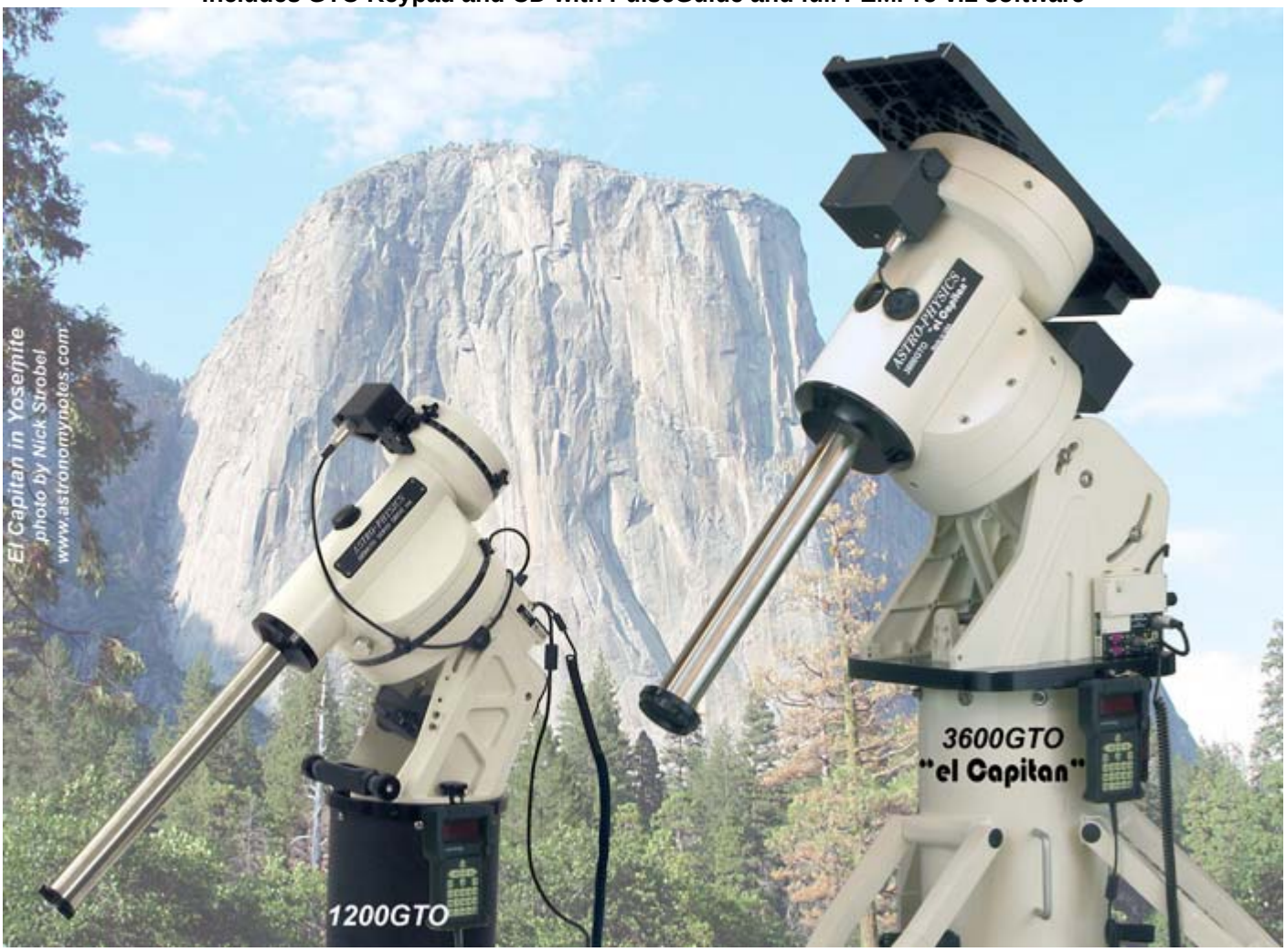
ASTRO-PHYSICS
3600GTO German Equatorial Mount (3600GTO)
" el Capitan "
with GTOCP3 Control Box

Includes GTO Keypad and CD with PulseGuide and full PEMPro v.2 software



Literally, the BIGGEST New Introduction for 2007!

Solid as a rock! A really BIG rock! This is the ultimate solution for imaging with large instruments or with setups that employ multiple instruments with a combined weight that would be excessive for smaller mountings. Please note: Although you might be tempted, Astro-Physics does not recommend rapelling off the side of this mount!

Some reasons to consider an AP3600 "el Capitan" mounting for your next large scope:

Originally designed to carry a large telescope in Antarctica for planetary research - the 3600GTO mount had to be reliable in the most severe environment on the planet and function flawlessly 24 hours per day for the entire polar night lasting 6 months. Once the mount is installed and the polar night begins, no maintainance can be done to the mount due to the extreme low temperatures and dangerous wind conditions that prevent technicians from working outdoors.

Our smaller mounts have proven themselves in these frigid Antarctic conditions over the past 3 years. We have had a number of 900GTO and 1200GTO mounts running continuously at Dome C in Antarctica, and they have shown themselves to be winners. In fact, they are some of the few things that actually work under those conditions, where the temperature is so cold that optics shatter and paint falls off tube assemblies like skin shed from a molting snake. The same design philosophy that has overcome these harsh conditions has made the 3600GTO the finest large mounting available.

Our 3600GTO mount was designed to be:

- Large, robust, rugged, simple modular design, easy to fix if something should go wrong
- The design has the same DNA as our smaller mountings, uses time-proven components that have withstood the test of time under all conditions, even in temperatures as cold as -70C.
- Extremely smooth and accurate dual servomotor-worm gear drive, designed for all astro-imaging situations
- Machining craftsmanship and beautiful mechanical design second to none
- Ability to carry very large and heavy scopes comfortably
- Will have many options for enhancing the operation and accuracy of the mount for remote imaging
- On-going development of the software and hardware will always be available to upgrade older mountings to bring them up-to-date
- Simple mechanics make adjustment easy and accurate
- Feature loaded software is intuitive and powerful
- Intensive support via direct communication with our technicians - we have never failed to fix a problem, and will always help someone get the most out of their mount
- Over 30 years of experience in making precision equipment for the amateur and professional astrophotographer

The 3600GTO uses the tried and true Astro-Physics GoTo electronics.

- Lead-free Electronics. The 3600GTO's electronics and components are totally lead-free for all customers. This includes wiring for the motor harness, the GTOCP3 Control box, Keypad and all cables. All functions of the lead-free GTOCP3 control box are the same as the original version.
- GTOCP3 Servo Motor Control Box. This control box has increased protection on all input lines, larger memory chip, and additional commands for mount control.
- GTO Keypad. Our unique keypad has evolved over the years to include a new circuit board with larger memory capacity, LED fiber optic backlit panel for greater longevity and quieter operation and epoxy coated elastomeric keys. We include the Keypad Protector with all keypads.

Flexibility

Transportable
Extremely solid, rugged, high payload mount, yet the equatorial head comes apart in two components for transport and field setup. Because of this mount's size and weight, we recommend that field assembly be done by two people working together. The RA axis and base assembly alone weighs just over 120 lbs. You wouldn't want to transport it as your regular mode of operation, but it can certainly be done for special occasions.

Portable Pier available.
As shown in the photo at right, our friends at ATS (Advanced Telescope Systems) have developed a portable pier for use with this large mount. The pier is extremely rigid, and folds up for transport.

Operate with 12V battery.
You can take it to the darkest skies and power it with a commonly available heavy-duty, deep-cycle marine 12V battery. In the observatory, we suggest a minimum 10 amp filtered, regulated power supply like our 15V, 10 amp power supply (PS15V10AC).

Image past the meridian.
The mount will track and guide well past the meridian in either direction if the object is located such that the telescope will clear the pier. This allows the user to set up the mount for a long series of exposures without stopping in the middle to flip sides. One can start the telescope under the mount while pointing at an object in the eastern part of the sky and track it all the way deep into the western sky. This is very useful for long exposure H-alpha or in cases where a large number of individual exposures are needed for stacking.

> *. . . I love the ability to place the OTA on the "wrong side" of the mount when starting an imaging session ("premature meridian flip") and which I have used extensively. This feature is pure INGENUITY! Anthony Ayiomamitis., (commenting on his 1200GTO that uses the same control system. All A-P mounts have this feature!)*

The full 360 degree rotation of both of the 3600GTO's axes also allows this mounting to be placed onto an astrographic pier for complete freedom from movement restrictions.

Easy alignment for non-critical viewing.
Can align with a polar alignment scope to quickly zero in on the pole for most non-critical observing or to get close before tweaking in for CCD. Our built-in software routine allows polar alignment in the daytime for solar observing, viewing planets at twilight, and drift alignment on bright stars before nightfall.

Components are modular.
All electronics including the GTOCP3 control box, motors, gearbox or cables can be removed for servicing. The RA and Dec axes can be shipped separately, if needed. The mechanical design of the mount is extremely simple and straightforward, allowing easy adjustment by anyone - no need to have a mechanical engineering degree to service the mount.

Through-the-mount cabling capability.
We designed this mount to allow cabling to be run through the axes shafts for tangle and clutter free operation. Cables from cameras, guiders, dew heaters and the mount's own servo drive cables can all be run through the mount's cavernous 4" shafts where they are out of the way and where they won't ever get caught or tangled during your imaging session. Ports have been included for the mount's servo cables. Custom cabling will be available for a variety of accessories.

Massive and sturdy telescope mounting platform.
The telescope attachment system of the 3600GTO was custom designed for strength, rigidity and flexibility. A special dovetail system was engineered for the mounting that allows for accurate balancing with a huge variety of instrument configurations. The dovetail plate's four clamps will grip the largest instrument solidly. Safety slots coupled with the sliding bar's safety stop will help keep accidents from happening. The dovetail system can be set up for tip-in or slide-in of the dovetail sliding bar. For permanent installations, a series of matching through-holes in the dovetail and sliding bar allow the setup to be bolted into its final position once adequate balance is achieved. This system provides the convenience of a dovetail with the security of a fixed mounting plate. As an added feature, the dovetail plate offers a cabling port on the eyepiece end for taking advantage of the large cable path that goes through the mount.

External computer not needed.
The keypad is a handheld computer with all of the features, functions and databases you need to tour the universe night after night. The vacuum-fluorescent display with a temperature range of -40 degrees F (and C, they are the same in this instance), allows hardy observers to use this mount on cold winter nights.

Free Keypad Firmware Updates
As new firmware versions are released in the future, you can upgrade your keypad directly from the download section of our website - free of charge!

Remote Control with personal computer, if desired.
All functions of the servo drive can be commanded from a laptop or desktop computer using PulseGuide or popular planetarium

software. Depending on the features of the program, you can position your telescope, center your image and control tracking rate, remote focusing, reticle brightness and park at the end of your observing session. The GTOCP3 control box provides two RS-232 inputs so that you can operate the mount with two programs simultaneously. For instance, you can control most mount functions with PulseGuide, which takes full advantage of our firmware protocol, and use TheSky as your planetarium program. If your computer does not have serial port inputs, there are many USB to serial port adapters available on the market. Examples of currently available software:

- **PulseGuide** by Ray Gralak (included with the 3600GTO) *Note:* a new, more robust remote control software is currently under development
- **Software Bisque's** suite which includes TheSky Astronomy Software, CCDSoft CCD Astronomy Software, TPoint Telescope Pointing Analysis Software and Orchestrate Scripting Software.
- **Starry Night Pro** by Imaginova
- **Earth Centered Universe (ECU)** by David Lane of Nova Astronomics
- **SkyMap Pro** by Chris Marriot
- **ACP Observatory Control Software** by DC-3 Dreams - Robert B Denney
- Any software that is **ASCOM** compliant.

Write your own computer program.
The Astro-Physics GTO protocol for the GTOCP3 Control Box is freely available to those who would like to write their own computer program for controlling the mount.

Precise Mechanical Fabrication.

Highly accurate mechanics.
Using modern CNC machining techniques, we make all components to a high precision level, which results in a final package that is solid and accurate in all respects. The critical angles are accurately machined so that the mount is orthogonal to a very high degree. This results in pointing accuracies well below 1 arc minute for a properly aligned mount.

Our machinists are among the most skilled available anywhere, and the pride they take in their work should be an example to all who work in manufacuring. Our mount assembly is directed by a life-long astronomer with 20 years of experience here at Astro-Physics!

Worm gear accuracy.
Critical worm gear accuracy is maintained by special machining techniques developed at Astro-Physics after extensive studies, actual field operation and many years of experience making precision mounts. Our worm accuracies are second to none and are guaranteed to be 5 arc seconds or less, peak-to-peak. The periodic error of each mount is verified during our extensive testing procedures. We optimize performance further by characterizing the error using a special version of PEMProAP and downloading the appropriate correction into the mount's GTOCP3 before it leaves Astro-Physics. With good alignment and PEM training with the Keypad or PEMPro, it is quite practical now to achieve unguided CCD images with today's hi-resolution cameras coupled to a large telescope.

Easy to Adjust and Maintain.
The design of the 3600GTO is straightforward with modular construction and no complicated internal wiring. We will provide information in the Technical Support section of our website pertaining to typical adjustment issues. If the electronics ever need servicing, the GTOCP3 control box can be easily removed and returned.

Polar alignment is extremely precise due to the heavy-duty adjusters for both altitude and azimuth. The system locks down with zero alignment shift for an unprecedented ability to achieve that "perfect dead on" polar alignment that is so critical to the best imaging and the most accurate goto's.

Mechanical Features

- All machined mounting made from aluminum bar stock and stainless steel. All fasteners are stainless steel.
- Motors and all electronic components are enclosed.
- Polar and declination axes come apart with relative ease for manageable transport.
- Fine altitude and azimuth adjustments for quickly and accurately zeroing in on the pole in the field.
- Base fits into 12 " diameter pier with 0.25" wall thickness.

Specifications of Equatorial Head

Worm Wheels	Aluminum - 13" (330mm), 256 tooth
Worm Gears	Brass - 1.41" (35.8 mm) diameter
Axis Shafts	4.72" (120mm) diameter with 4.02" (102mm) clear inside diameter
Axis Bearings	7.09 " (180mm) diameter deep groove ball bearings
Worm gear bearings	1.57" (40mm) angular contact ball bearings
Latitude range	15 to 70 degrees
Azimuth adjustment	Approximately 14 degrees (+/- 7 deg.)
Motors	Swiss DC servo controlled - 2 motors per axis
Capacity	Approximately 250 lb. (113kg) scope and accessories, depending on length.
Weight	Equatorial head (without counterweight shaft or counterweights): 205 lbs. (93 kg), Dec axis is 84 lbs. (38kg), RA axis and base assembly is 121 lbs. (55kg) Counterweight shaft (estimated): 30 lbs. (14kg)
Optional Saddle Plate	12.9" x 22" (328 x 559mm), 15 lbs. (7kg) dovetail receiver with four integrated clamps, safety slots and bolt-through locking feature. Optional auxilliary control panel available.
Optional Dovetail Sliding Plate	9.9" x 22" (251 x 559mm), 9 lbs. (4kg) with universal hole patterns and safety stops.

Servo Motor Drive

The drive system uses ***TWO*** high-quality Swiss DC servo motors for each axis controlled by a microprocessor to an accuracy of 0.05 arc seconds per step. Tracking is very smooth, noticeably smoother than any stepper motor drive or inexpensive servo drive. The dual motor system smooths out the drives even further by applying an averaged power curve to the drive system. In preliminary testing this has resulted in PE curves that are noticably smoother than the already phenominal curves on our 1200GTO mounts. The system can be accurately controlled over a speed range of 4800:1 which allows 0.25x sidereal for guiding to roughly 720x sidereal for 3 degrees per second maximum slew rate. The circuit draws well under an amp when tracking the stars, 3 to 5 amps with both axes slewing and requires only 12 volts to operate (15 volts is recommended). This servo drive will satisfy the requirements of the sophisticated, advanced astrophotographer, yet is easy for the casual, visual observer to use. Please refer to GTOCP3 Control Box and Keypad for Servo Drive for additional information.

Support

All Astro-Physics mounts are supported by a dedicated staff who will assist with any issues that may arise. You can talk to a real person in a timely manner. Astro-Physics staff also participate the ap-gto user groups in the Yahoogroups forum. The user group is comprised of GTO owners who are willing to share their wealth of experience using their mounts as well as imaging strategies and other concerns of advanced amateurs.

Integrated Pier Adapter

The pier adapter for the 3600GTO has been integrated into the mount's design and incorporates the design principles of the Precision Adjust Rotating Pier Adapters and in an innovative twist, puts the Super Heavy Duty Azimuth Adjuster UNDER the BACK of the mount where it is both conveniently located for fine polar alignment and remains out of the way. Polar alignment is smooth and easy, and the system locks down tight with no unintended movement.

PulseGuide™ Software

Please note: *Ray Gralak, the author of PulseGuide, is currently working on a new piece of software that will combine the Astro-Physics ASCOM driver, all the features of PulseGuide, and additional features including a powerful planetarium. The new software will have a new name befitting its vastly increased capabilities, and will replace PulseGuide when it becomes available. In the mean time, here's the lowdown on the existing PulseGuide software:*

PulseGuide is a stand-alone Windows (98, ME, 2000, NT4, XP and Vista) utility that provides complete remote control of Astro-Physics 400GTO, 600EGTO, 900GTO, 1200GTO and 3600GTO mounts. It derives its name from its most distinctive feature, pulse guiding, which can improve unguided tracking. Specifically, it can help correct tracking errors caused by polar misalignment and atmospheric refraction. You can also train PulseGuide to track objects moving relative to the stars, such as asteroids, comets, and the moon. In addition to pulse guiding, PulseGuide also has many useful utility features. With just a few exceptions, it supports the entire serial Astro-Physics command protocol.

PEMPro v. 2.0 Software - FULL Version!

PEMPro (Periodic Error Management Professional) is a Windows software application developed by Ray Gralak that makes it easy to characterize and reduce periodic error. While the periodic error of your 3600GTO will be 5 arc seconds or less, you can reduce it even further to maximize performance without auto-guiding. PEMPro v. 2.0 is the latest version of PEMPro and includes exciting new features like the "Polar Alignment Wizard" to quickly, accurately and easily dial in your polar alignment. The software will be included with all new 3600GTO mounts.

Recommended Accessories

- **15V 10-amp (PS15V10AC)** Regulated Power Supply with Cigarette Adapter
- **Santa Barbara Instrument Group** All CCD Star Tracker/Imaging Systems
- **Advanced Telescope Systems (ATS) Portable Piers**
- **Stainless Steel Counterweights** - Weight sizes to be determined for new 2.5" diameter shaft - tentatively 25 lbs. each
- **Polar Alignment Scope (PASILL4)**
- **Mounting Rings**

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