

Deep Space Products Mount Enhancements

Tricking Out a German Equatorial Mount

By Austin Grant

When you decide to step into the arena of astrophotography, one concept is very clear: the performance of the mount is critical. Beyond that, everything else is a conglomeration of conventional “wisdom” and quasi-relevant anecdotes. Jump in blindly, and you’re very likely to be disappointed with the outcome. Conversely, reading too much will lead you to the obvious conclusion that only a \$20,000 mount will do what you need. For the average backyard astronomer, jumping in blindly is the closer of those two alternatives that we’re likely to see.

My own journey began with a humble CG5-ASGT. After describing my optics, guiding and imaging gear, I was all but assured by the imaging crowd that I was destined for failure. “Too much weight!” they cried. “Too erratic periodic error!” they screamed! “Get a bigger mount!” they begged. But then there were the supporters, quietly offering advice from the background. They didn’t chime in nearly as much, as if they were too busy outside actually using their gear.

I’d be lying to you if I didn’t acknowledge that they, all of them, were right. I got great results, but it came at a cost. I spent a great deal of time tweaking my imaging rig. Polar alignment had to be nearly perfect.



Image 1 – The Trifid Nebula, composed of 25 x 90-second subs at ISO 1600, calibrated with darks, flats and dark flats. Captured with BackyardEOS, shot with a HyperCams-modified full-spectrum Canon T2i with an Astronomik L Clip-In filter, an 8-inch f/4 Newtonian and the HyperTuned Atlas. Stacked and processed in Images Plus 5.0.

Balance had to be spot-on. Autoguiding was hit or miss. Some nights it was brilliant, while others it was just a lost cause.

I spent hours and hours getting things right, only to tear it down before morning. If you ask me today, I’ll still tell you that the CG5 was and is a fantastic mount. I’ve still got mine, and I credit it with getting me im-

mediate success at a fraction of the cost of other mounts. It also helped me hone my skills in drift alignment, balance, and cursing. It’s not that this mount wasn’t great, just that something was missing.

For me, those missing components were consistency, usability and connectivity. Don’t get me wrong, the CG5 performed



Image 2 – M33, composed of 54 x 300-second subs at ISO 800, calibrated with darks, flats and dark flats. Captured with BackyardEOS, shot with a Canon 60Da, an 8-inch f/4 Newtonian and the HyperTuned Atlas. Stacked and processed in Images Plus 5.0.

admirably, but I was never confident that I could just start an imaging session and walk away. In fact, it's become something of a

joke at our local astronomy club that an imager will, at any time, just walk off mid-conversation while mumbling something to the

effect of “let me go check mine.” I wanted to know that my gear would work as intended, unattended.

This notion really started to grow on me once I purchased and installed my own SkyShed POD. The ability to open the clamshell and be imaging in minutes was real, but not with the constant, obligatory tweaking to all components of my imaging system. I needed immediate usability, something that I could quickly startup and be running. This meant that I needed more capacity headroom, smoother periodic error, and trouble-free autoguiding. Finally, I wanted more connectivity. I wanted the ability to connect and easily run every component from my PC.

As I researched my options, I kept being drawn back to the Atlas-class of mounts. Call it what you want, but I'm generally talking about a mount in the neighborhood of \$1500-dollars with around a 40-lb payload capacity. One of these mounts, I thought, would surely be the solution I was searching for. I ended up not

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only purchasing an Atlas-class mount, but an actual Atlas. I picked up an older used one, and was ready to wave goodbye to my imaging problems. And I did wave goodbye to some of them, but it just happened to be at the same time that I waved hello to more of the same.

Don't get me wrong, the mount was in almost every way superior to the smaller, less-expensive CG5. Unfortunately, after years of use, it exhibited many of the same issues, only to a lesser degree. My problems were not entirely solved.

Back to the drawing board, I quickly came across a website called Deep Space Products. Research showed that it, and the owner Ed Thomas, were highly recommended among the imaging community. With that knowledge, I called Ed to discuss my new, same-old issues. As we spoke, it was like he had received a copy of my list beforehand. On that list, I had: (1) both axes a bit stiff making it hard to balance payload, (2) stiffen the tripod, (3) autoguiding consistency, (4) no Losmandy-style dovetail, (4) improve altitude adjustment, and (5) reduce backlash. As I read the list, I wondered at the care my used Atlas had received from previous owners. Ed reassured me that there were solutions to each issue on my list.

Before we tear into how Deep Space Products saved my sanity, let me fill you in on how Ed got started in this business. In 2007, Deep Space Products opened shop as a small, family-owned business. Ed began building cooling solutions for the Meade DSI line of cameras and quickly saw success in modifying and improving existing astronomy products. In 2009, Deep Space Products acquired rights to the popular HyperTune products and service, which is focused on getting German equatorial mounts (GEMs) to reach their peak performance abilities. From there, Ed decided to address all aspects of these mounts, and Deep Space Products now carries various products lines that will address any issues that a HyperTune doesn't cover. It truly is a one-stop shop for completely overhauling a mount.

When it was time to make some deci-



Image 3 – All mounts that receive the HyperTune service earn this distinctive plate.

sions on my mount, I had some questions before sending it off. One of the first issues I wanted to address was the tracking and guiding. My periodic error, right at 17-arcseconds peak to peak, was actually pretty

fantastic for this class of mount. The problem is that it wasn't smooth and, therefore, not easily guided out. After years of use, the mount also had backlash issues, so any change in direction could potentially wreck

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Image 4 –DSP's Latitude Adjustment Upgrade installs three large thumb bolts that firmly lock a pressure plate at the latitude hub.

havoc. Ed assured me that, while it likely wouldn't do much for my already-low periodic error, a HyperTune would certainly tame my guiding and backlash issues.

We also discussed the stiff axes, and the resulting difficulty in balancing the mount. To give you an idea of how stiff the axes had become, when the mount was loaded, I could move 22 pounds of counterweights over 3-inches before seeing any rotation. This didn't instill confidence in my balance and couldn't have been good for the stepper motors. No problem, Ed said, as the HyperTune service is geared directly at countering these issues. With no more questions, I shipped my mount to Arizona for the HyperTune treatment.

It's not hard to describe exactly what a Standard HyperTune is and does, because the Deep Space Products website has a list of what takes place. Though it's impossible to describe the finesse that Ed has for reworking these mounts, I'll try to describe the procedure. (1) Complete inspection and dismantling of the equatorial head. (2) In-

spection and cleaning of each telescope mount part – removal of all metal burrs, shavings, thick grease and foreign objects. (3) High-resolution sanding and polishing of moving internal parts, resulting in a mirror-like finish and a “glide like” performance from the mount. (4) Inspection and adjustment of motors and encoders. (5) Reassembly using high-grade synthetic grease. (6) Resetting the worm gear meshing and adjusting backlash in both RA and DEC.

As if that weren't enough, there are several options available to improve mount performance beyond a Standard HyperTune. Customers can have Ed replace stock worm gear bearings with ceramic hybrid ball bearings, add a latitude adjustment upgrade, and even have Aeroquest High Precision gears installed. I chose to go with the ceramic bearing and latitude adjustment upgrades. Ed informed me that it would be around a 2-week turnaround for my mount, and that was just enough time for me to pull the trigger on some other upgrades that Deep Space Products is offering.

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Ed had addressed many of my concerns with the HyperTune, but there were still other issues that needed to be addressed. First, I added an ADM dual-saddle upgrade to my cart. My Atlas came stock with a 2-bolt Vixen-style saddle, which marred my dovetails and left me no option for using the more-sturdy Losmandy-style rails. The dual-saddle will carry either, and won't damage them in the process. Anthony Davoli, the owner and driving force of ADM accessories (www.admaccessories.com), has a solution for nearly any mounting configuration you can imagine. In fact, if he doesn't currently offer what you need, an email can probably make it happen. His products are second to none, and Deep Space Products offers the full ADM lineup.

With the saddle issue resolved, the only box left on my checklist involved that tripod. Now, don't get me wrong, the Atlas has a neat little tripod. In fact, I'd become very familiar with it while using my CG5, as they are essentially identical. What I'd hoped for in upgrading mounts was to also be upgrading tripods. The sturdier the better, right? Enter Telescope Performance Improvements (www.tpiastro.com), hereafter TPI.

TPI is the product of Dave Yates and Gary Bennett, self-described "consummate tinkerers," who set out to improve upon what comes from the factory. Gee, why would Ed team up with these guys? Dave is the mechanical genius behind TPI products, being an expert AutoCAD designer and machinist extraordinaire. Gary is the Product Development guy, brilliant at evaluating mount issues and conjuring up solutions. Oh, and both of them have day jobs, describing TPI as mostly a labor of love.

They got started by making improvements to the fork-mounts with which they were imaging. This evolved into several very helpful and well-read DIY projects, and it wasn't long before they moved on to GEMs. At this point, they have so many projects either in production or on the horizon, it won't be long before they get



Image 5 – The ADM Dual Saddle upgrade allows use of either Vixen-style and Losmandy-format dovetail rails without marring the finish on either.

a standalone article.

With TPI up and running, the much shared tripod for the Atlas(EQ6)/CGEM/CG5 was a perfect candidate for

improvement. While most tripods have a lower spreader to prevent the legs from collapsing outwards, these tripods feature a "hard stop" at the leg hinge point. As a re-









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Image 6 – TPI’s unique spreader/tray assembly ensures absolute rigidity of the tripod by creating four large tensioned triangles. The tray is sturdy enough to support a full-sized field battery and is beautifully machined and finished.

sult, a spreader isn’t required to stop the legs from collapsing, but it can be used to exploit that “hard stop.” What the TPI

spreader does is force the legs to spread to the point where the steel legs actually bow out. When you step on the center puck of

the spreader, it forces the legs to spread. By doing that, the hinge point at the top of the leg has so much pressure on it that it cannot budge, thus eliminating the typical tripod “wobble.” I ordered this spreader, and the optional heavy-duty battery tray.

While browsing the TPI products, I came across something that was too cool to pass up. They offer a set of tripod leg levelers. These offered a solution to a problem I’d experienced with the CG5 and Atlas, but had forgotten to mention to Ed. Leveling a stock tripod just doesn’t work well. Even for imaging, with the tripod in its lowest position, the procedure for leveling it is a chore at best. What’s most annoying is the game where you loosen one tripod leg, take the full weight of the mount as you raise the setup to lengthen the leg, then set it down to check the level. To “win” this game, you have to be able to level the mount in three tries or less. I’ve never won, and either way, when you have to pick up your entire assembled mount, everybody loses. The TPI tripod levelers, milled from solid aluminum with solid pads and easy to grip knobs, would surely remedy this chore. I put a set in the cart and eagerly anticipated this completely overhauled mount to arrive.

About two weeks after sending my mount to Ed in Arizona, several boxes were delivered to my door. Not only was this a joyous day, but the weather was perfect and it was going to be a clear night. I opened the boxes, and was completely blown away by the quality of the aftermarket parts. Every single detail of both the TPI and ADM parts was simply beautiful. If there was ever an example of fine craftsmanship, each of these components would be it. The fit and finish was simply marvelous.

With the delusion that I could actually have these parts assembled and ready for testing on the day of delivery, I began putting everything together. To my surprise, assembling the TPI products and installing the ADM saddle only took a couple of hours. The hardest part of the entire operation was removing the original tripod feet. No worries, applying heat did the trick, and,

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before you know it, the accessories were installed.

Snapping the tripod spreader into place resulted in a rewarding “click” that indicated there was certainly some tension on this bad boy. It is without a doubt significantly more stable than before, and I’d bet it would give a pier a run for its money. The battery tray is perfect for use in the field, or as an extra place to store accessories. It supports my deep-cycle marine battery with ease, but currently plays a perfect role of organizing my camera gear, focusing mask, and eyepieces. The levelers were immediately appreciated, and I’ll never have to lift the entire assembly again. The ADM saddle just plain worked, without tearing up my dovetails or leaving me wondering if everything was snug.

The only thing left to evaluate was the HyperTune. A cool and unexpected feature was the Inspection/Service Checklist that was returned with my mount. It reminds me of a doctor’s charting, and it’s just as thorough. It details stiffness and signs of use before the HyperTune, as well as any other noticeable peculiarities of the mount. Then, it details all inspections and upgrades. After reading over that, I checked out the latitude adjustment upgrade. This mod installs three knobs that hold a pressure plate where the latitude adjustment is made. It allows you to remove the locking bolt at the front of the mount, and simply make adjustments with the rear bolt. When alignment is perfect, you snug the three knobs. No more throwing off alignment as you try to tighten everything down. What a great idea!

Next, I installed my imaging gear and counterweights, and tried to balance the mount. Here, for the first time, is where I came to appreciate just what had been done inside this mount. Both axes were able to spin with the greatest of ease. I was able to easily see a balance change with only a quarter of an inch of counterweight movement, where before it took over 3-inches. Unbelievable! And the best part is that it set the tone for all my subsequent evaluations.

While Ed was correct and my periodic

error didn’t drop, it did smooth out. I was able to effortlessly autoguide in any part of the sky, for any length of time. Backlash was also controlled, and by that I mean virtually nonexistent. I just can’t believe that this is the same mount. I’m finally able to set an imaging run and just let it go. For the first time in years, I’m able to do some visual observing with my Dob as the images roll in.


I’ve always heard the phrase “If it ain’t broke, don’t fix it.” In this case, that’s the worst advice you will ever get. I honestly believe that every mount in this class, as well as many costing thousands more, will benefit from a HyperTune. Ed believes it too, so much so that he offers a HyperTune Do-It-Yourself Kit for those reluctant to send off their mounts. If you are at all handy, you should have no problem competently handling a HyperTune. In fact, I know you can do it because I’ve done it. I had Ed send a HyperTune Kit so that I could see for myself exactly what this overhaul entails.

The Standard kit includes a complete bearing set, appropriate hex wrenches and screwdrivers, sandpapers, polishing compound, thread locker, cleaning brush, razor, lubricant, electronic versions of photos and a step-by-step DVD of the process. We used the kit on a local club member’s mount, another Atlas, and, as with my mount, the results were night and day. I won’t say it’s as smooth as mine, because Ed is the master, but it’s silky smooth compared to before.

The bottom line is that Deep Space Products will improve your astro-imaging experience. The HyperTune service, either



Image 5 – TPI tripod leg levelers allow fine adjustment of tripod level without having to lift a leg to extend it. Once fine adjustment is completed, the levelers lock rigidly.

full or DIY, will get you rounder stars. The aftermarket products offered will make your mount more stable and more usable. What’s even better is that no matter what, Ed will be there for support. Whether you have questions before sending a mount for service, or after you’ve started a DIY HyperTune, Ed is easy to contact and will make sure that you get things figured out. If you have a consumer-grade mount, or even one a bit more specialized, the only way you will go wrong is if you don’t have it HyperTuned and given the Deep Space Products treatment. 

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