

GOTOSTAR HAND CONTROLLER **AND** **DUAL-AXIS DC SERVO-MOTOR DRIVER**

The new GOTOSTAR hand controller and our specially designed dual-axis DC servomotor driver is our new patent product. The controlling accuracy well fit a beginner as well as expert.

★ **128x64 dot LCD displayer** . More info displayed on one screen. The easy used bar menu operation offer you great facility. You can easy use it even if you are beginner without operation manual reading.

★ **32bit CPU core run more quickly and calculate more accuracy** .

★ **Intelligent alignment , never align error. Celestial pole pointing error displayed after easy two star alignment.**

★ **Over 120,000 sky objects include stars, sun, moon, planets, comets, asteroids, deep sky objects, variables stars and 256 user-defined objects.**

★ **Smart dual-axis DC servomotor with protect** . High-speed slewing and very accuracy low speed tracking of celestial, solar and lunar objects. **No re-alignment is needed after R.A. axes slow motion control is used. Auto move back when motor stalled.**

★ **Moving speed 1X 、 2X 、 8X 、 16X 、 64X 、 128X 、 256X (1 ° /sec), 512X (2 ° /sec), Max 1024X (4 ° /sec),no error occurred when power low.**

★ **RS232 serial port used for slew and CCD guide controlled by PC.**

★ **Variable tracking speed.**

★ **Easy one star and two star align**

- ★ Real time clock after power off .
- ★ White reading LED.
- ★ Protect for power connect in reverse. No damage when connect in reverse .
- ★ Horizon level protect when tracking .
- ★ Anti-backlash included with testing or easy setup.
- ★ Soft start and stop motor moving .
- ★ Electric focus commands interface build in for future products.
- ★ External low price GPS module selectable.
- ★ Patented high accuracy control algorithms offer great accuracy. Motor controller error less than 10 arc seconds.

GOTOSTAR™

Hand Controller User Manual

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★ **Over 120,000 sky objects** including stars, sun, moon, planets, comets, asteroids, deep sky objects, variables stars and 256 user-defined objects.

★ **Smart two axes DC servomotor with protect .** High-speed slewing and very accuracy low speed tracking of celestial, solar and lunar objects. **No re-alignment is needed after Right Ascension axis slow motion control is used. Auto move back when motor stalled.**

★ Slewing speed 1X , 2X , 8X , 16X , 64X , 128X , 256X, 512X, Max 1024X. No error occur when power low.

★ RS232 serial port for slew and guide controlled by PC.

★ Variable tracking speed.

★ Easy one star and two star align.

★ **Real time clock after power off .**

★ White reading LED.

★ **Protect for power connect in reverse. No damage when connect in reverse .**

★ **Horizon level protect when tracking .**

★ Anti-backlash calibration included . Anti-backlash value can be tested or set.

★ **Soft start and stop motor moving, no rush movement .**

★ Electric focus commands interface build in for future products.

★ External low price GPS module selectable.

★ Patented high accuracy control algorithms offer great accuracy. Motor controller error less than 10 arc seconds.

Below is a brief description of the individual components of this high performance hand controller:

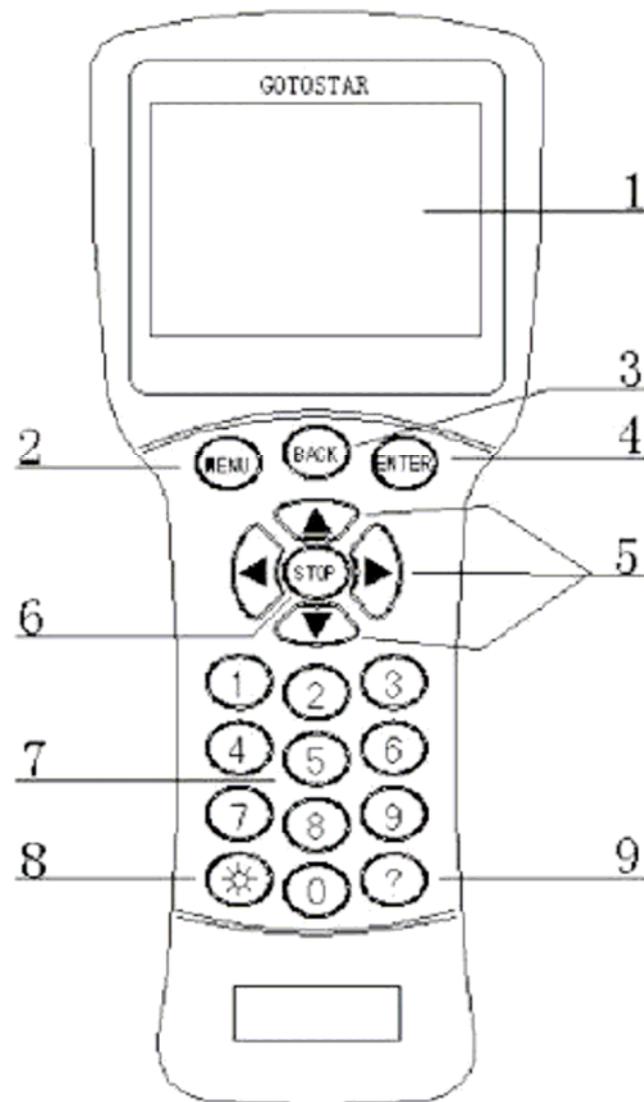


FIGURE.1 Hand Controller

- **LCD DISPLAY WINDOW** : Display chars and graph.
- **MENU**: Press Menu to start menu operation.
- **BACK** : Stop current operation and return in menu operation.
- **ENTER** : Enter key.

- **ARROW KEYS** : Move driver motor in main display. Select item or enter special parameter in menu. When in main display, press UP and DOWN moves Declination , press LEFT and RIGHT moves Right Ascension .
- **STOP** : start/stop Tracking. Stop Slew when slewing.
- **NUMBER KEYS** : Set speeds in normal display. Enter numbers in Menu.
- **LIGHT** : White led read light on/off.
- **?** : Display some help info.

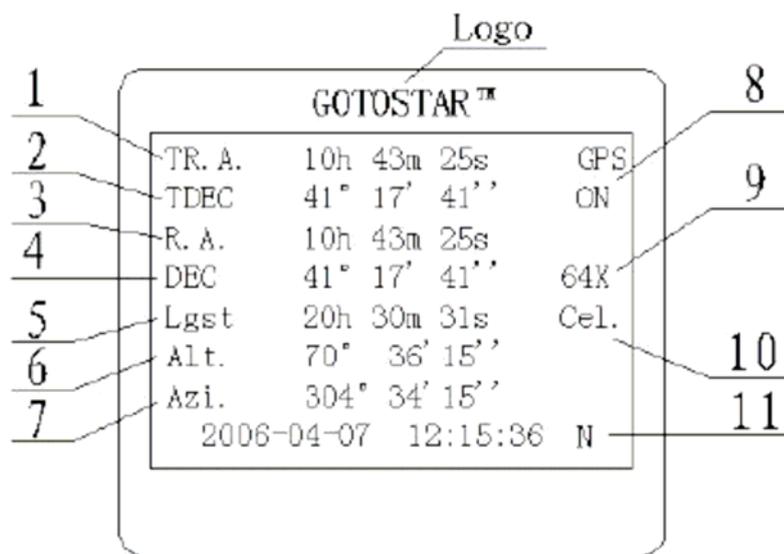


Figure.2 LCD display

Target Right Accent.

- 1• Target Declination
- 2• Equator right accent
- 3• Equator Declination
- 4• Local Sidereal time
- 5• Altitude
- 6• Azimuth
- 7• External GPS connect info

- 8• slew speed
- 9• tracking speed
- 10• Local time and in north or south hemisphere

About Menu and do what:

1• **Setup GOTOSTAR:** Before you use GOTOSTAR to control your telescope, you should Setup GOTOSTAR. All parameters are stored in flash.

- a. Set Local Time: Set up local time and daylight time saving.
- b. Set up site: Set up geography longitude and latitude and time zone. Or just select one city. If latitude is south, then automatically set the location as south hemisphere.
- c. Set N.S hemisphere: When you are in south hemisphere, you should set N/S hemisphere to south. And the equator mount is point to south.
- d. Set Display contrast: You can modify display contrast to make best view.
- e. Set Back Light: Keypads and LCD backlights can be set separately to make best view in dark.
- f. Set anti-backlash: Set up anti-backlash for both axes. Factory setting is 150 steps for both axes.
- g. Reset all: Erase user setting and restore factory settings to flash.

2• **Sync to target:** When doing this, GOTOSTAR's Right Ascension and Declination will synchronize to the target's Right Ascension . And Declination . This is similar to easy one star align. But you can synchronize to any sky objects.

3• **Select and slew:** In select and slew menu, you can select different types of sky objects. If the object you select is above the horizon, then GOTOSTAR will control the motor go to the object position.

- a• Planets, Sun, Moon: Select eight planets, sun.

Warning! Never look directly at the sun with the naked eye or with a telescope (unless you have the proper solar filter). Permanent and irreversible eye damage may result.

- b• Deep sky objects: There are a lot of catalog in this menu. Below is the list.
Named deep sky objects

Messier catalog

NGC IC catalog

UGC catalog

Caldwell Catalog

Bell Catalog

Herschel Catalog

c• Comets.

d• Asteroids.

e• Stars. You can select star in different way. Below is the list.

Named stars

Constellations

Double stars

GCVS variable stars

SAO catalog with Visual magnitude less than 7.5

f. User objects: User object's Equatorial coordinates (epoch J2000.0) are stored in flash memory.

g. Enter R.A. DEC.: Entered Apparent Right Ascension and Declination of the object.

4• Electro-focuser:

This item is used for focus the telescope. If you have electro-focuser compatible with GOTOSTAR and connected to the GOTOSTAR. In this menu, the left and right key moves focus fast and up and down key moves focus slowly.

5• Align:

This menu helps you align.

a• Easy one star alignment: When use easy one star alignment, GOTOSTAR suppose the RA axis is well aligned to polar axis. First, GOTOSTAR will prompt you put the telescope in park position. After press the enter key then bright stars used for align which is above the horizon is displayed with the altitude and azimuth. Select one bright star that you can see, and press enter. GOTOSTAR

will controller the driver move to near the target. Center the target in your telescope viewer and press enter key. One alignment is finished. **Sync to target** do same thing as easy one star alignment except you can synchronize to any target.

b• **Easy two star align:** Easy two star alignment works different from easy one star align. In easy two stars align, GOTOSTAR suppose your telescope optical axis is parallel to your Right Ascension axis. After you do same alignment process as easy one star alignment except you need two bright stars, GOTOSTAR will calculate the error misalignment of Right Ascension axis. Pole pointing error will display. You can easy adjust your mount. When two star align, you can do it slowly and don't need worry about align error.

c• **Dis R.A. axis error:** Display the celestial pole point error. Point error is zero when power on unless you do park scope before power off.

d• **Test anti-backlash:** Just follow the display and do. If no high accuracy is needed or your equator mount is poor (your worm gear has different clearance in different position), you can omit this produce.

6. **Set up track speed :** You can adjust your tracking speed in this menu.

7• **User objects:** You can add, modify, delete, all erase all records of your objects. All data you entered supposed to be J2000 epoch.

8• **Auto guide :** This is an advanced menu used for auto guide and manual guide. You can adjust your guide rate, which can best match your auto guide software to get best performance.

9• **Park Scope:** This procedure only need to be done if you don't move your telescope mount after you power off GOTOSTAR. Celestial pole pointing error will be stored to flash memory and recalled while power on again.

10• **To park position:** Don't need to explain. Just move telescope to park position.

Addendum:

DC Servo motor driver for EQ5 mounts installation:

Two axes motor driver is fit for EQ5, LXD55, LXD75, CG5, GP mounts and other compatible mounts. First install Right Ascension axis and Declination axis gear to shaft.

Second use M6 * 35mm stainless steel screw install Right Ascension axis driver to Right Ascension axis and use M6 * 12mm screw install Declination driver.

Make sure that the Right Ascension axis and Declination axis can run freely. If it can't run freely, then worm gear needs to be adjusted.