

Overview

CCD Commander is an automatic imaging tool for CCD imagers. It can complete your entire imaging session without any user intervention. This translates to more images and more rest! With CCD Commander you can image one object, or several objects throughout the night, moving the telescope, focusing, and imaging as required.

Requirements

CCD Commander takes advantage of other programs to automate your imaging session.

These programs are required to run CCD Commander:

TheSky6 v6.0.0.33 or later (Professional Edition only) by Software Bisque <http://www.bisque.com>

or

TheSkyX v10.1.8 or later (Professional Edition only) by Software Bisque <http://www.bisque.com>

or

ASCOM Telescope driver v2 or later <http://www.ascom-standards.org>

CCDSOFT v5.00.182 or later by Software Bisque <http://www.bisque.com>

or

MaxIm DL v4.11 or later (including v5.xx & v6.xx) by Diffraction Limited <http://www.cyanogen.com>

If you have an motorized focuser, CCD Commander will use:

FocusMax v3.3.29 or later by Larry Weber and Steve Brady

v3.2.1 Installer available here: <http://www.focusmax.org>

v3.3.29 patch available here: <http://ccdcommander.astromatt.com/FocusMax3329.zip>

Latest version available here: <http://tech.groups.yahoo.com/group/FMaxUG/files/>

CCDSOFT v5.00.182 or later @Focus or @Focus2 by Software Bisque <http://www.bisque.com>

MaxIm DL v5.08 or later Focus by Diffraction Limited <http://www.cyanogen.com>

TheSkyX v10.1.8 or later (Professional Edition only) by Software Bisque <http://www.bisque.com>

If you do not have a motorized focuser, CCD Commander can still be used without the ability to automatically focus.

If you have an instrument rotator, CCD Commander will use:

Optec Pyxis <http://www.optecinc.com>

Astrodon TAKometer <http://www.astrodon.com>

RCOS PIR <http://www.rcopticalsystems.com>

ASCOM Rotator driver v1 or later <http://www.ascom-standards.org>

If you do not have an instrument rotator, CCD Commander can be used without the ability to rotate.

If you have a dome, CCD Commander can use:

Automadome by Software Bisque <http://www.bisque.com>

Digital Dome Works by Technical Innovations <http://www.homedome.com>

ASCOM Dome driver v1 or later <http://www.ascom-standards.org>

If you do not have a dome, CCD Commander can be used without dome control.

If you have a cloud sensor, CCD Commander will use:

Boltwood/Clarity Cloud Sensor (version I or II) <http://www.cyanogen.com>

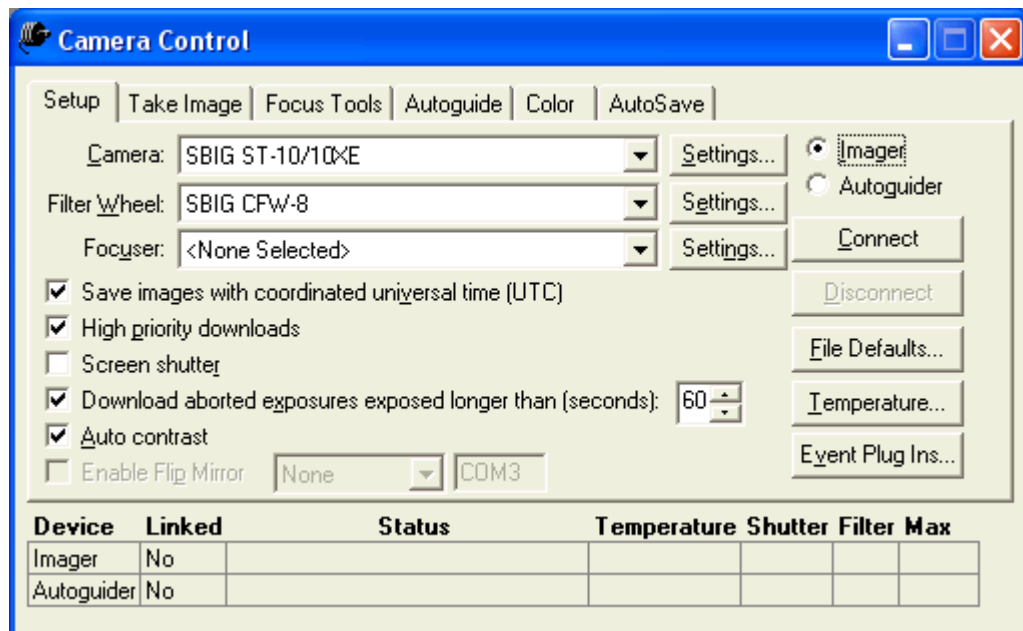
AAG Cloud Watcher http://www.aagware.eu/aag_cloudwatcher.htm

If you do not have a cloud sensor, CCD Commander can be used without cloud monitoring.

Getting Started

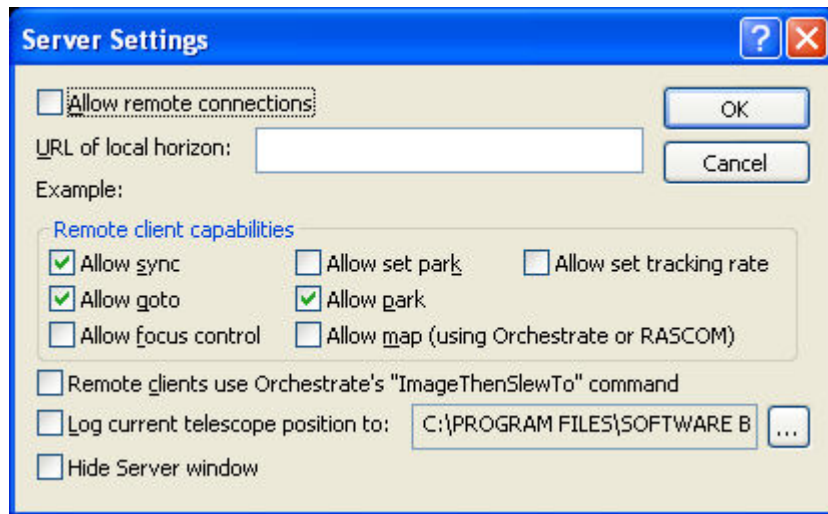
CCD Commander is a robust executive program. In order to work correctly, the other software CCD Commander manages must be first configured. Before you use CCD Commander for the first time, setup your software as described below.

1.
 1. If you want to use CCDSOft:
 1. Enable Events in CCDSOft.
 1. Run CCDSOft.
 2. In the Camera Control window, on the Setup check to see if there is a button called "Event Plug Ins..."



- 2.
- 3.
3. If not, you need to create a folder in your CCDSOft program directory.
 1. Using Windows Explorer, go to this directory on your PC.
 1. ex: "C:\Program Files\Software Bisque\CCDSOft Version 5"
 2. Create a folder named "Camera Event Plug Ins".
- 4.
4. Restart CCDSOft and check that the "Event Plug Ins..." button now shows.
- 2.
2. If you want to use TheSky6:
 1. Setup the "Server Settings" in TheSky6.
 1. Run TheSky6.
 2. Go to the Telescope->Server Settings menu.

- 3.
3. Enable "Allow sync", "Allow goto", and "Allow park". Make sure these three items have check marks next to them.



- 3.
 - 4.
 4. Click Ok.
 - 2.
 2. Setup your telescope's Park position in TheSky6.
 2. CCD Commander will use
 2. the Park function when a major problem has occurred. This should prevent damage from the mount colliding with something. If your mount does not support the Park function in TheSky6, please let me know.
 - 1.
 1. First test the park function - you might not need to do anything. If
 1. you need to setup the Park function, TheSky6 will tell you.
 - 2.
 2. Slew your telescope to the desired "Home" position.
 - 3.
 3. Click the Telescope->Options->SetParkPosition menu item.
 - 3.
 3. Start CCD Commander!
 3. (All other software tools, e.g. MaxIm/DL, TheSkyX, FocusMax, etc., do not require any additional setup with CCD Commander.)
- Now you can setup CCD Commander for use with your system.
- 1.
 1. Setup the program settings in CCD Commander.
 - 1.
 1. Click the Setup menu.
 - 2.
 2. Click on the Control/Device tab. For help with these values click [here](#)
 - 2.
 - 2.
 3. Select your Camera Control program from the drop-down list.
 - 4.
 4. Click the "Get Filters From..." button to pull in your filter descriptions from the camera control program.
 - 5.

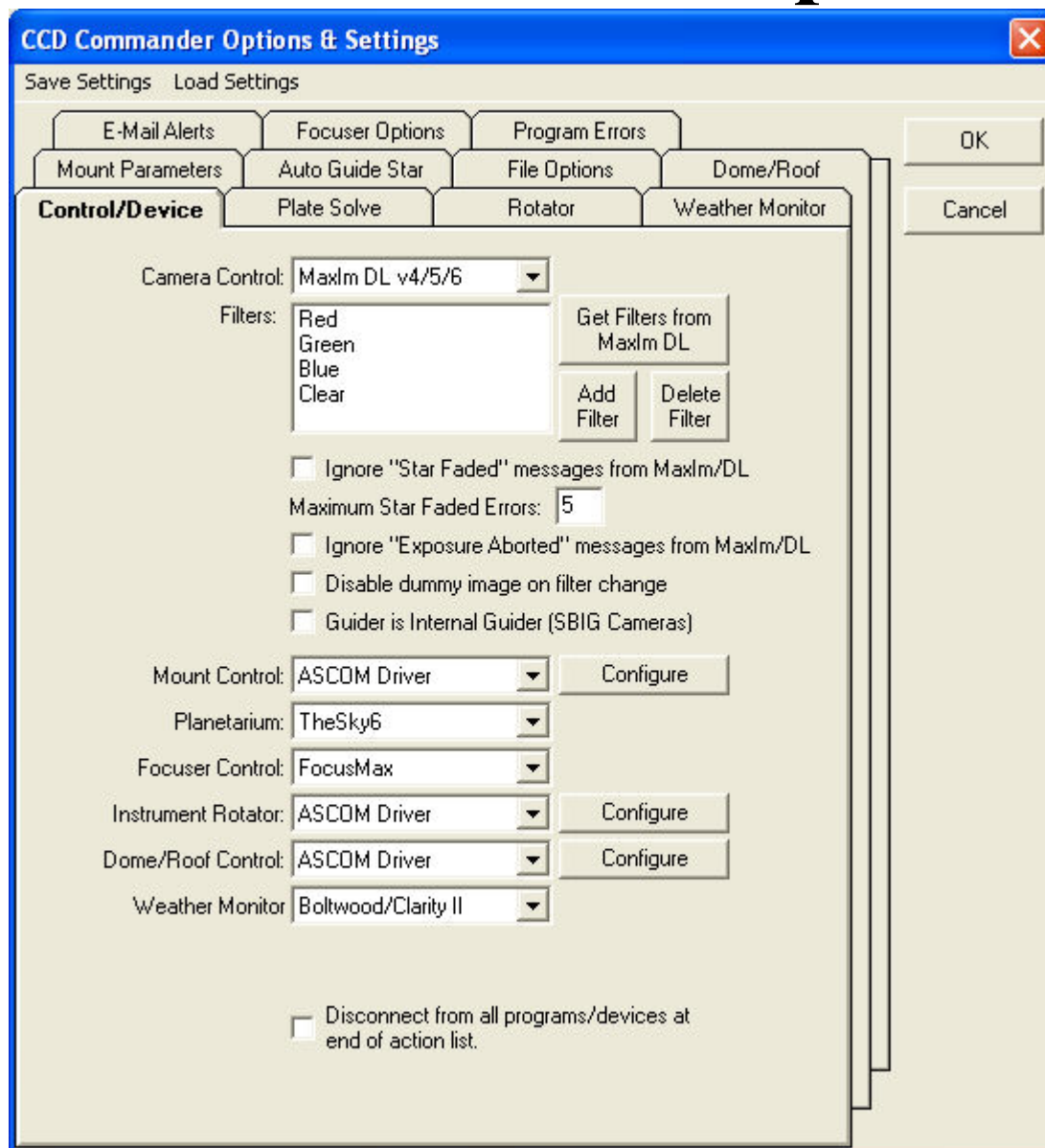
5. Select your Mount Control program from the drop-down list. Be sure to push the Configure button for the ASCOM Driver.
- 6.
6. Select any other programs you wish to use.
- 2.
2. Setup your mount parameters in CCD Commander.
 - 1.
 1. Click the Setup menu.
 - 2.
 2. Click on the Mount Parameters tab. For help with these values click [here](#)
 2. .
 - 3.
 3. S
 3. elect your mount type.
 - 4.
 4. German Equatorial Mounts have additional setup values required in the "GEM Setup" box.
 - 1.
 1. The "Eastern Limit" and "Western Limit" values are very important and tell CCD Commander when a slew will send the mount to the eastern or western side. The easiest way to set these parameters is to manually slew your mount to its limits and read the RA position it is pointing to. Then compute the difference from the current sidereal time. I was able to do this in The Sky using the Motion Controls window. Force the mount to one side of the meridian, slew to the limit, and find out how far from the meridian the mount is. Do this for both the eastern and western limits.
 - 2.
 2. Next tell CCD Commander which side of the meridian you calibrated the autoguider on.
- 3.
3. Setup the Plate Solve parameters in CCD Commander.
 - 1.
 1. Click the Setup menu.
 - 2.
 2. Click on the Plate Solve tab. For help with these values click [here](#)
 2. .
 - 3.
 3. Select your Plate Solve program from the drop-down list.
 - 4.
 4. Enter the appropriate values for the "Pixel Scale" and "North Angle".
 - 1.
 1. CCDSoft users can pull these values from a previously solved image still open in CCDSoft.
 - 5.
 5. PinPoint users need to select the location of the star catalog to use.
 - 6.
 6. MaxIm/PinPoint LE users need to specify a time-out value.
- 4.
4. Setup any of the other parameters you need to use in the Setup window.

CCD Commander is now setup and ready to use! Click [here](#) to learn more about CCD Commander's functionality.

NOTE: With the release of v1.2, some users experienced an error when running an Action List in CCD Commander. The error is reported as, "Error Number: 70" and "Permission Denied". This error is the result of a Windows permission setting. Look [here](#)

in the Troubleshooting section to see how to correct the setting and the error.

Control/Device Setup



Camera Control selects the program you want to use to control your CCD camera. Based on your selection, some items throughout CCD Commander can change.

Special Note: There is two selections in the Camera Control drop-down menu for CCDSoft. One is "CCDSOft v5" and the other is "CCDSOft v5 (w/AO)". This latter option should be selected when you are using any of the AO devices in CCDSoft in order to achieve the maximum guide rate possible.

The Filters list shows the current filters installed in your filter wheel (if available). If you do not have a filter wheel, the Filters list should be empty. You can automatically pull the filter definitions from your camera control program by using the Get Filters from... button. If you want to define the filter names in CCD Commander manually, you can use the Add Filter and the Delete Filter buttons. To change the description of a filter already in the list, simply double click on the filter in the list.

Checking Ignore "Star Faded" messages from MaxIm/DL will disable the feature where CCD Commander checks the "Star Faded" messages sent by MaxIm/DL.

If the "Star Faded"

messages are not ignored, you can set the maximum number of messages CCD Commander will allow before generating an error.

Checking Ignore "Exposure Aborted" messages from MaxIm/DL will disable the feature where CCD Commander checks the "Exposure Aborted" messages sent by MaxIm/DL.

Disable dummy image on filter change

will prevent CCD Commander from taking a dummy image to force a filter change. For cameras with filter wheels checking this option may cause problems when changing filters. For other cameras that use filters as a way to use some other functionality (i.e. ISO with a DSLR), this option may improve performance.

The

Guider is Internal Guider checkbox should be checked if you are using a self-guiding SBIG camera. CCD Commander needs to adjust its control of the guider when a self-guided camera is in use.

Mount Control selects the program used to control the mount. If you are using the ASCOM Driver, you must use the Configure

button to choose which driver you want CCD Commander to use.

Planetarium selects the program to use for the planetarium functions (object catalogs, FOVI position angles, etc.) If you select None

here, some functions in CCD Commander may be disabled.

Focuser Control selects the program used to control the focuser. If you do not have, or do not want to use an automatic focus routine you can set this to None.

Instrument Rotator selects the type of rotator you are using. If you do not have a rotator you can set this to None. When you select a rotator, the Rotator tab will become enabled. If you select the RCOS PIR you should use the Configure

button to setup the driver.

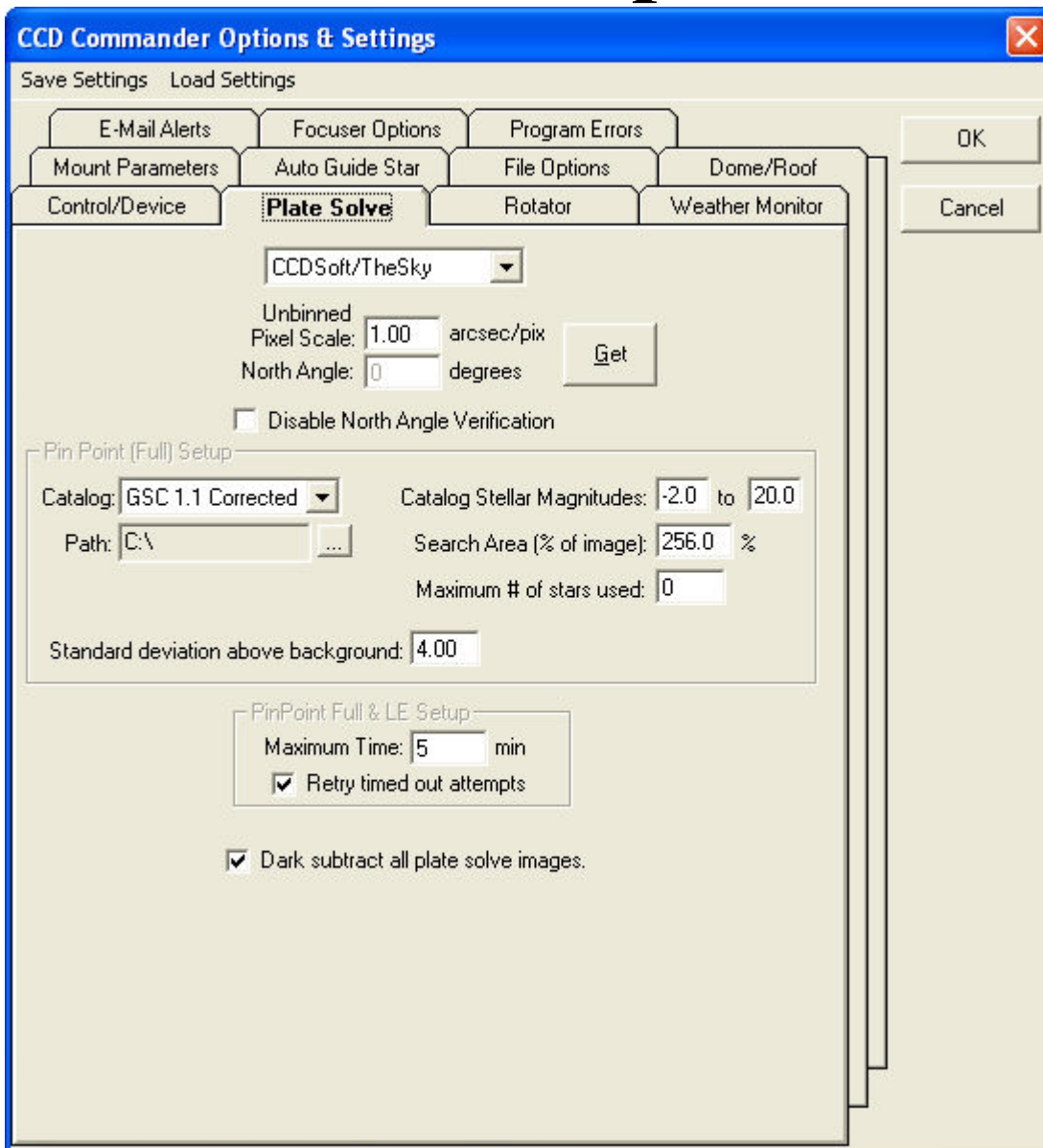
Dome Control selects the type of dome control interface in use. If you do not have a dome, or you are going to use a custom dome control set this to None. When you select a dome control interface, the Dome tab will become enabled. If you select the ASCOM Driver, you must use the Configure button to choose which driver you want CCD Commander to use.

Wether Monitor selects the weather monitor you are using. If you do not have a wether monitor or cloud sensor, set this to None. When you select a weather monitor, the Weather Monitor tab will become enabled.

Checking Disconnect from all programs/devices at end of action list.

will cause CCD Commander to disconnect from each of these programs/devices when the action list is completed - allowing a safe exit from any of the other programs prior to closing CCD Commander. This can cause some unwanted behavior - as the disconnect operation may cause the other program to close. Disable this checkbox to ensure that all the other programs stay open until you exit CCD Commander.

Plate Solve Setup



Here you select the method CCD Commander should use to Plate Solve images.

Note:

The MaxIm/PinPoint LE selection uses the MaxIm GUI interface to execute a plate solve. This method works, but is very sensitive to other programs running at the same time. Also it will not work if you are manually using the computer to perform other tasks. The other plate solve choices are much more robust and should be used if possible. Try the other choices and use this combination only if the others do not work.

Unbinned Pixel Scale

is passed by CCD Commander to the Plate Solve program. CCD Commander will pull the image coordinates from mount. Perform a Plate Solve function manually to get an accurate value for Pixel Scale. Enter the reported number into this field.

North Angle is used by CCD Commander to help in determining if the Plate Solve was successful. Even though the Plate Solve program thinks a solution was found, knowing the correct North Angle is a final check to confirm the result. CCD Commander will compare the entered value for North Angle with that reported after the Plate Solve. If the results are significantly different, CCD Commander will abort the

action and move on to the next action in the list. To determine a correct value for the North Angle, perform a Plate Solve manually. Enter the value reported into the North Angle field. Be sure to use the same program you specified for CCD Commander to use as different programs report the North Angle differently.

The Get button is available only when using CCDSoft/TheSky for Plate Solves. CCDSoft reports a different value for North Angle to the user than it does over the programmable interface. As a result it is difficult to get the proper value into CCD Commander. The Get allows CCD Commander to automatically get the Unbinned Pixel Scale and North Angle from a manually solved image in CCDSoft. To use this feature, first manually take an image in CCDSoft and execute an Insert WCS function on it. When complete, be sure to confirm your that your result is correct. With the image still open in CCDSoft, click the Get

button in CCD Commander to retrieve the parameters.

Disable North Angle Verification will turn off CCD Commander's checks for the North Angle. It is not recommended to disable this verification. However if you are running a portable setup and do not have an accurate polar alignment it may be necessary as your actual North Angle may drift over the night.

Pin Point (full) Setup

The full version of Pin Point requires that CCD Commander know some information about the star catalog you are using. You can specify that information here.

Catalog selects the star catalog you want Pin Point to use.

Path

specifies the location of the catalog. Click the "..." button to browse to the location of the catalog. See the Pin Point documentation for full details.

Catalog Stellar Magnitudes specifies the star magnitude range to use from the catalog. NOTE: This is an advanced parameter that should be used only if you have problems plate solving. The default value should work in most cases.

Search Area (% of image)

tells PinPoint how large an area to search when trying to match your image. 100% means that PinPoint will only search an area equal to the size of your image. If your mount continuously places the target near the center of your sensor, you can set this value to 100%. If your target often lies near the edge of your sensor or off the sensor, you should increase this value appropriately. A larger Search Area will increase the amount of time required for a plate solve.

Maximum # of stars used

specifies the total number of stars used from your image to perform the plate solve. If you have a very wide field image and/or a large sensor, setting this to a small number may decrease the time required to perform the plate solve. A value of 0 will use all the stars in the image (this can cause long plate solve times for large sensors).

Standard Deviation above Background

specifies the standard deviation threshold above which a star must be above in order to be detected by the PinPoint algorithm. Noisier images should increase this value to help discern the stars from the noise.

Pin Point Full & LE Setup

Maximum Time

specifies the amount of time CCD Commander should wait for PinPoint to return a solution. If no solution is found within the time-out limit, CCD Commander aborts the plate solve attempt.

Retry timed out attempts

if checked will allow CCD Commander to retry one time a failed plate solve attempt.

Dark subtract all plate solve images

when enabled will cause CCD Commander to take a dark frame for the plate solve exposure and do a dark frame subtraction.

Mount Parameters

The screenshot shows the 'CCD Commander Options & Settings' dialog box with the 'Mount Parameters' tab selected. The dialog has a blue title bar and a close button (X) in the top right corner. Below the title bar are buttons for 'Save Settings' and 'Load Settings'. The main area contains several tabs: 'Control/Device', 'Plate Solve', 'Rotator', 'Weather Monitor', 'E-Mail Alerts', 'Focuser Options', 'Program Errors', 'Mount Parameters' (selected), 'Auto Guide Star', 'File Options', and 'Dome/Room'. The 'Mount Parameters' tab contains the following settings:

- Mount Type:** Radio buttons for 'German Equatorial Mount' and 'Fork Mount'. 'Fork Mount' is selected.
- Delay after slew:** A text box with the value '0' and the unit 'seconds'.
- Disable Guide Declination Compensation:** An unchecked checkbox.
- GEM Setup:** A group box containing:
 - Eastern Limit (east side):** A text box with the value '5' and the unit 'minutes past the meridian'.
 - Western Limit (west side):** A text box with the value '5' and the unit 'minutes past the meridian'.
 - Automatically determine mount side at start-up:** A checked checkbox.
 - Autoguider calibrated in (Rotator Angles computed in):** Radio buttons for 'Eastern Sky' and 'Western Sky'. 'Eastern Sky' is selected.
- Enable Slew Scripts:** An unchecked checkbox.
- Slew Scripts:** A group box containing:
 - Before Slew:** A text box with a browse button (three dots).
 - After Slew:** A text box with a browse button (three dots).
- Verify telescope coordinates after Move To action:** A checked checkbox.
- Maximum acceptable telescope pointing error:** A text box with the value '3' and the unit 'arcminutes'.

On the right side of the dialog are 'OK' and 'Cancel' buttons.

Select the type of mount you are using. Select Fork Mount for any type of mount that can track and slew constantly through the meridian. Select German Equatorial Mount for any type of mount that requires a "flip" at the meridian.

The Delay after slew

entry tells CCD Commander to wait an additional period of time after the slew completes. This is useful if a dome needs extra time to catch up to the mount movement.

The Disable Guide Declination Compensation

will cause the Declination setting in CCDSoft or MaxIm to be set to 0 while autoguiding. This will disable any declination compensation to the guide star corrections.

The

GEM Setup box contains additional parameters for German Equatorial Mounts.

The Eastern Limit and Western Limit

values are very important and tell CCD Commander when a slew will send the mount to the eastern or western side.

The easiest way I have found to determine the Eastern Limit and

Western Limit is as follows:

- 1.
1. Position the mount with the telescope on the East side of the mount, looking at the Western sky.
- 2.
2. Slew to a target just East of the meridian (it helps to use a planetarium to determine a target).
- 3.
3. If your mount flips, then your Eastern Limit will be 0 (or very close to it). Skip to Step 7.
- 4.
4. If your mount does not flip, pick another target slightly further East. Slew to this target.
- 5.
5. Repeat step 4 until your mount flips. Your Eastern Limit will be the difference between the target RA and the Local Sidereal Time. (Eastern Limit must be 0 or positive.)
- 6.
6. Now position the mount with the telescope on the West side of the mount, looking at the Eastern sky.
- 7.
7. Slew to a target just West of the meridian.
- 8.
8. If you mount flips, then your minimum Western Limit is 0.
- 9.
9. If your mount does not flip, pick another target slightly further West. Slew to this target.
- 10.
10. Repeat step 9 until your mount flips. Your minimum Western Limit will be the difference between the target RA and the Local Sidereal Time. (Western Limit must be 0 or positive.)

The Western Limit serves a second purpose - telling CCD Commander how far past the meridian you can track. Some mounts will come up with a value of 0 for the Western Limit using the above procedure, but the Western Limit could be larger. Now with your telescope on the West side of the mount, slew your telescope until it hits its safety limit (or just before it hits the tripod/pier). Determine the RA your telescope is looking at. Now determine the difference between the telescope RA and the Local Sidereal Time. This is your maximum Western Limit

You should set the Western Limit

value anywhere between the minimum value determined in steps 8-10 above, and the maximum value. When you start an action by pushing the Start Action button on the main window, CCD Commander needs to determine what side of the mount your telescope is on. Normally this determination is easy. However, if the telescope is in the zone defined by the Eastern Limit and Western Limit values, it can be on either side of the mount. CCD Commander needs to determine which side of the mount the telescope is on for proper operation. When Automatically determine mount side at start-up is checked, CCD Commander will slew the telescope to force it to one side or the other. CCD Commander will always slew the telescope to the "normal" side of the mount given where it is pointing. If the telescope is looking to the eastern sky, CCD Commander will force the telescope to the west side of the mount. If the telescope is looking to the western sky, CCD Commander will force the telescope to the east side of the mount.

Unchecking Automatically determine mount side at start-up check box allows you to specify the mount side at startup when the telescope is in the "overlap" zone defined by the Eastern Limit and Western Limit values. The following window will be shown when the telescope is in the "overlap" zone.



You must specify the correct side of the mount that the telescope is on. Alternately, you can allow the automatic procedure, described above, to force the mount to one side automatically.

The next selection tells CCD Commander which side of the meridian the autoguider was calibrated on. This selection also applies to the angles in the Rotator tab. It is very important for all of these values to be calibrated/computed on the same side of the meridian.

The Enable Slew Scripts check box allows you to specify a custom script to run before any mount movement and after any mount movement. This can be very useful for dome users that do not want the dome to rotate until the mount has finished moving. Once you check this box you can select the scripts by clicking the "..." buttons.

Note: The Park Mount action only executes the Before Slew script.

When Verify telescope coordinates after Move To action

is checked, CCD Commander will query the telescope coordinates at the end of the slew and compare them to the Right Ascension and Declination that the telescope was supposed to slew to. Occasionally a minor error can prevent the telescope from reaching its desired coordinates, and this will trap those conditions. When the coordinates do not match, CCD Commander will slew to your target a second time. If the slew fails again, CCD Commander will skip ahead to the new Move To action in your list.

Maximum acceptable telescope pointing error specifies how close the telescope coordinates must be to the target Right Ascension and Declination in the above verification. If you are using a pointing corrector such as TPoint, you might need to increase this value. TPoint adjusts the telescope pointing to put it properly on target, but doesn't adjust the telescope reported coordinates. Thus the telescope can report coordinates off target, yet still be pointing at the proper location.

It is recommended to leave the Verify telescope coordinates after Move To action enabled with the default Maximum acceptable telescope pointing error unless you experience problems with these settings. When you have slew failures due to the coordinates not matching, first try to increase the Maximum acceptable telescope pointing error to a value specific to your mount.

Automatic Guide Exposure

The screenshot shows the 'CCD Commander Options & Settings' dialog box with the 'Auto Guide Star' tab selected. The dialog has a blue title bar with a close button. Below the title bar are buttons for 'Save Settings' and 'Load Settings'. The main area contains various settings for automatic guiding. The 'Enable Automatic Guide Exposure Mode' checkbox is checked. Below it are input fields for 'Minimum Guide Exposure' (1 seconds), 'Maximum Guide Exposure Increment' (2 seconds), and 'Maximum Guide Exposure' (30 seconds). There are also fields for 'Minimum Guide Star Brightness' (3000 ADU) and 'Maximum Guide Star Brightness' (20000 ADU). The 'Guide Box X Size' and 'Guide Box Y Size' are both set to 32 pixels. 'Typical Guide Star FWHM' is set to 4 pixels. 'Maximum Star Movement between exposures' is set to +/- 1 pixels. There is an unchecked checkbox for 'Ignore 1-pixel Stars (Useful for guiders with many hot pixels)'. Below these are two more unchecked checkboxes: 'Restart autoguiding when the guide error is more than +/- 1 pixels, for 1 guide cycles.' and 'Continuous Autoguiding'. A note explains that enabling continuous autoguiding will disable guide star dithering. At the bottom is an unchecked checkbox for 'Disable Automatic Guide Star Recovery'. On the right side of the dialog are 'OK' and 'Cancel' buttons.

CCD Commander Options & Settings

Save Settings Load Settings

Control/Device Plate Solve Rotator Weather Monitor

E-Mail Alerts Focuser Options Program Errors

Mount Parameters **Auto Guide Star** File Options Dome/Room

☒ Enable Automatic Guide Exposure Mode

Minimum Guide Exposure: 1 seconds

Maximum Guide Exposure Increment: 2 seconds

Maximum Guide Exposure: 30 seconds

Minimum Guide Star Brightness: 3000 ADU

Maximum Guide Star Brightness: 20000 ADU

Guide Box X Size: 32 pixels

Guide Box Y Size: 32 pixels

Typical Guide Star FWHM: 4 pixels

Maximum Star Movement between exposures: +/- 1 pixels

☐ Ignore 1-pixel Stars
(Useful for guiders with many hot pixels)

☐ Restart autoguiding when the guide error is more than +/- 1 pixels, for 1 guide cycles.

☐ Continuous Autoguiding

Note: Enabling Continuous Autoguiding will disable guide star dithering. But, the autoguiding will run continuously until the mount moves. Not recommended for self-guiding cameras.

☐ Disable Automatic Guide Star Recovery

OK Cancel

This window is to setup the parameters for the Automatic Guide Exposure function in CCD Commander.

If this function is enabled, CCD Commander will always automatically try to find a suitable guide star and guide exposure whenever the autoguider is enabled in a Take Images action.

The Minimum Guide Exposure and Maximum Guide Exposure

entries tell CCD Commander what range of exposure times are valid for the autoguider.

The Maximum Guide Exposure Increment limits the change CCD Commander will make to the guide exposure as it searches for a guide star. CCD Commander will always start with the Minimum Guide Exposure value. Each successive increment in the guide exposure will always be less than or equal to the Maximum Guide Exposure Increment

The minimum time is usually dictated by how well your seeing is. For poor seeing, the minimum time should be longer so that the autoguider does not "chase the seeing".

The maximum time is usually determined by how long your mount can accurately track without receiving

a guide correction. This value should be 2 to 4 times smaller than your maximum unguided exposure time. If your mount can track well for 4 minutes unguided, you can comfortably set the Maximum Guide Exposure

to 60 seconds or more.

The Minimum Guide Star Brightness and

Maximum Guide Star Brightness values tell CCD Commander what range of brightness values the guide star should fall into. Note that CCD Commander looks at the maximum brightness of the star recorded by the guide CCD. This means that, given the same star, the computed exposure time can vary depending on how the star falls on the guide CCD pixels.

The minimum brightness value should be set to give sufficient a signal-to-noise ratio of the star such that the guide algorithm can successfully track the star.

It is important to note that all autoguider centroid calculations work better as the guide star signal-to-noise ratio increases. This means that brighter guide stars can provide better guiding accuracy than dimmer guide stars. Keep this in mind when setting your minimum brightness.

The maximum brightness value should be set such that the star never saturates the guide detector.

The Guide Box X Size and Guide Box Y Size

specify what size window CCDSoft uses to track the star. It is important for CCD Commander to know this because it will check a box this size about a potential guide star for any other stars that might impede CCDSoft's tracking ability. In addition, CCD Commander will not pick a star that is too close to the edge of the guider since CCDSoft could move the mount significantly to bring the guide star far enough away from the edge for the guide box to fit.

You can change the size of the guide box CCDSoft uses. Software Bisque has documented this procedure [here](#)

For MaxIm the default guide box size is 32x32. Change the value in CCD Commander to match the value you have selected in MaxIm.

The Typical Guide Star FWHM

indicates the size, in pixels, of the typical guide star. CCD Commander uses the value help determine where the edge of a star is, and where another star may begin. The default value is sufficient in most circumstances and should not need to be changed. But if your guide stars are significantly larger than 4 pixels in any axis, then increase this value.

The Ignore 1-pixel Stars

checkbox will cause the search algorithm in CCD Commander to disregard stars that occupy only 1 pixel. This is especially useful for guiders that have hot pixels - but can be a problem for short focal length guide scopes where the guide star FWHM is <1 pixel. Evaluate your guider images to ensure that the guide star FWHM is routinely greater than 1 pixel before enabling this option.

The Maximum Star Movement between exposures

entry tells CCD Commander how much a potential guide star can move between exposures and still be considered valid. In order to rule out cosmic ray hits and other anomalies, CCD Commander takes two images of the Guide CCD in the search for a guide star. CCD Commander will accept a guide star if its centroid moves less than the amount specified here between the two exposures. Be cautious increasing this value - only do so if the default value causes CCD Commander to ignore real stars.

Checking Restart autoguiding when the guide error is more than...

will tell CCD Commander to stop autoguiding and attempt to reacquire the guide star when the guide error is larger than the specified error for the specified number of guide cycles.

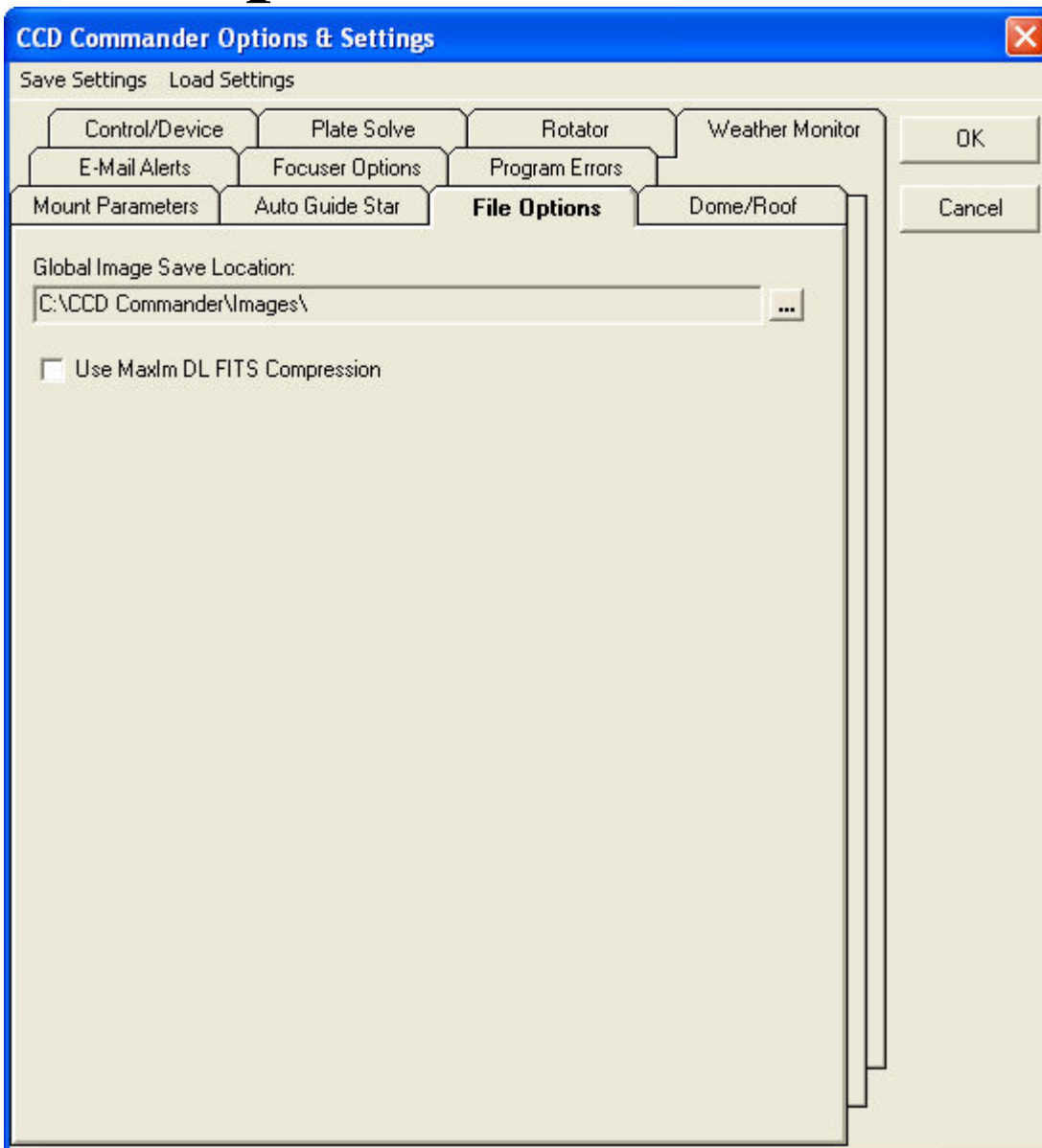
The Continuous Autoguiding check box tells CCD Commander to never stop the autoguider during an image sequence. Not until the mount moves will the autoguide be stopped. This is useful when you have an external guider and want to guide continuously throughout the exposure for optimum speed. Be aware that when using an SBIG self-guiding camera, the guider will continue uninterrupted through filter changes. It is not recommended to do this. Instead disable

Continuous Autoguiding to allow the autoguider exposure to be recomputed for each filter.

Disable Automatic Guide Star Recovery

will cause CCD Commander to always search for a guide star prior to starting autoguiding. This is useful if your mount is not able to get the guide star back into the guide box on a return slew.

File Options



Global Image Save Location

This specifies the location to save the images taken with CCD Commander. Click the "..."/>

Use MaxIm DL FITS Compression

This enables the use of the FITS Compression function in MaxIm DL when saving images. This can reduce the FITS file size - but be aware it will render the FITS files incompatible with other software packages, the resulting FITS files must be opened in MaxIm DL.

Rotator Setup

The screenshot shows the 'Rotator' tab of the 'CCD Commander Options & Settings' dialog box. The dialog has a blue title bar with a close button. Below the title bar are buttons for 'Save Settings' and 'Load Settings'. The main area contains several tabs: 'E-Mail Alerts', 'Focuser Options', 'Program Errors', 'Mount Parameters', 'Auto Guide Star', 'File Options', 'Dome/Room', 'Control/Device', 'Plate Solve', 'Rotator' (selected), and 'Weather Monitor'. The 'Rotator' tab contains the following settings:

- Rotator COM:** A text box containing the value '4'.
- Home Rotation Angle:** A text box containing '0', followed by 'degrees from North' and a checked checkbox.
- Guider Calibrated at:** A text box containing '190.50', followed by 'degrees from North' and a checked checkbox.
- Get Angle from TheSky:** A button.
- ☒ **Guider rotates with Imager**
- ☐ **Guider sees a Mirror Image of the sky**
- ☐ **Reverse rotator direction**
- During "Move To" Actions that Flip the Mount:**
 - ☒ **Maintain Position Angle by Rotating 180 degrees**
 - ☐ **Maintain Rotator Angle (Rotator does not move)**
- ☐ **Rotate TheSky FOV to Match Camera PA**

On the right side of the dialog are 'OK' and 'Cancel' buttons.

Rotator COM

specifies the serial port that the rotator is connected to. CCD Commander supports COM ports from 1 to 255.

Home Rotation Angle is the position angle that the camera is at when the rotator is at an angle of 0 degrees. If the top of the detector is north, then the Home Rotation Angle will be 0 degrees. If the top of the detector is east, then this value is 90 degrees. South is 180 degrees. Finally west is 270 degrees.

Similarly Guider Calibrated

at specifies the detector angle where the guider was calibrated.

The Guider Calibrated at value only applies when the Guider rotates with Imager checkbox is checked. Guider Calibrated will be disabled when the checkbox is not checked. If you use a guide scope/guide camera, then you should uncheck this value. When checked, CCD Commander will automatically recompute the guider coefficients in the camera control program, allowing the guider to function at any desired rotation angle. When CCD Commander recomputes the guider coefficients for a new rotation angle, the Guider Calibrated

at value will be changed. Since the new coefficients are for a different angle that change needs to be reflected here. Once you enter this value and successfully use CCD Commander, you shouldn't need to change this value or recalibrate the guider until you make a physical change to your setup.

Finally the Get Angle from TheSky6

button will fill in either or both of the angles (depending on which checkboxes to the left of the button are checked) from the angle of the FOV Indicator in TheSky6. The easiest way to determine these values and to get them entered it to perform the following steps:

- 1.
1. Connect your mount to TheSky6 and slew to a nice star field.
- 2.
2. Enable your camera's FOV Indicator in TheSky6.
- 3.
3. Take an image of the star field in your camera control program.
- 4.
4. Copy the image to your clipboard (either using Ctrl-C or Edit->Copy).
- 5.
5. Paste the image into TheSky6 (either using Ctrl-V or Edit->Paste).
- 6.
6. Perform an Image Link in TheSky6 to link the image.
- 7.
7. The Image Link will adjust the FOVI to the position angle of the image.
- 8.
8. Push the Get Angle from TheSky6
8. button in CCD Commander to pull the position angle from the FOVI.

GEM Users: Note the text on the page specifying what side of the meridian you should be on when getting these values. If your telescope was on the opposite side of the mount, select the opposite setting in the Mount Parameters

tab.

Fork Mount Users: The text specifying the side of the meridian will not appear on this window

Check the Guider sees a Mirror Image of the sky

if the image on the guide chip is mirrored. CCD Commander needs to know this to rotate the guide vectors in the proper direction.

The Reverse rotator direction check box will tell CCD Commander that the rotator need to be moved in the opposite direction than expected. See Rotator Physical Setup below for more information.

The During "Move To" Actions that Flip the Mount section defines what CCD Commander will do with the rotator when the mount flips. When using an external guide scope, it is often useful to not rotate the rotator except for framing. In this case, the Maintain Rotator Angle (Rotator does not move) option is ideal. When guiding through the rotator (self guided or OAG) the Maintain Position Angle by Rotating 180 degrees

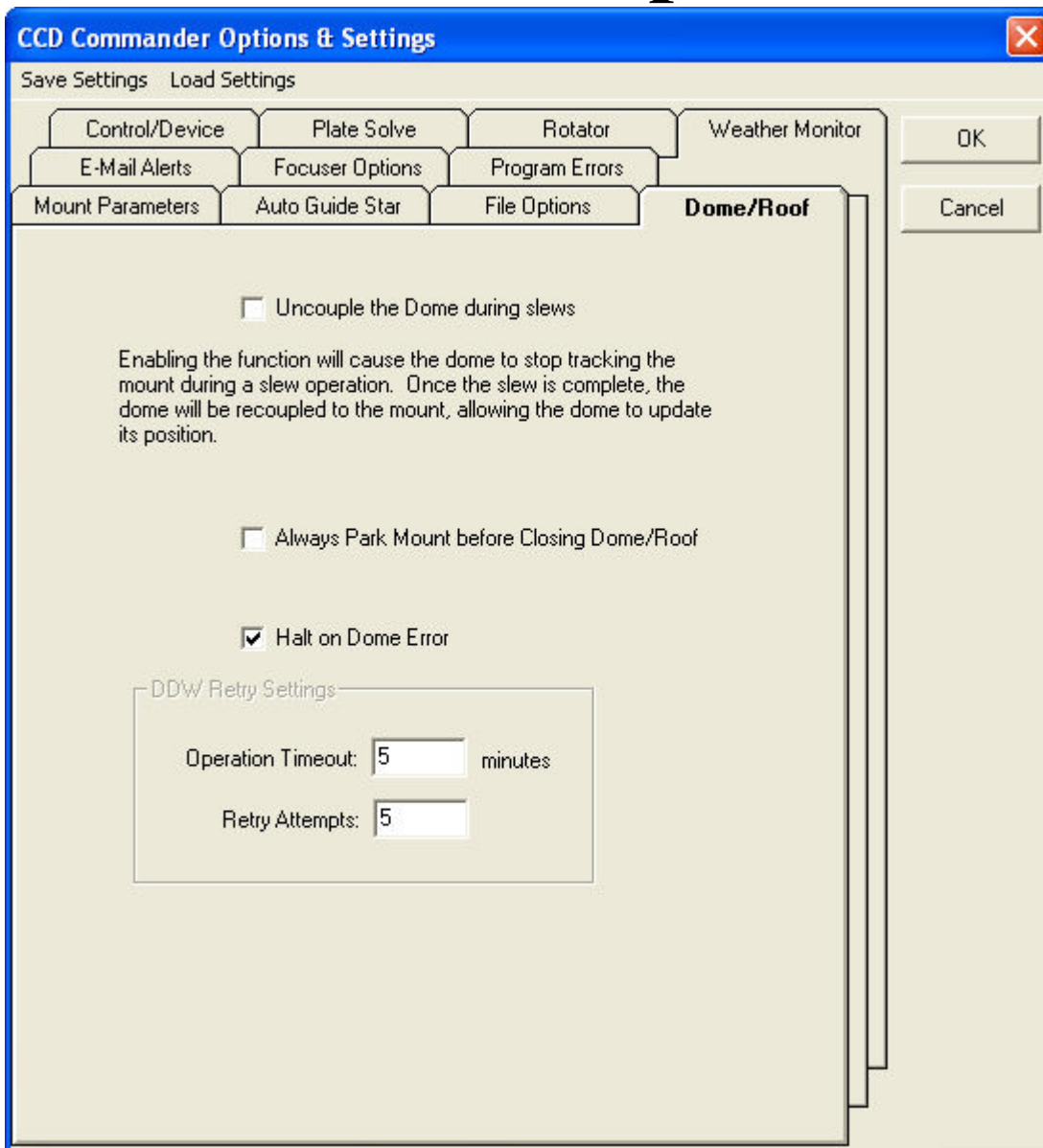
option can be better (but is not necessary).

Rotator Physical Setup

In order to function properly, the rotator must spin in the direction CCD Commander expects. The rotator must spin in the direction from North to East to South to West. As you are looking up at the sky, this is a counterclockwise rotation. You can also confirm the proper direction by Image Linking one image in TheSky6, increasing the rotator angle, and then Image Linking in TheSky6 a second time. Just like you increased the rotator angle, the position angle of the FOVI in TheSky6 should also increase.

If your rotator rotates in the opposite direction, check the Reverse rotator direction checkbox.

Dome/Roof Setup



When the mount moves, the dome can sometimes have a difficult time keeping track of the mount position - especially if you have a GEM and the mount flips sides as part of the slew. During a GEM flip, the dome can start off going to wrong way and then has to catch up to the mount after it flips.

When you enable the Uncouple the Dome during slews

checkbox, CCD Commander will prevent the dome from moving until after the mount has completed its slew. Once the slew is complete, CCD Commander will then re-couple the dome to the mount and wait (if possible) for the dome to report that its movement is complete. For some slews this might make the slew operation slightly longer, but for meridian flips it can greatly reduce the total slew time.

Always Park Mount before Closing Dome/Roof will cause CCD Commander to always issue a park command to the mount prior to closing the dome. This is necessary if the dome/roof cannot close with the mount/telescope in the "normal" operating position. Enabling this options will help ensure that the mount is parked prior to closing the dome/roof.

CAUTION:

CCD Commander cannot necessarily guarantee that the mount is parked prior to closing the dome/roof. If you have a setup where the dome/roof requires the mount and telescope to be in a specific position

prior to closing, there should be fail-safes installed to prevent the dome/roof from moving when the mount is in an unsafe condition. CCD Commander will attempt to park the mount prior to closing the dome/roof if this option is selected, but problems beyond the control of CCD Commander may cause prevent this from happening.

When Halt on Dome Error is checked, CCD Commander will halt all operations and treat the Dome Error as a general "Program Error". CCD Commander will attempt to perform the functions in the Program Errors tab. When Halt on Dome Error

is not checked, CCD Commander will report the error but will continue operation as normal.

DDW Retry Settings are for Digital Dome Works users. The DDW control software often is unable to complete an operation successfully. These retry settings will allow CCD Commander to retry an operation that never completed. While the Operation Timeout value can be set less than the time needed to complete an operation, ideally it should be longer than required to complete any operation requested.

The Retry Attempts

value determines how many failed attempts to retry before giving up on the operation.

Weather Monitor Setup

CCD Commander Options & Settings [X]

Save Settings Load Settings

E-Mail Alerts Focuser Options Program Errors
Mount Parameters Auto Guide Star File Options Dome/Roof
Control/Device Plate Solve Rotator **Weather Monitor**

Pause Action When:

Cloud Conditions:
☒ Unknown
☒ Cloudy
☒ Very Cloudy

Rain Conditions:
☐ Unknown
☒ Wet
☐ Rain

Close Roof/Dome When:

Cloud Conditions:
☒ Unknown
☒ Cloudy
☐ Very Cloudy

Rain Conditions:
☐ Unknown
☐ Wet
☐ Rain

☒ Park Mount when Pausing Action ☒ Roof/Dome will close autonomously via the Emergency Contact Closure

Query Sensor every: minutes Before resuming action, sensors must read "good" for: minutes

☐ Repeat last action after resuming

Monitor all these conditions for a "good" reading:

Cloud Conditions:
☐ Unknown
☒ Clear
☐ Cloudy

Rain Conditions:
☐ Unknown
☒ Dry

☐ Enable Weather Monitor Scripts

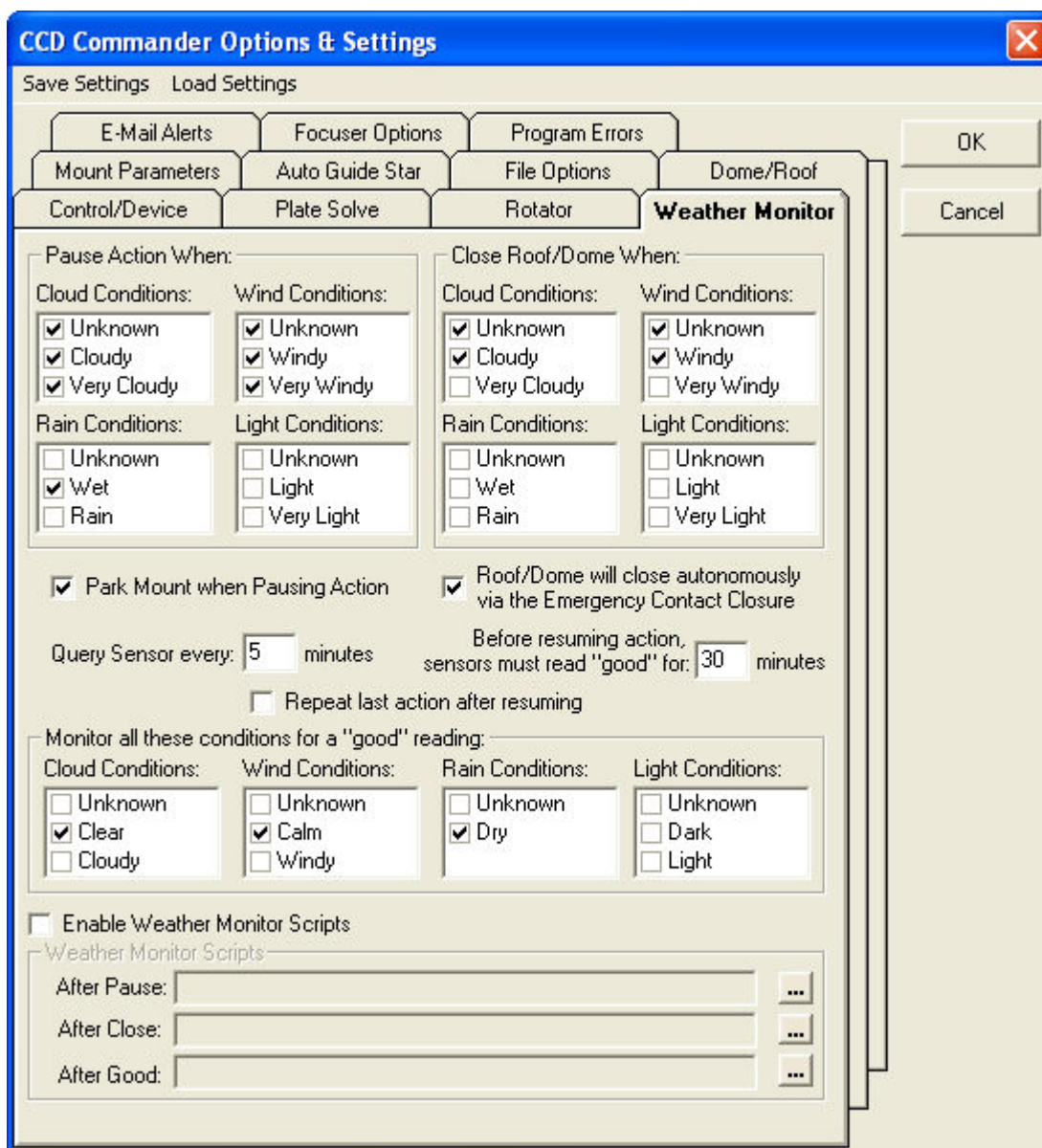
Weather Monitor Scripts

After Pause: ...

After Close: ...

After Good: ...

OK Cancel



The Weather Monitor functionality in CCD Commander will allow you to image even in questionable weather conditions. CCD Commander will monitor the output of a Cloud/Weather Sensor and, depending on the conditions you specify, will pause the action list, park the mount, and/or close your dome. Then when the bad weather condition clears, CCD Commander will open your dome, return the mount to the previous position, and resume the next action in your list. This can allow imaging in every small piece of clear sky!

The Pause Action When

list tells CCD Commander under what conditions you want to pause. You can select any of the conditions listed, but it is strongly suggested to enable all of them. The allowable selections change depending on the Cloud/Weather Sensor you have. The images above show the different options available for the different Cloud/Weather Sensors CCD Commander supports.

The Close Roof/Dome When list tells CCD Commander under what condition you want to close the dome. Again, you can select any of the conditions - however some of the selections are disabled when Roof/Dome will close autonomously via the Emergency Contact Closure check box is enabled.

The Roof/Dome will close autonomously via the Emergency Contact Closure check box must be checked if you have connected your Cloud/Weather Sensor directly to your Dome Controller. When the Cloud/Weather sensor detects severe weather, it will send a signal directly to the Dome Controller to close the dome. CCD Commander does not and should not attempt to close the

dome under this condition. Thus when this option is checked, the conditions under which the Cloud/Weather sensor activates its Emergency Contact are not enabled in CCD Commander to close the dome. However, CCD Commander will still make note of this event so that it knows to open the roof/dome when the weather clears.

The Park Mount when Pausing Action

check box tells CCD Commander to force the mount to a park position while the pause is in effect.

When the pause is complete, CCD Commander will slew the telescope back to the original coordinates.

The Park Mount before Closing Roof

check box has moved to the Dome/Roof setup tab.

Specify the frequency to query the cloud sensor using the Query Sensor every entry. A value of 1 minute seems to work well, but you can experiment for the best value with your configuration.

When a "good" condition occurs after the action has paused, CCD Commander times how long the "good" condition has remained. Use the Before resuming action, sensor must read clear for setting to tell CCD Commander how long to wait before resuming your action list.

Normally, when the action list is paused due to the Weather Monitor the current executing action will stop and not resume. When the "good" conditions return, the next action in the list will begin executing. Therefore when using the Weather Monitor function it may be important to not run any excessively long single actions since it could be stopped mid-execution. Instead spread out your tasks into multiple actions. When Repeat last action after resuming is checked the action that was in-process when the action list was paused will be repeated. (Be aware that this could lead to more images from a Take Images

action - for example.)

The Enable Weather Monitor Scripts

allows for custom scripts for each weather event to be setup. CCD Commander will execute the specified script after each of the three possible weather events: Action List Paused, Dome Closed, Good Condition Detected.

E-Mail Alerts Setup

The screenshot shows the 'CCD Commander Options & Settings' dialog box with the 'E-Mail Alerts' tab selected. The dialog has a blue title bar and a close button (X) in the top right corner. Below the title bar are buttons for 'Save Settings' and 'Load Settings'. The main area contains several tabs: 'Mount Parameters', 'Auto Guide Star', 'File Options', 'Dome/Roof', 'Control/Device', 'Plate Solve', 'Rotator', 'Weather Monitor', 'E-Mail Alerts' (selected), 'Focuser Options', and 'Program Errors'. The 'E-Mail Alerts' tab is divided into three sections. The first section, 'SMTP Server Setup', includes a text field for 'SMTP Server Name or IP Address' (containing 'smtp.astromatt.com'), a text field for 'Port #' (containing '25'), a checkbox for 'Use SMTP Authentication' (unchecked), and text fields for 'Username' and 'Password'. The second section, 'E-Mail Addresses', includes a text field for 'E-Mail Return Address' (containing 'matt@astromatt.com'), a text field for 'E-Mail "To" Addresses' (containing 'matt@astromatt.com'), and buttons for 'Add', 'Remove', and 'Send Test E-Mail'. The third section, 'Send E-Mail Alert When:', contains a list of events with checkboxes: 'Weather Monitor - Action List Paused' (checked), 'Weather Monitor - Dome Closed' (checked), 'Weather Monitor - Resuming' (checked), 'Plate Solve Failed' (checked), 'Dome Operation Failed' (checked), 'Guide Star Acquisition Failed' (checked), 'Guide Star Failed to Center' (checked), 'Guide Star Faded' (unchecked), 'Generic Error - Action List Aborted' (checked), 'Action List Complete' (checked), and 'Comment Actions' (checked). At the bottom is a text field for 'E-Mail Script' with a button to open a file.

E-Mail Alerts are a very useful way to allow CCD Commander to notify you of an event when you are not able to monitor the program directly. The e-mail message CCD Commander sends is simple enough to be sent to your cell phone (if you have a Text Messaging cell phone with an e-mail address - check with your service provider).

Setting up the E-Mail Alerts in CCD Commander is similar to setting up any e-mail client. CCD Commander uses the Simple Mail Transport Protocol (SMTP) to send e-mail messages.

SMTP Server Setup:

The SMTP Server Name or IP Address

should be provided to you by your Internet Service Provider (ISP). If you do not have this information available, you should be able to get it with a simple request to your ISP's support department.

The Port #

will almost always be 25. Unless your ISP specifically tells you to use another number, you should not need to change this value.

The Use SMTP Authentication should only be checked if your ISP specifically requires a user name and password to send Outgoing

mail. Usually this again is not required, but your ISP will let you know if it is. You can also try sending the test message with this disabled to see if SMTP Authentication is required.

Username and Password

are the authentication credentials provided to you by your ISP. CCD Commander will send these to the ISP as part of the SMTP process.

E-Mail Addresses:

The E-Mail Return Address

can be anything, but should be a valid e-mail account. If the SMTP process generates any errors as part of sending the message (bad addresses, mailbox full, etc.) the error message will be sent to the return address.

The E-Mail "To" Addresses list can be any number of e-mail addresses you want the alerts sent to. CCD Commander will copy each address in the list with the alert e-mail. Be sure to enter at least one address into the list via the Add button. You can remove e-mail addresses by first clicking the address in the list and then pushing the Remove button.

Send Test E-Mail will test the entire SMTP process to the Selected Address in the "To" address list. You must select (highlight) an address before pushing the Send Test E-Mail button. CCD Commander will initiate the SMTP process and send a small e-mail to the selected address and then notify you of success or failure. Check your e-mail account for the test message.

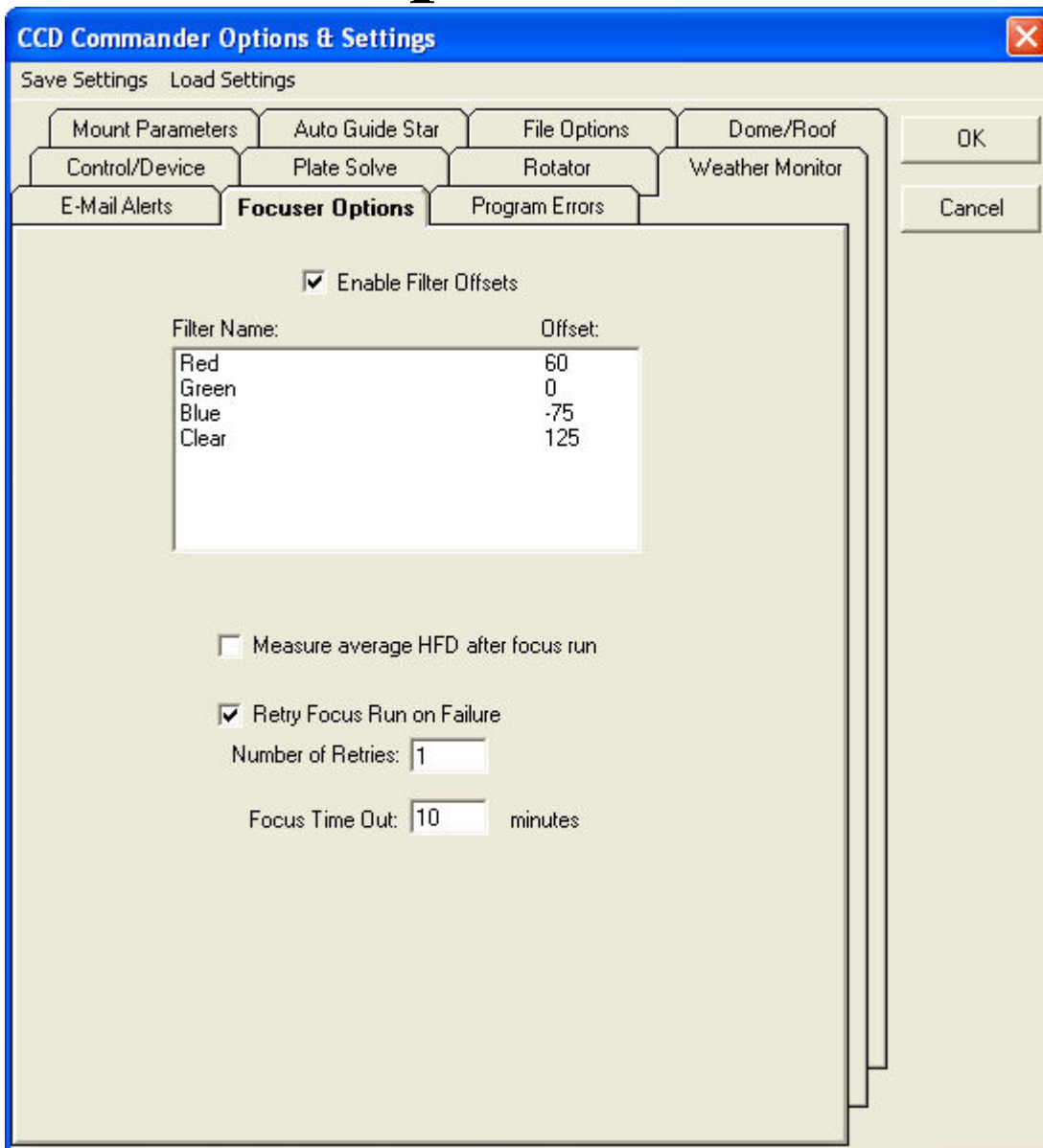
Send E-Mail Alert When:

This section defines the events that CCD Commander will send e-mails for. Check each event that you wish to be notified of. When any event occurs, CCD Commander will send an e-mail to everyone in the "To" address list and then continue standard execution.

E-Mail Script:

If desired, CCD Commander can run a script any time it will send an e-mail alert. The script will be passed two arguments - the first is the subject of the e-mail alert, the second is the text of the e-mail alert. This allows the data to be delivered in many different methods.

Focuser Options



Enable Filter Offsets

will turn on the filter offset function in CCD Commander. When the filter offset function is enabled, CCD Commander will automatically move your focuser the specified offset whenever the filter changes positions.

Every filter you've defined in the Control/Device

tab will be listed here. To change the offset for a filter, double click the filter in the list.

Polarity of the offsets is dependant on the specific hardware in use. If CCD Commander moves the focuser the wrong direction, try reversing the offset polarities.

Measure average HFD after focus run

is enabled only when FocusMax is the selected focus tool. At the end of a focus run, when this is enabled CCD Commander will take 5 additional exposures to measure the average HFD for reporting in the CCD Commander log file. If this is disabled, CCD Commander will report the HFD from the focus routine. The average HFD can be useful in under-sampled, or poor seeing conditions to give a better representation of the focus achieved.

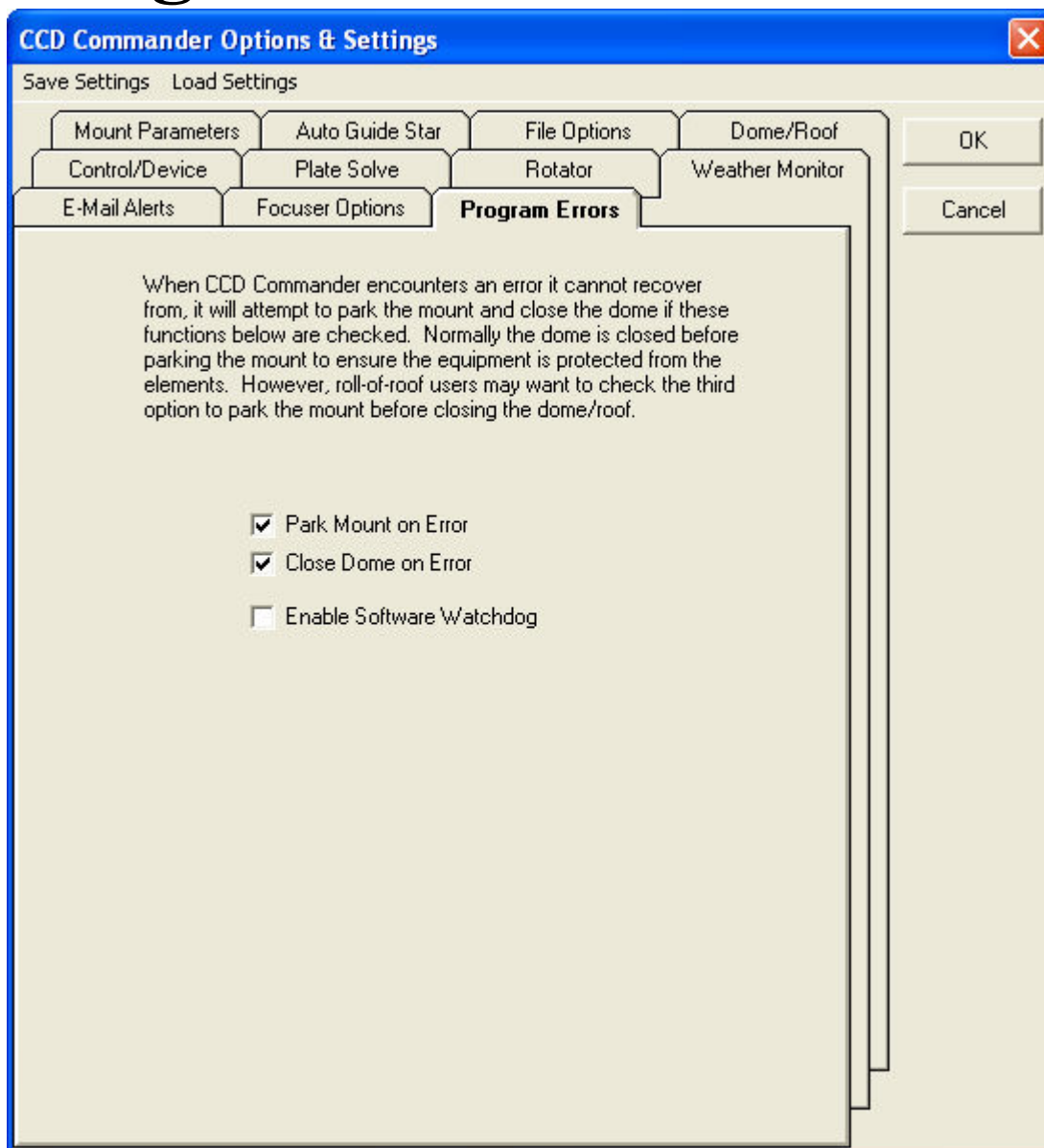
Retry Focus Run on Failure will cause CCD Commander to retry the focus run Number of Retries

times when the focus run fails.

Focus Time Out

defines the maximum amount a time a focus run can take. If this time is exceeded CCD Commander will abort the focus run and retry (if retry is enabled).

Program Errors

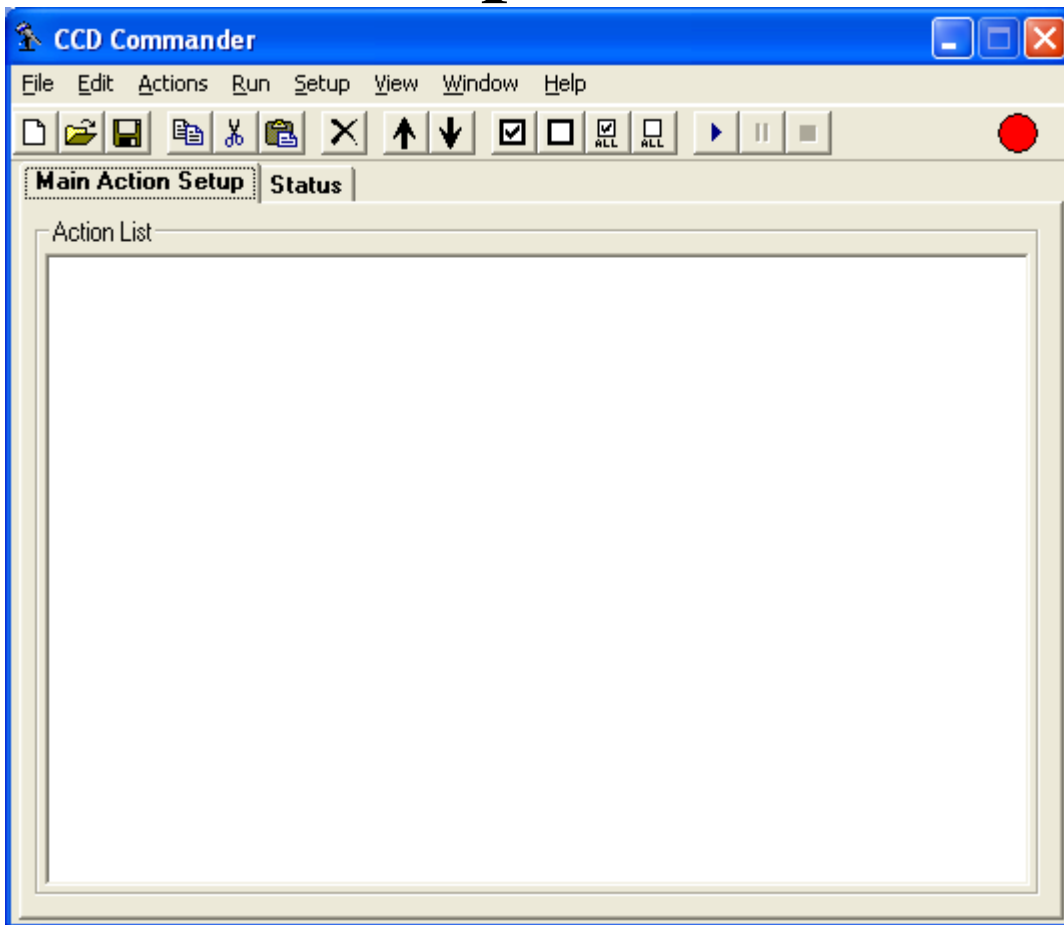


When CCD Commander encounters an error it cannot recover from, it will attempt to park the mount and close the dome if these functions (Park Mount on Error and Close Dome on Error) are checked.

The Enable Software Watchdog

enables a separate program that runs in a separate process than the main CCD Commander process. CCD Commander communicates with the watchdog program on a periodic basis. If something causes CCD Commander to stop functioning - where it no longer reports to the watchdog program, then the watchdog program will attempt to close the dome/roof and park the mount. This is to try and prevent a catastrophic problem caused by CCD Commander crashing or freezing. However, as this is still a software program running on the PC it is not immune from system wide PC crashes or freezing. The watchdog is an added layer of protection when using CCD Commander completely remote. In semi-remote configurations, the watchdog is normally not needed.

Action Setup



From the main CCD Commander window you can access all the functions of CCD Commander. There are at least two "tabs" on the main window.

The first tab is always the Main Action Setup tab. This is where the you can create, view, and edit the primary action list.

All of the necessary controls are located in both the menus and the tool bar at the top of the window.

Relevant Menus:

File Menu

This menu contains all of the functions necessary to manage your action lists.

New 

will clear the Action List for a fresh session.

Open 

will open a previously saved Action List. CCD Commander can open an action list created by any previous version of the software.

Save  will save the current Action List. The Save

menu item may not be enabled if you have never saved the current Action List.

Save As will save the current Action List to a new file. You can use Save As for the initial save operation or to save the current Action List to a new file name.

Import Target List

will open the Import Utility. See [here](#) for more information.

Exit

will close CCD Commander.

Edit Menu

This menu contains all of the functions necessary to edit and manipulate the action list. The Edit Menu is also available by right clicking the mouse on the Action List.

Copy Action 

will copy the selected actions to the Windows Clipboard. You can then paste actions to a Sub-Action List or another Action List in another instance of CCD Commander. The data will be maintained in the Windows Clipboard until you do another Copy or Cut from CCD Commander or any other application.

Cut Action 

will cut the selected actions to the Windows Clipboard. This is the same as doing a Copy followed by a Delete.

Paste Action 

will paste the current actions from the Windows Clipboard into the Action List. The pasted actions will appear immediately below the current selected action. If there are no actions available in the Windows Clipboard, this menu item will be disabled.

Delete Action 


will delete the selected actions in the Action List.


Move Action Up 


will move the selected actions in the Action List up one position.


Move Action Down 

will move the selected actions in the Action List down one position.

Check Selected  will check the selected actions in the Action List. See Use Check Boxes below for more information.

Uncheck Selected  will un-check the selected actions in the Action List. See Use Check Boxes below for more information.

Check All  will check all the actions in the Action List (and any Sub-Action Lists). See Use Check Boxes below for more information.

Uncheck All  will un-check all the actions in the Action List (and any Sub-Action Lists). See Use Check Boxes below for more information.

Use Check Boxes

enables the check boxes in the Action Lists. The check boxes allow individual actions to be enabled (checked) or disabled (un-checked) from the action list. This is a convenient method for editing your Action List without actually removing any actions from your list. When this function is enabled, the prior four menu items (and tool bar icons) will be enabled.

Jump to Running Action


will be enabled after a running action list containing sub-action lists has been modified. Normally CCD Commander keeps the visible sub-action lists in sync with the currently running action. However, after closing, adding, or modifying sub-action lists this will not be the case. Select this menu option to re-sync the GUI with the currently running action.

Actions Menu


This menu contains all of the actions available in CCD Commander. See the Actions book in the Table Of Contents for full details on each of the actions.

Run Menu

This menu contains all of the functions necessary to run the action list.


Start  will start running your action list. When Use Check Boxes in the Edit Menu is un-checked, Start will execute all of the actions in the list. When Use Check Boxes is checked, Start will execute only those actions that have a check mark. Once the action list is running, Pause and Stop will become

enabled. When execution begins, CCD Commander will automatically switch to the Status tab and the red running light will change to green and blink to show that the action is executing.

Pause  will pause a running action list until Start is selected again. Pause only pauses the execution of the action list in CCD Commander. All the external programs and hardware will continue to operate.

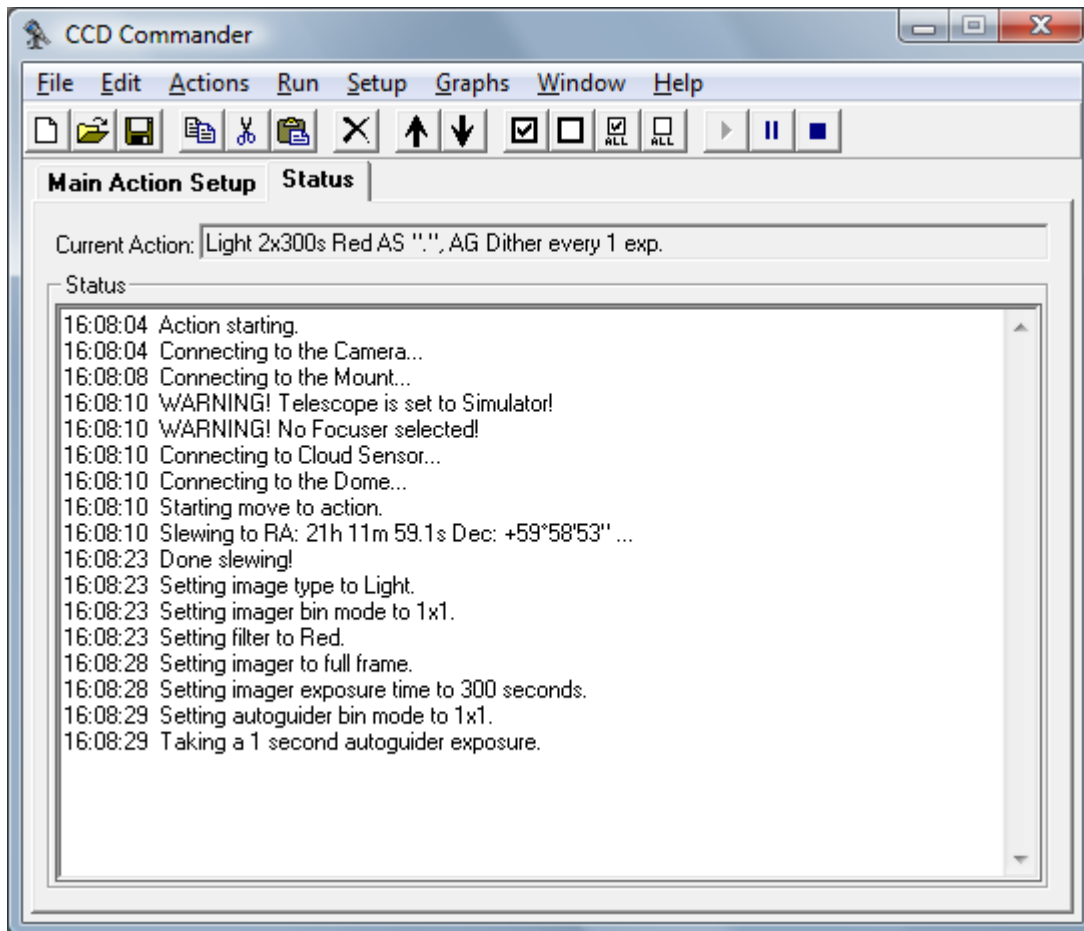
CAUTION:

The telescope mount will continue to track while CCD Commander is paused. CCD Commander will not be monitoring the telescope position or the Cloud Monitor. Be sure to use the pause function sparingly.

Stop  will stop (abort) a running action list. This function will also stop any activity in the external programs (slews, image exposures, autoguiding), but will NOT change the mount tracking. Be sure to park the mount when complete.

NOTE for GEMs: When you start the action, one of the first things CCD Commander will do is connect to your mount through TheSky. CCD Commander will try to determine what side of the meridian your telescope is positioned on. If your telescope is in the region of sky accessible from both sides of the mount, CCD Commander will force your telescope to whichever side the telescope is closer to and then move back to the coordinates you started at. This is to ensure CCD Commander knows the correct side of the meridian your telescope is on. You can disable this function in the CCD Commander Setup window. When disabled, CCD Commander will prompt you to state which side of the mount the telescope is on.

Status Tab



While the Action List is being executed, CCD Commander will add to the Status display to inform you of the current status. This data remains available after the action is complete. The current action that is being executed is also shown at the top of the tab.


When you start running the action list a second time, the Status display will clear and start again.


The information displayed in the Status box is also written to your hard drive in the "Logs" directory below the CCD Commander installation directory. The log file is a simple text file and can be viewed in any text editor or word processor. The name of the log file is the date and time that the Action List was run.

Relevant Menus:

Run Menu

This menu contains all of the functions necessary to run the action list.


Start  will start running your action list. When Use Check Boxes in the Edit Menu is un-checked, Start will execute all of the actions in the list. When Use Check Boxes is checked, Start will execute only those actions that have a check mark. Once the action list is running, Pause and Stop will become enabled. When execution begins, CCD Commander will automatically switch to the Status tab and the red running light will change to green and blink to show that the action is executing.

Pause  will pause a running action list until Start is selected again. Pause only pauses the execution of the action list in CCD Commander. All the external programs and hardware will continue to operate.

CAUTION:

The telescope mount will continue to track while CCD Commander is paused. CCD Commander will not be monitoring the telescope position or the Cloud Monitor. Be sure to use the pause function

sparingly.

Stop  will stop (abort) a running action list. This function will also stop any activity in the external programs (slews, image exposures, autoguiding), but will NOT change the mount tracking. Be sure to park the mount when complete.

NOTE for GEMs: When you start the action, one of the first things CCD Commander will do is connect to your mount through TheSky. CCD Commander will try to determine what side of the meridian your telescope is positioned on. If your telescope is in the region of sky accessible from both sides of the mount, CCD Commander will force your telescope to whichever side the telescope is closer to and then move back to the coordinates you started at. This is to ensure CCD Commander knows the correct side of the meridian your telescope is on. You can disable this function in the CCD Commander Setup window. When disabled, CCD Commander will prompt you to state which side of the mount the telescope is on.

Graphs Menu

Enable Temperature Recording

will enable or disable recording of the temperature and the graph function. Only when this is enabled, can you view the CCD Temperature Graph.

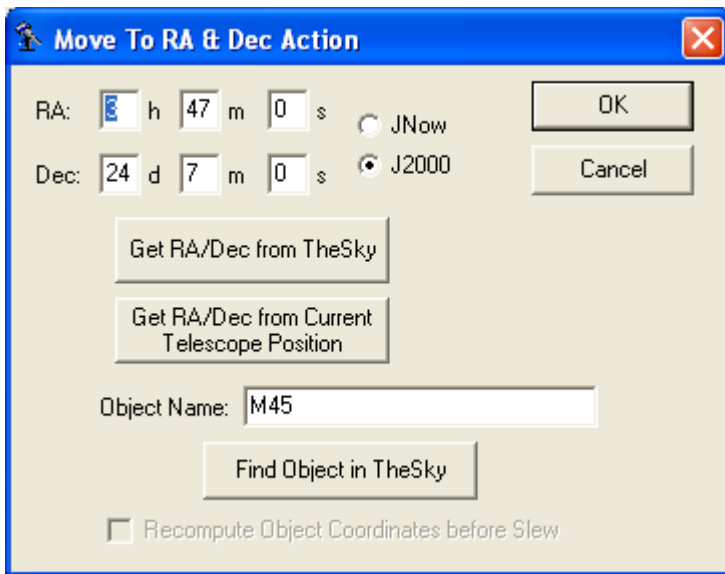
CCD Temperature Plot shows a window of the CCD temperature plotted over time. See the [CCD Temperature Graph](#) page for more information.

Enable Guider Error Recording

will enable or disable recording of the guide error. Disabling this can possibly increase your guider performance. Disabling this will also disable the Autoguider Error Graph.

CCD Guide Error Plot shows a window of the autoguider error plotted over time. See the [Autoguider Error Graph](#) page for more information.

Move to RA & Dec Action



Move To RA & Dec Action

RA: h m s ☐ JNow ☐ J2000

Dec: d m s

OK Cancel

Get RA/Dec from TheSky

Get RA/Dec from Current Telescope Position

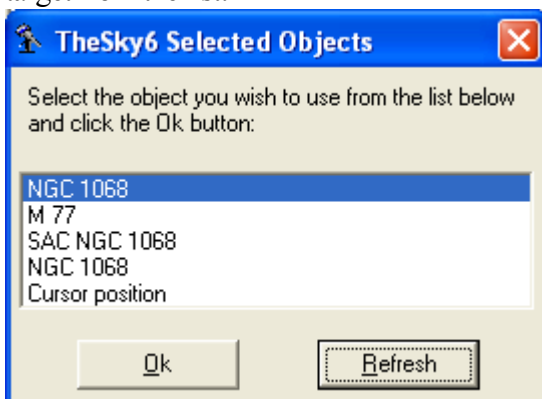
Object Name:

Find Object in TheSky

☐ Recompute Object Coordinates before Slew

The Move to RA/Declination Action will simply move the telescope to the coordinates entered. These coordinates can be either for the Epoch of the date the action is performed (JNow) or for the Epoch at January 1, 2000 (J2000). When you select J2000 coordinates, CCD Commander will automatically precess the coordinates to JNow when the action is performed. If you want to match coordinates over many days or months using the same action, use J2000 coordinates. Only whole number values are allowed in each field.

The Get RA/Dec from TheSky button will pull the coordinates from the currently selected object in TheSky. When you click this button CCD Commander will check to see what is selected in TheSky. If there are multiple objects that could be selected, CCD Commander will display the following window to allow you to select your desired target from the list:



TheSky6 Selected Objects

Select the object you wish to use from the list below and click the Ok button:

- NGC 1068
- M 77
- SAC NGC 1068
- NGC 1068
- Cursor position

Ok Refresh

If your desired object is not show, click closer to the object in TheSky and push the Refresh button.

The Get RA/Dec from Current Telescope Position will query the location the telescope is pointing to and enter the values into the window. This is useful if you have a difficult framing of the object and have framed it properly before creating your action list.

You can also enter the targets name in the Object Name box. This box can be used to name your target anything you desire. This name will show up in your action list instead of the RA and Declination coordinates.

If you enter a real object name in the Object Name box, you can get the coordinates for this object from

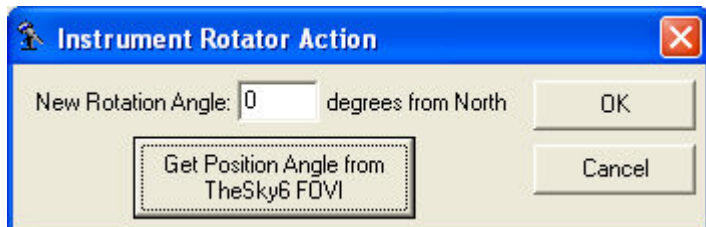
TheSky by clicking the

Find Object in TheSky button. If the object is found, the coordinates will be entered automatically for you. If the object is not found, the coordinates will be set to 0.

The Recompute Object Coordinates before Slew checkbox tell CCD Commander to find the object again in TheSky and get the updated coordinates. This is very useful for fast moving objects. If you enter an invalid name in the

Object Name box, CCD Commander will warn you with a beep when you push the OK button. This checkbox is disabled when J2000 coordinates are selected since the JNow coordinates will automatically be recomputed before the Slew. Recomputing the Object coordinates is only valid when using JNow coordinates.

Rotate with Instrument Rotator Action



This action will rotate the instrument rotator.

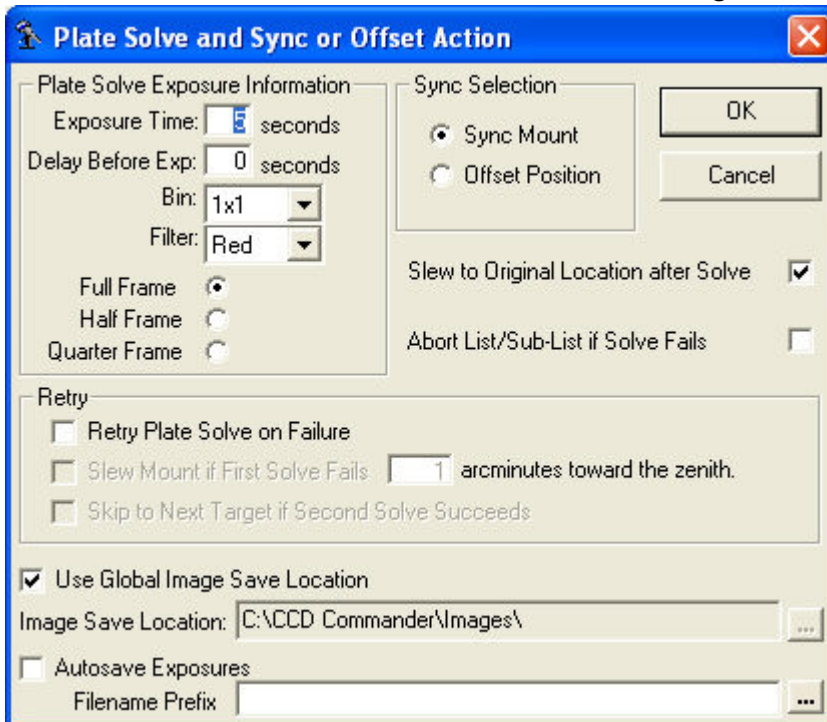
The

New Rotation Angle specifies the new Position Angle for the camera. The specified angle is not the rotator angle, but the actual north angle of the camera. CCD Commander will automatically compute the rotator angle and move the rotator the proper amount. Additionally, if the guider moves with the rotator, CCD Commander will recompute the guider coefficients to ensure guiding can continue after rotation.

The Get Position Angle from TheSky6 FOVI

button will automatically query the Position Angle from the active FOVI in TheSky6. This allows you to properly frame your target and select a guide star using the FOVI in TheSky6. CCD Commander will then enter the proper Position Angle for you, allowing a simple method of generating your action list.

Plate Solve and Sync Action



This action will take an image (using the imaging detector) and perform a Plate Solve. Next CCD Commander will either Sync the mount, or compute an offset of the current position. This is extremely useful for mounts that do not have superb pointing accuracy. Please note that the pointing accuracy must be good enough for the Plate Solve to succeed. Finally, if selected, CCD Commander will slew to the original coordinates.

The Exposure Time, Delay Before Exp., Bin, and Filter define the values for the exposure that will be taken.

The Full Frame, Half Frame, and Quarter Frame selections define the area of the imager detector to use. For wide field images, the Plate Solve can fail when the image covers too large an area of sky. In this case, Quarter Frame or Half Frame can be used. For narrow field images, Full Frame would probably work best to give the most number of cataloged stars in the image.

Sync Mount

tells CCD Commander to send a Sync command to your mount to correct where your mount thinks it is positioned. This can be undesirable for T-Point users, as the Sync command can corrupt the model.

Offset Position tells CCD Commander to compute the offset between where the mount thinks it is pointing and the Image Link results. Then on future slews, CCD Commander will apply this offset to correct for the mount pointing error. This option is excellent for T-Point users as it will not affect the model.

Slew to Original Location after Solve

will slew the mount to the coordinates it should have been at before the Plate Solve - using either the updated mount position from the Sync, or the offset computed. This gives you optimal pointing accuracy.

Normally when the Plate Solve fails, CCD Commander will simply go the next action in the list. **Abort List/Sub-List if Solve Fails**

will abort the entire Action List or Sub-Action List that the Plate Solve action resides in. If the Plate Solve action is in a Sub-List, execution will resume on the next action in the parent list. This can allow you to have some shut-down actions (close dome, park mount, etc.) in the parent action that will be executed when a Plate Solve fails.

Retry Plate Solve on Failure will cause CCD Commander to retry the plate solve exposure and solve if the first attempt fails.

Slew Mount if First Solve Fails...

will slew the mount prior to retrying the plate solve exposure. The slew will move the telescope in a direction toward the zenith. If the slew amount is large enough to move past the zenith and you are using a GEM, CCD Commander will flip the mount as part of this slew. This function can be used in a number of different ways.

One example is a rudimentary cloud monitoring system. If the first plate solve fails (presumably due to clouds obstructing the view), the slew size can be set large enough to point toward another part of the sky. When the second solve succeeds it implies that the entire sky is not cloudy and the Action List can continue.

Another use for this function is if you are plate solving on a star poor region of the sky, a small slew could help bring more stars into the field-of-view so that the second plate solve exposure can succeed. There are likely other uses for this function as well.

Skip to Next Target if Second Solve Succeeds

will cause CCD Commander to skip all the actions until the next Move To action. This is specifically used in the rudimentary cloud monitoring system mentioned above, but there may be other uses as well.

Image Save Location

The Use Global Image Save Location checkbox tells CCD Commander to use the path specified in the [File Options](#) setup window. When the checkbox is checked, the Global path is shown in the Image Save Location box.

When Use Global Image Save Location is not checked, the "..." button is enabled. You can then specify a different save location for this action only. Click the "

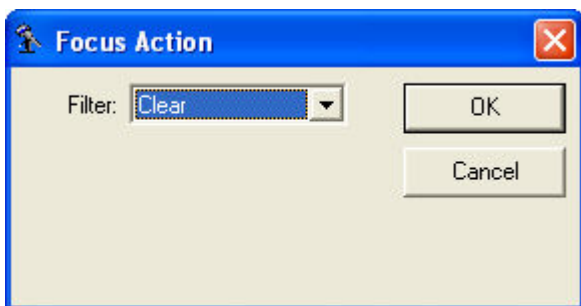
..." button to select the folder you want to use.

Filename Prefix

defines the start of the file name given to the downloaded images. CCD Commander will append a counter value to uniquely identify each file name. CCDSOFT may also append further information about the target to the file name.

The "..." button to the right of the Filename Prefix text box opens up the File Name Builder window which helps with creating automatic file name tokens. Visit the [File Name Builder](#) help page for more information.

Focus Action

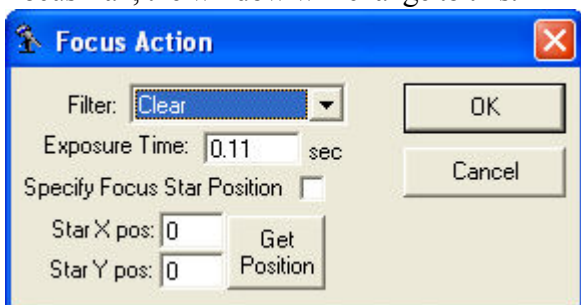


This action will run a focusing routine using the filter selected. The Focus routine will execute using whatever parameters you have configured in the focusing tool. Be sure that the focusing tool executes how you want using the parameters set.

The view of this window can change depending on the focusing tool selected. The default view is above.

For

FocusMax, the window will change to this:



Exposure Time

sets the initial exposure time FocusMax will use for the focus routine.

Specify Focus Star Position

allows you to pick the star location for focusing. This is useful if you do not slew to a focus star and want to use the target field-of-view to focus. Normally FocusMax chooses the brightest star in the field, but sometimes this can be the core of a galaxy or a star that may be too bright for focusing. Using this function allows you to specify the coordinates of the star you want to use.

Star X pos and Star Y pos

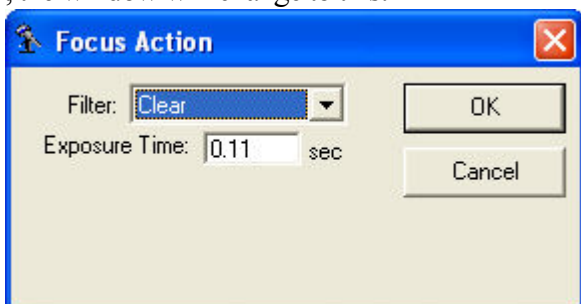
specify the coordinates of the star you want to use.

Get Position will pull the position of the star last used by FocusMax for the focus routine. You can use the FocusMax Select focus function to pick the star you want (if you are also using MaxIm/DL). You do not have to use the Get Position

button - simply entering the star coordinates works just as well.

For CCSoft @Focus

, the window will change to this:



Exposure Time

specifies the length of the focus exposure you want to use for the @Focus run.

Take Image Action

Take Image Action

Imager Information

Exposure Time: 300.000 sec

Number of Exposures: 6

Delay Before Exposure: 0.0 sec

Bin: 1x1

Filter: Red

Image Type: Light

Full Frame ☒ Width: 1024

Half Frame ☐ Height: 1024

Quarter Frame ☐

Custom Size ☐

Calibrate Images ☐

☐ Center AD When Complete

☒ Use Global Image Save Location

Image Save Location: C:\CCD Commander\Images\

☐ Autosave Exposures

Filename Prefix: <Date>CasaCieloObservatory<ObjectName><Filter><Bin><PA><Temper

☐ Plate Solve and Sync after Meridian Flip

☐ Sync to Current RA/Dec When Complete

☐ Rotate 180 degrees after Meridian Flip

☐ Perform two Plate Solves after Meridian Flip

Autoguider Information

☒ Autoguider Enabled

Exposure Time: 0.10 seconds

Bin: 1x1

Guide Star X pos: 515

Guide Star Y pos: 384

Max Error to Start: 0.5 pixels

Max Guide Cycles to Wait: 20

Guider Init Delay: 0 seconds

☐ Unguided Dither

Dither Information

Dither Frequency: 1 exposures

Dither Step: 1.0 pixels

Maximum Dither: 4.0 pixels

☒ X Axis Dither

☒ Y Axis Dither

☐ Maintain Dither Position With Filter Change

Plate Solve Exposure Information

Exposure Time: 5 seconds

Bin: 1x1

Filter: Red

Full Frame ☒

Half Frame ☐

Quarter Frame ☐

Sync Selection

☒ Sync Mount

☐ Offset Position

Abort List/Sub-List if Solve Fails ☐

Retry

☐ Retry Plate Solve on Failure

☐ Slew Mount if First Solve Fails 1 arcminutes toward the zenith.

☐ Skip to Next Target if Second Solve Succeeds

The Take Image Action window contains all the parameters for taking unattended guided or unguided images. The window is broken into five sections: Imager Information, Autoguider Information, Dither Information, Image Save Location, and Plate Solve Exposure

Information. You can click on the image above to go directly to that section in this page.

Imager Information

Here you define all the parameters for the imaging detector. The parameters here are similar to those defined in the camera control program. Some specific notes:

Custom Size

frame size will allow you to specify the exact size of the image you want. CCD Commander will center as best is possible the custom frame size on the middle of the detector.

Calibrate Images

will run a full calibration on your images as they are downloaded. You must setup the image calibration function in the camera control program to use the proper calibration frames. CCD Commander will save both the RAW and REDUCED files.

Autoguider Information

Here you define the parameters for autoguiding while the imaging detector is being exposed.

Autoguider Enabled enables and disables the autoguiding function. If you are taking a Dark, Bias, or Flat-field image, you would typically disable autoguiding.

The Exposure Time, Guide Star X pos, and Guide Star Y pos entries are only active when the Automatic Guide Exposure

function is disabled. If you want to manually choose your guide star, enter the information in these fields.

Max Error to Start defines what the maximum allowable error (in pixels) of the guide star can be before the imager begins its exposure. The autoguider will run until the guide error is less than this amount, or after

Max Guide Cycles to Wait tries. If the autoguider is unable to achieve a value less than this, the action will be stopped and CCD Commander will proceed to the next action in the list.

Guider Init Delay

specifies the number of seconds to wait before checking the guide error. If you know the guider takes a specific time before it pulls in the error you can set that time here. CCD Commander will then check the guide error after this time has elapsed.

Enabling the Autoguider also enables the Dither Information parameters.

Unguided Dither is enabled when Autoguider Enabled is unchecked. Checking Unguided Dither will enable the Dither Information parameters. Unguided Dither will slew the mount by the specified Dither Step

to dither your exposures.

Dither Information

Dither Frequency defines how often the guide star is dithered during the imager exposure. A

Dither Frequency of 1 will move the guide star after every exposure of the imaging detector. A value of 2 will dither after every 2 exposures of the imaging detector. This can be useful when taking many short imager exposures as the dither process can take some time to complete.

Dither Step defines the size of the dither movement between images. CCD Commander will always move this amount from one image to the next. Ensure that the Dither Step size is large enough to move at least one pixel on your imaging detector.

Maximum Dither defines the total size of the "dither box" around the guide star or initial coordinates. The guide star will never be more than the

Maximum Dither number of pixels or arcseconds from the where it started.

X Axis Dither and Y Axis Dither

can be used to selectively enable or disable the X and Y axis from the dithering process.

Maintain Dither Position With Filter Change

tells CCD Commander to continue the dither position and direction even after a filter change. Normally CCD Commander will attempt to re-use the same guide star and same dither position/direction when you image at the same coordinates with the same filter. On a filter change, CCD Commander can also keep the dithering coherent. This function is useful primarily when taking one image per filter and repeating the filter set like this: RGBRGBRGBRGB. With this kind of image sequence, the dither position will adjust for every image in the set such that the like-kind sub-exposures are all dithered. When imaging a single filter at a time, like RRRGGGBBB, it makes sense to reset the dither position with each filter change because it only matters that sub-exposures are dithered among each other. Dithering between filters would not be necessary for this imaging plan.

CCD Commander will always dither in a deterministic manner. This will ensure that every image is

always offset the same amount from the previous image and that any imager defects are always at a different location in your image set. In addition, the pattern CCD Commander follows ensures that the guide star will move a minimal amount between exposures, maximizing your imaging time.

Below is a plot showing how the guide star will move for a setup where the Dither Step is set to 1 and the Maximum Dither

is set to 2. CCD Commander starts with the guide star at the (0,0) position and moves a maximum of 1 pixel between each exposure. As soon as the dither location reaches the (2,2) coordinate, CCD Commander will retrace the dither path back to (0,0).

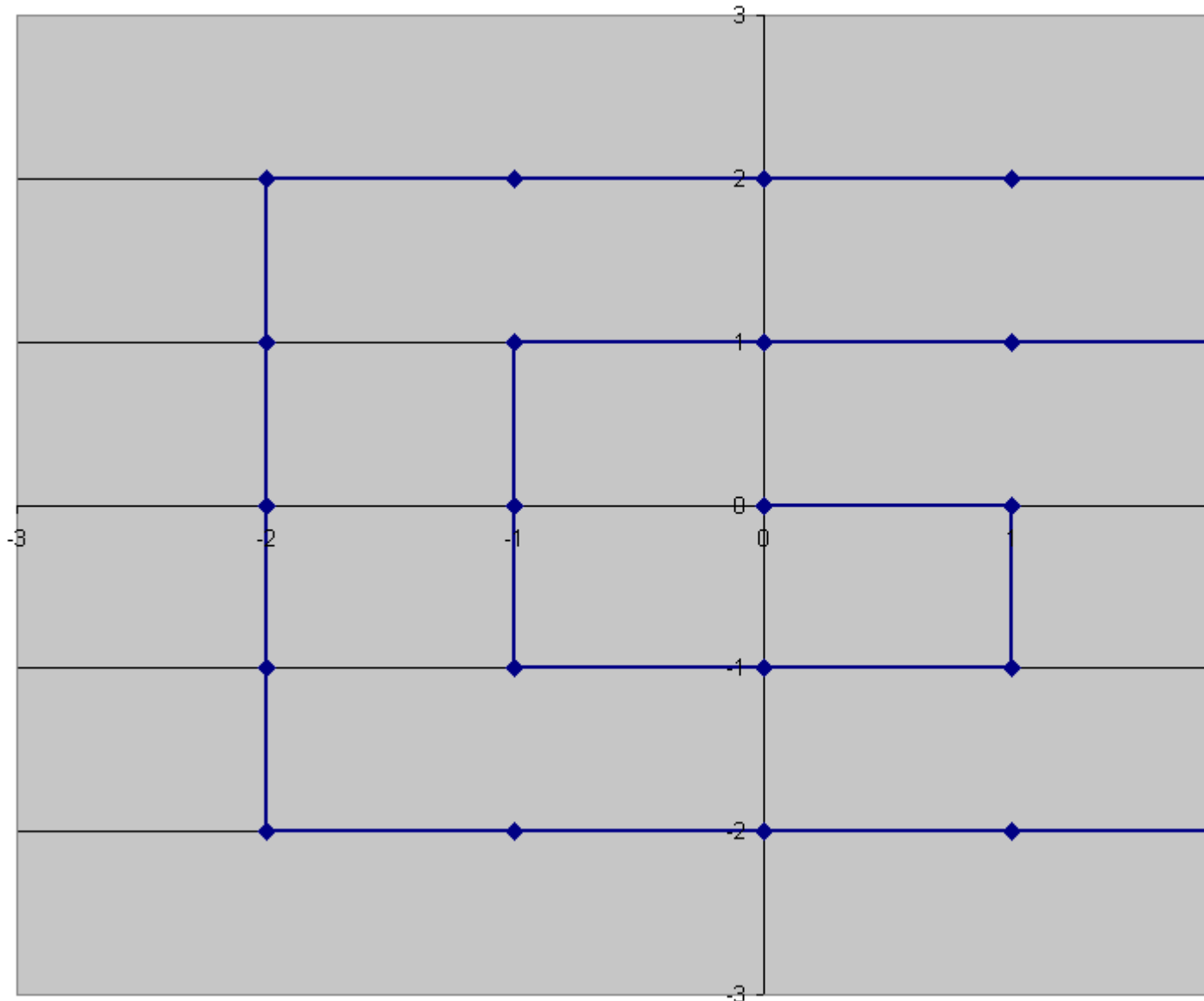


Image Save Location

The Use Global Image Save Location checkbox tells CCD Commander to use the path specified in the [File Options](#) setup window. When the checkbox is checked, the Global path is shown in the Image Save Location box.

When Use Global Image Save Location is not checked, the "..." button is enabled. You can then specify a different save location for this action only. Click the "..." button to select the folder you want to use.

Filename Prefix

defines the start of the file name given to the downloaded images. CCD Commander will append a counter value to uniquely identify each file name. CCDSOft may also append further information about

the target to the file name.

The "..." button to the right of the Filename Prefix text box opens up the File Name Builder window which helps with creating automatic file name tokens. Visit the [File Name Builder](#) help page for more information.

Plate Solve and Sync after Meridian Flip

This check box will tell CCD Commander that after a meridian flip it should take an image, perform a Plate Solve, and then sync the mount to the Image Link coordinates. This function is useful for mounts that cannot exactly center an object after the meridian flip. Since it is not necessarily known when the meridian flip will occur, it is useful to enable this function for every imager action (assuming this function is necessary). If the Plate Solve fails, CCD Commander will abort this action and move on to the next action in the list.

See the [Plate Solve](#) action for full details on each of these parameters. Note there is no Slew to Original Location after Solve parameter here. This function is always enabled for a Plate Solve after Meridian Flip.

The Perform two Plate Solves after Meridian Flip

option causes CCD Commander to repeat the plate solve. This is very useful if your mount has a significant amount of backlash after a meridian flip. If the first plate solve cannot get the target centered properly, the second one should be able to.

Checking Center AO When Complete

will set the AO deflection to the exact center position. This helps with mistaken image offsets during Plate Solve actions.

Checking Sync to Current RA/Dec When Complete will cause CCD Commander to issue a Sync command to the mount for the coordinates from the last Move To action.

Checking Rotate 180 degrees after Meridian Flip

will cause the rotator to compensate for the meridian flip.

Wait for Altitude Action

Wait for Altitude Action

Object Type:
☐ Sun ☐ Moon
☒ Other

Object Coordinates:
RA: h m s
Dec: d m s
Get RA/Dec from TheSky

Object Name:
Find Object in TheSky

Wait until object is at altitude: degrees
☒ Rising
☐ Setting

If the object crosses the meridian, the waiting will stop, regardless of the altitude set above.

OK Cancel

Compute Approximate Wait Time

This action will wait for the object entered to reach the specified altitude. CCD Commander can automatically compute the altitude of the Sun, Moon, or any deep space object using its celestial coordinates. For deep space objects, the coordinates are for the Epoch of the date the action is performed. Only whole number values are allowed in each field.

When you select Sun or Moon in the Object Type box, the Object Coordinates and Object Name are disabled. Only when Other is selected are these fields available.

The Get RA/Dec from TheSky

button will pull the coordinates from the currently selected object in TheSky. When you click this button CCD Commander will check to see what is selected in TheSky. If there are multiple objects that could be selected, CCD Commander will display the following window to allow you to select your desired target from the list:

TheSky6 Selected Objects

Select the object you wish to use from the list below and click the Ok button:

NGC 1068
M 77
SAC NGC 1068
NGC 1068
Cursor position

Ok Refresh

If your desired object is not show, click closer to the object in TheSky and push the Refresh button.

Alternately, you can enter an object name in the Object Name field. When you click the

Find Object in TheSky, CCD Commander will query the object's location from TheSky and automatically fill in the RA and Declination values for the object. If the object is not found, CCD Commander will enter 0 in each of the RA and Declination fields.

Wait until object is at altitude
specifies the altitude you want to wait until.

Rising

selects that CCD Commander should wait for the target to be higher than the specified altitude. Note that the altitude you enter might never be reached by the object in question. When this occurs, this action will complete when the object crosses the meridian. If you want to simply wait until the object crosses the meridian, you can enter 90 degrees for the altitude.

Setting

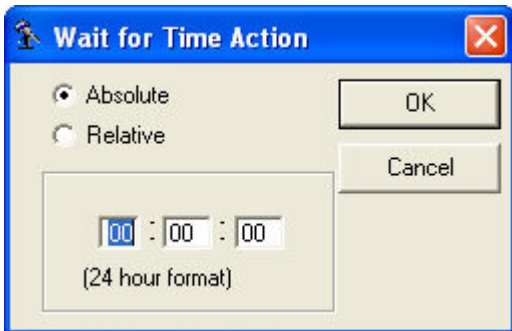
selects that CCD Commander should wait for the target to be lower than the specified altitude.

NOTE for GEMs: CCD Commander does not monitor the position of the mount during the Wait action. Therefore, it is best that your mount be in the parked position and not tracking if the Wait action will run for a significant period of time. If your mount is tracking during the Wait action, you must ensure your mount is positioned such that it will not enter the safety limits during the Wait action.

The Compute Approximate Wait Time

button will run CCD Commander's altitude calculation routines and report the approximate time your selected object will reach the altitude you have set.

Wait for Time Action



Absolute:

When Absolute

is selected, this action will wait until the specified time. The time entered is in normal 24 hour format.

The function will wait based on a 24 hour window from noon to noon. If the entered time is before the current time based on this noon to noon window CCD Commander will assume the time has passed and will not wait at all. For example, if you enter a time of 13:00 and it is 23:00 when the action runs, it will not wait at all. If you enter a time of 11:00, the action will wait until 11:00 except if the action runs when the current time is after 11:00 but before 12:00.

Relative:

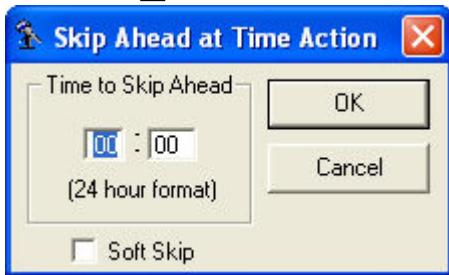
When Relative

is selected, this action will wait for the specified number of hours/minutes/seconds. The longest wait you can enter is 24 hours 59 minutes 59 seconds.

You can use the up and down arrow buttons to change the values as well as entering values in directly.

NOTE for GEMs: CCD Commander does not monitor the position of the mount during the Wait action. Therefore, it is best that your mount be in the parked position and not tracking if the Wait action will run for a significant period of time. If your mount is tracking during the Wait action, you must ensure your mount is positioned such that it will not enter the safety limits during the Wait action.

Skip Ahead at Time Action



This action provides a powerful tool in managing your action list. At the time specified, CCD Commander will skip ahead in your action list to the point where the Skip Ahead action is.

The most obvious use of this action is to automatically stop imaging and run a shutdown action at dawn. Then you can specify as long an action list as you want and the Skip Ahead action will stop the other actions before the sky brightens or the guide star is lost - preventing unneeded exposures and chasing a fading guide star.

Another possibly use is to ensure that you start imaging an event at the proper time. You can setup actions before and after the event to fully use the nights session. The Skip Ahead action will force CCD Commander to execute the actions associated with the event at the proper time, regardless of what was in the action list.

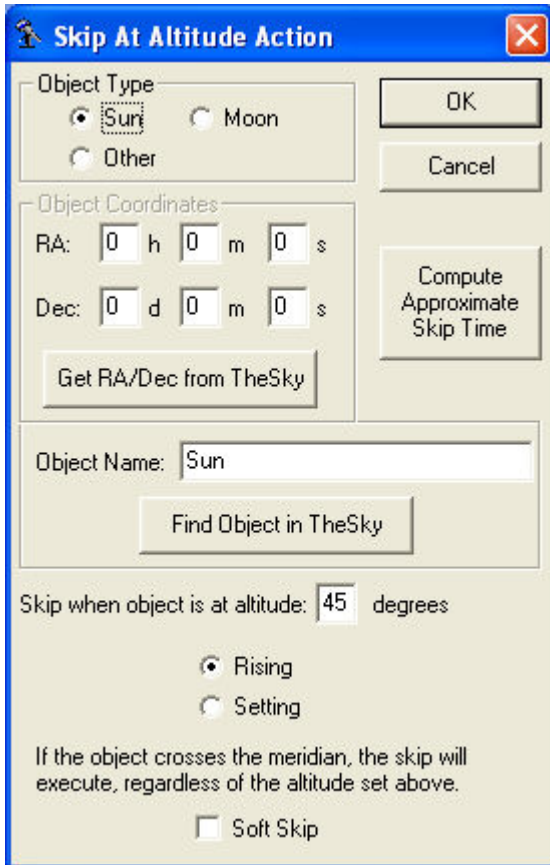
All that is needed is to enter the time you want CCD Commander to skip ahead at.

When you run an action list, CCD Commander will automatically search the action list (and any Sub-Action Lists) for all the Skip Ahead actions. The times are sorted so that the earliest Skip Ahead action will execute first. This means that if you specify Skip Ahead actions out of chronological order, you might have some actions that will never execute.

Enabling the Soft Skip option will cause CCD Commander to not skip at exactly the time requested if an image is in process. CCD Commander will wait for the image to complete prior to executing the skip.

Note: The Automatic Flat action contains a built in skip when you select dusk or dawn flats. The skip time is either sun set (for dusk flats) or the start of twilight (for dawn flats). You can find out what time these occur in the Automatic Flat action window. These times change every day, so be aware when using Skip Ahead actions and Automatic Flat actions (for dusk or dawn flats).

Skip Ahead when Object reaches Altitude Action



The screenshot shows a dialog box titled "Skip At Altitude Action" with a blue title bar and a red close button. The dialog is divided into several sections. The "Object Type" section has three radio buttons: "Sun" (selected), "Moon", and "Other". To the right are "OK" and "Cancel" buttons. The "Object Coordinates" section contains two rows of input fields: "RA:" with "0 h 0 m 0 s" and "Dec:" with "0 d 0 m 0 s". Below these is a "Get RA/Dec from TheSky" button. To the right of the coordinates is a "Compute Approximate Skip Time" button. The "Object Name" section has a text field containing "Sun" and a "Find Object in TheSky" button below it. The "Skip when object is at altitude:" section has a numeric input field set to "45" followed by the text "degrees". Below this are two radio buttons: "Rising" (selected) and "Setting". At the bottom, there is a text box stating "If the object crosses the meridian, the skip will execute, regardless of the altitude set above." and a checkbox labeled "Soft Skip" which is currently unchecked.

Similar to the [Skip Ahead at Time Action](#), this action will cause CCD Commander to skip ahead to the point that this action is in your list when your specified target reaches the altitude you specify.

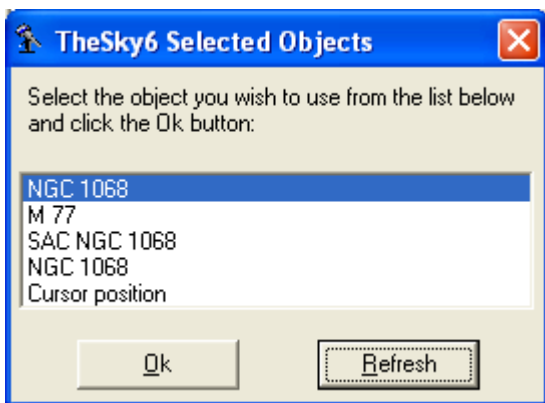
This action performs identically to the [Skip Ahead at Time Action](#)

. When you start running the action list, CCD Commander performs the calculations necessary to determine at what time the specified object will reach the desired altitude (either rising or setting). Then when the time is reached, CCD Commander will execute the skip.

CCD Commander can automatically compute the altitude of the Sun, Moon, or any deep space object using its celestial coordinates. For deep space objects, the coordinates are for the Epoch of the date the action is performed. Only whole number values are allowed in each field.

When you select Sun or Moon in the Object Type box, the Object Coordinates and Object Name are disabled. Only when Other is selected are these fields available.

The Get RA/Dec from TheSky button will pull the coordinates from the currently selected object in TheSky. When you click this button CCD Commander will check to see what is selected in TheSky. If there are multiple objects that could be selected, CCD Commander will display the following window to allow you to select your desired target from the list:



If your desired object is not show, click closer to the object in TheSky and push the Refresh button.

Alternately, you can enter an object name in the Object Name field. When you click the Find Object in TheSky, CCD Commander will query the object's location from TheSky and automatically fill in the RA and Declination values for the object. If the object is not found, CCD Commander will enter 0 in each of the RA and Declination fields.

Skip when object is at altitude
specifies the altitude you want to skip at.

Rising

selects that CCD Commander should wait for the target to be higher than the specified altitude. Note that the altitude you enter might never be reached by the object in question. When this occurs, this CCD Commander will skip ahead when the object crosses the meridian. If you want to simply skip when the object crosses the meridian, you can enter 90 degrees for the altitude.

Setting

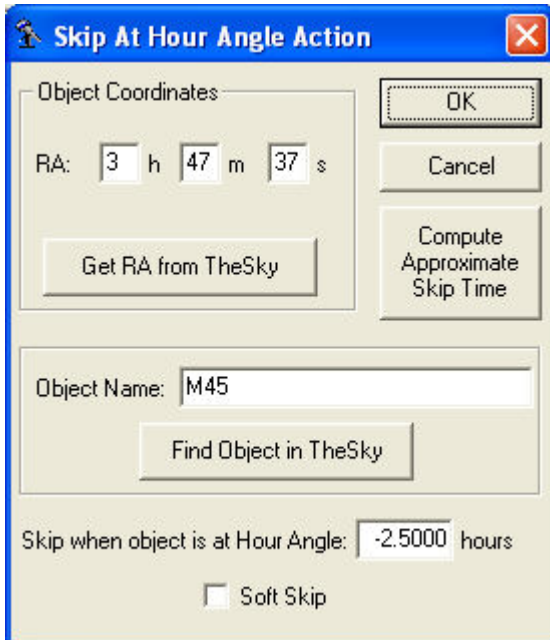
selects that CCD Commander should skip when the target is lower than the specified altitude. If the target can never go above the specified altitude, the skip will activate as soon as the target crosses the meridian.

The Compute Approximate Skip Time

button will run CCD Commander's altitude calculation routines and report the approximate time your selected object will reach the altitude you have set.

Enabling the Soft Skip option will cause CCD Commander to not skip at exactly the time requested if an image is in process. CCD Commander will wait for the image to complete prior to executing the skip.

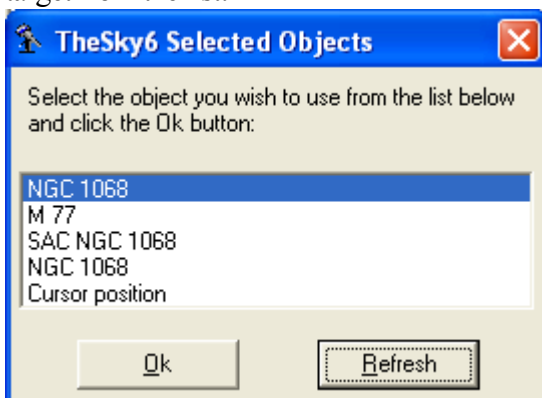
Skip Ahead when Object reaches Hour Angle Action



Similar to the [Skip Ahead at Altitude Action](#), this action will cause CCD Commander to skip ahead to the point that this action is in your list when your specified target reaches the hour angle you specify.

When you start running the action list, CCD Commander performs the calculations necessary to determine at what time the specified object will reach the desired hour angle. Then when the time is reached, CCD Commander will execute the skip.

The Get RA from TheSky button will pull the coordinates from the currently selected object in TheSky. When you click this button CCD Commander will check to see what is selected in TheSky. If there are multiple objects that could be selected, CCD Commander will display the following window to allow you to select your desired target from the list:



If your desired object is not show, click closer to the object in TheSky and push the Refresh button.

Alternately, you can enter an object name in the Object Name field. When you click the Find Object in TheSky, CCD Commander will query the object's location from TheSky and automatically fill in the RA values for the object. If the object is not found, CCD Commander will enter 0

in each of the RA fields.

Skip when object is at Hour Angle
specifies the hour angle you want to skip at.

The Compute Approximate Skip Time

button will run CCD Commander's altitude calculation routines and report the approximate time your selected object will reach the altitude you have set.

Enabling the Soft Skip option will cause CCD Commander to not skip at exactly the time requested if an image is in process. CCD Commander will wait for the image to complete prior to executing the skip.

Automatic Flat Action

Automatic Flat Action

Flat Information

Minimum Exposure Time: 1.000 sec
 Maximum Exposure Time: 60.000 sec
 Minimum Average ADU Value: 20000 ADU
 Maximum Average ADU Value: 22000 ADU
 Number of Exposures: 10
 Bin: 1x1
 Autosave Exposures: ☒
 Filename Prefix: <Filter>Flat<PA>
 Take Matching Darks: ☒
 Number of Darks per Flat: 10
 Dark Exposure Time Tolerance: 10.00 sec

Exposure Setup Frame Size

Full Frame ☒
 Half Frame ☐
 Quarter Frame ☐

Flat Frame Size

Full Frame ☒
 Half Frame ☐
 Quarter Frame ☐

Mount Information

☐ Park Mount
☒ Dusk Sky Flat Sun Altitude: -0.83 degrees
☐ Dawn Sky Flat -7.00 degrees
☐ Slew to: Compute Dusk Start Time
☐ Do not connect to or move mount

Rotations

Position Angle: 207 degrees
 Add Delete
 Move Up 0 180 27 207
 Move Down

Filters

Filter: Red
 Add Delete
 Move Up Red Green Blue Clear
 Move Down
 Reverse Order

☐ Continuously adjust exposure time to match ADU target.
☒ Use Global Image Save Location
 Image Save Location: C:\CCD Commander\Images\

The

Automatic Flat action will take automatic flats at Dusk, Dawn, or using your own flat screen. CCD Commander will automatically determine the optimum exposure time to achieve your desired average ADU. In addition, CCD Commander can continuously adjust the exposure time to maintain as constant an average ADU as possible - especially useful for Dusk and Dawn flats.

Flat Information:

Minimum Exposure Time and Maximum Exposure Time are used to bound the exposure.

Minimum Average ADU Value and Maximum Average ADU Value is range of average ADU values that indicate when the exposure time is sufficient. Once the average ADU value is within this range, CCD Commander will begin exposing your flats. CCD Commander will target half way between the minimum and maximum average value.

Number of Exposures is the quantity of flats you want for each filter.

The Exposure Setup Frame Size

sets the size of the frame (centered in the middle of the detector) that CCD Commander should use when it is trying to determine the exposure time at the beginning of the flat routine. Setting this to half or quarter frame can be very useful if you have a camera with a slow download. This will speed up the exposure setup time - giving you more time (especially useful at dusk or dawn) for your actual flats.

The Flat Frame Size

specifies the frame size for the actual flat field frames that will be saved.

If you don't want to save your flats, uncheck the Autosave Exposures checkbox. Be aware that you will not get any saved flats if this is not checked.

Filename Prefix is the text that is used at the start of the filename. CCD Commander will add text for each filter that is used in the action before the Filename Prefix. CCD Commander will add text for each rotation that is used after the Filename Prefix

. You can change this behavior by placing the Filter and Position Angle auto-naming tokens in the filename prefix.

The "..." button at the end of the Filename Prefix text box will open up the [File Name Builder](#) window. Click the link for more information.

The Take Matching Darks function will, at the end of the Automatic Flat function, take matching dark frames for the exposures used for your flat frames. You can specify how many darks per flat to exposure via the Number of Darks per Flat parameter.

The number of matching darks could be quite large, especially when CCD Commander continuously adjusts the flat exposure time during dusk or dawn flats. Setting the Dark Exposure Time Tolerance to a number greater than 0 will reduce the total number of darks taken. This is best illustrated with an example. Assume CCD Commander exposed a set of flats using these exposure times:

3.7s, 3.9s, 4.1s, 4.3s, 5.9s, 6.5s, 7.0s, 7.6s, 8.6s, 9.7s, 10.3s, 11.9s, 13.0s, 15.7s, 19.0s

If Dark Exposure Time Tolerance

is set to 1 second, then CCD Commander will expose darks that are at least 1 second apart, starting with the first exposure time. So the darks exposed would be:

3.7s, 5.9s, 7.0s, 8.6s, 9.7s, 11.9s, 13.0s, 15.7s, 19.0s

Now if the Dark Exposure Time Tolerance

were set a bit higher to 10 seconds, the following would be exposed:

3.7s, 15.7s

The Dark Exposure Time Tolerance

will need to be tuned to your sensor to give you the best set of darks that can be applied to your detector.

Mount Information:

If Park Mount is selected, CCD Commander will park the mount before executing the Automatic Flat action. This is useful if you have a flat screen that your telescope can point at when it is in the park position.

If Dusk Sky Flat is selected, CCD Commander will use its automatic dusk flat routine. No matter what it is doing when the sun sets, CCD Commander will automatically skip ahead in the action list to the Automatic Flat action and begin executing at sun set. Next, CCD Commander will slew the telescope just east of the zenith - the optimum point in the sky for dusk flats. CCD Commander then starts taking images at the Minimum Exposure Time. If the sky is too bright for the current filter, CCD Commander will continue taking exposures until the sky is dark enough to reach the Average ADU Value. CCD Commander will keep the telescope pointed at the same Altitude and Azimuth location which will cause any stars that may appear in the image to move through the frame - allowing a median combine to remove the stars from the flats. If the sky gets too dark to maintain the Maximum Exposure Time CCD Commander will stop taking flats.

You can specify where the sun should be when the Dusk Sky Flat begins. When using narrowband filters, it is sometimes useful to start flats even before the sun has fully set. The default Sun Altitude for Dusk Sky Flat is -0.83 degrees - this is the point at which the sun's disc is completely below the horizon. Set this number closer to 0 (or even positive) to start the Automatic Flat earlier in the evening. A larger negative number will start the Automatic Flat routine later in the evening.

Dawn Sky Flat acts very similar to Dusk Sky Flat. Just like with Dusk Sky Flat, Dawn Sky Flat CCD

Commander will automatically stop the current executing action and skip all of the actions until the Automatic Flat action is reached when the sun reaches the specified altitude. Next, the telescope will slew to just west of the zenith - the optimum point in the sky for dawn flats. CCD Commander then starts taking images, except now if the sky is too dark for the current filter CCD Commander will continue taking exposures until the sky is bright enough to reach the Average ADU Value. Again CCD Commander will keep the telescope at the same Altitude and Azimuth. Finally if the sky gets too bright to maintain the Minimum Exposure Time

CCD Commander will stop taking flats.

The Sun Altitude for the Dawn Sky Flat is exactly like that for the Dusk Sky Flat

. You can adjust this value to start the flat routine earlier (larger negative numbers) or later (numbers closer to 0) in the morning.

When Dusk Sky Flat or Dawn Sky Flat is selected, the Compute Dusk/Dawn Start Time button appears. Clicking this executes CCD Commander's sun set or dawn twilight start algorithms and reports the time at which the

Automatic Flat action will begin.

The Slew To option causes new fields to appear on the screen where you can specify a specific altitude and azimuth. CCD Commander will slew to the specified Altitude and Azimuth and take your flats. This is useful if you have a flat screen mounted somewhere other than your telescope park position. Just like with the others, CCD Commander will maintain the Altitude and Azimuth position during the Automatic Flat action.

Finally the Do not connect to or move mount option will do just that. CCD Commander will leave your mount alone when executing the Automatic Flat

. This can be useful if you are using a flat box and have set the telescope to a specific position already.

Rotations:

This

section defines all of the position angles you want your flats exposed at. CCD Commander will try to take all of the position angles requested for each filter, until the minimum or maximum exposure time is reached. It will move through the position angle list from the top to the bottom, taking flats for each position angle before moving to the next filter. The order of the position angles is not terribly important, although it is probably prudent to order the angles to minimize the time that the rotator must spin.

Filters:

This section defines all of the filters you want to use in the Automatic Flat action. CCD Commander will take as many flats as it can (given sky condition) for each filter. It will move through the filter list from the top to the bottom, taking all the flats for each filter before moving to the next. If you are using Dusk Sky Flat or Dawn Sky Flat, the order of the filters is very important. Since the sky will be darkening during the Dusk Sky Flats, you should order your filters from narrowest to widest - this allows the narrow filters to be used when the sky is bright and the wider filters to be used when the sky is darker. For Dawn Sky Flats, you should order your filters from widest to narrowest - this allows the wider filters to be used when the sky is dark and the narrower filters to be used when the sky is brighter.

The Reverse Order button is useful when you've just setup Dusk Sky Flats and now are trying to setup Dawn Sky Flats

. Rather than having to manually reverse the filter order, pushing this button will reverse it for you.

CCD Commander will automatically determine the optimum exposure time to achieve an average ADU value between the Minimum Average ADU Value and Maximum Average ADU Value before saving any exposures. During twilight flats (dusk or dawn) the sky is continuously darkening or brightening. If the exposure time is maintained over the flat set, the average ADU of the exposures will change. When the Continuously adjust exposure time to match ADU target. checkbox is checked, CCD Commander will adjust all of the exposure times to try and achieve a target ADU mid-way between the Minimum Average ADU Value and the

Maximum Average ADU Value for every saved exposure. This could result in a different exposure time for every flat - so be sure to normalize the flats when combining.

The Use Global Image Save Location checkbox enables you to specify a different path for your flat images. When this is unchecked, the "... button is enabled and you can select a different location to save these images.

Intelligent Temperature Control Action

The image displays two screenshots of the 'Intelligent Temperature Control Action' dialog box, illustrating different configuration options.

Top Screenshot (Enable Cooler, Use Intelligent Cooling checked):

- Enable Cooler:** Selected (radio button).
- Disable Cooler:** Unselected (radio button).
- Fan On:** Checked (checkbox).
- Use Intelligent Cooling:** Checked (checkbox).
- Intelligent Cooling Section:**
 - Desired Temperatures:** A list box containing -10.0, -15.0, -20.0, -25.0, and -30.0. Buttons for 'Add Temperature' and 'Delete Temperature' are present.
 - Maximum cooler power:** 80 %
 - Maximum time for temperature to stabilize:** 5 min
 - Temperature is stable when:**
 - temperature deviation is < 0.5 °C
 - cooler deviation is < 4 %

Bottom Screenshot (Enable Cooler, Use Intelligent Cooling unchecked):

- Enable Cooler:** Selected (radio button).
- Disable Cooler:** Unselected (radio button).
- Fan On:** Checked (checkbox).
- Use Intelligent Cooling:** Unchecked (checkbox).
- Simple Cooling Section:**
 - Temperature Set Point:** -20.0 °C

The Enable Cooler and Disable Cooler selections tell CCD Commander what you want to do for this entry in the action list. When Enable Cooler is selected, the Intelligent Cooling or Simple Cooling sections are enabled. These sections are described further below.

Disable Cooler will slowly warm the camera up and then turn off the camera's cooler.

The Fan On

checkbox is used to enable or disable the camera's fan when the action is run. Not all camera control programs can control the camera's fan.

When the Use Intelligent Cooling checkbox is unchecked, the Simple Cooling section is shown. In this mode, when this action is reached CCD Commander will set the cooler to the temperature specified in Temperature Set Point

and then continue to the next action in the list. If you want to wait for the temperature to stabilize you will need to insert your own delay into the action list.

When the Use Intelligent Cooling checkbox is checked, the Intelligent Cooling section is shown. In this mode CCD Commander performs a more complicated routine to not only set the cooler to a temperature, but also monitor it until it stabilizes and attempt to set

a lower temperature if possible.

The Desired Temperatures

list contains all the temperatures that CCD Commander will attempt to set. It will start at the warmest temperature and after the cooler reaches the set temperature, it will go to the next temperature in the list. CCD Commander is able to set the coolest temperature possible at the time the action runs.

Maximum cooler power

specifies the highest cooler power you want to operate at. After CCD Commander sets a temperature from the list it will wait for the cooler to reach the temperature. When it has reached the temperature, CCD Commander will wait for the temperature to stabilize. Once it has stabilized, CCD Commander checks the cooler power. If it is greater than this value, CCD Commander backs off to the previously achieved temperature.

Maximum time for temperature to stabilize specifies how long CCD Commander will wait for each temperature in the list to stabilize. If the temperature has not stabilized after the set time, CCD Commander backs off to the previously achieved temperature.

The two values under

Temperature is stable when: specify the parameters CCD Commander uses to determine at temperature setting is stable. Even when the temperature is stable, there is some variation in both the temperature and the cooler power. These two values specify how much variation is acceptable to consider the temperature stable. Watch your cooler performance for a few minutes to determine the optimum values for these parameters.

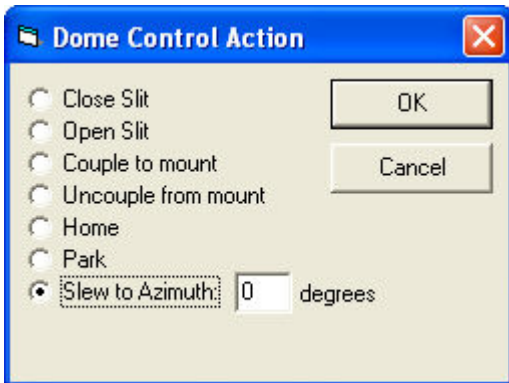
Note:

If CCD Commander cannot achieve the minimum temperature in this list, it will leave the cooler at that value and exit the action. The next item in your action list will then execute. So if you need to ensure the cooler is stable after leaving this action, you must be certain the minimum temperature is achievable given the parameters you set.

Automatic Dark Library: This action can be used (along with the Take Image action) to build a dark library at multiple temperatures on a cloudy night. Simply setup the Intelligent Temperature Control (ITC) action with a single (achievable) temperature in the temperature list. Follow this action with a Take Image action for your dark frames. Next use another ITC action to set the next lower temperature you want, then another Take Image

action. You can continue this for as many temperatures as you need. Be sure to start the session using higher temperatures and set lower temperatures throughout the night.

Dome Control Action

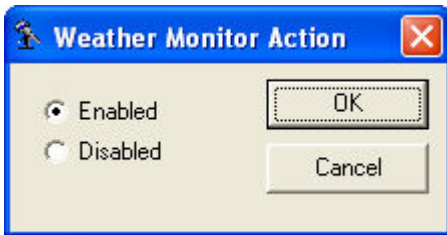


This action will perform a number of functions on your dome. Simply select the function you want performed for this action.

Note:

Not all domes support all of these functions. CCD Commander will attempt to perform the function requested, but some functions may not be supported by all domes.

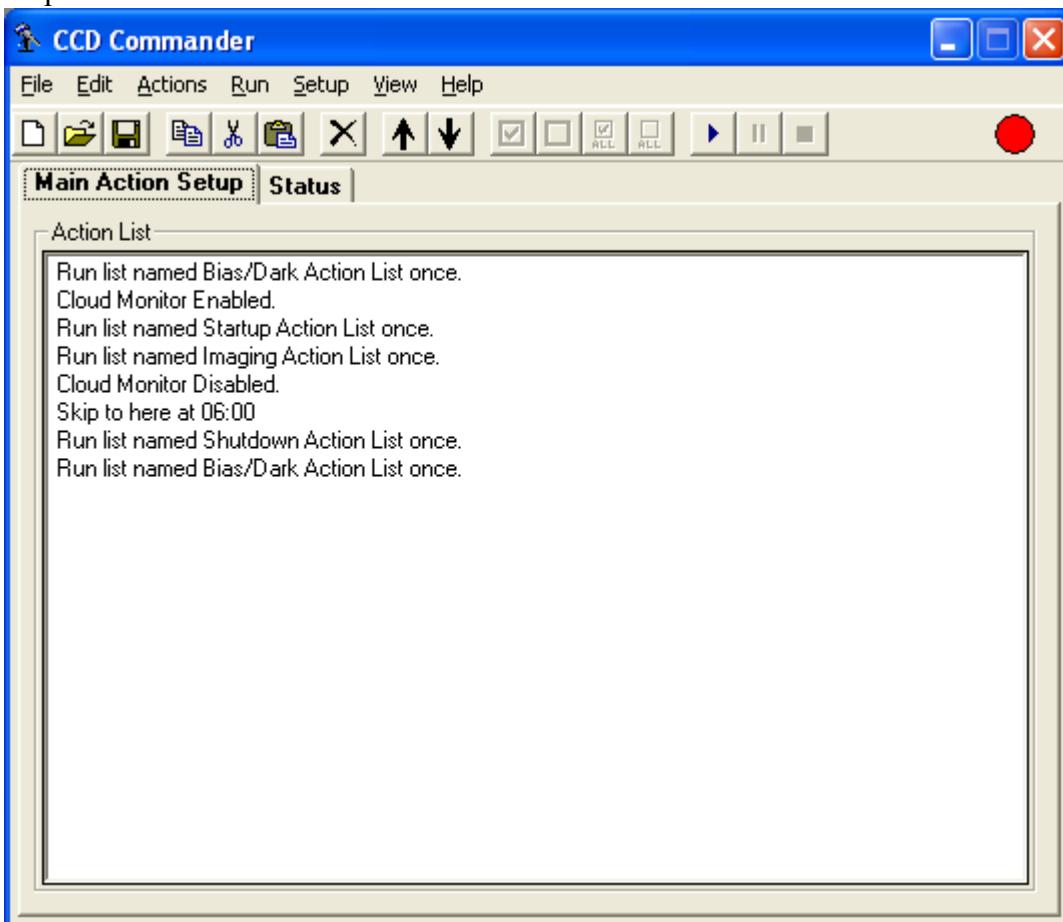
Weather Monitor Action



This action will Enable and Disable the Weather Monitoring function in CCD Commander. It may be important to disable Weather Monitoring after the dome is closed so you can take dark/bias frames at the end of a session. If Weather Monitoring were left enabled, it would pause the Action List even though the telescope is protected from the weather.

Special Note relating to Skip Ahead Action: When a Skip Ahead action activates, when CCD Commander is skipping over actions prior to the Skip Ahead, it will not skip a Weather Monitor Action. Instead the Weather Monitor Action will be executed. This allows you to have a Skip Ahead action that terminates your session at dawn and then shuts down your system. Without this functionality, a cloudy condition would keep the Action List paused and the shutdown processes would never be run.

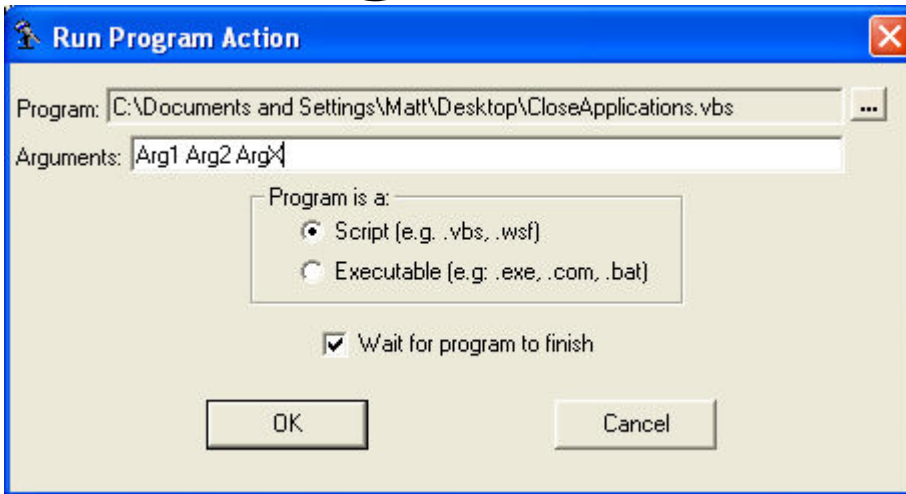
An example Action List using the Weather Monitor action and the Skip Ahead action is as shown here:



In the above Action List, I've created a number of Sub-Action Lists that represent some common tasks. At 06:00, CCD Commander will execute the Skip Ahead action and skip everything up to the location of the Skip Ahead action. The Weather Monitor action disabling the Weather Monitoring will be executed immediately before the Skip Ahead action is reached.

If the Weather Monitor action were located after the Skip Ahead action, then a cloudy condition would pause the action list immediately after the Skip Ahead action was executed and the process would be stuck waiting for the skies to clear. There is no danger in this occurring since the Cloud Monitor function would park the scope and close the dome as necessitated by the weather. But you would loose out on time that could be spent doing other things like taking Bias and Dark frames.

Run Program Action



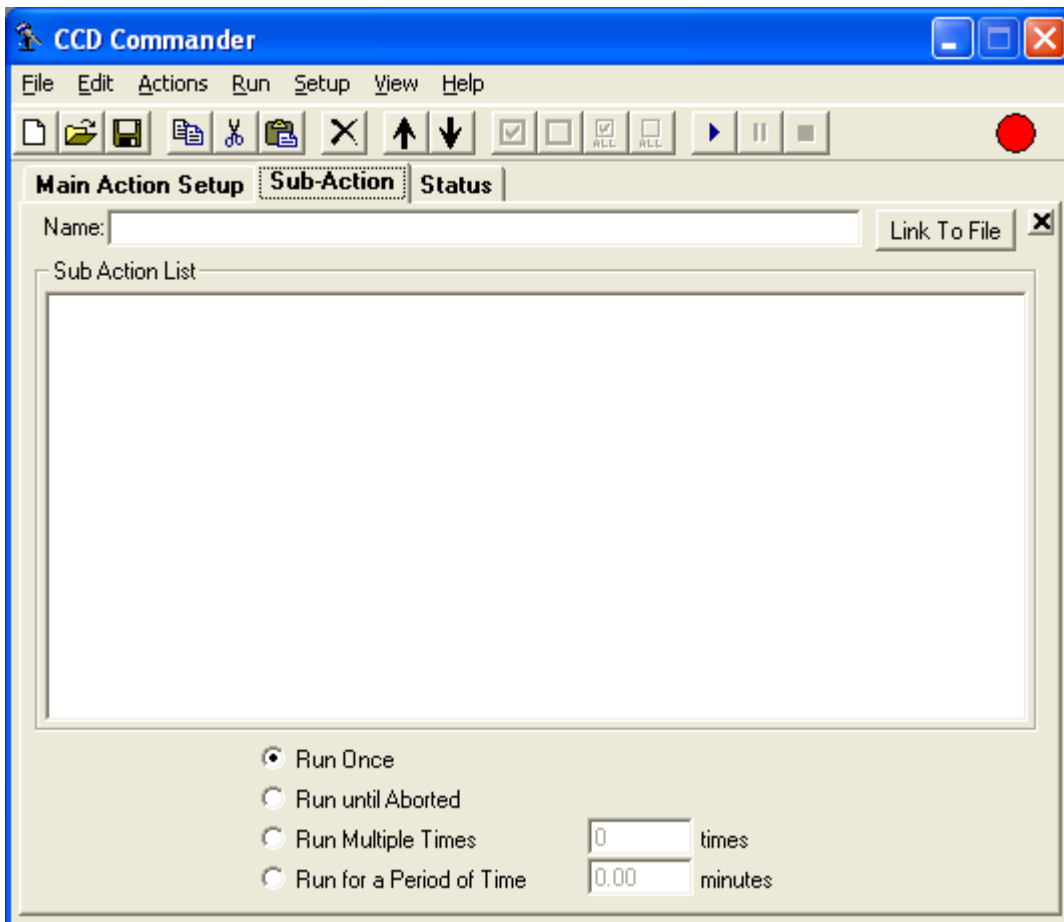
This action will run an external program (script or executable) that you specify. Click the "... " button to browse for the program you want to run. Once you select the program, the full path name will appear in the window.

Arguments for the program can be added in the Arguments text box. Any number of arguments can be placed here.

The

Wait for program to finish selection will, if checked, tell CCD Commander to wait for the completion of the program before executing the next action. If you do not check this box the program will run concurrently with the following actions in CCD Commander.

Run Sub-Action List



Clicking this action in the Actions menu will open a new Sub-Action tab on the main window. This will allow you to run an entirely new action list within a single line on your Main Action List. Any number of Sub-Action Lists can be added - including Sub-Action Lists in a Sub-Action List. This is very useful when you have common actions that you repeat throughout an action list.

You can also define separate action lists for each target and run each list using this action.

There are two different types of Sub-Action Lists available.

The first is simply a Named Sub-Action that is part of the Main Action. All aspects of the Sub-Action are saved with the Main Action and reside in memory while you are editing and running the Action Lists.

The second is a Sub-Action List linked to a CCD Commander Action List File. This is primarily for backwards compatibility, but can also be used to create common actions that you always use (Startup Action List, Shutdown Action List, etc.). These Sub-Action Lists load the details from a different file than the Main Action List resides in. This type of Sub-Action can only be viewed (not edited) since the list is linked to a specific file.

You can Unlink the list from the file. This will convert the Sub-Action to the first type described above. This provides full editing capabilities.

You can also save a Named Sub-Action and convert it to a Linked Sub-Action.

The Run...

radio buttons select how CCD Commander should execute the action list.

Run Once

runs the Sub-Action List once and then completes this action - resuming the parent action list.

Run until Aborted will repeat the action list forever until you push the Stop button on the CCD

Commander main window, or something else causes the Sub-Action List to exit (a Skip Ahead action, or a Plate Solve action).

Run Multiple Times

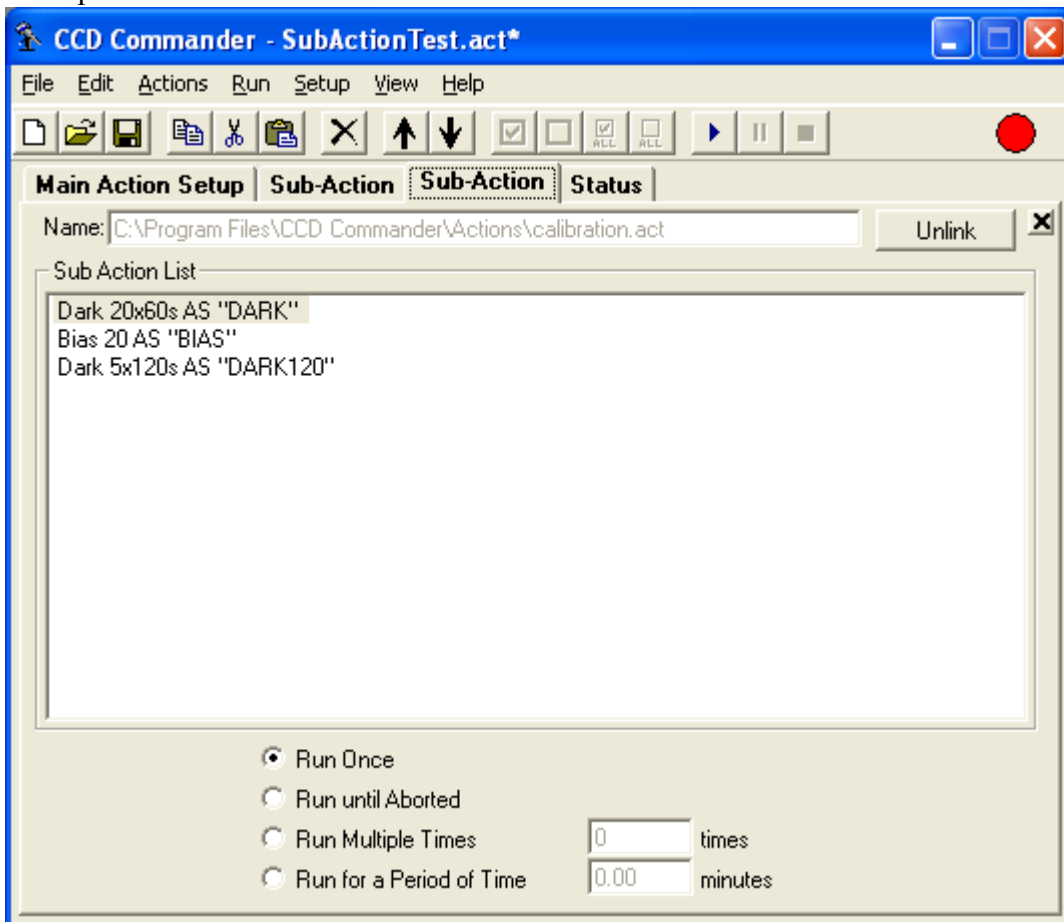
runs the action list for as many times as specified in the text box.

Run for a Period of Time

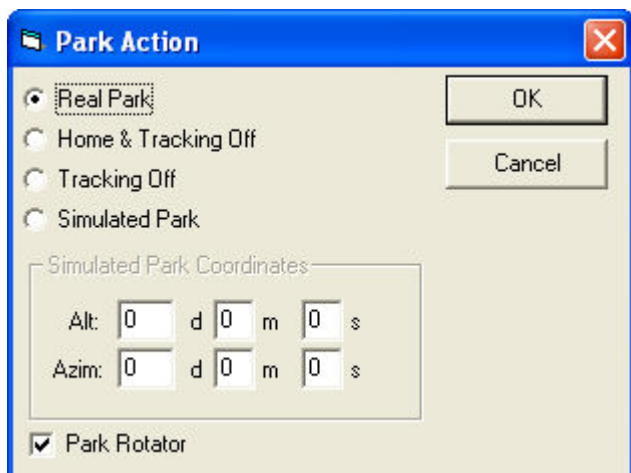
runs the action list until the amount of time specified is exceeded. CCD Commander will not interrupt the action list, so it will wait for the list to complete even if the time limit is exceeded. If the action list is very long, the time limit could be exceeded by a significant amount.

To close the Sub-Action List tab, click the small  button in the upper right corner of the tab.

Multiple Sub-Action levels:



Park Mount Action



Real Park

This action will park the mount. After parking the mount, CCD Commander will disconnect from the mount.

Home & Tracking Off

This will attempt to send the Home command to the mount and disable tracking. Some mounts may not support this feature.

Tracking Off

This will attempt to turn off the mount's tracking. Some mounts may not support this feature.

Simulated Park

This will cause CCD Commander to simulate a park function by repeatedly slewing to the same Altitude/Azimuth coordinates specified. CCD Commander will continue to keep the specified coordinates centered even while running other actions. At the end of the Action List, if the Simulated Park is still active CCD Commander will continue to keep the target coordinates centered until the Stop menu or button is pushed.

Park Rotator will also park the rotator in its Home position.

The mount will remain parked (Real or Simulated)
) until an action requiring information from the mount takes place.

The

Take Image Action using a "Light" frame will un-park to the mount. Using any other frame type (Dark, Bias, or Flat-field) will not reconnect to the mount.

The following actions will also un-park to the mount:

Move to RA & Dec Action

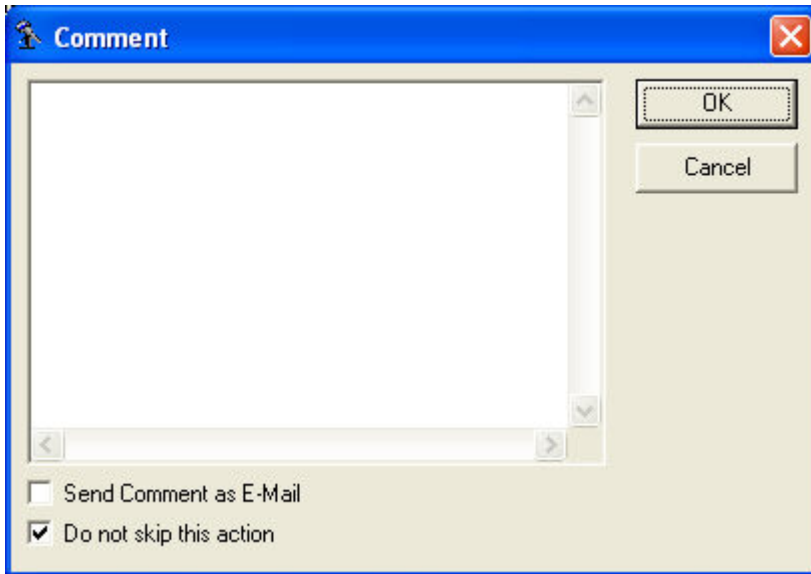
Plate Solve and Sync or Offset Action

Automatic Flat Action

All other actions will leave the mount in its parked state.

When you want to execute one of the Wait actions, it can be a good idea to first issue a Park Mount Action

Comment Action



This action simply inserts a comment text into the Action List and the Status Log. This can be useful to self-document action lists for better readability and understanding.

The first line in the text box will be visible in the Action List and the full text of the comment will be added to the Status Log.

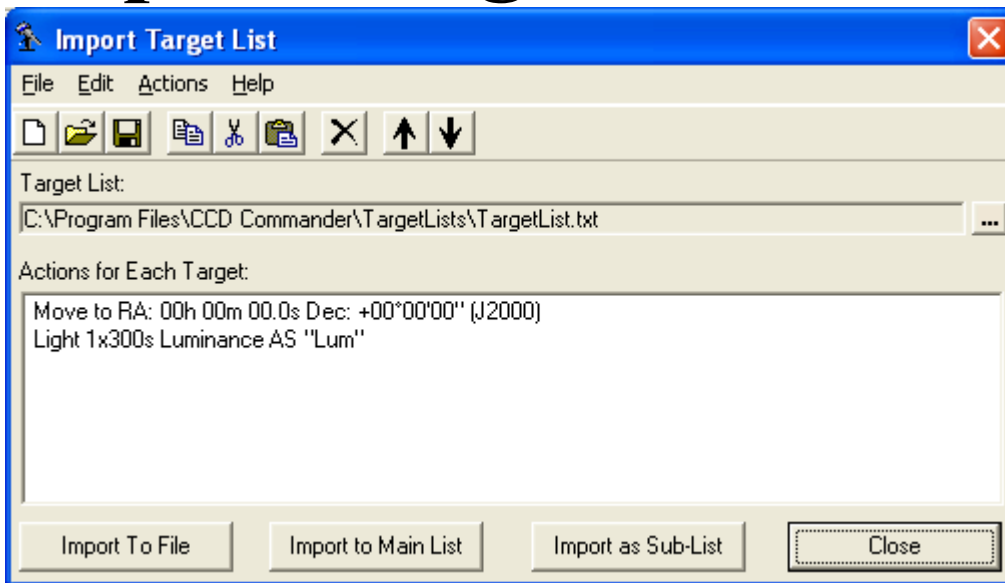
The Send Comment as E-Mail check box will cause CCD Commander to send the comment text to your specified e-mail recipients. (Note:

Comment e-mails must be enabled in the E-Mail tab of the Setup Windows.)

Do not skip this action

will cause the Comment to be added to the log (and e-mailed if enabled) if this action is passed in the action list even due to a Skip action skipping the action before and after this action.

Import Target List



The Import Target List function is used primarily for survey work. You must use an external program (like TheSky) to create a comma delimited target list. The target list must contain the Target Name, RA, and Declination coordinates for each target. The target list must also be in a format exactly like this:

NGC 5194, 13.50211, 47.1684

NGC 5195, 13.50401, 47.2418

NGC 5198, 13.50741, 46.6449

Where the first column is the Target Name, the second column is the RA coordinate and the third column is the Declination coordinate. The three columns must be separated by commas. There can be any number of spaces between each column. After the Declination coordinate there must be either a carriage return or another comma.

You can select your target list by pushing the "..." button and browsing to the proper file. The path and file name will then be listed in the Target List field.

In the Actions for Each Target list, you can add any number of actions from the Actions window. When importing the target list, CCD Commander will repeat the actions listed here for every target in the target list. CCD Commander will insert the data from the target list into each action as necessary to build your action list.

The File menu items will open and save CCD Commander Action List Template (.alt) files. These are specifically for the Import Target List function. If you want CCD Commander to remember what actions you've setup for the Import Target List window, save the list under the file name, "ImportActionTemplates\DefaultTemplate.alt". CCD Commander will always automatically open this file when displaying the Import Target List window.

The items in the Edit

menu perform just like those in the main CCD Commander window.

The Actions menu contains a sub-set of actions available in CCD Commander. Only those actions that may need to be executed for every target in the list are shown in the Import Target List window.

The three Import...

buttons at the bottom of the window will perform the actual import process.

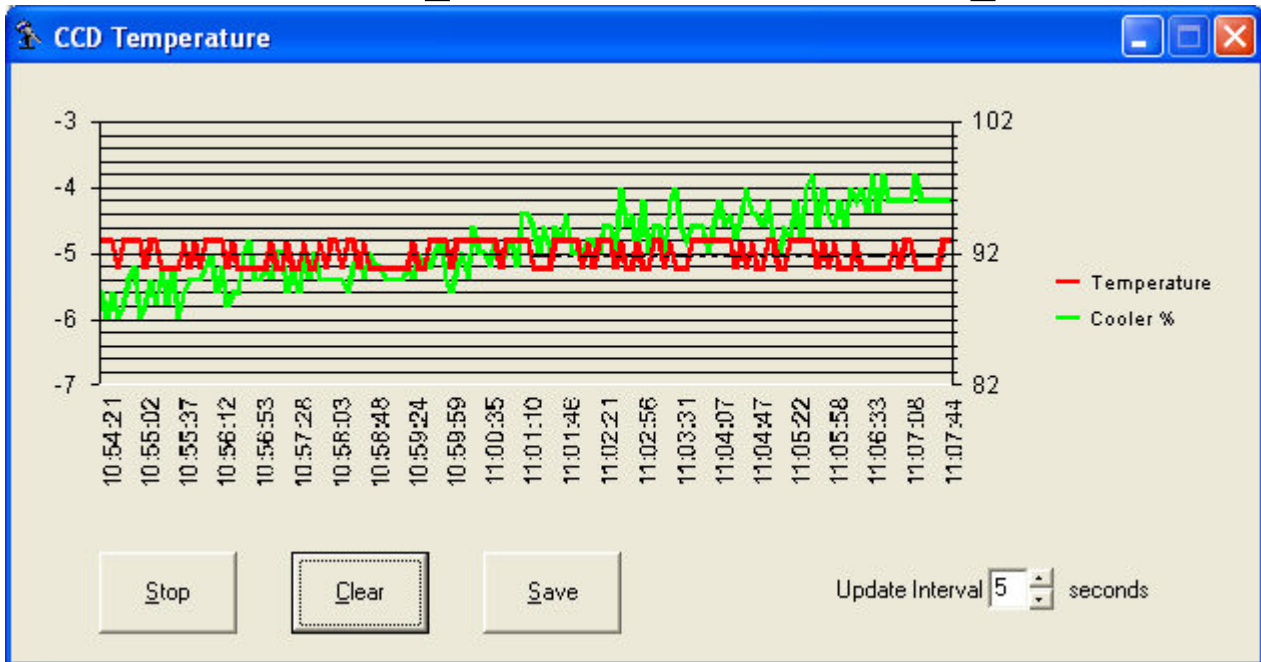
The Import To File

button will save the new Action List to a new file that you can later open in CCD Commander.

The Import to Main List button will clear the Main Action List in CCD Commander (like pushing the New button on the Main CCD Commander window) and then import the new actions into the Main Action List.

The Import as Sub-List button will create a Run Sub-Action List action in the Main Action List and then import the new actions into the Sub-Action List.

CCD Temperature Graph



This window shows a graph of the CCD temperature and thermoelectric cooler power. The CCD temperature is graphed in red. The cooler power is graphed in green. In addition there is a dashed line showing the trend of the CCD temperature over time.

The Stop button will stop recording of the temperature data. The button will change its text to Start to indicate that pushing the button again will start recording the temperature data.

The

Clear button will clear the existing data in the graph.

The Save

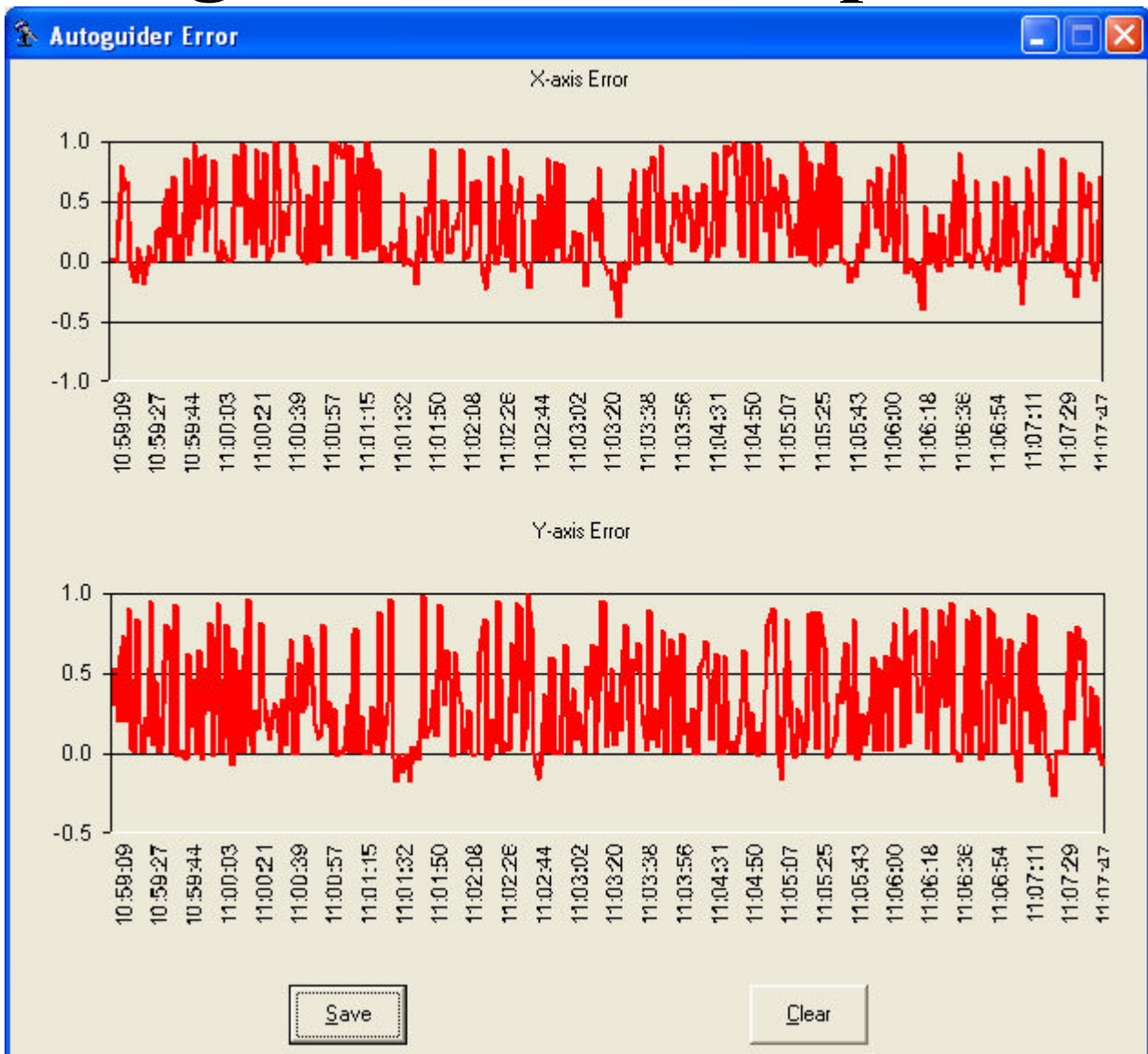
button allows the data to be saved in a comma delimited text format for evaluation or preservation of the data.

The Update Interval

setting tells CCD Commander how often to query and plot the temperature and cooler power. The update interval can be set from 5 to 30 seconds.

These graphs are a very useful tool to check that your imaging session did not have any temperature problems.

Autoguider Error Graph



These graphs show the autoguider error while the autoguide process is running and an image is being exposed. CCD Commander does not plot the error while the autoguider is being setup, or while dithering. These plots will show the guide error that occurs only while your images are being exposed.

The Save

button allows the data to be saved in a comma delimited text format for evaluation or preservation of the data.

The

Clear button will clear the graphs.

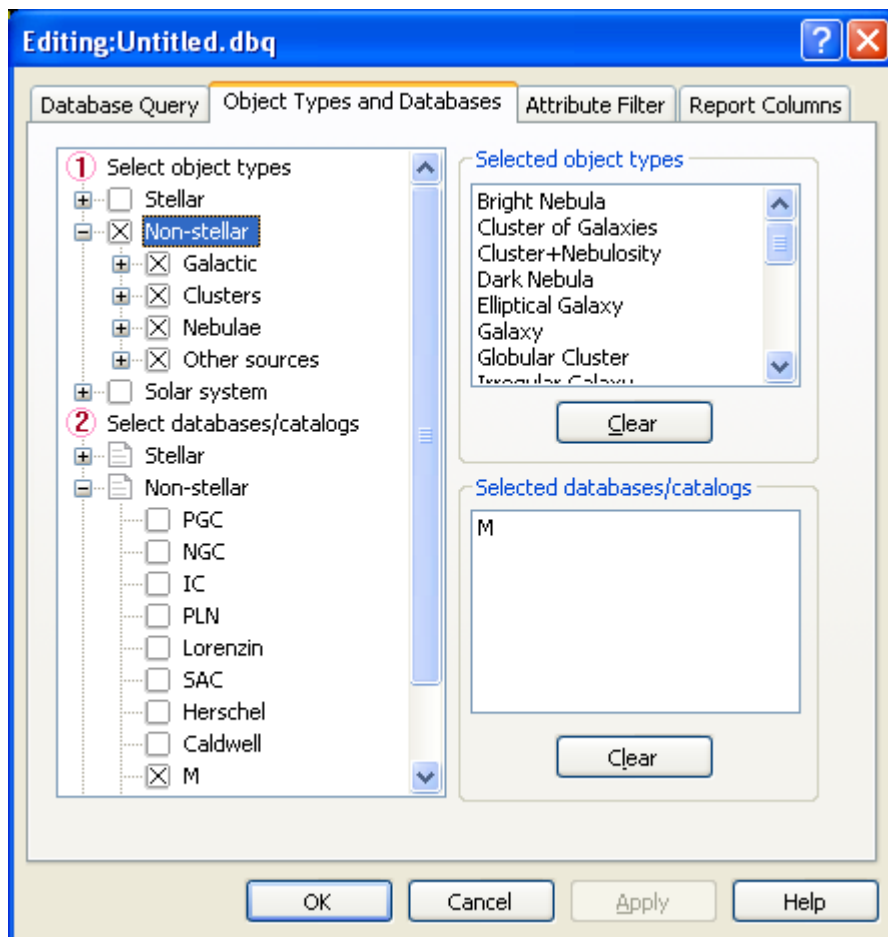
These graphs are a very useful tool to check that your imaging session did not have any severe autoguider problems.

Creating Target Lists in TheSky6

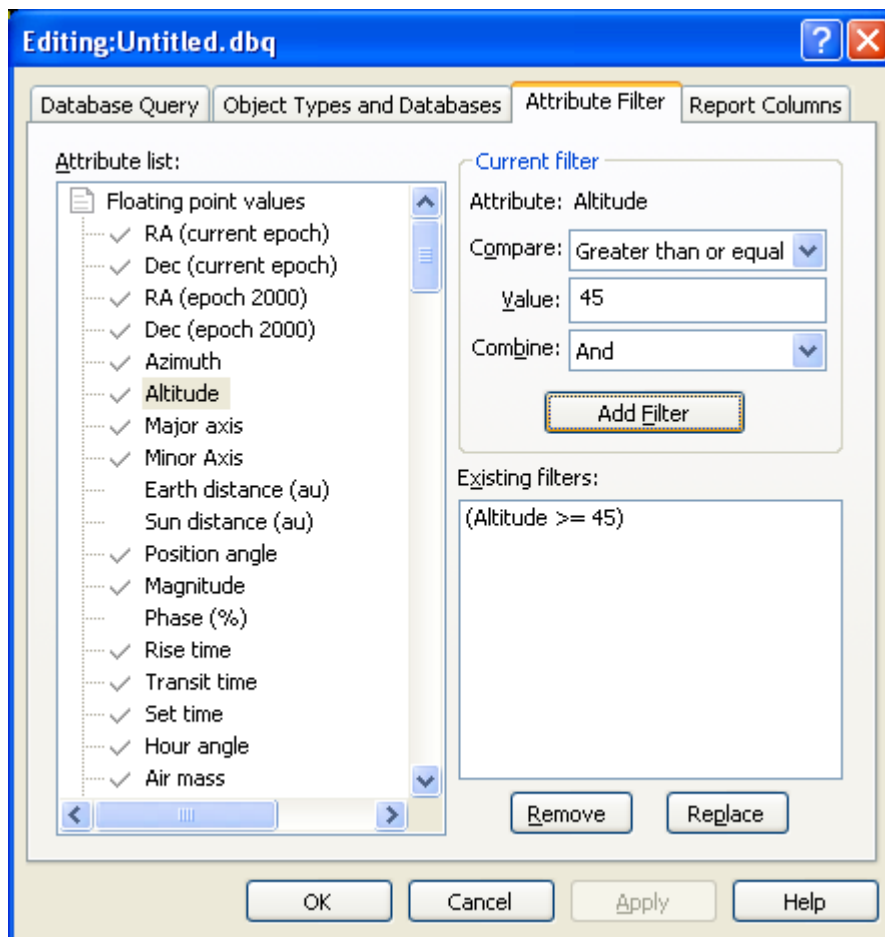
It is quite simple to create a target list in TheSky6 using the Data Wizard tool.

This procedure will show how to create a simple target list of all the Messier objects higher than 45° altitude at the current time.

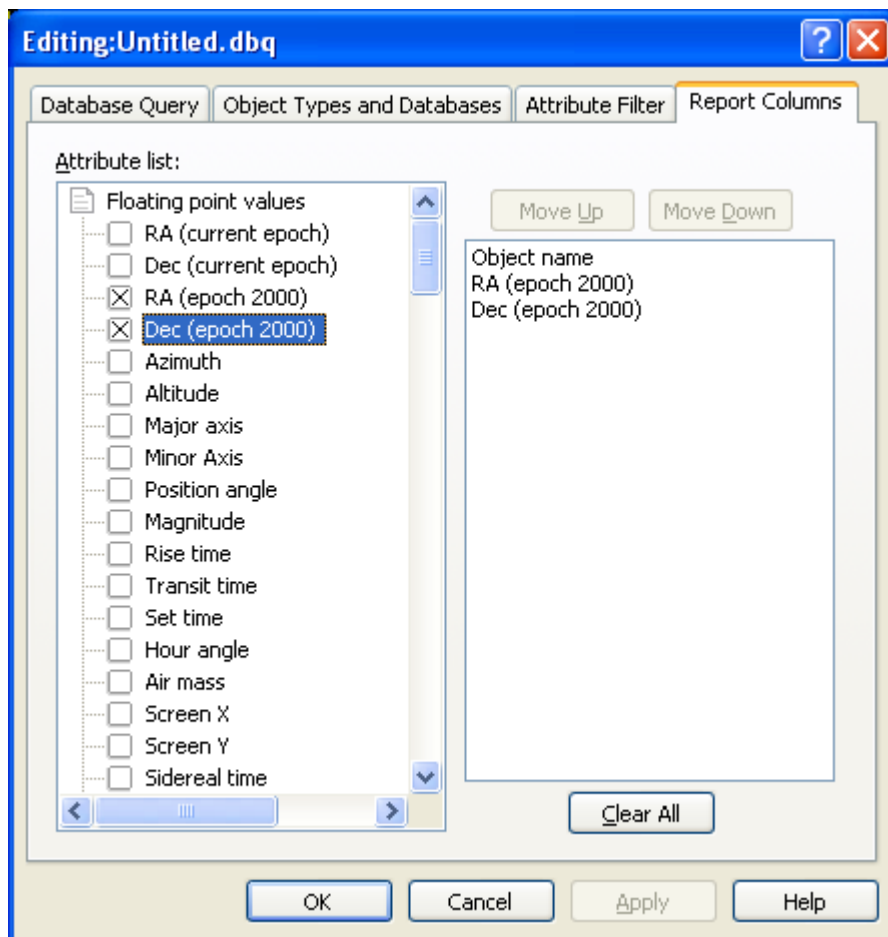
- 1.
1. Open TheSky6.
- 2.
2. Click the Data->Data Wizard menu (or push Ctrl-Shift-W).
- 3.
3. In the Data Wizard window, click the Query->Edit Parameters... menu
- 4.
4. Go to the Object Types and Databases tab.
- 5.
5. Under Select object types, mark the box next to Non-stellar. (Note: You have to expand the object type list to select all the possible object types in the list. Ensure the Selected object types list shows all the object types you are interested in.)
- 6.
6. Under Select databases/catalogs, expand the Non-stellar list and mark the M item.



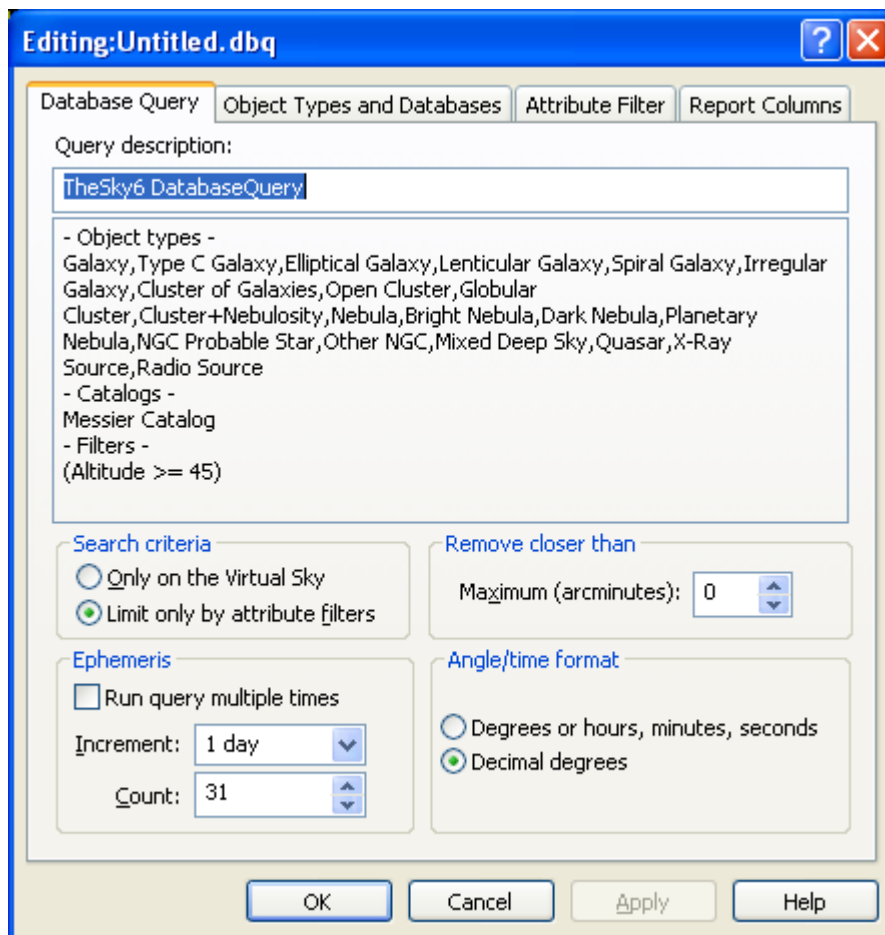
- 6.
- 7.
7. Go to the Attribute Filter
7. tab.
- 8.
8. Double click on the Floating Point Values item in the Attribute List
8. .
- 9.
9. Click on the Altitude
9. item.
- 10.
10. In the Current Filter section, the Compare selection, select Greater than or equal
10. .
- 11.
11. Enter 45 into the Value
11. field.
- 12.
12. Click the Add Filter button.



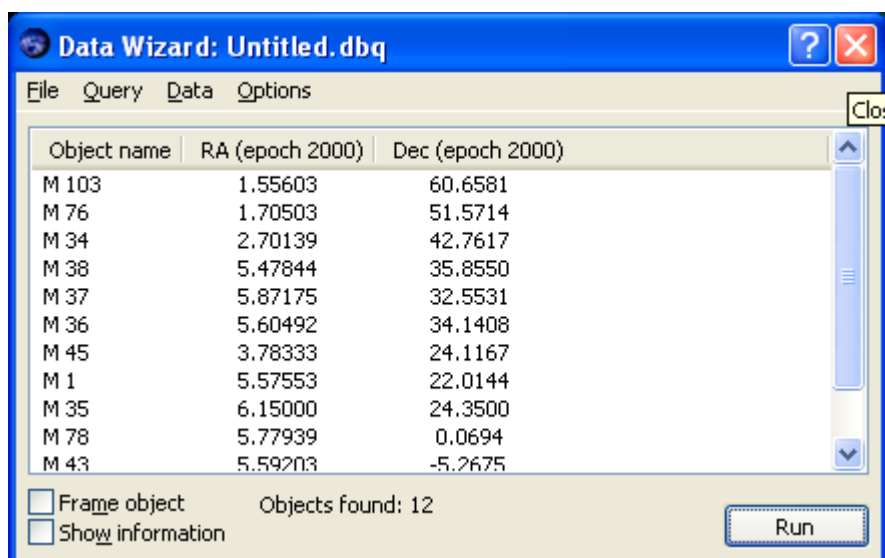
- 12.
- 13.
13. Go to the Report Columns
13. tab.
- 14.
14. Double click on the Floating Point Values item in the Attribute List
- 14..
- 15.
15. Mark the RA and Dec attributes (you can choose either the current epoch or epoch 2000 values).



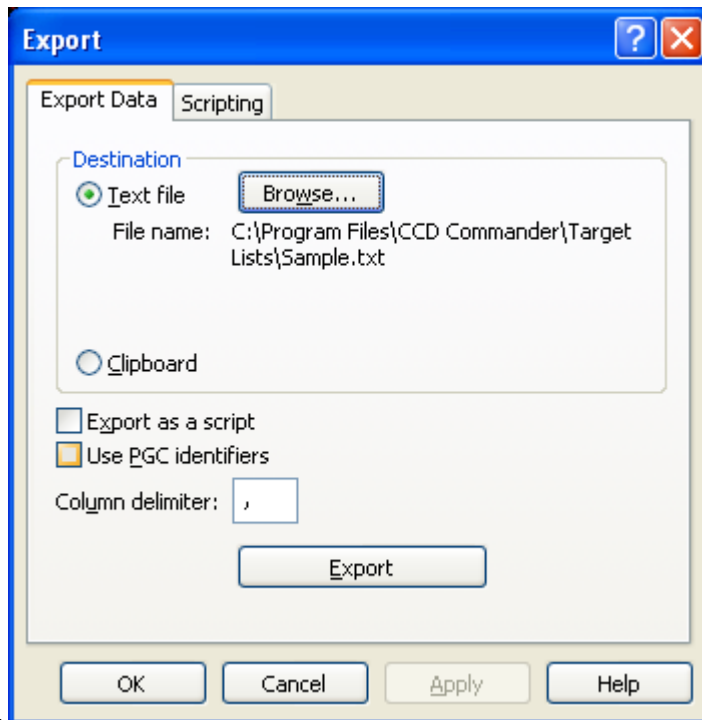
- 15.
- 16.
16. Click the Database Query
16. tab.
- 17.
17. You will see a summary of your settings here. Confirm everything looks correct.
- 18.
18. In the Angle/time format section, make sure Decimal degrees is selected.



- 18.
- 19.
19. Click the OK
19. button.
- 20.
20. Back in the Data Wizard window, click the Run button.



- 20.
- 21.
21. Click the Data->Export
21. menu item.
- 22.
22. Select the file name to export the list to. Ensure the other parameters are as shown here:



- 22.
- 23.
23. Click the
23. Export button.
- 24.
24. You are done with TheSky6 now, close out the open windows.
- 25.
25. The resulting text file needs to be slightly edited to be used in CCD Commander. My text file looks like this (yours will be slightly different depending on the objects visible at the time you do the above procedure):

25. Object name,RA (epoch 2000),Dec (epoch 2000)

M 103,	1.55603,	60.6581
M 76,	1.70503,	51.5714
M 34,	2.70139,	42.7617
M 38,	5.47844,	35.8550
M 37,	5.87175,	32.5531
M 36,	5.60492,	34.1408
M 45,	3.78333,	24.1167
M 1,	5.57553,	22.0144
M 35,	6.15000,	24.3500
M 78,	5.77939,	0.0694
M 43,	5.59203,	-5.2675
M 42,	5.58808,	-5.3903

- 26.
26. The first line of the text file is a header that TheSky6 inserts. Remove the first line to use the file in CCD Commander.
- 27.
27. Save the text file.
- 28.
28. Now you can import this target list into CCD Commander.

Command Line Arguments

There are several functions that can be accessed via the CCD Commander command line. These can be accessed via the Windows Command Shell, the Run window, a batch/scripting file, or similar.

The CCD Commander command line is broken down into three parts shown here:

CCDCommander.exe <Command> <Argument1> <Argument2> ... <ArgumentX>

The first thing must always be the CCD Commander executable name. The .exe extension is optional.

Next is the Command.

This is followed by any number of Arguments as defined for the command.

The available Commands and their respective arguments are:

Command:

AutoRun

The AutoRun command has one argument which must always be included. CCD Commander will load the specified file name and automatically begin execution.

Argument:

FileName

This must be the name and path of a valid CCD Commander action list.

Example usage:

CCDCommander.exe AutoRun "C:\CCD Commander\MyAction.act"

This will reset both the Window Position and the MaxIm/DL Sequence Number.

Command:

Reset

The Reset command can have any number of arguments, but they all must be one of the following.

Argument:

WindowPos

Resets the startup position of the CCD Commander main window to the default position. Used if the startup window position becomes corrupted causing the CCD Commander window to appear off the screen.

Argument:

MaxImCount

Resets the Sequence Number used for saving images taken using MaxIm/DL.

Argument:

All

Resets all of the saved settings in the Windows Registry. Reverts all of the values in every CCD Commander window to their default values.

Example usage:

CCDCommander.exe Reset WindowPos MaxImCount

This will reset both the Window Position and the MaxIm/DL Sequence Number.

Command:

Import

The Import command must always have two arguments. It will execute the Import Target List function.

Argument1:

TargetListFile

Specifies the name of the text file containing the target list.

Argument2:

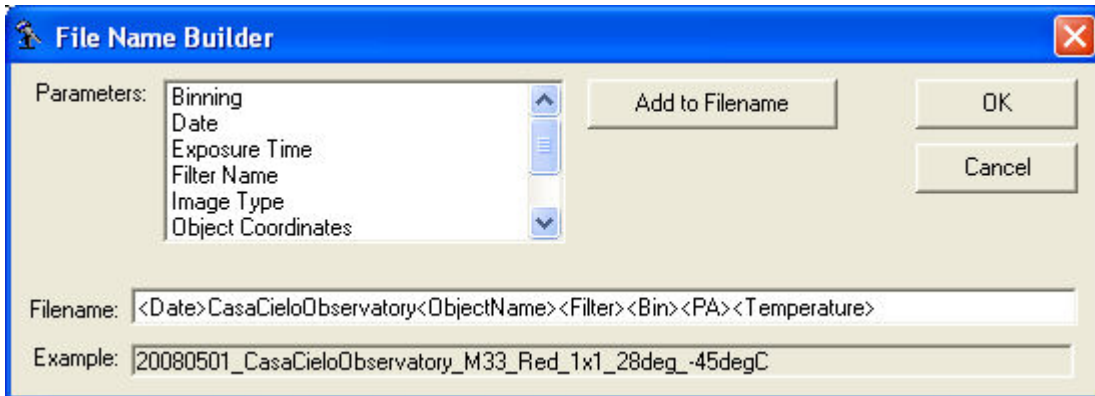
ActionListFile

Specifies the name of the action list file that the new action list will be written to.

Example usage:

```
CCDCommander.exe "C:\Program Files\CCD Commander\TargetLists\TargetList.txt" "C:\Program Files\CCD Commander\Actions\ActionList.act"
```

File Name Builder



The File Name Builder is a simple tool to allow you to setup the automatic file naming parameters in your filenames. You do not have to use the File Name Builder if you can remember the parameters - just type them into the text box where needed. But this window makes it convenient to create file names, and there is nothing to remember!

Select the parameter you wish to add from the list, and then click the Add to Filename button. This will append the selected parameter into the Filename text box.

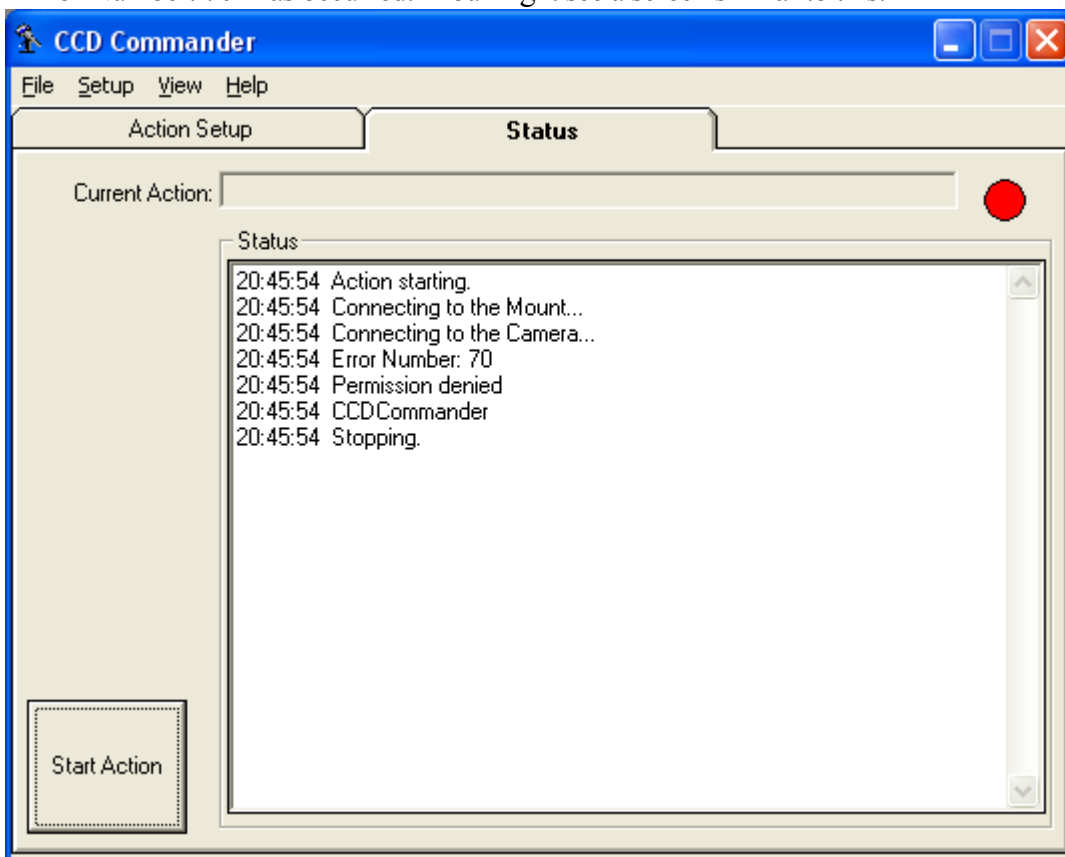
The Filename text box is fully editable. You can insert any other text you want to include in the file name. Just be sure not to change the texts between the <> characters, as this will create an invalid parameter.

The Example text shows a sample file name that will be created with your given parameters. You can use this to verify your file name.

Clicking the Ok button will insert the text from the Filename text box back into the action setup window.

Correcting the "Permission denied" error with CCD Commander

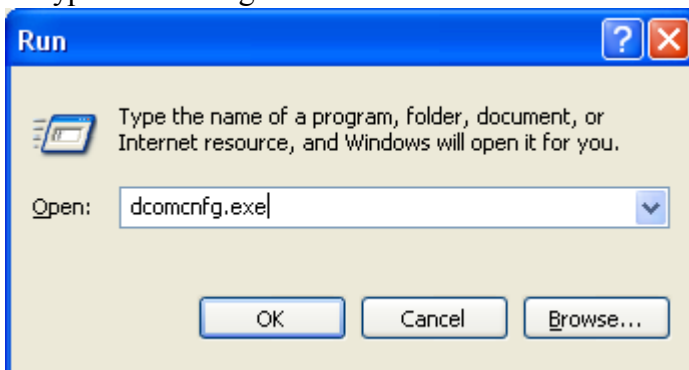
With the v1.2 release of CCD Commander, a few users have reported an error when CCD Commander attempts to connect to either CCDSOFT or MaxIm DL. CCD Commander reports that "Error Number: 70" has occurred. You might see a screen similar to this:



This error is the result of a permission problem with Windows. There is a simple fix that needs to be performed with Windows to prevent this error from occurring.

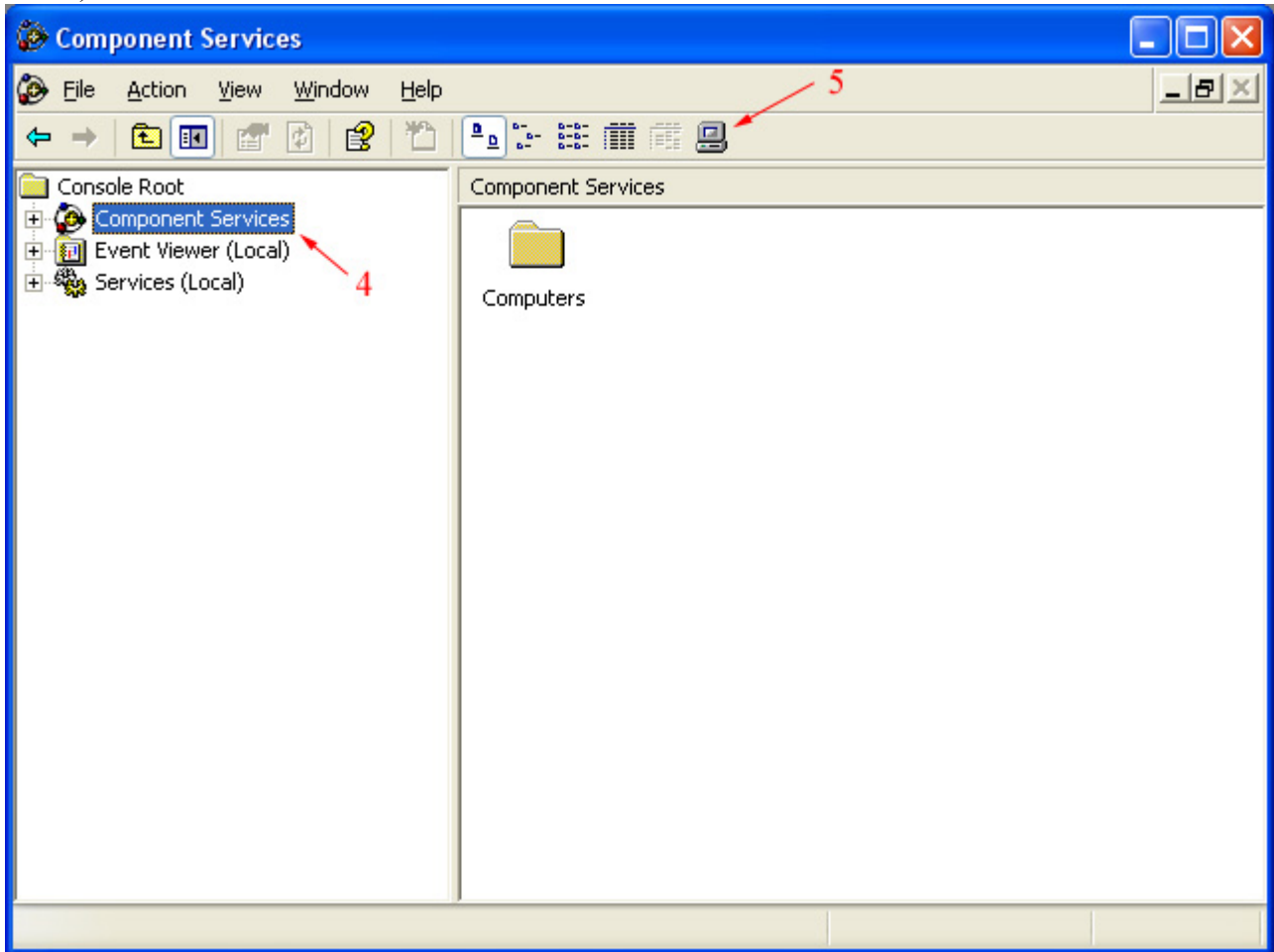
I've documented the procedure for Windows XP and Windows 2000:

1. Click Start->Run.
2. Type in dcomcnfg.exe into the Run window.



3. Click the OK button.

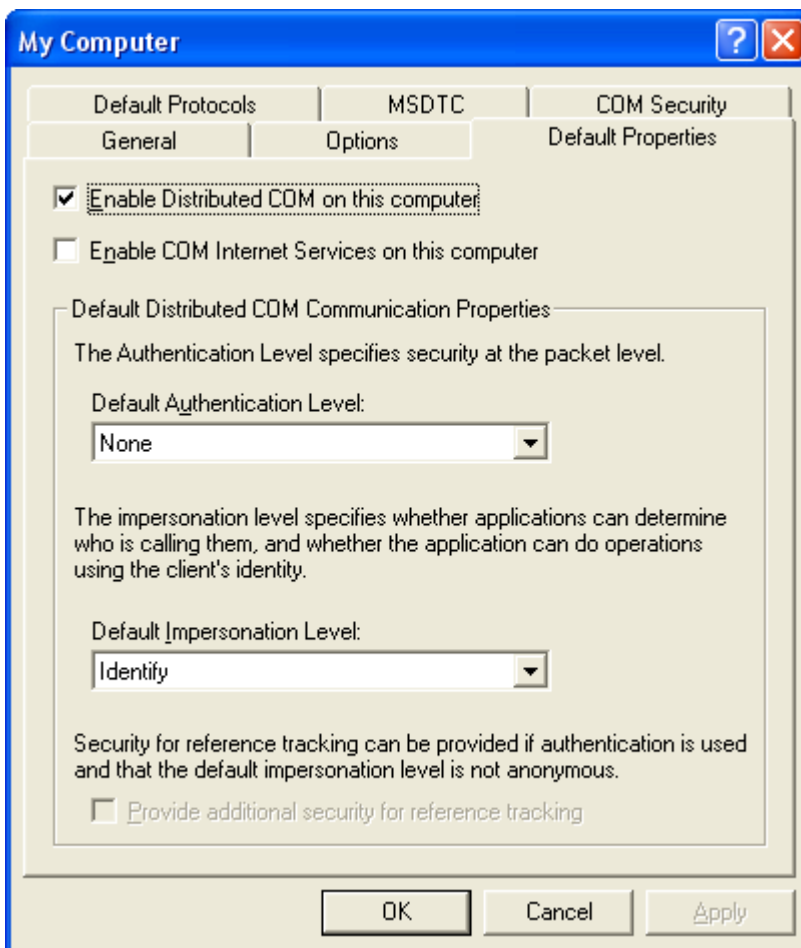
4. Windows XP Only: Click the “Component Services” text on the left half of the window (arrow #4 below).



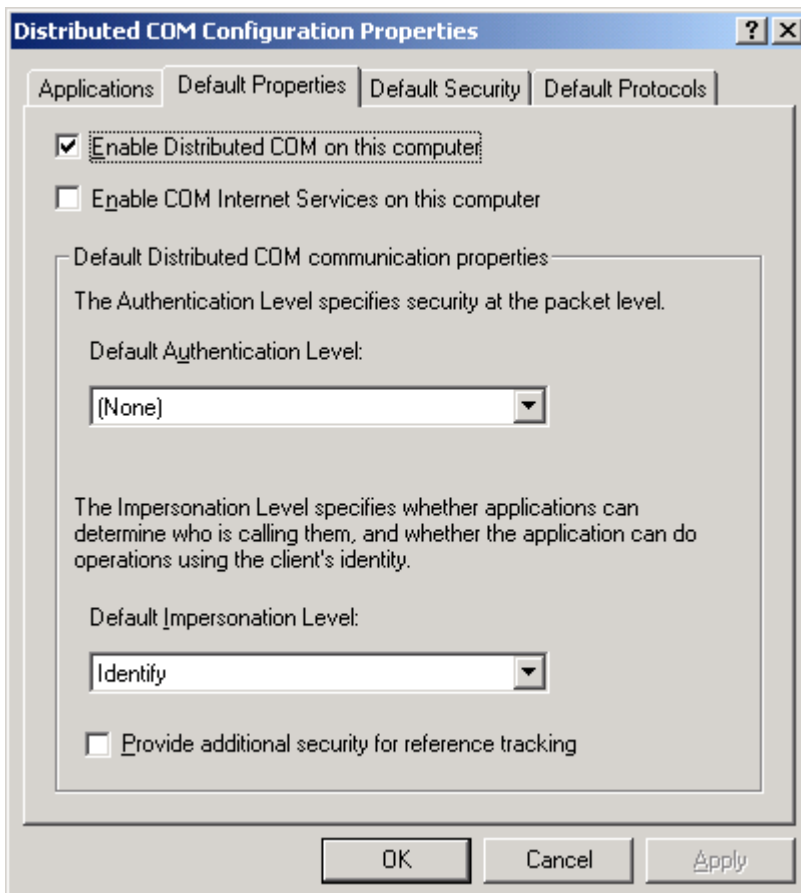
5. Windows XP Only: Click the computer icon on the toolbar (arrow #5 above).

6. On the new window that opens, click the “Default Properties” tab.

Windows XP:



Windows 2000:



7. Change the "Default Authentication Level" to "None" as shown above.

8. Confirm that the “Default Impersonation Level” is set to “Identify”.
9. Click OK and close the “Component Services” window.
10. Reboot your computer.
11. CCD Commander should now execute normally.