EQMOD

Controlling the HEQ5, EQ6 and other mounts from a PC

WORDS: STEVE RICHARDS

A little bit of history

The original HEQ5 and EQ6 mounts didn't have a Go-To or autoguider system. Instead there was a very simple controller that allowed for Sidereal rate tracking and very slow speed slewing of 2x, 8x and 16x. The mounts worked well and had excellent load capabilities for their price, but the lack of Go-To facilities reduced their desirability. Several third-party manufacturers offered gear and electronic kits for the EQ6 to convert it to Go-To, but the feature set was usually very basic or the slew speeds hideously slow!

In 2005, Sky-Watcher introduced a Go-To version of the EQ6 and also made a matching upgrade kit available for earlier mounts. This original system was called the SkyScan and it was subsequently extended to the HEQ5 mount as well.

The SkyScan controller had a fairly minimal feature set – for the most part the included features were adequate and the system worked well, locating objects from the built-in database and tracking them accurately within the limits of the mount's hardware. However, there were several omissions that would have made the system so much better had they been included.

Major features missing from the original Go-To hand-controller:

1. No SYNC command
2. No NUDGE command
3. No GPS Support
4. Not flash upgradeable

Minor features missing from the original Go-To hand-controller

1. Date lost at turn-off
2. Time lost at turn-off
3. Daylight Saving Data lost at turn-off

The original name of SkyScan was changed to SynScan in more recent models and the very latest versions of the hand-controller, which have upgradeable firmware, address these omissions to some extent. However, the cost of an updated hand-controller is out of proportion to the advantages of upgrading.

The EQMOD solution

The limitations of the original hand-controller led a group of enthusiasts to develop their own control system comprising of a modified hand-controller and some ASCOM driving software. This enabled full control of the mount to be passed to a computer. This group of developers made their software, which they called EQMOD, an open source solution so it is available free of charge by download.

Shortly after the release of the original software an independent interface was designed that circumvented the hand-controller altogether, making modification to complete PC control even easier. This device was made available commercially by Shoestring Astronomy and is known as the EQDIR interface.

The original EQDIR interface, which works directly from your computer's RS232 Serial Port, is available in the UK from Opticstar (www.opticstar.com/Run/Astronomy/Astro-Accessories-Imagers-Shoestring.asp?p=0_10_5_0_5_60) but there are other solutions, including a new USB port version by HitecAstro and available from First Light Optics (www.firstlightoptics.com/proddetail.php?prod=HitecAstro_EQDIR).

It is also possible to make your own interface using readily available components or even ready-made RS232 to TTL boards as used in robotic applications. If you are using an RS232 Serial Port version of the EQDIR, but you don't have a serial port on your PC – and many newer PCs don't – it will be necessary to install a USB to RS232 adaptor. Make sure you buy one from a reputable astronomy source to avoid disappointment.

The functionality of the EQMOD soon overtook even the latest hand-controllers, making the system a very attractive proposition in its own right. Of particular interest was the inclusion of 'n star' alignment (allowing a large number of alignment stars to be stored to further refine the accuracy of Go-Tos), which meant a proper SYNC capability and the very powerful Periodic Error Correction (PEC) facility.

The current hand-controllers have a facility called 'PC Direct', which will allow third-party applications like planetarium software to control the mount. EQMOD can also use this connectivity, therefore obviating the need for any other interface. However, keeping the hand-controller in the loop seems a bit of a backward step and using an external interface remains the better method of connection.

EQMOD mount compatibility

The EQMOD system works on a wide range of equatorial mount equipment manufactured by Synta, including:

EQ3-2 with SynScan Upgrade
EQ4 with SynScan upgrade (EQ5)
EQ5 SynScan
EQ5 with SynScan Upgrade
EQ6 Pro
NEQ6 Pro
EQ6 SynTrek
EQ6 with SynScan upgrade
HEQ5 Pro
HEQ5 SynTrek
HEQ5 with SynScan upgrade
NEQ3 SynScan
Orion SkyView Pro EQ
Orion SkyView Pro with Upgrade Kit

ASCOM Platform

To use the EQMOD system, it is necessary to install the ASCOM Platform. This is a set of interface standards for scriptable or programmable low-level control of astronomical instruments and related

devices. The individual equipment drivers interface with the equipment via this platform. More information about the ASCOM Platform can be found here: http://ascom-standards.org. The ASCOM platform itself can be downloaded from http://ascom-standards.org/Downloads/Index.htm

EQMOD ASCOM Driver

This is the driver that has been developed by the EQMOD Group, who can be found at this Yahoo Tech Group address: http://tech.groups.yahoo.com/group/EQMOD/

The EQMOD Driver can be downloaded from: http://eq-mod.sourceforge.net/

The EQMOD ASCOM driver uses the file EQCONTRL.DLL to communicate with the stepper motor controller board via the EQDIR interface. This enables you to control a SkyScan/SynScan or SynTrek HEQ5, (N)EQ6 or several other mounts using any ASCOM-compliant planetarium software or other ASCOM-compliant software such as MaximDL.

Functions included:

▶ SIDEREAL, LUNAR, SOLAR TRACKING RATES
▶ USER PROGRAMMABLE TRACKING RATES (both on Dec. and RA)
▶ VARIABLE SLEW SPEEDS that can be set from x1 to x800 of the sidereal rate at 0.144 resolution (depending on the accuracy of the planetarium database)
▶ AUTOGUIDER PORT SPEED RATE SETTING (RA and DEC speeds can be set independently)
▶ PULSEGUIDE (at variable speed rates and with 'duration' parameter support and duration override)
▶ PEC TRAINING (via hand control or PULSEGUIDE sequence) AND PLAYBACK (encoder position accurate)
▶ NORTH and SOUTH hemisphere support
▶ EQMOD SLEWPAD interface that allows a three-button mouse to be used as a SLEW HAND PADDLE.
▶ JOYSTICK SUPPORT for hand control of the telescope slew
▶ GAMEPAD SUPPORT for hand control of the telescope slew
▶ NUMERICAL KEYPAD SUPPORT for control of the telescope slew
▶ SPIRAL SEARCH for use when the chosen object cannot be found in the field of view
▶ MOSAIC SLEWING to automate the capture of individual tiles
▶ GPS SUPPORT for time and location synchronisation
▶ 1 – STAR and N – STAR ALIGNMENT
▶ SYNC (via ASCOM / Planetarium Software) adds alignment points during session to improve pointing accuracy
▶ STORAGE/RECALL OF ALIGNMENT DATA
▶ PARK TO HOME/PARK TO CURRENT/PARK TO CUSTOM/UNPARK
▶ USER DEFINABLE MOUNT LIMITS
▶ HORIZON MODELLING to avoid slewing to objects that have disappeared below your local horizon
▶ Customised night sky tours using the ASCOM application EQTOUR
▶ EQMOD Simulator

Functions that will be supported (currently under development):

▶ BACKLASH COMPENSATION (currently not implemented since most of the EQ designs do not require backlash compensation)

EQMOD control screen

EQMOD is an ASCOM driver that can be started from within an ASCOM compliant application like MaximDL or the excellent (and free) Cartes du Ciel (CdC) Planetarium software (http://www.stargazing.net/astropc). Once opened, EQMOD will immediately try to communicate with the mount and once it has done so successfully, you will be presented with a small version of the main controller. Clicking on 'Setup' will open this up to reveal the whole control interface, which is very comprehensive, as shown in Fig. 1.

However, it is first necessary to select 'ASCOM' as your telescope interface. Using the ASCOM chooser in your application software, select the 'telescope' as 'EQMOD ASCOM EQ5/6' to go live or 'EQMOD ASCOM Simulator' to try the software out before going live. I would recommend that you try the latter first to get an idea of how things work before committing to the purchase or construction of the interface.

You can enter and save your current location in Latitude and Longitude and up to another nine locations. The current date and time with offsets for your time zone and Daylight Savings preferences are automatically collected from your PC.

The EQTOUR application

If you are one of the many astronomers who use the ASCOM driver, EQMOD to control your Sky-Watcher Go-To mount or a similar ASCOM driver for another make of mount, there is an add-on application called EQTOUR that may well be of interest to you. This application allows you to call up various sets of sky tours like Messier, Caldwell, Globular Clusters and so on. Simply click on an object name to slew to it. However, even more useful is that you can produce tours of your own, enabling you to send your telescope off to find predetermined objects of your choice.

Details about the application and how to download it for free can be found at http://eq-mod.sourceforge.net/tour See Fig. 2 for a typical tour file and a screen display of the application in use with EQMOD.

EQTOUR is launched either manually or by clicking on the 'binocular' button in the 'Slew Controls' section of the EQMOD control panel (Fig. 1). Once EQTOUR has been launched, you select the tour of interest from the drop down list followed by a double-click on the tour object that you want to 'Go-To'. Only objects above your pre-set altitude and brighter than your pre-set magnitude are shown in the available list of objects. See the next page for larger versions of the images below.

Fig 1: The EQMOD ASCOM control screen is comprehensive to say the least

Fig 2: Once you've loaded a 'tour' file, EQTOUR will show you the sights