed)

tip. You can choose the limit between 00 and 90. 00 is the horizon and 90 is the zenith.

tip. When you try to goto the object off the altitude limit, the message of "Object under limit" is showed.

6.15 Find

- This finds you the objects around the field of the view the telescope is pointing.

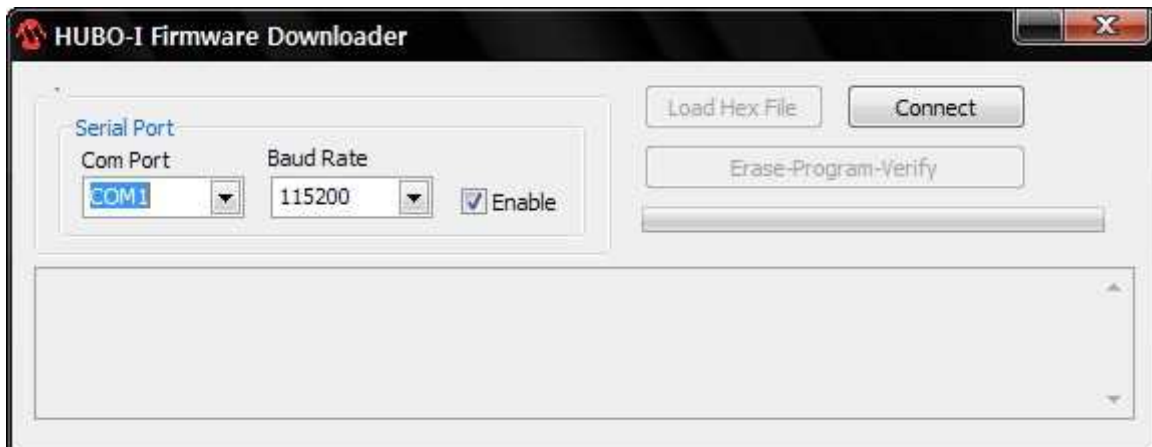


4 FIND ⇒ Select "Distance" or "Magnitude" with Arrow keys ⇒ **ENT.** ⇒ select the object with Arrow keys ⇒ Goto(refer to 7.3. Goto) (completed)

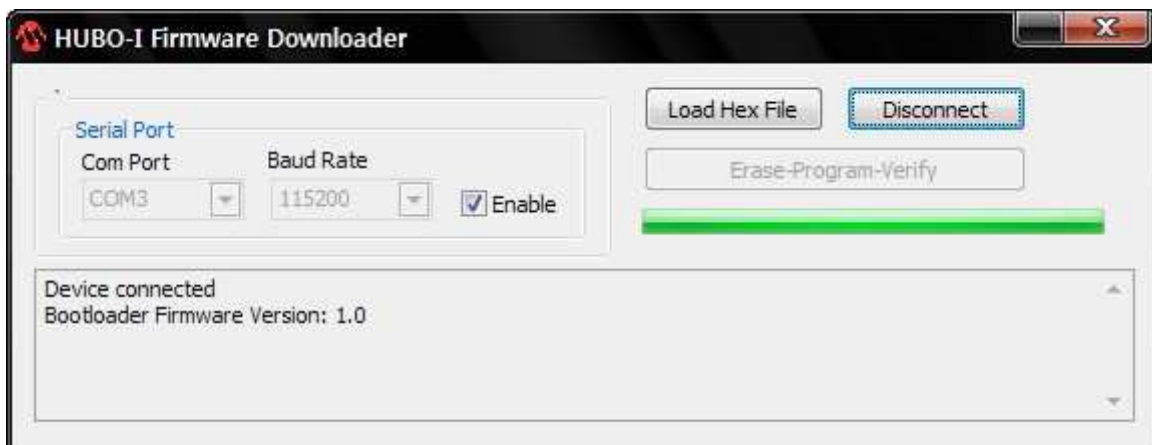
tip. "Distance" sorts objects by the distance and "Magnitude" sorts objects by the brightness.

7. Firmware Update

- Users can update the firmware on HUBO-i. The quality of program and user-friendly features will be improved by the constant firmware update.
- ① Download HUBO-i Firmware Downloader and the latest firmware to your PC from Astrodreamtech.com.
tip. To check the current firmware version, press PREV at the start-up screen of controller.
 - ② Connect HUBO-i controller to the mount and connect them to a PC by USB cable. Turn on the mount pressing both PREV and NEXT.

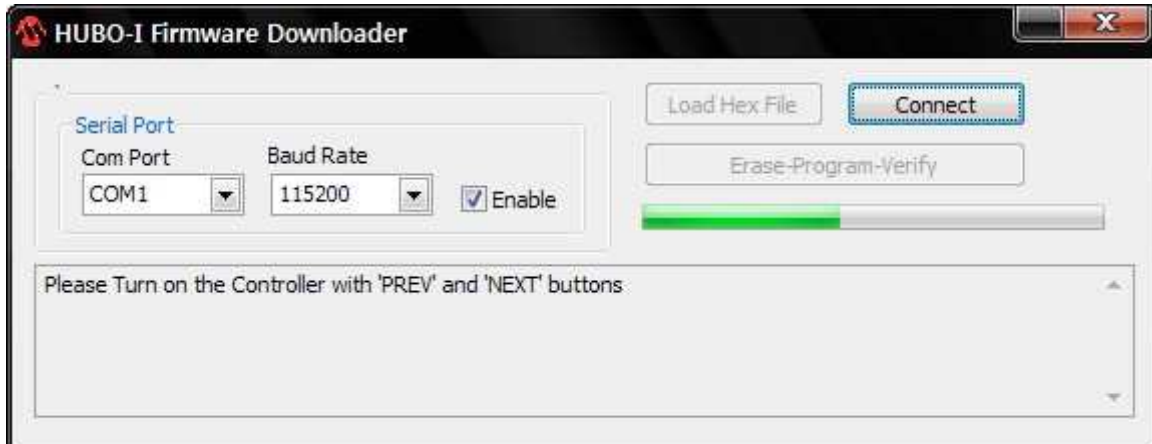


- ③ Execute the downloaded HUBO_Firmware_Loader.exe, select COM Port and click Connect. Baud Rate is 115200. Refer to 9. Connecting a PC to check the COM port.

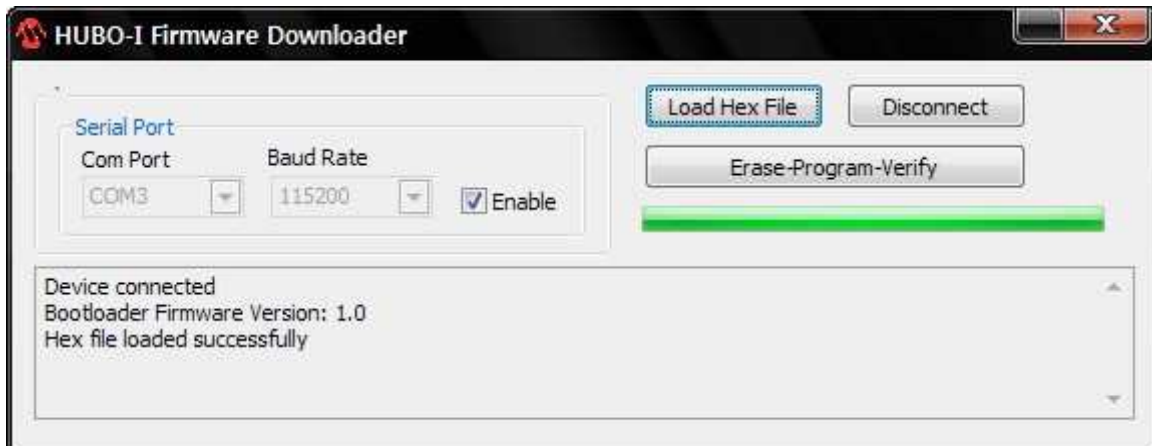


If the HUBO-i controller is successfully connected, the message of "Device

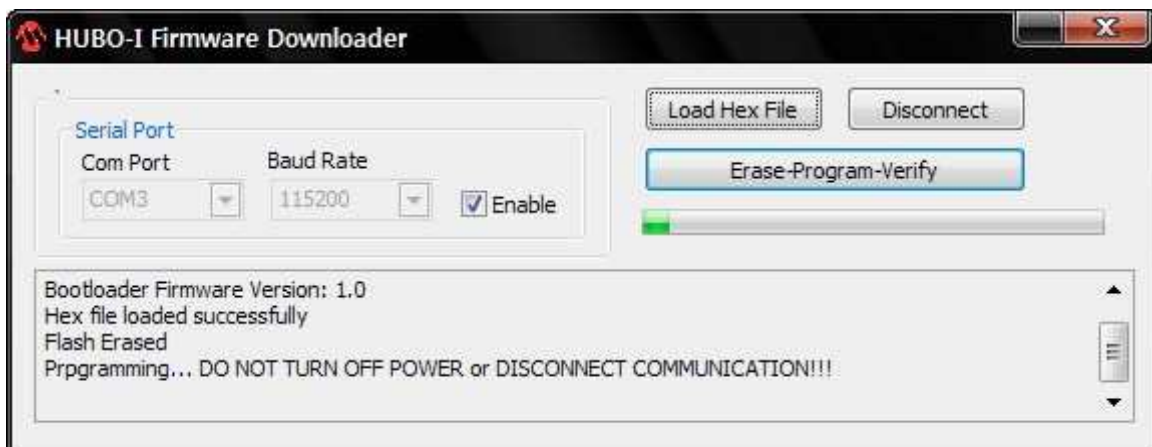
connected" is showed.



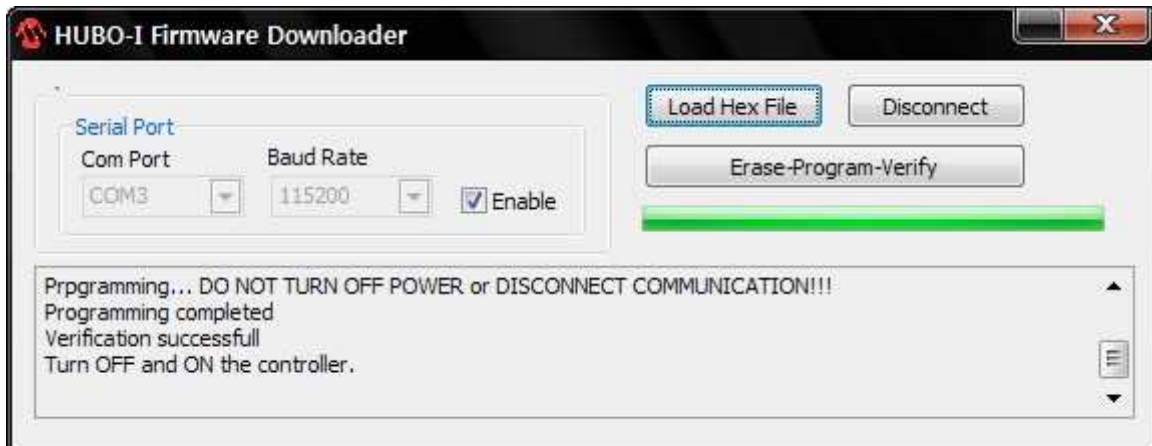
In case of failure, the message above is showed. Check again Com Port, Baud Rate and pressing PREV and NEXT at once when turning on the controller.



- ④ Click Load Hex File and select the downloaded firmware. If Firmware Downloader successfully reads the firmware, the message of "Hex file loaded successfully" above is showed.



- ⑤ Click Erase - Program - Verify and update the firmware on HUBO-i controller. Be careful not to turn off the mount until the update is completed.



- ⑥ When the update is completed, turn off the mount and turn it on again.

8. Menu Structure

Level 1	Level 2	Level 3
ENT.(press hold)	Time & Date	
	Location	
	Speed setup	Slew speed Acc.
	Backlash	
	Balance	
	Auto Res.	
	North/South	
	Align angle	
1 GOTO		
2 ALGN	Pole Star ALIGNED	
	Land mode / Astro Mode	
	Guide Star	
3 D.S.	Common Name	
	Messier	
	NGC	
	IC	
4 FIND	Distance	
	Magnitude	
5 USER		
6 STAR	Common Name	
	Star Name	
	Star Number	
	BSC Number	
	SAO Number	
	HR Number	
	Guide Star	
7 MENU	Drive	
	Timer	
	Back light	
	Contrast	
	Recticle Ill.	
	View angle	
8 MSC	Parking	
	User Define	
	MSC Obj.	
	Satelites	
9 PLNT		