StarGPS – add GPS to your Telescope

By Bob Pasken

Introduction

I have been an amateur astronomer for almost forty years. Over the forty year period, I have ground several mirrors and purchased several commercially built scopes ranging in size from a Orion 60mm refractor to a 10” Meade LX-6. I am a research meteorologist and my work has carried me around the world at times for extended periods. Early in my career, I purchased an Optical Technique Quantum-4 (Q4), which traveled with me around the world to the field experiments that are an essential part of my work. As the Q4 became more of an antique with value more than just as a scope, I became loath to trust the Q4 to the vagrancies of checked bagged on an airline and bought the ETX-90EC to carry with me on my travels. The ETX-90EC had the added benefit of having GOTO capability and a large database of objects in both hemispheres so that I could search the heavens without carrying all of my books and star charts. The ETX-90EC has also become my grab-and-go scope during the hectic academic year. I leave the scope setup and simply carry it out on the deck and turn it on

When the StarGPS unit was announced I was interested in the StarGPS because it automatically set the Autostar with the correct time and location without my intervention. I could simply turn on the scope and while setting up my observing table and chair the StarGPS unit would take care of setting the time and location. Although the GPS function would not be major advantage at home where the time and location are accurately known, it would be a big plus when I was in a field. I was eager to test the StarGPS unit to see if it helped with the initial setup and if it could improve the accuracy of an already accurate GOTO.

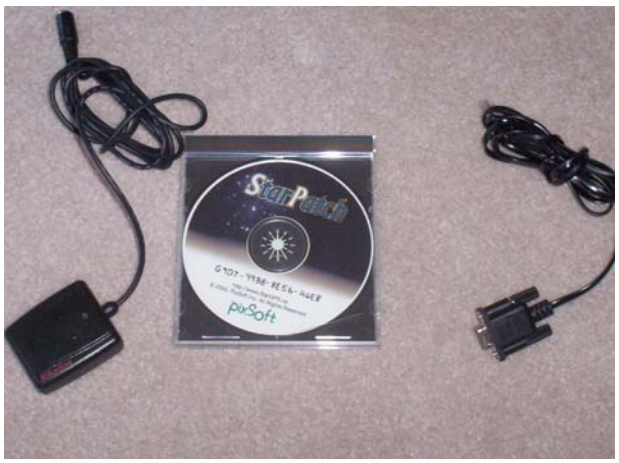

Figure 1
Contents of the StarGPS package

Package Description

The StarGPS package is designed for Meade telescopes equipped with either the Autostar 495/497 series or the AutostarII and provides GPS time and location information. A shown in Figure 1 the StarGPS package consists of three parts, a small Rikaline GPS unit, the software and the necessary cables needed to load and use the software needed to make StarGPS work. Chris Conner, with help of Dick Seymour (the Autostar expert!), developed a GPS Setup software patch for both Autostar versions, which allows Autostars to interpret GPS NMEA 2.0+ data and use this data to set the date, time, latitude and longitude.

In addition, Dick helped dream up the idea of a newer Windows program called StarPatch that allows the GPS setup patch needed by the StarGPS package and Dicks' Autostar and Autostar II patches to be added in a simpler and much faster manner than Meade Autostar Update (ASU) program. StarPatch provides a number of enhanced features over ASU. StarPatch adds 495/497 GPS Setup capability, Fast 495/497, automatic verification of download, reuse of unchanged data from previous updates, easy selection and use of available patches, an "Update Autostar" button to simplify updates, "Get Updates" retrieves the latest software, and it works with Autostar II (excluding features 1, 2 and 3). The StarPatch CD-ROM includes a registration key that enables all the program features and allows the GPS Setup patch to be installed onto one Autostar 495/497 Handset. This patch allows you to connect a GPS receiver to the Autostar so the date, time, latitude and longitude can be automatically set. Unlike the LX200gps, it cannot north align and level the tripod. StarPatch does not entirely replace ASU. ASU must still be used to move Library Objects to and from the Handset (e.g. satellites, comets and tours). You can purchase a complete package with a small GPS receiver, cable to connect it to the scope, CD to update the Autostar. According the PixSoft website you can use a Garmin GPS receiver if you already own. In this case, you get the CD and two cables, one to connect your computer to your Autostar to update the Autostar and one cable to connect your GPS receiver to the Autostar.

Installation

Setting up StarGPS was simple. I inserted the StarPatch CD and let it run. Once StarPatch is installed on your computer, you can click on Help>User Manual. Read the steps for installation, print them if you need to, and then install the GPS patch to the ETX. As I noted earlier, StarPatch works just like Meade's ASU. The GPS patch is one of a number of patches to the Autostar you can download. All of Dick Seymour's current patches are included on the CD among them a patch to allow the Autostar 497 to drive a Meade 4504. The CD box will have a label attached with a registration code. If you do not register StarPatch at the point indicated in the setup instructions the Autostar will not make use of the GPS data and the download of patches will suddenly slow down about half way through the download.

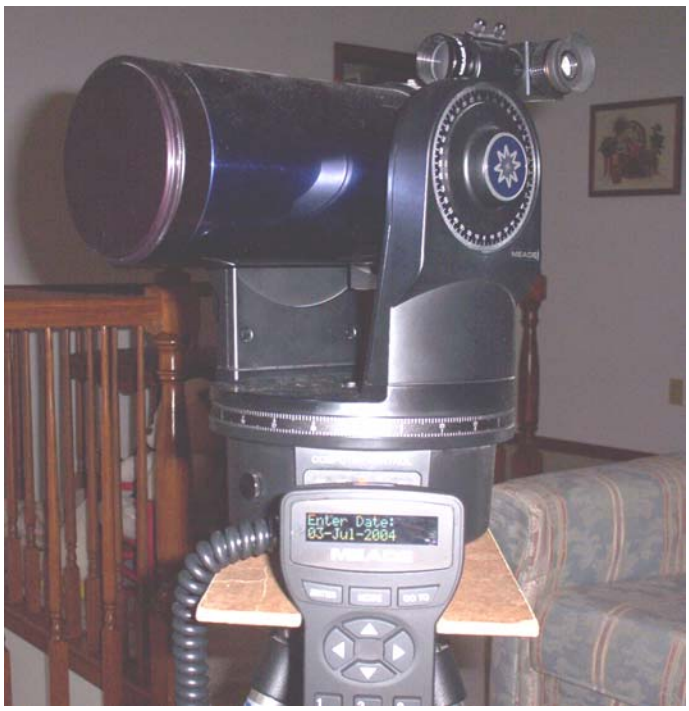

Figure 2
The ETX-90EC before the installation of the StarGPS package

Figure 2 shows my ETX-90EC in its normal configuration for travel. I use a Manfrotto photo tripod with a small wood plate bolted to the top. The wood plate has holes for eyepieces and a notch to hold the hand paddle. The tripod and scope combination fit into a small bag that I use for travel. Installing the StarGPS package was simple. The first step is to thread the Autostar to GPS cable through the center of the hand paddle cord. This solves a cable management problem with having too many cords that are liable to be tangled when the scope is in use. A second cable is supplied that is used for downloads and to control the scope from a computer. Figure 3 shows how little changes after you

install the StarGPS package. Note the Autostar is displaying the GPS search message. This is the only way you can tell that an Autostar has the StarGPS patch.

Having downloaded the latest version of the Autostar 497 code and the StarGPS patch, connected the cable between the GPS receiver and the scope, and turned on the scope. The scope came to life, beeped, the Autostar flashed "Checking for GPS." The time, latitude and longitude appeared on the Autostar and after few seconds, the familiar Align routine came up. I aligned the scope and went on my way. I set up the scope on my deck and ran it through its paces several times. This involved turning on the scope, allowing a GPS, align, viewing a few objects, turn the scope off (not park) and repeating same process over again. The scope performed flawlessly. The Autostar was reading the time, date and location from the GPS and setting the date and time correctly. A nice feature of StarGPS is that while it is searching for GPS satellites it displays the number of satellites it has found and the relative signal strength of each of the satellites while it is acquiring the GPS signal. When it has found enough satellites with strong enough signals, it determines the location, date and time from the GPS satellites. The display during the acquisition phase is shown in Figure 4

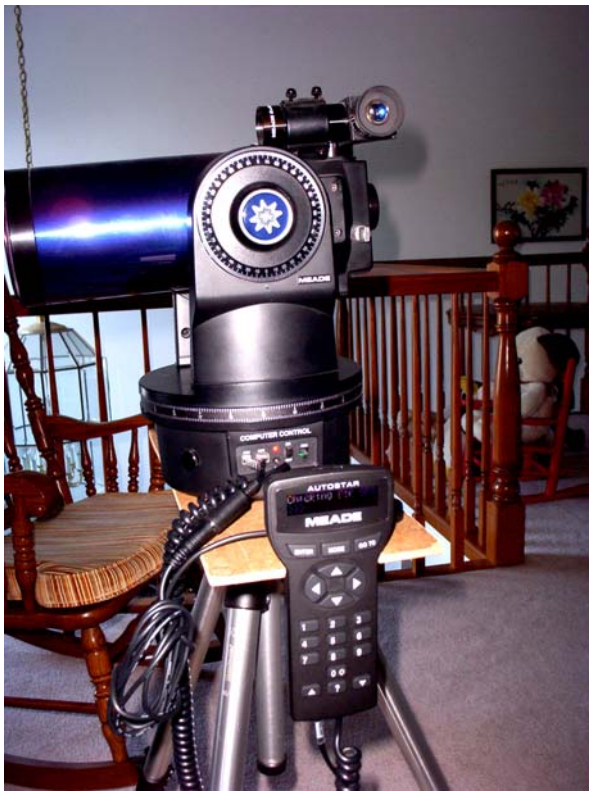

Figure 3
The ETX-90EC after the StarGPS additions have been made

Figure 4
StarGPS satellite acquisition phase

and the process is fun to watch. This acquisition phase can last up to five minutes, although two to three minutes are more typical.

Curiously, the acquisition phase lasts only a few seconds once the GPS has been setup for the evening. Powering the scope off and then back on at a new site a few feet or miles away that night results in the acquisition phase occurring much more rapidly once the scope has been started that night. I used Xephem to determine the number of GPS satellites visible. The number of visible satellites was always larger than what StarGPS found. Even when there were as many as five well placed satellites, StarGPS would struggle to find three. The long acquisition times are likely due to the small size of the antenna in the GPS unit.

Testing

I started with two laptops and four sets of hard drives. My iBook with Virtual PC and a Compaq 1700 with drives loaded with Windows-98SE, Windows 2000 and Windows-XP. I loaded StarGPS on each set of the disks and then tried loading and upgrading the Autostar. This was not an entirely fair test since once the StarGPS software is loaded it is tied to a specific Autostar Reloading or upgrading does not alter the software on the Autostar. I started with Windows-98SE and everything went smoothly. I moved the scope around the Saint Louis area and no matter where I moved the scope it correctly set the date, time and location. It was convenient not to have to do anything but turn the scope.

When a new set of patches came out from Meade and from Dick Seymour I attempted to load these patches from a Windows-2000 system. Unfortunately, there seems to be a problem with StarPatch and Windows-2000. Every time I attempted download the patches, the download would get between 10 and 15% complete when the entire system would hang requiring a reboot of the computer. The Autostar would needed careful handling to get it into the Safe Load mode to allow reloading of the base code from Meade's ASU. After several attempts to use StarPatch and Windows-2000, I destroyed a 497-hand paddle by not carefully restarting the Autostar in Safe Load mode. I did not

have the same problems with Windows-98 or Windows-XP. The problem appeared with both the iBook and Compaq-1700, thus eliminating a hardware problem with one of the laptops Since Windows-2000 is known to have compatibility problems with software, I should have known better than to use Windows-2000 for a critical download.

After acquiring another Autostar and using ASU to load the most current version of the software, I started the testing process over again. Moving the scope to sites away from home demonstrated the value of StarGPS. I used the scope at several sites in the Saint Louis area and in Upstate New York. StarGPS worked flawlessly at each site; it returned the date, time and location correctly and made setting the scope up easier. After setting the scope level and pointing, the tube north I merely turned on the scope, set up my observing chair and pushed enter when "Align -> Easy" appeared in the display.

I also ran a series of tests to determine if the StarGPS provided any improvement in the quality of the GOTO's. The scope already provides extremely accurate GOTO's being able to put an object in to the field of view of a 9mm Meade 4000 Plossl eyepiece. Tests with the StarGPS active and inactive showed no real change in accuracy. This may or may not be the case for all users of StarGPS, since the difference between my home and the closest site in the Autostar database is small, and my scope already is already very accurate.

Problems

As I mentioned earlier there seems to be some incompatibilities between StarPatch, which is needed to download the software patch necessary to make StarGPS work and Windows-2000. The problem manifests itself when a patch is downloaded to the hand paddle. After the download is about 15% complete, the computer locks up and requires a hard reboot. My other complaint has to do with the long time it takes to get a GPS fix. Although the average GPS fix time fell in the two to three minute range, often I got frustrated waiting for a lock and restarted the process by shutting off the scope and turning it back on.

So, do I recommend the StarGPS package? Well, StarGPS is not necessarily for everyone. The complete StarPatch with the GPS receiver is $169.00; if you use your own GPS receiver, it's $99.00 for the CD and cables. Having time and location download is just a convenience, but it was worth the price for me, especially since the ETX-90 is my grab-and-go scope and I use it at Boy Scout summer camps and Cub Scout day camps around in the Saint Louis area. If you observe from one or two spots and you don't mind changing sites, do it by hand and forget the GPS. However, if you travel with your scope, or if you just don't want to fool with entering the time every time the scope is turned on and changing SITE when you travel, the StarPatch GPS is for you. My experience is that it was easy to install, the instructions were well written and clear, the cables are sturdy and well made, and it worked right out of the box. In case there are, other Autostar users who have been wondering if anyone has tried this product out, I can tell you that it works as advertised and I am happy to have it.

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