

## ACP and AstroPhysics GTO Mounts

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This note is being written to document how to setup ACP for use with an AstroPhysics GTO mount.

Prior to AP keypad version 4.x, mount initialization was always accomplished by the keypad on mount power up. Starting with keypad version 4.x, functionality has been added that allows an AP mount to be initialized via either the keypad or external software. The AP ASCOM driver has recently been updated (4.1.18 or later) to perform mount initialization. Initializing the mount with the ASCOM driver is the preferred method for use with ACP.

Background – AP mounts used standalone:

It is important to understand how AP mounts work in a standalone mode first before trying to control it with an external program such as ACP.

Simply stated, all the “smarts” in AP mounts are in the mount controller. The keypad does very little except store setup and object data. When the mount is first turned on (Autostart mode), the keypad sends setup information to the mount controller. This setup data consists of date/time, location, and the status of various parameters (PEM on/off, slew rates, backlash compensation, etc.). There are a number of ways outlined in the AP manual to get the mount controller synced with the sky. Once that is done, the mount will be able to point to virtually any object over the visible sky. Of course, this assumes good polar alignment and the OTA being orthogonal to the mount axis.

When the mount is turned off (it does not matter whether it is parked in an AP preset position or not) the mount controller remembers two things specifically: 1) where it was pointing when turned off, and 2) what date/time it was when turned off. When powered up again, the mount controller gets the setup data from the keypad, including the date/time. The controller then calculates the amount of time that has elapsed since it was turned off and figures out where it is pointing. This process is known as “initializing the mount.” Assuming the mount has not been moved at all physically since being shut down, the mount is automatically synced with the sky from this point on.

Not much can go wrong in this process with the exception of the fact that the keypad clock is not particularly accurate. If a long period of time has elapsed between using the mount (say 1 month), it is likely that the time could be off by a number of seconds – perhaps enough such that the target is not in the OTA’s FOV (although, it would almost certainly still be in the FOV of a finder scope). With a precise source of data for date/time (which we can do), pointing accuracy upon startup is virtually perfect.

## Adding ACP:

Since startup pointing accuracy is important to running ACP, it is very desirable to make sure the initialization time sent to the mount is as accurate as possible. This is easily accomplished by using the PC's clock, synced with one of the various internet time services and using external software to initialize the mount. The AP ASCOM driver can now accomplish this.

The first time setup process is:

- 1) Set keypad to EXT. This means the mount controller will get its setup data from an external program (AP ASCOM driver). Power down the mount
- 2) In ACP, Telescope, Setup, Properties, fill in all data in the driver. These values will be used for mount initialization. BE SURE THEY ARE CORRECT. Exit by pressing the OK buttons.
- 3) In ACP Preferences, Telescope, check both "need local topocentric coordinates" and "adjust coordinates for atmospheric refraction." Do not check "enable consistent approach slewing." The AP mount controller already has this functionality built in.
- 4) Using an appropriate time-setting tool, insure the PC clock time is as accurate as possible (I use "AboutTime").
- 5) Power on the mount. The keypad will say "External..." meaning it is waiting for the mount to be initialized by external software (the ASCOM driver in this case).
- 6) In ACP, Telescope, Connect. This initializes the mount. Further, all keypad setup data is updated by the mount controller with the initialization data. (Note, this is the only way to keep the keypad data in sync with the data in the ASCOM driver – other than by doing it manually.)
- 7) In ACP Preferences, Observatory, since we know for sure that the data in the mount controller is correct, get the location data from the mount.

Once this is done for the first time, you only need do steps 4, 5, and 6 for subsequent observing sessions.

Regarding step #7, it is important to understand that whatever program sends data to the mount last, controls what data is in the mount controller. So, if the ASCOM driver has one location in it and ACP has another, the location in ACP is ultimately the one that will be used by the mount. Therefore, it is important to be very aware of what data third party software might be sending the mount. Guide and/or slew rates are good examples of data that can get sent by planetarium programs, altering what the ASCOM driver initially sent and causing confusing results.