ASTRO-PHYSICS
GTO Keypad - Release Notes and Revision History

GTOCP4 and GTOCP5 – If you have these control boxes, we recommend that you upgrade to Keypad Version 5.xxx. Refer to the Software Updates tab of our website: www.astro-physics.com

GTOCP1, GTOCP2 and GTOCP3 – We recommend the most recent 4.19.3 or 4.19.5 version for these earlier control boxes. They do not have the memory or advanced command language required for Keypad version 5.xxx.

08-27-21 Version 4.19.5
The JAVA-based Keypad Loader can only be uploaded from GTOCP4 with P02-01 or later version firmware installed. However, a keypad with 4.19.5 can be used with any GTOCP1, GTOCP2, GTOCP3 or GTOCP4 control box.

- **Includes button rate accommodation from 4.19.4 (required for GTOCP4)**
- **Eliminates commands at power-up that could interfere with proper Auto-connect=EXT start.** Commands were being sent at power-up that could interfere with external control of the mount. Only the **:U#** (long format) is still being sent at keypad power-up.
- **Works with Java loader like v5.xx with ONE EXCEPTION:** The load for v4.19.5 must be done in two parts if including the database (database only required if it had been corrupted). This loader can only be used with a GTOCP4.

08-27-21 Version 4.19.4 (not released)

- **Made accommodation for P02-xx button rate table.** 4.19.4 provides a work-around for the addition of the rate tables in VCPx-P02-xx control box firmware.

07-29-16 Version 4.19.3

- **Fixed display bug in Get Time / Location from Mount function.** Time loaded from mount correctly; however, first display of time showed zeros in hours field. Subsequent displays were fine. Time now displays correctly.
- **Corrected version number returned by status command.** Correct firmware version is now being displayed when seeking keypad status via “3=Tools ? 0=Status ? (North Key) ? Code Level: V4.19.3”.
- **Clarified New Setup Menus.** The wording was changed on the “New Setup” screen in order to clarify the function. It now says “New Setup / Start From / Park Position / Press: 1, 2, 3, 4”. (Previously it was “New Startup / Resume From / Reference Position / Press: 1, 2, 3, 4”.)

01-19-16 Version 4.19.2

- **Auto-Connect=YES will restore the last used location for all locations 0-9 when the mount is powered up again.** In prior versions, only locations accept 1-9 were remembered, not location "0" (hard-coded Astro-Physics latitude and longitude).

01-18-16 Version 4.19.1

- **Fixed variable reset in startup routine.** Fixed a bug that prevented the keypad from slewing to a target object after the new startup routine.

01-18-16 Version 4.19

- **Fixed Park 1 leap-year related issue that caused incorrect movement.** Although the issue would resolve itself on March 1st, after the leap-year day of February 29, we felt it was important to fix this problem since many people rely on Park 1.
- **New Park 4 Position**. This position has been available in the AP V2 ASCOM driver and APCC for some time and is now added to the Keypad.

- **New Park 0 Position.** This position allows you to park anywhere you wish. Simply move the mount (via the servo, not the clutches) to the desired position and select Park 0. The mount will NOT start tracking when you power up again.
- **New Sync, Align, Resume Menu** This menu now offers new selections: 3=ResumeLastPosition and 4=New Setup. "ResumeLastPosition" is used when you have parked the mount at the end of the previous session and wish to begin a new session. Selecting it will initialize the mount and you'll be ready for your first object. If you select #4, the new Setup Menu will display.
- **New Setup Menu** "New Setup" is only used when you are setting up the mount for the first time or if you have readjusted scope position via the clutches and wish to restart from a "Reference Position". The "Reference Position" can be eitiher 1,2,3 or 4. If using "Reference Position", you must be certain that your mount is actually in that position, otherwise, the misinformation will cause the mount to be lost.
- **New Park/ Mount Options Menu** In addition to the expanded park position selections discussed above, additional mount types are available for selection: Mach1GTO, 1100GTO, 1600GTO and 3600GTO.

??-??-?? Version 4.18 - Not released

10-20-08 Version 4.17

- **Fixed Initialization Freeze-up.** A bug was discovered in the initialization process of version 4.16. It likely was also present in v.4.15, but this has not been confirmed, since very few keypads were ever programmed with v.4.15. Keypads would sometimes freeze up during initialization, especially when resuming from reference Park 1.

07-03-08 Version 4.16

- **Real-Time Clock Functions.** It was discovered that version 4.15 would disable the real-time clock in older keypads with serial numbers of 1490 and earlier (purchased before April, 2002). When v.4.15 was loaded into these older keypads, the real-time clock stopped functioning due to a memory allocation issue in the smaller memory of the older keypads. There was no damage done to the clock, and clock function could be restored by simply re-loading v.4.12, or by loading the newest version.

03-24-08 Version 4.15

- **Eastern Longitudes.** The accuracy of eastern longitude values that are sent to the mount has been improved by including minutes in the calculation. We are unable to add seconds into the calculation at this time, due to memory space limitations in the keypad.
- **Eastern Time Zones When Polling the Mount.** The 3=Get Time/Loc FrMnt command (how you “poll" the mount) now returns correct time zone values for people in eastern longitudes using the GTOCP3 control box. (GTOCP1 & 2 control boxes already returned the correct time zone values in version 4.12 and continue to do so in version 4.15)
- **Shipping Notice.** Because these changes only applied to eastern longitudes, a small number of keypads with v.4.12 were shipped to US addresses after the date referenced above.

09-06-04 Version 4.12

- **GMT and LST issues for E longitude.** Fixed bugs. Keypad will correctly interpret all E longitude data when polling the mount for location, time and time zone data. (This was found to NOT be completely correct. See v4.15 above.)
- **Set Date & Time.** Fixed bug that caused LOC:-3 display in 4=Time/LST and error message when Set Date & Time screen was selected under some circumstances.
- **Auto-Connect set to YES.** Fixed bug. Locations 2-9 will Auto-Connect correctly.
- **RESET command.** The keypad will reset all user-defined values to the default setting of 0 in real time.
- **Error checking in Site Location Data screen**. Only N-S-E-W values will be accepted. If incorrect, you will get an error message.

08-28-04 Version 4.11

- **Resume from Park**. Fixed bug. Now works properly.

- **Site Location Data screen.** Changed name from Set Site Location to more clearly define its function. Also fixed bug. If you press MENU when exiting Site Location Data screen, it will not impact the location display of 4=Time/LST screen.
- **Sync command in Messier, NGC and IC input screens**. The Sync command was removed from this screen since it was not valid. You must press >NEXT twice to enter the Sync command screen.

08-26-04 Version 4.10

- **PEM state.** Fixed bug. Will automatically change to Play after recording.
- **RA/Dec readout.** Fixed bug. N-S-E-W buttons will work correctly.
- **RA/DEC/REV button**. Fixed bug. The Re-calibrate command now works properly.
- **Meridian Delay settings.** Are no longer saved from previous session. You must set up meridian delay for each sessioni to prevent unintended consequences.

02-16-04 Version 4.07

- **Re-designed menu system.** Startup and setup displays have been re-designed for easier use and access. Other displays are totally new. Please look through all of the menus to make note of the changes before you go out observing.
- **Full cursor control in all entry areas.** The keypad's cursor can be moved backwards and forwards with the <PREV and NEXT> in all of the areas where data is entered. Great for fixing any mistakes you make without having to start from the beginning again. This feature will be especially handy for time and location settings. When you hit the last column of entry data the cursor will move back to the start. You must press GOTO to save or to run your entry or MENU to exit from the screen.
- **All entry screens will only enter or save when GOTO is pressed also pressing MENU will exit you from any screen with the entered data being lost**. Adds built in confirmation of all entries.
- **Saved variables.** The keypad will now store the important user variables, tracking, slewing and guiding rates and other settings, after it is shut down or unplugged.
- **Four button (N-S-E-W) + Stop Now available throughout the keypad, in all menus, object screens and most input areas.**
- **Guide speed / button speed settings.** Separate settings for external auto-guider operation and button speeds. Auto-guider settings of .25, .5, 1x are now independent of the button speed settings.
- **New +/- routine/display to change button speed.** Now permits auto-guide value to be changed on this menu as well.
- **Start from Reference Park**. This allows you to start the mount in the field by placing the telescope in Park1 position for quick daytime polar alignment.
- **External auto connect.** Now you can start the servo from an external computer and send time, date and location from that source at startup without having to unplug the keypad each time. This insures that the keypad, mount and computer will all be synchronized with each other automatically. The keypad will go directly to the Main Menu as soon as the external program initializes the mount. All values of time, date and location will be transferred to the keypad. The keypad can then be used in the normal manner at any time.
- **SmartGuide control.** Adds variable speed capability to both axes. Designed to null out drift during unguided exposures. Great for tracking slow-moving, non-sidereal objects such as lunar craters, comets and asteroids.
- **Get time and location from mount.** You can now ask the mount for the time and location and set that value to the keypad. This value could be sent to the mount via your external computer program. This allows the mount, the keypad and external computer to all be in sync.
- **9 Locations.** Longitude, Latitude and time zone now can be set to 9 different places. We suggest noting them on a piece of paper on the back of your keypad so that you can keep track of them all.
- **Altitude/Azimuth display.** Added to real-time RA/DEC display. ALT/AZ values change as mount is moved in RA/DEC directions. With tracking rate set to zero, mount can be positioned for fixed targets to any Alt / Az point.
- **Altitude/Azimuth input.** This new option allows you to slew to any position in the sky as long as you know it Altitude and Azimuth angles.
- **New local horizon limit setting.** Useful for keeping your telescope from slewing to objects below your observing site's horizon.
- **Audio feedback with Recalibration command**. You will now hear a beep when you re-calibrate the mount to let you know that it has done it. Re-Calibrate has also been removed from the objects menu. It is still located in the RA/DEC/REV screen 9=Re-Calibrate.
- **What's Up Now Tied to horizon limit as well using the M, NGC, and IC databases of objects in the keypad.** What's up Now function will suggest objects to view based on what is actually above the horizon at the time 'What's Up' is requested.

- **Auto initialization routine.** Detects when new firmware is loaded to the keypad and if saved values need to be re-initialized. This new 'power on' routine will now auto-decide if the keypad needs to be re-set to factory defaults when new saved values are added. When a new future release of the code is loaded into the keypad, the user will no longer have to manually reset all his/her custom keypad settings, i.e. locations and daylight savings.
- **Full error checking.** Added to Location, Date/Time, RA/DEC, Alt/Az entry - with notification if entry is not valid. Will not allow impossible settings.

Version 3.2 These features are only available as a download when combined with version 4.0 above.

- **Sun warning**. A warning displays when you request an object or RA/Dec position that is within 15 degrees of the sun. The note will not display during the park function.
- **Database level and program code level display**. Allows you to check your version number for the program code (this number also displays on Main Menu) and database level. In order to update or download the database from the internet (feature available soon), you must have version 3.2 installed on your keypad.

10-29-01 Version 3.09

- **Site Menu**. Opening location selections on Site Menu will no longer impact current location setting in keypad (problem introduced in version 3.08).
- **Time/LST**. Current location display changed, i.e. LOC:1.

10-24-01 Versions 3.08

- **Park 1**. Parks on correct side of mount East of Greenwich.
- **RA/Dec Number Entry**. After number entry, keypad goes to Objects Menu.
- **Park**. Stop and Main Menu buttons active while mount is parking. Other buttons are inactive.
- **Load**. Will ask for confirmation.
- **Time/LST**. Added new display that shows active location selection.
- **Programming for new keypads (in-house use only)**. All defaults will be set to zero, button rate set to 64x.

10-09-01 Version 3.07

- **RA Backlash setting**. Correct settings 6-9 for 400 and 600EGTO.
- **Solar Menu**. Stop now works when Solar Menu is displayed.

09-12-01 Version 3.06

- **Auto-start**. No entries are needed to start the hand controller. Calibration is automatic. Use this feature if your mount is permanent, polar-aligned and your telescope has not been moved since the previous observing session. Must have version "C" or above.
- **Auto-link.** The hand controller can be removed and re-attached to the servo box without need for recalibration. Version "C" or above is required.
- **Auto-park.** The telescope can be parked in any orientation.Simply remove the power and the mount will remember where it is. Version "C" or above is required.
- **Sync.** The telescope can be synchronized with any star in the star list, which now includes the major solar system objects. No need to go through the polar alignment routine if you are already polar-aligned. Version "C" or later needed.
- **Meridian swap delay.** The point where the scope swaps sides can be advanced or delayed from 1 to 6 hours (essentially from eastern to western horizon). This feature must be used carefully so that telescope does not strike the pier. Version "C" or above.
- **Recalibration.** Can be accessed in various menus by pressing the RA/DEC/REV button, as well as button #9 when you are in the Objects Menu.
- **Continuous update of current position.** Pressing the NEXT > button in the Objects Menu changes the readout into digital setting circles with continous display of RA and Dec positions. The RA and DEC co-ordinates update continuously as you slew with the N-S-E-W buttons.
- **Park.** The mount will go into standby mode after reading the park position. The RA tracking will stop.
- **Solar Menu.** The solar menu contains all planets, sun and moon on one menu. No scrolling to a second screen.

- **Daylight savings.** This setting is now on the Set Date & Time Menu. When you change one, you can change the other at the same time, if needed.
- **Park positions 1,2,3.** Added stop ability in this parking function to abort the request to park the telescope. If you stop, the Park Menu will appear on the display.
- **Object data.** Can be requested before moving to an object. Press the NEXT > button to see the object data (magnitude, constellation, object type).
- **Photographic timer.** You can now change the N-S-E-W button rate while the photographic timer is running. Press the +/- button and select rate from the display.
- **PEM (Permanent Error Memory).** Press the +/- button to change the N-S-E-W button rate while you are recording.
- **Button speed menu.** Use the +/- button to enter and exit. This button is active when N-S-E-W buttons are active. Also active when in PEM menu.
- **Status.** The Main Menu includes a Status button selection, which will, under normal circumstances, state "All Systems Go." Other error messages are possible including "Motor Stall" and "Low Battery". The error messages will display when there is a problem with the communication between the keypad and the mount. Version "C" or above required.
- **RA/Dec Position Memory.** A special feature that allows you to save the RA/Dec position of one object to memory, go to another object, then return to the original position.
- **Button Speed Menu.** Use +/- button to enter and exit from this menu.
- **Reticle setting.** Save at end of session and recall for new session.
- **Photographic timer.** Fixed countdown for time over one hour.
- **Solar menu.** Press GOTO to initiate slew, makes it consistent with other menus.
- **RA/Dec Rev button.** Exit by pressing RA/Dec Rev button.
- **PEM function.** Save on/off setting at end of session and recall for new session.
- **Atmospheric refraction calculation.** Improved the calculation.
- **Precession of catalog objects.** Improved the precession calculation.
- **Common Object Names Tour.** Added ability to scroll names more quickly.
- **RA/Dec entry screen.** Press GOTO to initiate slew, makes it consistent with other menus.
- **Stop function in RA/Dec entry screen.** Stop button now works when you initiate a slew from the RA/Dec entry screen.
- **Version numbers**. Added to Main Menu screen.

December 1999 version 2.6

- Fix park function which didn’t work properly if RA button had been reversed.

06-02-99 version 2.5

- Park functions work correctly in Southern Hemisphere.
- Improved declination backlash range for 400GTO.
- Prevent user from bypassing Startup routine in location selection and Cal. Menu screens. In previous versions, it was possible to press MENU and escape the Startup, however then the mount was not calibrated.
- If a user still manages to bypass the Startup routine at the Cal. Star selection screen by pressing MENU, the keypad will send the data for the reference park position (see the manual for discussion of this position).

01-30-99 version 2.4

- Revised park function to include Park 1, Park 2 and Park 3. When you select one of these park positions, the mount auto-slews to one of the following locations: Park 1 - the scope will be level and pointing north. Park 2 - the scope will be level and pointing east. Park 3 - the scope will point to the pole. You can use the Park 1 position (also called reference park) with a bubble level to polar align your telescope in the daytime or when you can’t see Polaris.

01-14-99 version 2.3

- N Polar Calibration routine changed. Previously, the user had to manually move the telescope to the next calibration star, and then the scope would slew back to Polaris. Now, the user moves the scope manually to the

first star, then all subsequent movements are automatically slewed with keypad controller. Each time you use the N-S-E-W buttons to center a star, then press Menu, you recalibrate.
- Two Star Calibration routine has been simplified. Probably easiest to compare instructions to see the differences. Now the user goes to a star and makes adjustments halfway with N-S-E-W buttons and the remaining half with the alt-az adjusters. When the user selects Menu to exit, the mount recalibrates and you can either go to another star or exit the program.

11-12-98

- Reword screen that comes up when push "+ -" button. Used to display, i.e. "guide speed: 64 x", now displays "button rate: 64x".

11-2-98 version 2.2

- Allow user to change button rate at five additional places in the program. Pushing "+-" button brings up screen that allows you to change button rate. Button rate can be changed when you are in these functions: "Pick star" screen in startup procedure, ‘cal star" screen in startup procedure, "objects menu" screen, screen that displays after you slew to an object, RA/Dec coordinates display that is accessed by next button after you slew to object. These are places that the user is likely to need this feature. The screen displays "guide speed: <rate> x", rates are from .25x through 1200x. Toggle through the selections using Prev< and Next> buttons.

9-15-98

- Corrected remainder of objects that have -00 latitude (these had +00)

8-25-98 version 2.1

- Fixed sign of declination number of Southern Hemisphere objects from + to -. Used to show + sign when displaying RA/Dec coordinates prior to go-to action.
- Will now go to objects between 0 and -1 latitude.
- Save position of common object names in Tours menu. When you go to a common object from this menu, then press Menu, the display will return to the screen that shows the last common object you viewed. If you go to other objects using other menus (Search, M, etc) then return to common names menu, the display will show the last common name object you viewed. Previously, it returned to the beginning of the common objects list each time.
- Save position of Stars/Constellation in Tours menu. When you go to a star in a chosen constellation, then press MENU, the display screen will return to the same constellation and screen as previous entry. Previously, it returned to the first screen of the constellation with the alpha star.
- Save position of Objects/Constellation in Tours menu. When you go to an object in a chosen constellation, then press MENU, the display screen will return to the same constellation and object screen as previous entry. Previously, it returned to the first screen of the constellation with the alpha star.

7-29-98

- Fixed planets menu, which used to skip #1 and begin w/# 2 (if you pressed 1 accidentally, you got gibberish). Now #1 works properly for first selection.

7-21-98

- Increased backlash compensation for 400 & 600E mounts

7-18-98

- Fix PEM (timer was not going off consistently)

7-16-98

- Add N-S-E-W button function to Cal. Menu when star choice data is displayed
- Prevent observer from using N-S-E-W directional buttons in Center Polaris screen
- Put Focus selection in #2 spot in Setup1 so that people don't accidentally change the backlash setting which was in #2 spot

7-15-98

- Removed Display Time/LST from Setup-2 menu
- Add RA Backlash to Setup-1 menu (new function)
- Moved Reticle adjustment to Setup-2

7-13-98

- Corrected lunar position calculation
- Change focus default setting to Low to correspond with *TheSky*Ô

After 6-22-98

- Fixed PEM and added timer
- Fix save of Dec backlash
- Complete safe zone with save
- Change set site location - took negatives out, added W-E and N-S (the minus zeros were a problem).
- Fixed ADS separations
- Removed "size" from object data since most objects are irregular and this data was not loaded
- Fixed RA/Dec entries involving minus 0
- Activate park function
- Added current position function to NEXT button at Objects Menu
- Reorganized and corrected search function
- Recalculated lunar position (later determined this was incorrect)

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