

MCU Control and Update Utility[©]

MCU Control and Configuration is specifically designed for the HEQ5/EQ6/Atlas mounts modified with Anand Rajiva's HEQ-5/6 Update Kit or Mounts using the LittleFoot controller. Information about these fine products is available at <http://astronomie.rajiva.de/>.

This program is supplied for free for your personal use and no warranty is implied or given concerning the suitability for your intended application. In other words:

'Use at your own risk'

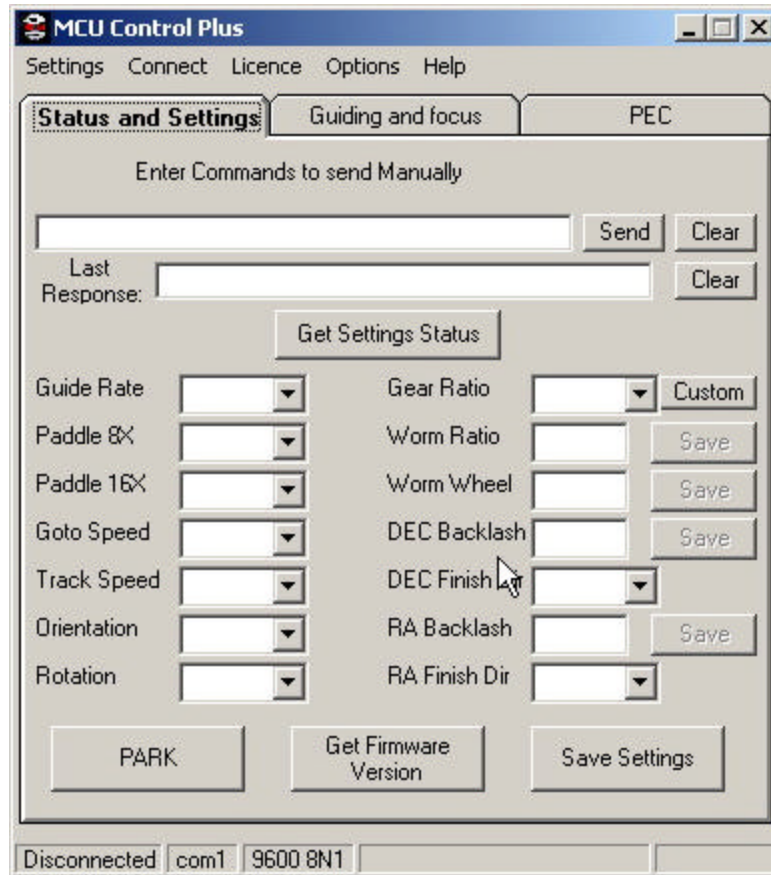
MCU Control and Configuration is used for Mount Configuration, Guiding, PEC training, and GoTo.

www.kennaquhair.com/MCUControl/.

MCU Control and Update Utility[®]

Getting Started

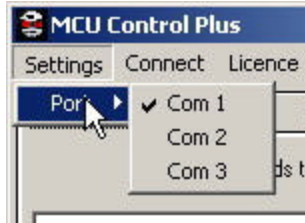
Starting the program will bring up the normal MCU Control



The **'Options'** menu allows you to select **'Save Settings on Exit'**. Checking this option will save the settings from all window when exiting any of the programs. This includes saving the window positions.

MCU Control and Update Utility[®]

Under the **'Setting'** menu you select which com port to use to connect to the mount from the ports available on your computer



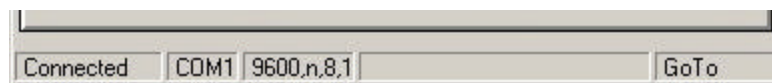
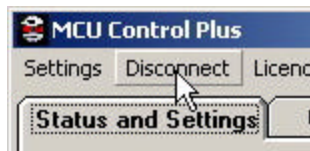
When you first start the program the status of the com port is shown at the bottom of the screen.



When you press the **'Connect'** menu item connection is made to the mount through the selected com port.



When successfully connected **'Connect'** changes to **'Disconnect'** and the status bar changes from **'Disconnected'** to **'Connected'**. If the GoTo key is enabled the status bar will display **'GoTo'** at the bottom right.



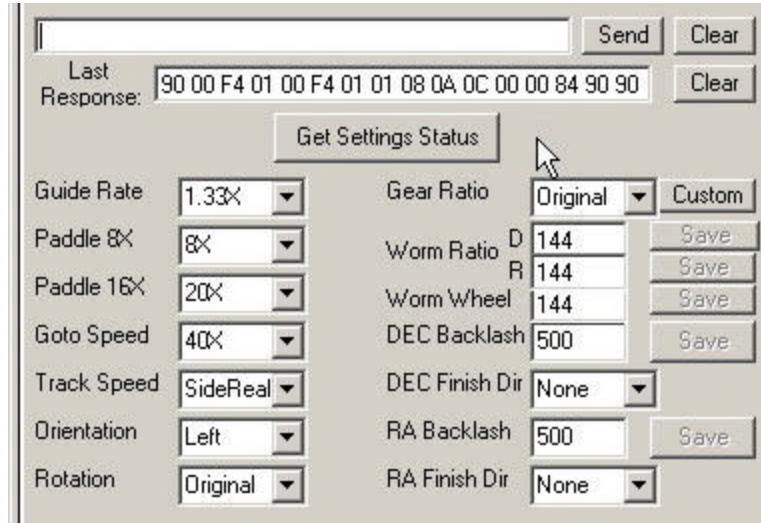
The **'Licence'** menu item will open the License window where you can enter your Goto and IntellyTrack keys



If connected your serial number will be displayed but the Goto and IntellyTrack keys are not.

MCU Control and Update Utility[©]

The **'Status and Settings'** tab is where the mounts parameters are entered or changed.



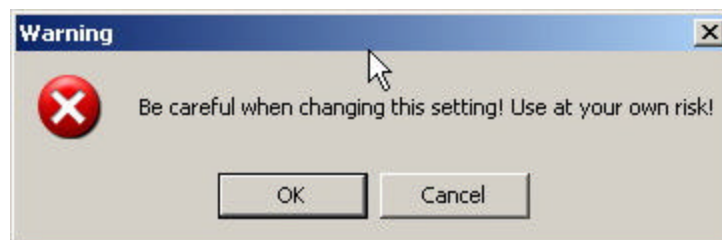
The selections on this tab are described here.

The long text box is used for manually sending commands to the mount. Enter the commands as they appear in the MCU protocol and press **'Send'** and the command is sent to the mount. Any response from the mount will be displayed in the text box labeled **'Last Response'**. Pressing the top **'Clear'** button will clear the command window and the lower one will clear the response window.

'Get Settings Status' will update all the boxes in the tab with the values currently stored in the mount. The returned string is displayed in **'Last Response'** text box.

'Guide Rate' allows you to choose between **1.33X**, **1.67X** and **2.00X** guide rates. These values are stored in the mount and are used by both the hand controller and the **MCU Control Plus** software.

'Paddle 8X', **'Paddle 16X'** and **'Goto Speed'** set the speed used by the respective buttons on the hand controller and the **MCU Control Plus** software. The available choices are **4X**, **8X**, **16X**, **20X**, **27X**, and **40X**. Generally on **4X** to **16X** are used for the paddle rates. If **27X** or **40X** rates are chosen a warning box will appear.



Click **'OK'** to accept the change or **'Cancel'** to abort the change

MCU Control and Update Utility[©]

'Track Speed' Selects between **'Disabled'**, **'SideReal'**, **'Solar'** and **'Lunar'**.

'Disabled' turns tracking off. Most often used for terrestrial viewing

'SideReal' is the most used. This track the normal night sky to compensate for the earths rotation. This is also used for planetary observing.

'Solar' and **'Lunar'** are used for tracking the Sun and Moon.

'Orientation' has two selections, **'Left'** or **'Right'**. This lets the mount know which side of the meridian you are pointing at. If you perform a GoTo and the mount doesn't move in the right direction, most likely this value is set wrong. When the mount does a meridian flip this value is automatically changed.

'Rotation' has two selections, **'Original'** or **'Reversed'**. This selects the direction for RA tracking. **'Original'** uses the direction as selected by the N/S switch on the hand controller. **'Reverse'** makes the motor turn in the opposite direction. This is mostly used for those that have installed the Conrad gear upgrade.

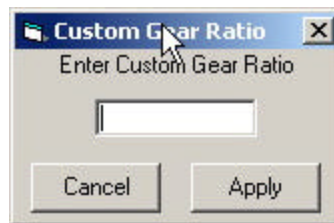
'Gear Ratio' has 3 selections, **'Original'**, **'Conrad'** and **'MT-1'**.

'Original' is used if you still have the original 132:1 reduction gears that came with the EQ-6 or HEQ-5 mount.

'Conrad' is used if you have installed the Conrad 100:1 reduction gear box.

'MT-1' is used if you are using the MT-1 motors or there Clones on your mount.

Another option is **'Custom'**. This allows you to add a custom gear ration to the list.



Entering a value, up to 255, and clicking on **'Apply'** will at that value to the **'Gear Ratio'** drop down box. After that you need to select this value from the drop down box.

After changing the gear ratio you will see a message box informing you that the power to the mount must be re-cycled before the change will take effect. After power cycling the mount you will need to re-connect.

MCU Control and Update Utility[®]

‘Worm Ratio’. This is where you set the reduction ratio of the worm gear to the worm wheel. The EQ6 is 180:1 and the value entered would be 180. There are separate values for both RA and DEC worms. This allows for mounts that have different ratios on both axis. You need to click on the ‘Save’ button next to the box for the changes to take effect a message box will appear that tells you to press the ‘Save’ button at the bottom of the form and power cycle the mount for the changes to take effect.



‘Worm Wheel’. This value is used only for the PEC function and is the same as the RA Worm Ratio if you do not have a extra reduction ratio between the motor gearbox and the wormwheel. This value is the reduction ratio of the Worm Wheel it self! For example the HEQ-5 has a Worm Ratio of 180 but the Worm Wheel it self is just 135. You need to click on the ‘Save’ button next to the box for the changes to take effect a message box will appear that tells you to press the ‘Save’ button at the bottom of the form and power cycle the mount for the changes to take effect

‘DEC Backlash’ and **‘RA Backlash’** is the number of micro steps used to take up any backlash in the gear train on either axis.

‘DEC Finish Dir’ and **‘RA Finish Dir’** sets when and how backlash compensation is applied. The options are:

‘None’ only applies backlash compensation if the direction of movement changes

‘Pos’ always finishes movement in the positive direction

‘Neg’ always finishes movement in the negative direction

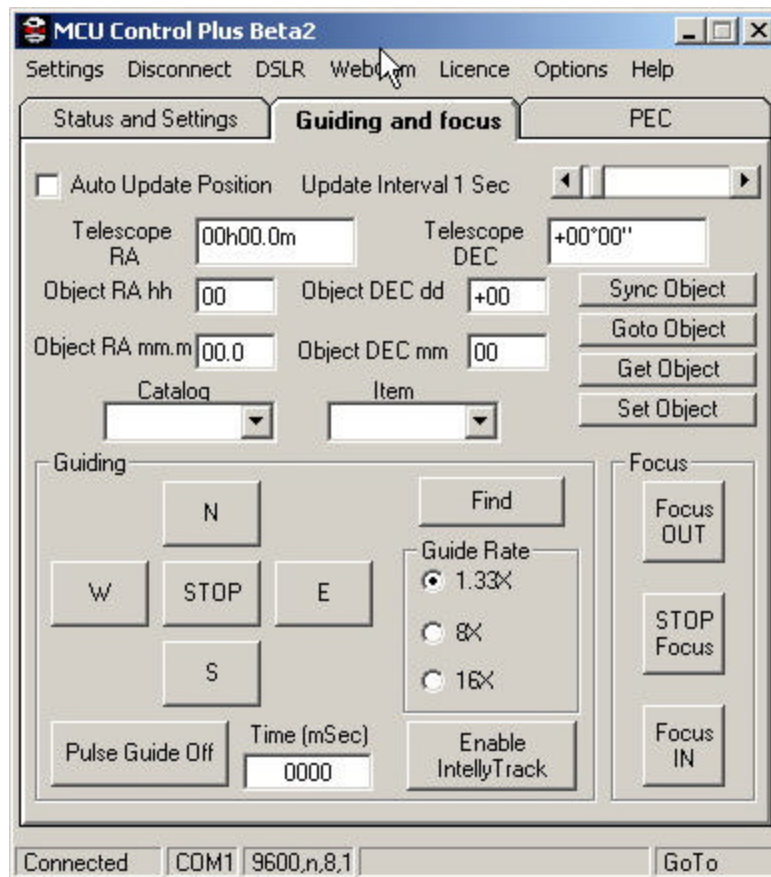
‘Park’ saves the current RA worm position and other values in the MCU in the mount. This feature is no longer need since the inclusion of the Auto Park feature but remains for backwards compatibility.

‘Get Firmware Version’. This button will retrieve the current firmware version from the mount. When connecting to the mount it will automatically display the current version.

‘Save’. This button will save all the current savable settings in the MCU’s non-volatile memory.

MCU Control and Update Utility[®]

Guiding and Focus



The **'Guiding and Focus'** tab is used to **'Sync'** and **'Goto'** objects, Determine the mounts current co-ordinates, Manually guide the mount in normal or **'Pulse Guide'** modes, activate the **'Find'** function, enable or disable **'IntellyTrack'** and use an electric focuser through the MCU.

'Auto Update Position' when checked will continually update the **'Telescope RA'** and **'Telescope DEC'** boxes. The update interval is set by the slider to the right. The available update time are from 0.5 Sec to 10 Sec.

The **'Telescope RA'** and **'Telescope DEC'** boxes will also update when you **'Sync'** to an object.

MCU Control and Update Utility[©]

The '**Object RA hh**', '**Object RA mm.m**', '**Object DEC dd**', '**Object DEC mm**' boxes are used for manually entering the co-ordinates of an object you wish to '**Sync**' to or '**Goto**'. The boxes will also be filled in if you select an object from one of the 'Catalog' files.

The formats for the entries are specific and need to adhere to the following criteria.

'Object RA hh': The format is in hours. For instance the RA hours for M1 is 05. If you just enter a 5 the correct format will be automatically entered when you click outside of the box.

'Object RA mm.m': The format is in minutes with 1 decimal place required. The decimal separator **must** be a period ('.'). If entered in the wrong format the correct format will be automatically entered when you click outside of the box.

'Object DEC dd': The format is in degrees. A '+' or '-' sign is required. If no sign is entered it will be assumed to be positive and a '+' will be added when clicking outside the box. To enter a negative number you must manually enter the minus sign ('-'). The correct format will be automatically entered when you click outside of the box.

'Object DEC mm': The format in arc minutes. No decimal part is allowed. If a negative value is entered a message box will appear and the previous entry will be restored. The correct format will be automatically entered when you click outside of the box.

'Set Object' sends the values in the object RA and DEC boxes to the mount and tells the mount this is the current target object.

'Sync Object' tells the mount that the current target is where the mount is now pointed. The '**Telescope RA**' and '**Telescope DEC**' values will now reflect the new co-ordinates.

'Get Object' will query the mount for the current target co-ordinates. The object RA and DEC values will be updated to these values.

'Goto Object' will the command the mount to start slewing from the present telescope position to the target object position. If '**Auto Update Position**' is checked the '**Telescope Position**' will be updated and the estimated time to complete the slew will be displayed in the status bar

The '**Catalog**' drop down boxes are used to select objects from a pre-determined set of catalogs. There are 4 catalogs that are supplied with the program, but it is easy to create a new catalog of your favorite objects or pre-plan a nights observing. If you want to create a custom catalog all you need is a text editor. The format for the catalogs is in the header of the supplied catalogs. Instructions for adding this file to the catalog.lst file are also in this header. The catalog can contain up to 400 entries. I recommend you keep the header part of the file in any new catalog that you create.

MCU Control and Update Utility[©]

Guiding, Find, and Focus Commands

The four guiding buttons, **N**, **E**, **S** and **W** will command the mount to move at the guide rate selected to the right. The first guide rate is the value you have selected as the lowest guide rate for the mount, i.e. 1.33X, 1.67X, 2.0X. The other 2 guide rates use the guide rates you have programmed in the MCU update for the 8X and 16X settings.

Pressing a guide button will start guiding in that direction at the selected rate. You can guide both N/S and E/W at the same time. If **N** is selected and you press the **S** button the mount will stop guiding **N** and start guiding **S**, likewise with E/W. To stop guiding in any one direction, just click that button again. To stop all guiding press the **Stop** button.

'Pulse Guide' will guide in the selected direction for the time entered in the text box and then stop. This time is in milli-seconds. The status of pulse guiding is shown on the command button.

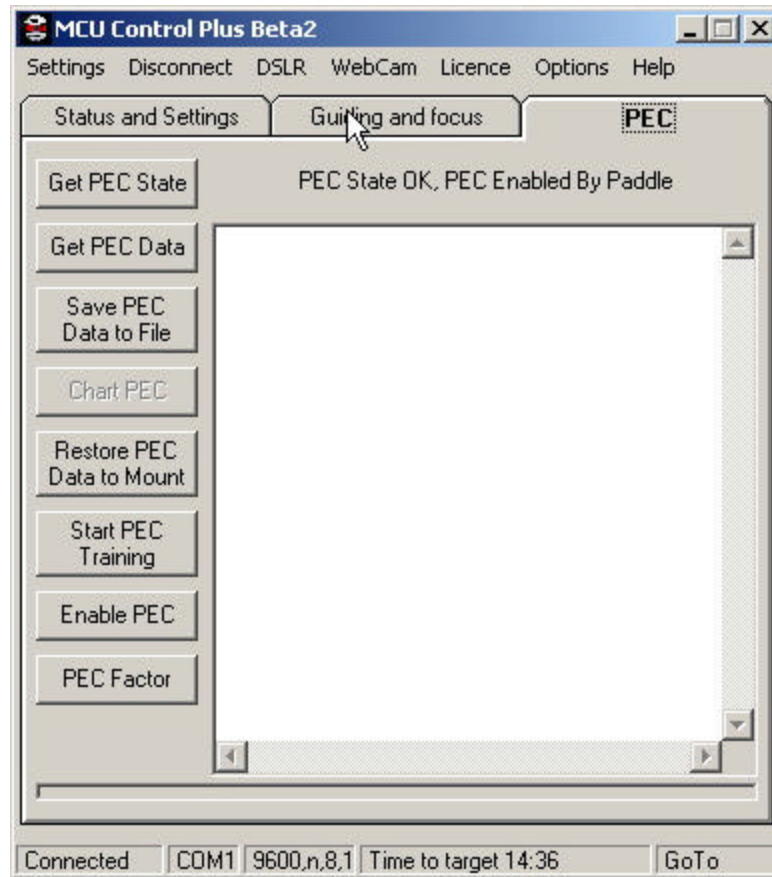
The **'Find'** will start the find routine in the MCU firmware. This is a square search pattern to help locate an object in the eyepiece. While the **'Find'** mode is active **'Auto Update Position'** and manual guiding is disabled. To end the **'Find'** function, simply press the **'Find'** button again.

'Enable IntellyTrack' starts the IntellyTrack function of the MCU update. This function is very useful for tracking objects that aren't moving at normal sidereal rate, such as comets, and also correcting for a less than perfect polar alignment. To disable IntellyTrack, click the button again.

'Focus OUT', **'STOP Focus'** and **'Focus IN'** send command to the mount to Start/Stop the focuser outputs of the MCU update.

MCU Control and Update Utility[®]

PEC

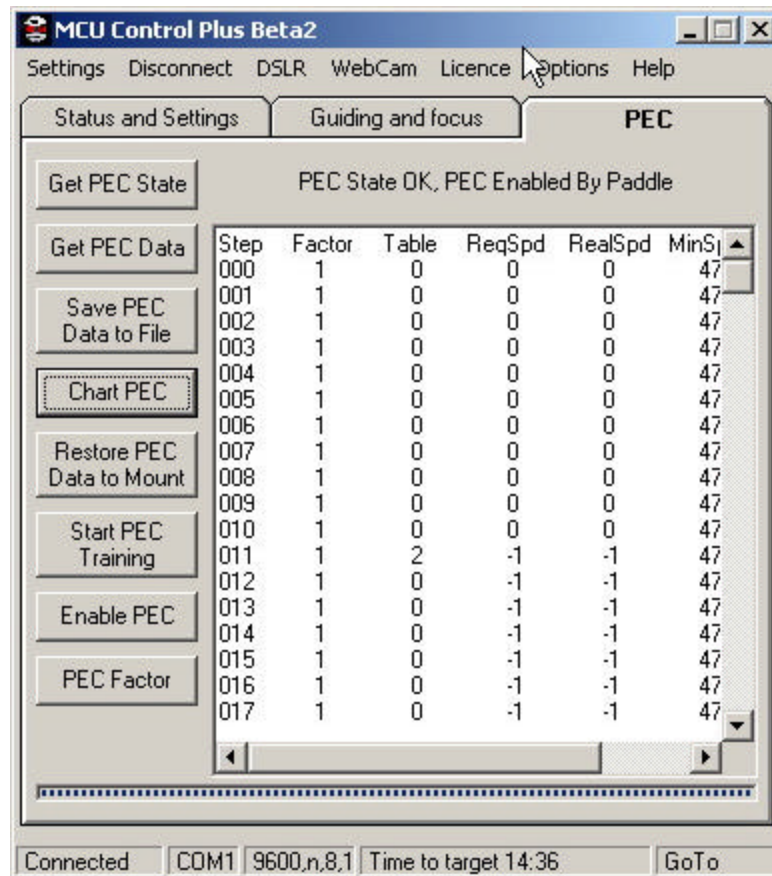


The **'PEC'** tab allows you to enable, disable, train, save, restore and chart the PEC table in the MCU update.

'Get PEC State' will query the mount to determine the state of periodic error correction, in the mount. This will display if PEC is enabled by either the hand controller or software, and the current state. This is automatically updated when you enter the **'PEC'** tab.

MCU Control and Update Utility[®]

'Get PEC Data' will retrieve the 256 point of PEC data stored in the mount. This data will be displayed in the window to the right of the control buttons.



'Save PEC Data to File' will open a dialog box letting you choose a file to store the PEC data too. This file is in a comma delimited format and is compatible with PEC explorer and Excel. Using **'Restore PEC Data to Mount'** will allow you to restore different PEC training sessions to the mount.

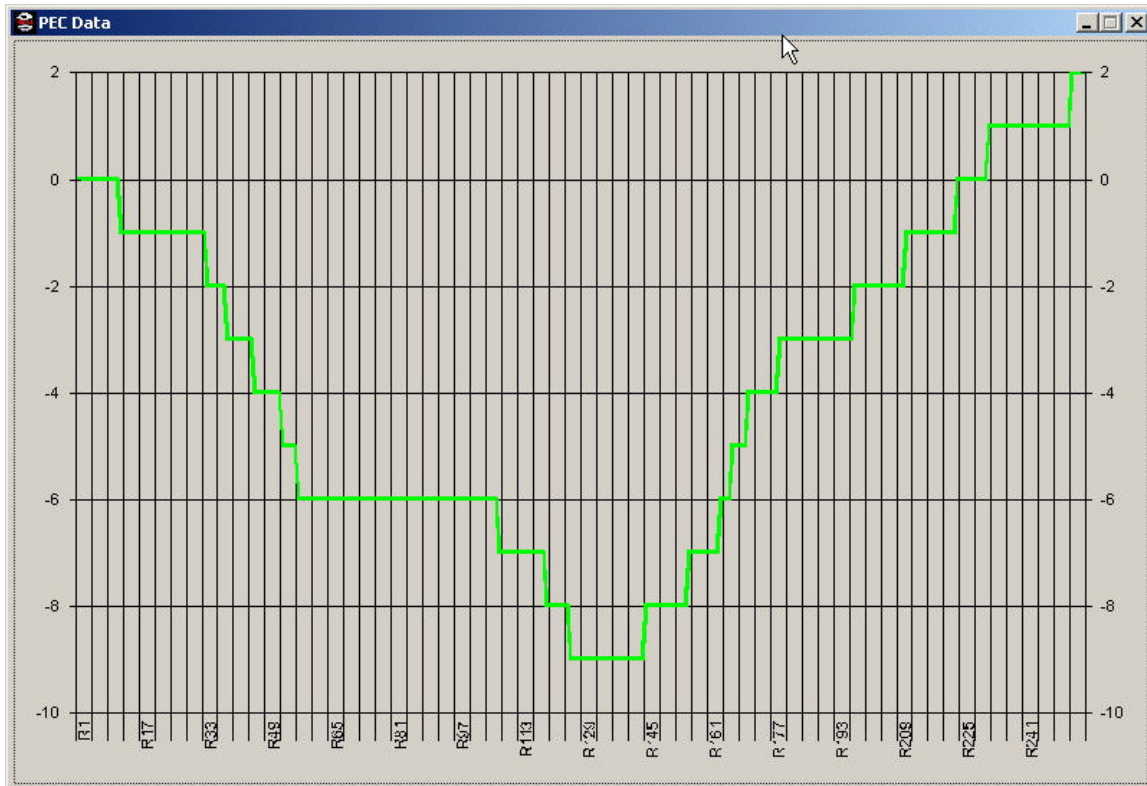
'PEC Factor' sets the aggressiveness of the PEC corrections. Valid values are 1 to 9 and are selected from a drop down menu.

'Start PEC Training' will clear the MCU's PEC table and start a new training session. If you have a valid PEC table in the mount you should be sure to save it before starting a new training session. The training can be either with manual guiding using the hand controller or software or auto guiding using the webcam interface. It is best to train through at least 2 full revolutions of the RA worm wheel. To stop training press the button again.

'Enable PEC' is used to turn on and off PEC from software control. To completely turn PEC off it must also be disabled with the hand controller through **Menu 3, Left**.

MCU Control and Update Utility[©]

'Chart PEC' give you a graphical representation of the PEC data displayed in the window to the right. This can give you a good idea of whether your PEC training was good or not and give a view of the periodic error of your mount.



The numbers shown are not in arc seconds but in the correction sent to the mount. If the chart increases the mount was told to move faster at that particular point in the worm cycle.

MCU Control and Update Utility[©]

MCU Control and Configuration

Copyright 2005

Doug Dieter

<http://www.kennaquhair.com/gallery/albums.php>

<http://www.kennaquhair.com/MCUControl/>