Version 0.90A Release Notes

WHAT ARE RELEASE NOTES?

SiTechExe and ServoConfig have been ported over to a more modern compiler (Visual C# 2010 Express) to work with current (XP, Win7-32 and Win7-64) operating systems and programming environments (Microsoft Dot NET v4 Framework) and an updated ASCOM Platform (ASCOM 6). The Programs will look and operate like they have in the past, but there are some extremely good new features now available.

In addition, the software now is distributed and installed/updated on the user's PC via an Installer Package executable (.exe) file rather than having to download individual files as they are updated and manually copying them to their proper locations. Updates will also be handled by an Installer Package approach rather than having to download individual files as they are updated and manually copying them to their proper locations

These Release Notes will address both how to Install (or update if Sitechexe is already installed on the PC) the software now using the Installer Package, and some details on explaining the updates in the release till the updates are incorporated into an update to the manuals.

These Release Notes contain the following Sections:

INSTALLATION
FILE LOCATIONS
INFORMATION ON NEW FEATURES
ACKNOWLEDGEMENTS
VERSION HISTORY

INSTALLATION:

For users that are performing an initial installation on a PC, and also for users upgrading to the current release (including from any versions up to and including 56Z for Sitechexe and versions 1.1 or 1.2 for ServoConfig), an Installer Package executable is provided to handle all the Sitech file installation.

Installation (and subsequent use) of the new SiTech software, and all of its capabilities, requires you to perform the following 4 installs **in the following order**:

1) Microsoft Dot NET Framework 4.0 (no previous versions are required for Sitech, but other software you use may require earlier versions to also be on your PC). Two options exist to install Dot NET v4. Pick one to use:

a) Download and run the Standalone Dot NET Framework Redistributable Package (~48MB) that installs Dot NET v4 on all current Windows OS's (XP, Win7-32 and Win7-64). This installer will determine your OS and only install the files appropriate for your OS. Afterwards you can delete the large installer file. Use the following link

http://www.microsoft.com/download/en/details.aspx?id=17718

b) Run the Web Installer (~869kb) for the Operating system that you are using. Use the following link and select the one for your operating system and PC (i.e. XP, Win7-32, or Win7-64, etc.):

http://www.microsoft.com/download/en/details.aspx?id=17851

2) ASCOM 6 is required to be installed to be able to run the Sitech 0.90A Installer, and for Sitechexe to interface with any ASCOM compatible programs or hardware. Dot NET v4 must be installed before installing ASCOM 6. ASCOM 6 will install and automatically update from all earlier ASCOM installations (4.1, 5.0, 5.5), i.e. no earlier versions are required. Use the following link to download the ASCOM 6 Platform installer (the Sitech installer will provide the ASCOM driver you will use for the Sitech software):

http://ascom-standards.org/Downloads/Index.htm

3) Run the new SiTech Installer executable (Dot NET Framework version 4 and ASCOM 6 must already be installed) and it will install the new SiTech ASCOM driver and all the files needed to run your controller, including the new ServoConfig version 1.3 that works with all currently available SiTech controllers. The only thing missing is the catalogs for PlateSolve2.

NOTE: If you are upgrading from version 56Z or earlier, and you have any custom files you created, compare the contents of the C:\program files\common files\ASCOM\telescope\sitech folder with the Sitech folder located as described for the "support" files in the "File Locations" section of these release notes, and manually copy the files you want to continue to use to the new location that were not automatically moved.

4) To use the powerful capability of the included PlateSolve2 program (Plate Solution Program, current version is v2.20), you will need to download one or both of the customized Catalogs it uses for a reference. PointXP5 (Mount Modeling Program, current version is v5.28) and PlateSolve2 are programs written and provided by Dave Rowe that are included in the Sitechexe installer and are automatically installed. Both of these programs are significant updates from the original programs that Dave also had graciously provided in earlier Sitech versions.

PlateSolve2 provides the capability to solve CCD images for their center coordinates, allowing you to perform Initializations by simply taking an image, or to build a model with the automated Scripting tool within Sitechexe. To use Platesolve2, you must download one or both Star Catalogs for use with the new PlateSolve2. The Catalogs are:

a) UCAC3 Catalog 411 MByte Zip File. Read more about the UCAC3 catalog at the US Naval Observatory. **NOTE**: This download is a customized much smaller version of the full UCAC3 catalog. The program will not run with the full catalog, so to use UCAC3 data, you must use this customized version

b) APM Catalog 525 MByte Zip File. Custom Catalog that is unchanged from the version used with the earlier Sitechexe versions and PlateSolveXP.

c) Download one or both of the Catalogs (and a tip o'the hat to PlaneWave for graciously hosting them on the PlaneWave website download page) at:

http://planewave.com/index.php?page=4 Look for the PlateSolve2 download area, and download the catalog(s) that you want to use (the UCAC3 is highly recommended). There is no need to download the file PlateSolve2.exe, since the Sitech Installer will have already downloaded it and installed it for you.

d) Unzip the catalog(s) and place the files anywhere you choose **(each catalog must be in its own folder however)**. Remember where you unzipped and saved them, since when you first open PlateSolve2.exe, you will need to use PlateSolve2's menu "File/Configure Catalog Directories" to point to the folders where you saved the unzipped catalog files.

FILE LOCATIONS:

The new SiTech Installer, starting with Release version 0.90A, automatically places files in different locations than previously used on your PC in order to be compatible with post XP OS's. If you are upgrading a previously installed version of Sitechexe (v56Z or earlier) the appropriate files will be copied to the new locations, but a copy will also be left in the "old" locations.

All these files are divided into two categories: Support files (data and configuration files) or Program Files. Support files are data files that either support SiTech operations like the configuration, horizon, and PointXP files, etc.. Program files are like Sitechexe.exe and PlateSolve2.exe, etc..

For your information (since the installer does all the file activity for you now), depending on your PC Operating system, files are will be located at:

Files containing data or configuration information, referred to as "support" files, are located at:

Win XP:

C:\Documents and Settings\All Users\Application Data\SiTech\SiTechExe
or (if you ever reinstalled Windows), it may be at:
C:\Documents and Settings\All Users.WINDOWS\Application Data\SiTech\SiTechExe

Vista and Win 7:

C:\ProgramData\SiTech\SiTechExe

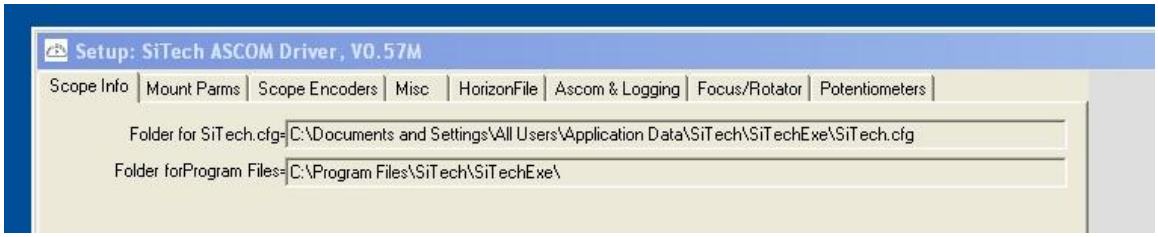
The files that capture the programs themselves associated with the Sitech system (SiTechExe.exe, PlateSolve220.exe, PointXP528.exe, CalPointsXP.exe, LXtoSitech.exe, etc.) are now located at:

Win XP-32, Vista-32, and Win7-32: C:\Program Files\SiTech\SiTechExe

WinXP-64, Vista-64, and Win7-64: C:\Program Files (x86)\SiTech\SiTechExe

The actual locations used by the install program for the Sitech.cfg file and the Sitech program files are shown on the Main Sitech screen Config tab/Change Config! Button/ Scope Info tab up at the top of the window as shown below (the example is for a WinXP SP3 PC).

Note the info is read only, but you can cut and paste from it to paste into windows explorer, etc.:



If you do cut and paste from the Folder for Sitech.cfg line, be sure you delete the filename "Sitech.cfg" from the path if all you want is the path name.

INFORMATION ON NEW FEATURES:

The basic overall look and feel and operation of Sitechexe and also of ServoConfig have not changed with Release Version 0.90A. However, there are a lot of changes "under the hood", and quite a number of new features and capabilities.

Until the current SETUP and OPERATIONS Manuals have their updates finished, the Release Notes will provide a very abbreviated set of notes to help you use recently added features, new features, and updated features included in the Release Version 0.90A. And, as always, the user community listserver is available for additional help.

New Features or updated features include:

1. Connecting to ASCOM compatible programs and hardware:
2. SkyView
3. PointXP5 and PlateSolve2
4. Focuser Support
5. Rotator Support
6. New Scripting capabilities
7. Joystick
8. Jog
9. Altitude Limit management
10. Multiple Serial Ports
11. Cycle Comm Port
12. Clock Calibration fix
13. Manual limit changes
14. ServoConfig 1.3
15. Satellite Tracking and TLERetriever2

More information on each of the New or updated Features:

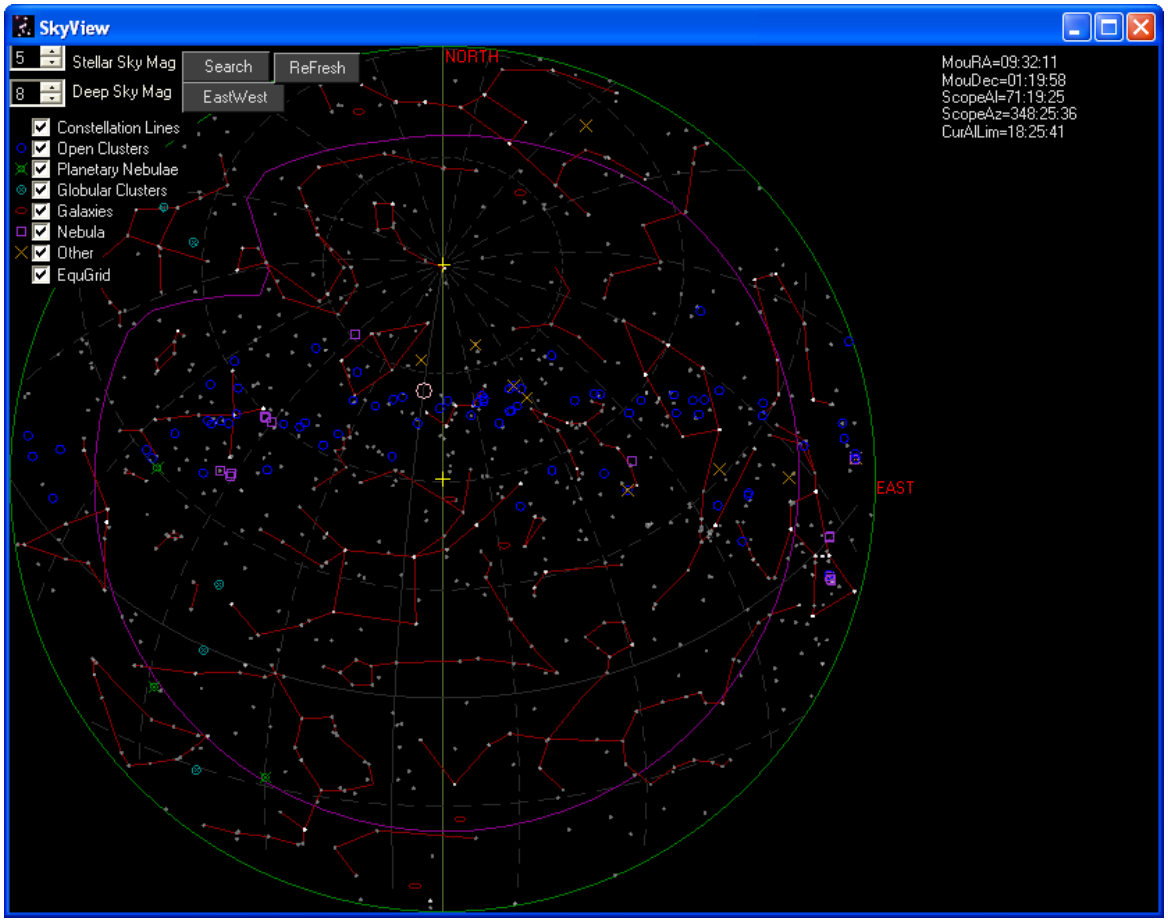
1) Connecting to ASCOM compatible programs and hardware:

The new SiTech Installer also installs a new SiTech ASCOM driver called SiTechDll. When you run a program with an ASCOM connection to SiTech, the previous "SiTech" selection will not work, so you have to choose the new one that includes "SiTechDll" in its name.

2) SkyView

An exciting new capability is now available is now available called SkyView. It pretty much makes using a separate Planetarium program to provide a graphic interface for basic operations really optional. It certainly does not have the capabilities of a full

fledged planetarium program, but does really help with basic operations and situational awareness.



Star and deep sky magnitudes can be adjusted, as well as toggling on/off categories of information. There is also a search capability, and the ability to reverse the E/W orientation displayed. Dragging the window size increases or decreases the overall size. The altitude limit line from a custom horizon (built using the Horizon tool in the Config pages) is also displayed, as well as other pertinent information in the upper right area. The meridian line and the celestial equator (dec = 0 line) is displayed

You can click on a target or even an empty area, to do GOTOs and Inits. If the resolution of the screen results in your click covering multiple targets, a list is provided for you to choose which one you really wanted. The screen does refresh itself, but you can force a refresh with the refresh button.

3) PointXP5 and PlateSolve2 (New mount modeling, new user interfaces, new Catalog, new Autofocus capability)

Dave Rowe has written and graciously allowed Dan Gray to include both PointXP5 (Mount Modeling Software) and PlateSolve2 (Plate Solving Software) with Sitechexe. The PointXP5 application is accessed by clicking on the "PointXP Cal Points" Button on the Sitech Main Screen/Scope Tab. You normally access the PlateSolve2 application by using the Sitech Scripting page (Sitech main screen > Features Tab > Run Script Button). However, PlateSolve2.exe may also be run standalone (refer to the File Locations section of these Release notes for its location).

PointXP5 provides the capability from within Sitechexe to model your mount and its Polar Alignment (or axis offsets for Alt/Az mounts). A good model will dramatically improve your mount's performance. On a good mount with a good optical system, PointXP5 can provide pointing performance with only a 5 arcsecond RMS error. (The previous versions of Point XP would be providing approximately a 20 arcsecond RMS error for the same mount and Calibration data). The Polar alignment modeling in PointXP5 is significantly more accurate than in previous versions. A Losmandy G-11 converted to Sitech, and using a 320k Gurley encoder on the RA axis in Tick Management mode (with no PEC active), with only a coarse physical polar alignment performed (no drift Align) performed a 30 star scripted PXP modeling run. Using the model just built, and an AT6RC telescope and an SXVF-H9 CCD camera (pixel FOV was ~ 1.92 arcseconds) in reasonably steady seeing, the system was able to perform 10 minute unguided imaging, with only a 0.1 pixel eccentricity in the images. Different systems will undoubtedly get different results, but the point is the performance of any reasonably prepared mount should be expected to improve.

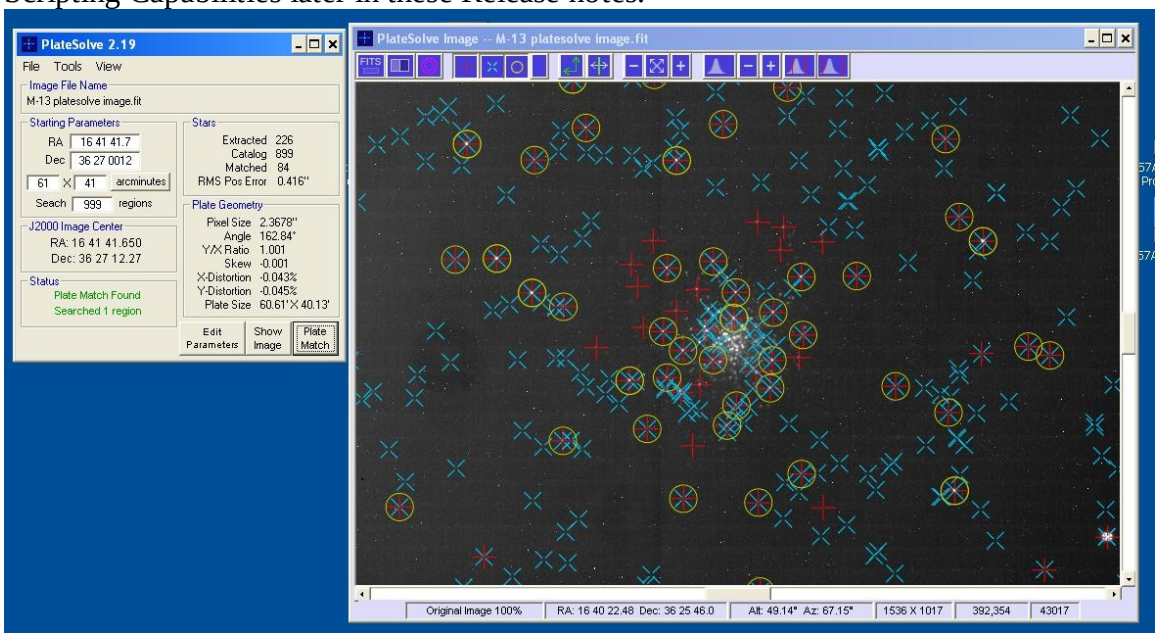
Using the Sitechexe Run Script page (Sitech main page, Features Tab, Run Script tab) you can perform a scripted run to automatically gather images of the Calibration points and perform automated Plate solutions of those images by PlateSolve2. PointXP5 then can use those data to model your mount. Or, you can do a single photo init by using this same run script page. Alternatively you can run the program as a standalone program and manually load and solve a CCD image for its coordinates using the file menu. The PlateSolve2 program is located where Sitech installed the "Program" Files as described in the Installation section of these Release Notes.

Instructions for setting up and using scripted operations are in the Sitech Operations Manual, sections 5.1.1 thru 5.1.7. You should read this information first to understand what the functions are, then compare the older screens to the new since the displays for PlateSolve2 and PointXP5 have changed from those in the OPERATIONS manual. The next update to the Manuals will have the detailed information updated in the manuals.

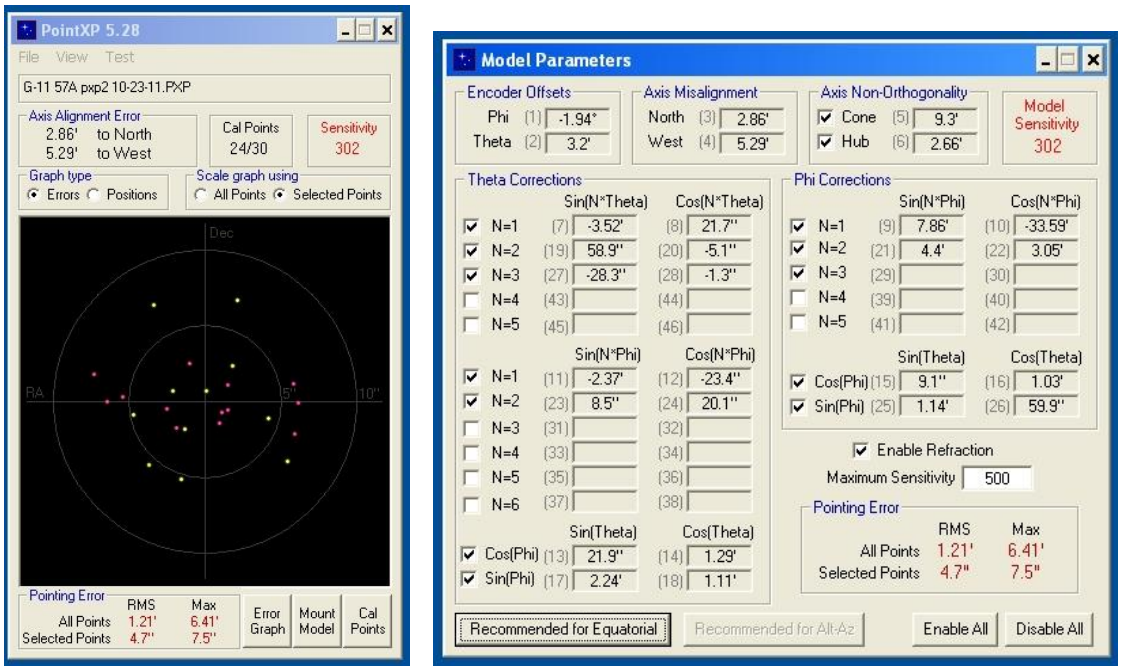
PlateSolve2, runs faster and is more accurate than before (especially when using the custom UCAC3 catalog). **NOTE:** The standard very large UCAC3 catalog will NOT work with PointXP5. Remember to also set the catalog location you saved the catalog(s) to using the PlateSolve2 File menu/Config Catalog Directories option.

The new PlateSolve2 screen looks and works much the same as the previous one shown the OPERATIONS Manual, as does the screen for showing the image being solved. It also can now solve images with non-square pixels (you need to enter the aspect ratio into the "Edit Parameters" window). It will also use a JPEG image (like created by DSLR's) if you select "use jpg" in the Run Scripting window.

One of the more impressive new capabilities now available is the Autofocus capability that PlateSolve2 provides. The details of this capability are described in the 5) New Scripting Capabilities later in these Release notes.



To use the new PointXP5 rather than the original one, go to the Sitechexe main page Config Tab>Change Config!>Mount Parms tab, and check the "Use ActiveX PointXP" box. The PointXP5 screens and their operation are slightly different than that shown in the current manual, although the basic function are the same:



The modeling accuracies in PointXP5 are significantly improved, as is the mount's performance after being modeled. According to the software author, Dave Rowe, for the "highest" accuracy, you should do a 25 to 35 Cal Point scripted PXP run. There is not much improvement in modeling accuracy after 35 Cal Points. You need between 12 and 15 Cal Points for "good" pointing accuracy and not trying to do unguided imaging. Less than 12 Cal Points works, but accuracy starts to decrease. As few as 6 Cal Points will allow the scope to point "reasonably" well. PXP Modeling kicks in with as few as 2 Cal Points, and will attempt to model encoder offsets and Polar Alignment errors, but with limited accuracy.

You can still do a Scripted PXP run if you do not have a CCD camera on your scope. However, an eyepiece with crosshairs is HIGHLY recommended. In the Config pages in Sitech, select NONE for type of camera and acquisition software. Make sure you have done at least one to three Calibration Star Inits before starting the script. Being connected to a planetarium Program is highly recommended for ease of picking nearby Calibration stars (but the internal Sitechexe database can also be used, just be careful you correctly identify the star that you manually slew to!). Run the script and it will slew to a selected point and pause, then use your planetarium program (or your knowledge of the sky and the internal Sitech database) to do a short GOTO to a nearby identified star. Manually center it in your crosshairs after the GOTO if not centered, and do a CalStar init. Then resume the script to go to the next scripted Cal Point and repeat. To summarize, the script will send the scope to an optimized area for the Cal Point, and you must then goto a star you pick in that area and do your CalStar init on it after tweaking it to the center.

After the Cal Points are collected, click on the PointXP5 button on the Sitech Main screen to open the modeling program.

Deselecting any "bad" Cal Points is easily done by clicking on them in the main screen, and you then need to select one of the "Recommended for" buttons at the bottom left of the Model Parameters screen to match your type of mount.

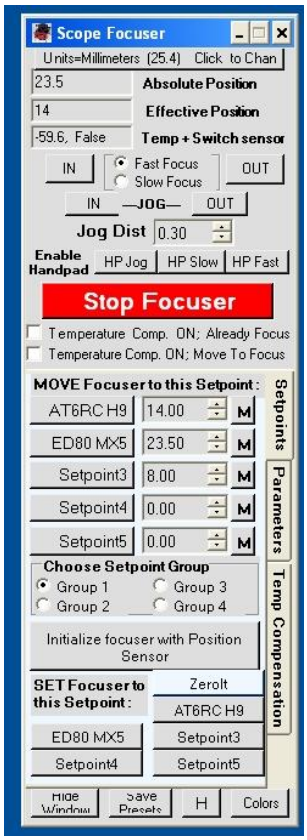
Save the model you create using the file dropdown menu on the PointXP5 main screen.

Your model is not automatically loaded into Sitech as part of starting your next Sitech session any more, unless you used the SET PARK/PARK, and then UNPARK routine. The logic was that if you did not PARK the mount, then you would have probably moved the mount's location before the next observing session. Moving the mount would mean the model would need to be updated (especially the alignment measurement/correction), and the time to run a new scripted run to build a new model is about the same as to take data points to try and update the previous model. However, if you wish, you can still use the file menu in PointXP5 to re-load a previously saved model and accept the incorrect alignment data induced errors.

4) Focuser Support (TCF, Init Sensor Ops, user specified units)

The Focuser routine is a slightly updated version from the one described in the Operation Manual, section 8. Please read Section 8 first to get the basics, and then this release notes abbreviated writeup. You will need a focuser with a servo Motor mounted to it, and a ServoI Controller dedicated to running the focuser. If the main controller (i.e. for the scope RA/Dec motors, or Alt/Az motors) is also a ServoI controller, you can either use a separate serial port for each of them if you have two serial ports available on your PC, or you can use a Y-cable for the serial cable and the main controller and Focuser controller can share the same serial port. If you use a ServoII Controller for the main controller, the serial Y-cable option does not work.

The Focuser Controller must be set to "Addr 3" (Note: Addr 3 is not the same as the serial port Comm 3) using ServoConfig, no matter which serial cable/port Config is used. Information for configuring this second controller is in the Operations Manual, Section 8. In the Config Pages for Sitechexe (Main Screen> Config Tab>Change Config! Button>Focuser/Rotator Tab), you must select Use Sitech Focuser. If you have one focuser, it will need to use the RA/Az channel in the Focuser Controller. If you use two focusers, check the "use 2 focusers box". Then, one focuser window will be labeled "Scope Focuser" (and be on the RA/Az channel), and the 2nd focuser will be labeled "Guider Focuser" and be on the "Dec/Alt" channel. Note, you can select the units that will be displayed (inches, MM or microns). The ticks/rev are the ticks to move 1 inch of focuser travel. The focuser fully racked IN position should be the zero measurement, and full racked out should be a positive value.



Temperature Compensated Focusing (TCF) provides the capability for the focuser to automatically move to compensate for thermal changes in the telescope that affect the focus. The instructions for using the TCF capability are in the Operations Manual, section 8. The circuit for the TCF Temp Sensor is shown in the SETUP Manual, in Appendix M. Before you use it for the first time, you need to fill in the information on the Focuser Setup Dialogue page (access this using the Parameters Tab on the Focuser's main page). You can also set the gain and offset for the temp sensor to read out in degrees C. The Gain value suggested is pretty close and will probably work fine for you. The offset may need to be adjusted a couple of times till the temp reported matches a reliable thermometer held near to the sensor.

The operations for the zero position sensor have been changed and re-named from what is in the current manual. It is now referred to as the "Position Sensor". The circuit for the Position Sensor is shown in the SETUP Manual, in Appendix M. Before you use it for the first time, you need to fill in the information on the Focuser Setup Dialogue page (access this using the Parameters Tab on the Focuser's main page). Before you use it for the first time, you should determine what the approximate total focuser travel is, and what the mid travel position is for your focuser and enter the id travel position in the Setup Window as the "Transition Point". Then move the focuser to this mid travel position, and adjust your position sensor to change state at that position. Also, check the "Focuser has sensor for Initialization, and select which direction to move the focuser from its normally focused position to cause the sensor to change state.

The idea is that when you click on the Initialize focuser with Position sensor, the focuser will move in the initial direction you specified till the sensor changes state (sensor uncovered to covered, or vice versa) and then stop there and set the position of the focuser to the mid travel position you specified as the transition point.

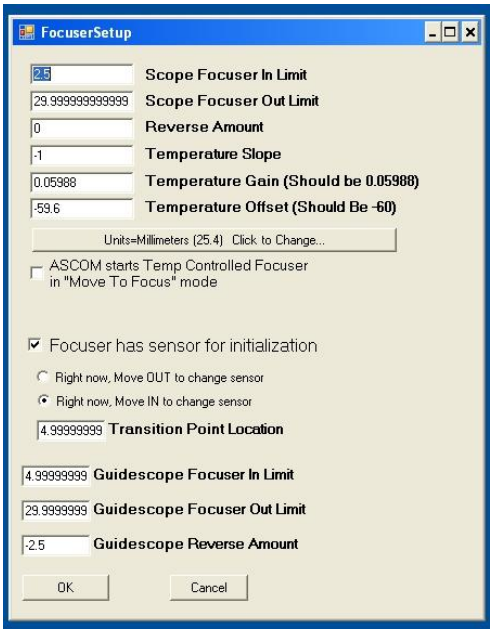
If you do not have a position sensor, do the same type of setup (move the focuser to the midpoint, etc.), but then create a "setpoint" with a name like "Init" with the value for the position the location of that midpoint in the focuser's travel. Then use the "Set Focuser to this SetPoint" buttons for the "Init" setpoint you just created.

Then, after the focuser is "initialized" move the focuser to where the CCD camera is in focus, and name a setpoint (rightclick on an unused setpoint) for that focus position. Then set the setpoint value to the position the focuser is reporting by clicking on the "M" to the right of the setpoint.

NOTE: Be sure to click on "Save Presets" to write all this hard earned work to the focuser.cfg file so it is not lost!!

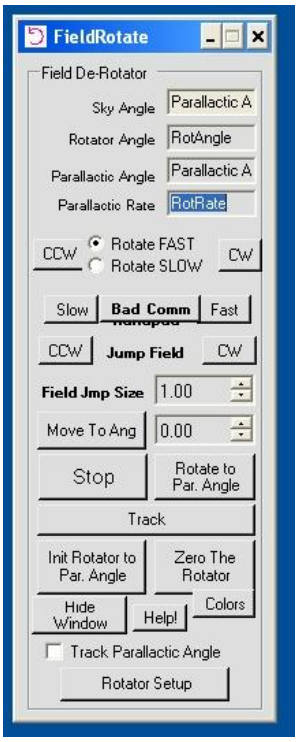
The remaining controls are essentially unchanged from those written up in the current version of the Operations Manual in Section 8. Be sure to set up your IN and OUT limits per section 8, as well as the backlash settings (if fully racked IN = 0, then backlash is usually a negative number)

Note: always click on "Hide Window" rather than the X in the upper right corner. The window will minimize to the task bar at the bottom, but will not close until Sitechexe is closed. The Rotator window behaves the same way.



5) Rotator Support (MaxIm control using SBIG CCD or OAG)

The rotator capability is essentially as described in the Operations Manual, Section 9. Do not forget to click on Rotator Setup at the bottom of the rotator window to set the maximum rotator rotation in either direction. This will prevent twisting any cables going to your camera equipment.



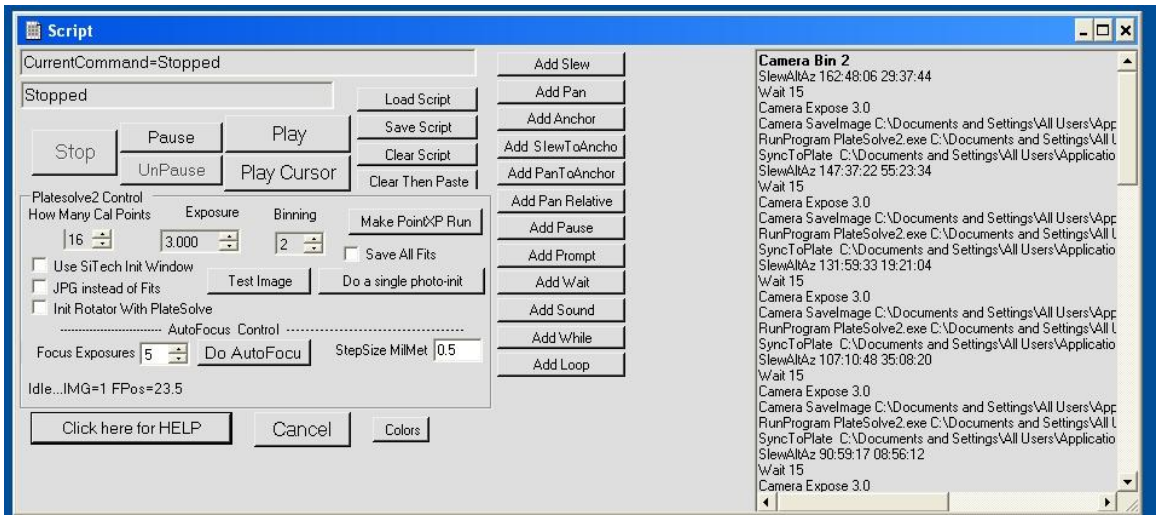
You can also initialize the rotator to the correct parallactic angle based on a plate solution by PlateSolve2 by checking the "Init Rotator with PlateSolve" box on the scripting window.

MaxIm has a cool capability that works with the Sitech ASCOM Rotator. It shows a reticle for the camera FOV and a box for the guider chip FOV, and you simple grab the guider box and rotate it around the camera FOV to easily rotate the system to capture a desired guide star. Obviously you have to connect to the ASCOM Sitech Rotator from MaxImDL for this to work

Note: The boxes for Parallactic angle and rate are not data entry boxes. They simply display the data for what the angle and rate is for the point the scope is aimed at.

6) New Scripting capabilities (Start from cursor, Autofocus, Init rotator, use jpg images, take Test Images)

Scripting is one of the more powerful capabilities in Sitechexe, and several new capabilities have been added in this area.



There are a number of various reasons why you might find yourself pausing or even stopping a script before it completes, and then you would perhaps like to restart the script from other than the current position or at the beginning. You can now simply click on the point in the script window you want to start the script from, and then click on Play Cursor to start the script from that position.

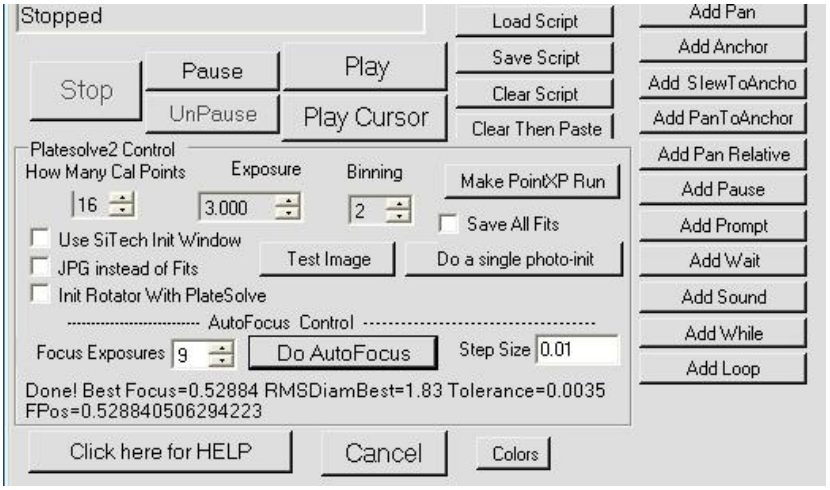
If you want to take a test image to verify things are set up correctly without having to run a script or do an Init, you may simply click on Test Image.

Click on Single Photo Init to take an image, and automatically perform a plate solve on it using PlateSolve2, and use that solution to send an Init to Sitechexe (You will need to have Sitechexe already have a reasonable idea of where it is first, and have all the setup items filled in on the configuration pages for the telescope, CCD camera and acquisition software first)

You can also initialize the rotator to the correct parallactic angle based on a plate solution by PlateSolve2 by checking the “Init Rotator with PlateSolve” box on the scripting window.

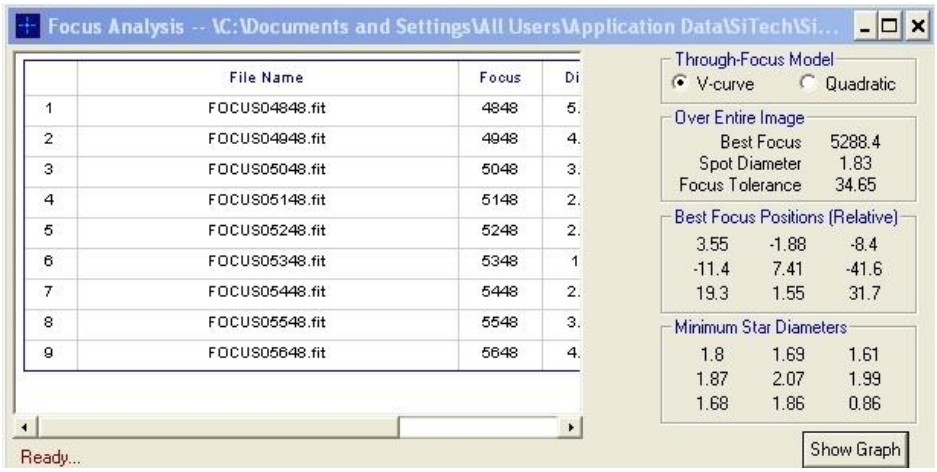
Sitechexe can also perform a very accurate and fast autofocus activity using PlateSolve2 and PointXP5. While most autofocus routines use a single star to perform the focus

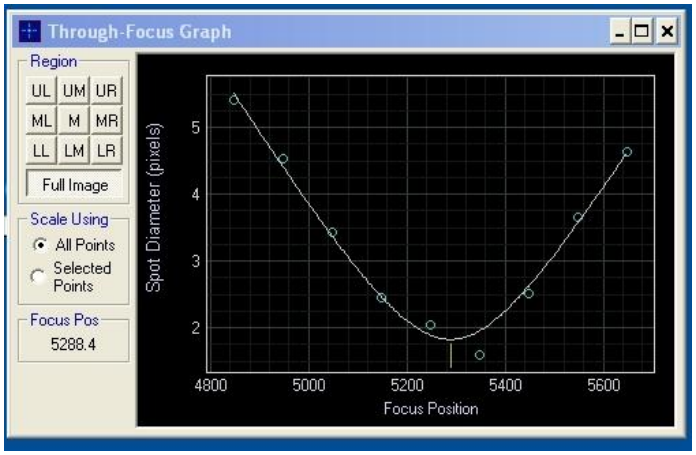
analysis on, the Platesolve2 Autofocus routine calculates a weighted average of all of the star diameters in the field of view to determine the best focus, and also makes a calculation of focal plane tilt. Using all of the stars really helps to find the best focus in unsteady seeing conditions. The same information for being properly configured to do a scripted Platesolve2 run must be configured, in addition to the two parameters needed in the Autofocus area. The results of the autofocus activity will be shown in the Autofocus Control area of the Run Script window, and in the Autofocus screens that will open. The data includes best focus position, RMS diameter at best focus (in pixels), and Focus Tolerance (which is the amount the focus must change to make a 3% difference in the star diameter).



When setting focus steps, keep them small enough to not drive really far out of focus, and have the starting position already reasonably well focused. Several images will be taken, with some inside focus, and some outside focus. Click on View Graph to see the "V-Curve" of the data.

The focal plane tilt is based on the best focus positions calculated in each region of a 3x3 array in the image. The panel labeled "Best Focus Positions (Relative)" gives the offsets, in focuser movement units, of these best focus positions relative to the overall image average. If there is a large difference in the focus positions across the image, then it's possible that the optical system has significant focal plane tilt. To use this feature with maximum reliability and robustness, it's a good idea to point the telescope at the center of the Milky Way (if possible) in order to have many stars in the analysis of each region. One should take several focus runs pointed in slightly different directions, checking for tilt consistency. Slewing the telescope to a different part of the sky can cause relatively large changes in the collimation of some optical systems due to flexure and hysteresis. It's a good idea to carefully study the focal plane tilt before making adjustments to the optical system.





7) Joystick

One of the more fun capabilities that have been added is the ability to use a joystick in addition to a handpad. You need to have the joystick plugged into the PC before starting Sitechexe, and it is recommended to do the Joystick Calibration routine available in the control panel on the PC. Then start Sitech, and check the "Use Joystick" box in the Sitech Config pages/Mount Parms tab. There is no other configuration required in Sitech to be able to use it.

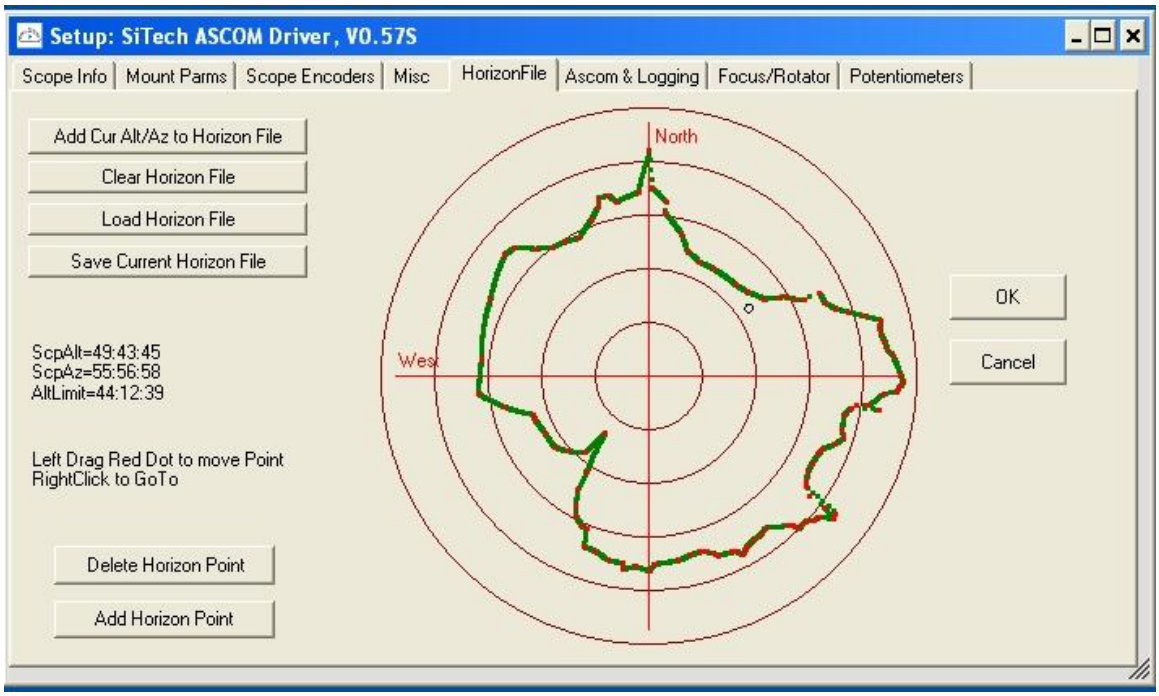
There is a very slight delay when using the joystick, but it is easy to learn to compensate for it. The larger the deflection of the Joystick, the faster the motion of the mount. You also have to hold the trigger pulled during the whole time the stick is deflected to have the joystick input recognized (again, this is actually very easy to).

8) Jog

Users that operate their scopes remotely (even if only from inside a warming room), asked for a "jog" capability, and it is included in this release. On the Sitech Main Page, SCOPE tab, just below the virtual handpad buttons, enable the JOG capability by checking the Jog button. Just below that, enter the distance you want the jog to be in Arc Minutes. Then to Jog, click on one of the virtual handpad buttons (do not hold it down).

9) Altitude Limit management (Horizon file builder, multiple Hrz files, alt limit vs horizon file)

The horizon file builder tool was added in the version 56 series of releases, but is included in these notes. In the Configuration pages (Config Tab>Change Config!>HorizonFile tab) the horizon file tool is made available. For users with portable scopes that want to use scripted activities that use a local horizon, this tool is a quick and easy way to build and save multiple horizon files.



The horizon file is ALWAYS used by the program CalPointsXP when you have Sitech build a scripted PXP run. Now you also have the option to use the same file as your local altitude limit instead of having to use a set altitude value. To select which option you

want to use for your altitude lower limit, do to the Config tab>Change Config!>Mount Parms tab and check (or not?) the "Use Horizon File Sitech.hrz"

If you already have a horizon file for your system at your current location, but you want to use this tool to improve it, save your current file by clicking on "Save Current Horizon File", and give it a unique name. Then either click on "Clear Horizon File" to start building a new one from scratch, or use the procedure below to Add or Delete points to edit the existing file being used.

After you have properly initialized your mount, aim the mount as low as possible at a point on your local horizon but so that the field of view is not blocked. Then simply click on the "Add Cur Alt/Az to Horizon File" You may also add or delete points in your horizon file by simply clicking on that point and then clicking on the Delete Horizon Point or the Add Horizon Point. You may also simply move a point (Red dots) by Left button Dragging it. Right Click on a red dot to do a GOTO to that dot.

You can also add points that the scope is already aimed at by simply going to the Sitech Main Screen Config Tab, and clicking on the button "Add Cur Alt/Az to Horizon File" button. Just be careful not to accidently add points by clicking this button when you meant to click on the Change Config Button!!

When you are done, click on Save Current Horizon File and save it with the filename Sitech.hrz, and put it in its own folder that has a unique name. When you load it, simply go to that folder and copy it over the existing Sitech.hrz file (the operational file must always be named Sitech.hrz).

10) Multiple Serial Ports

The capability to use separate serial ports for multiple controllers was added in the version 56 series of releases, as well as being able to change serial ports on the fly, and to show which serial ports are currently available , missing or being used. The serial ports you use can be native serial ports (i.e. built in db9 connectors on the PC), or usb-serial dongles, or a mix. If you are using two ServoI controllers, you may also use a single serial port for both controllers if you use a "Y-cable" for the serial cable as shown in Appendix E of the SETUP Manual. The Y-cable option is not available when using a ServoII controller with a ServoI controller as the second controller.

When using a 2nd controller (for a focuser or rotator), the 2nd controller must be set to "Addr 3" (not the same as serial port Comm 3) no matter if it is on its own separate serial port or not. Specify the serial port for the second controller on the Config tab>Change Config!>Misc tab. You can also specify a different comm delay for the 2nd serial

controller if you wish. However, if you use the Y-cable option, the Focuser/Rotator must be set to the same comm port as the RA/Dec controller, and the comm delay will be the one set for the RA/Dec controller.

The RA/Dec (Alt/Az) controller comm delay and serial port to use is still set on the Misc tab in the Configuration pages.

The ServoII controller has a built in usb-serial converter for plugging in the ServoII directly to a USB port, or it may use a native serial connection directly. There is a jumper on the bottom of the controller to select which Config to use (jumper removed for USB option). To flash the ServoII controller, you must use the usb option…

11) Cycle Comm Port

The communications link between the Sitech Controller and the PC running Sitechexe must be maintained and be error free to use all of the capabilities and accuracy provided by Sitechexe.exe

If the comm link itself is lost, error messages will show up on the status window on the Sitech main page, and if "mute" is not checked on the Config pages>Misc Tab, a "Lost Communication with Sitech" voice msg will be heard. However, if the data gets garbled but the serial link is still OK, you do not get notified of a comm problem, but strange things could be happening with Sitechexe. So, two capabilities were added. The first is a checksum is automatically used on the comm link data, and if bad checksums are noted, the comm link is "cycled" automatically. The second capability is the ability to manually cycle the comm link without having to burrow all the way into the Config pages. So now, there is a "Cycle Comm Port" button on the Sitech Main Screen Config Tab. You may see that button become "lighted" occasionally if the Sitech checksum routine cycles the comm port on your behalf. This capability has dramatically reduced the problems seen due to comm link sync issues!

12) Clock Calibration fix

There was a Bug Fix made in the Version 56 series of releases to correct the Clock Calibration routine. If a user had performed a Clock Calibration, the sign of the calibration had been reversed, and tracking actually was made worse not better. That is fixed now, and tracking is fixed

Use the Features Tab>Offset Tracking Rates page to perform a clock calibration. Click on Servo Cal to 1.0, and then use the system non-stop for at least 30 minutes (60 minutes is better). Then return to the Offset Tracking Rates page and click on "Save ServoCal".

13) Manual Limit Changes

There are two new limits that are user configurable by manually editing Sitech.cfg (use notepad or any other ascii text editor to open, edit, and re-save the file). These do not have a GUI interface from within Sitechexe since they are rarely needed to be changed, but are now available just in case….

a) CamTimeout=15 This is the default time (in seconds) that the Platesolve modeling script will wait for an image to be downloaded and saved for use by PlateSolve. Since larger (or slower) camera downloads can take longer times, if the script is timing out waiting for the image to be available, set this to a longer and longer time (determine by trial and error). Keep it as short as possible however so the script is not slowed down more than required. There is a limit needed instead of simply waiting and waiting forever in case there is a camera problem, etc.

b) TrackError Limit=10 This is the error limit sensed by Sitech in position error that will cause Sitechexe to put the controller into Manual (Blinky) Mode. For instance, at a star party if a guest bumps the scope, but the movement is less than this limit, the scope encoders will drive the scope back to its original position. However, if the bump is more than this limit, the system will go into Blinky mode to protect the system. If you think its OK to tolerate more than 10 deg bumps for your system, edit this to a larger value. Note, this also will increase the limit for anything else that may happen to make the commanded and reported tracking position send the system into Blinky mode (like a hardware jam… the system will take longer if a jam occurs to accumulate errors up to a larger limit)

14) ServoConfig 1.3

A new ServoConfig is now installed with the Installation package. Use this version 1.3 to update/flash/configure both ServoI and ServoI controllers. The capabilities and use of the ServoConfig program are unchanged from what is described in the SETUP Manual.

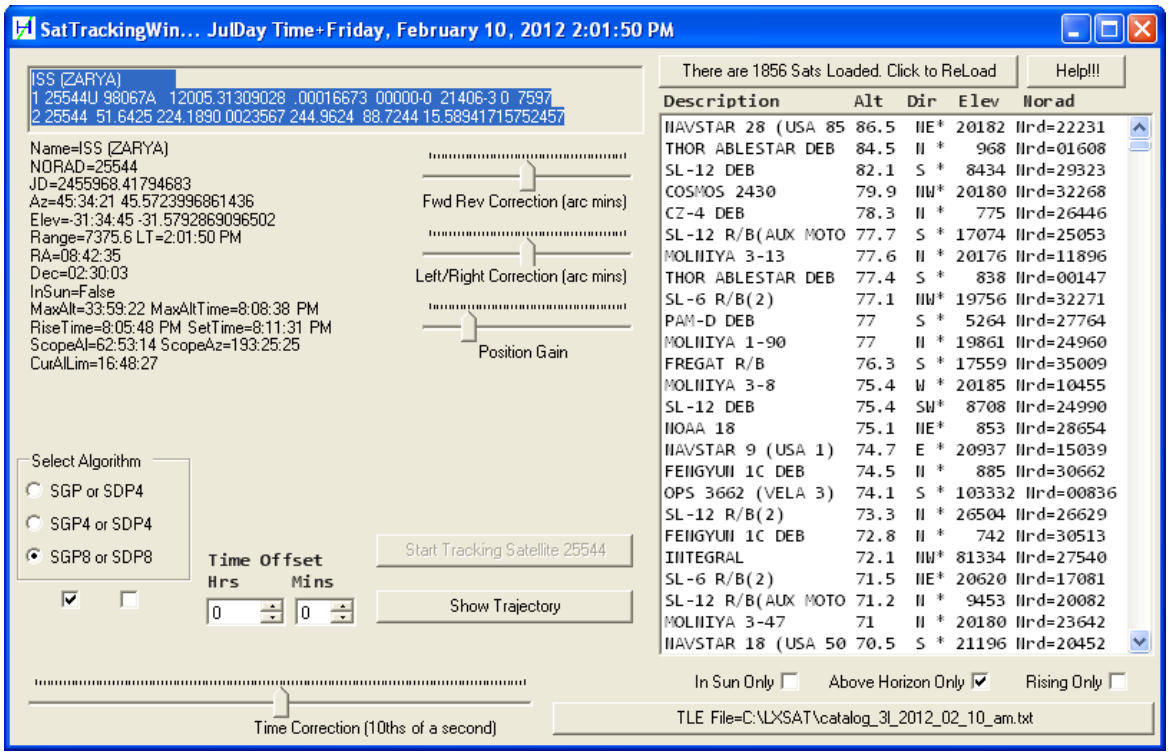
NOTE: Servo I and Servo II controllers still must use different firmware, but Sitechexe.exe runs with both)

15) Satellite Tracking

A really cool new capability for using your scope is now contained within Sitechexe for being able to track satellites with your telescope. In the past, Sitech had to rely on a separate program (SatTracker.exe) for the commands to track a satellite, and a 3rd program (LXtoSitech) to translate those tracking commands (which were in Meade's LX200 format) to ASCOM commands for Sitech to understand and act on. Then a 4th Program also had to be run to create a virtual comm port to allow the translator and the two different programs to be able to connect to each other. Whew…. It worked pretty good, but users did not like having to have all that complexity.

So, Dan wrote his own Satellite tracking routine and incorporated it inside Sitechexe! And it uses the new SkyView to show the trajectory of the Satellite you choose to track along with where the scope is aimed. The only part that is NOT inside Sitechexe is the freeware program to download the "Two-Line-Elements (TLE's)" from "Space-Track" which is an organization that maintains current orbital data for satellites. The freeware program is named "TLERetriever2.exe". There is more information on this program and how to get it and use it at the end of this Satellite Tracking section.

The Satellite Tracking page is accessed from the Sitech Features Tab, Sat Track button.



There are two parts to the SiTechExe Satellite Tracking Screen, the left half is data about the satellite you've selected, and ways to control it.
The right half of the screen has to do with loading and selecting a satellite from your database.

We'll start with the database part of the SiTechExe Satellite Tracking screen, or the right side of the screen

********** Screen Right Side: Database **********

There is a very wide button near the bottom of the right hand side labeled TLE File= and your current TLE file, or "NoName" if none is selected. To select a file, click here, and browse to your file. As mentioned previously, you can get your files from:
http://celestrak.com/
or
https://www.space-track.org/perl/login.pl
You MUST register with Space-Track to get their data.

As soon as you select a file, it's loaded into the large Listbox on the right side of the screen.

There are 3 checkboxes above this button, you can select which satellites to read into the ListBox.
1. Sun Only: The satellite has to be in the sun.
2. Above Horizon Only: The satellite has to be above the horizon.
3. Rising Only: The satellite must be rising. Buttons 2 and 3 are mutually exclusive.
When you make a change to these buttons, the listbox is immediately updated.
The default is Above Horizon Only.

Above the Listbox are 4 labels, Description, Alt, Dir, Elev, Norad These are Clickable, and the Listbox will be ordered by what you click on.

I like to click on Rising Only checkbox, then sort by altitude, and you can see all of the high satellites.
Also, you can click on Elev, and the low earth orbit satellites are listed first. These move FAST!

The altitude and Direction are not updated except at the time a change is made, such as loading a new file, changing the InSun, Rising Only, or Clicking the Refresh button at the top of the listbox.

********** Screen Left Side Satellite Control **********
Now that you've selected a satellite, we'll concentrate on the left half of the screen:

Ok, starting at the upper left is a TextBox that is read only. It is the current TLE data. You can read here, to see what all the numbers mean:
http://celestrak.com/NORAD/documentation/tle-fmt.asp

The default is an early 2010 TLE of the space station. Whenever you select a new satellite, the TLE is displayed here.

Next down is information about the current satellite you've selected....

- Name: Name, from the 1st line of the 3 lines of data.
- NORAD Number.... You can find information on the web about this particular satellite on the web, here's one alternative:
- http://celestrak.com/satcat/search.asp Just enter the NORAD Number,
- Next is the current Julian Day, used for these calculations
- Next is the azimuth of the satellite.
- Next is the altitude or elevation above the horizon of the satellite.
- Next is the Range in Kilometers from you to the satellite.
- Next is the RA or Right Ascension of the satellite. If tracking a satellite, you'll also see the Error between where the satellite is, and where the telescope is.
- Next is the Declination, same as Right Ascension.
- Next is an indicator if the satellite is in the sun or not.

Pass Information:

- Next line is the maximum altitude of the next pass, and the time of maximum altitude.
- Next line is the Rise time, where it rises above 10 degrees over your horizon, and also the set time, when it falls back below 10 deg's.

  Important note: The pass indications above, may NOT agree with where the satellite is currently, that's because the pass indications are from 10 deg's. You could have a satellite selected, that's above the horizon, but if it never makes it above 10 degrees, then it will not be considered a valid "Pass".

Scope Information:

- Next is the telescope Altitude and Azimuth,
- Next is the telescope current lower altitude limit, based on your azimuth if using your Horizon File.

Next is a box which allows you to select the algorithm used. There are a total of 5 algorithms published by Norad (originally in the language Fortran). Three for satellites closer than about 5,900 Kilometers average distance from the surface of the earth, and Two for the satellites farther.

SGP, SGP4, SGP8, are for the closer satellites, and SDP4 and SDP8 are for the farther satellites. For a discussion of these algorithms, you can go here:
http://en.wikipedia.org/wiki/Simplified_perturbations_models
If the satellite is not visible, you can try the other settings. Theoretically, the SDP8 and SGP8 are supposed to be more accurate.

Underneath this box is two checkboxes, used as indicators only, to indicate if using the SDPn model or the SGPn model

There is a time offset feature, where you can see the passes, etc, in the future or the past. This does NOT affect the trajectory in the SkyView window, just the current satellite RA and Dec.

You can slide the very bottom slider, to correct for a slow or fast PC Clock. This does not affect the trajectory either, just the current satellite RA and Dec.

Clicking on the ShowTrajectory button will update the trajectory in the SkyView window. This window must already be opened. If it's a slow satellite, the satellite (and telescope if you're tracking it) may appear to drift from the trajectory. In fact, it is not. Just click the "ShowTrajectory" button again, it will update.

Next is the "Track Satellite" button.
If it is "Grayed out", then you can't track the current satellite now. Here's the reasons:

1. The satellite is below 10 deg's in elevation and rising
2. The satellite is below your altitude limit and falling
3. Your telescope isn't initialized

If it's not grayed out, you can track the satellite.
When you click on "Track Satellite" the text changes to "Stop Tracking Satellite". Your telescope will move to intercept the satellite. If the satellite is rising and it's below your altitude limit, the telescope will move to just above your altitude limit and wait for the satellite to appear. You can watch the satellites progress in the SkyView window.

Once it starts tracking the satellite, there are some options for you...
1. Position Gain. Slide to the left if there is too much oscillation.
Slide to the right to decrease the error between the RA and Dec of the satellite, and the RA and Dec of the telescope. The higher the number, the lower the gain.

2. Left Right Correction. This moves the telescope relative to the trajectory of the satellite, left or right. You can also do this with the Left/Right arrows on the (real) telescope telescope handpad when tracking a satellite. When you stop tracking a satellite, the handpad reverts to normal operation.

3. Fwd Reverse Correction. This moves the telescope relative to the trajectory of the satellite, Forward or Reverse. You can also do this with the up/down arrows on the (real) telescope handpad when tracking a satellite. When you stop tracking a satellite, the handpad reverts to normal operation.

Clicking on the Text, just below the slider will revert the correction to zero. This is also done when you stop tracking the satellite.

********** What to do if you can't find the satellite? **********

- Be sure your Site Latitude, Site Longitude and site elevation are very accurate in SiTech config.

- Be sure your computer clock is very accurate (to within 1 sec)
- Use the very latest TLE data from Space-Track.
- Do a telescope Model using PointXP.
- Try the different Satellite Tracking Algorithms, SGP, SGP4, SGP8 Look up the Norad Number on the internet and see if it has decayed.
- Make sure it's in the sun.
- Check the transit time and transit elevation of the satellite displayed in SiTech with heavens-above.com or other satellite software that's proven, and be sure it's the same (look for a possible bug in SiTech algorithms).
- Do longer exposures for fainter satellites.

The following screen grabs are to illustrate what trajectories look like and how to interpret things….

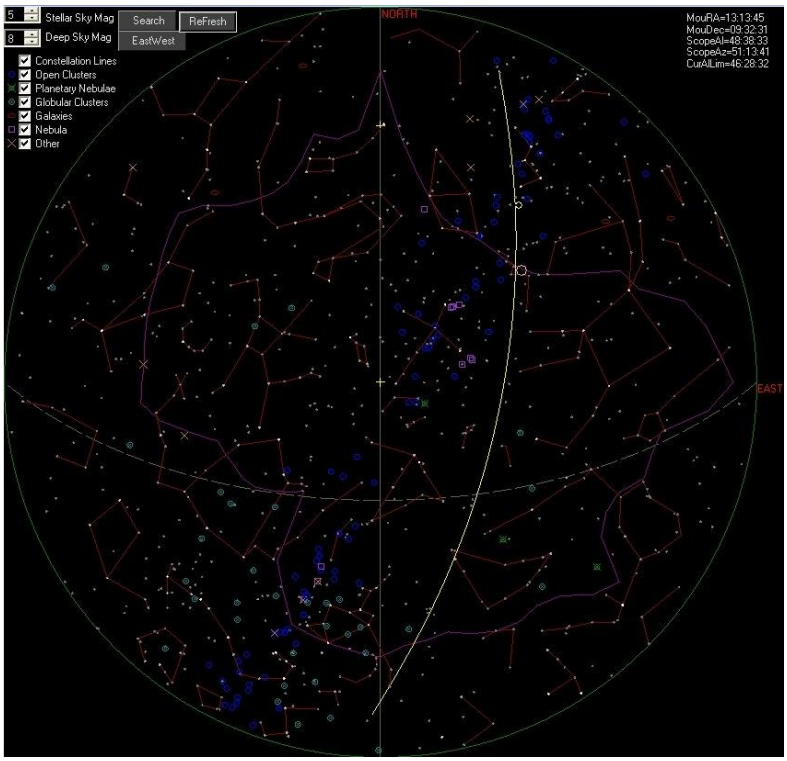
Select a satellite by clicking on it, and look at the trajectory by clicking on the "Show Trajectory" button.

If the satellite is above the Satellite low altitude limit (the higher of 10 degrees above a zero altitude horizon, or your local horizon as captured in the Sitech.hrz file and shown on the SkyView), then when you click on Start Tracking the scope will do a GOTO to the Sat position and start tracking it. The Sat cursor is a small circle, and the scope cursor is a larger circle. When the two circles are concentric the sat should by in the FOV.

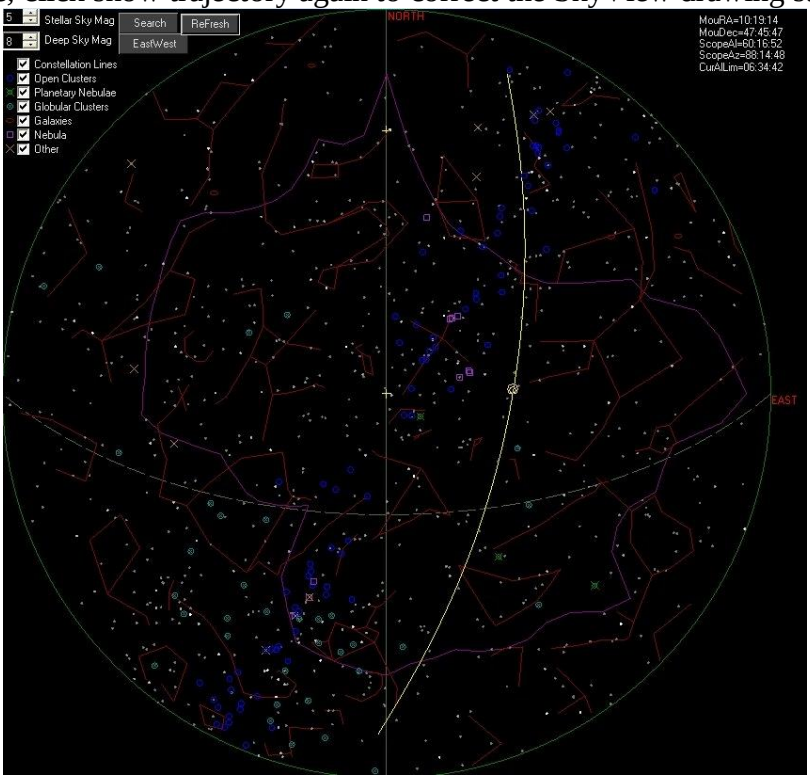
If the Sat is rising (elevation is increasing) but is below the altitude limit, the scope will slew to where the trajectory crosses the alt limit, and wait for the sat to rise enough to be above the alt limit, and then it will start tracking it.

By displaying the trajectories, you can also easily determine if the trajectory is a good candidate to be tracked…. If you have a GEM, you do not want the trajectory to cross the meridian since it will have to do a meridian flip and you will lose tracking. It also should be in sunlight, else it will not be visible, and it needs to be above your altitude limit.

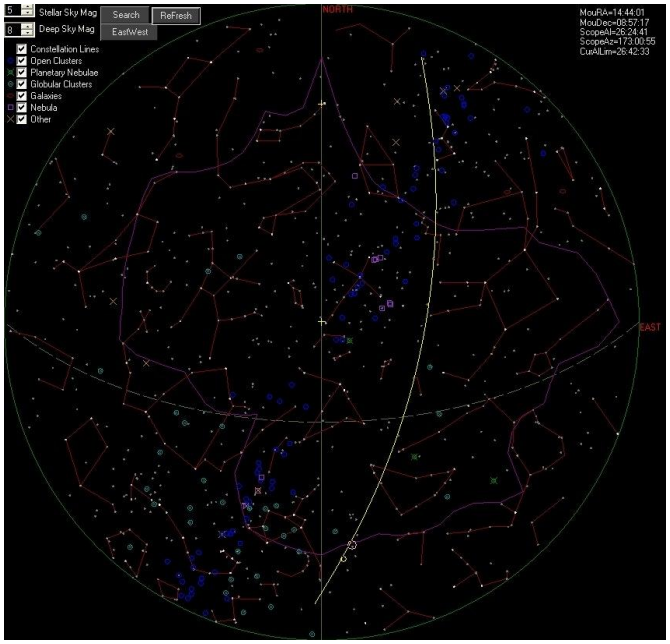
The trajectory shown below meets these criteria and shows the rising satellite coming up from the northern horizon moving south but still below the northern local horizon altitude limit (shown by the purple line), with the scope waiting at the alt limit for the satellite to arrive:



The following screen grab shows the satellite is being tracked by the scope. Note the telescope cursor and the satellite cursor are concentric. Remember, if it drifts off the trajectory line, click show trajectory again to correct the SkyView drawing status



This screen grab shows the scope has stopped tracking at the local horizon altitude limit while the satellite continues on towards the southern horizon.



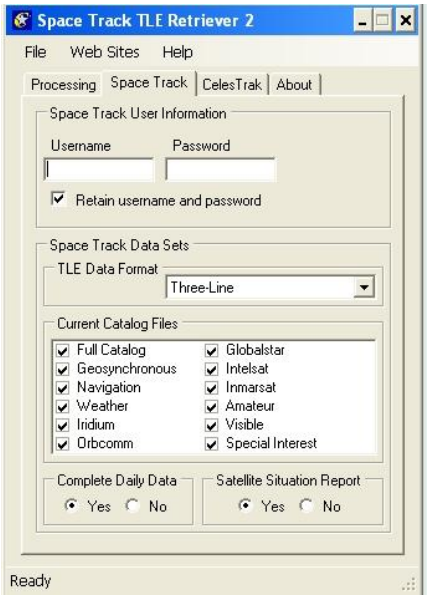
TLERetriever2.exe

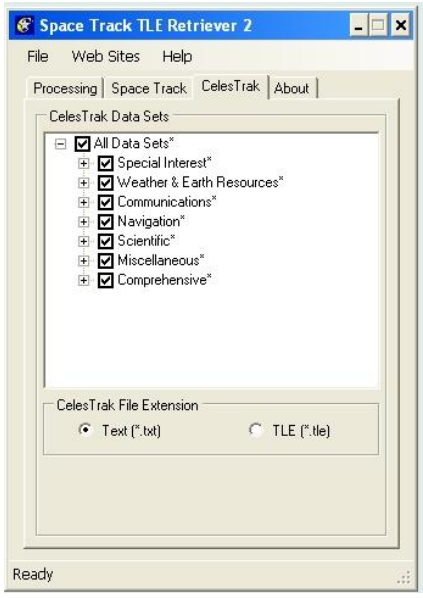
To download the TLE data for the satellite trajectories, you can download the freeware program TLERetriever2 from the following link:
http://celestrak.com/SpaceTrack/TLERetriever2help.asp
(Click on the link: "Version 2.0.1.1" in the paragraph named "Latest Version" which is just below the screen grab graphic at the top of the website.

You will also have to have a Space-Track userID and password (also for free) to download the TLEs. Get your userid and password using the following link:
https://www.space-track.org/perl/login.pl

The TLERetriever2 setup should be per the following 3 screen grabs. The first is the "Processing Tab". After setting things up with the other tabs, return to this tab and click on "Download Data". When the download has stopped, it will report how many files have been downloaded in the bottom left are where this screen grab says "ready". Then click on "Process Data" to process the data into a format that Sitechexe can read.

The following two screen grabs are of the Space Track tab and the CelesTrak tabs. Make yours configured the same as shown here for a starting configuration (obviously use your own userid and password):





The data you will want to point the Sitechexe Sat Tracker routine to is saved to a directory the TLE Retriever made. It is usually called:
C:\Documents and Settings\Chuck Shaw\My Documents\My TLEs\CelesTrak
NOTE: Obviously this is for my system (Win XP Pro SP3) and user name, so yours will be similar but not quite the same….

Acknowledgments:
Bill Gray from Project Pluto has provided a lot of program source code on his website. I converted his CPP implementation of SGP, SGP4, SGP8, SDP4 and SDP8 to C# for satellite tracking, thanks Bill.

The Flamsteed and Bright Star Catalogs all 5thMagStars and 3rdMag Stars came from Don Ware, Thanks Don!

The data for the NGC and IC projects came from: http://www.ngcic.org/
Here is the quote from their website:
The Historically Corrected New General CatalogueT (HCNGC) Ver 1.11
CopyrightC 2006 by The NGC/IC Project LLC (http://www.ngcic.org) - All rights reserved.
Permission is given for any non-commercial use of this data. For commercial use (Magazines, software, starcharts), permission for limited use is granted if the following acknowledgement is provided: 'The data used in this product, in whole or in part, is used with permission of The NGC/IC Project LLC - http://www.ngcic.org' - please contact Bob Erdmann at hcngc@ngcic.org for any questions or clarifications.

I have also changed the format of the data as well.
Dan Gray
http://www.siderealtechnology.com

Version History:

057U: (Really 0.90A)
* Changed layout of Sat Track window
* Added the equatorial lines to sky window
* added logging of sat tracking
* added sat ISDeep indicator.
* Stop Tracking Satellite if sat tracking window closed
*Fixed Jump in RA when tracking satellite through 0 hrs RA

057T:
* Fixed Can't select more than one object
* Added a few more defaults to focuser config if file an old file. Hopefully won't crash now if old file.
* Won't erase an old focuser config file if it can't open it. You get a warning instead, and default values.
* Erases sat trajectory when closing sat screen
*

057S:
* Fixed magnitude limit on deep sky objects
* Fixed can't connect via ascom if no serial port (You're welcome chuck!).
* Made delay shorter if can't connect
* Fixed the scope indicator in SkyWin if changed latitude.
* Added scopeal/az/altlimit to SkyWin
* Added celestial equ to SkyWin
* Added separate sidereal time for the sky window, so things stay in sync
* Added Refresh button on SkyView
* Fixed a few redraw glitches

057R:
* Added some icons for sub windows
* Fixed SkyWindow Database Search of single object, such as "horsehead"
* Fixed Focuser Window coming up on startup
* Logged whenever tracking is stopped (if logging on)
* Added reverse left/right skyview option
* made skyview redraw be a background task
* Can't track satellite if scope not initialized

057Q:
* Added tracking error limit adjustment (manual edit of cfg file "TrackErrorLimit=10.0")
* Added Camera Timeout adjustment (manual edit of cfg file "CamTimeout=15")
*
* Fixed/Changed a few things in satTracking
* fixed/Changed a few things in SkyView

057P
* Added Planetarium screen with databases and searches.

057O
* fixed xor so satellite and scope postions don't leave mouse turds

057N
 * Added Satellite Graphic
 * Fixed blowning up on startup with old focuser config file.
 * Added Tracking COrrections with Satellite, via sliders, and handpad
 * Fixed a few Satellite tracking bugs

057M
 * Working on Satellite Tracking
 * Fixed park on startup bug.

057L
 * Back to .Net 4.1!!!! Ugh!

057K
 * Made eng units in autofocus same as focus.
 * made altitude limit work with horizon file OR horizon limit, not both.
 * Made script proceed to next line if goto less than altitude limit.
 * Made a way to interrupt the focuser init to sensor
 * focuser init to sensor stops at the end.
 * Added a focuser init to zero point button
 * Fixed a rototor bug or two
 * Changed focuser zero sensor to init sensor
 * Added the tracking rates to the joystick control
 * Edited the 3 ascom drivers, now 1.1, and fixed a few issues
 * Moved from .NET 4 to .NET 3.5. Note, Ascom Diagnostics doesn't connect properly with .Net Remoting with 3.5, but works ok otherwise.
 * Edited the Installer, registers properly now.
 * Fixed a bug in horizon file loading a new one.
 * Updated and added LXToSiTech.txt to the data folder
 * Made a new version of LXToSiTech with the new data folder structure.

057J Fixed more focuser bugs and made an installer.

057I FIxed more focuser bugs

057H fixed a few more focuser thingys.
 * Made an option to initialize the rotator with Platesolve

057G fixed a few focuser thingys. Added engineering units options.

057F Sped up the starting sequence

057E fixed stuff for chuck to get going, mainly focuser stuff
0.57D
*Added RMS and Peak to the PXP button text
*Can clear all pxp terms by right clicking the PXP button
Can load/save horizon files.
*Script starts at cursor
*Made jog option

* Added John McClusky's Rotator and Focuser routines
* Tweaked the SiTechFocuser Ascom Driver, and made it ascom 5 compatable
* Created the SiTechRotator Ascom Driver, and made it ascom 5 compatable
* Added reading the serial ports in the background in Setup.
* Added Joystick Support
* Fixed a focuser/rotator communication bug
* Fixed Platesolve from script

0.57C
*All kinds of stuff. Main one is the auto focus using PlateSolve2.
*Also hopefully fixed how PointXPAX5 is used, precessing, etc....

0.57B
Added home fast speeds as parameter
* Limit Switches color the movement arrow buttons red.

0.57A
Migrated to Visual C# 2010 Express.
Added separate files for separate serial port logging.

* If possible controller reset, we reset the "gots"
* Fixed the offset init bug.
* Made the system work with PointXPAX
* Made the system work with PlateSolve2.

****