STARKEEPER.IT

Voyager

Image Acquisition Automation Software

By Leonardo Orazi

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1 Main Page

1.1 Welcome

Welcome to the Official English language Wiki for the Voyager astrophotography automation software.

Voyager is commercial software written and sold by Leonardo Orazi. The official website is Starkeeper.it.

This Wiki's purpose is to provide an English documentation, and to allow other Voyager users to contribute to the English language documentation.

Enjoy!

1.2 Downloadable PDF Manual

A downloadable PDF version of the contents of this Wiki is available here:
https://wiki.starkeeper.it/images/voyager.pdf

1.3 Contents

1.4 Disclaimer

While the authors of this Wiki have worked hard to make the information useful, we cannot guarantee it is correct.

This is a volunteer effort to help the community, and there are no warranties expressed or implied.

USE AT YOUR OWN RISK!

Please use care and caution and watch your equipment closely while running it with Voyager or any automation software, especially when trying something out for the first time.

By using the information in this Wiki, you acknowledge that you are doing so at your own risk.

The authors of this Wiki assume no liability for any loss or damage to your data or equipment resulting from your use of information in this Wiki.

2 Introduction

<languages /> <translate> Astrophotography is not a simple hobby .. the amount of equipment and software we use to satisfy our passion is enough to cause problems. Operating everything properly and in sync is not easy for even the most expert and experienced users. Voyager's goal is "Simple and Smart Automation of Astrophotograpy."

2.1 Philosophy

Voyager is systems integration software, interfacing third-party software products to make them work together and achieve practical results, using a single management console. Voyager's goal is to reduce user interaction with the various software components needed for astrophotography, thus freeing the astro-photographer to concentrate on other things. Yes, this is yet another astrophotography software product - but it is written by an astrophotographer for other astrophotographers, including those who travel to enjoy their hobby.

2.2 Audience

VOYAGER was developed for use in astrophotography travel - for people who go to places with dark skies to do their imaging, maybe traveling tens if not hundreds of kilometers. However, the features and reliability of Voyager are just as useful for those who do their astrophotography from a permanent location.

For successful astrophotography organization is essential, not only of your equipment, but especially during the imaging process itself. Every minute saved is a minute earned for capturing photons. As any experienced astrophotographer knows, things don't always work perfectly - the guide star is lost, a cloud passes by - and Voyager is designed for maximum recovery and reliability when these things happen.

For these reasons, many astrophotographers will find Voyager to be a good fit for imaging from your permanent setup as well as for travel.

2.3 Features

Operations and equipment managed by the current version of VOYAGER include:

- CCD / CMOS / DSLR cameras and filter wheels: ASCOM, TheSkyX, MaximDL, ASI Camera (native ZWO ASI driver), QSI cameras (native driver), QHY CMOS (Native Driver), direct connect
- Mounts: ASCOM driver, TheSky6, TheSkyX, or Array Virtual Mount
- Autoguiding: PHD2, TheSkyX, or MaximDL
- Planetarium: TheSky6, TheSkyX,HNSKY or Cartes du Ciel to retrieve target data
- Plate Solving (blind or referenced) for precise target aiming: Pinpoint Full or LE, TheSkyX ImageLink, PlateSolve2, All Sky Plate Solver, or nova.astrometry.net
- AutoFocus: FocusMax, TheSkyX @Focus2, TheSkyX @Focus3, MaximDL, or Voyager's own Robofire which offers both local field (multi-star) and single star focusing, including focus in place or slew to a target star
- Rotator: ASCOM
- Complete capture sequence management including automatic meridian flip
- Flat device: Gemini SnapCap, Alnitak Flip-Flat, Voyager flat simulator, Tecnosky TecnoCap, Arduino Flat Device, Tecnosky TecnoCap Multilevel, PegasusAstro FlatMaster, All ASCOM CoverCalibrator compatible devices
- Automated flats calculating the optimal exposure time using the entered parameters
- Viking - Starkeeper.it's companion software product for managing I/O devices in your observatory
- Dome: ASCOM, ASCOM Dome ConnectionLess, ScopeDome LS with Scope Sync
- Weather: AAGCloudwatcher / Solo, Boltwood / Clarity II / SkyAlert Weather Station
- Proprietary Script Engine based on DragScript Engine technology for complete automation. Uses a drag and drop graphical interface to offer unlimited customization of a multi-sequence night's imaging, from startup to shutdown
- Mosaic / Research / Survey mode dedicated to finding Exoplanet transits. Unlimited number of targets per session. Can be expanded to supernova and asteroid research
- Management of alerts using SMS, text to speech call, Skype call, and email

- Web Dashboard - remotely monitor and control most of your imaging session over the web

In summary:

- Capture images with filter selection, binning, readout and speed options
- Manage CCD cooling with cool-down and warm-up ramping to set temperature
- Target pointing accurate within a definable error
- Local Astronomical Night calculation
- Target altitude calculation with a graphic showing times of darkness and target Rise, Transit and Setting times, plus current telescope position relative to the target and the astronomical night
- Auto guider calibration and automatic guide star selection
- Optimized dithering
- Plate Solving recovery center for aiming and recovering your image targets
- AutoFocus
- Automatic Flats and SkyFlat sequences with multiple filters including automatic pointing to a flat panel at shutdown
- Numerous watchdog timers to avoid losing data during an imaging session
- Customizable automated management of meridian flips including optional rotator flip
- Automatic blind solving emergency action after plate solve failure during a sequence
- Personalizable multi-sequence imaging sessions

The above operations can be combined to handle imaging scenarios from the simple to very complex. If you have special needs, please contact the author through the forum: forum.starkeeper.it </translate>

3 Command Line

4 Voyager Command Line Arguments

For advanced users is possible to call manually Voyager using arguments from command line.

Executable name is Voyager2.exe, you can found the location of the executable using the facilities of OS, usually are in "C:\Program Files (x86)\Voyager\Voyager2.exe".

Here list of allowed command line (parameters can be mixed):

- **/instance:x** this command line arguments force Voyager to start with a specific instance, substitute x with the number of instance (1 to 4). Max 2 instance are allowed if you using the BASE license, if you have CUSTOM license the number of instance you can start depends on how many node you have purchased with your license. All wrong parameters start the instance#1 , the default. Example : *Voyager2.exe /instance:2* running the instance#2 of Voyager

Important Note! If you receive the message about another instance running this mean the Voyager2.exe process is already running in your OS (You have already Voyager opened or a dead process are running in OS and you must kill it from task manager).

- **/run:"fully qualified script filename"** You can automatically launch a DragScript when you start Voyager from the command line. Example: *Voyager2.exe /run:"C:\documents\pippo\voyager\script\script.vos*"
-

5 Installation

Voyager is a shareware program. The demo version is free to use. The author assumes no liability resulting from improper use or bugs in the program. As an integrator of third-party applications, VOYAGER cannot know for sure the behavior of other software. Any damage arising from the use of VOYAGER is not covered by any insurance.

USE AT YOUR OWN RISK!

The latest version of the application can be downloaded here:
https://software.starkeeper.it/#download_voyager_section

5.1 Prerequisites

VOYAGER runs on Microsoft Windows operating systems, both 32 and 64 bit. Basic requirements are:

- Operating Systems 32 / 64bit Windows XP with Service Pack 3, Windows Vista, Windows 7, Windows 8 and 8.1,

Windows 10

- Microsoft Dot Net 4.0
- ASCOM platform from version 6.5 SP1 and newest https://ascom-standards.org
  Important Note! If you are using a version 6.5 of ASCOM Platform please be sure to use at least the SP1 to avoid problem on target pointing. This is a declared ASCOM bugs solved in 6.5 SP1 !
- minimum 1024x600 screen

VOYAGER has also been tested on Mac using PARALLELS virtual environment.

5.1.1 Third Party Applications and Versions Supported by Voyager

Applications, with minimum versions, that can be managed by VOYAGER:

- CAMERA CCD / CMOS / DSLR
  - connected via ASCOM Platform 6.x https://ascom-standards.org All cameras have ASCOM Driver
  - or Maxim DL CCD version 5.x or later(All cameras supported from Maxim DL)
  - or TheSkyX using Camera Add On (All cameras supported from the TheSkyX Camera Add On)
  - or ASI Camera (ZWO ASI native driver direct to camera with SDK)
  - or QHY Camera (QHY Native driver direct to camera with SDK)
  - or FLI Camera (FLI Native driver direct to camera with LibFli.dll)
  - or QSI CCD (QSI COM component released by QSI to install)

- MOUNT / TELESCOPE
  - connected via ASCOM Platform 6.5 SP1 https://ascom-standards.org
  - or TheSky6 Professional Edition 6.0.0.24 and later
  - or TheSkyX Professional Edition 10.1.11 and later
  - Array Virtual Mount (Advanced version of Voyager)

- GUIDING
  - PHD2 version 2.3.0 and later
  - or MaximDL 5.x and later
  - or TheSkyX

- PLANETARIUM
  - Cartes du Ciel
  - TheSkyX
  - TheSky6
  - Hallo Northern Sky
  - Stellarium (officially tested from version 0.21.0 using remote interface)

- PLATE SOLVING / BLIND SOLVING
  - PinPoint LE version 5.x
  - or PinPoint FULL version 5.x and later
  - or TheSkyX ImageLink
  - or PlateSolve2
  - or nova.astrometry.net
  - or All Sky Plate Solver
  - or ASTAP

- FOCUSER
  - connected via ASCOM Platform 6.5 SP1 https://ascom-standards.org
  - or FocusMax 3.4.40 and later
  - or MaximDL 5.x and later
  - or TheSkyX @focus2 and @focus3

Important Note! LakeSideAstro Focuser also if have ASCOM driver are usable with Voyager only with driver v2.0.6.0 and newest !

- FLAT DEVICE
  - Gemini SnapCap
  - Alnitak Flat-Fielding Device
  - Tecnosky TecnoCap and MultiLevel
  - Arduino Flat Device
  - Artesky Flat Device
  - Sky Flats
  - ASCOM Cover Calibrator Device
  - Geoptik Flat Device
  - PegasusAstro Flat device
  - All ASCOM CoverCalibrator compatible

- ROTATOR
  - connected via ASCOM Platform 6.5 SP1 https://ascom-standards.org
  - RCOS TCC Rotator

- DOME
  - connected via ASCOM Platform 6.5 SP1 https://ascom-standards.org
  - ScopeDome LS with ScopeSync
  - NexDome

- WEATHER
  - AAG Cloudwatcher / Solo
  - Boltwood / Clarity II / SkyAlert Weather Station or compatible

- OBSERVING CONDITIONS
  - connected via ASCOM Platform 6.5 SP1 https://ascom-standards.org
  - using Viking Client

- SKY QUALITY MONITOR (SQM)
  - connected via ASCOM Platform 6.5 SP1 https://ascom-standards.org

- SAFETY MONITOR (SQM)
  - connected via ASCOM Platform 6.x5 SP1 https://ascom-standards.org
  - Textfile Safety Monitor
- I/O CARDS
  - Viking and all supported Cards

Important Note! In order to use Voyager, you must at minimum connect a Camera and Mount.
The availability of executable actions within Voyager depends on the number and capability of connected applications.

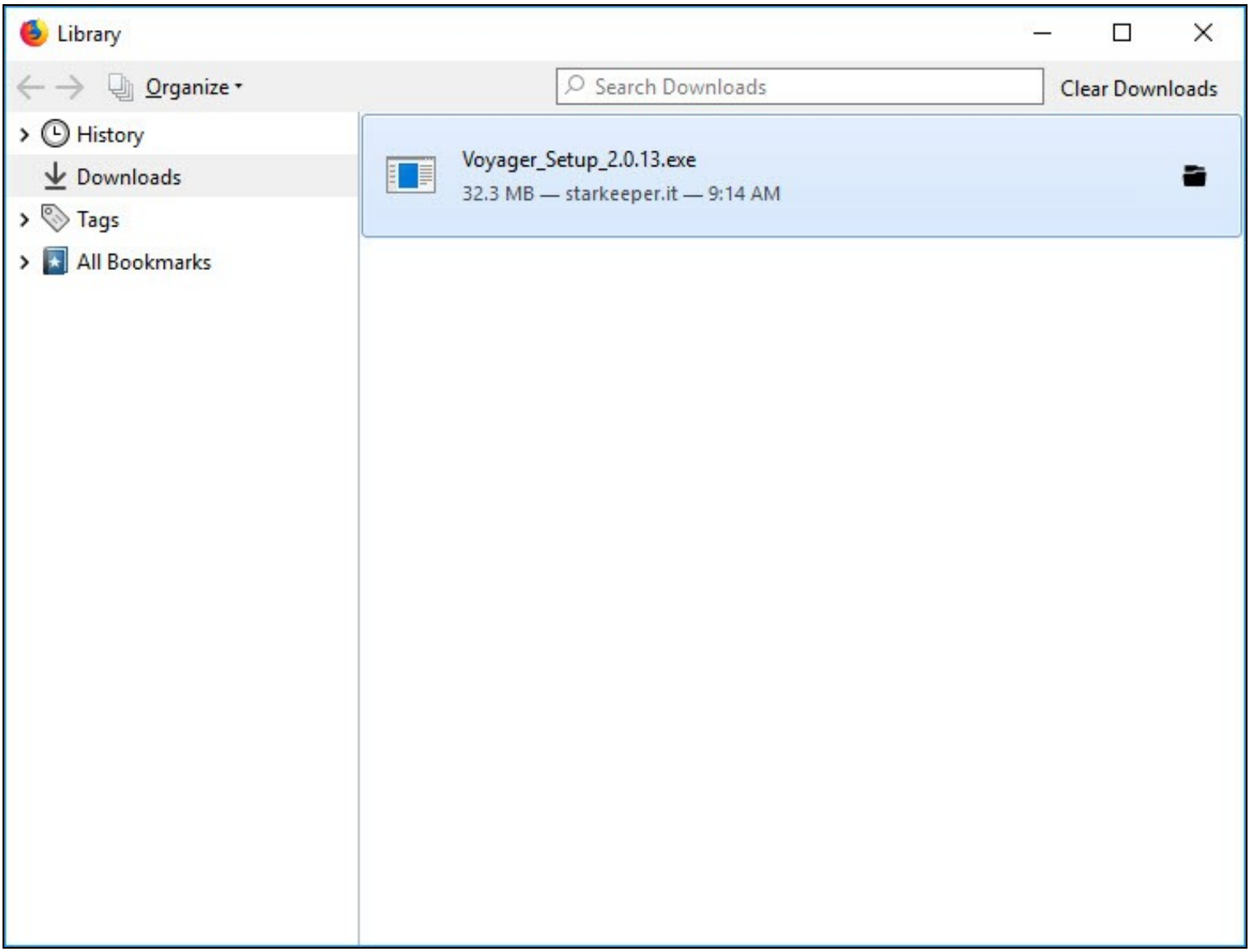
6 Installation Video

There is a video on how to install Voyager on the Voyager Astro Imaging YouTube channel:

7 Installation Procedure

After downloading the installation file:

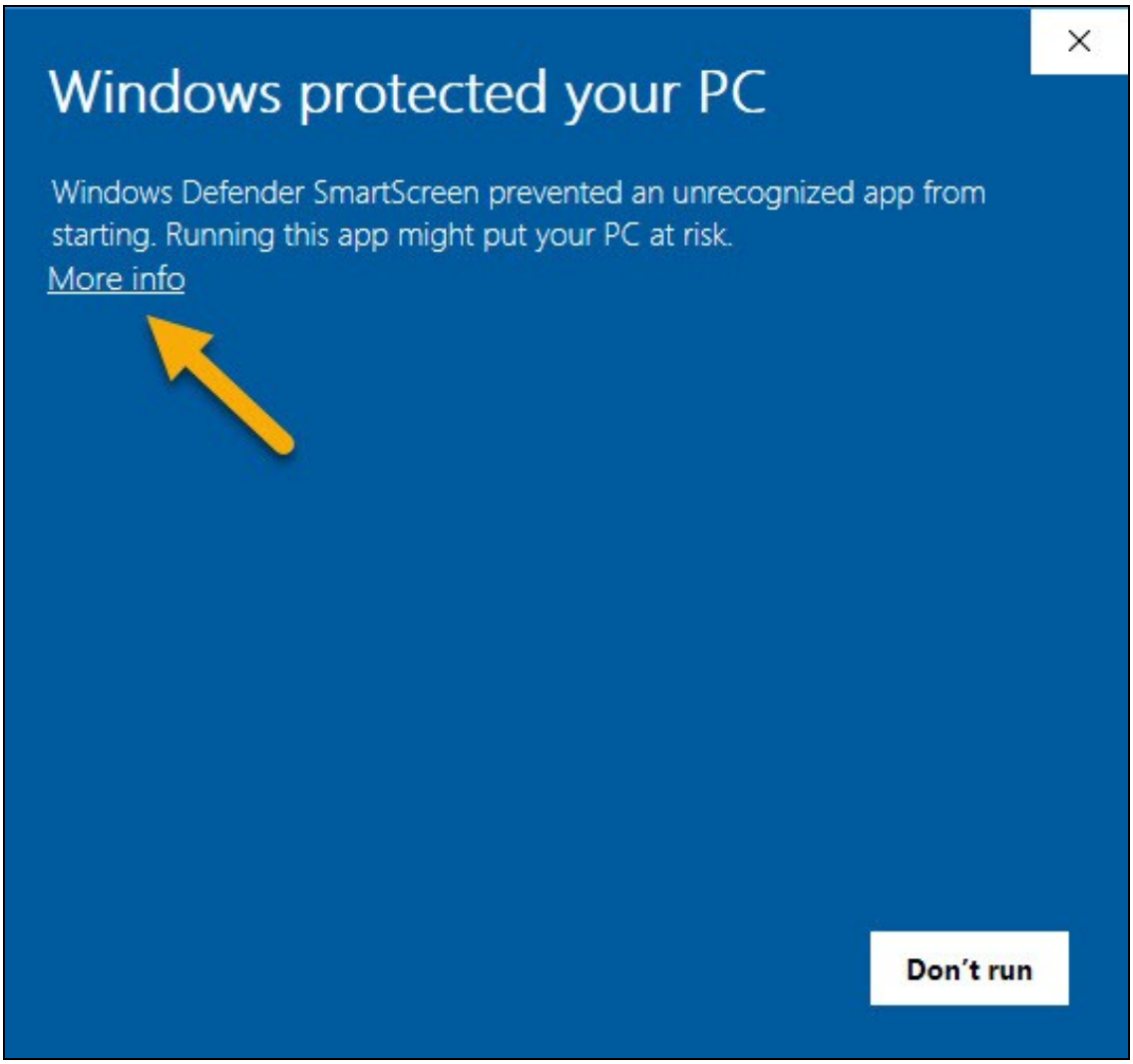
1. Start by double clicking on the downloaded file:



2. Voyager is a signed application as of Voyager 2.2.1. It is signed by "Starkeeper di Orazi Leonardo."

Windows 10 may or may not show a blue dialog box saying Windows 10 protected your PC:

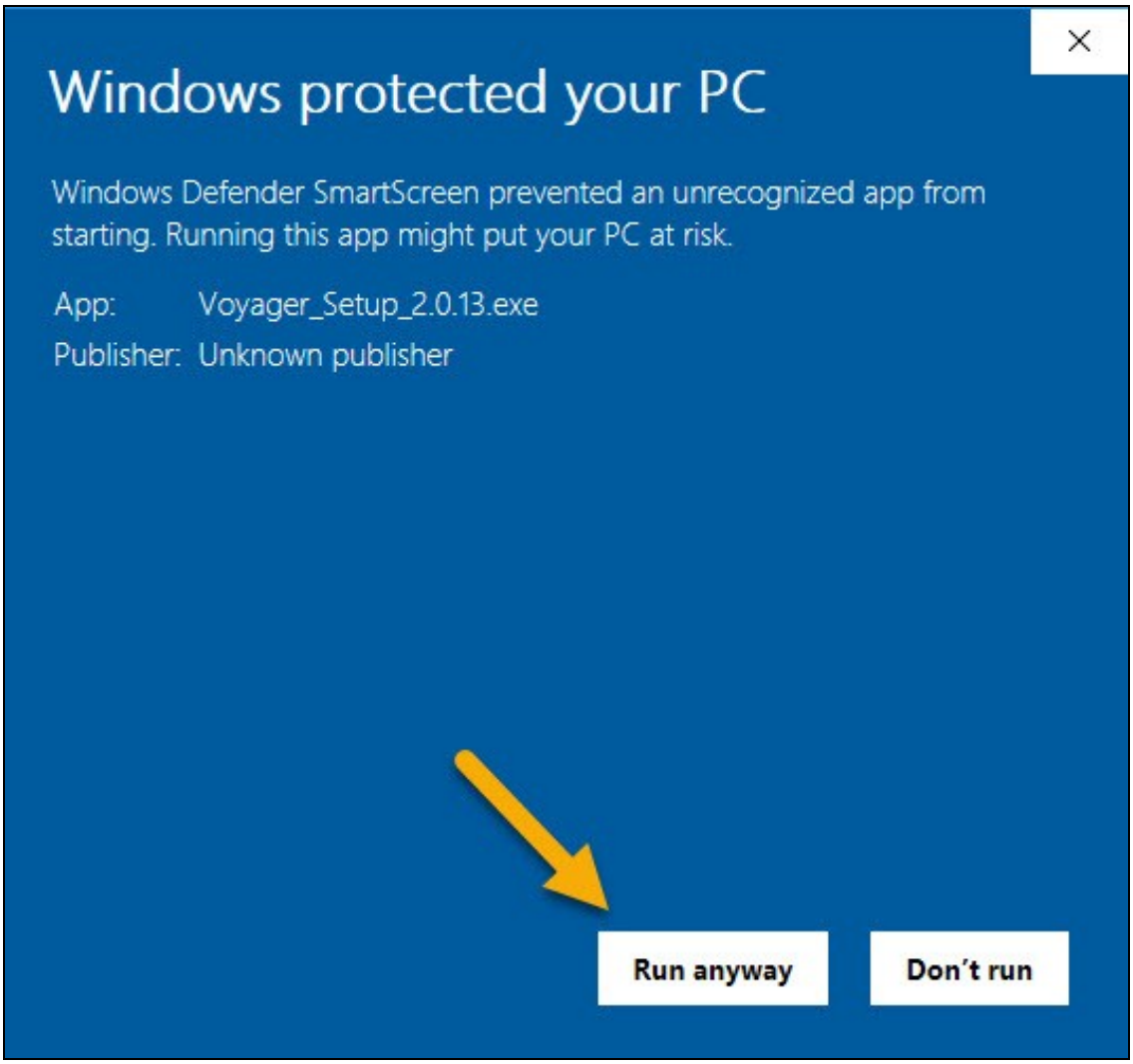
If it does, click the More info link:



3. After clicking More Info, you will see this additional information.

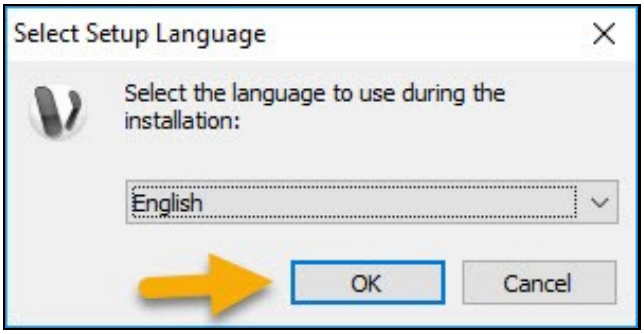
As of Voyager 2.2.1, Voyager is a signed application. The Publisher will be: "Starkeeper di Orazi Leonardo" instead of Unknown publisher.

Click the Run Anyway button to continue installing Voyager:

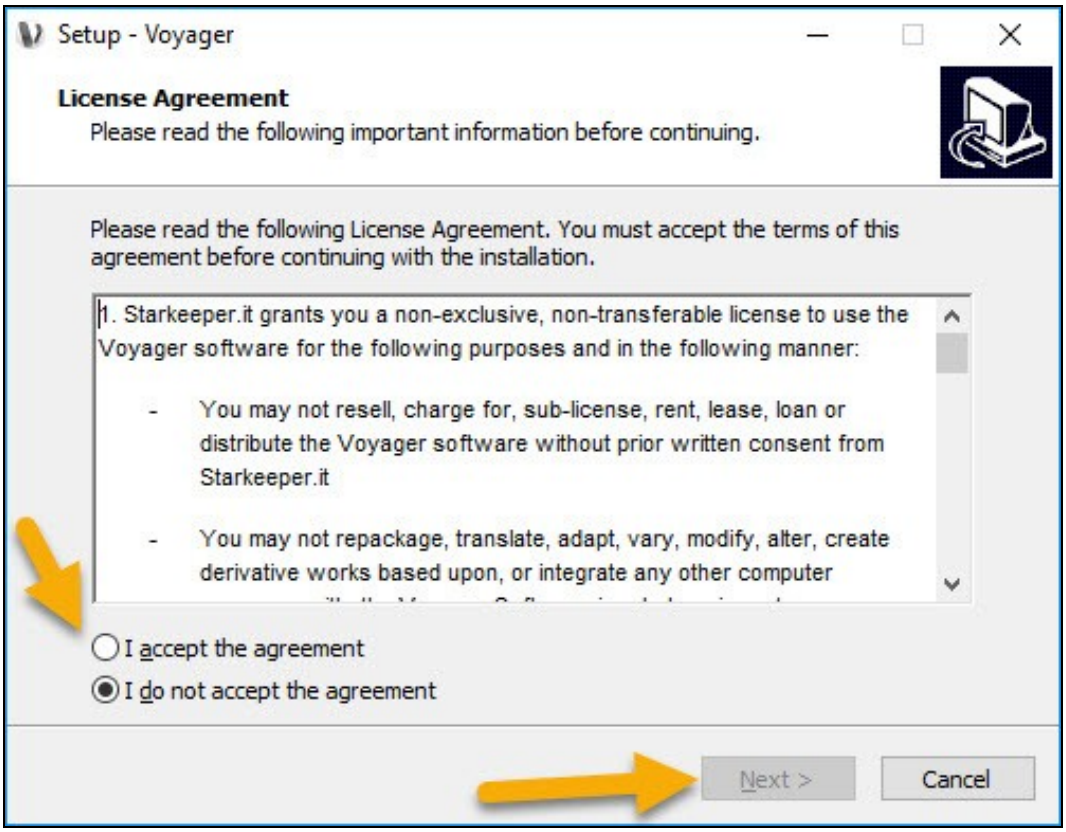


4. If you get the User Account Control warning asking if you want to allow this application from "Starkeeper di Orazi Leonardo" to make changes to your PC, click Yes to continue installing Voyager.

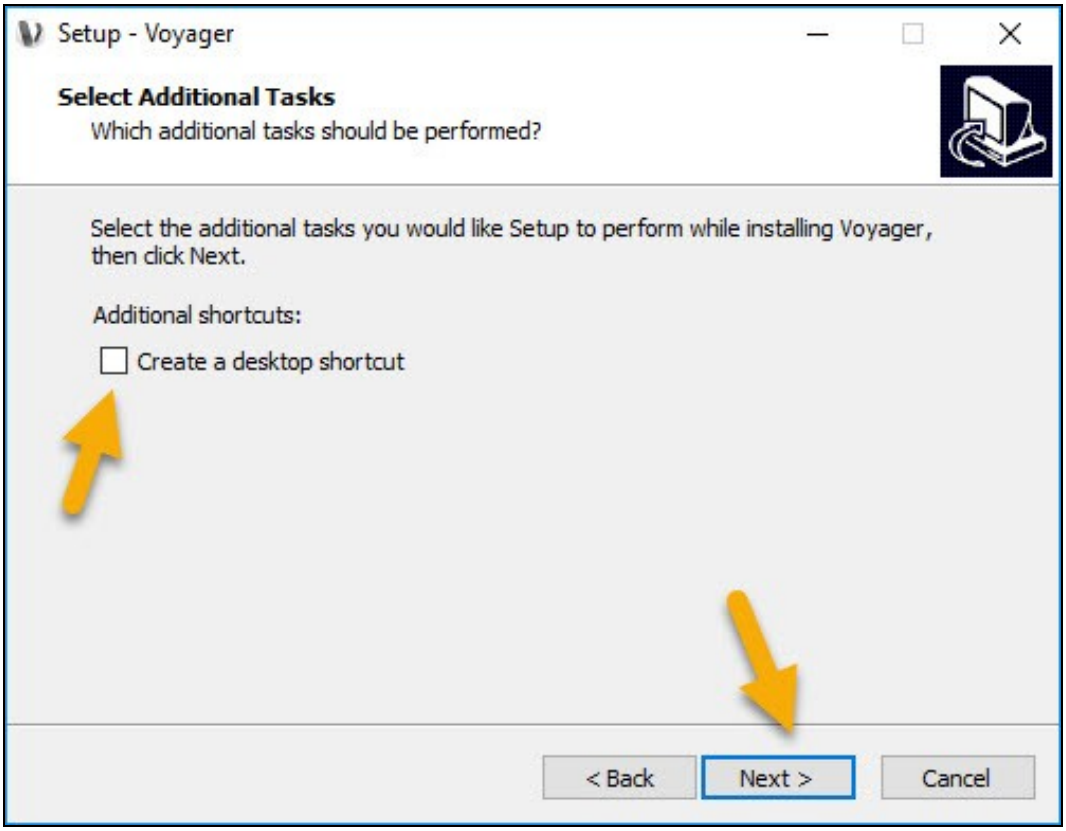
5. Choose your installation language, English or Italiano, and click OK



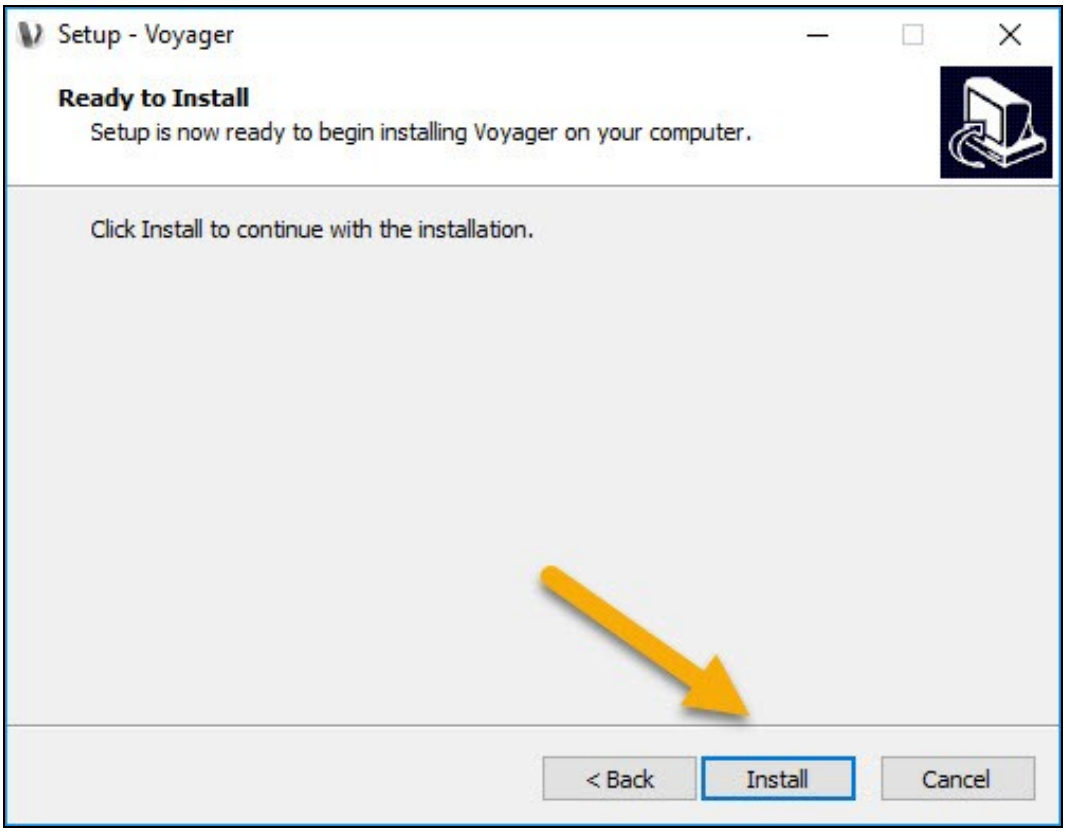
6. Read the license agreement, click the I accept the agreement radio button, and click the Next button to continue installing Voyager:



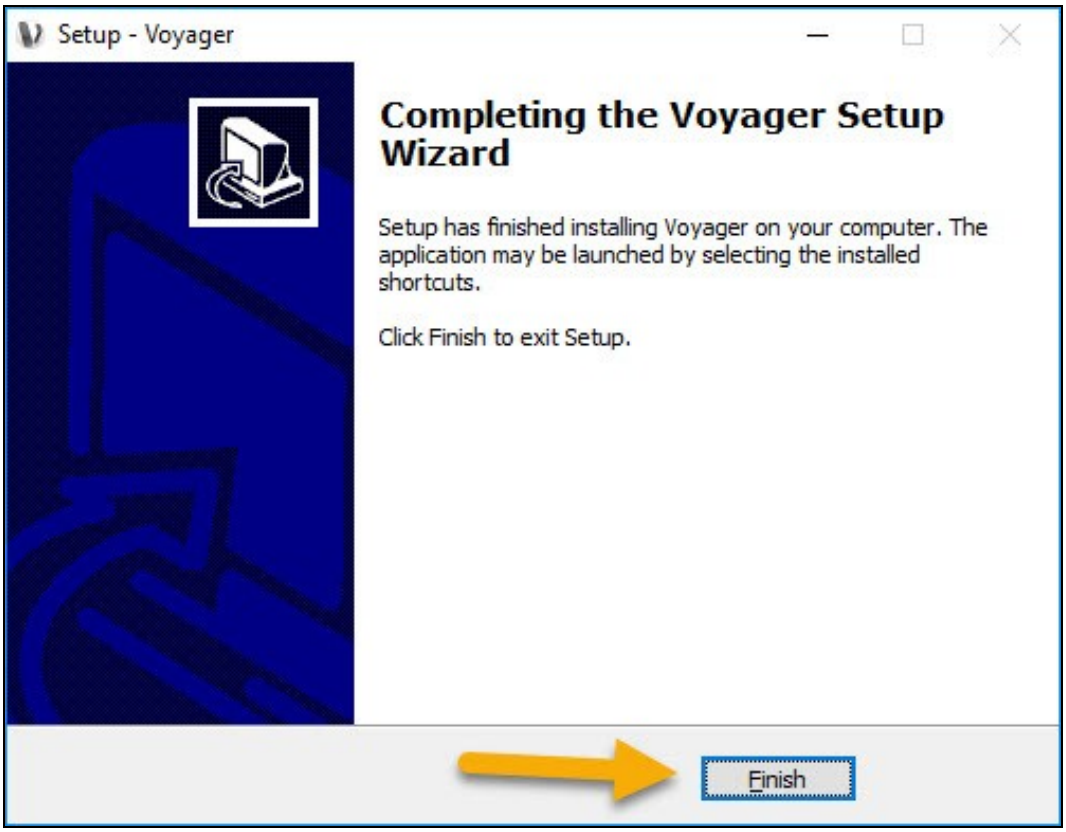
7. Optionally, check the "Create a desktop shortcut" box and click Next to continue installing Voyager:



8. Finally, click the Install button to do the installation:

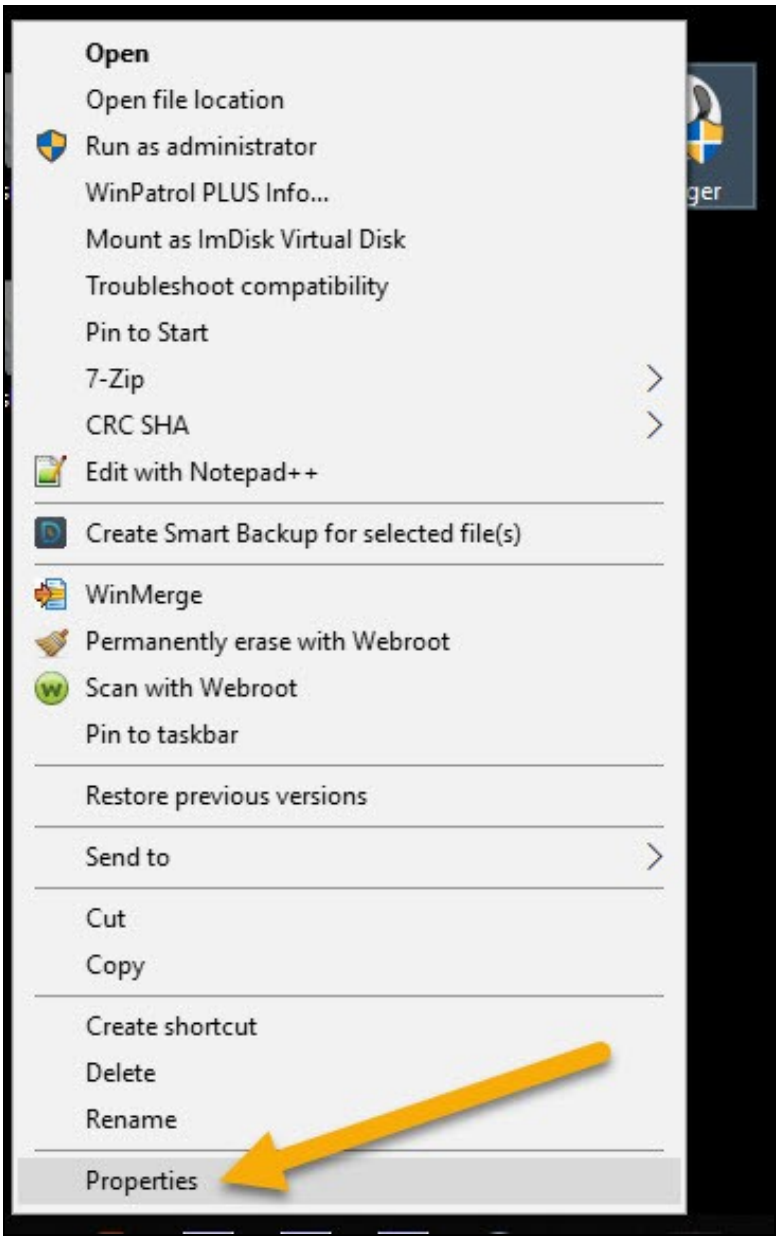


9. You will see a dialog box with a progress bar while files are extracted and installed. Click Finish to complete the installation:

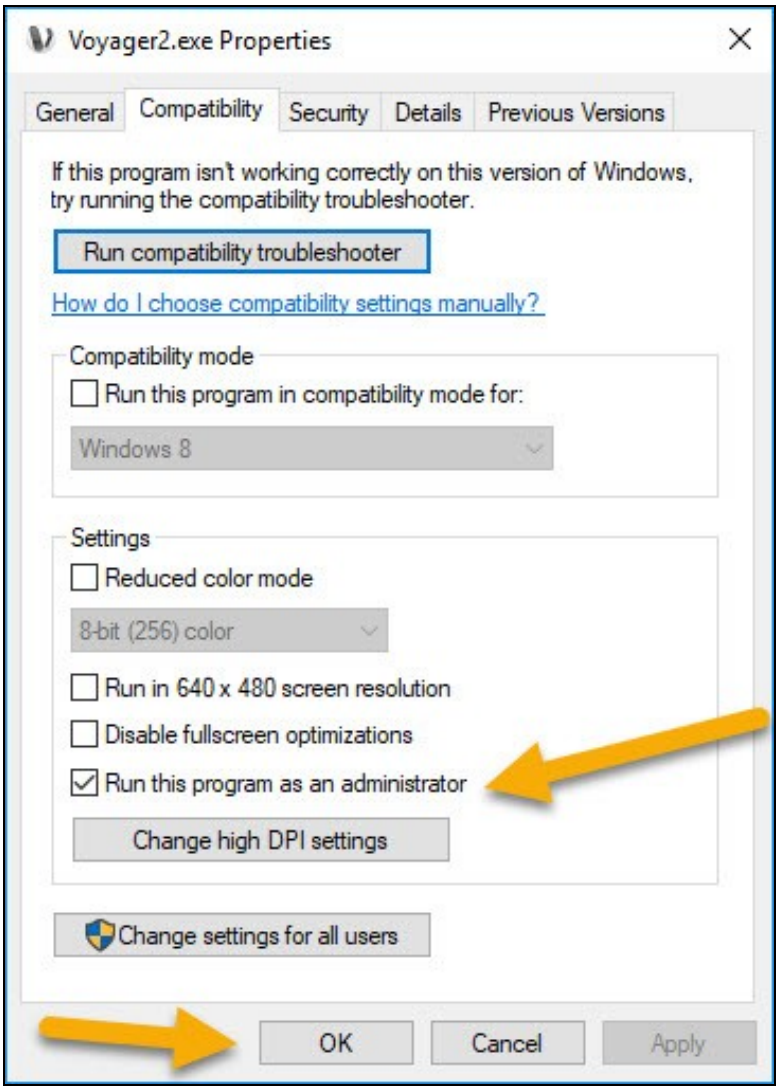


Important Note! For Windows 7, Windows 8, Windows 8.1 and Windows 10 users: Voyager has to run with administrator privileges so it can communicate with other software. The installation program attempts to set administrator privileges but it is a good idea to confirm this was successful. The next instructions tell you

how to do this.
10. To make Voyager run as Administrator, you can set the properties from either the desktop shortcut, if you created one, or from the Voyager2.exe file's properties. If you created a desktop shortcut, right click the shortcut and click Properties:

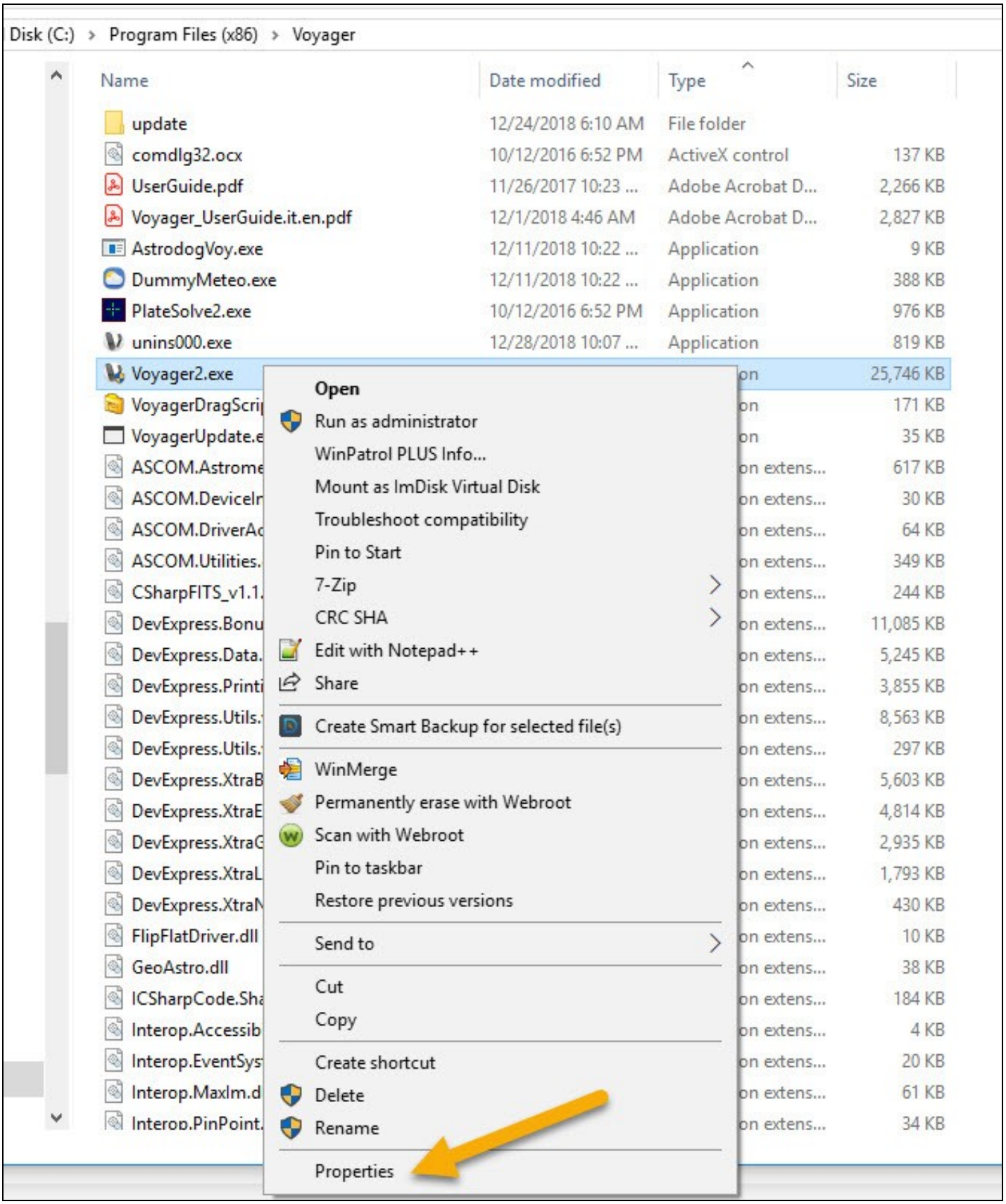


Important Note! Don't click "Run as administrator" from this menu since that will only run Voyager as administrator this one time. You want to set the properties so Voyager will always run as administrator. Next click the Compatibility tab, then check the "Run this program as administrator" checkbox and click OK to save your changes.

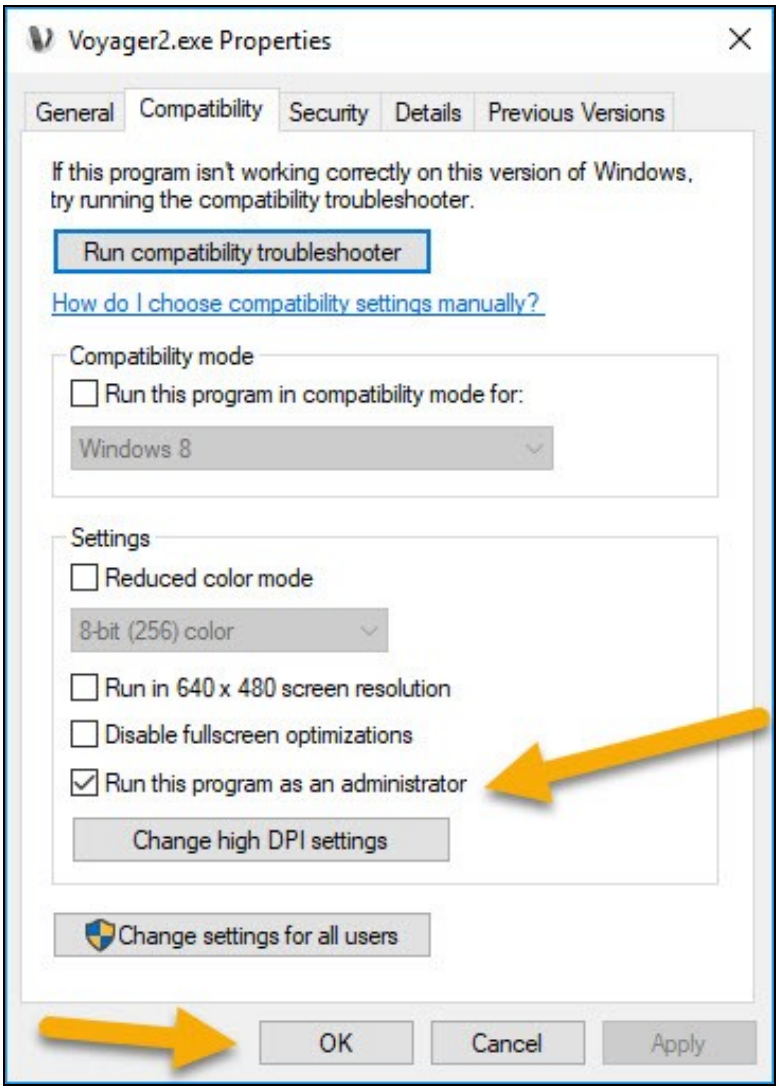


OR

If you didn't create a desktop shortcut, navigate to the directory containing Voyager2.exe - usually this is in C:\Program Files(86)\Voyager\. Right click the Voyager2.exe file and click Properties:



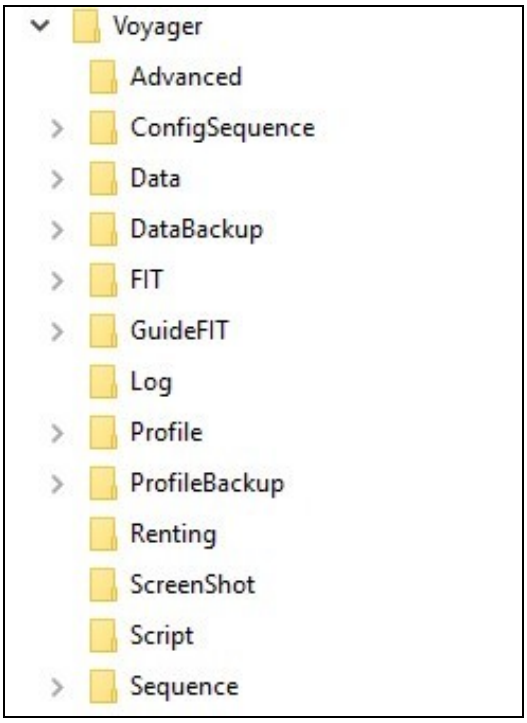
Next click the Compatibility tab, then check the "Run this program as administrator" checkbox and click OK to save your changes.



Congratulations, you have installed Voyager!

7.1 Voyager Folders

When you first run VOYAGER, it will create a series of folders in your Windows user's Documents directory:



- Advanced

Reserved to Voyager Full/Advanced version

- ConfigSequence

Configuration files of the automated imaging sequences or automatic flat taking sequences

- Data

Database files for various pourpouse

Important Note! This folder is under auto backup since release 2.3.5h of Voyager

- Data Backup

Database backup (backup of folder Data with age system like for Profile Backup

- FIT

FITS files (image files with metadata) created by VOYAGER actions for plate solving and test shots. These files are erased at each start of Voyager.

- GuideFIT

FITS files created by guiding actions. These are the screenshot and the jpg or fit file related to a find star problem. These files can be delete whenever you choose. However, if you need help with guiding, you will need to provide one or more files from this folder to assist in troubleshooting, so you may want to keep the last session's files at least.

- Log

Text files with the log of operations performed by Voyager. The level of information is very high. These files will be required in case of bugs to fix or anomalies to interpret.

- Profile

Settings files for the various imaging system configurations you define

Important Note! This folder is under auto backup since release 2.3.0 of Voyager

- ProfileBackup

AutoSaving of Profile folder with datetime naming at each start of Voyager and before an online update of Release from Voyager. You can define age of backup to retain on this folder using the Setting of VOyager, tab Voyager, Box Profile Backup

- Renting

Ticket file system access reserved to Voyager Renting Plugin

- ScreenShot

Screenshots of the program in case of watchdog events such as guiding or other failures

- Script

DragScript files used to automate imaging sessions

- Sequence

Default folder containing the FITS files generated by running sequences, the files are sorted to subfolders that are created with the name of the target. You can override this and send FITS files to a directory of your choice in the Setup section.

7.2 Log File

The Log folder contains the files Voyager creates as it executes tasks. There will be a file for each day of use, and each file will contain at most the logs from 24 hours of operation. Information in the log file is intended to help the developer trace the cause of a problem in the event of application failure or malfunction.

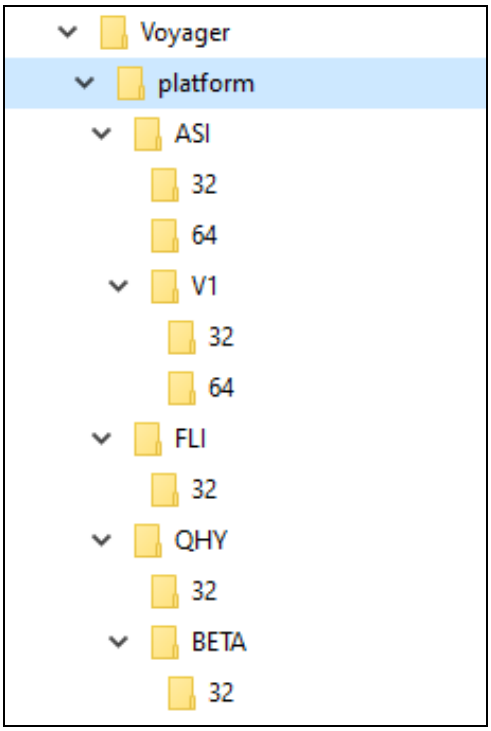
The developer may ask you to attach a zip file with the relevant portion of the log to help track down a problem. You can use a text editor, such as Notepad or the free third party editor Notepad++ to find the time of the problem, and then trim the log file down to the relevant lines. If there are more than a few lines of interest, save the relevant lines to a new text file and then compress them into a .zip file to attach to your email requesting help.

You may be asked to email the relevant portion of the log file with a text editor, and attach a zip file in your email They will be required as necessary to send an email. In that case it will be necessary to decrease the size of the zip file and select only the necessary period. The log file entries are timestamped, so just select the entries around the time of the problem.

7.3 SDK Platform Folder

The SDK platform folder contains all the SDK/DLL Library used by Voyager for external Camera/Driver. It is organized by Vendor and internally by architecture bits.

This folder is not located in document folder but in Voyager installation folder, usually ***C:\Program Files (x86)\Voyager***



Important Note! You can add folder inside for beta SDK version where to copy your file but attention, each voyager installation (also daily build) will overwrite the folders structures and file internally needed (your structures will remain untouched). For example if you change SDK from QHY in platform\qhy\32 each file with same name will replaced with original by Voyager installation !!
Important Note! For ZWO ASI : ASI Camera V2 SDK DLL is just under ASI folder (32,64) , the ASI Camer SDL DLL is under V1 folder (32,64)
Important Note! For QHY Beta Driver : Voyager since release 2.3.0 have a control camera dedicated to Beta driver version. If you want to manually update or change this driver use the folder paltform\QHY\BETA\32

7.4 Installing Previous Versions

Retrieve the old version setup from the Releases Category in Voyager's forum and execute the installer.

If you can't find the version you are looking for please contact support.

7.5 Installing Daily Build Versions

The daily Builds are development versions of Voyager based on the current official release version. They contain new features or existing bug fixes.

They can be downloaded directly from the Voyager forum here. They are declared unstable as they have not been tested and their installation is on a voluntary basis.

To go back from the Daily Build versions you need to reinstall the original release version.

8 Voyager Command Line options

9 Command Line Arguments for starting Voyager with options

For advanced users is possible to call manually Voyager using arguments from command line.

Executable name is Voyager2.exe, you can found the location of the executable using the facilities of OS, usually are in "C:\Program Files (x86)\Voyager\Voyager2.exe".

Here list of allowed command line (parameters can be mixed):

- **/instance:x** this command line arguments force Voyager to start with a specific instance, substitute x with the number of instance (1 to 4). Max 2 instance are allowed if you using the BASE license, if you have CUSTOM license the number of instance you can start depends on how many node you have purchased with your license. All wrong parameters start the instance#1 , the default. Example : *Voyager2.exe /instance:2* running the instance#2 of Voyager

Important Note! If you receive the message about another instance running this mean the Voyager2.exe process is already running in your OS (You have already Voyager opened or a dead process are running in OS and you must kill it from task manager).

- **/run:"fully qualified script filename"** You can automatically launch a DragScript when you start Voyager from the command line. Example: *Voyager2.exe /run:"C:\documents\pippo\voyager\script\script.vos*"
-

10 Licensing

10.1 LICENSING

Voyager can be used in a limited free demo mode, a 45 day free trial full functionality mode, or with a "Basic" commercial paid license. Trial and commercial licenses are recorded in the [1] online server.

10.1.1 License Types

There are three types of license as of the time of this writing: Demo, Trial, and Basic.

10.1.1.1 Demo License

The Demo license is free, lasts forever and provides the right to use the current installed version of Voyager. No updates are permitted, it must be downloaded (free media is not provided), and no paid plug-in or add-on functionality is provided.

In addition, automatic imaging sequences will be limited to last no more than 60 minutes. At the end of that time the sequence will be aborted automatically by the system. The demo license is the default if when you first run Voyager. If another type of license was in effect but has expired, the demo license will be re-activated.

10.1.1.2 Trial License

The Trial License allows you to test all of Voyager functionality including any plug-in for a period of 45 days after activation. There will be no other limitations. After this period, the license will again be the Demo. The Trial license can not be extended without a request and direct approval by Voyager, using the contact email in the chapter entitled References.

10.1.1.3 Basic (Commercial)

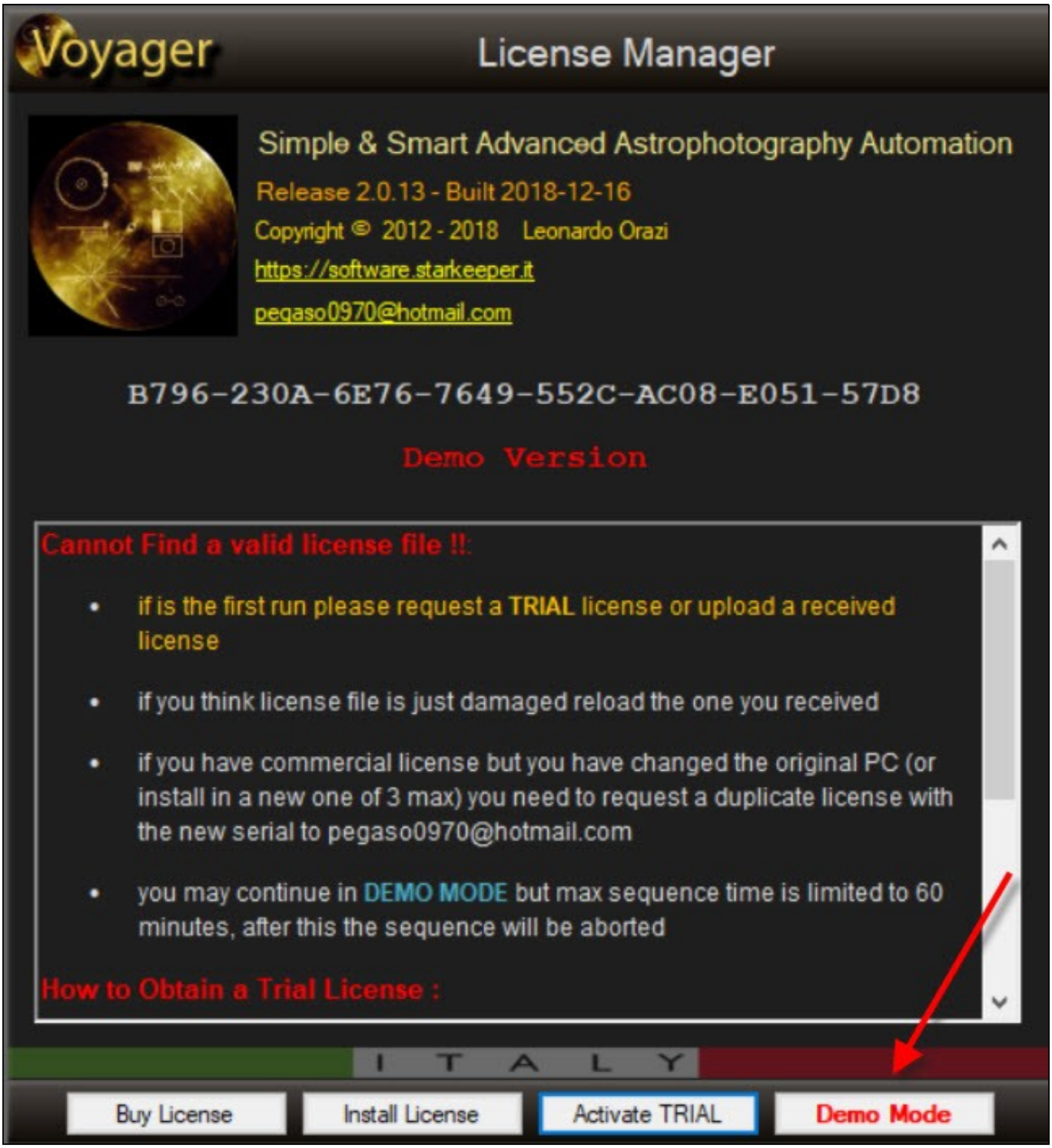
The Base license is the paid license that gives you the right to use Voyager in all its functions excepting any additional paid plugins. The license is for life, support, upgrades and updates are guaranteed for a period of 12 months after which a modest license renewal fee is required to continue to receive support, upgrades and updates. The Basic license includes the right to install Voyager on 3 different PCs simultaneously. A unique serial number is generated for each PC on which you install Voyager. If you want to de-activate Voyager on one PC and use it on another, you must send an email including the Voyager serial number for the PC you wish to de-activate. Contact information is on the References page.

10.1.1.4 Custom (Commercial with dedicated customizations)

The Custom license is dedicated to those who want to have application extensions dedicated to their needs. For example, the particular management of your setup, additional functions dedicated to research or sharing, management of multiple arrays at an advanced level via LAN. To request more information or ask for quotes for dedicated development you can contact the author using the References page.

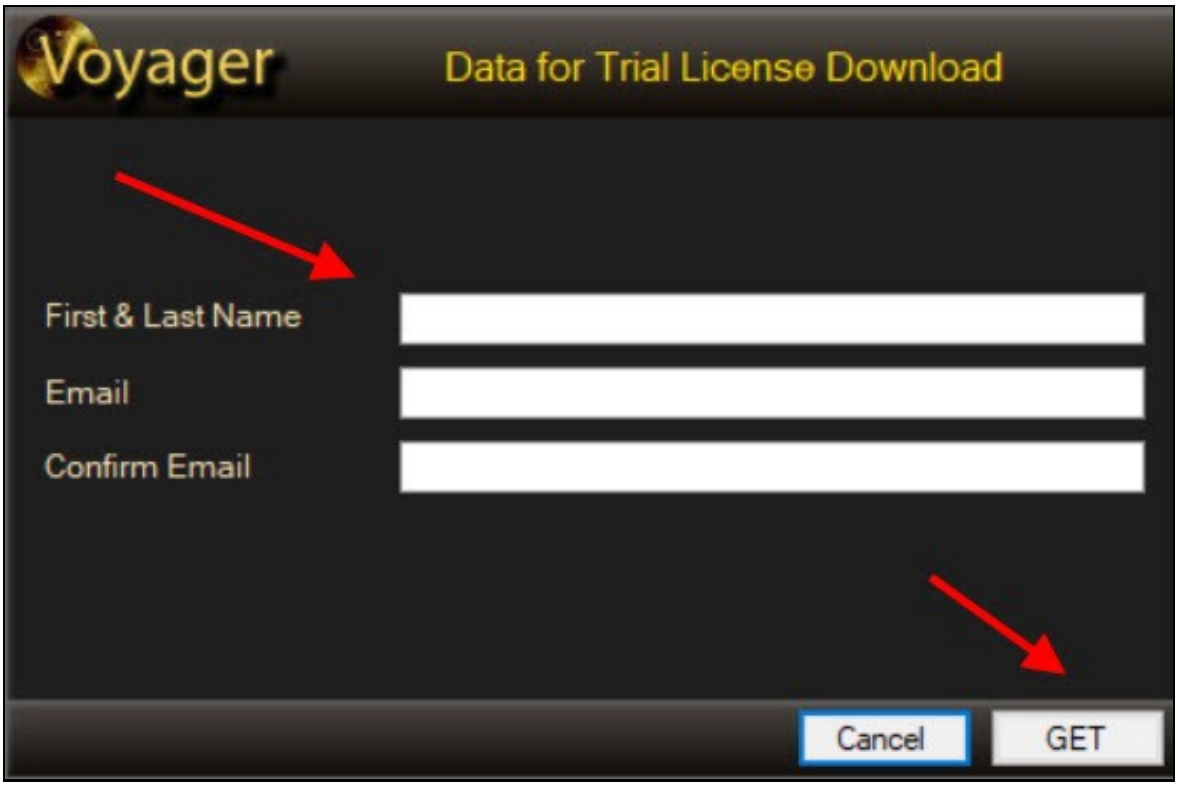
10.2 Demo License

The Demo license is the default license when you install Voyager. Just press the Demo Mode button to activate it:



10.3 Trial License

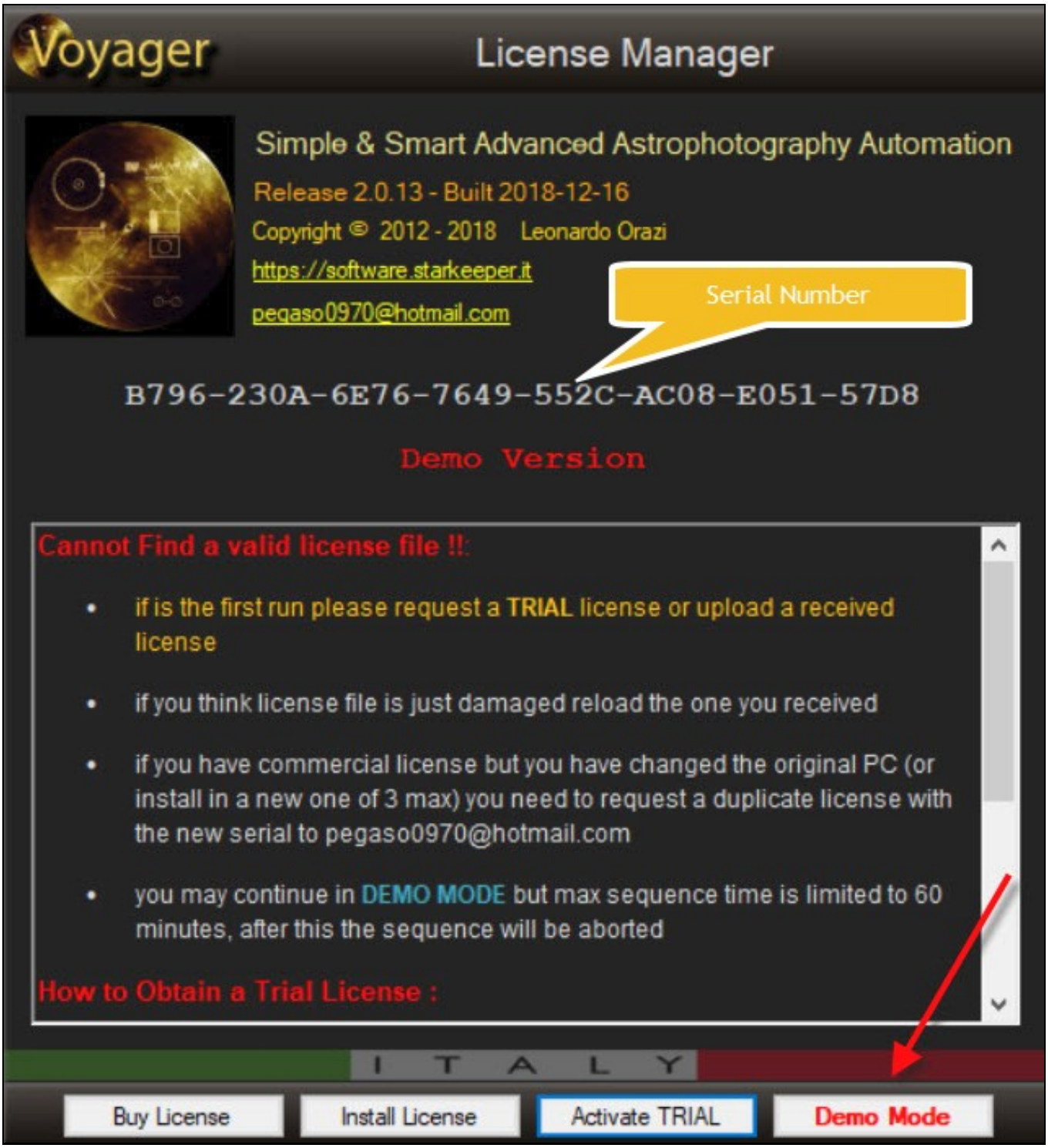
A 45 day free trial license can be requested online through the licensing utility function. Press the **Activate TRIAL** button when you start Voyager, fill out the form asking for your first & last name, email and confirm email, then press the GET button.



Activating your license this way requires an Internet connection.

The Trial license can also be requested via e-mail indicating the **serial number** of your Voyager installation, your first and last name and the email address you wish to have recorded with your license.

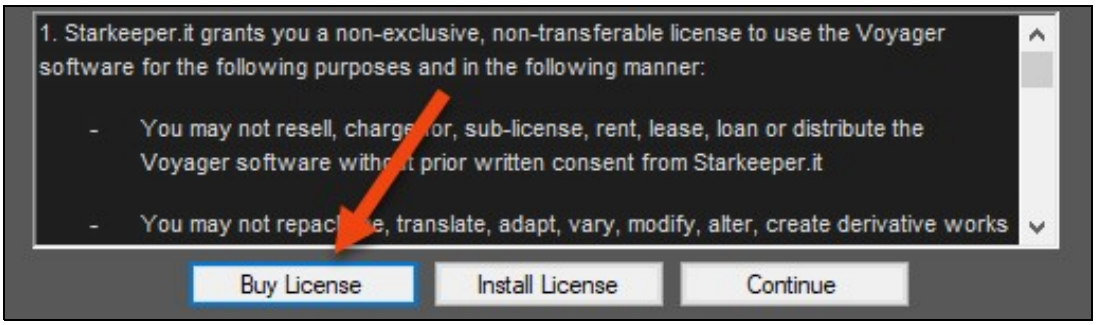
The serial number is specific to your installation of Voyager on a single computer. It is the string of eight groups of four characters each:



Send your email using the contact information on the References page.

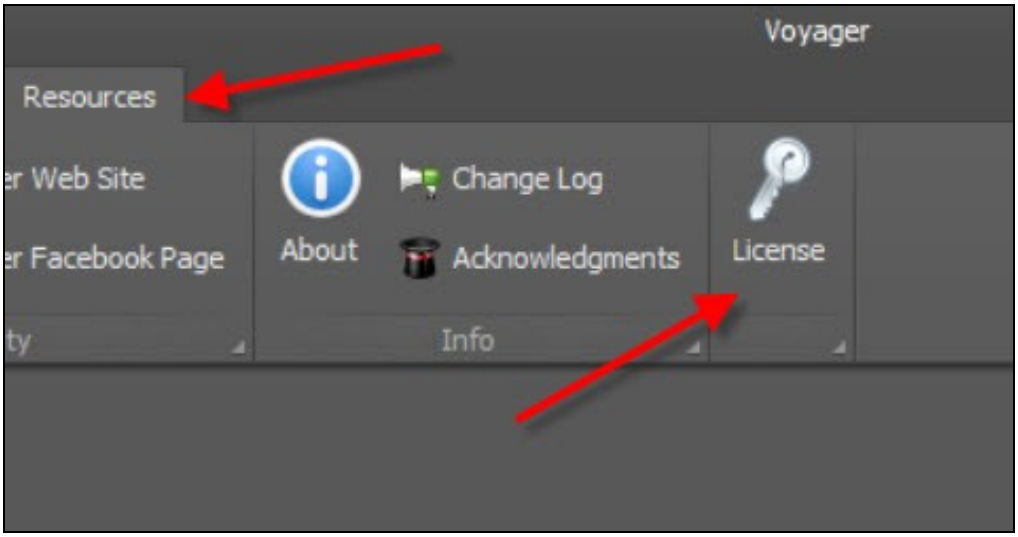
10.4 Base License

The Base license can be purchased by pressing the **Buy License** button which takes you to our web store, where you can pay via PayPal or credit card.

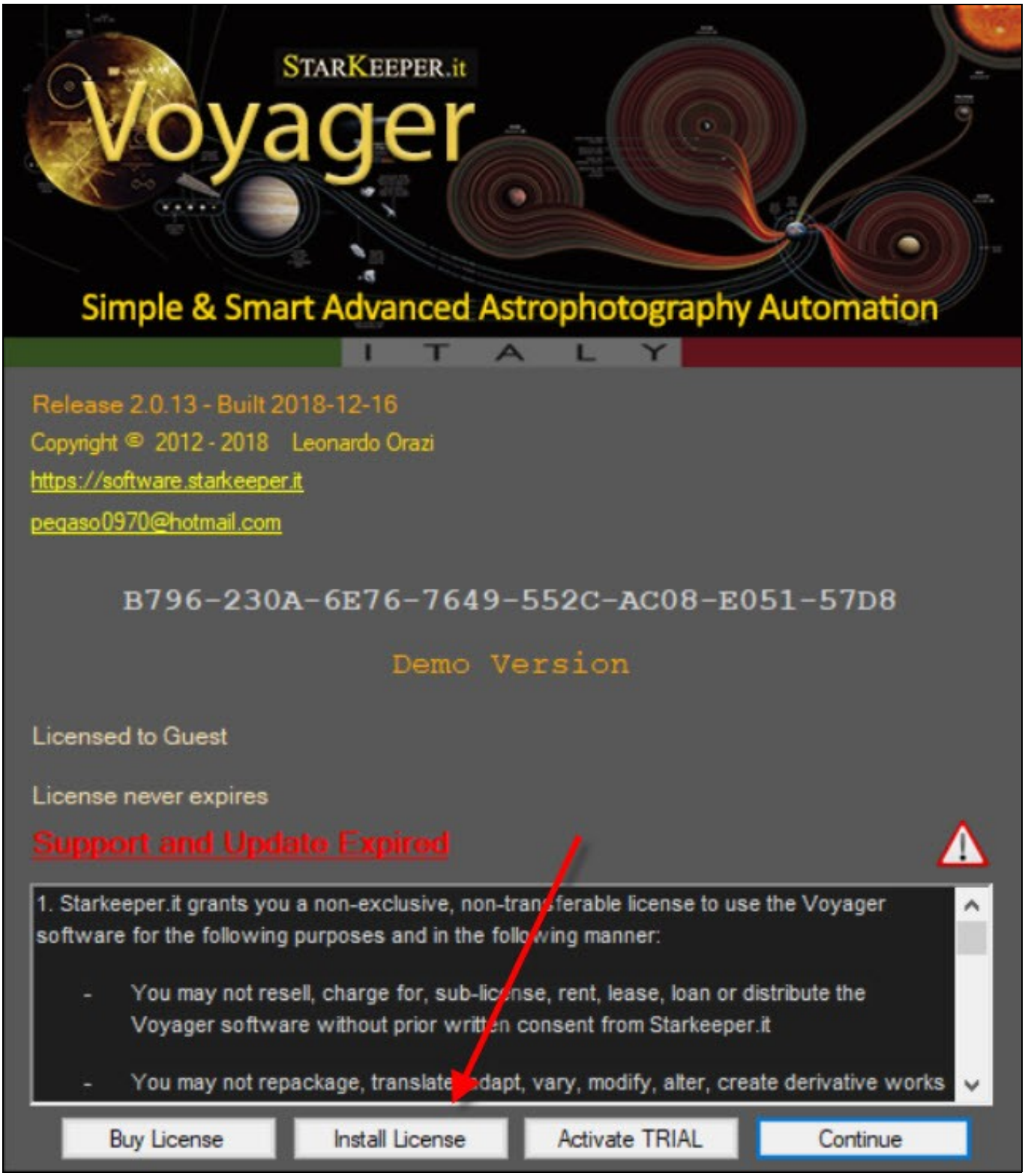


Be sure to enter the serial number from your installation of Voyager in the Web Store form when you purchase the base license.

Within the 24 to 48 hours after receipt of your payment, you will be sent license files which you import into Voyager using the Install License utilities, accessed by clicking the Resources tab and then the License button:



Then press the Install License button to install the license files you were sent:



Important Note! When you make your payment be sure to include your serial number in the notes that are sent to the merchant who provides the license. Failure to do so can lead to delays in sending your license files.

10.5 Updates

Program updates are provided with the Trial license during the trial period, and the Base license during the first 12 months from activation. Updates are semi-automatic. If your PC has an interconnect connection, when Voyager starts up it will check for updates. If an update is found, you can choose to install it now or later. You can also download the latest version of Voyager from the site at software.starkeeper.it/index.php/download and upgrade by overwriting the current installation. Your profile data is stored in another location and is not

affected by the upgrade.

Important Note! If you try to forcibly update a Demo license file, an expired Trial license file or a Base license file after 12 months of free upgrades, you can risk blocking the program. If this happens, you should contact the developer using the info at References to restore the latest version to which you are entitled. This may incur an additional charge.

10.6 Plugin

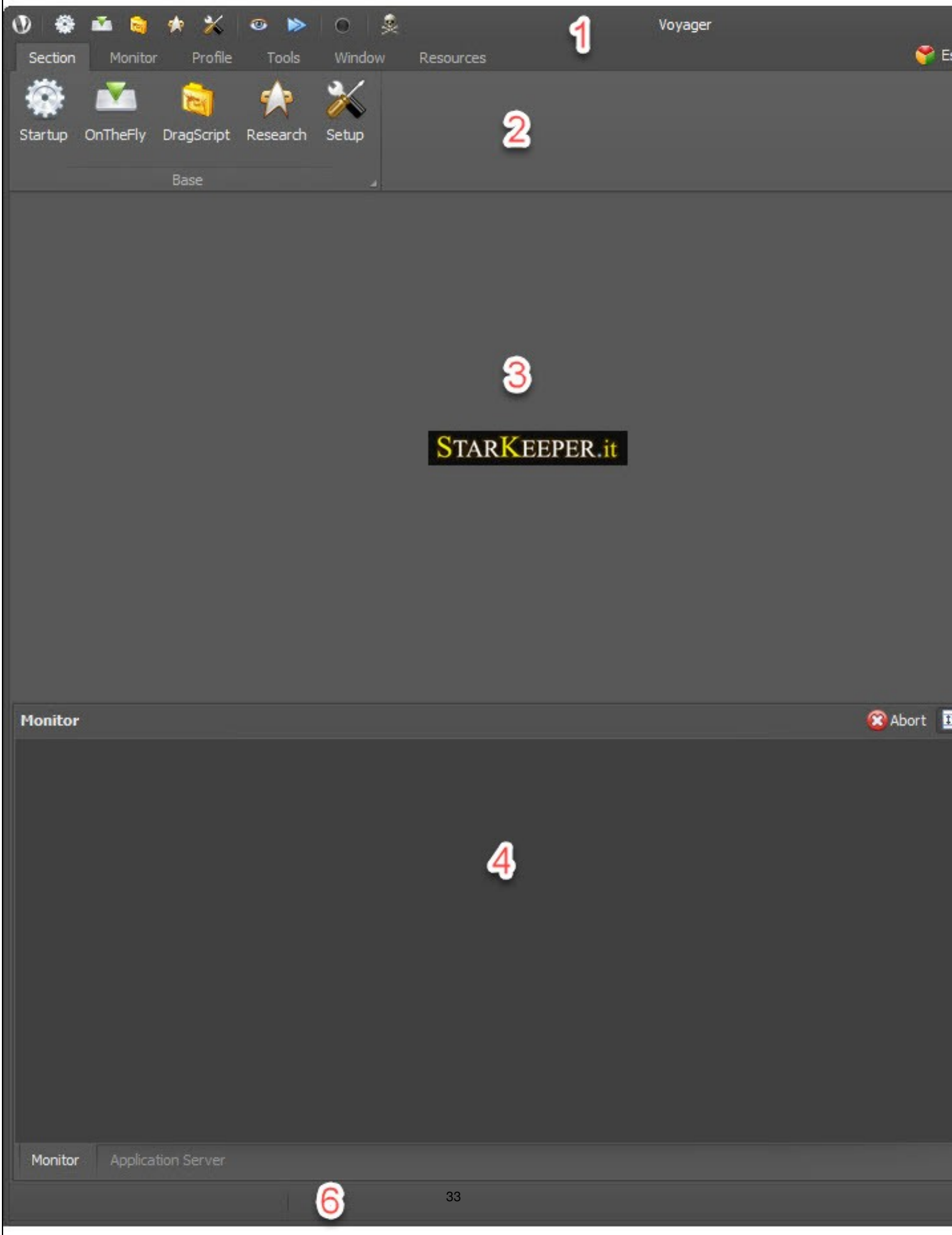
Regardless of the type of license it is possible to activate plugins in Voyager for particular functions. To activate the plugins **you must first of all already have a Voyager license** and then purchase the Plugin directly from the Voyager website in the dedicated section by providing the Voyager installation serial code. The Voyager team will send you an updated license with the purchased Plugin unlocked.

Please Refer to Plugin section form more informations.

11 Main Window

11.1 Main Window Areas

When you start Voyager, the main window appears (this one has a profile already loaded - yours won't show the "Esprit-ASI1600MM-Simulator" text that mine is showing):

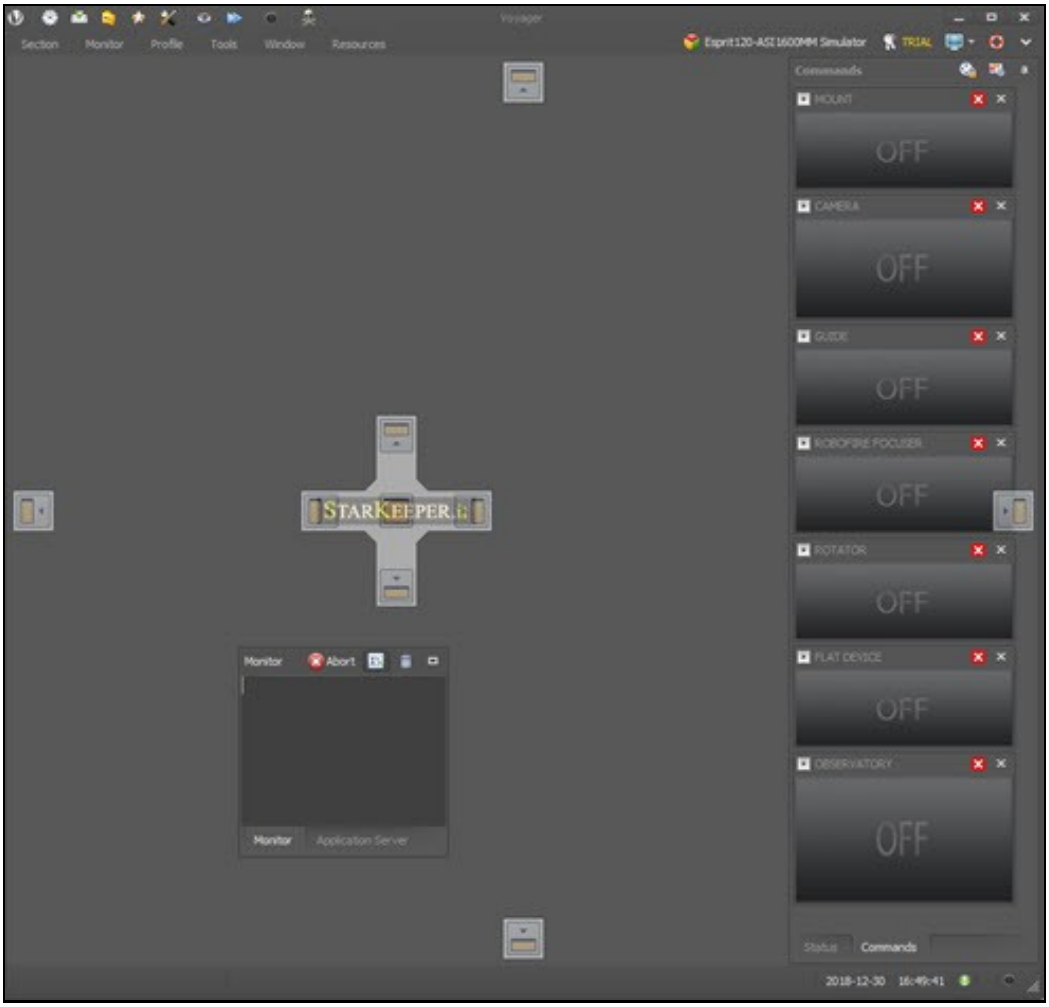

Voyager
1
Section
Monitor
Profile
Tools
Window
Resources
Startup
OnTheFly
DragScript
Research
Setup
Base
2
3
STARKEEPER.it
Monitor
Abort
4
Monitor
Application Server
6

There are six main areas in the main window

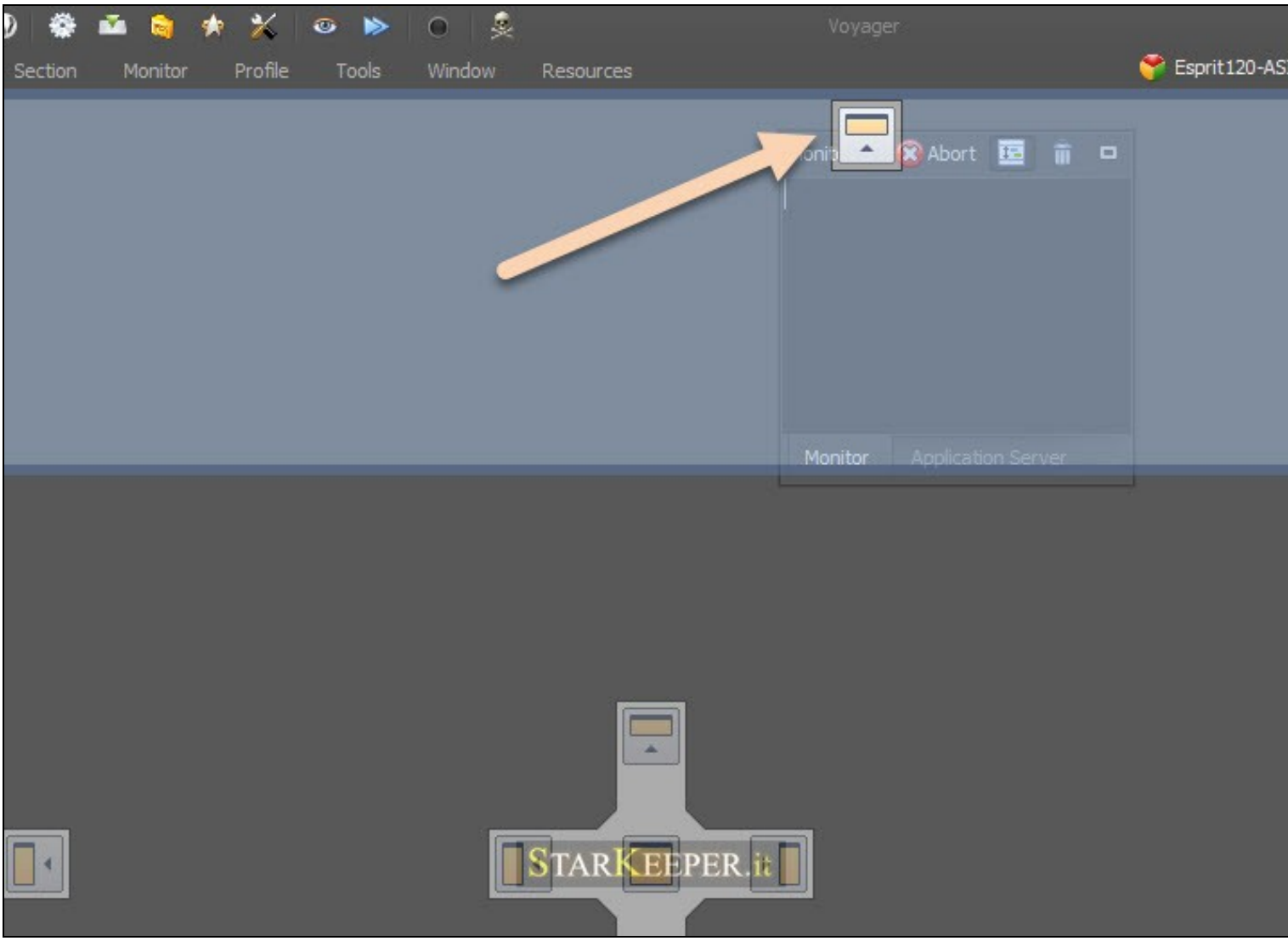
1. **Command Bar**: Directly open the most frequently used workspaces
2. **Main Menu Ribbon**: Voyager's main menu
3. **Workspace**: Setup, Startup, OnTheFly, DragScript and Research windows
4. **Monitor**: A running time-stamped, color-coded log of Voyager's actions and status information
5. **Status**: The Status Window and Command Window widgets
6. **Status Bar**: Status and version number for connected equipment and software

11.2 Window Arrangement

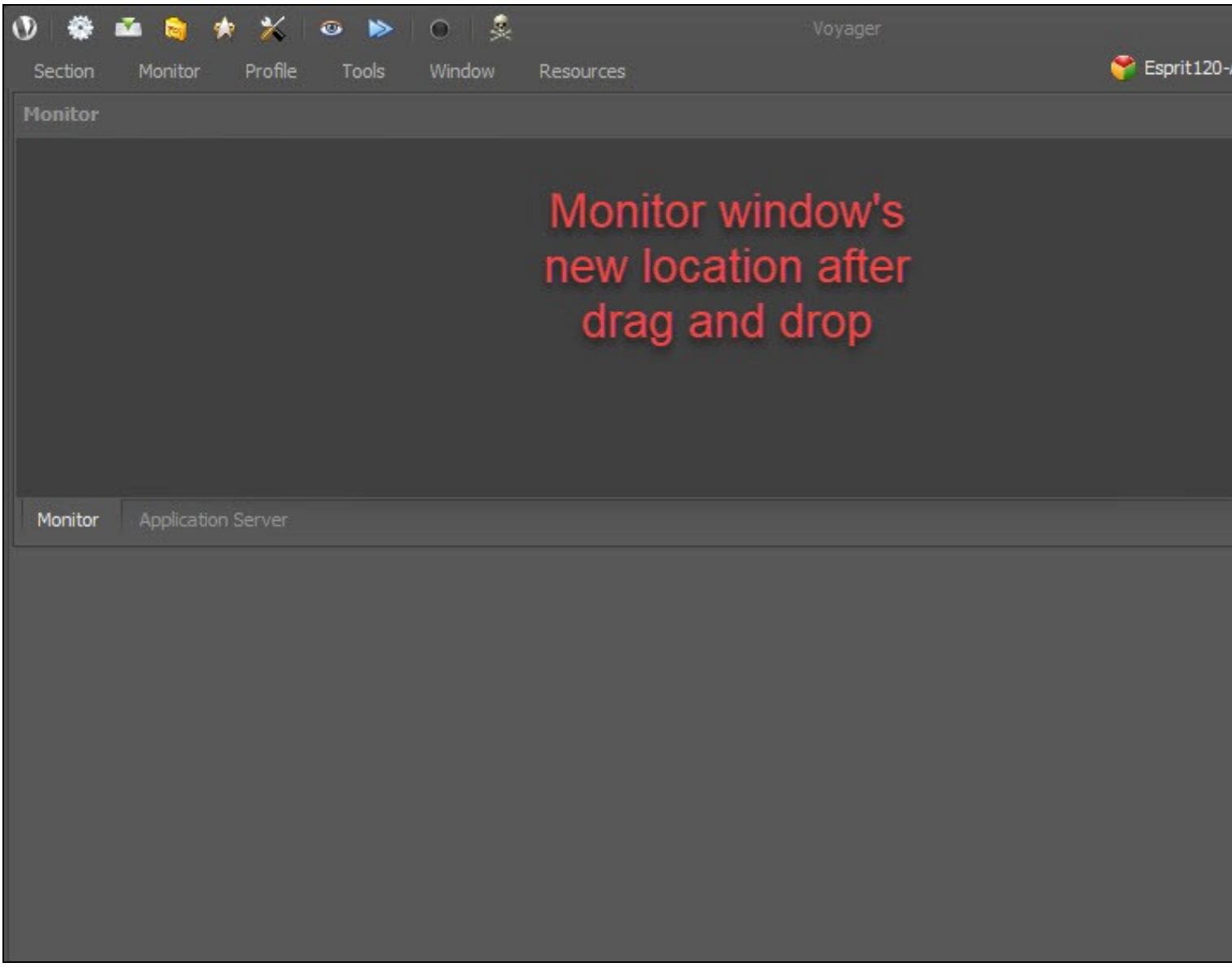
Voyager's windows can be re-arranged to suit your taste. Click on the title bar of a window and start to drag it, and the window location chooser overlay appears:



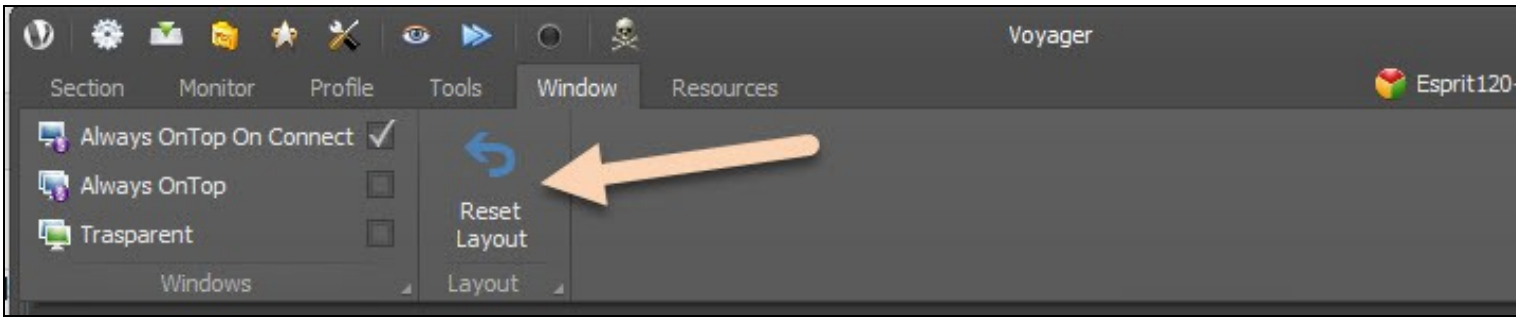
Continuing to hold the left mouse button down, drag the window over any of the "new location" icons, as indicated by the arrow in the screen capture below. A blue shadow region will appear, showing the new location of the window. Release the mouse button to place the window in its new location.



Release the mouse button in this example, and this is the new position of the Monitor window:



To return the default window configuration, click Window in the Main Menu and then click the Reset Layout button:



11.3 Main Menu

The Main Menu uses the modern Windows "Ribbon" style. There are six main ribbons - we will cover each one in detail next:

11.3.1 Section

- **Section**: Select the Startup, OnTheFly, DragScript, Research or Mosaic and Setup workspaces

1. **Startup**: Connect to your equipment and other software - you have to define a profile first
2. **OnTheFly**: Issue commands in real time to do things such as take a picture, perform autofocus, or plate solve an image
3. **DragScript**: Load, run or stop a script to automate your session
4. **Research & Survey or Mosaic**: Load, run or stop a script to perform deep sky mosaic (also create with Voyager VirtualFOV facilities), research and survey sequences, e.g. to look for exoplanets, supernovae or asteroids
5. **Setup**: Define a profile - equipment, software and parameters of your imaging system
6. **Custom Array Observatory:** Issue commands and load run or stop session for the Custom Array of telescope managed by Voyager in Master-Slave mode (up to 4 telescopes)

When you click on any of these icons, a tab will be created below the ribbon containing that workspace. You can have multiple tabs active and click between them to make changes in each workspace. For example, you may change the definition of a sequence in the OnTheFly workspace, then execute a DragScript that runs that sequence in the DragScript workspace.

11.3.2 Monitor

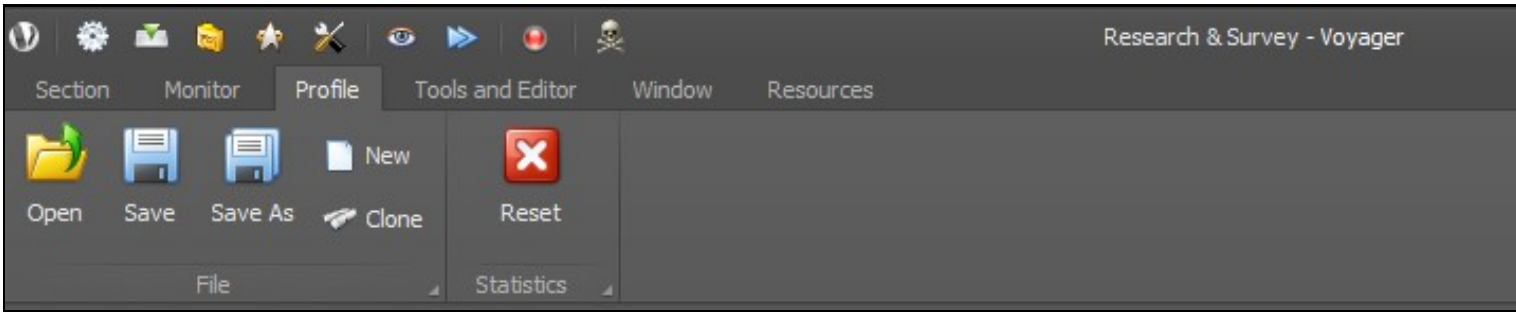
- **Monitor**: Monitor and control a running Sequence or DragScript

1. This area will be greyed out when you start Voyager. Once you have connected your equipment in the Startup section, and are executing a Sequence or DragScript, most of the controls in the button will be active.
2. **Abort**: Immediately stop the running DragScript or OnTheFly action
3. **Pause**: Pause the running DragScript or Sequence - this requests a pause, and Voyager will execute the Pause when it is safe to do so. For example, it may wait until the camera cooling cycle is complete before pausing.
4. **Remove Pause**: Remove a request to pause - if you request a pause that can't be performed immediately, you can remove your request here
5. **Resume**: Continue a Paused operation
6. **AutoFocus**: If a running Sequence allows it, perform an Autofocus action at the next possible time with either the default filter for the Sequence or the filter selected from the drop-down.
7. **Reset**: Remove the injected request (if there's one pending) to run an Autofocus
8. **HALT ALL**: Immediately halt any running operation or DragScript - Emergency stop.

9. **Clear**: Clears the contents of the Monitor window
10. **Font Size**: Change the font size of the text in the Monitor window. Make smaller to fit more information in the visible portion of the window, or larger to make it easier to read. Click Default to return the font size to the default value.

11.3.3 Profile

- **Profile**: Load, save and clone equipment configuration profiles. Profiles are saved by default to the Profile folder as shown in Installation#Voyager_Folders



1. **Open**: Load a saved profile and make it active - note: you must Disconnect Equipment before you can Open a new profile
2. **Save**: Save the settings of the active profile
3. **Save As**: Save the settings of the active profile under a new file name
4. **New**: Create a new, empty profile
5. **Clone**: Select an existing profile and load it under a new name
6. **Reset**: Resets statistics kept on a per-profile basis. These statistics help Voyager determine how long on average an action takes to perform

11.3.4 Tools and Editor

As of Voyager 2.0.14e (daily build) and 2.1.0 (stable), you can edit sequences while actions are running. You can invoke the sequence and flat sequence editor from this menu to do this.

A running sequence will use the sequence that was defined at the time it started running. You can edit a sequence while it is running, but the changes will not take effect until you stop and restart the sequence.

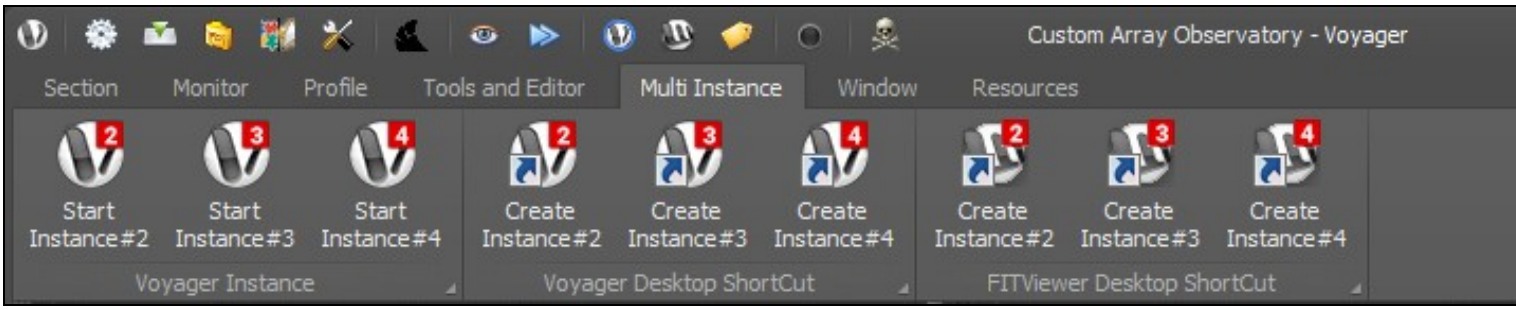
- **Tools**: Access the Sequence and Flat Sequence Editors, DragScript editor, Meteo (Weather) simulator, calculate sequence durations and manage the wrong focus star list:

1. **Sequence Editor**: Open the Sequence editor - note, as of Voyager 2.0.14e (daily build) and 2.1.0 (stable) you no longer need to have equipment connected to use the Sequence editor
2. **Flat Sequence Editor**: Open the Flat Sequence editor- note, as of Voyager 2.0.14e (daily build) and 2.1.0 (stable) you no longer need to have equipment connected to use the Flat Sequence editor
3. **Array Sequence Editor**: Open the Custom Array Sequence editor, Sequence editor dedicated to the Array System
4. **DragScript Editor**: Open the DragScript editor
5. **DragScript ITA**: Open the Italian language version of the DragScript editor

6. **Meteo Simulator**: Creates a file that contains information similar to the weather status information obtained from an AAGCloudWatcher or Boltwood Clarity II weather station. Voyager can suspend, terminate or resume actions based on weather status. The Meteo simulator lets you test these actions without waiting for the real weather to change
7. **Web Dashboard BETA:** Open the interna webpage of the web dashboard if the local Voyager webserver is configured and enabled, or open the legacy online Voyager web dashboard under Starkeeper.it website (internet connection in the last case is needed)
8. **FIT Viewer:** Open then Voyager FIT Viewer Application (distinct application)
9. **RoboClip:**Open the RoboClip Editor/Viewer
10. **Sequence Duration Calculator**: load a sequence and this tool will provide an estimate of how long that sequence will take to run to completion
11. **Wrong Focus Stars**: Click to bring up the Robofocus Wrong Focus Stars manager, where you can maintain a list of focus stars that Voyager should not use. For example, if a focus star is too bright or dim, or behind an obstruction, you may want to list it here so Voyager will not attempt to use it in the future

11.3.5 Multi Instance

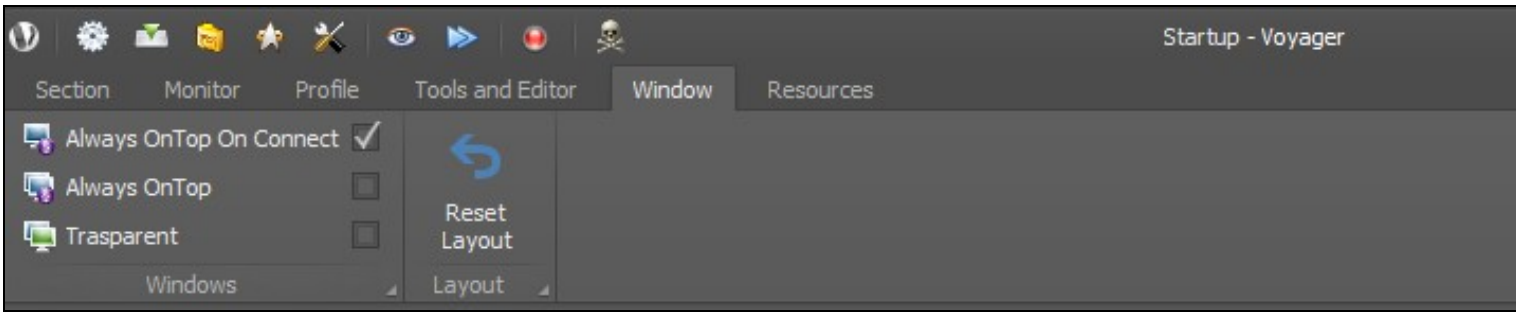
- **Multi Instance**: open another Voyager instance if allowed, create a shortcut in desktop for each instance, create a shortcut in desktop for the FITViewer dedicated to the instance



1. **Voyager Instance:**
    1. **Start Instance#2**: start Instance#2 of Voyager on the same PC
    2. **Start Instance#3**: start Instance#3 of Voyager on the same PC
    3. **Start Instance#4**: start Instance#4 of Voyager on the same PC
2. **Voyager Desktop ShortCut:**
    1. **Create Instance#2**: create shortcut on the desktop for start the Instance#2 of Voyager on the same PC
    2. **Create Instance#3**: create shortcut on the desktop for start the Instance#3 of Voyager on the same PC
    3. **Create Instance#4**: create shortcut on the desktop for start the Instance#4 of Voyager on the same PC
3. **FITViewer Desktop ShortCut:**
    1. **Create Instance#2**: create shortcut on the desktop for start the Instance#2 of FITViewer on the same PC
    2. **Create Instance#3**: create shortcut on the desktop for start the Instance#3 of FITViewer on the same PC
    3. **Create Instance#4**: create shortcut on the desktop for start the Instance#4 of FITViewer on the same PC

11.3.6 Window

- **Window**: Make the Voyager window stay on top, be transparent, or reset the layout



1. **Always OnTop on Connect**: The Voyager window stays on top while equipment is being connected
2. **Always OnTop**: The Voyager window is always on top
3. **Transparent**: The Voyager window is transparent so you can see what's beneath it
4. **Reset Layout**: Resets the window layout to defaults - you must close and restart Voyager for this to take effect

11.3.7 Resources

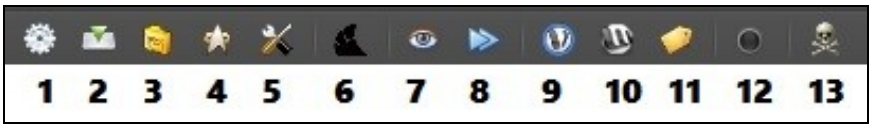
- **Resources**: Links to tutorials, help files, Voyager websites, and the Licensing Manager

1. **Voyager "Unofficial" Wiki**: Links to this Wiki
2. **Online Video Tutorials**: Links to video tutorials in various languages https://software.starkeeper.it/voyager-video-list/
3. **Help File**: Loads the PDF file of the user guide in Italian
4. **Getting Started**: Links to the Quick Start section of this Wiki
5. **Application Server and API Manual :** PDF manual of Application Server embedded in Voyager and related API for integration with third parts applications. Some more info under NDA available.
6. **Voyager Forum**: The forum at https://forum.starkeeper.it/
7. **Voyager Website**: The main website for voyager at https://software.starkeeper.it/
8. **Voyager Facebook Page**: Voyager's Facebook page at https://www.facebook.com/voyagersw
9. **About**: The opening splash screen - includes your unique Voyager installation serial number
10. **Change Log**: Release notes in both Italian and English
11. **Acknowledgements**: People who have helped with development, installation, sound and testing of Voyager
12. **Support:** if a mail client is configured on your PC this will be opened with the support mail selected, you can get support also writing directly to voyagerastro@gmail.com
13. **License**: License file management page where you can see what type of license you have installed, if and when it expires, when your current support and update period expires, and your unique Voyager installation serial number. There are also buttons here to buy a license and install a license file.

11.4 Command Bar

At the very top of the Voyager window you will find the Command Bar:

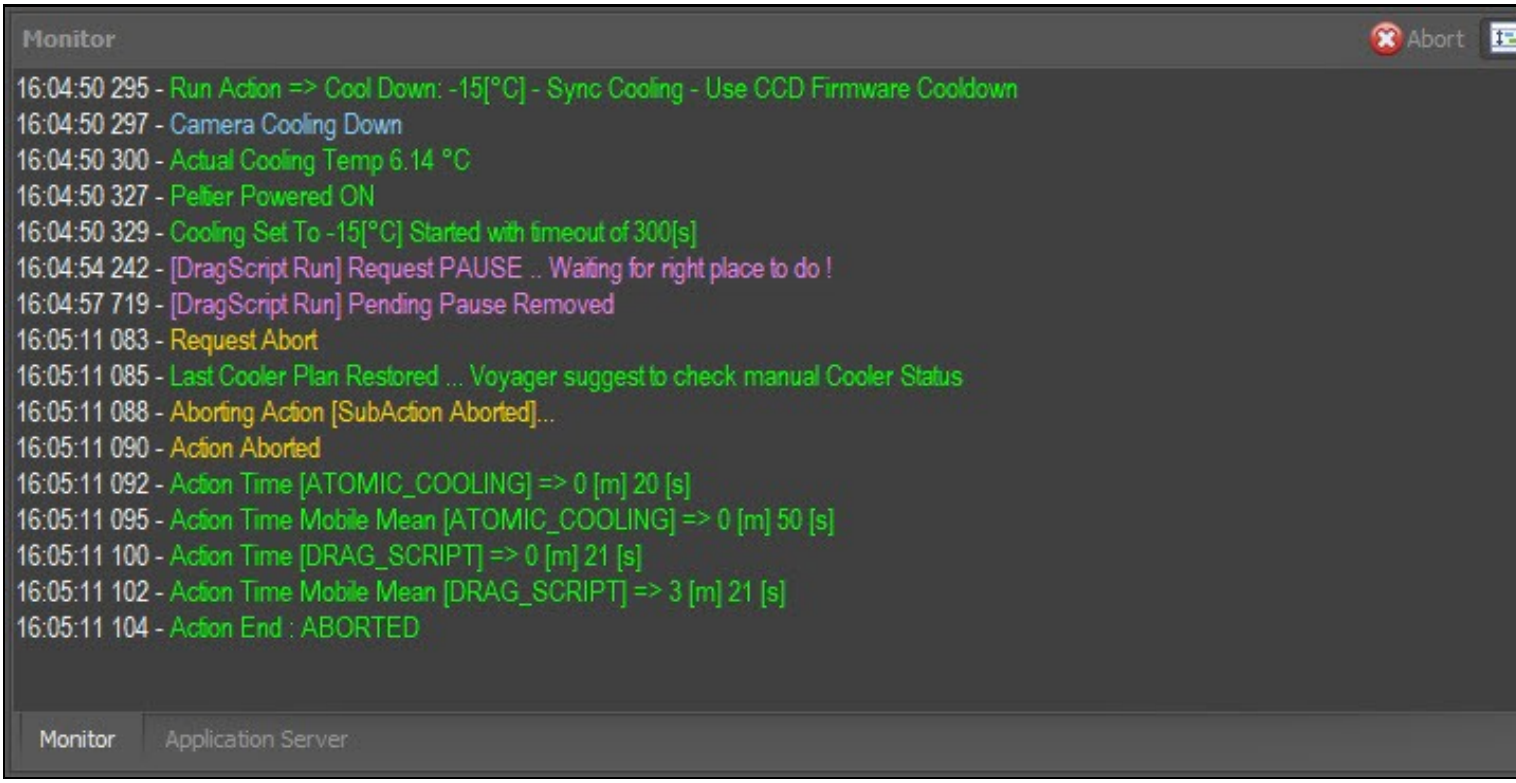
In addition to the usual Windows controls to minimize, maximize and close the application, on the upper left you will find the Command Bar icons. By clicking these, you can directly open the most frequently used windows of the Voyager application.



1. **Gear icon**: Startup
2. **Inverted green triangle on a white rectangle**: OnTheFly
3. **Yellow folder**: DragScript
4. **Star badge**: Research & Survey
5. **Wrench and screwdriver**: Setup
6. **SC Observatory Logo:** Custom Array Observatory
7. **Eye**: Status widgets
8. **Blue triangles**: Commands
9. **Voyager logo blu borded:** Webdashboard
10. **FIT Viewer Icon:** FIT Viewer
11. **Orange label:** RoboClip
12. **Voyager Status**: Green = idle; Blue = Running
13. **Skull and crossbones**: Halt all scripts and/or commands immediately! Emergency stop.

11.5 Monitor Window

The Monitor window is at the lower left of the main Voyager window. It displays a time-stamped, color-coded running log of actions performed by Voyager. The same log is written in a text file on disk in Installation#Voyager_Folders



Messages are color-coded as follows:

- **Green**: Action or status, normal operation
- **Yellow**: Warning - does not require user intervention but might be worth watching. Voyager will continue to operate as directed by the operator, configuration, script or sequence. Examples: 1) Operator requests that Voyager abort the running DragScript. Voyager monitor log has a yellow message indicating "Request Abort," (as seen above), and then completes the request as shown by the other monitor log messages. 2) Voyager is carrying out a pointing operation. It slews to the target and performs a plate solve. If the error is beyond the specified margin, a yellow message in the monitor log indicates this, but if the number of pointing retries has not been exceeded, Voyager will slew again based on the error and then do the plate solve operation.
- **Purple**: Events and/or DragScript run operations
- **Red**: A serious error action that will be aborted, such as a blind solve failing indicating Voyager is unable to verify where the telescope is pointing
- **Cyan**: Starting of a SubAction in a container Action
- **Orange**: Emergency events from Weather control or Viking I/O server
- **Gray**: Debug information with low level significance

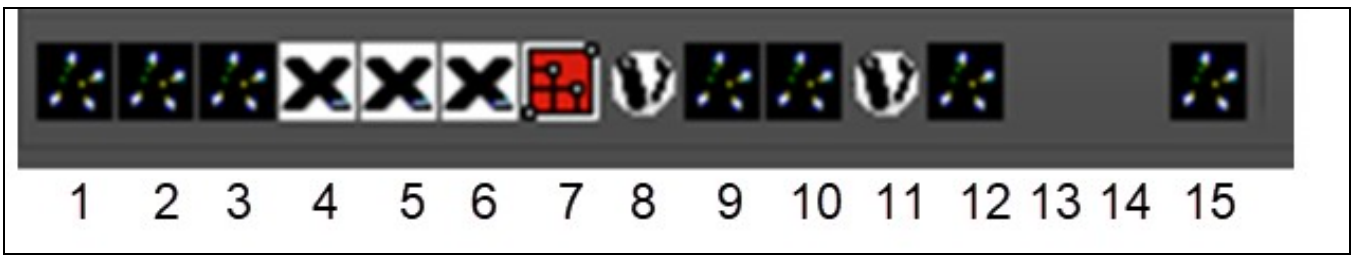
11.6 Application Server

Voyager contains an Application Server that listens to a TCP/IP port and accepts JSON RPC commands. At this time, the protocol is not published and the Application Server is not being used in the Base commercial license. It is being used with a custom license by the SC Observatory to orchestrate imaging by an array of four scopes with remote actions. In the future this application server will be used for additional advanced features. The Application Server window provides a log of Application Server traffic when it is running.

11.7 Status Bar

There is a status bar at the bottom of the main window:

The left side of the status bar contains icons indicating the status of the connected hardware and software. Hover your mouse over an icon to get additional information about that component, including its name the software version number if available.



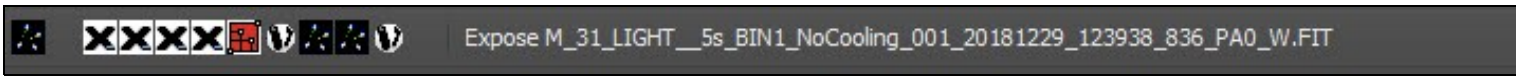
The icons represent your connected equipment as follows:

1. Camera control
2. Filter Wheel control
3. Mount control
4. Guiding control
5. Planetarium control
6. Plate solving control
7. Blind solving control
8. Autofocus control
9. Focuser control
10. Rotator control

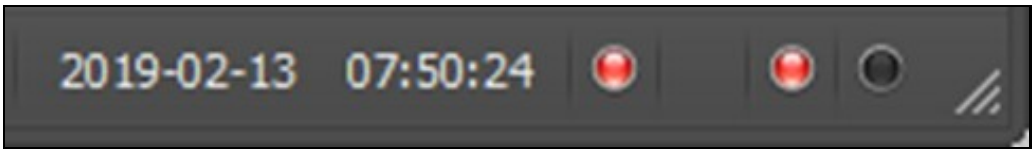
11. Flat device control
12. Dome control
13. Observing Conditions
14. SQM
15. Safety Monitor

In the example shown here, no Observing Conditions or SQM driver are connected, so those icon areas are blank.

While a script or sequence is running, messages appear in the middle of the status bar corresponding to the current operation:



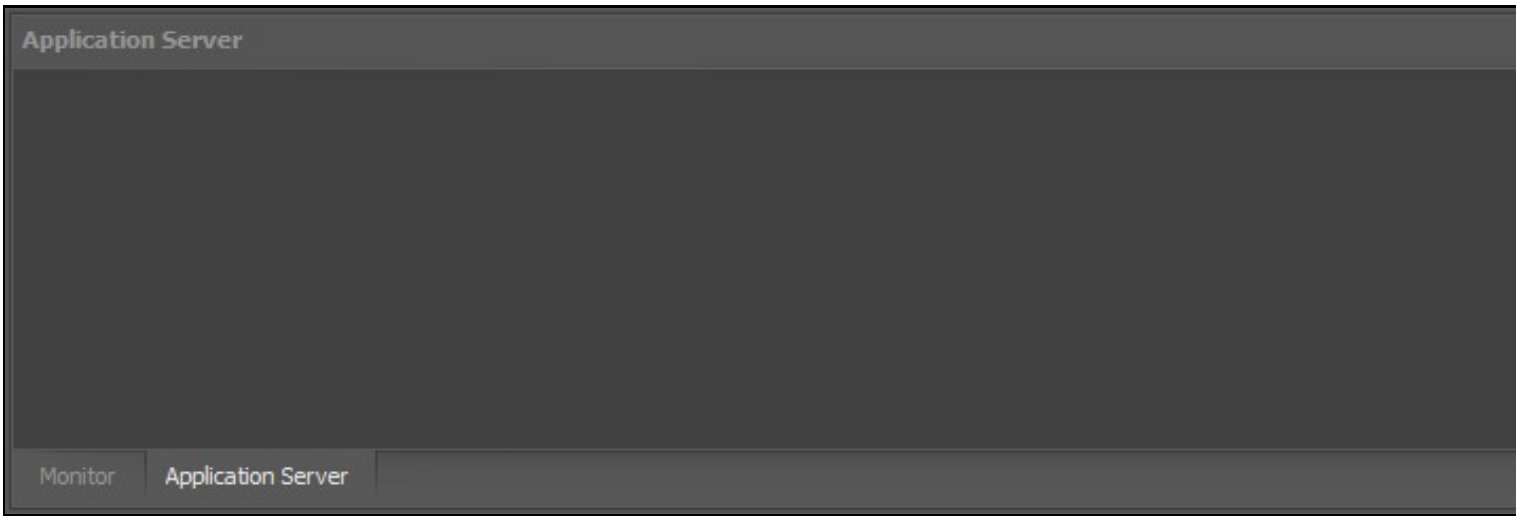
Some additional information is found on the right side of the status bar. Hover your mouse over the "LED" light controls for additional status information related to those controls:



- Local date
- Local time
- Weather status
- Viking Client connection status
- Safety Monitor status: Off = not configured, Red = UnSafe, Green = Safe
- Application Server connection status

11.8 Application Server

The Application Server tab, right next to the Monitor tab, opens the application server message window. Voyager's custom licensed version contains an Application Server allowing external control of Voyager operations. This server is not currently active in the Base license version of Voyager.



12 Status Window

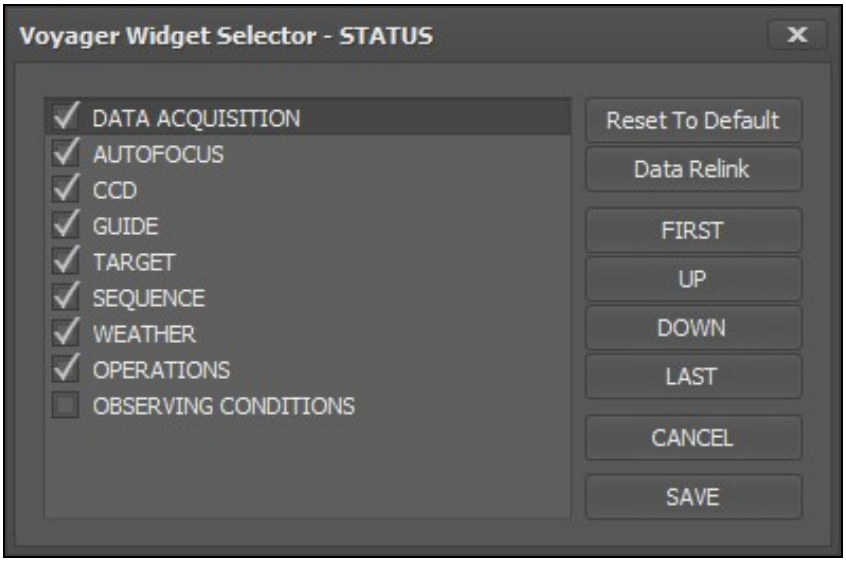
12.1 Status Window

On the right side of the main window there is a column that can display either a configurable selection of status widgets, or a configurable set of command widgets:


Status
DATA ACQUISITION
LST 23:47:25
PIER East
RA 22:34:50
TIME 17:32:20
DEC -09° 03' 03"
FLIP-T 01:12:35
AZ 204° 23' 22"
ROT-D 0 °
ALT 41° 51' 48"
DOME
OPERATIONS
TRACK
SOLVE
SLEW
EXPOSE
CALIBRATE
MERIDIAN FLIP
GUIDE
ROTATE
FOCUS
DOME
AUTOFOCUS
Unknow
CCD
-12.1°C
-17°C
Power
90%
Temp.
-14.1
Set T.
-15.0
GUIDE
1
100
RA 0.000
StarMass
Ao Tilt-X 0%
DEC 0.000
0
Ao Tilt-Y 0%
TARGET
90
0
Rise
17.35
Transit
23.20
Set
05.04
SEQUENCE
Sequence Stopped
WEATHER
VERY CLOUDY
16.4 °C
CALM
99 %
DRY
SAFE
LIGHT

At the top of the status window, you will find controls that let you configure the window itself:

1. **Show Synoptic View**: Show the most recently saved arrangement of the status widgets
2. **Save Synoptic View**: Save the current arrangement of the status widgets - recall by clicking Show Synoptic View
3. **Select Layout**: Brings up a dialog that lets you decide which status widgets to display - see below
4. **AutoHide**: Toggles whether the Status and Command windows always show, or slide out of view when the cursor is not over them. When they are hidden, tabs appear at the edge of the window. Click or hover the mouse over the tab to make the windows slide back into view, and hold your cursor over the window to keep it in view.



In the Widget Selector window:

- Click a status widget's name to highlight it, then click again to toggle whether it is displayed in the Status window or not. A checkmark appears if it is to be displayed
- Click a widget's name to highlight it, then click the buttons First, Up, Down, or Last to move that status widget's position in the Status window
- Click the Reset to Default button to restore the list of displayed widgets to their default order
- Click the Cancel button to exit the Widget Status selector without making any changes
- Click the Save button to change your chosen Widget Status configuration

12.2 Status Widgets

Each of the status widgets contains an "LED" in the upper left corner which gives a quick indication of the status of that component (mount, autofocus, guiding, etc.) of your operation.

- Dark gray means that component is inactive.
- Green means everything is OK

- Yellow means there is a problem but it is not serious (i.e., Voyager will try to correct it automatically)
- Orange means there is a serious problem but Voyager will also try to correct it automatically
- Red means a critical problem, Voyager will abort the operation

Now let's examine each of the available status widgets and see what their display tells us.

12.3 Data Acquisition

This widget "lights up" when a mount is connected, otherwise it is grayed out. It has the following information:

- **LST**: Local Sidereal Time
- **RA**: Mount's current Right Ascension (celestial hour angle)
- **DEC**: Mount's current Declination
- **AZ**: Mount's current Azimuth
- **ALT**: Mount's current Altitude
- **PIER**: Mount's current orientation - East or West of the pier. East mean mount passed meridian and is flipped. West mean mount is before meridian and not flip done
- **TIME**: Current local time
- **FLIP-T**: Elapsed time until meridian flip
- **ROT-D**: Dome position, if connected
- **DOME**: actual azimuth of Dome if supported

Important Note! If the background of the PIER field is yellow, it means that the meridian calculation is derived from the mount's LST and RA values
Important Note! If the FLIP-T value is negative, the mount is tracking towards the meridian and the value shown will decrease with time. If it is positive, the mount is tracking away from the meridian. If the background of the FLIP-T field is yellow, it means you have chosen to delay the meridian flip, a feature only available with AstroPhysics mounts

12.4 Operations

This widget has a status "light" next to various operations that turns on or off (bright colors or dark) when the operation is progressing.

- **TRACK**: Green when the mount is tracking at sidereal speed, dark gray when it is stopped

- **SLEW**: Green when the mount is slewing, dark gray when it is stopped
- **CALIBRATE**: Green when the guide scope software is calibrating, dark gray when it is not
- **GUIDE**: Green when the guide software is guiding, dark gray when it is not
- **FOCUS**: Green when an autofocus operation is in progress, blue when it is dithering, dark gray when it is not active
- **SOLVE**: Green when a plate solve operation is in progress, dark gray when it is not
- **EXPOSE**: Green when the camera is taking an exposure, orange when it is downloading, dark gray when it is not active
- **MERIDIAN FLIP**: See table below for status indicators
- **ROTATE**: Green when the camera rotator is moving, dark gray when it is not
- **DOME**: Green when the dome shutter is opened, Orange if the dome shutter is closed, blue if Dome have something moving like shutter or azimuth rotating, red if there's an error on dome status reported by the dome external driver, dark gray when dome it is not configured

For all status "light" a red color mean error or misconfiguration.

12.5 Meridian Flip Status LED

Color / Flashing	Meridian Flip LED Meaning
Dark Grey	Meridian flip has not yet been done
Green	Meridian flip was done successfully
Flashing **Orange**	Scope is pointing beyond meridian and flip will be done at designated minutes past meridian
Flashing **Blue**	Meridian flip in progress
Grey	Meridian flip is not managed (it is a user choice for Voyager to manage the meridian flip)
Flashing or Solid **Red**	Meridian management error has occurred

12.6 Autofocus

This widget lights up when an autofocus operation is in progress.

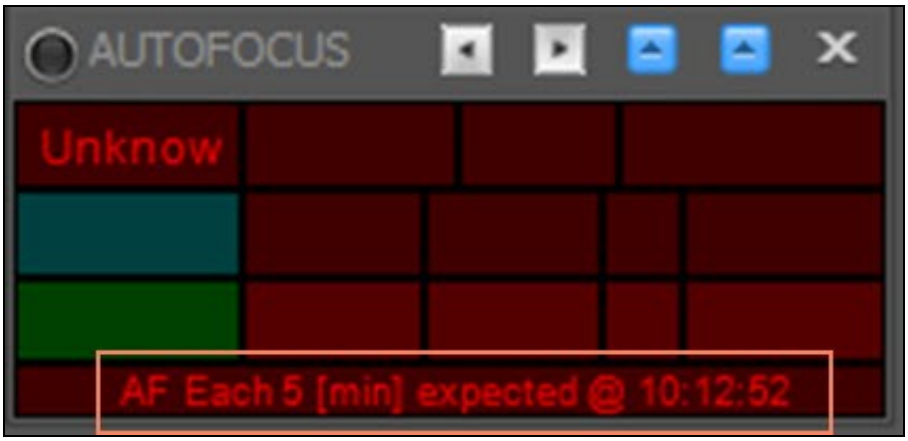
Information displayed includes (from left to right):

- First Row
    1. Result of the last autofocus operation (DONE or ERROR)
    2. Time of the last autofocus operation
    3. Duration of the last autofocus operation
    4. Position of the star in pixels relative to the image frame used for focus (not valid for RoboFire LocalField autofocus)
- Second Row
    1. Percentage of change in HFD (Half Flux Diameter) final value from the mean of all autofocus operations in this session (the green value underneath this one) to the last autofocus
    2. Focuser position at the end of the autofocus operation
    3. HFD (Half Flux Diameter) obtained by the last autofocus operation
    4. Empty Field
    5. Temperature in °C for the last autofocus operation

- Third Row

1. HFD (Half Flux Diameter) mean value of all autofocus operations in this session (each sequence starts a new session)
2. Focuser position at the end of the previous autofocus operation
3. HFD (Half Flux Diameter) obtained by the previous autofocus operation
4. Empty Field
5. Temperature in °C for the previous autofocus operation

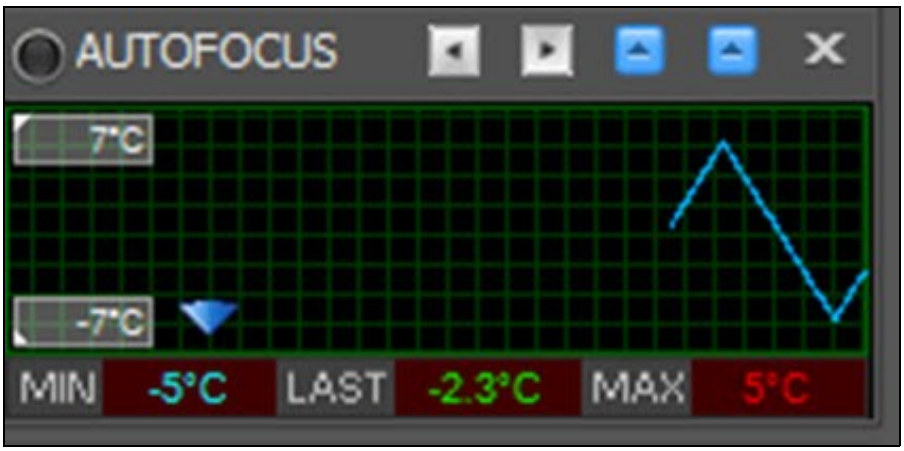
- As of Voyager 2.1.1f, you can specify to run autofocus every X minutes in your sequence. If that option is chosen, the Autofocus status window contains a line showing the time of the next autofocus run:



Also as of Voyager 2.1.1f, the autofocus status window has two panels. Click the grey arrow icons in the title bar to switch between them.

One status window is as documented above.

The second status window, shown below, contains the graph of the temperature from the focuser with trend:



- **MIN**: Lowest temperature reading from the focuser since connecting
- **MAX**: Highest temperature reading from the focuser since connecting
- **LAST**: Most recent temperature reading from the focuser

Click this window to bring up a configuration dialog:

From this dialog you can set the temperature scale's Minimum and Maximum values in °C, and the horizontal axis's time scale in minutes.

Hover your mouse pointer over an icon to see a tool-tip explaining what the icon does. The red dot over the icons show the checked status on of the option.

The icons in this pop-up dialog perform the following actions:

Icon	Action
	Clear the graph
	Close the pop-up window without saving changes
	Make the specified changes and close the window
	Measure data values with the mouse
	Resets scale to the defaults
	Automatically sets graph scale based on data values
	Show the temperature scale values, max and min

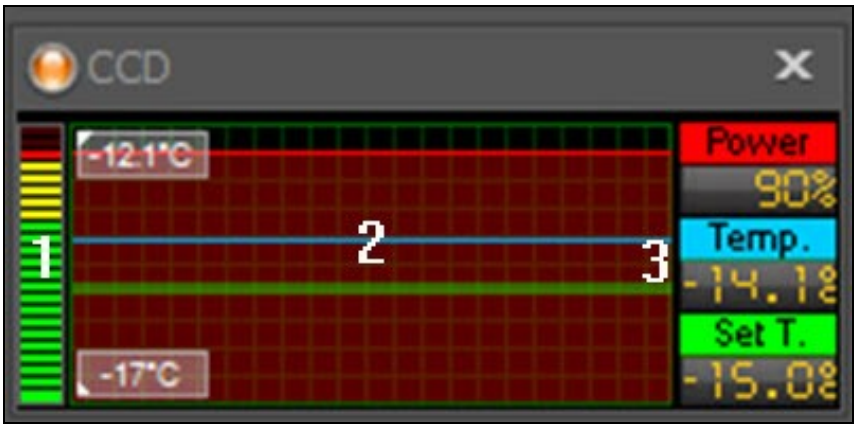
There are two blue icons In the autofocus title bar :

1. Open RoboFilre VCurve autofocus dashboard
2. Open RoboFire Local Field autofocus dashboard

The dashboards will be opened at each focus action and closed automatically after 30 seconds, or the time indicated on the RoboFire Setup window. The dashboard gives realtime data during an autofocus operation, or the last autofocus data if manually opened.

Important Note! Data reported in the Auto Focus status window is not real-time. It is updated at the end of the auto focus operation

12.7 CCD



If your CCD or CMOS camera has a cooler, this widget tells us about the sensor temperature.

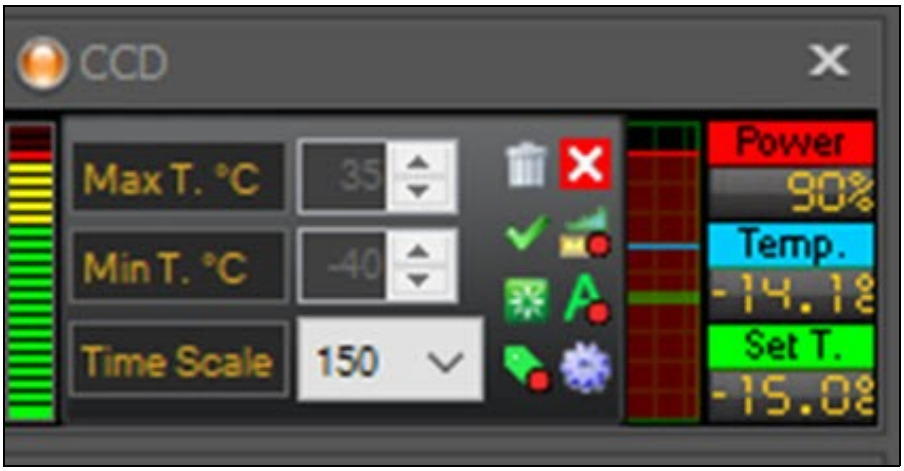
1. This vertical bar indicates the percentage of your CCD cooler's power is in use. It has three colors from green to yellow to red. Green is normal power, yellow is high power, red means nearing or reached maximum power. Consult with your camera's manual to determine what value(s) are acceptable.
2. In this area you will find a graph that displays these values as they change over time: Red line - Camera cooler power usage; Blue line: Camera sensor temperature; Green line: Set point temperature - the value you chose as your desired sensor temperature
3. Current values of camera sensor cooler power usage, actual sensor temperature, and desired temperature (Set point temperature)

   - The two white numbers in rectangles on the left are the minimum and maximum values of the graph's vertical axis.

The LED in the upper left corner indicates cooling status:

- **Flashing Green**: The camera is cooling
- **Solid Green**: The camera has reached the set point temperature
- **Yellow**: There is a problem but Voyager is attempting to resolve it
- **Red**: There is a critical problem and Voyager cannot resolve it

Right or left click on the CCD status window and you will get this pop-up dialog window:



From this window you can set the temperature scale's Minimum and Maximum values in °C, and the horizontal axis scale's sampling time in seconds. Hover your mouse pointer over an icon to see a tool-tip explaining what the icon does. The red dot over the icons show the checked status on of the option.

The icons in this pop-up dialog perform the following actions:

Icon	Action
	Clear the graph
	Close the pop-up window without saving changes
	Makes the specified changes to the CCD graph and closes the pop-up window
	Measure data values with the mouse
	Resets scale to the defaults
	Automatically sets graph scale based on data values
	Show the temperature scale values, max and min
	For future development

Important Note! If the graph's temperature values are out of scale you will see a colored arrow pointing upwards or downwards depending on whether the value is greater or lesser than the maximum or minimum graph scale value. If the camera is not accepting power for cooling you will see the error code ERR in power and the left bar will flash power.

12.8 Guide

This widget displays information from your guiding software.

- The graph tracks the position of the guide star centroid, as reported by the guiding software, over time. The blue line shows Right Ascension and the red line shows Declination
- The white number label at the upper left is the scale in pixels - e.g., a value of 1 means the graph's vertical scale is +/- 1 pixel, so 2 pixels peak-to-peak
- The white number label at the lower left is the number of samples represented by the graph
- The polar graph on the right shows guiding error values with the center representing zero error, and points in a circle depending on the +/- error value
- The RA value at the bottom of the widget is the RMS (Root Mean Square) guiding error in Right Ascension as reported by your guiding software. Lower numbers are better
- The DEC value at the bottom of the widget is the RMS (Root Mean Square) guiding error in Declination as reported by your guiding software. Lower numbers are better
- Note the RA and DEC values are drawn on the basis of the active sampling scale
- The StarMass value reported by the guiding software
- The Ao Tilt-X and Ao Tilt-Y are the x and y axis tilt values of your Adaptive Optics device, if one is installed and connected

Important Note! Depending on the capabilities of your Adaptive Optics (AO) driver it is possible that the data contained in AO Tilt-X and AO-Tilt-Y fields is not correct. This however does not compromise the use of the AO. There are guiding watchdogs associated with the tilt of the AO.
Important Note! Depending on your guiding system, the polarity of the axes may be reversed. Voyager currently replicates the polarity of the PHD2 guiding system

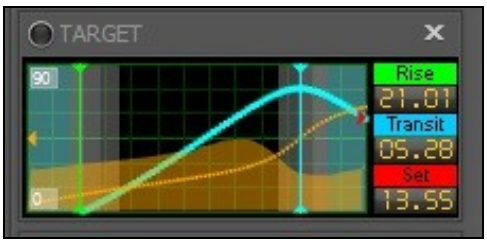
Right or left-clicking on the Guide status window brings up a popup window that lets you make adjustments to the widget. You can change the vertical axis pixel scale, and the horizontal axis sampling scale (Frame scale). Hover your mouse pointer over the icons to get a tool-tip describing what they do, as documented in this table:

Icon	Action
	Clear the graph
	Close the pop-up window with no changes made
	Makes the specified changes to the CCD graph and closes the window

Icon	Action
	Measure data values with the mouse
	Resets scale to the defaults
	Show StarMass / Star mass moving average
	Show the scale labels
	Show global RMS guide error / RMS guide error for current sub

12.9 Target

If you have a valid target selected in a currently running sequence, or valid RA and DEC coordinates in the OnTheFly panel, the Target status window will provide the information shown in the list below. If no valid target is selected, the status widget displays "NO VALID DATA" in yellow.

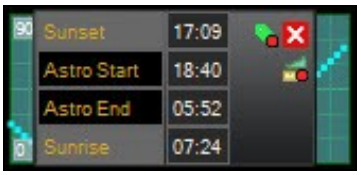


- Displays the altitude of your current target over the course of the night. The areas of the graph with a black background are astronomical night. The areas of the graph with a

blue background are daylight. The areas of the graph with a light gray background are civil twilight, and a dark gray background marks nautical twilight.

- The two numbers in gray boxes at the left of the graph are the altitude values in degrees represented by the bottom and top of the graph
- The cyan graph curve shows the altitude of the target during the timeline of the graph.
- The vertical green line marks the time the target rises
- The vertical cyan line marks the time of the target's transit
- The vertical red line marks the time the target sets
- The vertical orange line marks the target's current altitude
- The dotted orange curved line is the azimuth of target
- The orange filled curved if present (Horizon enabled) display the horizon limit related to the target for the night
- The boxes on the right show the time values indicated by the correspondingly colored vertical lines, for the target's rise, transit, and set
- If any of these values are outside the timescale (horizontal axis) of the chart, a blinking colored arrow appears at the appropriate edge of the chart, pointing in the direction the value would appear if the chart were bigger. E.g., if the setting time of the target is well past sunrise, a red blinking arrow would appear on the right side of the chart, pointing to the right.

Right or left-click on the Target status widget to display a pop-up window which lets you make adjustments to the widget, and tells you the actual times of sunset, astronomical night start and end, and sunrise:



- The values on the left of the chart are as labelled: the actual local time of Sunset and Sunrise, Astronomical Night start and end

The icons in the pop-up window perform the following actions:

Icon	Action
	Close the pop-up window
	Toggles whether hovering the mouse over the widget displays the time value corresponding the mouse's position over the x axis. A red dot appears on the icon when measuring is active
	Toggles whether the scale labels are shown. A red dot appears on the icon when labels are shown

12.10 Sequence

If no sequence is running, the sequence status window displays the yellow text "Sequence Stopped:"

If a sequence is running, the status window displays information about its progress:

- The left section contains two vertical progress bars. The green bar on the left displays progress against the total number of images that will be taken during the sequence. E.g., if your sequence will take five images, after the first one completes, the green bar will be show 1/5th of the total. The green bar is redrawn after each exposure completes.

- The red bar indicates the percentage completed of the current exposure and moves in real time as the exposure progresses.

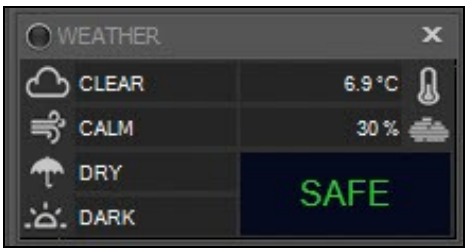
Important Note! The progress bars are reset each time the sequence is started

12.11 Weather

If a weather sensor is connected, the weather status window displays the current weather conditions. It also has a status box with values SAFE, SUSPEND or EXIT. The relationship between the weather conditions and the decision to continue, suspend or terminate operations is completely configurable in the Weather portion of the Setup workspace.

Important Note! You should not rely on Voyager alone to protect your equipment from the weather. Software bugs, weather sensor failures, incorrect or unreachable weather file data, or other problems could cause Voyager to miss changes in the weather that could damage your equipment. By using Voyager, you agree that we have no liability for any damage to your equipment caused by failure to recognize and / or act on weather status information. If you do unattended imaging, it is important to make an investment in multiple, redundant ways to protect your equipment from the weather.

Under SAFE conditions, the weather display may appear similar to this:



The values displayed here are based on readings from the connected weather device. If no weather device is connected, the widget displays the text "OFF."

- The first box in the left column with the cloud icon displays cloudiness with possible values: Unknown, Clear, Cloudy, Very Cloudy
- The second box, with the wind icon, shows windiness with possible values: Unknown, Calm, Windy, Very Windy
- The third box, with the umbrella icon, shows whether it is raining, with possible values: Unknown, Dry, Wet, Rain
- The fourth box, with the sun icon, shows how dark it is, with possible values: Unknown, Dark, Light, Very Light
- The first box in the right column shows ambient temperature in degrees C as reported by the connected weather device
- The second box in the right column, with the mist icon, displays the relative humidity as reported by the connected weather device

The text on the lower right is either SAFE, SUSPEND, or EXIT. When weather conditions change, an event can be triggered which will cause the current DragScript or running sequence to be suspended, terminated, or resumed from suspension. See the Weather section in the Setup page for configuration instructions, and the DragScript and Sequence section for how Voyager handles these events.

Here's how the status widget may appear if weather conditions occur which, according to the weather setup, would cause operations to pause (be suspended):

If weather conditions occur that would cause operations to terminate, based on the weather configuration, the weather status widget may appear like this

:

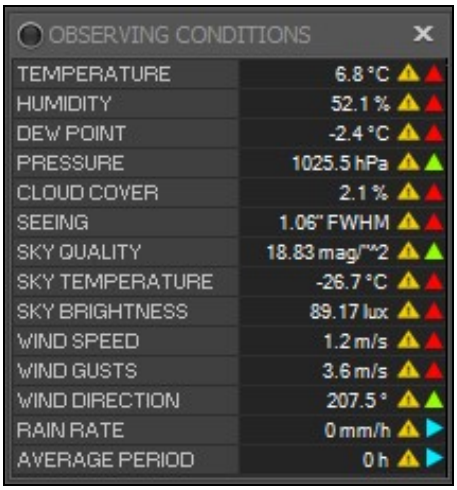
If the Light COnditions is disabled this cause Voyager to ignore the light conditions and calculate the SAFE status without this information, Voyager will evidence this putting a red cross over the light conditions icon and adding to the reporting og the overall status of SAFE conditions a brackets defined safe conditions with all conditions enabled. In the example in next image the LIGHT Conditions are disabled and the final SAFE status is SAFE because the other coditions is on SAFE status. The overall status between brackets take in account also the light conditions and report EXIT cause the Light conditions is Very Light that is configured in the weather table like an exit emergency event:

12.12 Observing Conditions

If an Observing Conditions monitor is connected, this widget displays the current observing conditions.

Observing condition trends are monitored and an icon is displayed to the right of the current value depending on the trend. See Observing Conditions Setup for values affecting the trend calcluation.

- **Yellow triangle**: The number of measurements taken by Voyager is not yet enough to calculate the trend correctly. This depends on the interval chosen in Observing Conditions Setup
- **Red arrow up**: Trend is increasing (red means the trend is getting worse. For this parameter, an increase is worse)
- **Green arrow up**: Trend is increasing (green means the trend is improving. For this parameter, an increase is better)
- **Red arrow down**: Trend is decreasing (red means the trend is getting worse. For this parameter, a decrease is worse)
- **Green arrow down**: Trend is decreasing (green means the trend is improving. For this parameter, a decrease is better)
- **Cyan arrow**: The trend is stationary



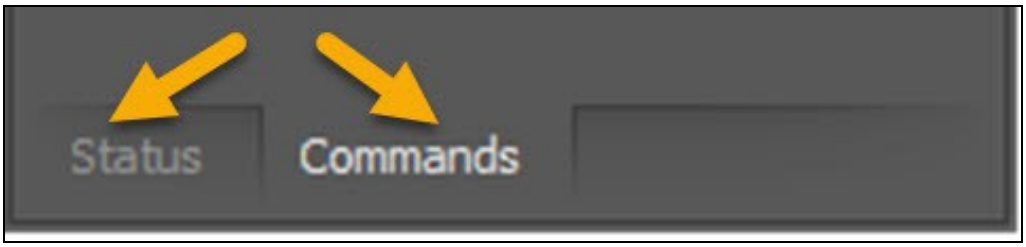
- **Temperature**: Temperature in °C
- **Humidity**: Humidity in percent
- **Dew Point**: Dew point in °C
- **Pressure**: Atmospheric pressure in hectoPascals
- **Cloud Cover**: Percentage of the sky covered by clouds
- **Seeing**: Seeing measured by the FWHM (Full-Width Half Max) in arc-seconds
- **Sky Quality**: SQM of local sky measured in magnitudes/arc second squared
- **Sky Temperature**: Infrared sky temperature measurement - an indicator of cloud coverage but varies with ambient temperature
- **Sky Brightness**: Sky brightness in lux
- **Wind Speed**: Wind speed in meters/second
- **Wind Direction**: Wind direction in decimal degrees
- **Rain Rate**: Rainfall measured in mm/hour
- **Average Period**: Moving average time period used in determining trends - is the parameter increasing, decreasing, or staying steady?

13 Command Window

13.1 Choosing Status or Command Window Display

On the right side of the Main Window are two tabbed windows, the Status Window and Command Window.

Click on the tabs at the bottom of the window to select between them:



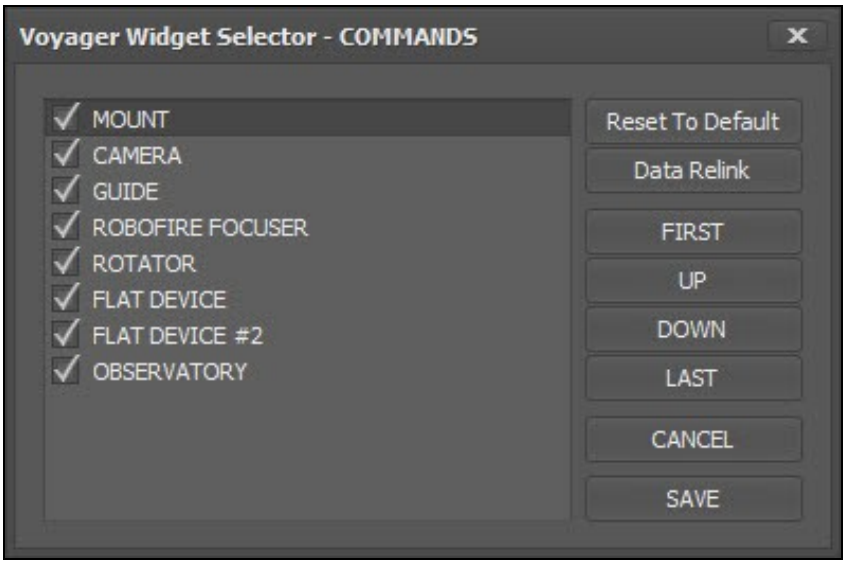
13.2 Command Widgets

Select the Commands tab tp display set of configurable command widgets. These widgets provide buttons that execute immediate commands on the mount, camera, guiding system, focuser, rotator, flat device, and roll-off roof or domed observatory. It also displays some status information about these components:

Controls at the top of the Command window are used to configure the window's contents:

1. **Lock / Unlock commands**:. When locked, commands cannot be issued, protecting against unintentional commands being sent during an imaging session.
2. **Select Layout**: Choose which command widgets are displayed in the Command window
3. **Auto Hide**: Toggle whether the Command window slides out of view when not in use. If the Command window is hidden, tabs appear on the right side of the main window. Click the tab to restore the Command window into view.

Click the **Select Layout** icon to bring up the Widget Selector window, which controls whether a widget is shown and the order of the widgets:



- Click the name of a widget in the left column to select the widget
- Click the name of a selected widget to toggle the checkmark. The widget will be visible only if the checkmark is shown

The buttons in the right column control the ordering of the widgets:

- Reset to Default: Resets the widget display to the default configuration
- Data Relink: internal relink object in the list to the real box in the control if you loose control of list order
- First: Move the selected widget to the first position
- Up: Move the selected widget up one position
- Down: Move the selected widget down one position
- Last: Move the selected widget to the last position
- Cancel: Close the window without saving changes
- Save: Save the new widget configuration and close the window

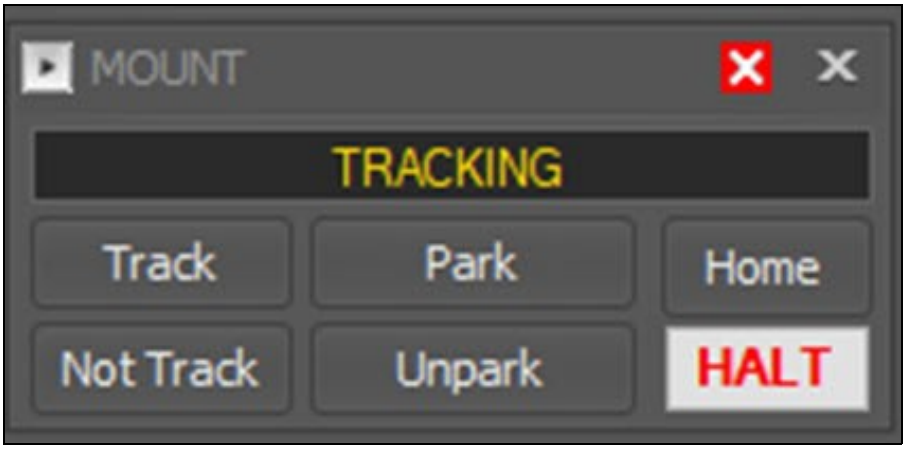
Controls at the top of the command window


Commands
MOUNT
TRACKING
Track
Park
Home
Not Track
Unpark
HALT
CAMERA
Temp.
-15.54
COOLING
-20
Set Point (°C)
Cool Down
ON
OFF
Warmup
Filter
R
Set
GUIDE
CALIBRATION COMPLETE
Calibrate
Acquire
Guide
Dithering
Stop
ROBOFIRE FOCUSER
Temp.
3.6 °C
IDLE
Position
25000
Goto
<< IN
<
HALT
>
OUT >>
ROTATOR
P.A.
0
IDLE
000.00
Move To
Zero
HALT
Flip
Manual Sync
FLAT DEVICE
Brigh.
Unknow
IDLE
0
Set
Open
Close
Light ON
Light OFF
OBSERVATORY
OFF
Status
Commands

13.3 Mount

The yellow status text indicates the current state of the mount: Parked, Tracking, Stopped (not tracking), Slewing, or Homed

The Mount widget can send immediate commands to the mount:



The buttons in the Mount widget send the following commands to the mount:

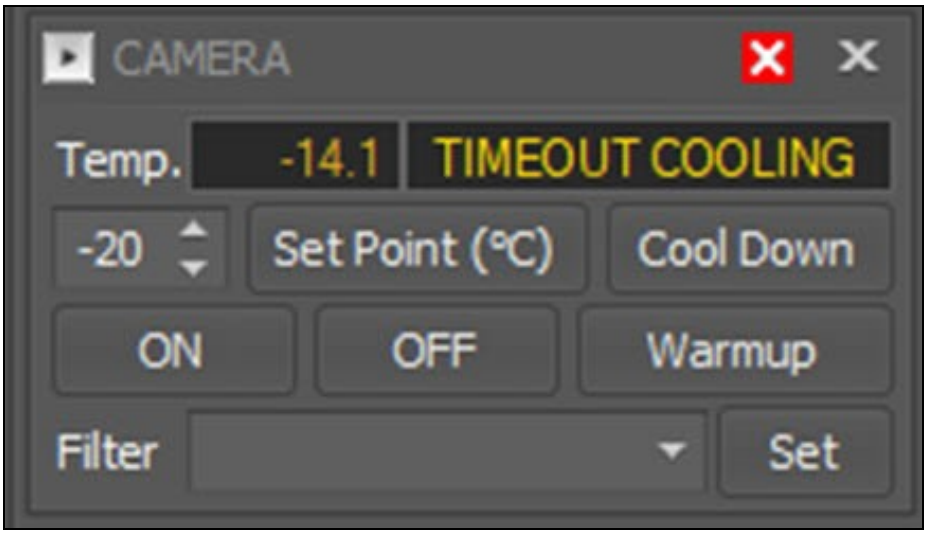
- **Track**: Begin sidereal tracking
- **Not Track**: Stop sidereal tracking
- **Park**: Park the mount
- **Unpark**: Unpark the mount
- **Home**: Home the mount (if supported)
- **HALT**: Abort the command sent from this widget and any other movement in progress

There are two ways to abort a command sent from this widget:

Icon	Action
	Aborts the command sent from this widget only
	Abort the command sent from this widget **AND any movement in progress for any reason**

13.4 Camera

The Camera command widget provides a way to send immediate commands to the camera's cooling system and filter wheel.



The camera's current sensor temperature is displayed along with a status message indicating the current cooling operation: OFF, COOLING, WARMUP RUN, COOLDOWN TIMEOUT.

Beneath the "Temp." display is a control to set the desired sensor temperature.

Double click the temperature and type in the desired camera sensor temperature, or use the up and down arrows to change the value to the desired setting.

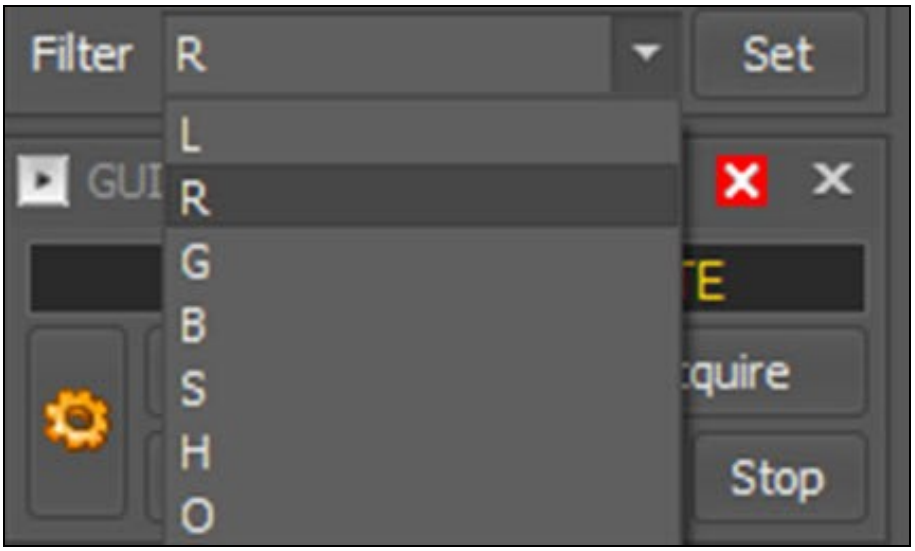
Click the SetPoint (°C) button to apply the change.

The remaining buttons in the widget send the following commands to the camera's cooling system:

- **Cool Down**: Begin a cooling operation with the goal of reaching the specified set point temperature
- **ON**: Turn the cooling on
- **OFF**: Turn the cooling system off
- **Warmup**: Begin a warm up operation

Important Note! These immediate commands bypass any cooler management that may be in progress from other actions. This could lead to unintended results. The Sequence dialog can also control cooling actions.

To change the filter using a connected filter wheel, click the drop-down list next to the Filter: label, click the desired filter, and click the Set button.



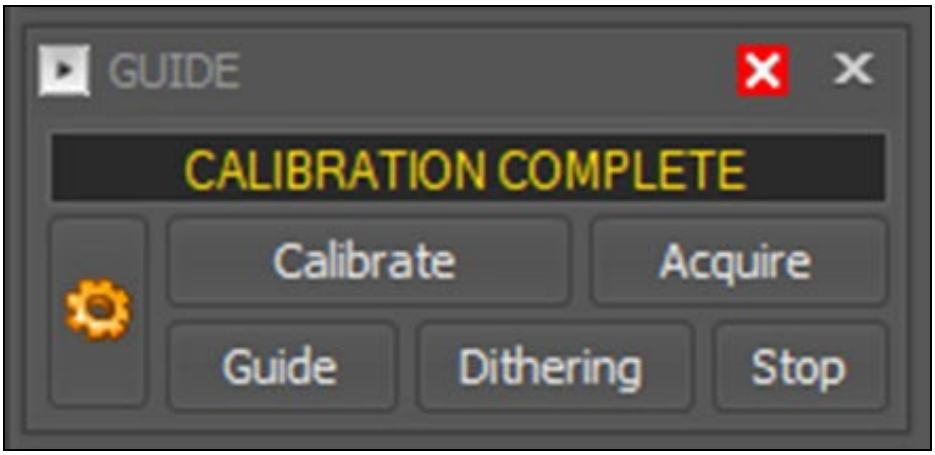
To abort a command sent from this widget, click the red X:

Icon	Action
	Aborts the command sent from this widget only

13.5 Guide

The Guide command widget contains buttons that send immediate commands to the connected guiding system.

All of these commands can be automated through Setup, Sequence and DragScript settings and commands, but this window lets you also send commands to the guider for immediate execution.



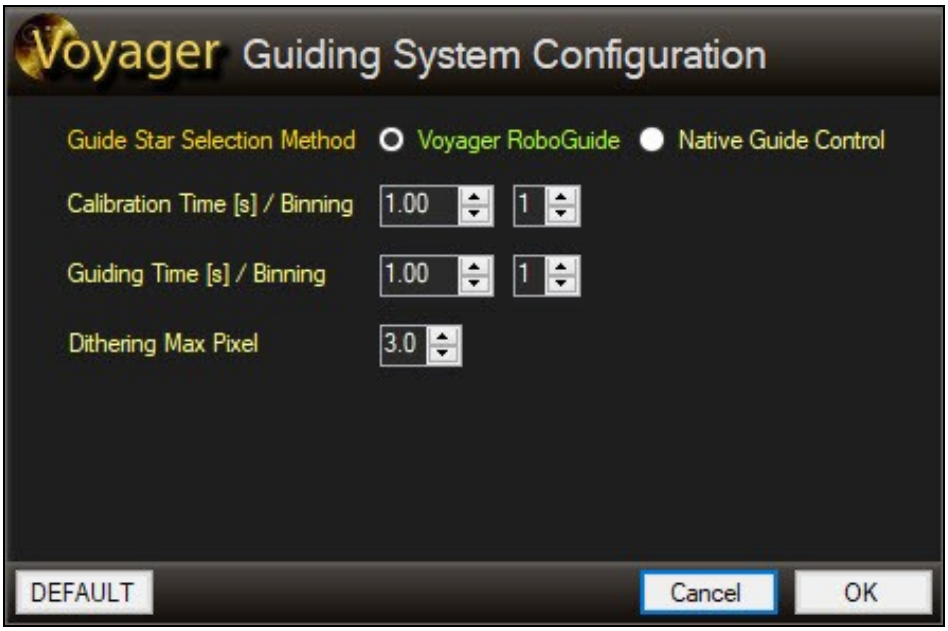
The yellow text indicates guiding system status: GUIDING, IDLE, PAUSED, DITHERING, CALIBRATING, CALIBRATION COMPLETE, CALIBRATION FAILED.

Click the buttons to send the following commands to the guiding system:

- **Calibrate**: Calibrate the guider
- **Acquire**: Acquire a guide star
- **Guide**: Begin guiding

- **Dithering**: Command the guider to perform a dithering operation
- **Stop**: Stop guiding

Click the gear icon on the left to bring up the guiding configuration window:



From this window, you can select whether to use Voyager RoboGuide or your guiding system's Native Guide Control. You can also set:

- **Calibration time**: Exposure time in seconds used for a guider calibration run
- **Calibration binning**: Binning level used for a guider calibration run
- **Guiding Time**: Exposure time in seconds used while guiding
- **Guiding Binning**: Binning level used for guiding exposures
- **Dithering Max Pixel**: The maximum distance, in pixels, that the guiding system should move the mount when dithering

There are three buttons at the bottom of this window:

- **DEFAULT**: Sets the values in this window to their defaults
- **CANCEL**: Closes this window without making any changes
- **OK**: Saves the changes and closes this window

To abort a command sent from this widget, click the red X:

Icon	Action
	Aborts the command sent from this widget only

13.6 Focuser

The Focuser command widget can send immediate commands to the connected focuser.

The yellow information text provides the following information:

- **Temp**: Current ambient temperature reported by the focuser if it has a temperature sensor
- **Status**: IDLE or MOVING if the focuser is stopped or moving, respectively
- **Position**: Current focuser position

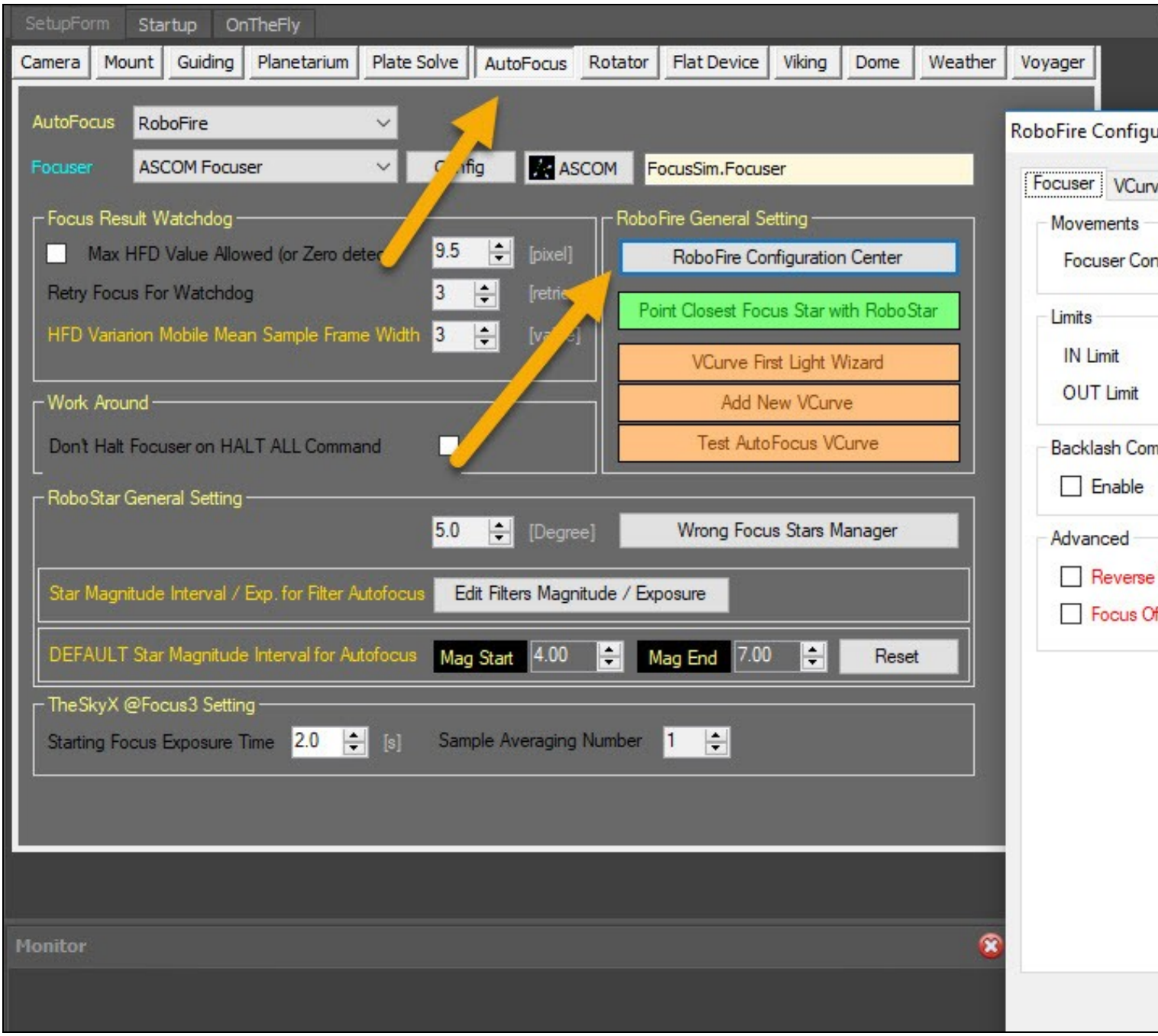
This section of the focuser can be used to command the focuser to a specific position:

Click in the gray box and type in the desired focuser position, then click the Goto button to command the focuser to move to that position.

The bottom row of buttons command the focuser to move relative to its current position:

- **<<IN**: Make a large move inwards
- **<**: Make a small move inwards
- **HALT**: Stop moving
- **>**: Make a small move outwards
- **OUT>>**: Make a large move outwards

The number of steps for a small focuser move is configurable. The setting is in the SetupForm workspace, on the AutoFocus tab, in the RoboFire General Setting box. Click RoboFire Configuration Center and select the Focuser tab. The Focuser Control Facility Step Size CMD is the number of steps that will be performed for a small focuser move. The large focuser move is the smaller number multiplied x5.



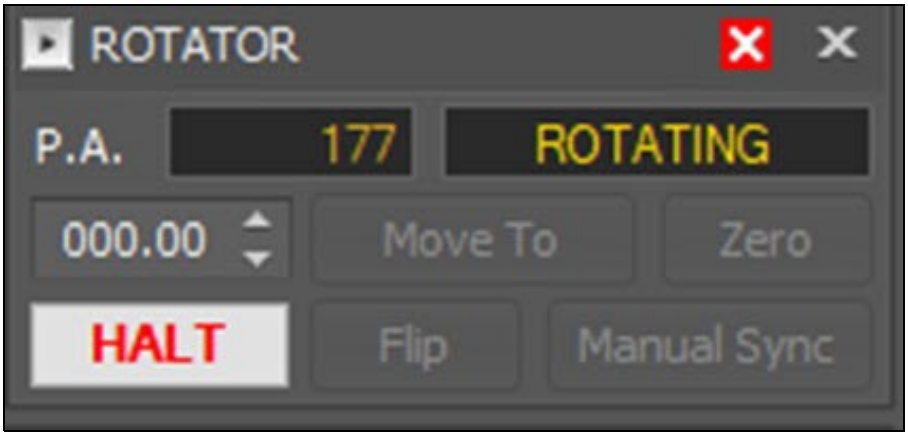
There are two ways to abort a command sent from this widget:

Icon	Action
	Aborts the command sent from this widget only
	Abort the command sent from this widget **AND any movement in progress for any reason**

13.7 Rotator

The Rotator command widget provides the capability to send commands directly to a connected rotator, which moves the camera to a specified PA (position angle).

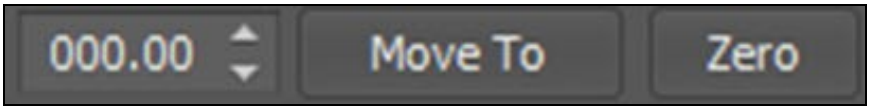
If a rotator is connected, the widget appears like this:



The first line of the rotator widget displays the current PA in degrees, and the rotator status: IDLE if it is not moving, ROTATING if it is moving.

if the P.A reporte is the mechanical one the forecolor of field will be black, if the P.A is synched with an offset the forecolor will be gold 

The second line of the widget has a control for setting a new PA:

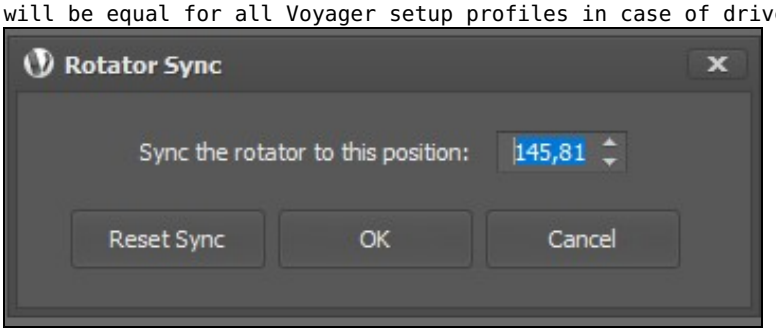


- Set the desired PA in one of two ways: Click in the box with 000.00 in this example, and type in the desired PA; or, click the up and down arrow icons to set the desired PA
- **Move To**: Click the Move To button to command the rotator to move to the PA set in the box to the left of the button
- **Zero**: Click the Zero button to command the rotator to move to a PA of zero.

The last line of the rotator widget has buttons that perform the following commands:

- **HALT**: Stop the current command and any other movement in progress
- **Flip**: Command the rotator to move to a point 180 degrees away from the current PA. Do this after a meridian flip to keep all sub exposures oriented the same way.
- **Manual Sync**: This command synchronize the Position in Degree of the Rotator to the Position edited in the Manual Sync Form, this will create an offset between the mechanical position and the position reported to user and Voyager actions. When you press this button a new form "Rotator Sync" will be opened
    - Voyager can manage Rotator Sync based on the driver capabilities: - (A) Driver without Sync (like ones with ASCOM Interface V2) - (B) Driver with Sync (like ones with ASCOM Interface V3) The value of offset for Sync can be managed using the Sync button in Rotator Command Widget in Voyager GUI column Command. You will input manually the angle to sync. If you have driver type (A) Voyager will calculate automatically for you the Offset and value will be stored in actual Voyager Profile. You might have more Voyager profiles with different offset if you sharing the same driver and rotator. If you have driver type (B) ASCOM Driver will calculate automatically for you the Offset and value will be stored in ASCOM driver settings permanently. Value stored

will be equal for all Voyager setup profiles in case of driver and rotator sharing.

- 

- **Sync The rotator to this position:** define the positon in Angle used to sync the rotator , when you open the form the last PA solved by a plate solving or blind solving or web solving will be showed
- **Reset Sync:** the offset for the sync will be removed and the position reported to the user and to Voyager actions will be the mechanical one
- **OK:** apply the sync and calculate the offset in Voyager on in ASCOM (depends on ASCOM Interface type)
- **Cancel:** exit form sync operation without doing anything

There are two ways to abort a command sent from this widget:

Icon	Action
	Aborts the command sent from this widget only
	Abort the command sent from this widget **AND any movement in progress for any reason**

Important Note! The direction of rotation and the rotation algorithm is controlled by the ASCOM rotator driver. Voyager sends the ASCOM commands to the rotator to move to a position and the ASCOM driver decides which way to move. There are some Gemini brand rotators that will move to position zero (0) if you press the HALT button. If you use this rotator in a sequence, you can set up Voyoager to indicate that you do not intend to use the HALT function

Template:ProTip

13.8 Flat Device

A Flat Device is an evenly illuminated panel used to take flat calibration frames. There are several types of flat panel devices, and the commands supported by them vary depending on their capabilities. If supported by the device, Voyager can send commands to turn a panel on or off, open or close the panel (move it out of the way or put it into position for use), and adjust the panel's brightness.

As of Voyager 2.1.0a, two flat devices may be configured in Flat Device Setup. If you have the second Flat Device configured, there will be a second Flat Device command widget available, with the same buttons and fields as for the first Flat Device.

The Flat Device widget sends commands to a flat panel device for immediate execution:

The first line of the Flat Device widget shows the current brightness of the flat panel, if known, and the status of the device, either IDLE or MOVING if the device can be opened or closed.

The buttons perform the following actions, if supported by the flat panel device:

- **Set**: Click on the number to the left of this button or click the up and down arrows to set the desired panel brightness level. Click the Set button to execute the command.
- **Open**: Open the flat panel device - move the device out of the way so normal imaging can be done
- **Close**: Close the flat panel device - move the device into position so flats can be taken
- **Light ON**: Turn the flat panel device on
- **Light OFF**: Turn the flat panel device off

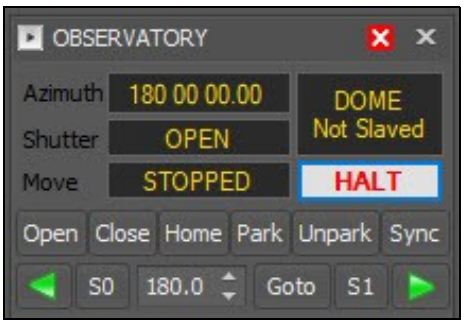
To abort a command sent from this widget, click the red X:

Icon	Action
	Aborts the command sent from this widget only

13.9 Observatory

The Observatory widget shows the status of a connected observatory (typically a dome or roll-off roof building) and can send commands to the observatory for immediate execution.

The available commands will depend on the capability of the observatory and the software driver controlling it. For example, a roll-off roof observatory may only support the Open and Close commands. A domed observatory is usually rotatable and may also have a shutter that can be opened and closed. A rotating observatory dome may be "slaved" to the mount, meaning its position will change automatically as the mount moves so the telescope has an unobstructed view.



The status fields provide the following information:

- **Azimuth**: The azimuth position of the dome in degrees
- **Shutter**: OPEN if the dome's shutter is open, CLOSED if the shutter is closed
- **Move**: STOPPED if the dome is not rotating, MOVING if the dome is rotating
- **DOME**: Slaved or Not Slaved: If the DOME software is "slaved" to the mount, the dome will automatically move when the mount moves so the telescope has an unobstructed view

The command buttons of the Observatory widget immediately execute the following commands, if the Dome control doesn't allow the command, the command will be disabled:

- **Open**: Open the shutter for a domed observatory, open the roll-off roof for a roll-off roof observatory
- **Close**: Close the shutter for a domed observatory, close the roll-off roof for a roll-off roof observatory
- **Home**: Rotate the dome to its Home position. Disabled if is an rool-off roof observatory
- **Park**: Rotate the dome to its Park position. Disabled if is an rool-off roof observatory
- **Unpark**: Unpark the Dome if the dome driver software supports the unpark command
- **Sync**: Sync the observatory driver azimut to the value reporte in the numeric up and down field, if the driver allow this operation. Disabled if is an rool-off roof observatory
- **Left Green Arrow**: Rotate the dome counter-clockwise by the value in numeric up and down field. Disabled if is an rool-off roof observatory
- **Right Green Arrow**: Rotate the dome clockwise by the value in numeric up and down field. Disabled if is an rool-off roof observatory
- **S0**: Set Slaved off: Command the dome to not automatically rotate to follow the mount's current azimuth position. Disabled if is an rool-off roof observatory
- **S1**: Set Slaved on: Command the dome to rotate to follow the mount's current azimuth position. Disabled if is an rool-off roof observatory
- **Goto**: Set a desired azimuth position for the dome using the control to the left of the Goto button. Click the numbers and type in the desired position, or use the up and down arrow icons to set the desired position. Click the Goto button to command the dome to rotate to the desired position.. Disabled if is an rool-off roof observatory

There are two ways to abort a command sent from this widget:

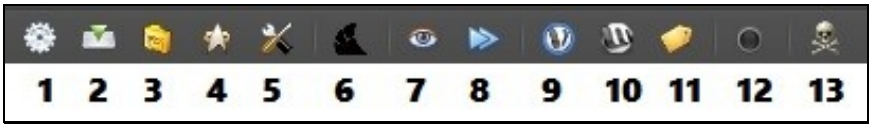
Icon	Action
	Aborts the command sent from this widget only
	Abort the command sent from this widget **AND any movement in progress for any reason**

14 Setup

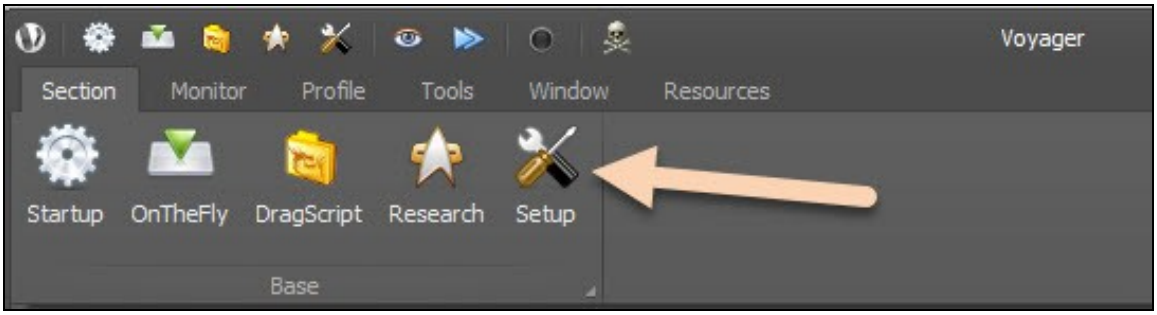
14.1 Entering Setup

There are two different ways to enter the Setup workspace:

- Click the wrench and screwdriver icon, #5 in this image, at the very top of the Voyager Window:



- Click the Section menu and choose the Setup icon:



Choose the part of setup you wish to configure by clicking the buttons that appear at the top of the Setup workspace:

Important Note! The use of Setup is only possible when Voyager is not connected to the current profile. You must disconnect your equipment before making changes to your Setup.

Important Note! A complete and correct Setup is a key element for proper operation of Voyager. Errors in setup can cause serious malfunctions of your system

Important Note! Everything done in Setup is saved to the current profile. See the Profile section below for more information.

14.2 TheSkyX / TheSky64 preliminary operations

if you want to use TheSkyX or TheSky64 for one or more of the controls in your setup please activate and registered the server and DCOM components inside TheSkyX / TheSky64 application, follow the next step in order for the first time before setting up Voyager:

1. if you use a Win7 and newer OS startin TheSkyX / TheSky64 like administrator (right click with the mouse over the TheSkyX / TheSky64 icon on desktop and press run as administrator)
2. in TheSkyX / TheSky64 application click on main menù *Tools*
3. open the *TCP Server* menu item
4. activate the flag Listening for connections

5. if requested allow clicking *OK* your Operative System to unlock in local private network the firewall policy or manually open in Windows Firewall the port 3040 TCP
6. press *Close* button
7. close TheSkyX / TheSky64

If you have enabled TheSkyX and you want to switch to TheSky64 , the registration procedure must be redone with TheSky64.

Important Note! Without this operation Voyager cannot contact TheSkyX, open and integrate functionalities , you will retrieve a "*COM retrieve ID ....*" Error

14.3 Quick Links to Setup Documentation for Individual Components

Documentation for each of the different setup sections is contained on its own page. Here are links to each of the setup pages:

- Camera Setup
- Mount Setup
- Guiding Setup
- Planetarium Setup
- Plate & Blind Solve Setup
- AutoFocus Setup
- Rotator Setup
- Flat Device Setup
- Viking Setup
- Dome Setup
- Weather Setup
- Observing Conditions Setup
- SQM Setup
- Safety Monitor Setup
- Voyager Setup
- Voyager Remote
- Common Setup

14.4 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

14.5 Profile Management

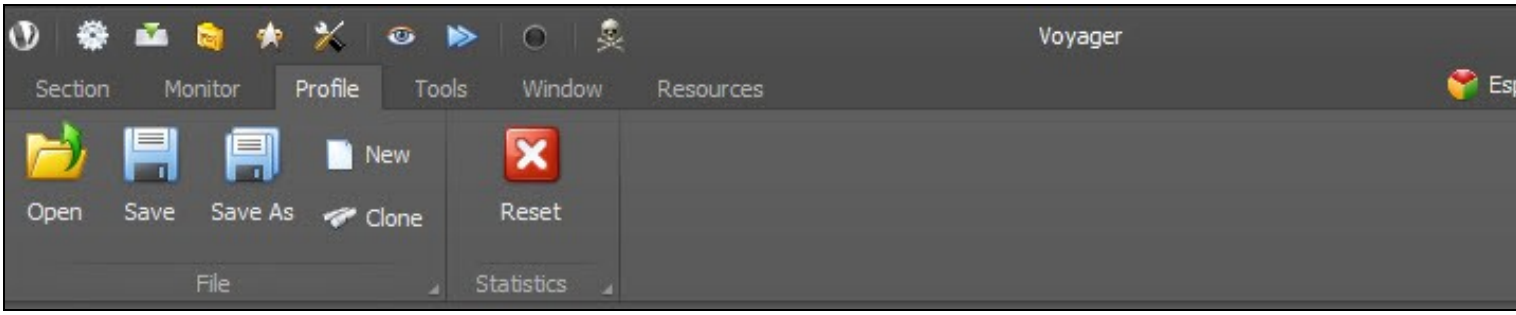
You can create an unlimited number of profiles to manage different imaging configurations.

A profile contains Voyager's settings and is saved in a profile file in the \Voyager\Profile folder. By default this will be in the Documents folder:

Documents\Voyager\Profile

Profile files have the extension .voy and are in XML format. There is also a file named last.rdo that keeps track of the last used profile. This profile is loaded when Voyager next starts.

In normal use, there is no need to manually edit or move profile files. You can, however, copy them to a new PC to make them available under a different Voyager installation.



Profile management is available on the main menu Profile ribbon. Available commands are:

1. **Open**: Load a saved profile and make it active - note: you must Disconnect Equipment before you can Open a new profile
2. **Save**: Save the settings of the active profile
3. **Save As**: Save the settings of the active profile under a new file name
4. **New**: Create a new, empty profile
5. **Clone**: Select an existing profile and load it under a new name
6. **Reset**: Resets statistics kept on a per-profile basis. These statistics help Voyager determine how long on average an action takes to perform

Important Note! All setup changes will be made, and automatically saved, to the currently loaded profile. When Voyager starts, it will attempt to load the profile in use the last time that Voyager closed.

Important Note! When you start Voyager for the first time, or if the last profile loaded does not exist, Voyager creates a profile named Default that must be completely edited to match your configuration. Do not manually edit existing profiles - use the setup area of Voyager.

Important Note! The current profile file is saved automatically for every change of settings or when the current profile is closed

15 Camera Setup

15.1 Camera Setup Workspace

Click the Camera button in the Setup workspace to display the Camera setup window:

Important Note! Camera selection must be filled out - this is mandatory for proper operation of Voyager

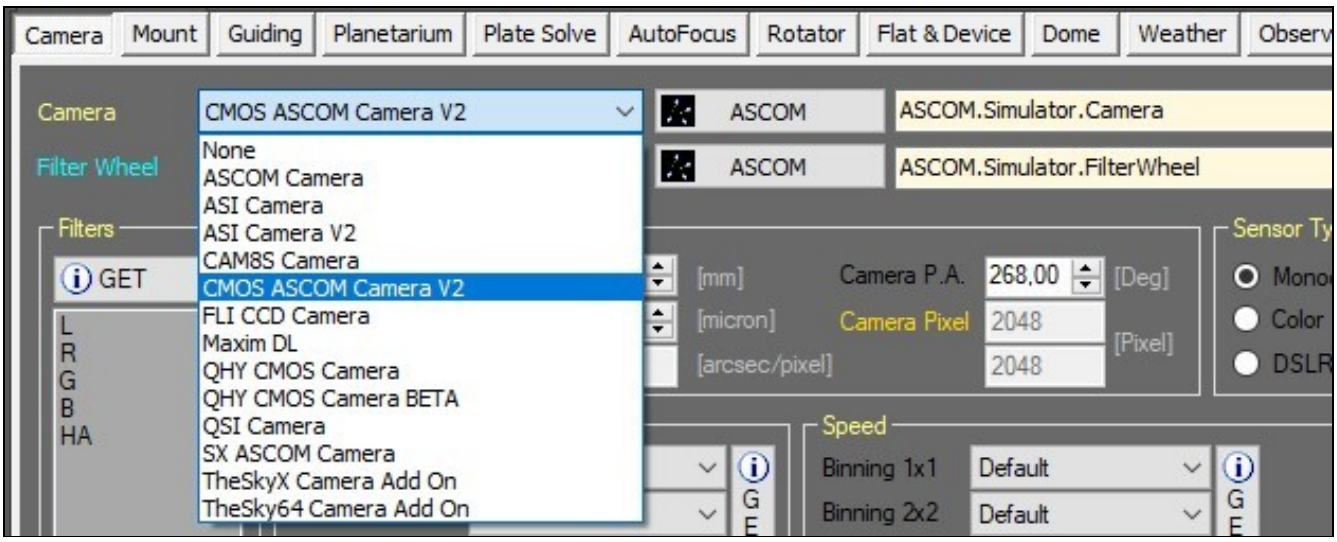
15.2 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- Gold or Yellow: Use caution when changing as things may not work well or as expected
- Red: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

15.3 Camera Choice

Voyager supports the following ways to connect to a camera:



- ASCOM Camera
- ASI Camera (with ASI SDK frozen to 1.16.0 version)
- ASI Camera V2 [starting from Voyager Daily Build 2.2.16h] (for cameras need SDK equal or greater than 1.16.3 and/or using FPGA binning mode like ASI294MM Pro)
- CAM8S Camera
- CMOS ASCOM Camera V2 [starting from Voyager Daily Build 2.3.4j] (ONLY for CMOS cameras using ASCOM Camera Interface V2 and having numeric Gain managed in driver - Like all MORAVIAN CMOS)
- FLI CCD Camera
- Maxim DL
- QHY CMOS Camera
- QHY CMOS Camera BETA [starting from Voyager 2.3.0] (for using your QHY camera whit the last Beta SDK released from QHY, Beta version embedded in Voyager depend on relase or daily build creation)
- QSI Camera
- SX ASCOM Camera
- TheSkyX Camera Add On
- TheSky64 Camera Add On

Visit the Installation Prerequisites section to see which versions of these third party applications are supported by Voyager.

Depending on the Camera selection, different configuration options are available, so make this selection first.

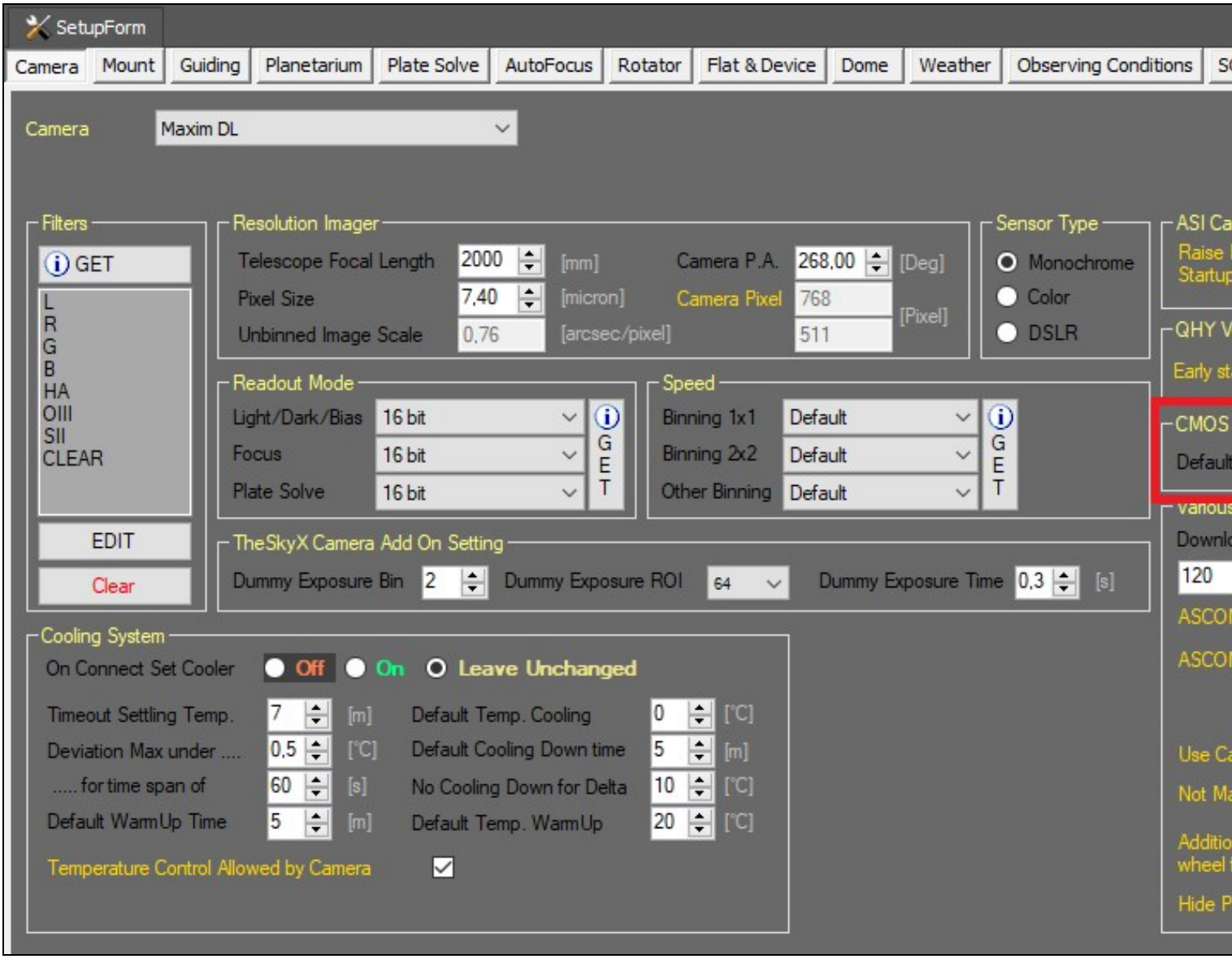
For ASCOM connected cameras, the Camera Advanced Config button brings up the ASCOM Properties dialog. The ASCOM button brings up the ASCOM chooser dialog - use this to select the specific ASCOM camera for this configuration.

15.4 CMOS ASCOM Camera V2

Choose CMOS ASCOM Camera V2 if you have a CMOS camera without native support in Voyager and you want to use the numeric Gain configurable in Sequence slots. The camera must have ASCOM driver implements ICamera V2 interface. You can ask to support if your camera are in the list of suitable for this kind of drivers. Usually all the cameras with ASCOM 5.x and newer.

The difference between normal ASCOM driver choice in Voyager is the possibility to use Gain in Sequence slots to define custom gain value for each shot.

The default Gain for plate solve and focus shot are defined in the Camera Setup tab:



15.5 TheSkyX Camera Add On

If you choose TheSkyX Camera Add On from the Camera drop-down list, Voyager will connect directly to TSX configured Camera and Filter Wheel.

Important Note! Please remove the AutoSave flag in TheSkyX Camera Add On to prevents CFITSIO error during Voyager FIT data management. Voyager will save for you all the data needed.

15.6 Info about Camera Driver / SDK / ASCOM Driver

Some clarification about level of drivers, especially for CMOS cameras:

- Camera Driver (low level file needed by Camera to work with your OS, usually contains also the firmware will be loaded on camera for some brand/models) this must be installed in anycase and usually are not included in SDK and ASCOM driver
- SDK (mid level file for allow application to talk with the camera driver, can be used to direct access to camera) this not include camera driver usually depends on camera brands
- ASCOM Driver (ASCOM platform file allow all application compatible with ASCOM to work with camera, use SDK to access to camera driver) not include camera driver but usually include SDK, location of the SDK

usually is not the right one for the application use only SDK ? this is the reason if you install newer ASCOM driver not mean automatically you will have your application with updated SDK.

SDK with direct access is the most performant usually especially for CMOS with big size sensor.

Voyager have direct driver using SDK for some CMOS / CCD cameras, brands usually have a Beta Release of driver for the new cameras or just released on market. So if you want to use beta driver and upate ones used in Voyager in the wiki is described how to do or in the page of each single brand. (basically download SDK file and copy on Voyager SDK Platform folder). See Voyager SDK Platform folder. Some brand like ASI and QHY have double camera control in voyager to use stable or beta version of SDK.

In any case, we will not be responsible for any malfunctions or strange behaviors.

If you have problems with these drivers, first open a support ticket at your CMOS support service.

A last thing, like wrote in wiki, if you will update Voyager installation with a new daily build or release we will install back the choosed driver by Voyager.

15.7 QSI Native Driver

If you choose QSI Camera from the Camera drop-down list, Voyager will connect directly to your QSI camera using the COM object released with the their SDK (not via ASCOM).

Usually until 6.x version of the CD installation software of QSI this will be included in the main installation of CD, now ATIK (owner of QSI) seems to have removed it and trust only on ASCOM driver.

How to allow Voyager work with QSI SDK driver ?

You can use the legacy driver installation (instead of the last version):

https://qsimaging.com/drivers-software/#cd-and-drivers

"*Our legacy installer includes our old ASCOM driver* ***QSI Installer*** *(.zip) 30.9MB v1.0.0.3*"

You can download from here the SDK:

https://qsimaging.com/drivers-software/#custom

Open the QSI folder inside and install it like for instructions in the readme.txt:

"*Installation of QSICamera.dll requires the use of regsvr32 to register the dll in the Windows Registry.*

We recommend placing QSICamera.dll in C:\Windows\System32 and then calling regsvr32 from powershell run as an administrator.

PS C:\WINDOWS\system32> regsvr32 .\QSICamera.dll

Note: On a 64 bit machine

QSICamera.dll from the x64 folder should be placed in C:\Windows\System32

QSICamera.dll from the x32 folder should be placed in C:\Windows\SysWOW64

To unregister you will need to call regsvr32 with the /u argument.

PS C:\WINDOWS\system32> regsvr32 /u .\QSICamera.dll"

We do not put this on Voyager installation to avoid retro compatibility problem with camera having 5.x and 6.x version of firmware, we are not sure all working fine with the 7.x SDK.

If you have a 5.x or 6.x installation CD the SDK will be installed automatically with the main installation menù.

If you want direct support please contact us for remote checking.

15.8 ASI Native Driver / ASI Native Driver V2

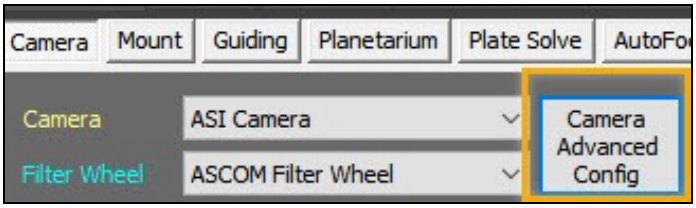
If you choose ASI Camera or ASI Camera V2 from the Camera drop-down list, Voyager will connect directly to your ZWO ASI camera (not via ASCOM).

Important Note! Difference between the two ASI Native driver:

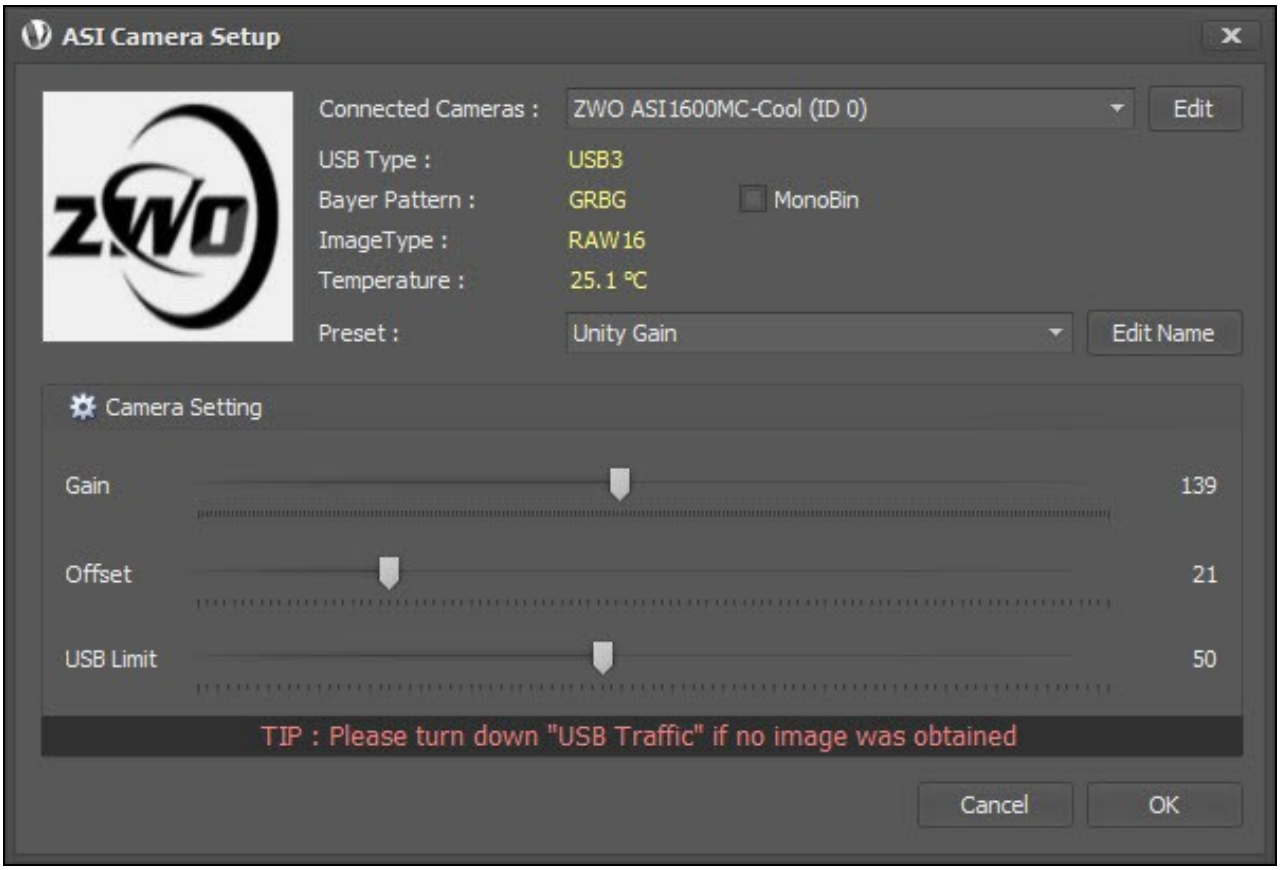
- ASI Camera (with ASI SDK frozen to 1.16.0 version)

- ASI Camera V2 [starting from Voyager Daily Build 2.2.16h] (for camera need SDK equal or greater than 1.16.3 and/or using FPGA binning mode like ASI294MM Pro)

Click the Camera Advanced Config button to bring up the ASI Camera Setup dialog:

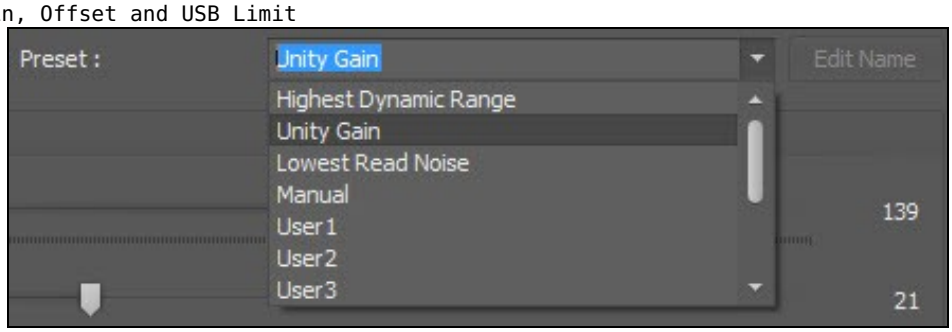


The ASI Camera Setup dialog is very similar to the ZWO ASI ASCOM dialog:



Important Note! You set default values for Gain, Offset and USB Limit in this dialog. You can override these values when you define a Sequence or Research and Survey definition on a per-element (group of exposures for a given filter) basis

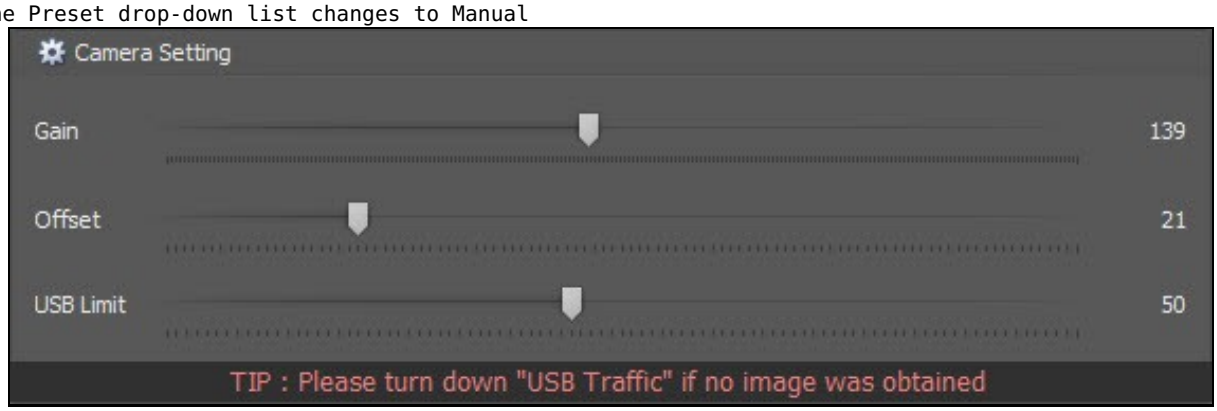
- **Connected Cameras:** Choose the camera from the drop-down list
  - **Edit:** Click the Edit button if you would like to use a different name for the camera selected from the drop-down list
  - **USB Type:** Displays the type of USB connection, USB3 or USB2
  - **Bayer Pattern:** Displays the Bayer Matrix pattern If the **Connected Camera** has a color sensor
  - **Temperature:** Displays the sensor temperature returned by the camera
  - **MonoBin:** If checked and If the connected camera has a color sensor, the pixels from the color sensor are binned by the camera and a monochrome image is returned
  -
- **Preset:** Choose a preset from the drop-down list and the preset's values will be applied to the settings for Gain, Offset and USB Limit
  -



  - Choose one of the User presets (User 1, User 2, etc.) to create a custom preset for Gain, Offset and USB Limit
  - Click the **Edit Name** button to change the preset name from User X to a name of your choosing:

- **ASI Reset Voyager Preset Setting:** Click to reset any custom (User 1, User 2, etc) presets you created in this profile. This button appears in the top-level Camera Setup dialog if you choose ASI Camera

- **Gain, Offset and USB Limit Sliders:** Click and drag these sliders with your mouse, or click on the slider and use the up and down or left and right arrows to change the values. If you change the values this way, the Preset drop-down list changes to Manual



- **Gain:** Move the slider to set the gain value. See your camera's manual for an explanation of how your choice here affects your image
- **Offset:** Move the slider to set the offset value. See your camera's manual for an explanation of how your choice here affects your image
- **USB Limit:** Move the slider to set the USB limit value. This controls how fast the camera sends data to the USB port. If your download does not finish, try a lower setting.
- **Remove Gain Limit Management:** (Starting from Voyager 2.2.14b version) ASI Camera driver (like for ASI specific) limit the maximum gain for DSO use, calculus is automatically done. If you want to use gain up to raw max gain, check this flag and reopen the form. If you use high gain level for this cameras you can shrink in a bad way the full well capacity and increase drammatically the noise. **Use at your risk !**
- **Cancel:** Discard changes and exit this dialog
- **OK:** Save changes and exit this dialog

Important Note! The ASI Camera native driver is the only way to control the Gain and Offset values of a ZWO ASI camera from Voyager. You cannot control them from Voyager if you use the ASCOM driver to connect to your ASI camera

15.9 ASI Camera Name Match

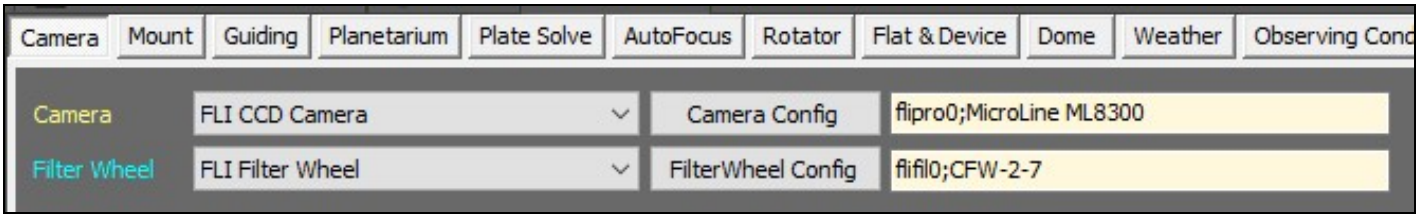
Tells Voyager to check the ASI Camera name on connection if you are using the ASI Camera (not ASCOM) driver.

- **Raise Error On Camera Connect in Startup if Name Not Match:** If checked and the ASI Camera camera type has been selected, Voyager will raise an error when connecting to the camera if the camera name specified in setup does not match the camera name returned by the driver.

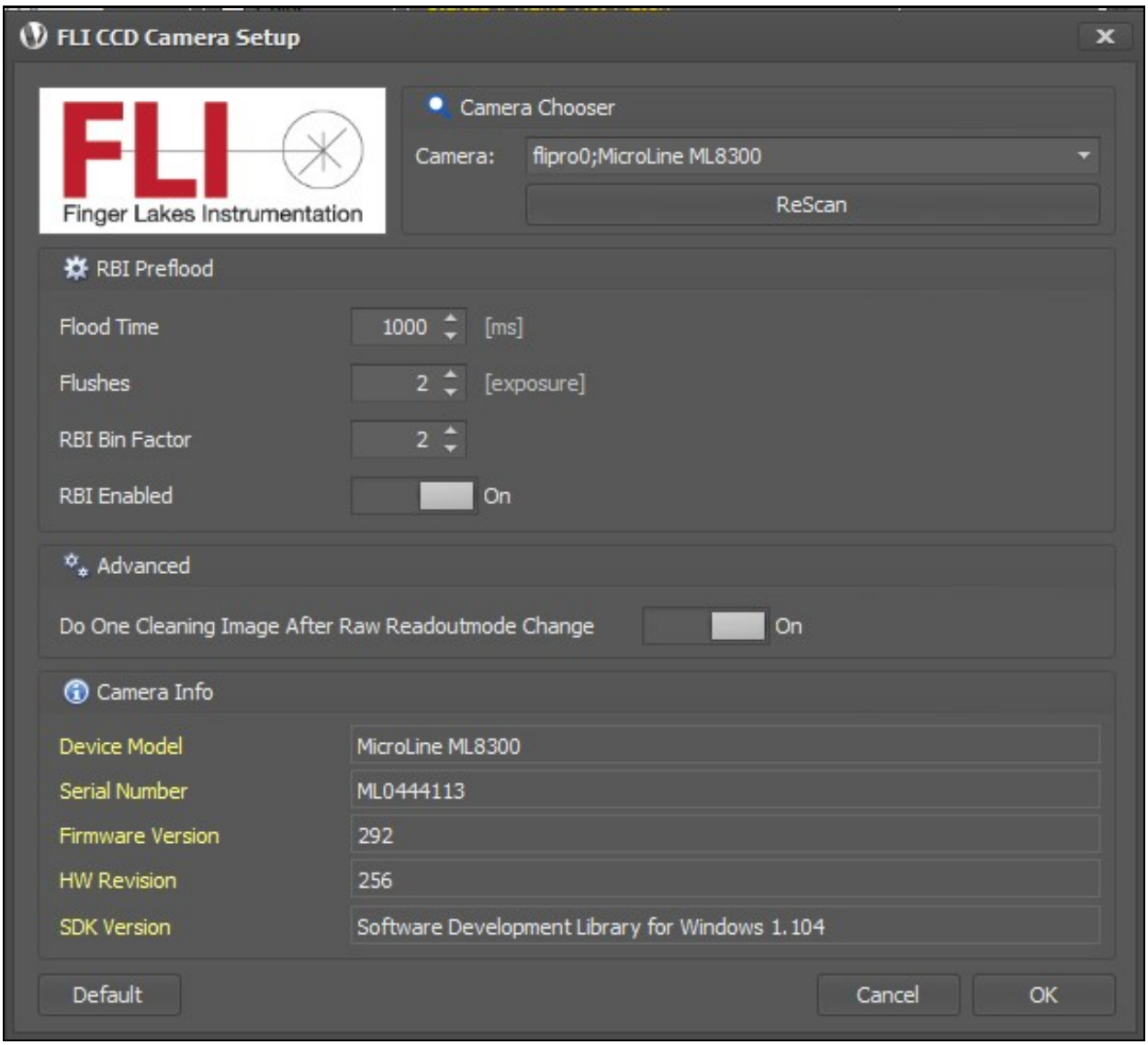
15.10 FLI CCD Native Driver

If you choose FLI CCD Camera from the Camera drop-down list, Voyager will connect directly to your FLI CCD camera (not via ASCOM) and if you want directly also to your FLI Filter Wheel.

Click the Camera Advanced Config button to bring up the FLI CCD Camera Setup dialog:



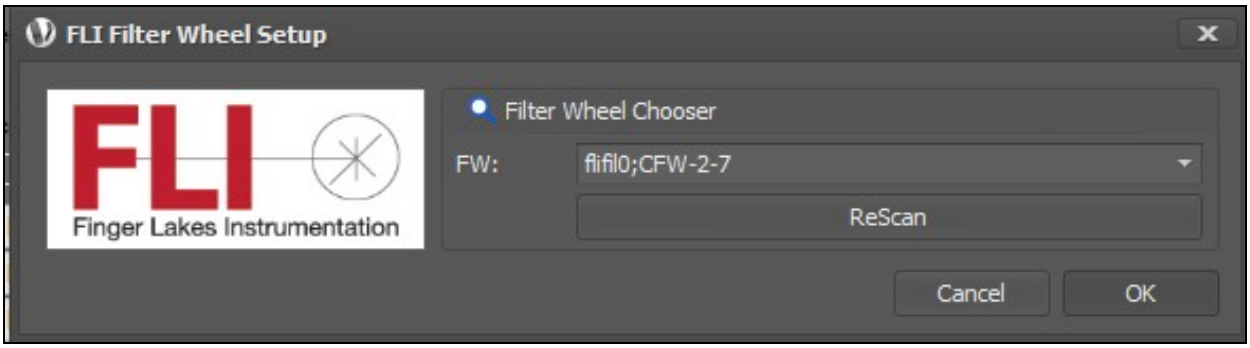
The FLI CCD Camera Setup dialog is this one:



- **Camera Chooser:** Choose the camera from the drop-down list, the camera must be connected to open the settings form
- **Rescan:** to read again the list of FLI CCD Camera connected to the PC
- **RBI Preflood:** to avoid ghost issue on the KAF CCD Sensor RBI can be use to remove and mitigate the

effect. More info on website of vendor. This will add extra time to the shot
    - **Flood Time:** time of exposure in milliseconds with flooding of sensor with IR internal leds
    - **Flushes:** number of cleaning cicle after flooding (dark mode an background flush will used if avalaible from firmware)
    - **RBI Bin Factor:** factor to use in binning for the flooding
    - **RBI Enabled:** switch to off if you dont want to use the RBI at all and dont want to retrieve the Readout Mode dedicated to RBI (advice is to leave ON and just not use RBI mode in various shot configuration)
- **Advanced:** advanced features if avalaible
    - **Do One Cleaning Image After Raw Readoutmode Change:** used to remove with/black block of data in the image after a readoutmode switch, this will ad extra time to the shot
- **Camera Info:** general info about the camera read directly from it
    - **Device Model:** Name and Sigla of model
    - **Serial Number:** serial number attribuited to camera from vendor
    - **Firmware Vesion:** firmware version
    - **HW Revision:** hardware version
    - **SDK Version:** version of SDK DLL library used by Voyager to manage the Camera and the Filter Wheel
- **Default:** press this button to restore setting to the default
- **Cancel:** to exit form without saving changes
- **OK:** to save the changes to settings

The FLI Filter Wheel configuration form:



- **Filter Wheel Chooser:** Choose the filter wheel from the drop-down list, the filter wheel must be connected to open the settings form
- **Rescan:** to read again the list of FLI filter wheel connected to the PC
- **Cancel:** to exit form without saving changes
- **OK:** to save the changes to settings

Important Note! If you use different camera control or software for your FLI data collect, please verify your previous calibration files work fine. We suggest to redo a set of calibration files dedicated in Voyager.

15.11 QHY CMOS Native Driver

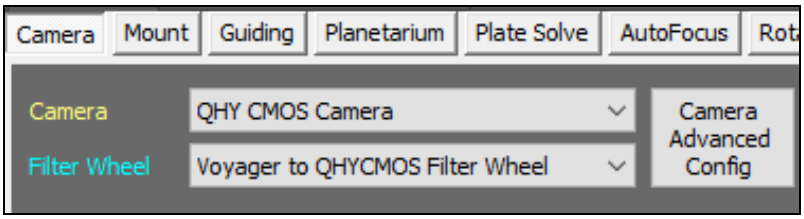
If you choose QHY CMOS Camera or QHY CMOS Camera BETA from the Camera drop-down list, Voyager will connect directly to your QHY CMOS camera (not via ASCOM).

Important Note! Difference between the two QHY Native driver:

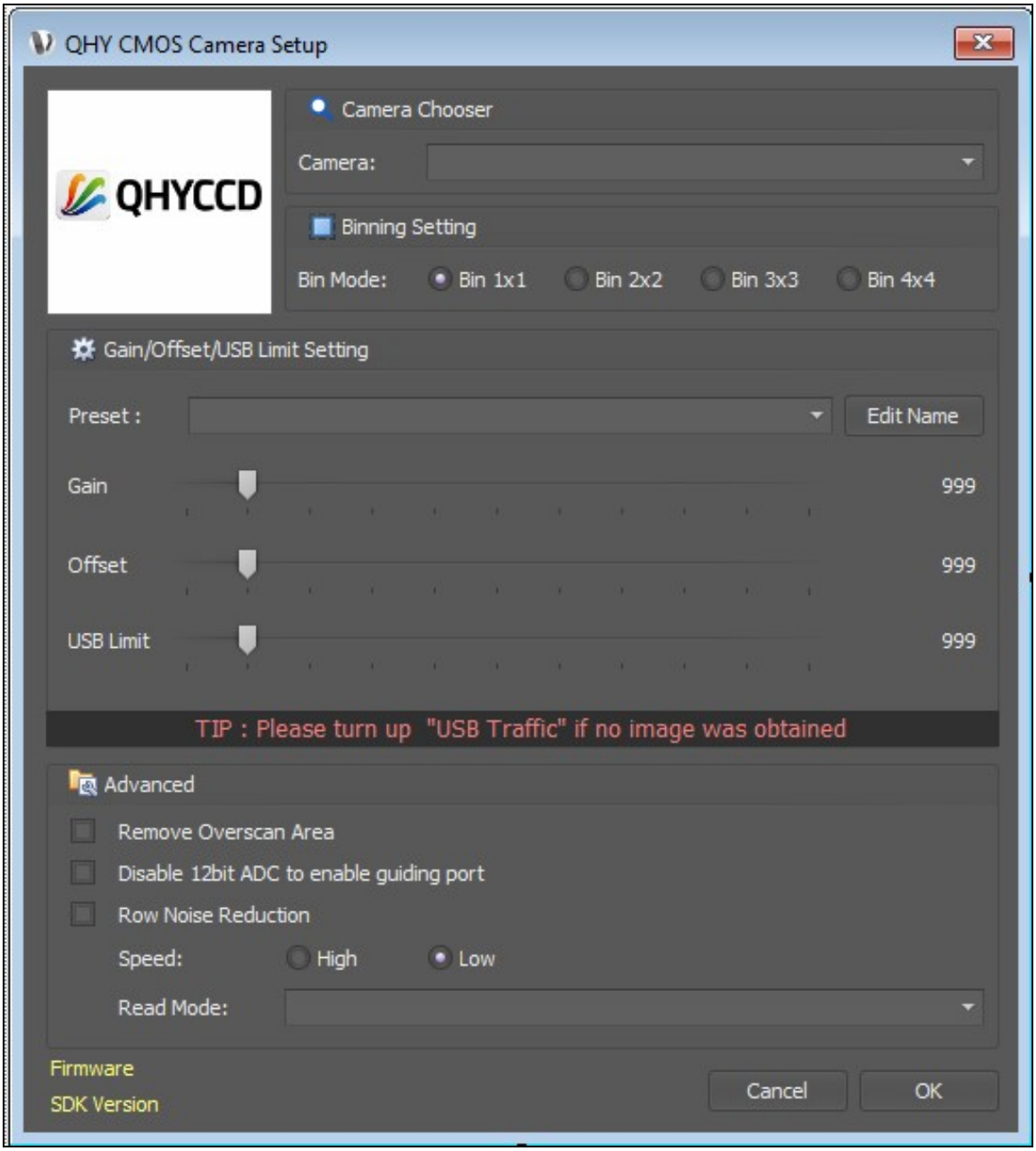
- QHY CMOS Camera (SDK frozen to the last recommended and stable as for producer report)

- QHY CMOS Camera BETA [starting from Voyager Release 2.3.0] (for camera need SDK equal or greater than the recommended or Beta SDK, you can update manually this driver if needed)

Click the Camera Advanced Config button to bring up the QHY CMOS Camera Setup dialog:



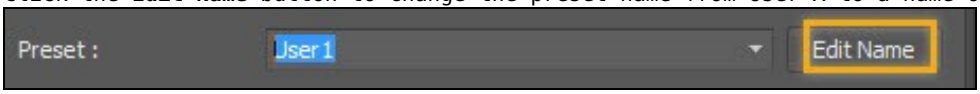
The QHY CMOS Camera Setup dialog is very similar to the QHY ASCOM dialog:

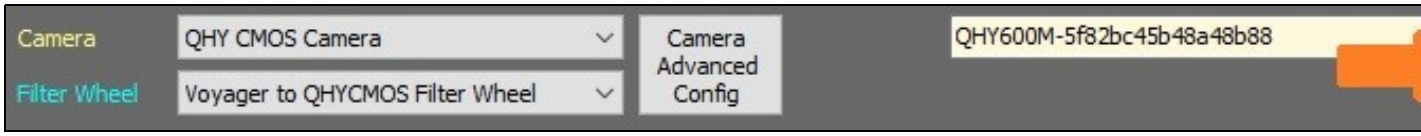


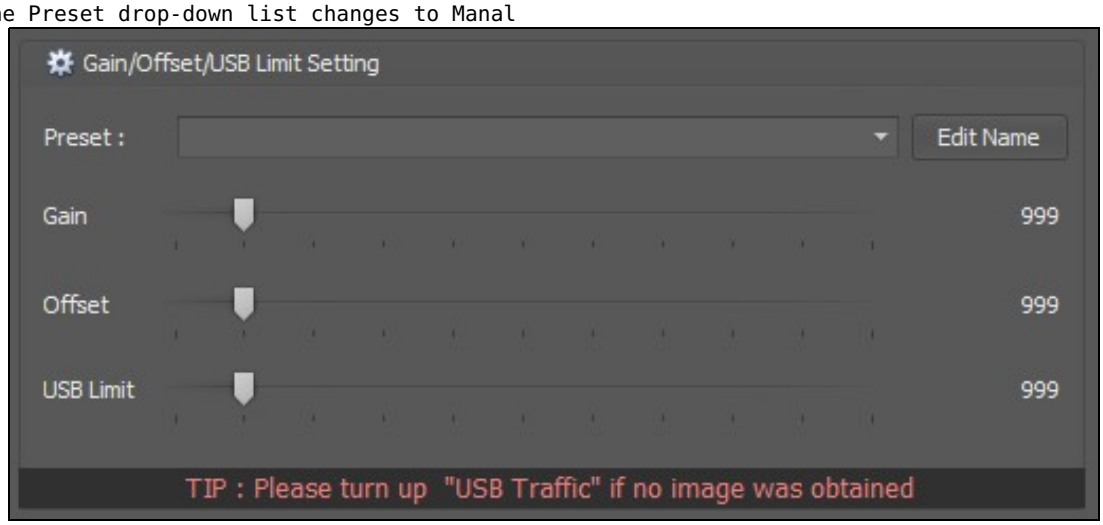
Important Note! You set default values for Gain, Offset and USB Limit in this dialog. You can override these values when you define a Sequence or Research and Survey definition on a per-element (group of exposures for a given filter) basis

Important Note! If you using the direct driver in Voyager and your QHY filter wheel is setting up to use I2C you must use the dedicated Voyager driver for the filter wheel (Voyager to QHYCMOS filter wheel) because the direct driver isn't ASCOM and work on SDK so you cannot mix things with I2C that is managed from SDK.
If you want to use the QHY filter wheel with USB please install and select the QHY ASCOM USB driver for serial.
In case of use of I2C mode or USB mode.. be sure the hardware switch in the filter wheel is positioned in the right mode, you must look at flashing and color when you start the filter wheel (default mode usually is in I2C mode). Refer to the QHY documentations.

Important Note! Changing manually driver in the platform folder of Voyager is an operation to your entire risk and can introduce misconfiguration or issues. To go back simply reinstall Voyager. If you install a new version of Voyager or a Daily Build the SDK will be restored by installation in any case.

- **Camera Chooser:** Choose the camera from the drop-down list
- **Bin Mode**: list of the allowed binning mode for the choosed camera (selection not made any change in camera settings)
- **Preset:** Choose a preset from the drop-down list and the preset's values will be applied to the settings for Gain, Offset and USB Limit
    - Choose one of the User presets (User 1, User 2, etc.) to create a custom preset for Gain, Offset and USB Limit
    - Click the **Edit Name** button to change the preset name from User X to a name of your choosing:
    - 

- **CMOS Reset Voyager Preset Setting:** Click to reset any custom (User 1, User 2, etc) presets you created in this profile. This button appears in the top-level Camera Setup dialog if you choose QHYCMOS Camera
- 

- **Gain, Offset and USB Limit Sliders:** Click and drag these sliders with your mouse, or click on the slider and use the up and down or left and right arrows to change the values. If you change the values this way, the Preset drop-down list changes to Manal
    - 

- **Gain:** Move the slider to set the gain value. See your camera's manual for an explanation of how your choice here affects your image

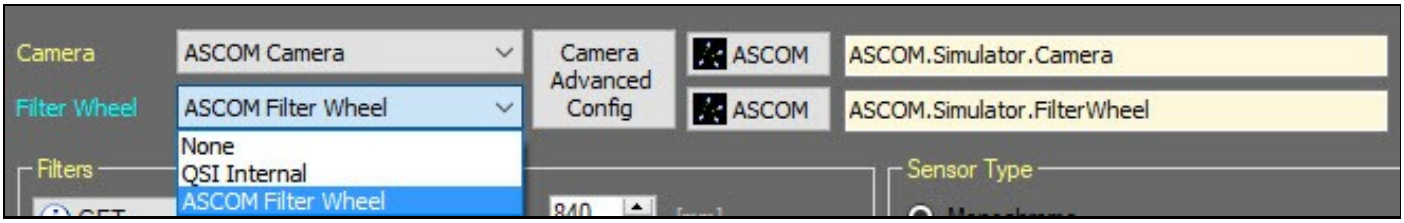
- **Offset:** Move the slider to set the offset value. See your camera's manual for an explanation of how your choice here affects your image
- **USB Limit:** Move the slider to set the USB limit value. This controls how fast the camera sends data to the USB port. If your download does not finish, try a higher setting. 0 value is the fastest possible.
- **Remove Overscan Area:** remove overscan area from data download where sensor allow this
- **Disable 12bit ADC to enable guiding port**: Disable 12 bit ADC to enable guiding port where sensor allow this
- **Row Noise Reduction:** Row noise reduction where sensor allow this
- **Speed:** High speed or low speed in download where sensor allow this
- **ReadMode:** readoutmote dropdown list where to select the readout mode for the camera (cannot be changed if camera is connected). Special mode are available for QHY600 and similar cameras.
- **Firmware Label:** report the versione of the firmware inside the camera selected
- **SDK Version Label:** report the SDK version inside the Voyager Release / Daily Build you are using. You can update SDK copying the dll of a new SDK from QHY directly inside the Voyager installation directory. We suggest to you use the ones released with Voyager distributions
- **Cancel:** Discard changes and exit this dialog
- **OK:** Save changes and exit this dialog

Important Note! The QHYCMOS Camera native driver is the only way to control the Gain and Offset values of a QHY CMOS camera from Voyager. You cannot control them from Voyager if you use the ASCOM driver to connect to your QHY CMOS camera

15.12 Filters

If your camera is connected via MaximDL or TheSkyX Camera Add On, filters must be configured in those applications and imported to Voyager using the GET button, as described below. When you choose Maxim DL or TheSkyX Camera Add On, no filter wheel selection will be presented because the filter wheel is not connected to Voyager, it is connected to Maxim DL or TheSkyX.

For ASCOM and QSI camera, you must configure a Filter Wheel from the Filter Wheel drop-down list:



For an ASCOM filter wheel, click the ASCOM button to display the ASCOM chooser and select the filter wheel for this configuration.

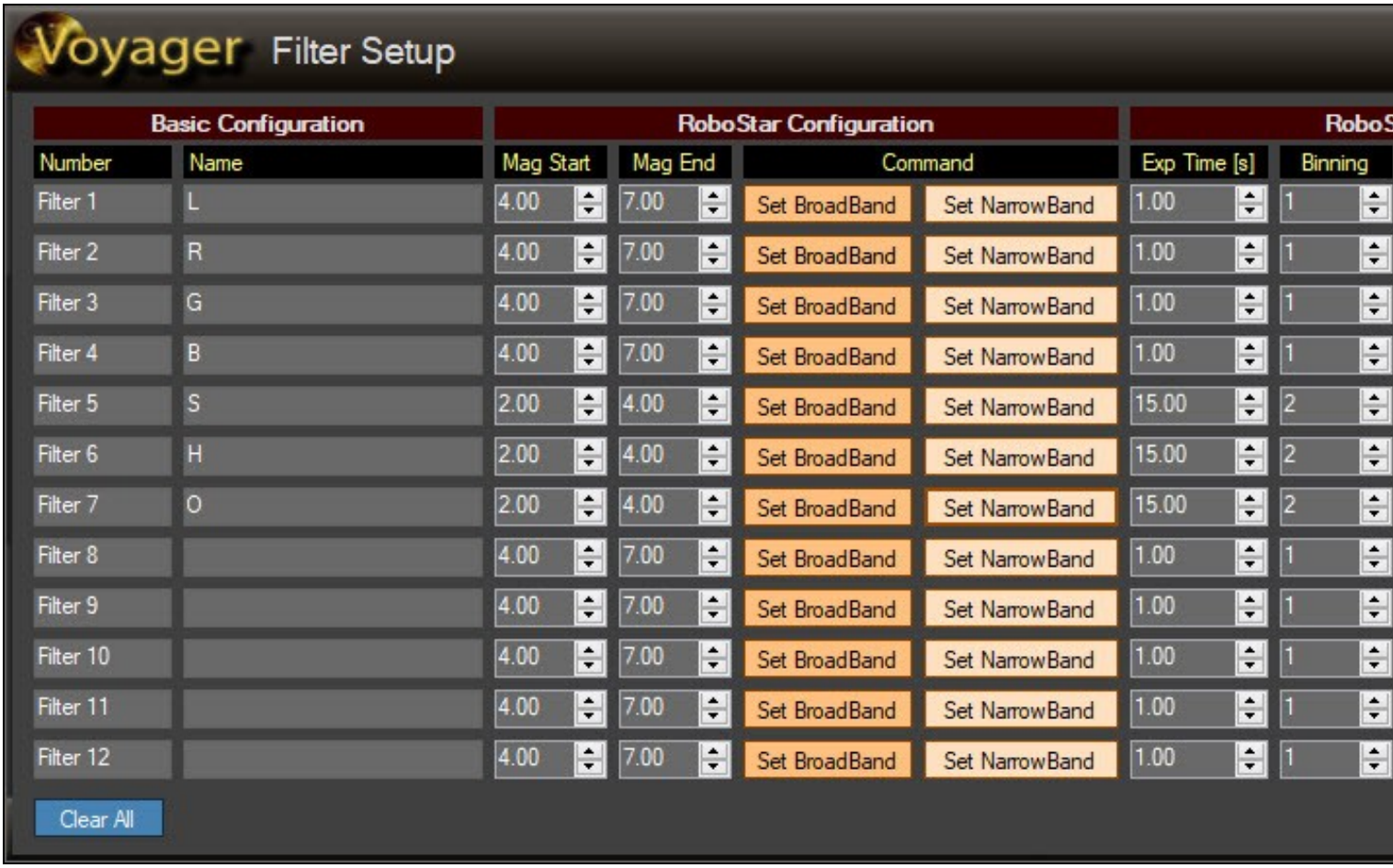
Once a Camera and optionally a filter wheel have been selected, next populate the Filters window with the list of available filters.

With Voyager disconnected to external devices, click the GET button to retrieve a list of filters and label names from the filter device or third party application.

Important Note! For DSLR's and One Shot Color cameras (OSC), a filter named ** Bayer Matrix ** will be shown.
Important Note! For monochrome cameras with no filter wheel, click the Clear button and the filter ** Clear ** will be created.

15.13 Filter Setup

Some filter wheel drivers or applications cannot return a list of filters. For those cases, click the EDIT button and manually enter the filter list:



Important Note! If entering filters manually and using a third party application such as MaximDL or TheSkyX Camera Add-on, make sure the filter Name and Number match those defined in the third party software. It is

preferable to use the GET button to ensure a match.
Important Note! Max number of filters managed by Voyager is 12
Important Note! Magnitude usable interval start from 0 to 7

15.13.1 RoboStar Configuration for Filters

Set the minimum (Mag End) and maximum (Mag Start) stellar magnitudes for Voyager's RoboStar autofocus routine on a per-filter basis.

Click the "Set Broadband" or "Set NarrowBand" buttons to use the default magnitudes for these respective filter types.

15.13.2 RoboStar LocalField Configuration for Filters

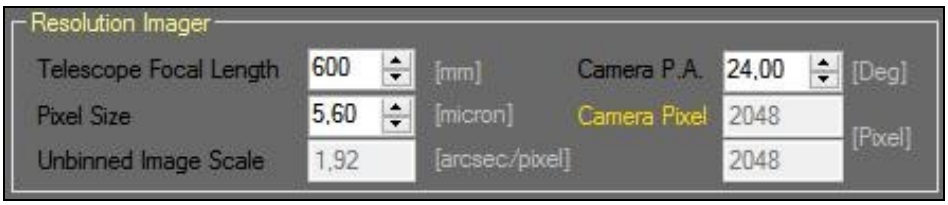
Set the Exposure Time in seconds and Binning for the RoboStar LocalField (multiple-star) autofocus routine on a per-filter basis.

Check the box "Not Use LocalField in Sequence" if you do not want to use LocalField autofocus while a sequence is executing.

15.14 Resolution Imager

This is where the image scale of your telescope and camera is defined.

Important Note! For correct operation of Voyager these settings are mandatory



- **Telescope Focal Length**: The focal length of the primary telescope in millimeters (mm)
- **Pixel Size**: The size of the main camera's pixels in microns

After entering these two values, Voyager will automatically calculate the image scale for binning 1x1. This value is computed in arc-seconds/pixel and appears in the Unbinned Image Scale field

- **Camera P.A.**: The position angle of Camera updated to the last valid solving PA retrieved by Voyager during overall operations. This value will be passed to the Virtual Field of View facility in Web Dashboard to drawing your FOV over the Aladin map. The update of this value will be done at Voyager application closing.
- **Camera Pixel** : The size in pixel in horizontal and vertical of your camera in bin1.This value will be passed to the Virtual Field of View facility in Web Dashboard to drawing your FOV over the Aladin map. This is a readonly field.

Important Note! Failure to define the image scale could lead to malfunction of the Plate Solving system and the loss of image alignment

Important Note! From Voyager 2.0.13a, Voyager will force Maxim DL to use the focal length set in Voyager

15.15 Sensor Type

In this panel, select the type of camera sensor:

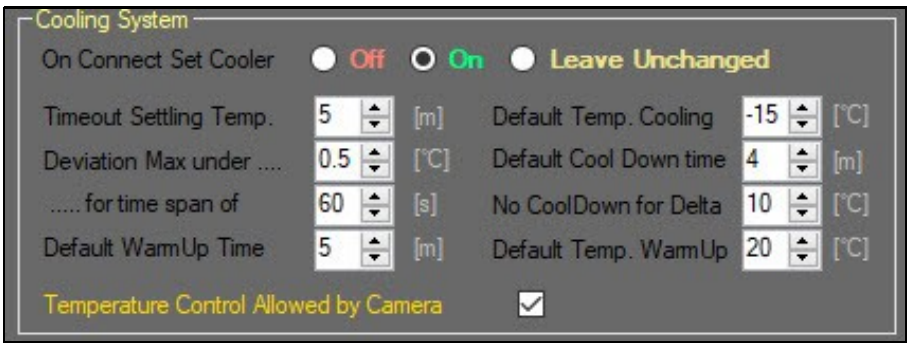
- **Monochrome**: Mono cameras with or without a filter wheel
- **Color**: Color cameras with a Bayer Matrix (OSC or One Shot Color cameras)
- **DSLR**: Commercial cameras, modified or not

Important Note! If you use a third party application such as MaximDL or TheSkyX to manage your camera, all cameras defined in that application can be managed in Voyager

Important Note! If you want to use a filter wheel with a color camera, please choose Monochrome like camera type. This will enable the filter wheel control where you can configure control and filters.

15.16 Cooling System

If the camera has a cooling system (usually a Peltier cooler), Voyager can manage it using these settings:



- **On Connect Set Cooler**: When Voyager connects to the camera, turn the cooling system Off, On, or leave it unchanged. If you connect to your system a long time before use, you may want to leave this "Off" or "Unchanged" and then turn the cooler on using the sequence settings or a DragScript command. If you are planning to disconnect and reconnect Camera so many thank during setting up Voyager use the "Unchanged" to avoid camera cooling to be stressed.
- **Timeout Settling Temp**: The time in minutes after which the cooling action is considered failed if the desired temperature is not reached
- **Deviation Max under**: The absolute temperature difference in °C allowed from the desired temperature before the cooling action is considered successful. This temperature must be maintained for the amount of time indicated in the next field, "... for time span of"
- **... for time span of**: The amount of time that the temperature must be within the "Deviation Max under" described above for a cooling action to be considered successful
- **Default WarmUp Time**: The time in minutes after which the warmup action is considered failed if the desired temperature is not reached
- **Default Temp. Cooling**: The desired temperature in °C for a cooling operation
- **Default Cool Down time**: The desired time in minutes used to reach the desired cooled temperature, to avoid cooling too fast which in some cases can cause frost to form

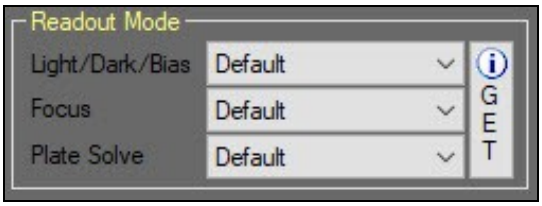
- **No CoolDown for Delta**: The maximum difference in °C below which the camera's native firmware cooling system is used instead of the Cool Down parameters specified here. In other words, if the camera's sensor is currently at -25 °C and you request a change to -30 °C, if the "No CoolDown for Delta" value is 10 °C, Voyager will just command the camera to cool to -30 °C without any management of cool down ramp time.
- **Default Temp. WarmUp**: The desired temperature in °C for a WarmUp operation. Note that if this is set too high, the WarmUp operation may fail. However, in most cases this does not cause any problems.
- **Temperature Control Allowed by Camera:** remove flag if camera doesn't allow temperature control or not have it

These settings are used for all operations relating to setting the camera's sensor temperature. To find out how they work in detail read see the OnTheFly section.

Important Note! The fields "Default Cool Down Time," "Timeout Settling Temp" and "... for time span of" are closely linked. The "Timeout Settling Temp." should be larger than the "Default Cool Down Time" plus the "...for the span of" time, or the cooling action would always result in a timeout error
Important Note! You can use the cooling system's native firmware factory settings in the Cooling panel of the Sequence Configuration dialog
Important Note! The Sequence Configuration dialog's Cooling panel supports auto setpoint scaling. If the camera cannot reach the desired temperature within a defined time, it will try to reach a designated warmer temperature

15.17 Readout Mode

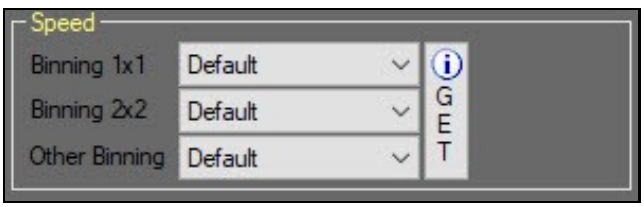
Some cameras have settings to control readout speed vs. readout noise. The Readout Mode section of the Setup workspace lets you configure these settings:



- **GET**: Click this button to retrieve the list of available modes, if any. **Voyager must be disconnected from the control systems for this to work**
- **Light/Dark/Bias**: Recommended setting is to have the highest quality - lowest noise, regardless of speed. But this is optional - you can choose any setting
- **Focus**: Recommended setting is fastest speed, regardless of noise, so autofocus operations happen quickly
- **Plate Solve**: Recommended setting is fastest speed that still results in successful plate solves. If you are not sure, set for highest quality.

15.18 Speed

Some cameras have settings to control gain in order to improve dynamic range. The Speed section of the Setup workspace lets you configure these settings in order to accelerate some Voyager features:



- **GET**: Click this button to retrieve the list of available modes, if any. **Voyager must be disconnected from the control systems for this to work**
- **Binning 1x1**: Choose the gain to be used when taking exposures with binning 1x1
- **Binning 2x2**: Choose the gain to be used when taking exposures with binning 2x2
- **Other Binning**: Choose the gain to be used when taking exposures with binning other than 1x1 and 2x2

15.19 TheSkyX Camera Add On Setting

Settings for TheSkyX Camera Add On can be configured in this panel of the Camera setup workspace:

Due to a lack of commands in TheSkyX's DCOM interface (the interface used by external applications to manage TheSkyX operations), Voyager is unable to determine the current filter selected in the filter wheel. To ensure the correct filter is used, Voyager takes a very short "dummy exposure" and sets the filter to the desired value. The "dummy image" is not saved. The default values here should be good for most setups. The goal is to make this a very short exposure with a fast download, so if you know of better settings for your camera, you can set them here.

- **Dummy Exposure Bin**: Binning level to be used when taking dummy exposures
- **Dummy Exposure ROI**: Region Of Interest size to be used when taking dummy exposures
- **Dummy Exposure Time:** Exposure time to be used when taking dummy exposures

Important Note! Be sure your dummy exposure time is not under the minimum value accepted from the camera. This could be thrown an error in the camera driver

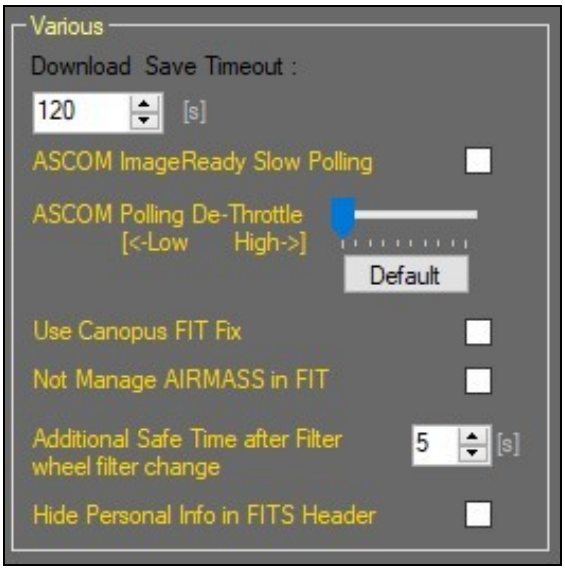
15.20 Maxim DL

Settings dedicated to Maxim DL Camera additional features:

- **Quit Camera Connection on Voyager Setup Disconnect:** disconnect camera in Maxim DL when disconnect setup from Voyager

15.21 Various

Miscellaneous settings are contained in the Various panel of the Camera setup workspace:



- **Download Save Timeout**: Time in seconds after which the download of an image from the camera times out (fails)
- **ASCOM ImageReady Slow Polling**: Delay before polling the ASCOM driver to see if the image is ready to download. This is used if the camera's firmware is slow and needs some time between ImageReady queries (see discussion in the Voyager forum)
- **ASCOM Polling De-Throttle**: Controls the amount of delay between requests to the ASCOM camera driver to avoid overflowing a slow camera's command buffer.
- **Use Canopus FIT fix**: MPO Canopus is an astrometry and photometry application usually used in Astronomical Research . This flag fix a *OBJCTDEC* key in saved FIT Header adding a + for a positive value. Without this flag Canopus cannot handle correctly the FIT made by Voyager (or others FIT generator)
- **Not Manage AIRMASS in FIT**: Voyager will not write AIRMASS calculated value in the FIT Header, if camera control in Voyager is an external application, this application will be delegated to write the AIRMASS header (like Maxim or TSX Camera add on)
- **Additional Safe Time after Filter Wheel filter change:** add an extra time wait of x seconds after the driver of the filter wheel report changing of filter is finished. This to avoid that filter wheel that report wheel have finished to move but is not true might affect the next image in shot
- **Hide Personal Info in FITS Header**: remove personal data from FIT Headers (SITELAT, SITELONG, OWNER, SWOWNER, OBSERVER)

15.22 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote

Voyager Setup
Weather Setup
WEB Dashboard Setup

16 Mount Setup

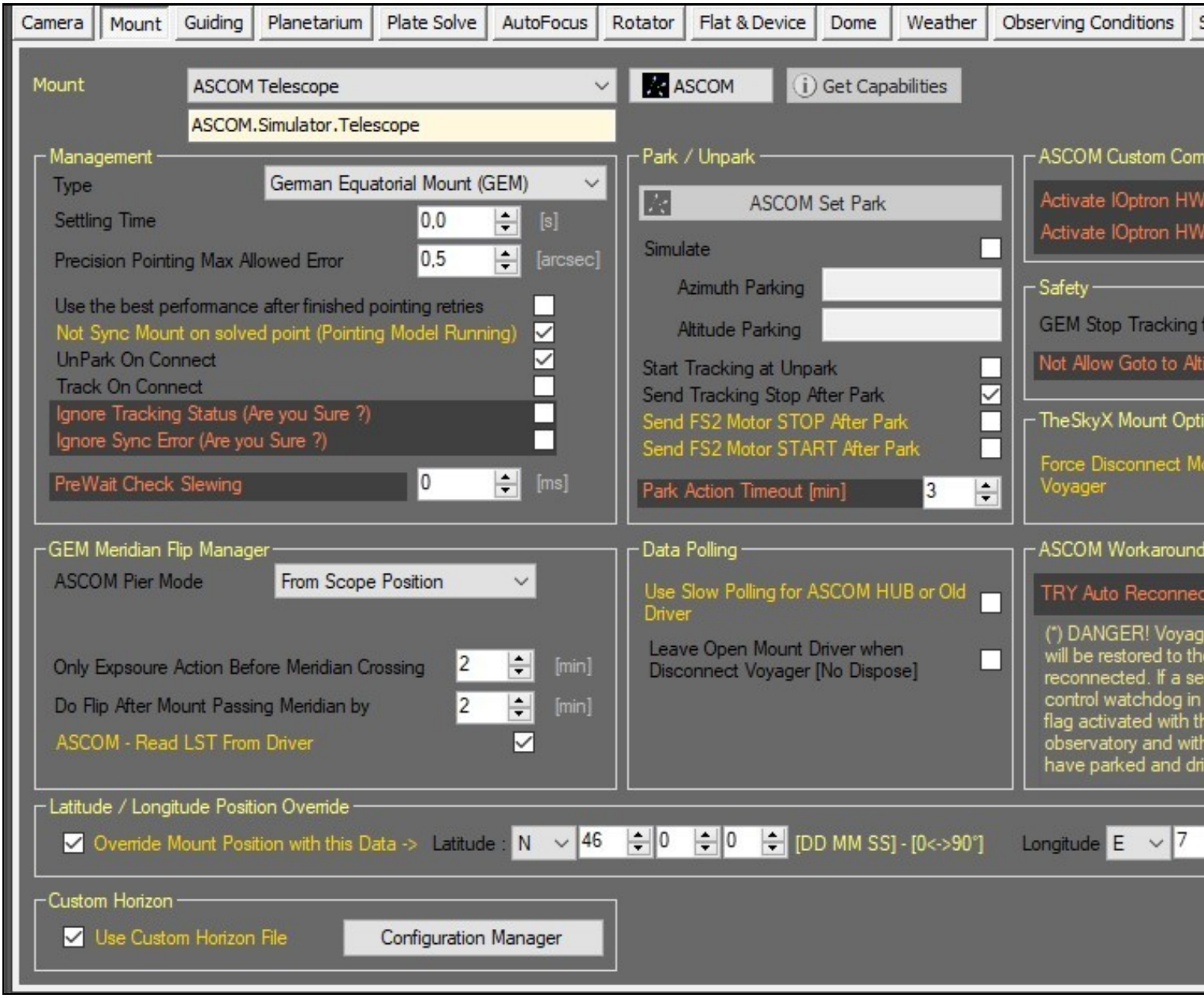
16.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

16.2 Mount Selection

Click the Mount button in the Setup workspace to display the Mount Setup window:



- **Mount**: Choose the driver for your mount from this drop-down list. Options include TheSkyX, TheSky6, ASCOM, and Array Virtual Mount. Available configuration options may vary depending on the capabilities of the selected mount driver.
- **ASCOM**: If an ASCOM Telescope is chosen, click the ASCOM button to bring up the ASCOM chooser, and select your mount from the available choices.
- **Get Capabilities**: If an ASCOM Telescope is chosen and setup is connected in Voyager, click this button retrieve the ASCOM properties of the mount to determine what is enabled or disabled

Important Note! If some options are disabled, like latitude and longitude, you cannot use the selected driver with Voyager
Important Note! Array Virtual Mount is a special internal mount of Voyager used in an array of telescopes mounted in the same mount. Only the master node can handle the mount, the other nodes need to be configured as Virtual Mounts.

16.3 TheSkyX and Voyager

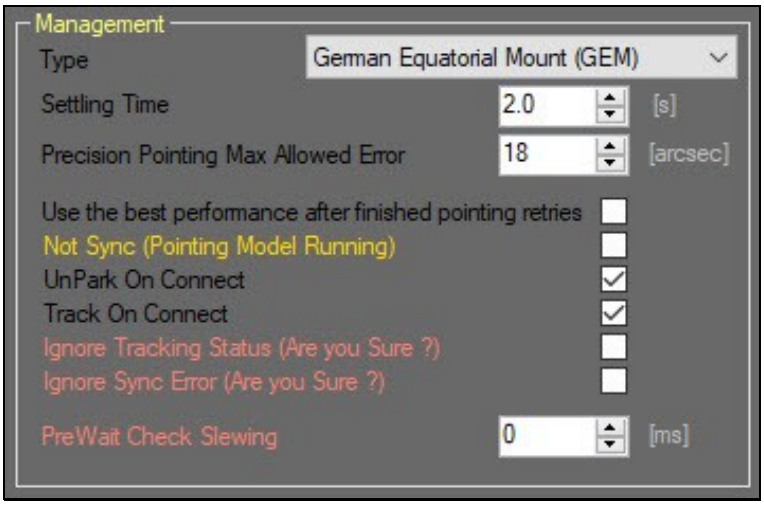
Voyager can connect to TheSkyX using its native API to control your mount. You can also connect using Paramount's ASCOM driver that controls TheSkyX, but we recommend connecting directly to take advantage of TheSkyX's native API.

If you get a connection error when attempting to connect to TheSkyX, read this Important Note:

Important Note! You will get a connection error if TheSkyX is started manually and Voyager and TheSkyX are running in different modes (administrator or user). Let Voyager start TheSkyX (it will do so when you click Connect in Voyager's Startup workspace) or make sure both TheSkyX and Voyager run as administrator to avoid this problem.

16.4 Management

The Management panel of the Mount setup workspace contains basic configuration information about your mount:



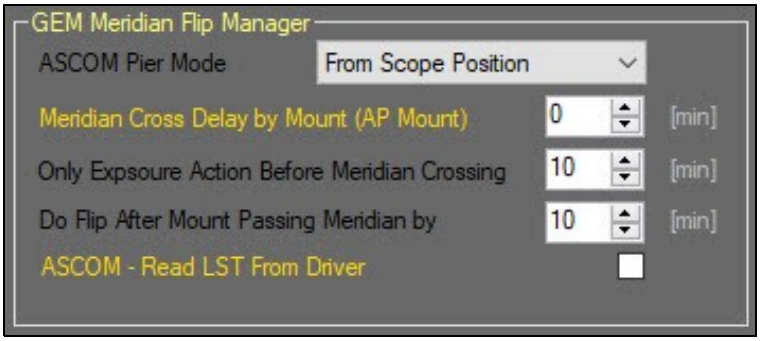
- **Type**: Select from the available types, German Equatorial Mount (GEM) or Fork Mount
- **Settling Time**: Amount of time in seconds to wait after moving the mount before continuing with the next action
- **Precision Pointing Max Allowed Error**: Maximum allowed error distance in arc-seconds when performing a precision pointing action
- **Use the best performance after finished pointing retries**: Precision pointing will be done up to three times in an attempt to achieve an error less than the Precision Pointing Max Allowed Error. If the error is still larger than the max allowed, if this setting is not checked, precision pointing will end with an ERROR condition. If this setting is checked, the error will be accepted and precision pointing ends with an OK status.
- **Not Sync (Pointing Model Running)**: Do not send sync commands to the mount after a precision pointing action. You may prefer this choice if your mount is maintaining its own pointing model and you do not wish to add more sync points to it. In this case, Voyager will use offsets to move the mount to fix errors found during the precision pointing operation. Some mounts that maintain their own pointing model may need you to set a flag in the mount's software to allow Voyager to add new points to the model to refine pointing precision. Consult your mount's documentation to determine if this is the case.
- **UnPark on Connect**: Issue an UnPark command after connecting the mount
- **Track on Connect**: Issue a command to begin sidereal tracking after connecting the mount
- **Ignore Tracking Status (Are you Sure?)**: Do not take any actions (such as aborting a sequence) if the tracking status from the mount is unavailable or gives an unexpected result. For the Astro Electronic FS2 motor control system this is needed due to a lack of some basic ASCOM commands. If you have an FS2 system please read the "Important Note!" below before using this setting
- **Ignore Sync Error (Are you sure?)**: Ignore the Sync Error during closed loop precision pointing action. This flag is dedicated to the Astro Electronic FS2 system. Voyager checks if the mount's position after Sync matches the expected value, or has too large a misalignment, in which case a red error message is displayed in the log. Normally this would cause an abort of the currently running action. You can bypass this error (at your own risk) and continue the actions. This is only for use with the Astro Electronic FS2 mount control system Please read the "Important Note!" below before using this setting
- **PreWait Check Slewing**: The number of milliseconds that Voyager should wait before checking via ASCOM commands to see if the mount is slewing or has finished slewing. Some ASCOM drivers do not correctly report the mount's slewing status - there is a delay between the mount starting or stopping slewing and the status reported via ASCOM. This can cause problems as Voyager will think the mount is slewing when it is not, or vice-versa. If this is the case with your ASCOM driver, you can set a prewait delay here so Voyager gets a stable reading from the ASCOM driver. The default of 0 ms means Voyager will not wait to check status.

Important Note! Ignoring Tracking Status or Sync Errors may cause imaging errors or even damage to your equipment, e.g. if your mount is continuing to track when it should have stopped. Be sure you understand these risks if you choose to ignore these conditions

Important Note! Best practice: determine how closely your mount can achieve a goto after a maximum of three precision pointing attempts. Use a slightly larger value than this as the Precision Pointing Max Error. How much larger depends on the variance in your mounts precision pointing results and whether you can accept that much error in your image position

16.5 GEM Meridian Flip Manager

The GEM Meridian Flip Manager section of the Mount Setup workspace is where you configure information used to automatically manage meridian flips:



- **ASCOM Pier Mode**: Select how Voyager should determine the orientation of your mount relative to the meridian (East or West). Options are:
  - **From Scope Position**: Determine if the mount is on the East of West side of the pier based on the current telescope RA and DEC relative to the meridian. Use this option if you control your mount via planetarium software such as TheSkyX. **If you control your mount using planetarium software such as TheSkyX or TheSky6, please use the ASCOM Pier Mode "From Scope Position" and absolutely don't use the planetarium software to move the mount during a Sequence or execution of a DragScript. If you do this, you may lose the meridian flip feature in Voyager with possible damage to your setup.**
  - **ASCOM Normal**: The mount is connected via ASCOM and correctly reports East or West orientation
  - **ASCOM Inverted**: The mount is connected via ASCOM and Voyager should invert the reported orientation - i.e., use East if the ASCOM driver reports West, and West if the driver reports East

Important Note! If you use ASCOM Pier Mode (not "From Scope Position") and your mount's ASCOM driver is able to give pier information to Voyager, the default choice is ASCOM Normal. To check if it's correct and Voyager can correctly manage a meridian flip, align and sync your mount following the normal procedure according to your mount's documentation. Next point manually to an object East of the meridian (before the meridian). At this point connect Voyager to your mount and check what is reported in the STATUS WIDGET. If it says "WEST" all is OK. If it says "EAST" you need to use ASCOM inverted. If Voyager cannot retrieve Pier info you will be informed by a messagebox in the screen at connection time.

Important Note! Note: Pier status of EAST means the mount is flipped and after the meridian (mount is East, scope pointing West), WEST means the mount is before meridian and not flipped (mount is West, scope pointing East)

- ~~**Meridian Cross Delay by Mount (AP Mount)**~~: **NO MORE AVAILABLE in the latest releases of Voyager !!!**
- **Only Exposure Action Before Meridian Crossing**: During a sequence Voyager can slew the mount (do a goto) for various purposes, such as to find a focus star or to re-target after a guiding error. This setting prevents Voyager from performing a slew (goto operation) of the mount for this number of minutes before the target crosses the meridian. Normal operation will continue, exposures and guiding will be done; but if Voyager needs to slew the mount for focusing or re-targeting, the slew will not happen and the

sequence will continue to run. If an emergency goto for re-alignment is needed, Voyager puts the Sequence in standby until the mount has passed the meridian by the number of minutes designated in "Do Flip After Mount Passing Meridian By." At that time, Voyager will perform a goto to do the meridian flip and resume the sequence. This is done to avoid the critical zone around meridian flip time, and wait until the mount is at a position where a goto is sure to not trigger the meridian flip.

- **Do Flip After Mount Passing Meridian by**: Time in minutes to wait after the mount passes the meridian before performing the meridian flip. If an exposure is running, by default the exposure will not be terminated and this means the meridian flip will be further delayed. In the sequence setup dialog there is an optional flag to force the meridian flip a given time after the meridian is reached. If set, this will abort the exposure and start a goto and meridian flip action. Whether or not you use this flag depends on your mount and pier mechanical characteristics. Most mounts allow some minutes of tracking after the meridian without generating a pier collision.
- **ASCOM - Read LST from Driver**: If this box is checked, use the Local Sidereal Time reported by the ASCOM driver and not what is calculated from the PC. Usually with newer drivers, the PC and mount time are sync'd by the driver. Older mounts may not have this facility and the meridian flip time calculated by Voyager may be different from the time calculated by your mount. This can cause a damaging pier collision. If you are not sure, please check this flag, so Voyager and your mount are using the same LST.

Important Note! Some mount drivers need to be configured to not stop when reaching the meridian point and continue for some minutes or degrees, or Voyager cannot handle the meridian flip. Also, if your mount driver can do an automatic meridian flip, you must absolutely disable the mount driver from doing this. Let Voyager perform the meridian flip for you.

16.6 Park/Unpark

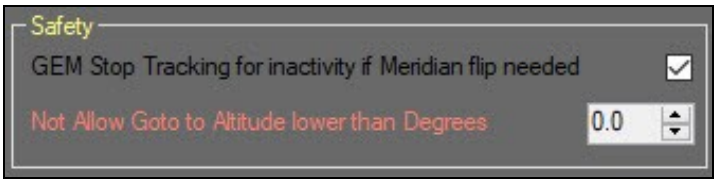
The Park/Unpark section of the Mount Setup workspace is where you can configure your mount's behavior relative to parking.

- ASCOM Set Park: If the mount is connected via ASCOM and the driver supports the Set Park function, click this button to set the parking position: **Note**: Unlike most of Setup, **your mount must be connected** for this to work. Click the ASCOM Set Park button and a window will pop up asking you to move the mount with the hand controller, or a virtual hand controller, to the desired parking position. Follow the prompts and Voyager will send the Set Park Position command to the ASCOM connected mount.
- Simulate: Check this box and Voyager will simulate a Park command whenever a Park action is performed within Voyager. The mount will be slewed to the position designated in the next two fields, Azimuth Parking and Altitude Parking
- Azimuth Parking: Azimuth position used when parking if the Simulate checkbox is checked
- Altitude Parking: Altitude position used when parking if the Simulate checkbox is checked
- Start Tracking at Unpark: If checked, start sidereal tracking after an Unpark action is performed.
- Send Tracking Stop after Park: If checked, stop tracking after a Park action is performed

- Send FS2 Motor STOP After Park: reserved to FS2 system
- Send FS2 Motor START After Park: reserved to FS2 system
- Park Action Timeout (min): If a Park action has not successfully completed after this many minutes, consider the action as having failed

16.7 Safety

The Safety section of the Mount Setup workspace is where you configure a safety feature relative to management of meridian flips:

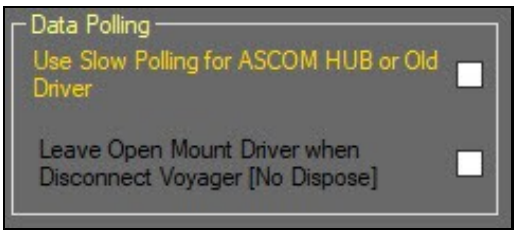


- **GEM Stop Tracking for inactivity if Meridian flip needed**: if a sequence is running the meridian flip can be done by Voyager, but if you have no actions running and just Voyager connected to your equipment without your supervision a pier collison can happen if the mount is tracking. If set, this flag recognize that no actions are running in Voyager and stops the mount tracking (if tracking is on) when the mount reach the meridian crossing point for the actual position. Please check this flag for your setup safety.
- **Not Allow Goto to Altitude lower than Degrees:** An error will be raised and the action will stop if a command is given to slew to a position whose altitude is less than the value in the spinner control.

Important Note! If you are sure your mount manages meridian flips without any help from Voyager, uncheck this box and also set your Sequence setting Meridian Flip tab, Meridian Flip Mode to "Do not Manage." Please be sure your mount prevents pier crashes because with these settings, Voyager will only command slews, Voyager will not command your mount to flip pier sides

16.8 Data Polling

The Data Polling section of the Mount Setup workspace is where you specify behaviors regarding the connection to your mount:



- **Use Slow Polling for ASCOM HUB or Old Driver**: If checked, Voyager will wait longer between sending commands or status requests to the mount driver. This is helpful for some slower devices that need more time to process a command and have limited ability to buffer incoming commands
- **Leave Open Mount Driver when Disconnect Voyager (No Dispose)**: If checked, Voyager will not force the ASCOM driver to be released if another program is using it, e.g. APCC from AstroPhysics or the ScopeDome LS controller

16.9 iOptron Home Options

If you have an iOptron mount that has a built-in Home position, either user-defined or factory-defined, you can tell Voyager to use either of those (but not both) positions when issuing a command to Home the mount:

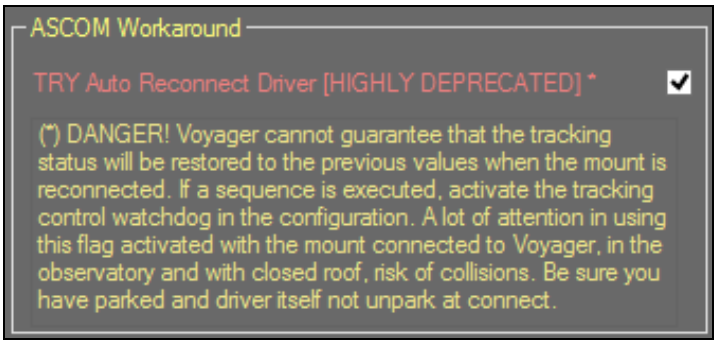
- Activate iOptron HW Built-in Zero Position like HOME: If checked, Voyager will use the default built-in Zero position to Home the mount when the HOME button in the Command Window is clicked
- Activate iOptron HW Own Defined Zero Position like HOME: If checked, Voyager will use the user-defined Zero position to Home the mount when the HOME button in the Command Window is clicked

16.10 TheSkyX Mount Options

If you using TheSkyX like mount control you can decide if lock the disconnection of the mount in TheSkyX to the disconnection of setup in Voyager or not, depends if you have other application running connected to TheSkyX for other needed external task:

16.11 ASCOM Workaround

HIGHLY DEPRECATED: if check Voyager use this workaround to create a new ASCOM instance of the mount driver in case of Driver crash and disappear and try to reconnect the mount without abort Sequence. Actually driver of some mounts running in LAN not check for the integrity of the socket connection and in case of disconnect or failure of LAN crash at first call of methods or crash itself. Voyager already handle this event without check this flag and exit from sequence, user using DragScript can decide to reconnect and restart. For who doesn't want to stop the sequence its possible to use this flag to do an immediate restore but this is highly deprecated.



Important Note! DANGER: Voyager cannot guarantee that the tracking status will be restored to the previous values ??when the mount is reconnected. If a sequence is executed, activate the tracking control watchdog in the configuration. A lot of attention in using this flag activated with the mount connected to Voyager, in the observatory and with closed roof, risk of collisions. Be sure you have parked and driver itself not unpark at connect.

16.12 Latitude / Longitude Position Override

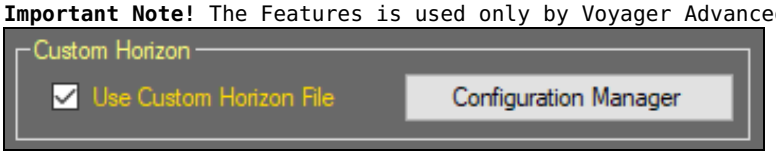
If your mount driver doesn't report information about Latitude and Longitude or if you want to override the driver info you can input the location latitude and longitude directly here ion Voyager. Data from mount about this 2 values will be ignored.

Important Note! If you use TheSkyX like mount control in Voyager we suggest to use this way for manage the latitude and longitude data !

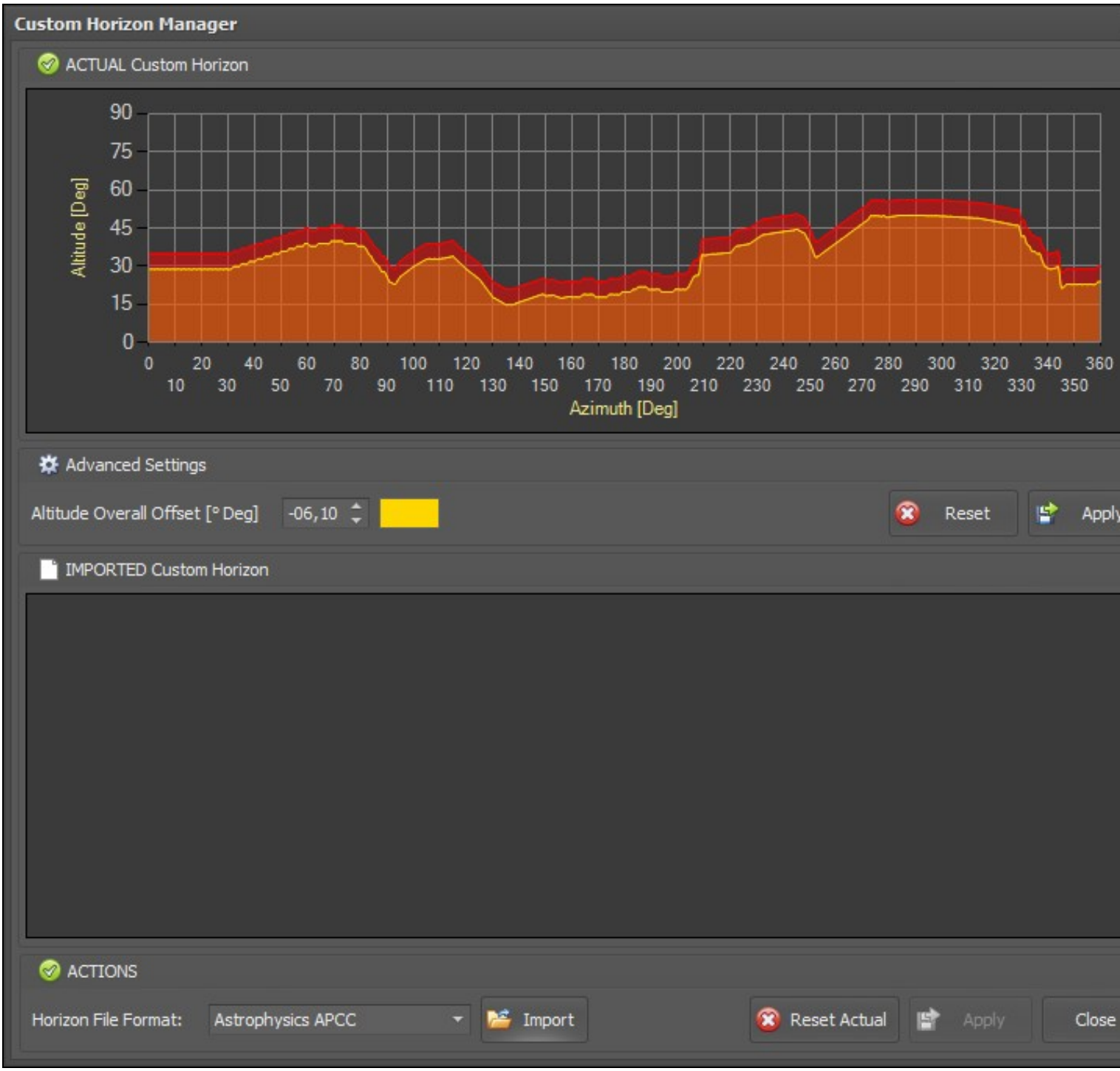
16.13 Custom Horizon

Manage here azimuth and altitude table data to create your custom horizon.

Important Note! The Features is used only by Voyager Advanced and Full during the RoboTarget scheduling process



- **Use Custom Horizon**: If checked RoboTarget will take in account the horizon to make elegible a target and with which interval of time to use
- **Configuration Manager:** press the button to open the Custom Horizon Configuration Manager



- **ACTUAL Custom Horizon:** chart of actual horizon loaded with on x axis the Azimuth in degree and on y axis the Altitude in degree. Red graph area was drawing using the raw data of custom horizon. The Yellow area is the raw data plus the offset in Altitude if you have setting up
- **Advanced Settings:**
    - **Altitude Overall Offset [°Deg]:** adding a fixed value to all the altitude in the custom horizon to differentiate a big or small FOV that take advantage of his size to be more suitable on the sky horizon
    - **Reset:** set the offset to 0°
    - **Apply:** save the offset and redraw the chart
- **IMPORTED Custom Horizon:** you can load from file and see the chart here of a custom profile before to promote to actual profile with the apply command
- **ACTIONS:**
    - **Horizon File Format:** select the file format to load from file. Supported (APCC,Cartes du Ciel, TheSkyX, Generic with azimuth and altitude separate by space, command or ;

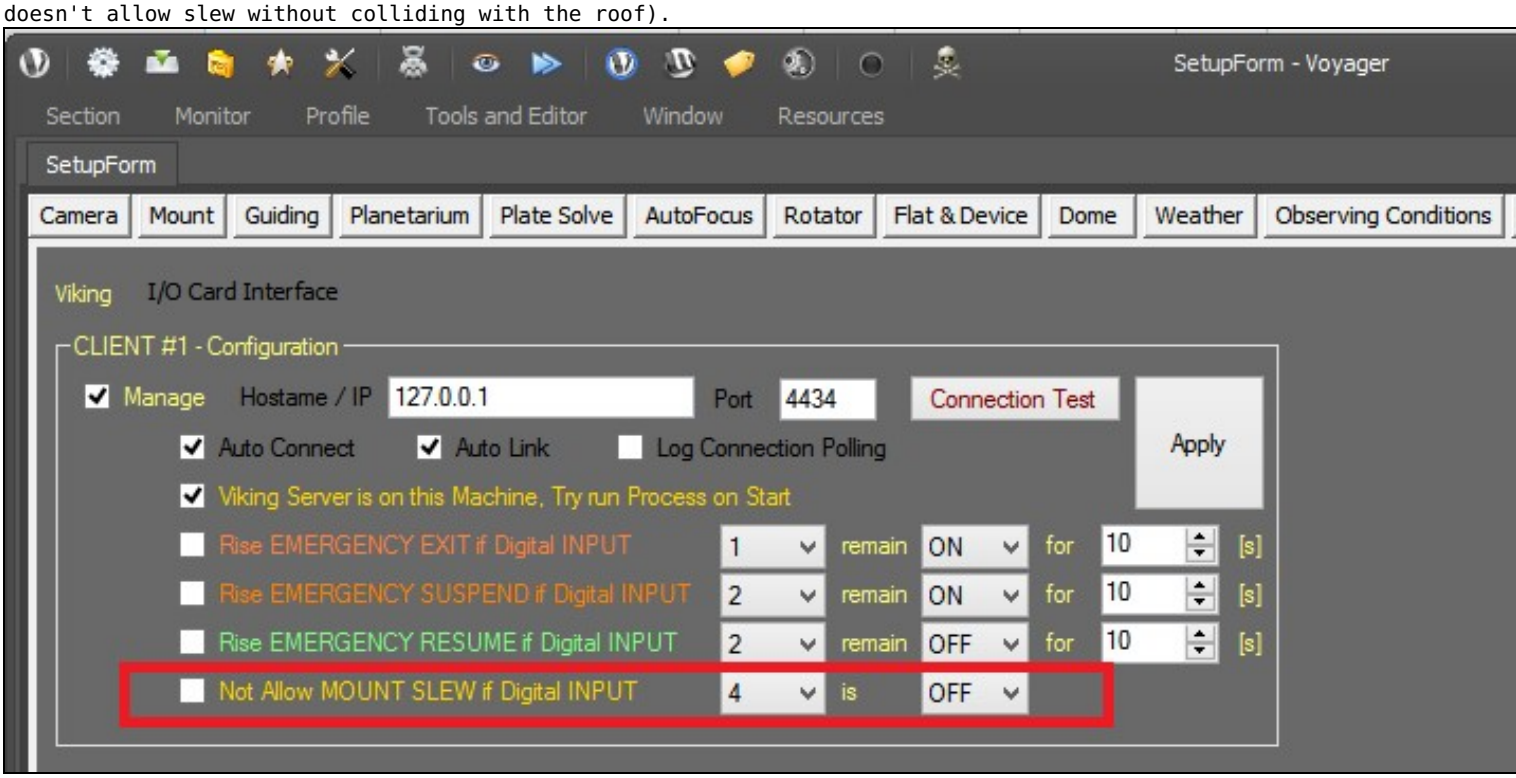
- **Import:** select and import the horizon file from disk
- **Reset Actual:** remove the custom horizon from Voyager profile
- **Apply:** save the custom horizon to the voyager settings profile file
- **Close:** close the window

Important Note! The custom horizon is saved on profile file. You must edit the profile and load for each profile you are using in Voyager. If you want for sure you can load the same file for each profile and use the offset based on the camera FOV.

16.14 Viking Slew Safety Lock System integration

If you using Viking like companion of Voyager you can activate the slew safety lock system to lock mount slewing if a defined input in Viking have a defined status.

Usually this is used for not allow a slew of the mount when the roof is closed (mount position and height doesn't allow slew without colliding with the roof).



17 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup

18 Guiding Setup

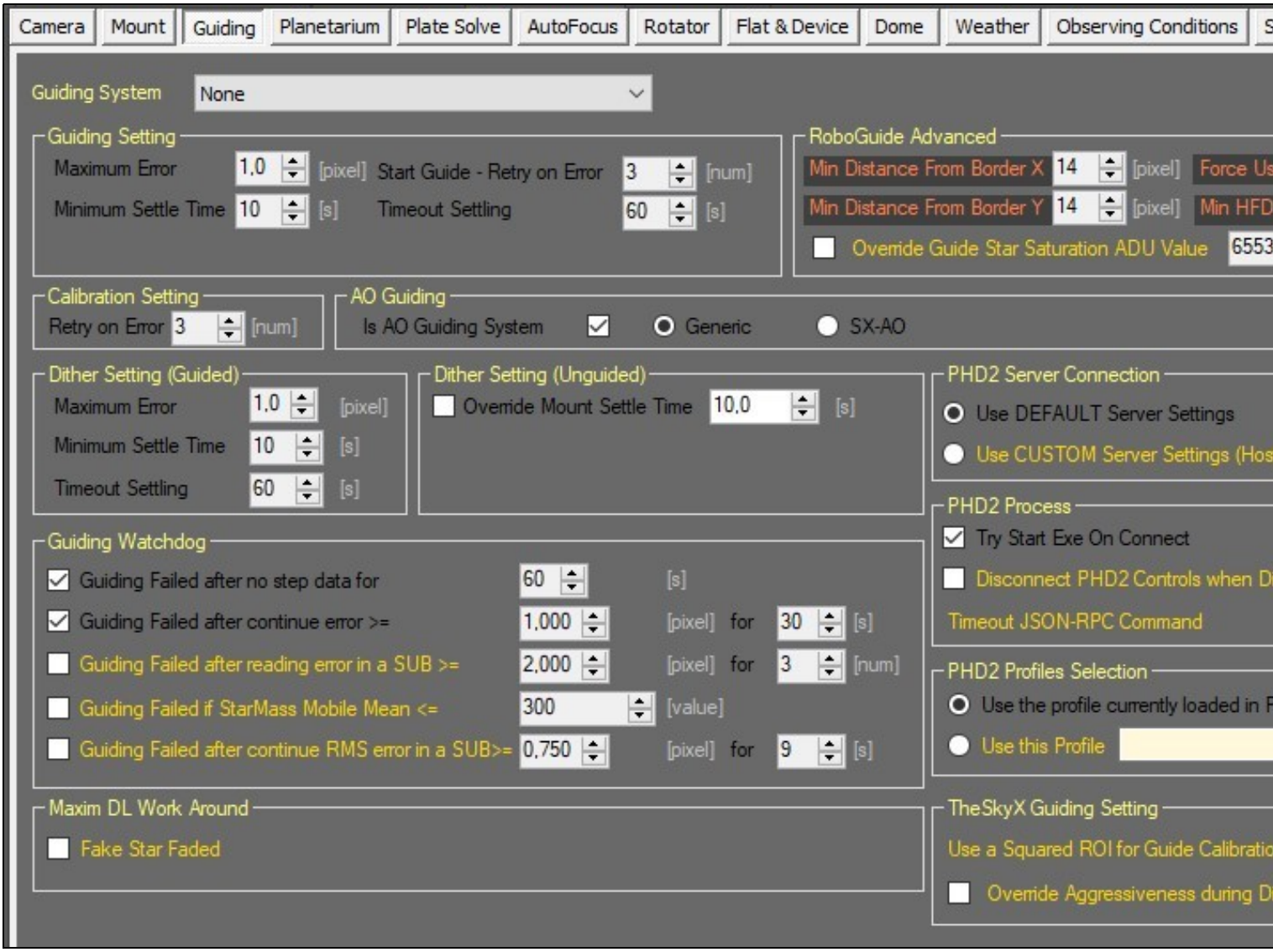
18.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

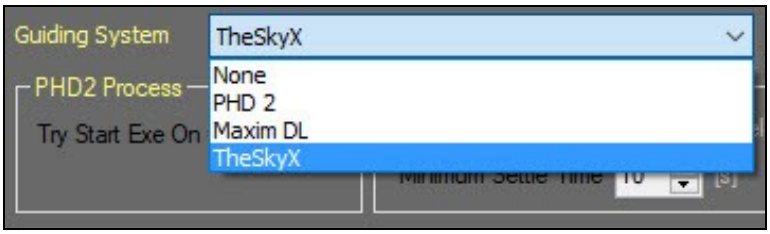
18.2 Guiding Setup Workspace

Click the Guiding button in the Setup workspace to display the Guiding Setup window:



18.3 Guiding System Selection

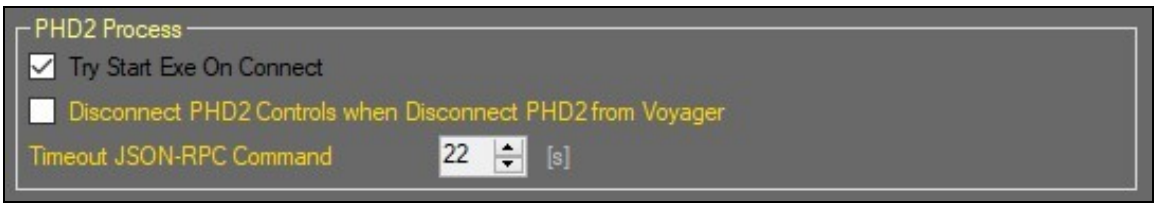
From the Guiding System drop-down box at the top of the screen, select your Guiding System: None, PHD2, MaximDL or TheSkyX



Important Note! If you use Maxim DL for Guiding, you must also use Maxim DL for your main camera selection

18.4 PHD2 Process

In the PHD2 Process panel of the Guiding Setup workspace you can configure how Voyager connects to and disconnects from PHD2:



- **Try Start Exe On Connect**: If checked, Voyager will try to start PHD2.exe when connecting equipment and software
- **Disconnect PHD2 Controls when Disconnect PHD2 from Voyager:** If checked, when Voyager disconnects from PHD2 it will first send a command to PHD2 to disconnect all gear (typically mount and guide camera)
- **Timeout JSON-RPC Command:** timeout for communcation answers between Voyager and PHD2 server in JSON-RPC Protocol. Voyager talk with PHD2 using this protocol and the PHD2 server. Default is 10second.

Important Note! To ensure Voyager can start PHD2 process and run, you must install PHD2 in default directory (not choose different folder during PHD2 setup)

Important Note! if you receive a timeout error in communications with PHD2 server you can increase the timeout JSON-RPC Command time but better to understand if the server in PHD2 is enabled and running and not other kind of issues are happening. Check also in Operative System firewall to have answer yest to enable firewall rule for allow external application to connect PHD2 server (window showed first time you run PHD2 server). At last check the antivirus or Windows Defender is lock the communication to and from PHD2.)

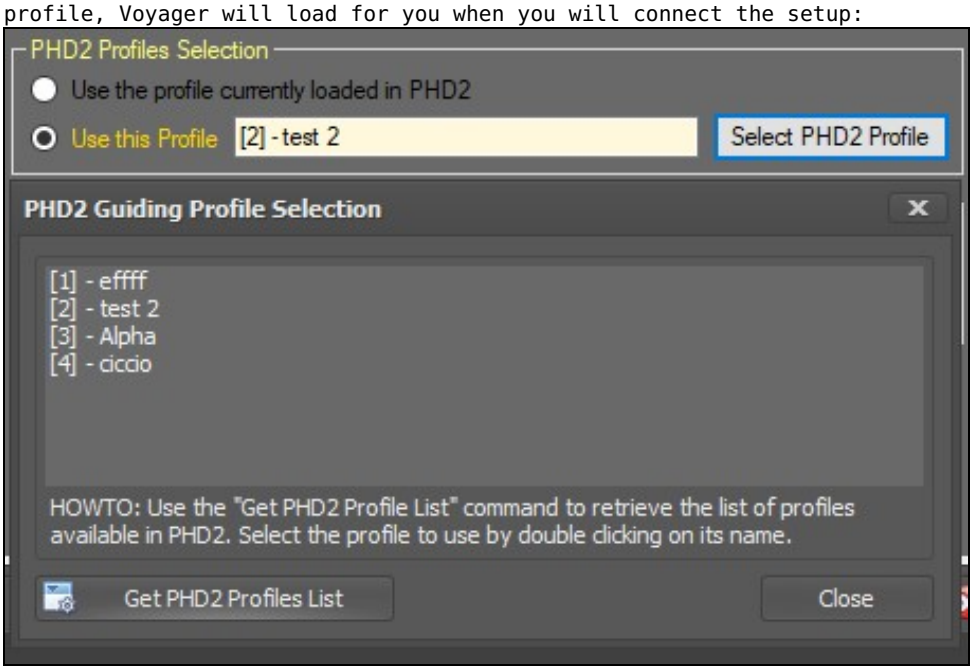
18.5 PHD2 Server Connection

In the PHD2 Server Connection panel of the Guiding Setup workspace you can configure optional a Voyager way to connect to the PHD2 server:

- **Use DEFAULT Server Settings:** If Checked Voyager will use localhost server of PHD2 and default port 4400 (this is the default of PHD2 and default of Voyager)
- **Use CUSTOM Server Settings (Host/Port):** If Checked Voyager will use the defined host and port

18.6 PHD2 Profile Selection

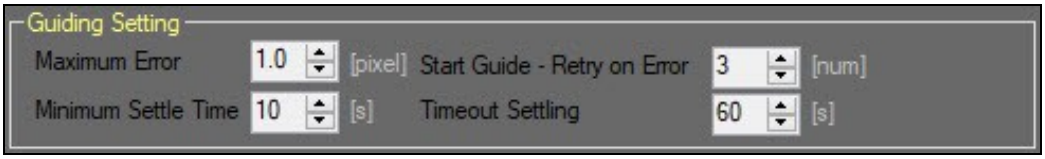
In the PHD2 Profile Selection panel of the Guiding Setup workspace you can configure optional a PHD2 guiding profile, Voyager will load for you when you will connect the setup:



- **Use the profile currently loaded in PHD2**: not profile Selection in PHD2, Voyager will use the Profile of PHD2 currently loaded
- **Use the profile:** Voyager will load the profile with ID and name in the readonly text field when you will connect the Setup.
- **Select PHD2 Profile**: will opened a form for select the PHD2 profile to use. The form for selection of PHD2 Profile interact with PHD2 application, so PHD2 must be opened or Voyager will try to open it for you:
    - **Profile List**: list of profile when retrieved from PHD2 application in [ID] - Name format
    - **Get PHD2 Profile List:** Voyager will try to open PHD2 and retrieve the list of configured profiles
    - **Close:** form will be closed

18.7 Guiding Setting

The Guiding Setting panel of the Guiding Setup workspace contains some basic error, settling, retry and timeout settings:



- **Maximum Error**: The maximum allowable guiding error, in pixels. If the guiding error exceeds this number, a guiding error is assumed
- **Minimum Settle Time**: The shortest time, in seconds, to wait for the Guider to settle after starting or resuming guiding
- **Start Guide - Retry on Error**: The number of times to retry starting or resuming guiding. After this number of retries, guiding is considered to have failed
- **Timeout Settling**: The maximum time to wait, in seconds, for guiding to settle after starting or resuming guiding. After this time a guiding error is assumed

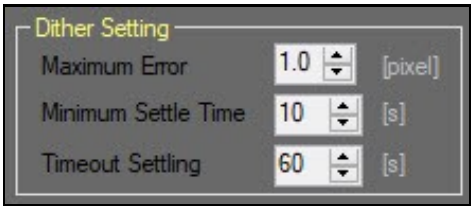
18.8 AO Guiding

The AO Guiding panel of the Guiding Setup workspace contains parameters pertaining to Adaptive Optics (AO) guiding systems

- **Is AO Guiding System**: If checked, the guider in this configuration is an Adaptive Optics (AO) system
- **Generic / SX-AO**: If "Is AO Guiding System" is checked, this radio button specified whether the AO is a Starlight Xpress (SX) or a generic system

18.9 Dither Setting

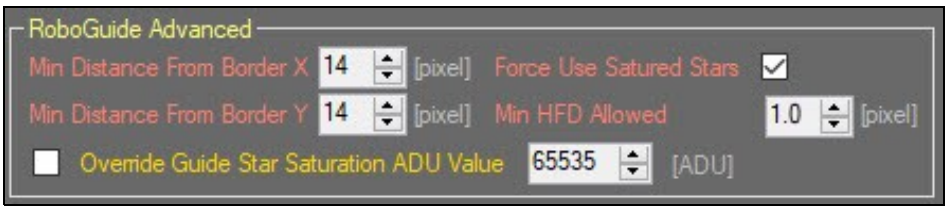
The Dither Setting panel of the Guiding Setup workspace specifies parameters for dithering. Dithering is optionally done by the guiding system between a specified number of exposures in order to shift the image center slightly so hot pixels do not appear in the same location in all your images. By dithering, when sub-exposures are stacked by your image processing software, hot pixels can be largely eliminated as statistical outliers. The amount maximum of dithering during sequence must be choosed directly in Sequence setting. The Dither Setting here is related to settling of dithering operations.



- **Maximum Error**: The maximum amount, in pixels, to obtain after issuing a dither command before checking if guiding has settled. A value greater than this restart the Settle Time.
- **Minimum Settle Time**: The shortest time, in seconds, to wait after issuing a dither command before checking if guiding has settled
- **Timeout Settling**: The maximum time, in seconds, to wait for guiding to settle after issuing a dither command . If guiding has not settled by this time, a guiding error will be assumed

18.10 RoboGuide Advanced

The RoboGuide Advanced panel of the Guiding Setup workspace contains configuration options for the RoboGuide guiding function:

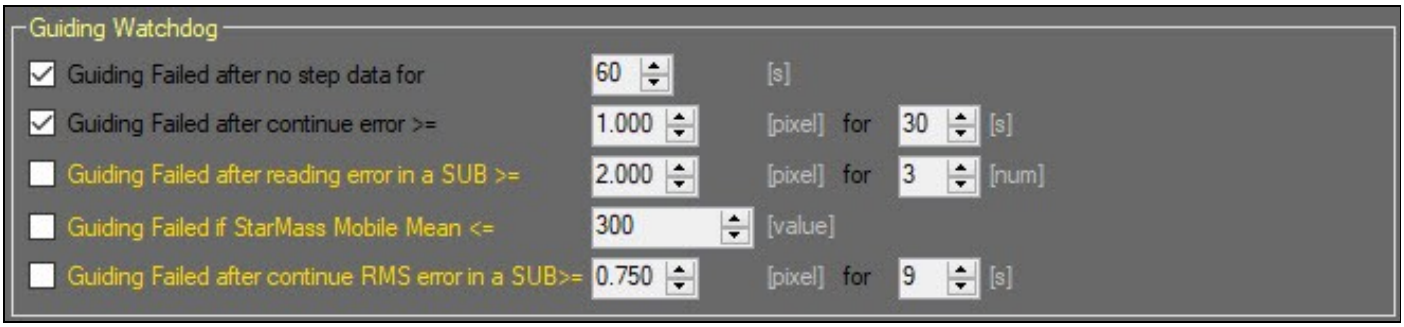


- **Min Distance From Border X**: If RoboGuide is selecting a guide-star, maintain at least this distance in pixels from the X-axis borders
- **Min Distance From Border Y**: If RoboGuide is selecting a guide-star, maintain at least this distance in pixels from the Y-axis borders

- **Force Use Saturated Stars**: If this box is checked, RoboGuide will use saturated stars as guide stars. If unchecked, RoboGuide will not choose a saturated star as a guide star. This can be useful at long focal lengths where you can find only a few stars and the best is saturated
- **Min HFD Allowed**: If RoboGuide is selecting a guide star, use stars with HFD (Half Flux Diameter) at least this big as measured in pixels
- **Override Guide Star Saturation ADU Value**: If checked, use the specified ADU value to determine which stars are saturated and should not be used for guide stars. By setting this to less than the maximum ADU value of your guide camera, you can force Voyager to choose dimmer guide stars that might improve your guiding

18.11 Guiding Watchdog

The Guiding Watchdog panel of the Guiding Setup workspace specifies parameters that determine if a guiding operation has failed.

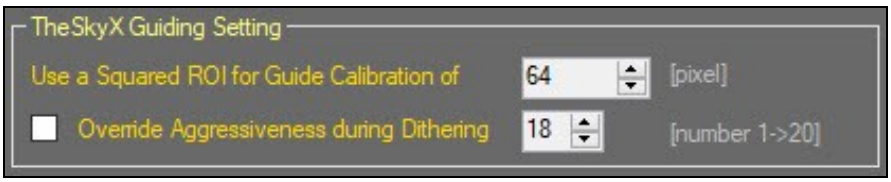


- **Guiding Failed after no step data for**: If checked, if the guiding system does not report any movement for the specified number of seconds, the guiding operation has failed
- **Guiding Failed after continue error >=**: If checked, if the guiding system reports errors of greater than or equal to the first value in pixels, for the second value of seconds, the guiding operation has failed
- **Guiding Failed after reading error in a SUB >=**: If checked, if the guiding system reports errors of greater than or equal to the first value in pixels, for the second value of sub-exposures, the guiding operation has failed
- **Guiding Failed if StarMass Mobile Mean <=**: If checked, if the guiding system reports that the StarMass's moving average is less than or equal to this value, the guiding operation has failed
- **Guiding Failed after continue RMS error in a SUB >=**: If checked, if the guiding system reports RMS errors of greater than or equal to the first value in pixels, for the second value of seconds, the guiding operation has failed

Choosing Guiding Watchdog values that are correct for your configuration is an excellent way to monitor how your imaging session is progressing.

18.12 TheSkyX Guiding Setting

TheSkyX Guiding Setting panel of the Guiding Setup workspace contains a configuration parameter that applies if you are using TheSkyX for guiding:



- **Use a Squared ROI for Guide Calibration of**: When calibrating the guider and guiding using TheSkyX, tell

it to use a ROI (Region of Interest) of this number of pixels squared.

- **Override Aggressiveness during Dithering:** If checked, use the value in the spinner box, a number between 1 and 20, to override the aggressiveness setting for dithering by TheSkyX. This was introduced to solve a problem with guided dithering using TheSkyX. See https://forum.starkeeper.it/t/voyager-daily-build-2-2-1a-for-tsx-users-changed-to-2-2-1b/918/20 for details.

18.13 MaximDL Work Around

The MaximDL Work Around panel of the Guiding Setup workspace contains configuration information if guiding is done via MaximDL:

- **Fake Star Faded**: Maxim shows in some versions a fake star faded message but the guide star is normally in the ROI. This is a workaround to try to avoid this message and continue guiding.

18.14 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup

19 Planetarium Setup

19.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

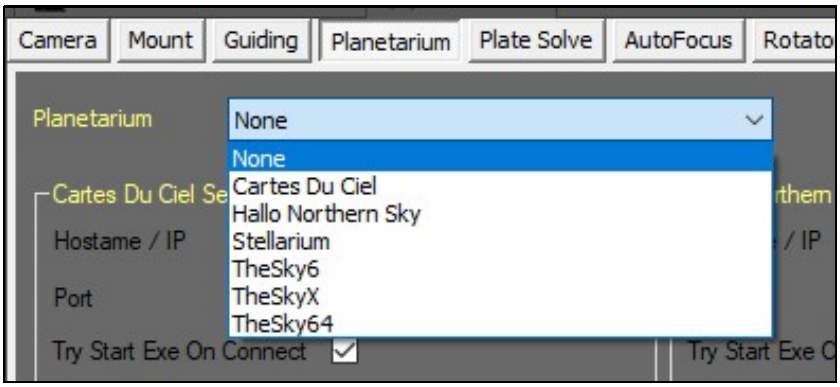
19.2 Planetarium Setup Workspace

The Planetarium Setup workspace informs Voyager about your Planetarium selection:

Voyager uses the planetarium to search object and retrieve target coordinate information. Center coordinate of map showed. Get coordinate of selected object in planetarium.

19.3 Planetarium Choice

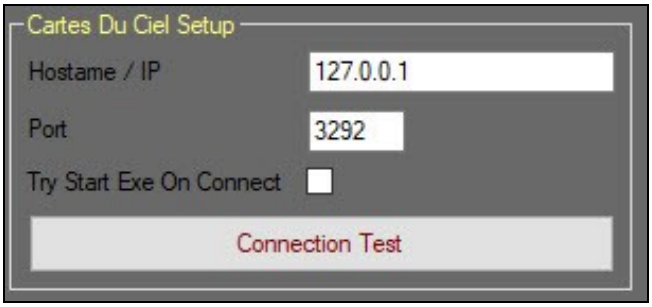
The Planetarium Choice area of the Planetarium Setup workspace is where you specify the planetarium software Voyager should use:



- Planetarium: Use the drop-down list to select your planetarium. Options include None, TheSkyX, TheSky6, Cartes Du Ciel and Hallo Northern Sky

19.4 Cartes Du Ciel Setup

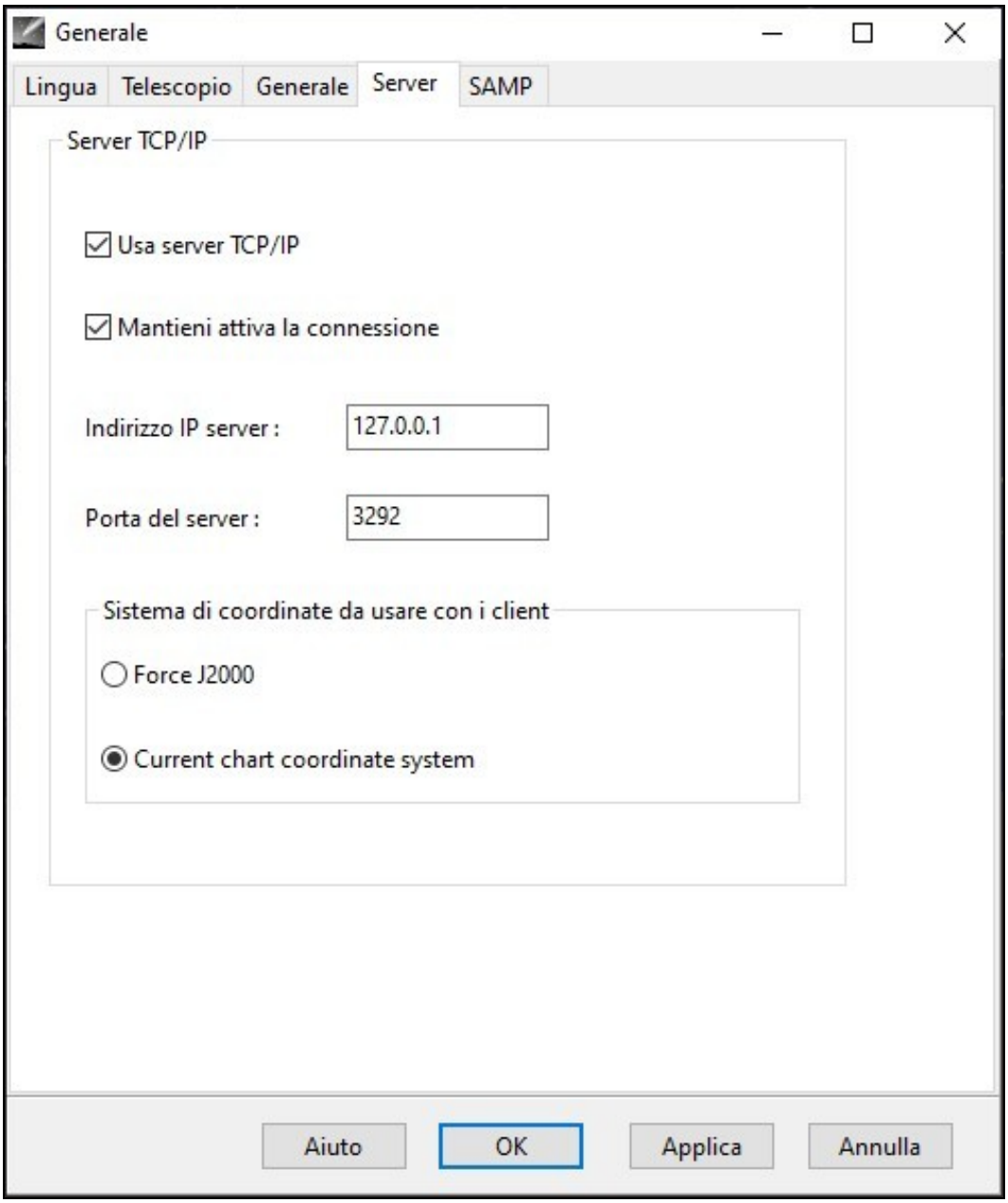
The Cartes Du Ciel panel of the Planetarium Setup workspace specifies how to reach the **Cartes du Ciel planetarium software**:



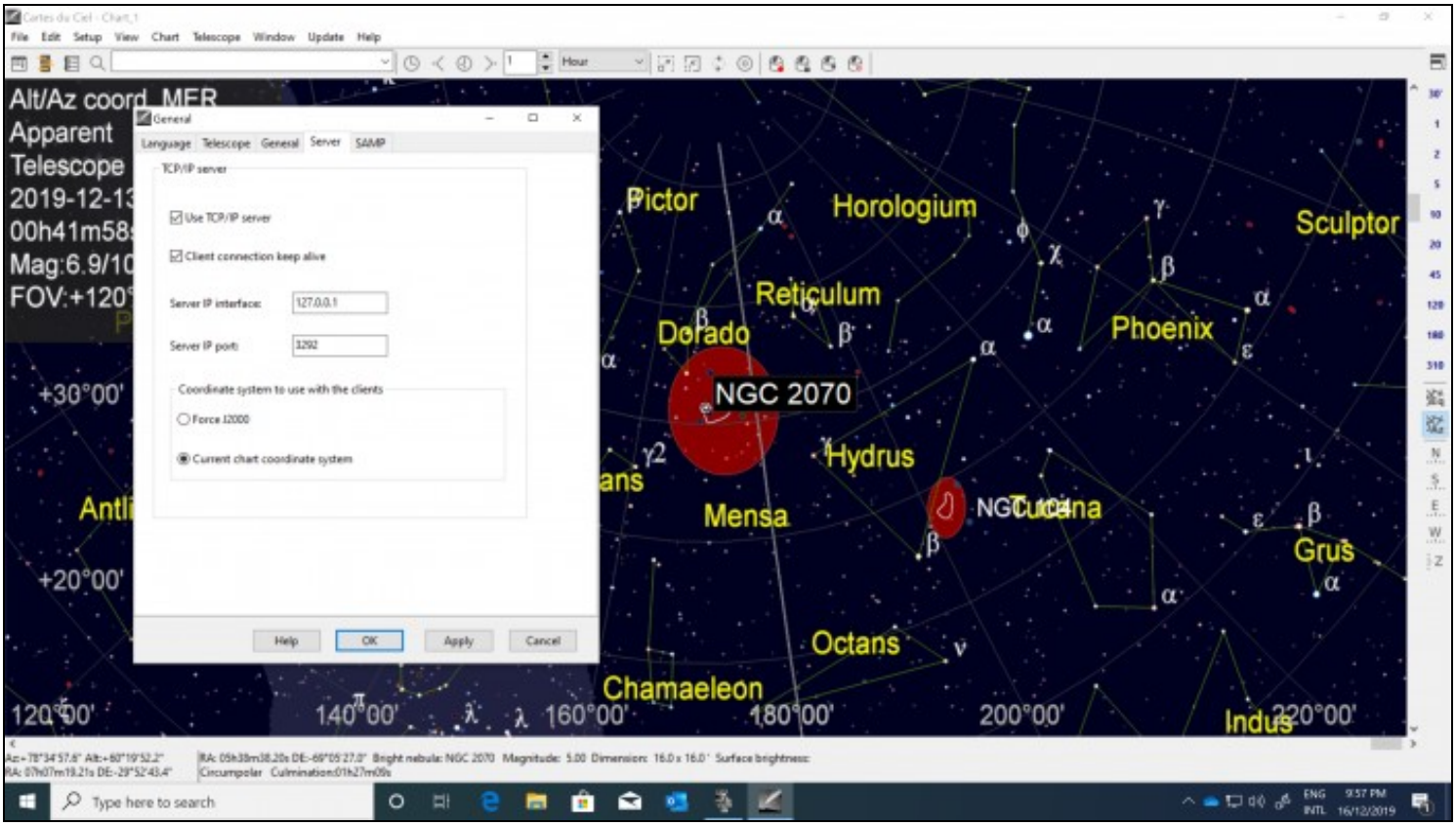
- **Hostname / IP:** The hostname or IP address of the machine hosting Cartes du Ciel
- **Port:** The port number of the Cartes du Ciel server
- **Try Start Exe On Connect:** If checked, attempt to start the Cartes du Ciel executable (program) when connecting the planetarium
- **Connection Test:** Enter the parameters in the previous fields and click Connection Test to see if Voyager can reach Cartes du Ciel using these parameters

Note: You must enable Cartes du Ciel's TCP/IP server for this to work.

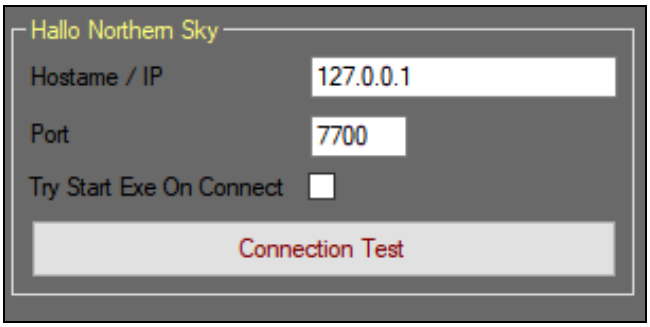
Go to Setup > General... > Server and check the Use TCP/IP server box. The port number in the Server IP port field must match the port number in Voyager's setup as shown above.



In the latest version of CdC the author added a change on Setting and default coord system is in JNow, please choose "Current Chart coordinates system" radio button.

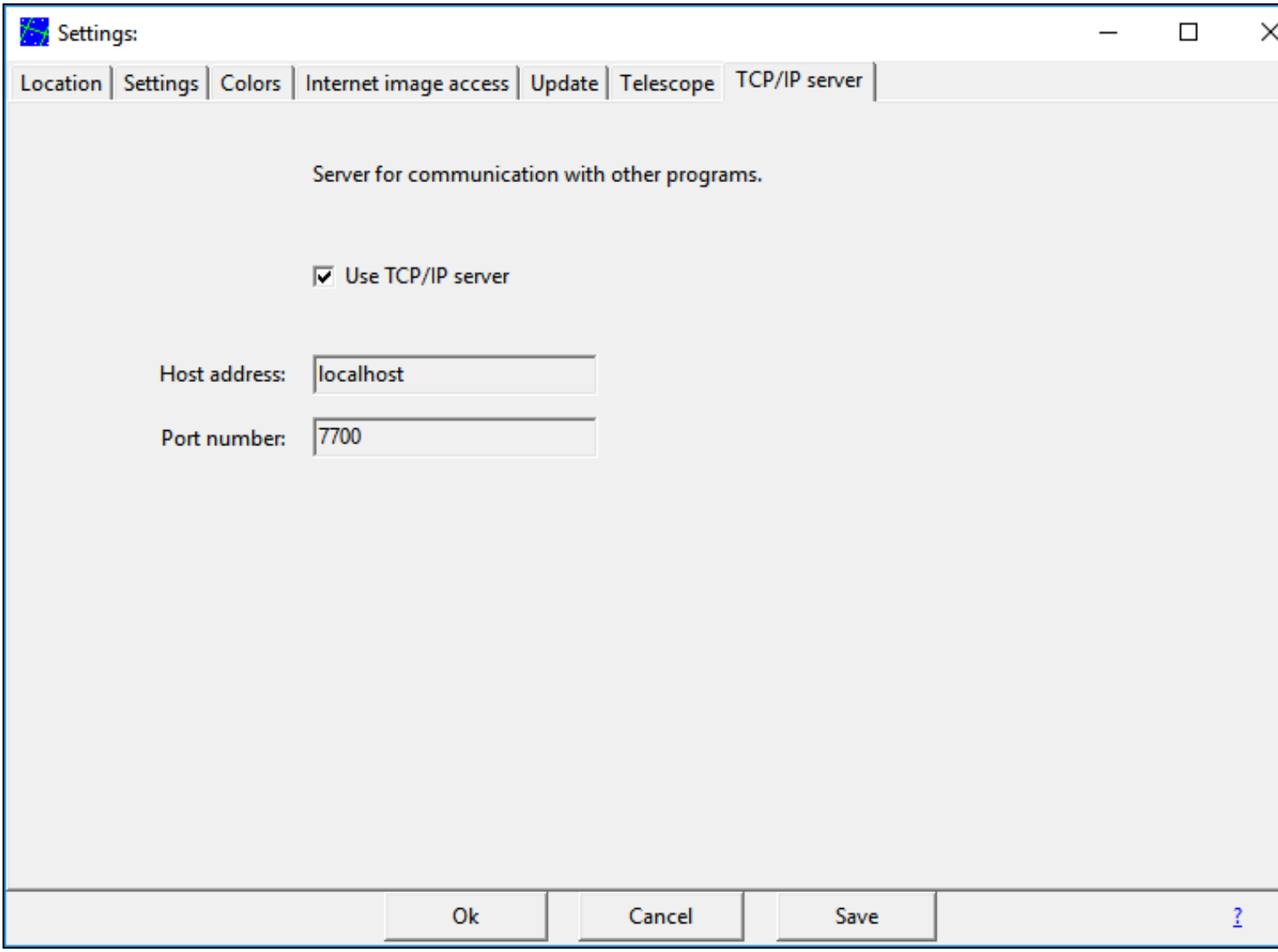


19.5 Hallo Northern Sky



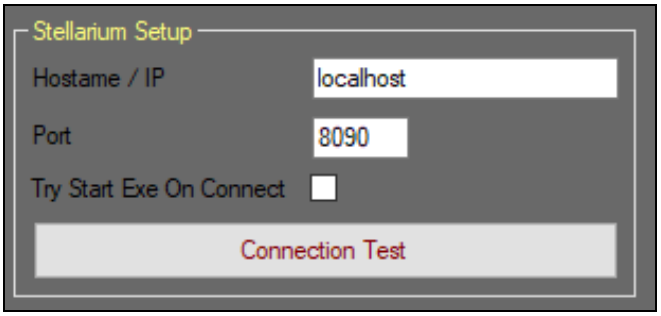
- **Hostname / IP:** The hostname or IP address of the machine hosting Hallo Northern Sky
- **Port:** The port number of the Hallo Northern Sky server
- **Try Start Exe On Connect:** If checked, attempt to start the Hallo Northern Sky executable (program) when connecting the planetarium
- **Connection Test:** Enter the parameters in the previous fields and click Connection Test to see if Voyager can reach Hallo Northern Sky using these parameters

Note - In Hallo Northern Sky's Settings dialog, you must enable "Use TCP/IP server" on the TCP/IP server tab. The port number on this tab must match the port in Voyager's setup for Hallo Northern Sky:



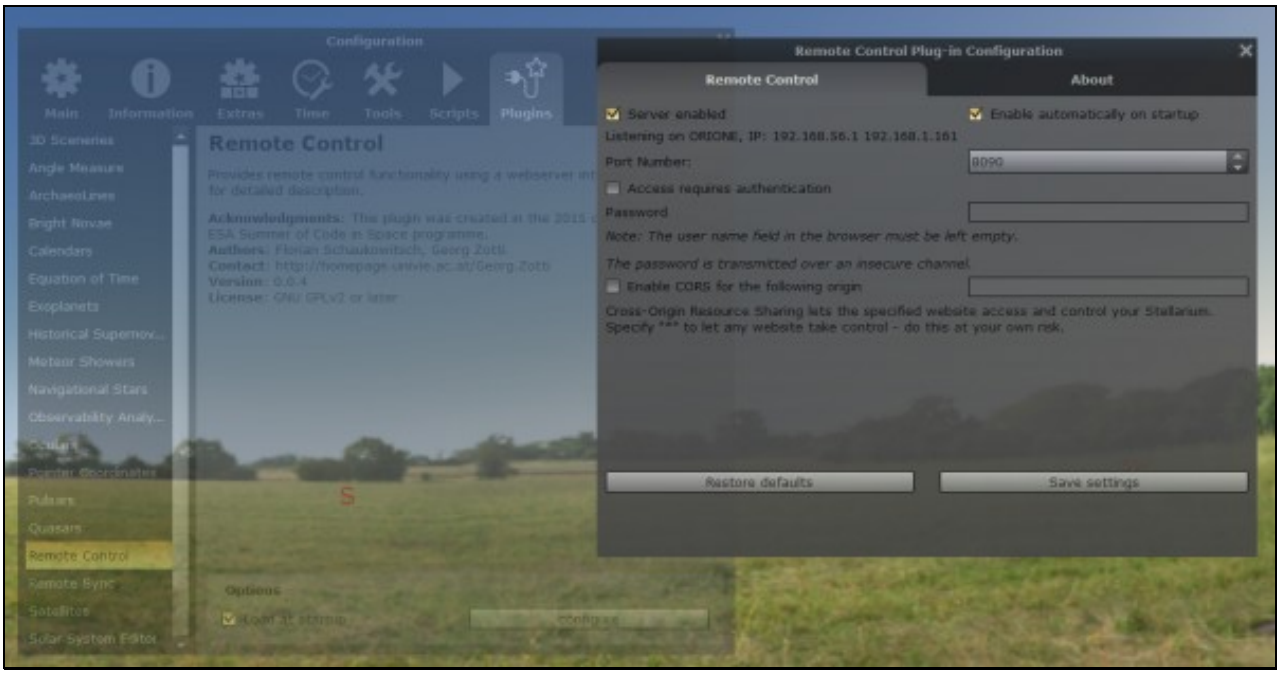
Important Note! If Voyager is unable to connect to your chosen planetarium program, check to make sure the program is running, its server is enabled, the port settings in the planetarium program's server setup match the port settings in Voyager, and finally - and very importantly! - make sure Voyager and your planetarium program are listed in your Windows Firewall and any anti-virus programs as allowed to communicate over the network.

19.6 Stellarium



- **Hostname / IP:** The hostname or IP address of the machine hosting Stellarium

- **Port:** The port number of the Stellarium server
- **Try Start Exe On Connect:** If checked, attempt to start the Stellarium executable (program) when connecting the planetarium
- **Connection Test:** Enter the parameters in the previous fields and click Connection Test to see if Voyager can reach Stellarium using these parametersConfigure in Stellarium the Remote Plugin:



Default port is 8090, restart Stellarium if necessary and unlock the firewall when requested.

19.7 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup

20 Plate Solve Setup

20.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

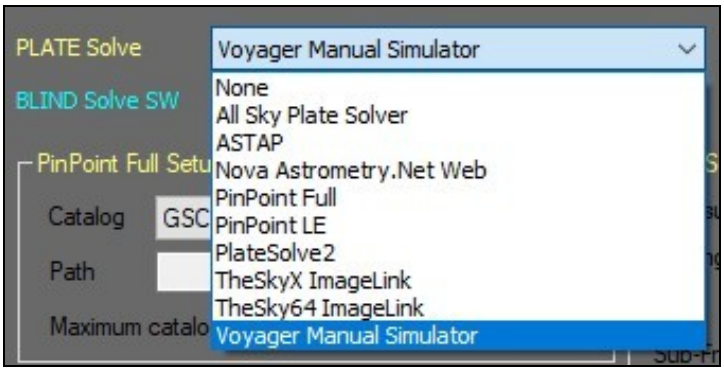
- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

20.2 Plate & Blind Solve Setup Workspace

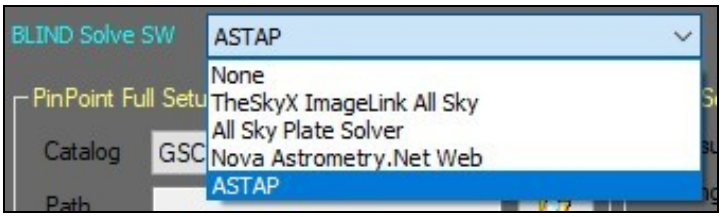
The Plate Solve Setup workspace contains configuration information for the various plate solving software that Voyager can use:

20.3 Plate & Blind Solve Software Choice

The Plate Solve panel of the Plate Solve Setup workspace is where you select your choice of plate solver and blind solver:



- **PLATE Solve**: Select the plate solve software that Voyager should use for plate solving when the field's RA and DEC is known (at least approximately). The choices include None, PinPoint Full, TheSkyX ImageLink, PinPoint LE, All Sky Plate Solver, PlateSolve2, Nova.Astrometry.Web and ASTAP.



- **BLIND Solve SW**: Select the software Voyager should use for blind solving when the field's RA and DEC are unknown. The choices include None, TheSkyX ImageLink All Sky, All Sky Plate Solver, Nova.astrometry.net and ASTAP.

PinPoint is a product of DC3 Dreams: http://pinpoint.dc3.com/

PinPoint LE is a limited edition of PinPoint, bundled with MaximDL: http://www.diffractionlimited.com

All Sky Plate Solver uses the astrometry.net engine and runs it on a local Windows system under Cygwin: http://www.astrogb.com/astrogb/All_Sky_Plate_Solver.html

TheSkyX ImageLink is a component of TheSkyX from Software Bisque: http://www.bisque.com/sc/pages/TheSkyX-Editions.aspx

PlateSolve2 is a product of Planewave Instruments: http://planewave.com/downloads/software/

Nova.Astrometry.Net is an online blind solver. It is very good at solving images but your image must be uploaded so it requires an Internet connection: http://nova.astrometry.net

ASTAP is a product of Han Kleijn : http://www.hnsky.org/astap.htm

Important Note! PointPoint LE does not work under some OS with certain antivirus and antimalaware programs. Also when using Voyager from TeamViewer the communication done for the remote control of Windows can compromise the ability of Voyager to talk with Maxim DL.

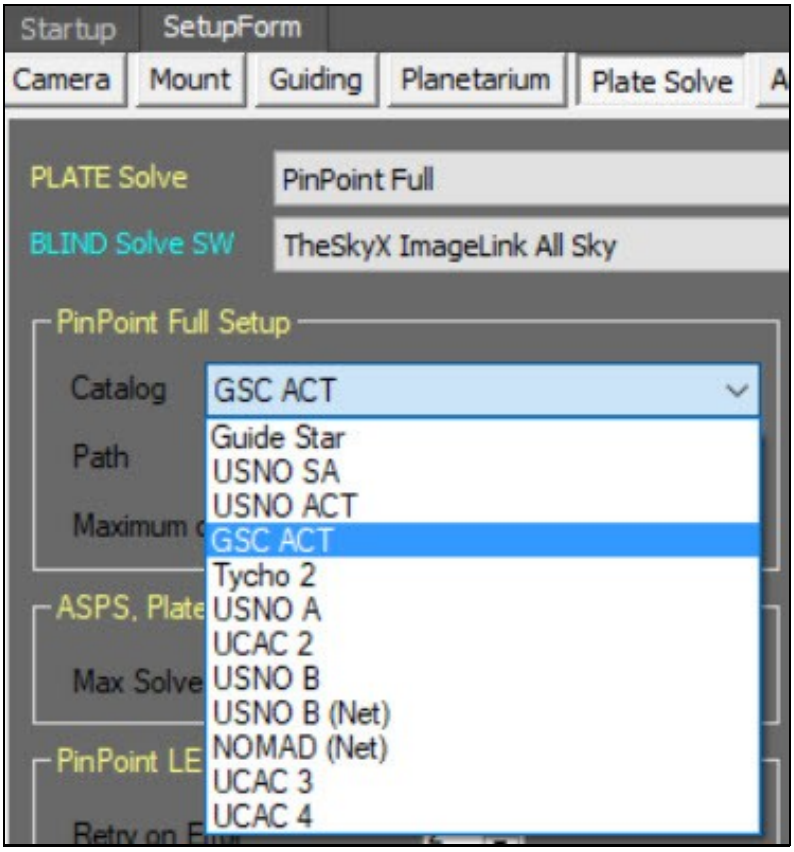
Important Note! In order to use TheSkyX ImageLink AllSky you must download from your Software Bisque subscription the AllSky Database and install in folder Documents\SoftwareBisque\Astrometry. After this operation please activate the flag "Use All Sky Image Link for scripted Imge link" in TheSkyX application, menù Tools->ImageLink tab AllSky

20.4 PinPoint Full Setup

The PinPoint Full Setup panel of the Plate Solve Setup workspace contains parameters needed if you use PinPoint Full version for plate solving:

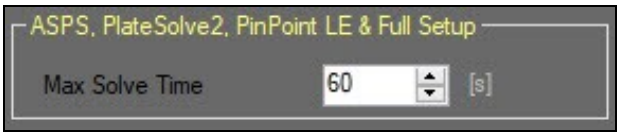
- **Catalog**: Choose the star catalog you want to use with PinPoint from the drop-down list. The catalog must be installed and accessible from PinPoint.
- **Path**: Click the folder icon to browse for the path where the selected star catalog is installed
- **Maximum catalog magnitude**: Magnitude of the dimmest star in the selected star catalog

Here's the list of catalogs usable by PinPoint:



20.5 ASPS, PlateSolve2, PinPoint LE & Full Setup

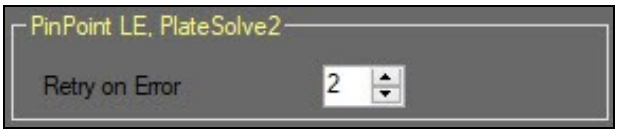
The ASPS, PlateSolve2, PinPoint LE & Full Setup panel of the Plate Solve Setup workspace contains parameters used by all these plate solve products. Note: ASPS = All Sky Plate Solver.



- **Max Solve Time**: Maximum time in seconds beyond which Voyager will consider the plate solve operation to have failed

20.6 PinPoint LE, PlateSolve2

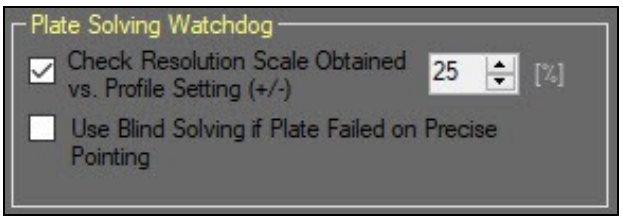
The PinPoint LE, PlateSolve2 panel of the Plate Solve Setup workspace contains parameters used by these plate solvers:



- **Retry on Error**: The number of times to retry the plate solve if it fails

20.7 Plate & Blind Solving Watchdog

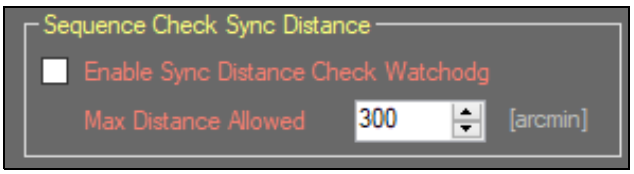
The Plate Solving Watchdog panel of the Plate Solve Setup workspace contains information used to verify information returned by the plate solver and whether to attempt failover to blind solving:



- **Check Resolution Scale Obtained vs. Profile Setting (+/-)**: If the checkbox is checked, then if the image resolution scale returned by the plate solver differs from the profile setting of image scale by this percentage or more, consider it an error
- **Use Blind Solving if Plate Failed on Precise Pointing**: Voyager uses plate solving to achieve precise pointing. If the checkbox is set, then if a precision pointing plate solve fails, try again using the blind solver.If you have blind solver we suggest to switch on this flag

20.8 Sequence Check Sync Distance

If enabled, this adds a new Sync watchdog to sequences which limit the maximum acceptable distance for which a sync can be done after plate solving.



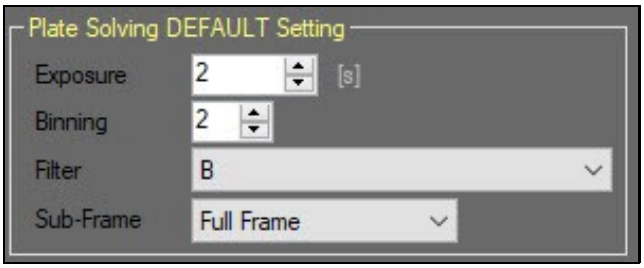
- **Enable Sync Distance Check Watchdog:** If checked, the sync distance watchdog for Sequences is enabled
- **Max Distance Allowed:** The maximum allowed distance between the current telescope position as reported by the mount and the position returned by plate solving for a sync to be done

In this example, if the Enable Sync Distance Check Watchdog checkbox were checked:

- If the distance between the telescope position reported by the mount and the position reported by plate solving is under 300 arc minutes, a sync would be done, otherwise the sync would not be done

20.9 Plate & Blind Solving DEFAULT Setting

The Plate Solving DEFAULT Setting panel of the Plate Solve Setup workspace contains default exposure settings for plate solving:



- **Exposure**: Length of plate solve exposures in seconds
- **Binning**: Binning of plate solve exposures
- **Filter**: Filter to use for plate solve exposures
- **Sub-Frame**: Size of frame to use for plate solve exposures: Full Frame, Half Frame or Quarter Frame. For a wide field scope or big sensors, sometimes a smaller field will give better plate solving results

20.10 Precision Pointing

Voyager can either do a simple slew or Goto to a target using its RA and DEC coordinates, or perform Precision Pointing.

- **Goto**: Voyager sends a command to the mount to slew to the specified RA and DEC coordinates. With a simple slew or goto, Voyager does not verify that the correct target was reached and is centered in the frame; it relies on the mount's pointing model to have successfully moved to the specified coordinates
- **Precision Pointing**: Voyager commands the mount to slew to the specified RA and DEC coordinates, and then verifies and re-slews if necessary until the mount is pointing to the specified RA and DEC within your chosen error tolerance
    1. Command the mount to slew to the specified RA and DEC coordinates
    2. Take an exposure of the length specified in Plate Solving DEFAULT Setting
    3. Plate solve the image from (2); if the plate solve operation fails and the Use Blind Solving if Plate Failed on Precise Pointing setting is checked, try a Blind Solve operation
    4. Sync the mount if sync is allowed by the user specified setting in the Management panel of Mount Setup: Not Sync (Pointing Model Running)
    5. Calculate the error between the requested and actual RA and DEC coordinates
    6. If the error is greater than the maximum allowed specified error in Mount Setup, command the mount to move by the amount of the error and go to step (2)

If the pointing error exceeds the the maximum allowed specified error in Mount Setup, Precision Pointing is tried up to three times. If the maximum allowed error is still exceeded after three tries, the precision pointing operation will end with either an ERROR or OK status, depending on the setting of the "Use the best performance after finished pointing retries" flag in Mount Setup. If this flag is not checked, an ERROR is raised. If the flag is checked, an OK status is returned even though the mount did not achieve an error less than that specified as the maximum allowed.

Precision Pointing can be done from many places in Voyager, such as during a Sequence, in a DragScript, and from OnTheFly actions.

20.11 TheSkyX ImageLink

TheSkyX ImageLink panel of the Plate Solve Setup workspace contains parameters needed if you are using TheSkyX ImageLink for plate solving:

- **Use Unknown Resolution Scale Flag**: If checked, Voyager will set the "unknown resolution scale" flag when requesting TheSkyX ImageLink to perform a plate solve action. This flag may result in TheSkyX taking longer to perform a plate solve so it is better to use the image scale if you know it

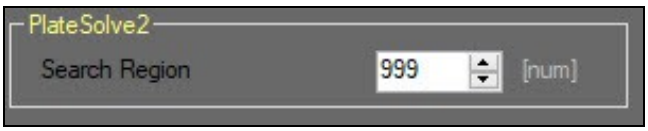
20.12 All Sky Plate Solver

The All Sky Plate Solver panel of the Plate Solve Setup workspace contains parameters needed if you are using All Sky Plate Solver for plate solving:

- **Near Radius Solve**: ASPS will look within a radius of this many degrees to find a solution to the image when used as a plate solver

20.13 PlateSolve2

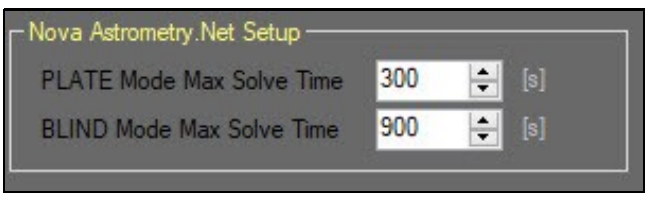
The PlateSolve2 panel of the Plate Solve Setup workspace contains parameters needed if you are using PlateSolve2 for plate solving:



- Search Region: Number of regions PlateSolve2 will search before giving up and returning an error for the plate solve operation

20.14 Nova.Astrometry.Net Setup

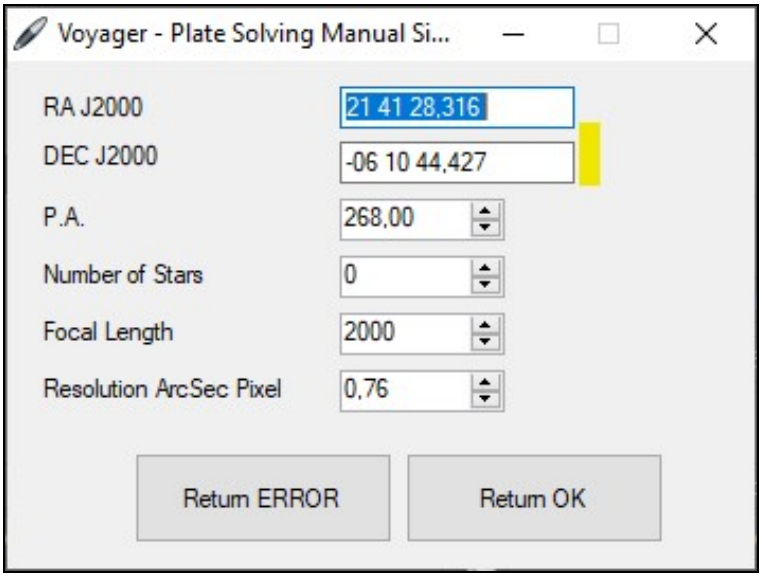
The Nova.Astrometry.Net Setup panel of the Plate Solve Setup workspace contains parameters needed if you are using Astrometry.net for plate solving:



- **PLATE Mode Max Solve Time**: Maximum elapsed time in seconds allowed for Astrometry.net to run a plate solve operation before considering the operation to have failed
- **BLIND Mode Max Solve Time**: Maximum elapsed time in seconds allowed for Astrometry.net to run a blind plate solve operation before considering the operation to have failed

20.15 Voyager Manual Simulator

The Voyager Manual Simulator isn't a real plate solve engine. Voyager when call this simulator will open a windows form where the user can edit in input the data of solving solution, this until the default timeout:



- **RA J2000**: string format of RA J2000 solved (center of plate) like solution
- **DEC J2000**: string format of DEC J2000 solved (center of plate) like solution
- **PA**: position angle like solution
- **Number of Stars**: simulate a number of stars like solution
- **Focal Length**: focal lenght like solution
- **Resolution ArcSec Pixel**: resolution of 1 pixel in arc seconds like solution

Important Note! Default data are presented reading directly from the FIT header and from profile running. RA and DEC match the RA and DEC saved in the FIT

20.16 Other Setup Pages

```
? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
```

Setup
SQM Setup
Viking Setup
Voyager Remote
Voyager Setup
Weather Setup
WEB Dashboard Setup

21 AutoFocus Setup

21.1 AutoFocus Setup Video

There is a video on setting up AutoFocus on the Voyager Astro Imaging YouTube Channel

21.2 AutoFocus Setup Workspace

The AutoFocus Setup workspace is where you store settings for Voyager's autofocus operations:

21.3 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

21.4 Avoid different Thickness Filter Set

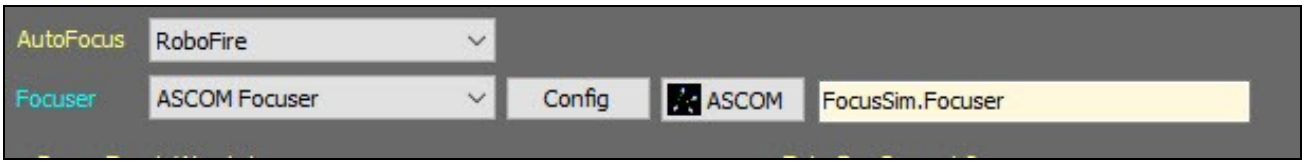
Using filter with different thickness is something to avoid. This cause focus shift between set of filters and can cause autofocus failure.

If unfortunately you are in this situation you can mitigate this in Voyager by:

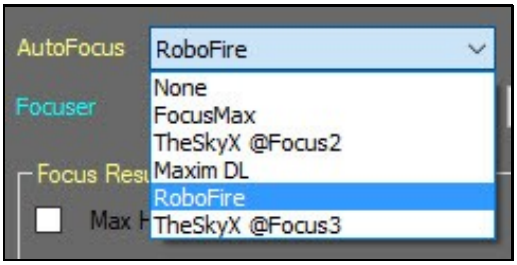
- create and use a dedicated profile for narrow band filter without broadband filters
- in the sequence override the plate solve fitler with one narrow filter and increase binning and exposure time for solving (https://wiki.starkeeper.it/index.php/Sequence_Configuration#Plate_Solving_Tab)
- change the **Near Focus** setting of RoboFire increasing for how much is needed to recognize the HFD value when you switch to narrow filter and for sure not using LocalField autofocus (https://wiki.starkeeper.it/index.php/AutoFocus_Setup#VCurve_Mode_Tab). At start of focus an HFD lower than Near Focus parameter will abort the focus process.

21.5 AutoFocus Choice

Select the AutoFocus program you want to use at the top of the AutoFocus Setup workspace:



- AutoFocus: Select the autofocus program from the options in the drop-down list



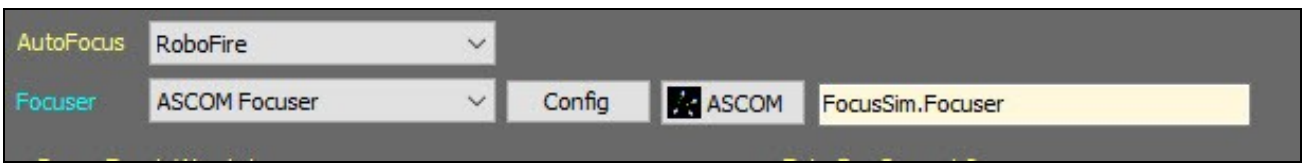
- Available selections include None, FocusMax, TheSkyX @Focus2, Maxim DL, RoboFire, and TheSkyX @Focus3

- FocusMax is a product of CCDWare: http://www.ccdware.com/products/focusmax/
- TheSkyX has two autofocus routines: @Focus2 and @Focus3. TheSkyX is a product of Software Bisque: http://www.bisque.com/sc/pages/TheSkyX-Editions.aspx
- Maxim DL is a product of Diffraction Limited: http://diffractionlimited.com/product/maxim-dl/
- RoboFire is Voyager's proprietary autofocus function, and has two options: RoboFire VCurve mode (focusing on a single star), and RoboFire LocalField (multi-star focus)

Important Note! RoboFire Autofocus doesn't allow use of focuser with relative driver movements mode ... only absolute ASCOM driver
Important Note! RoboFire Autofocus is not compatible (at now) with Baader SteelDrive focusers

21.6 Focuser Choice

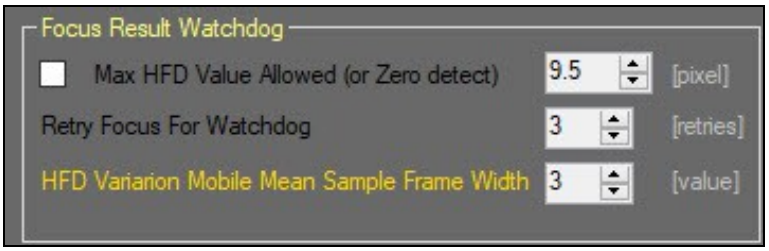
If you choose RoboFire for autofocus, you must select ASCOM Focuser from the Focuser drop-down, and then click the ASCOM button to select the focuser. Click the Config button to modify the ASCOM focuser's settings:



If you use any of the other autofocus options, you must set up the focuser in those programs, not in Voyager.

21.7 Focus Result Watchdog

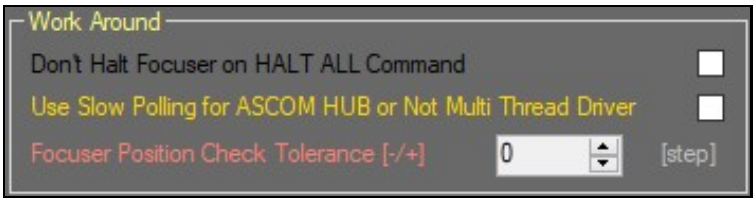
The Focus Result Watchdog panel in the AutoFocus Setup workspace has several parameters controlling whether an autofocus operation is considered successful:



- **Max HFD Value Allowed (or Zero detect)**: If checked, specify the maximum HFD (Half Flux Diameter) value in pixels beyond which the autofocus operation is considered to have failed
- **Retry Focus For Watchdog**: The number of times an autofocus routine will be tried before giving up
- **HFD Variation Mobile Mean Sample Frame Width**: The number of HFD values ??obtained from the autofocus action to be used for the calculation of the moving average. The value of the moving average will be used by the HFD watchdog during the Sequence at the end of each autofocus to validate the result obtained in percent.

21.8 Work Around

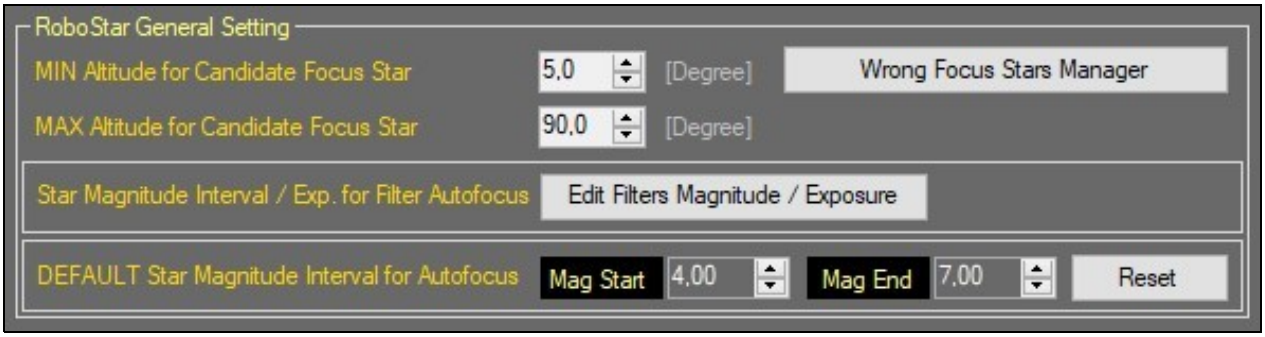
The Work Around panel in the AutoFocus Setup workspace contains a parameter to prevent focuser motion from stopping after a HALT ALL command:



- **Don't Halt Focuser on HALT ALL Command**: If checked, when a HALT ALL command is issued, which normally stops all motion, do not stop the focuser if it is moving. This is needed because sending HALT to some focuser drivers cause them to move the drawtube to the zero position.
- **Use Slow Polling for ASCOM HUB or Not Multi Thread Driver**: If checked, adds a delay between requests to the ASCOM focuser HUB driver. This may help for autofocus drivers that are not multi-threaded or have trouble responding quickly enough to Voyager's requests. Leave off unless needed.
- **Focuser Position Check Tolerance [-/+]**: If non-zero, when Voyager commands the focuser to move to a position, the move will be considered successful if the ending step value is within this many steps plus or minus from the commanded value. I.e., if a tolerance of 5 is specified, a focuser goto 1000 command will succeed if the ending position is any value between 995 and 1005. By default, this is zero and focuser commands will return an error is the ending value is different from the commanded value. It is recommended to use a value of 0 here unless your focuser has difficulty going to the commanded position, which is unusual but has been seen in some focusers. Less than optimal focus may be obtained if this value is non-zero

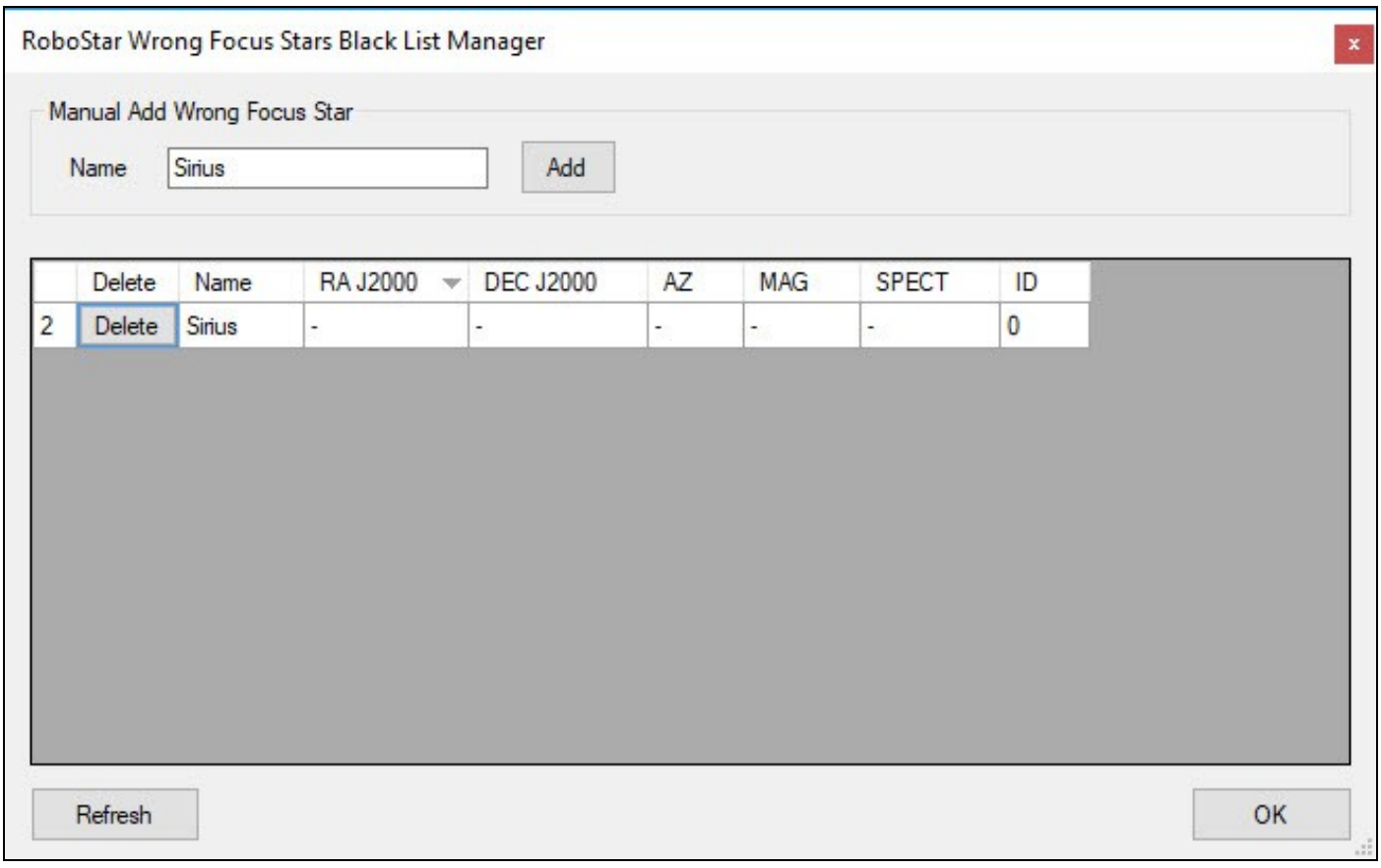
21.9 RoboStar General Setting

The RoboStar General Setting panel in the AutoFocus Setup workspace contains parameters for Voyager's RoboStar operation, which automatically selects a focus star:

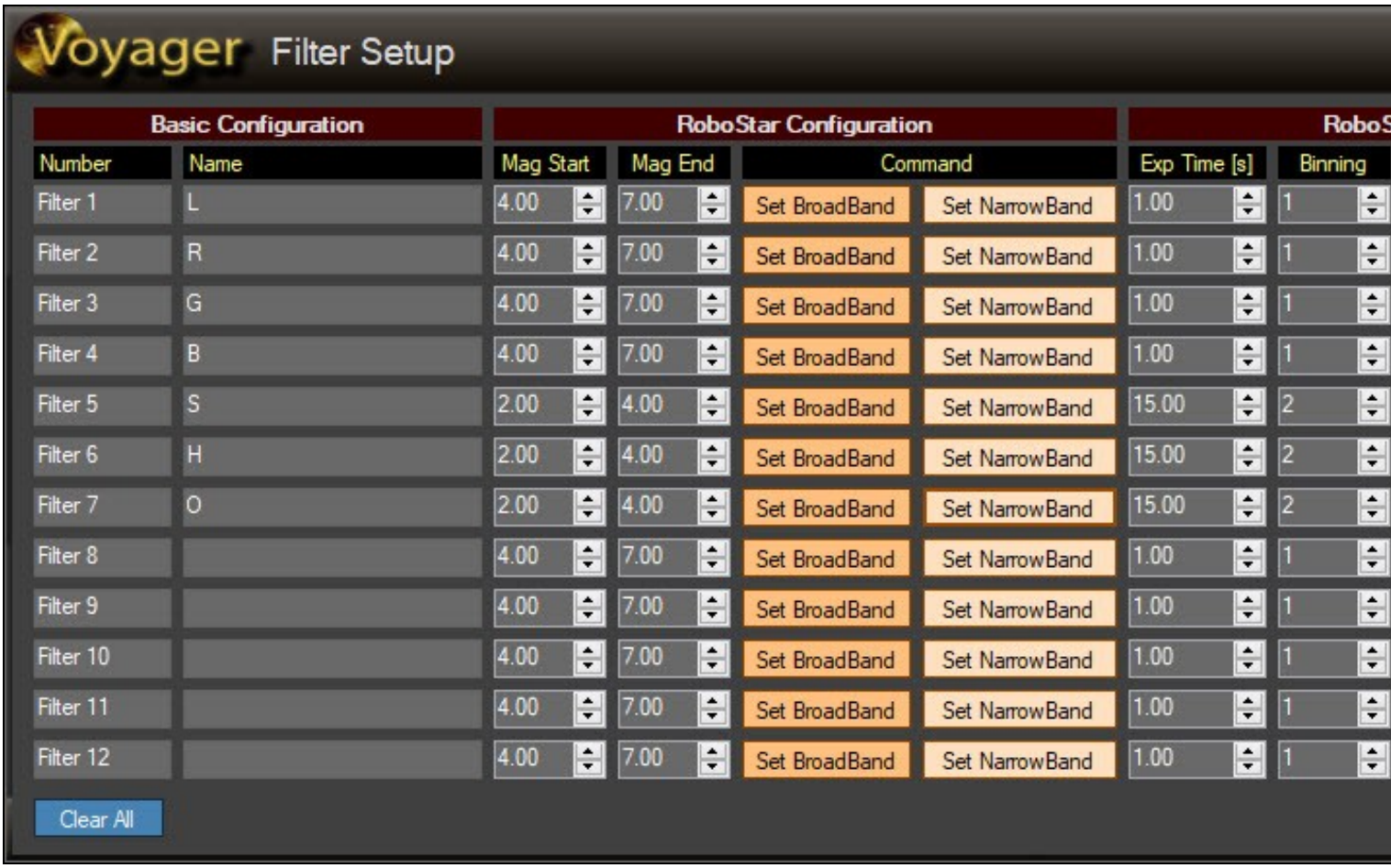


- **MIN Altitude for Candidate Focus Star**: Minimum altitude allowed for the focus star when chosen by RoboStar for a VCurve AutoFocus. A star lower than this value will not be considered.
- **MAX Altitude for Candidate Focus Star**: Maximum altitude allowed for the focus star when chosen by RoboStar for a VCurve AutoFocus. A star higher than this value will not be considered.
- **Wrong Focus Stars Manager**: Click this button to bring up the RoboStar Wrong Focus Stars Black List Manager. Add stars to this list that you do not want used as focus stars. For example, a double star may not work as a focus star and could be listed here. To add a star to the list, type its name in the Name field, click the Add button, and click OK. Just add the name, and if that name exists, Voyager will add the star to the black list and also display the data for any other blacklisted stars

Important Note! As of Voyager 2.1.1e, you can bring up the Wrong Focus Stars manager at any time, even when a sequence is running, by clicking the Wrong Focus Stars button on the Tools and Editor ribbon



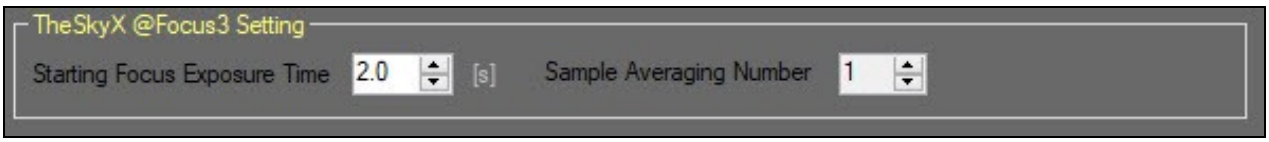
- **Star Magnitude Interval / Exp for Filter Autofocus**: Click the Edit Filters Magnitude / Exposure button to bring up the **Filter Setup** dialog where you can specify the dimmest and brightest stars to be used by the RoboStar routine when searching for a focus star. You can also specify the exposure time and binning for each filter, as well as whether or not to use each filter during a RoboFire LocalField autofocus operation during a sequence.



- Documentation for the Filter Setup dialog is here: **Filter Setup**
- **DEFAULT Star Magnitude Interval for Autofocus**: Specify the magnitude range to be used for focus stars, from the brightest (Mag Start) to the dimmest (Mag End). Click the Reset button to restore the default magnitudes.

21.10 TheSkyX @Focus3 Setting

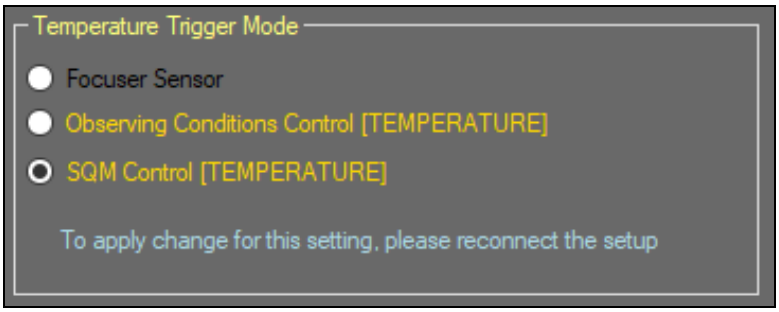
The TheSkyX @Focus3 Setting panel in the AutoFocus Setup workspace contains parameters for TheSkyX @Focus3



- **Starting Focus Exposure Time**: Exposure length in seconds to be used by TheSkyX's @Focus3 autofocus routine
- **Sample Averaging Number**: The number of exposures to take at each focuser position by TheSkyX's @Focus3 autofocus routine

21.11 AutoFocus Temperature Trigger Mode

Contains options for selecting the temperature data source to select for generating the autofocus trigger

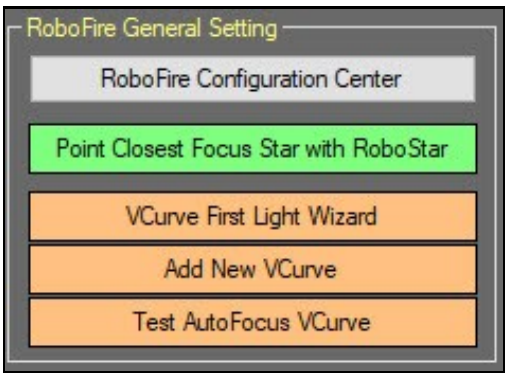


- **Focuser Sensor**: this is the default option. Data about temperature for generate the trigger for AutoFocus will be readed from focuser temperature sensor
- **Observing Conditions Control [TEMPERATURE]:** with this option the data about temperature for generate the trigger for AutoFocus will be readed from the observing conditions control configured in Voyager, and exactly reading the TEMPERATURE variable in the data set
- **SQM Control [TEMPERATURE]:** with this option the data about temperature for generate the trigger for AutoFocus will be readed from the SQM control configured in Voyager. Be sure your SQM driver are of tupe observing conditions or reports this features.

Important Note! In case of absence or failure of the Observing Conditions Control or SQM Control, Voyager will switch automatically to the focuser sensor for generating the trigger.

21.12 RoboFire General Setting

The RoboFire General Setting panel in the AutoFocus Setup workspace contains important RoboFire autofocus settings and controls, including RoboFire configuration, VCurve First Light Wizard and management, and a live action to find the closest focus star using RoboStar:



- RoboFire Configuration Center: Click this button to bring up the RoboFire Configuration Center tabbed dialog, described below in the RoboFire Configuration Center documentation

21.13 RoboFire VCurve vs. LocalField: Which to Use When?

Voyager has two different autofocus methods: VCurve (single-star) and LocalField (multiple-star).

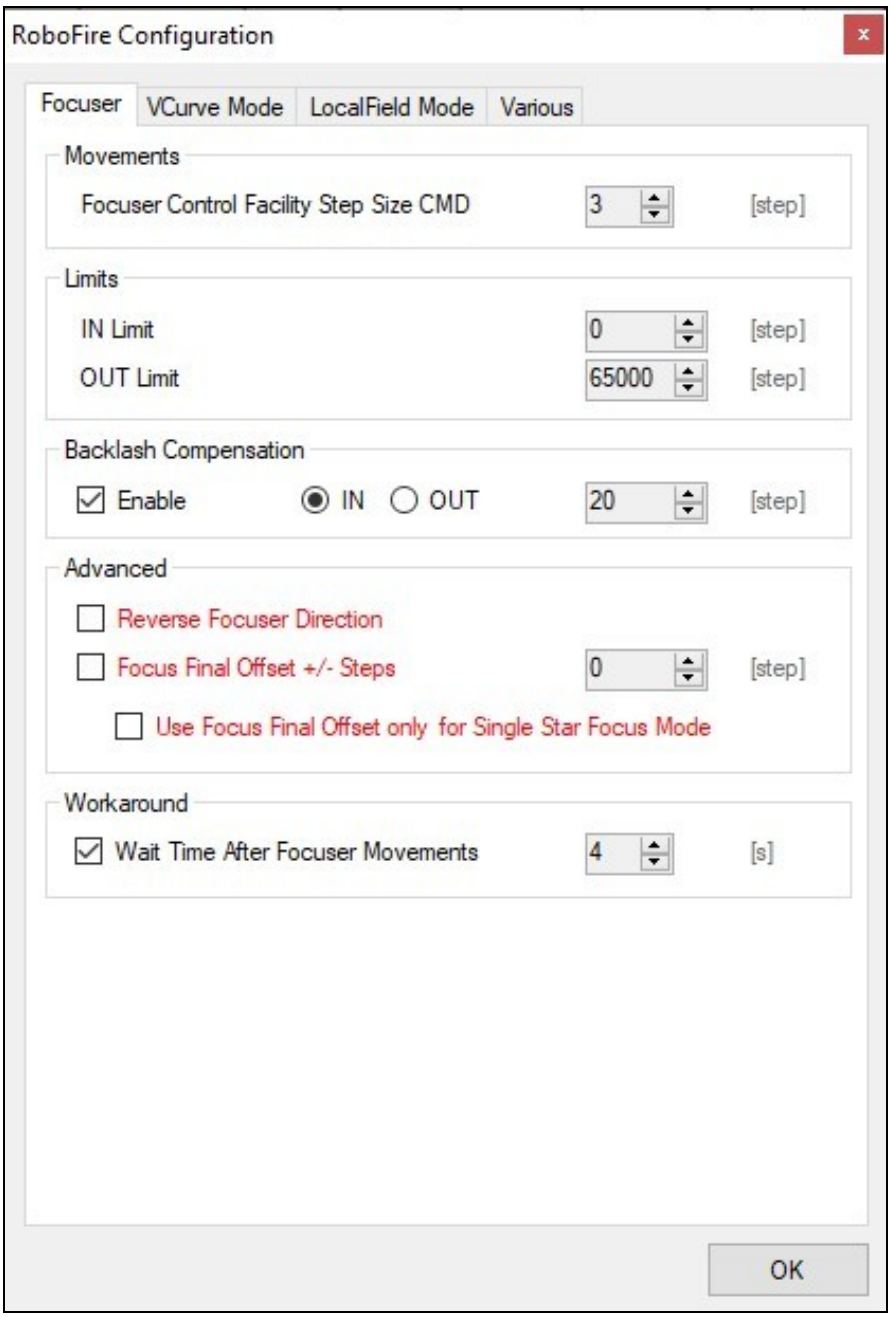
- VCurve: VCurve autofocus is done on a single star at the center of the field of view. VCurve works best when your optics are flat - the focal point is the same across the field - or when the region of interest is in the center of the field in a portion that is flat or close to flat (same focus). For example, this is a good choice for small galaxies and planetary nebulae.
- LocalField: LocalField autofocus optimizes the average focus (HFD: Half Flux Diameter) of multiple stars across the entire field. If your optics are not flat - there is some variation across the field - and your region of interest spans the field, LocalField will give you the best focus across the entire image. For example, this is a good choice for large nebulae or star clusters taking up the entire field.

Important Note! If you decide to use LocalField focus evaluate to activate also the Realign to target flag in the Sequence Guide and Dithering tab, This to avoid drift of image if your mount are not perfect aligned. This is true especially for highr res setup

21.14 RoboFire Configuration Center

Voyager's RoboFire autofocus function is configured from the RoboFire Configuration Center panel of the AutoFocus Setup workspace. Click the RoboFire Configuration Center button to bring up the tabbed dialog box.

21.14.1 Focuser Tab



- **Focuser Control Facility Step Size CMD**: Number of focuser steps to move for each click of the "<" and ">" small move buttons in the RoboFire Focuser command widget . The Large Move buttons "<<IN" and ">>OUT" move this number of steps x5.
- **Limits:**
  - **IN Limit**: The minimum position (furthest in) of the Focuser in steps
  - **OUT Limit**: The maximum position (furthest out) of the Focuser in steps
- **Backlash Compensation**:

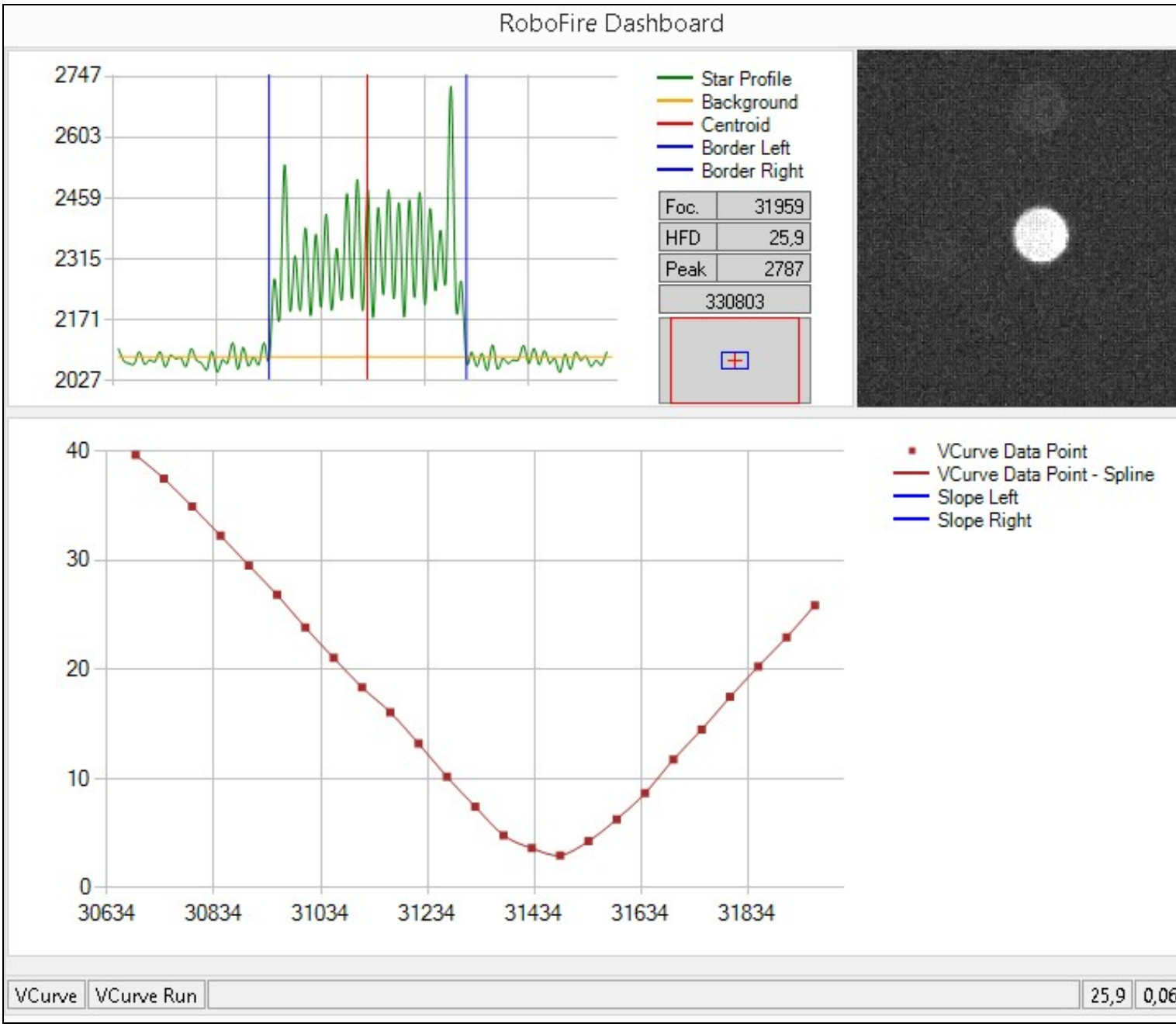
- **Enable**: Check this box to enable backlash compensation. Some focusers have "backlash," which is what happens when you reverse focuser direction and the focuser doesn't move for a number of steps because the mechanism has a bit of "play" when changing direction
- **IN/OUT**: If the Enable box is checked, the IN/OUT radio buttons control when backlash compensation is applied, either when moving IN or OUT. IN means backlash compensation will be done when the focuser receives a command to move IN (a compensation value will be added to the requested value in the IN direction and after the IN move is finished a move OUT will be done by the same compensation value)
- **Steps**: Set the number of focuser steps of backlash compensation to apply. If the Enable box is checked, RoboFire autofocus will command the focuser to move this many steps when reversing focuser direction to compensate for backlash

- **Advanced:**
  - **Reverse Focuser Direction**: If checked, Voyager will treat the focuser position as reversed from normal, i.e. a smaller position number is further out, and larger numbers are further in. Please only check this setting if you are sure, as it could cause damage to your equipment if set incorrectly.
  - **Focus Final Offset +/- Steps**: If checked, Voyager adds / subtracts this value of steps when an autofocus operation is terminated with success. This option allows you to manage optics with a zonal defect or a collimation problem that cannot be fixed
  - **Use Focus Final Offset only for Single Star Focus Mode**: if checked and Focus Final Offset +/+ Steps option is checked the offset will be added if the current focus running is a single star type
- **Workaround:**
  - **Wait Time After Focuser Movements:** if check a delay after the focuser movements will be applied. Expressed in seconds.

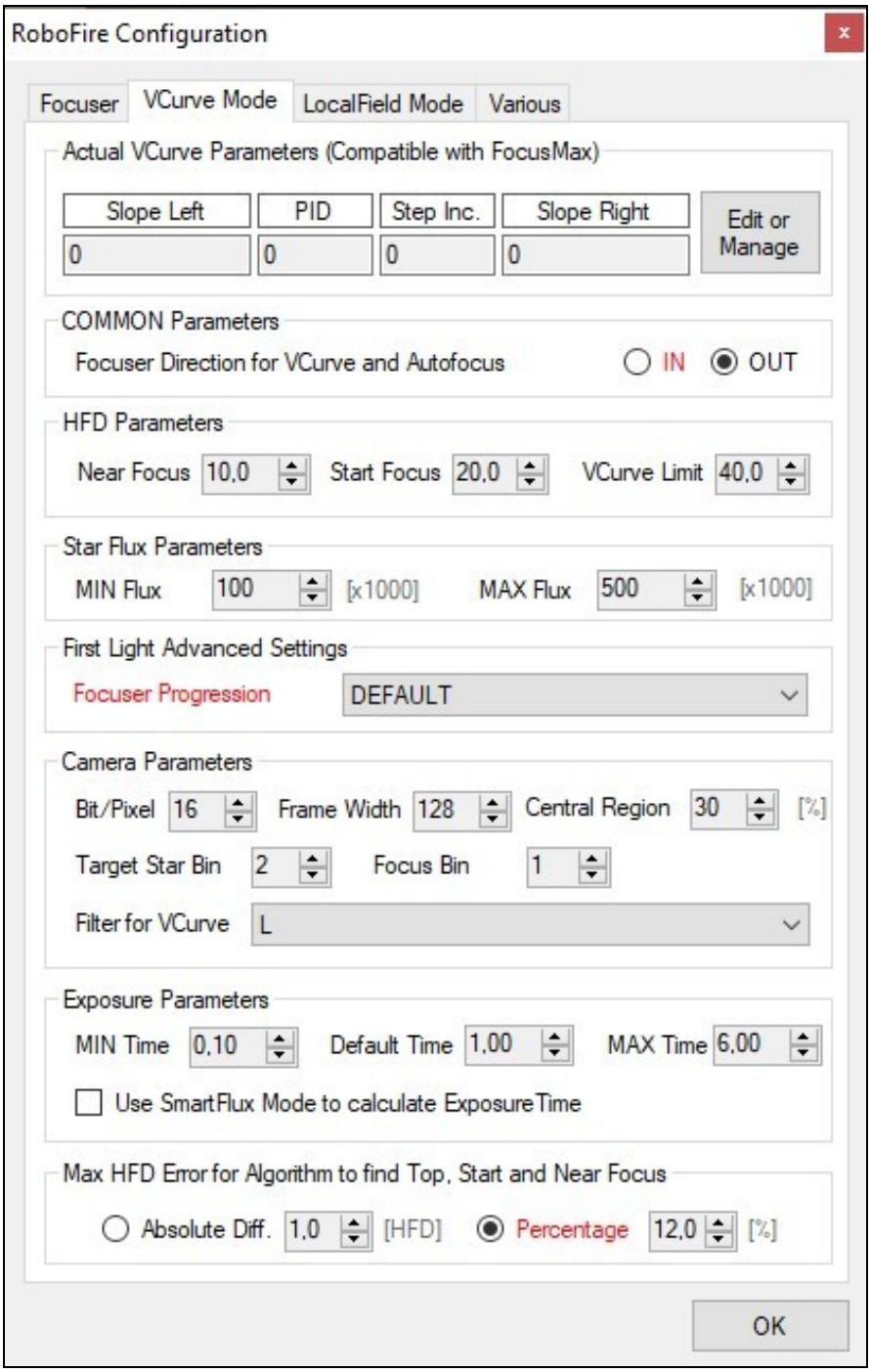
21.14.2 VCurve Mode Tab

Voyager's RoboFire single star autofocus works by creating a "V Curve" representing HFD (a star's Half Flux Diameter or "size") vs. focuser position. You should run the VCurve First Light Wizard to create an initial VCurve, and the Add New VCurve operation to run additional VCurves. Running multiple VCurves can improve autofocus accuracy. The buttons you click to run these VCurve functions are in the AutoFocus Setup workspace.

VCurve from a RoboFire autofocus run

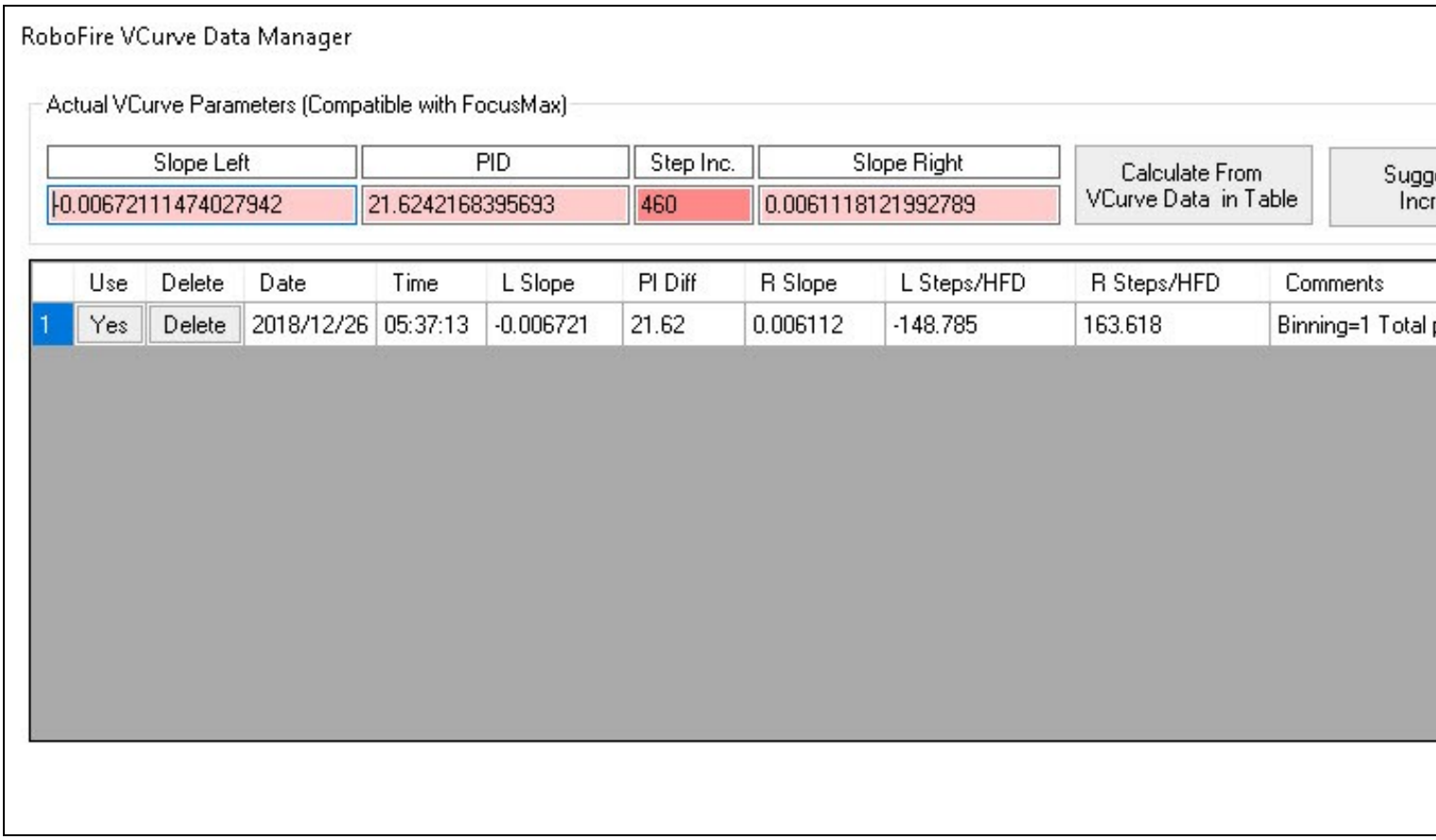


Continuing with the RoboFire Configuration dialog, the second tab is the VCurve Mode Tab, filled out with some values from running the VCurve First Light Wizard on an actual system. The values you see will look different.



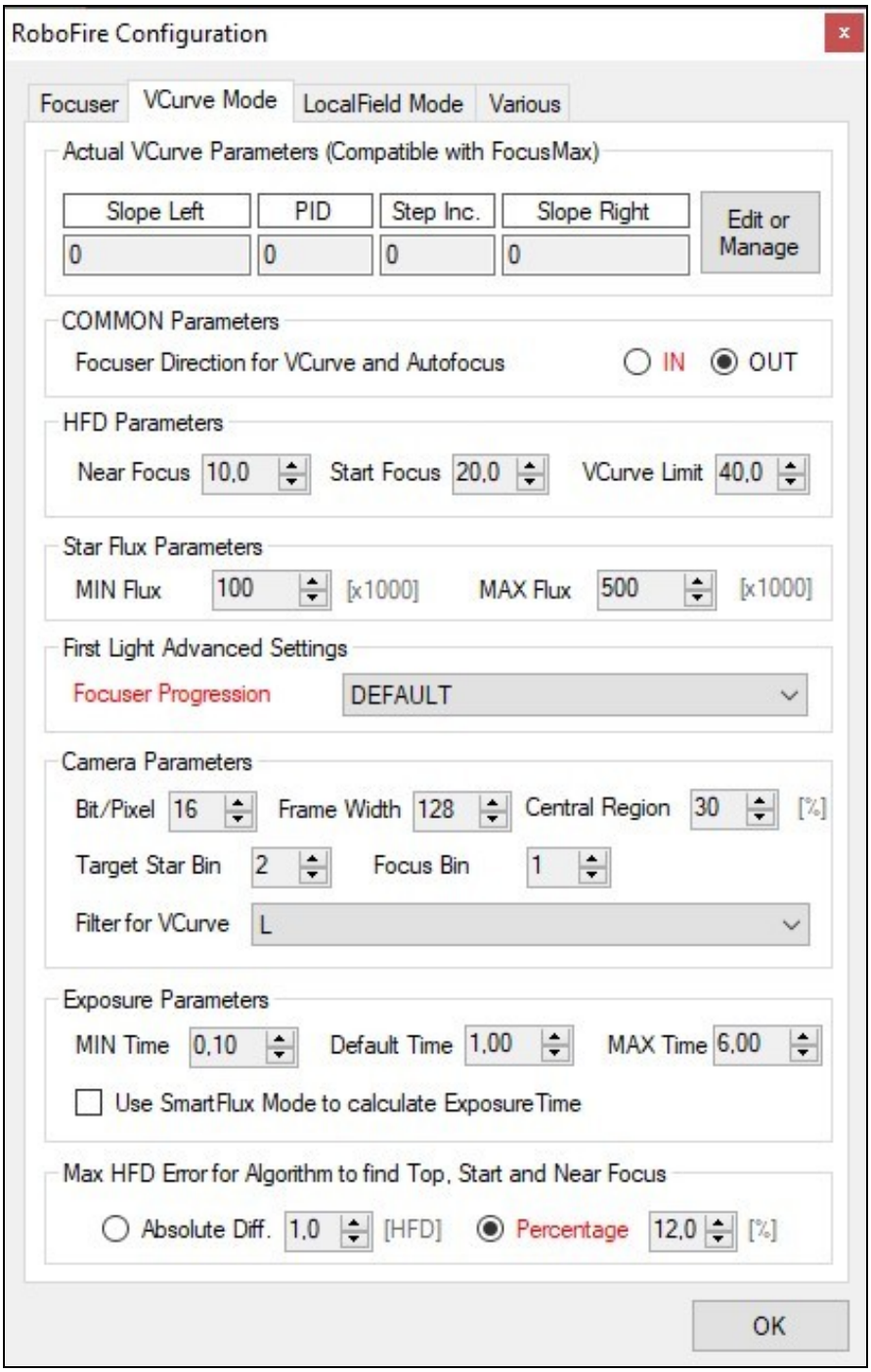
- **Actual VCurve Parameters (Compatible with FocusMax):** If you have values from running VCurves with CCDWare's FocusMax product using the same focuser and optical system, you can manually enter them here.
  - **Slope Left**: The slope of the left portion of the VCurve
  - **PID**: (Position Intercept Difference): The number of focuser steps between the X-axis intercept points (where the Half Flux Diameter is zero) of the left and right VCurve lines. The smaller this value, the steeper the V Curve lines.
  - **Step Inc**: The number of focuser steps between each measured point on the VCurve
  - **Slope Right**: The slope of the right portion of the VCurve

Click the Edit or Manage button in the Actual VCurve Parameters panel to bring up the RoboFire VCurve Data Manager. The Data Manager shows the current VCurve parameters being used by RoboFire autofocus and the values from runs of the VCurve First Light Wizard and any runs of the Add New VCurve function.



- **Actual VCurve Parameters (Compatible with FocusMax)**: If you have computed a VCurve with Voyager, the VCurve parameters are shown here. If you have values from CCDWare's FocusMax using the same focuser and optical system, you can type them in here.
- **Calculate from VCurve Data in Table**: Click this button to calculate VCurve parameter values based on the rows in the Data Manager table below the button. Only rows with a "Yes" value in the "Use" column are included in the computation.
- **Suggest Step Increment**: The Step Increment is the number of focuser position steps moved between VCurve measurements. If you have data entered in the Actual VCurve Parameters table and are not sure of the proper step increment, click this button for a recommendation. Type the recommended value into the Step Inc. field to use it in RoboFire autofocus operations.
- **Validate Manual Values**: Click this button to verify that the values you entered in the Actual VCurve Parameters fields make sense. This doesn't guarantee proper autofocus results; it only checks the values for mathematical or logical inconsistencies.
- **Use/Delete Buttons**: Click the button in the Use column of the VCurve Data table to toggle between "Yes" and "No." Only rows with "Yes" in this column are used when you click "Calculate from VCurve Data in Table.
- **Comment**: The Comments field is populated when you run Voyager's VCurve operations. Click the Comment button in the VCurve data table row to edit the comment.

Returning to the RoboFire Configuration dialog, VCurve Mode tab:



- **COMMON Parameters**:
  - **Focuser Direction for VCurve and Autofocus**: IN / OUT: Click this radio button to define the direction the focuser should move when performing a VCurve autofocus operation.
- **HFD Parameters**: HFD is the Half Flux Diameter of the focus star
  - **Near Focus**: HFD value to use when running the Near Focus part of the autofocus routine. During the Near Focus routine, multiple measurements are taken of the focus star to establish its HFD, which is then used to determine where the focuser is on the VCurve. Once this position is established, the number of steps needed to reach the middle of the VCurve (in focus) can be determined.
  - **Start Focus**: The HFD of the focus star at which to start the autofocus operation
  - **VCurve Limit**: The HFD value at the beginning and end of the VCurve
- **Star Flux Parameters**:
  - **MIN Flux**: Minimum (dimmest) flux of the focus star. The number entered is multiplied by 1000 to determine the minimum star flux

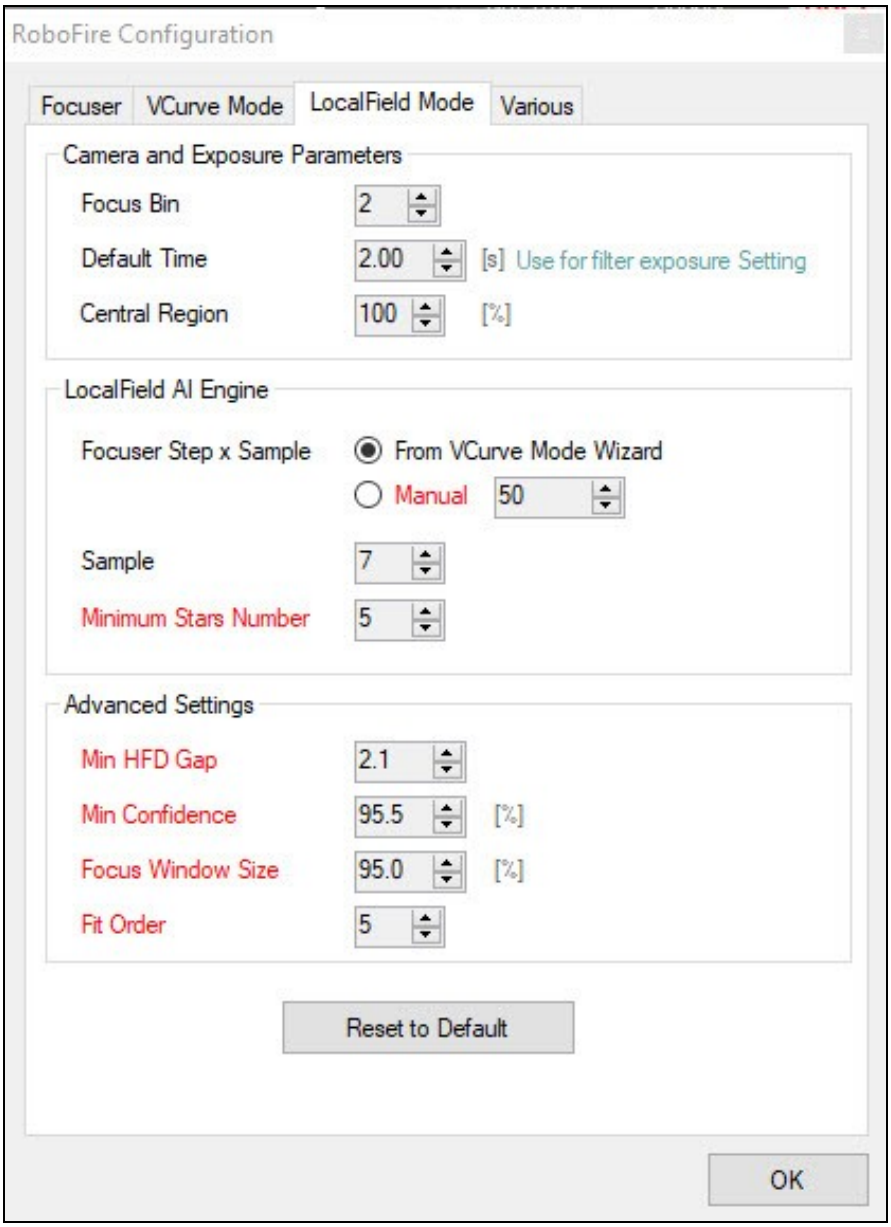
- **MAX Flux**: Maximum (brightest) flux of the focus star. The number entered is multiplied by 1000 to determine the maximum star flux

- **First Light Advanced Settings:**
  - **Focuser Progression:** RoboFire Automata use a logaritmic search of position in power of 2 (1,2,4,8,16,32... focuser steps). If you focuser resolution is Low change the resolution of Progression from Default up to Low and Very Low Resolution. Lower is the resolution selected smaller will be the increment during the slope search in the First Light Wizard. Use it if you experience too big change in interval used by RoboFire with fast override of max HFD value in VCurve Limit Parameter. RoboFire need to find at least 3 point between the HFD Parameters selected inside the interval defined between Near Focus and VCurve Limit to allow slope calculation. Otherwise an error will be raise for few points usable for slope calculation.
- **Camera Parameters**:
  - **Bit/Pixel**: BIts per pixel of the imaging camera's sensor
  - **Frame Width**: Width in pixels of the autofocus frame - the focus star must stay in this frame during the autofocus operation. Maximum size is 1024 pixels
  - **Central Region**: The percentage of the overall camera frame used as the central region. Focus stars must be within this region
  - **Target Star Bin**: The binning used for the exposures taken to find the target star when RoboStar is used to find a suitable focus star
  - **Focus Bin**: The binning used for exposures taken during autofocus
  - **Filter for VCurve**: Filter used for exposures taken while building a VCurve
- **Exposure Parameters**:
  - **MIN Time**: The shortest allowed exposure time, in seconds, for autofocus. The RoboFire autofocus routine will adjust the exposure time between the MIN and MAX to try to find a time that achieves the desired star flux parameters
  - **Default Time**: This is the exposure time, in seconds, used for the initial image taken by the RoboFire autofocus routine
  - **MAX Time**: The longest allowed exposure time, in seconds, for autofocus. The RoboFire autofocus routine will adjust the exposure time between the MIN and MAX to try to find a time that achieves the desired star flux parameters
- **Max HFD Error for Algorithm to find Top, Start and Near Focus**:
  - RoboFire autofocus will take successive exposures and compare the resulting HFD's, looking for the values to converge within the specified error amount (either Absolute Diff or Percentage)
  - Click one of the radio buttons - either the one before Absolute Diff or the one before Percentage - to select how the Max HFD (Half Flux Diameter) Error is determined
  - **Absolute Diff**: If the radio button for this choice is selected, the maximum HFD error allowed is this number expressed in pixels
  - **Percentage**: If the radio button for this choice is selected, the maximum HFD error allowed during autofocus is this percentage

21.14.3 LocalField Mode Tab

The LocalField Mode tab of the RoboFire Configuration dialog of the AutoFocus setup workspace contains parameters used by RoboFire's LocalField autofocus operation. LocalField autofocus is a multiple star focusing routine which finds the focuser position that minimizes the average HFD (Half Flux Diameter) of multiple stars in the autofocus exposures.

Prior to Voyager 2.1.1e, the LocalField tab looked like this: (see below for the new one)

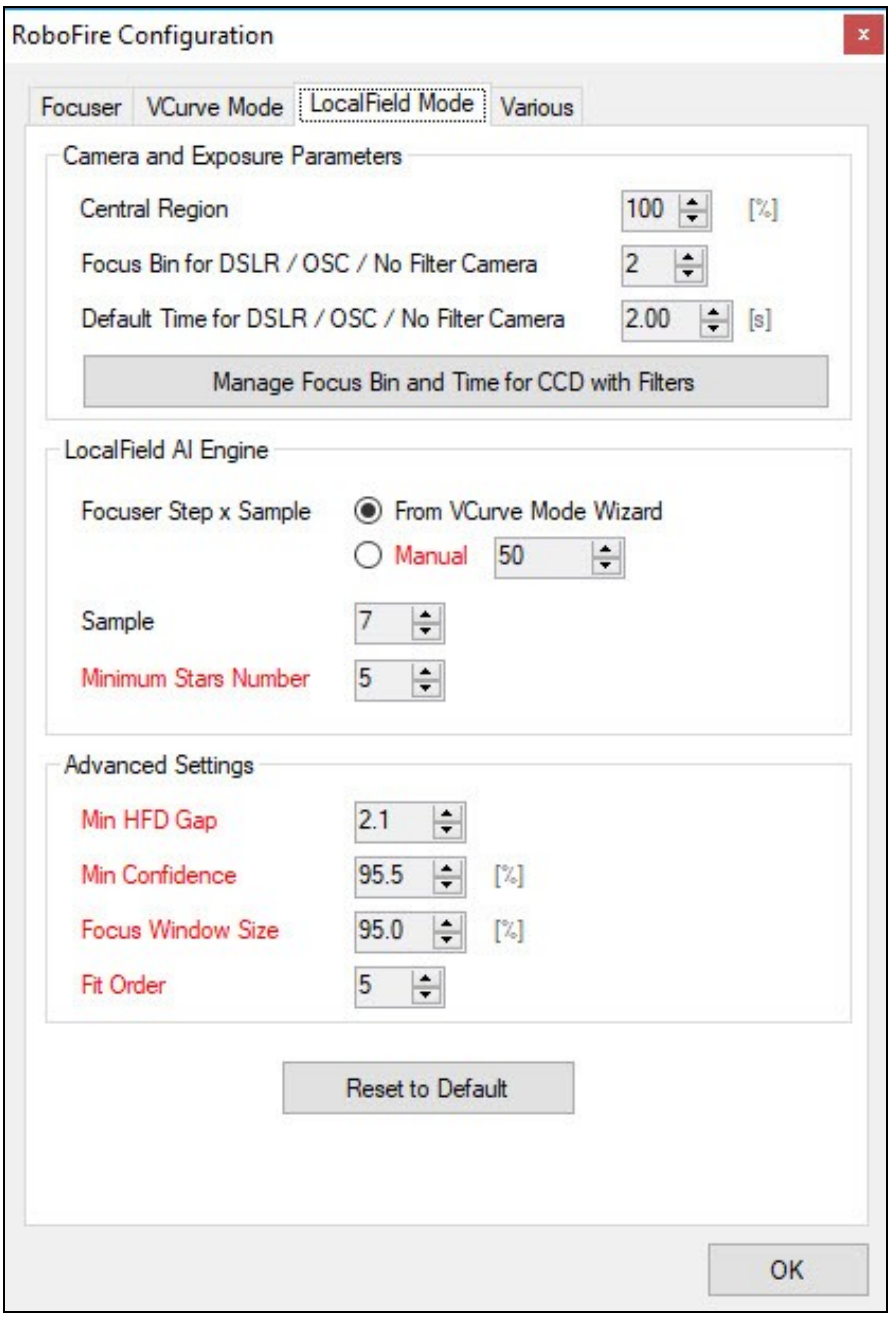


- **Camera and Exposure Parameters**
  - **Focus Bin**: The binning used for LocalField autofocus exposures
  - **Default Time**: The exposure length in seconds of LocalField autofocus exposures. For the individual filter exposure times, use the Filters Setup Dialog
  - **Central Region**: The percent of the image's central region used by the LocalField autofocus operation
- **LocalField AI Engine**:
  - **Focuser Step x Sample**:
    - **From VCurve Mode Wizard**: Choose this radio button to use the step size from the RoboFire VCurve settings. The step size is the number of steps to move the focuser between autofocus exposures
    - **Manual**: Choose this radio button to enter the step size manually
  - **Sample**: The number of exposures to take during the LocalField autofocus operation. One sample is taken at each focuser position
  - **Minimum Stars Number**: LocalField autofocus will require at least this number of stars in each exposure to be successful
- **Advanced Settings**:
  - **Min HFD Gap**: a minimum pixel gap from the minimum value of HFD and maximum value of HFD found during the LocalFIeld sampling
  - **Min Confidence**: The minimum statistical confidence percentage to consider autofocus successful

- **Focus Window Size**: The percentage of the image (Central Region of CCD) used during the autofocus routine
- **Fit Order**: Curve FIT order in AI analysis of results

- **Reset to Default**: Reset all LocalField Mode settings to Voyager's defaults

As of Voyager 2.1.1e, the labels in the LocalField setup tab have been changed to make them easier to understand:



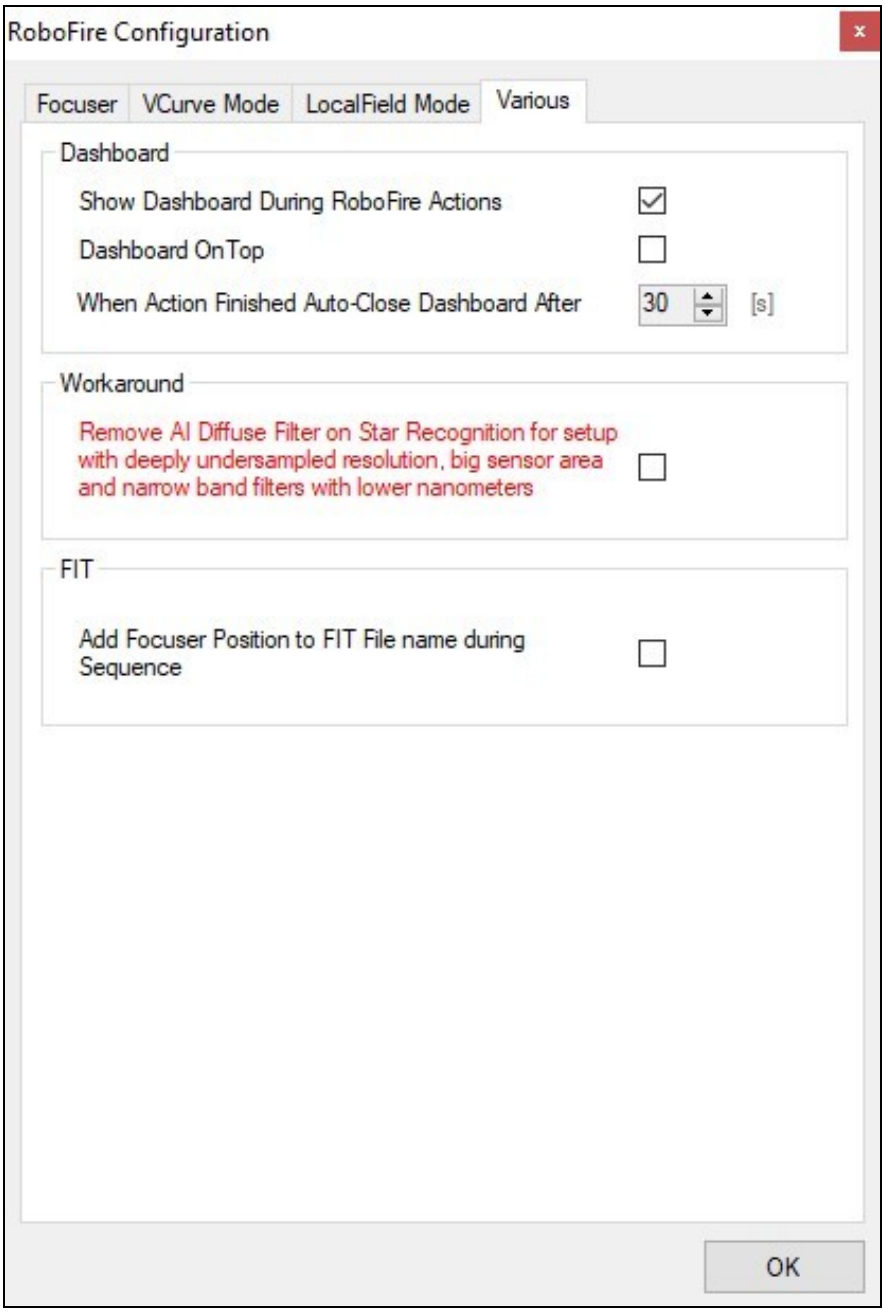
- **Camera and Exposure Parameters**
  - **Central Region**: The percent of the image's central region used by the LocalField autofocus operation. **Reduce this percentage if you are getting out of memory errors during LocalField autofocus**
  - **Focus Bin for DSLR/OSC/No Filter Camera**: The binning used for LocalField autofocus exposures IF you are using a DSLR, One Shot Color or any camera without filters
  - **Default Time DSLR/OSC/No Filter Camera**: The exposure length in seconds of LocalField autofocus exposures IF you are using a DSLR, One Shot Color or any camera without filters

- **Manage Focus Bin and Time for CCD with Filters:** If you are using a mono camera with a filter wheel, click this button to use the Filters Setup Dialog where you can specify binning and default exposure time for each filter

- **LocalField AI Engine**:
  - **Focuser Step x Sample**:
    - **From VCurve Mode Wizard**: Choose this radio button to use the step size from the RoboFire VCurve settings. The step size is the number of steps to move the focuser between autofocus exposures
    - **Manual**: Choose this radio button to enter the step size manually
  - **Sample**: The number of exposures to take during the LocalField autofocus operation. One sample is taken at each focuser position
  - **Minimum Stars Number**: LocalField autofocus will require at least this number of stars in each exposure to be successful
- **Advanced Settings**:
  - **Min HFD Gap**: a minimum pixel gap from the minimum value of HFD and maximum value of HFD found during the LocalFIeld sampling
  - **Min Confidence**: The minimum statistical confidence percentage to consider autofocus successful
  - **Focus Window Size**: The percentage of the image (Central Region of CCD) used during the autofocus routine
  - **Fit Order**: Curve FIT order in AI analysis of results
- **Reset to Default**: Reset all LocalField Mode settings to Voyager's defaults

21.14.4 Various Tab

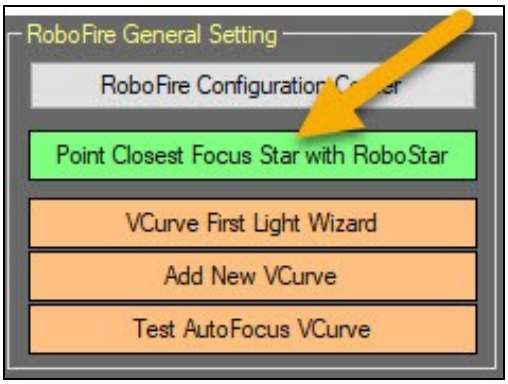
The final tab of the RoboFire Configuration dialog contains some miscellaneous parameters:



- **Dashboard**:
  - **Show Dashboard During RoboFire Actions**: If checked, the RoboFire dashboard appears while the autofocus operations are in progress
  - **Dashboard on Top**: If checked, keep the RoboFire Dashboard on top of other windows while it is active
  - **When Action Finished Auto-Close Dashboard After**: If the RoboFire dashboard is displayed during the autofocus operation, this is the number of seconds to wait after autofocus completes before automatically closing the dashboard window
- **Workaround**
  - **Remove AI Diffuse Filter on Star Recognition for setup with deeply undersampled resolution, big sensor area and narrow band filters with lower nanometers**: to avoid empty star recognition process for situation descripted in the label. Use only if are inside the cases written in label. THis flag is red, if you aren't sure of what to do please referring to the Voyager suppor

- **FIT**
  - **Add FOcuser Position to FIT File name during Sequence**: flag this to add position of focuser (if available) to the name of FIT file will be saved

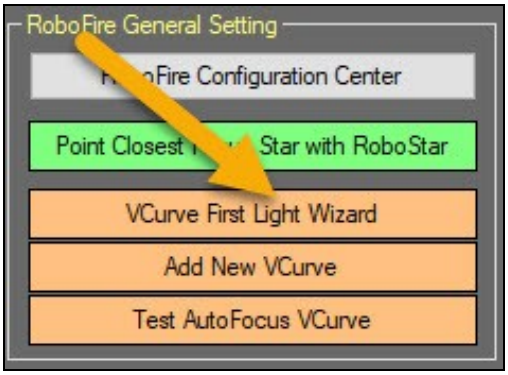
21.15 Point Closest Focus Star with RoboStar



This button starts a RoboStar operation to find a suitable nearby focus star.

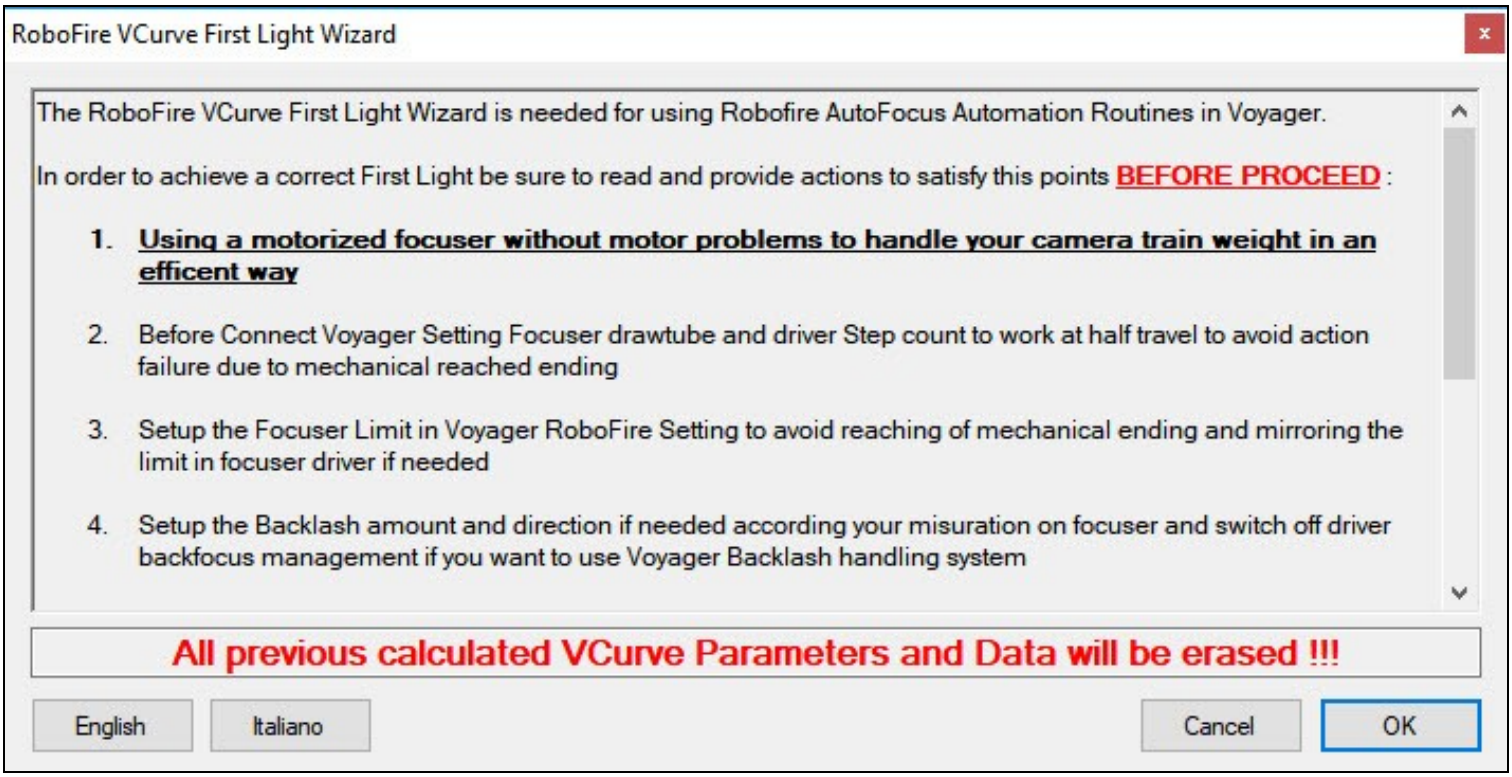
Important Note! Pointing will be done with a simple goto, not a precise pointing. This because you may not have a good focus and solve may fail. Porpouse of this goto is to have a star in the field for the first light wizard or for adding new vcurve. Precise pointing isn't necessary. You will receive a warning about plate solve disabled ... is not an error (is yellow so its a warning). Just Voyager remember to you about performing a simple goto.

21.16 VCurve First Light Wizard



Click this button to start the VCurve First Light Wizard, which walks you through all the steps needed to calculate a VCurve with your system.

The first panel of the wizard lists **important actions you must take** before running the wizard. Please read and follow all these steps to avoid damage to your equipment. This information will not be repeated here - read and follow the steps in the wizard.

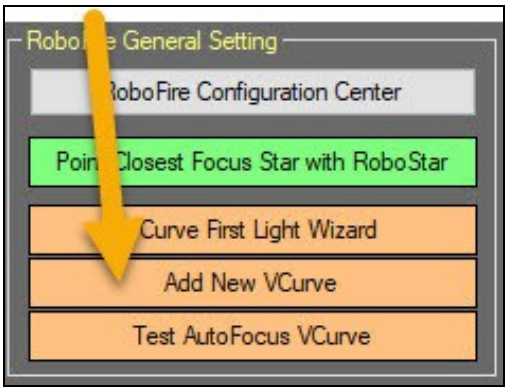


When you have read and followed all the steps in this panel, click the OK button to immediately run the VCurve First Light Wizard

TODO: Run the wizard and capture screen shots

Important Note! VCurves are optics-specific. If you change the optics of your scope, e.g. add a Focal Reducer or Field Flattener, you should run a new VCurve
Important Note! VCurve results are saved in the current profile. Create a profile for each set of optics and run a new VCurve when the optics change

21.17 Add New VCurve

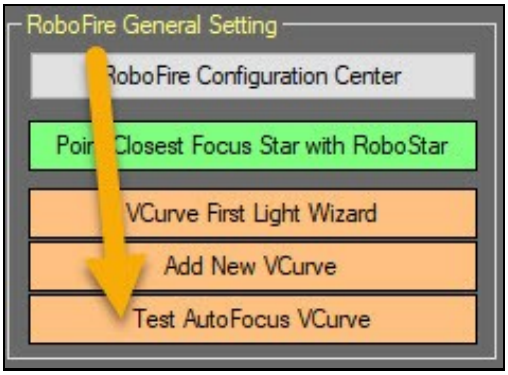


Click this button to run an immediate operation to take exposures as specified in the RoboFire Configuration Center to calculate a VCurve.

Important Note! You must run the VCurve First Light Wizard before running the Add New VCurve operation
The new VCurve is stored in the VCurve data table where it can be used to refine the RoboFire autofocus VCurve. Taking several VCurves can help your autofocus results.

TODO: Run this command and capture screen shots

21.18 Test AutoFocus VCurve



Click this button to run a RoboFire autofocus operation to test the VCurve parameters with a real life autofocus

TODO: Run and capture screen shot

21.19 Other Setup Pages

```
? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup
```

22 Rotator Setup

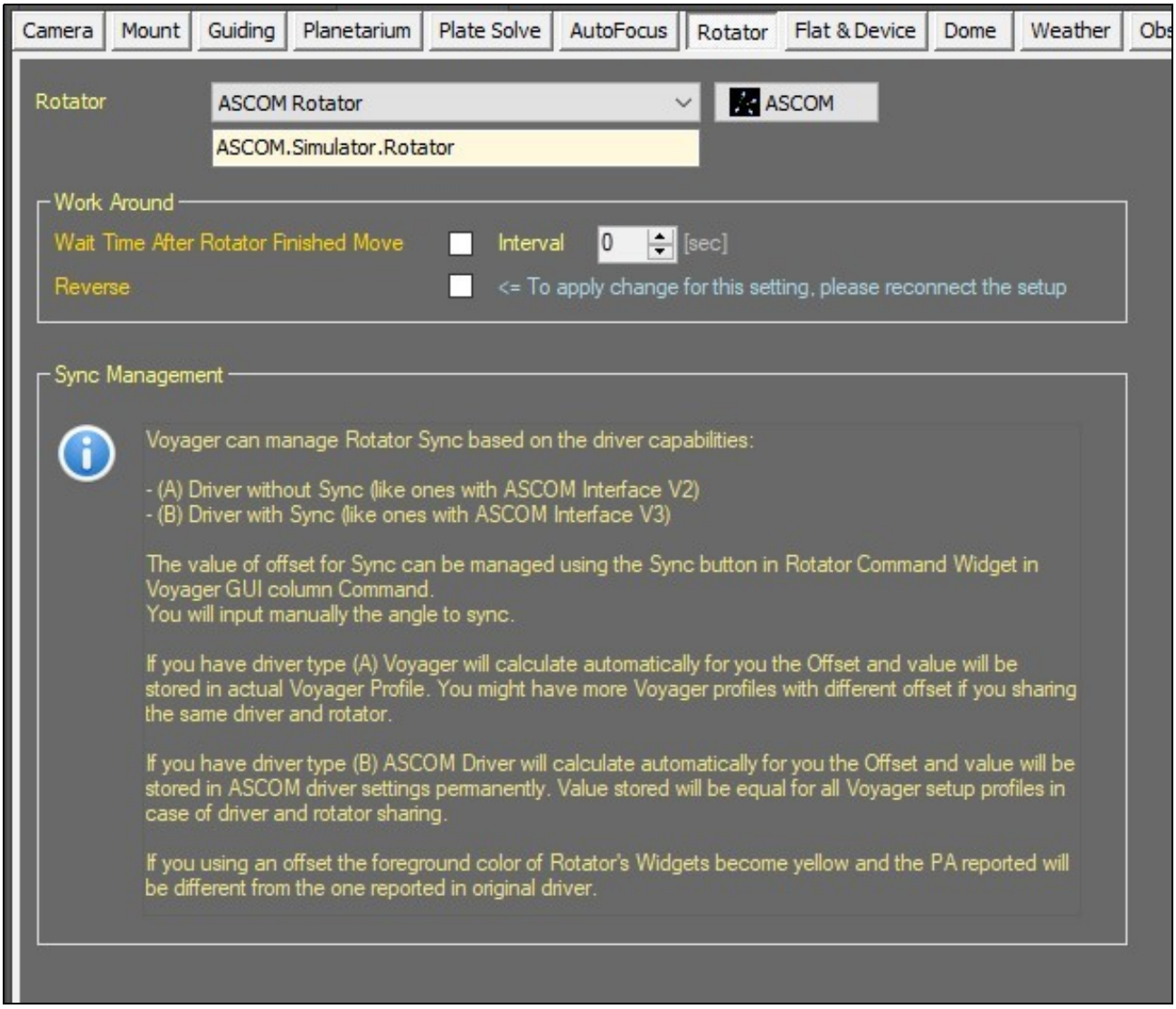
22.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

22.2 Rotator Setup Workspace

Click the Rotator button in the Setup workspace to display the Rotator Setup window:



22.3 Rotator Choice

Select your rotator from the drop-down list at the top of the Rotator Setup window:

- The options are None for no rotator
- ASCOM Rotator for a rotator controlled via an ASCOM driver.
- RCOS TCC Rotator for RCOS hardware
- Click the ASCOM button to choose the ASCOM driver for your rotator

22.4 Sync Management

For sync we talk about synchronize the position angle of the rotator to the Equator position angle (or the arbitray angle). Voyager can manage Rotator Sync based on the driver capabilities:

- (A) Driver without Sync (like ones with ASCOM Interface V2)

- (B) Driver with Sync (like ones with ASCOM Interface V3)

The value of offset for Sync can be managed using the Sync button in Rotator Command Widget in Voyager GUI column Command.

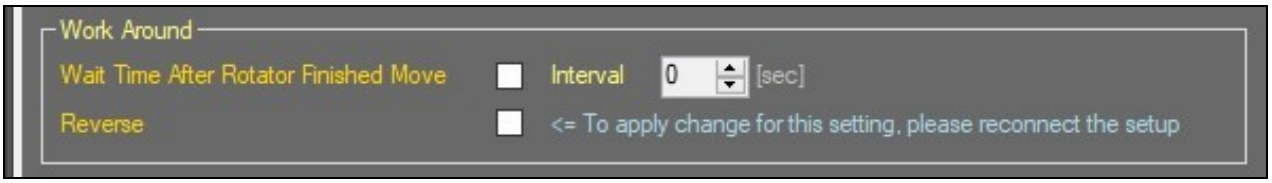
You will input manually the angle to sync.

If you have driver type (A) Voyager will calculate automatically for you the Offset and value will be stored in actual Voyager Profile. You might have more Voyager profiles with different offset if you sharing the same driver and rotator.

If you have driver type (B) ASCOM Driver will calculate automatically for you the Offset and value will be stored in ASCOM driver settings permanently. Value stored will be equal for all Voyager setup profiles in case of driver and rotator sharing.

22.5 Rotator Workaround

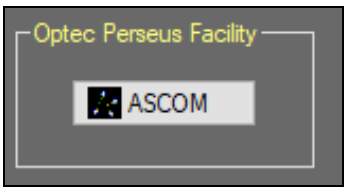
The Rotator Workaround panel of the Rotator Setup workspace contains a workaround for rotators that require a delay after finishing the move and before resuming exposures:



- **Wait Time After Rotator FInished Move**: Check the box and enter the delay time in seconds if your rotator requires Voyager to delay the next action after the rotator move finishes. This can be helpful if your rotator returns from the "Move" command before it actually finishes the rotation, or if a delay is required after the move completes to allow vibrations to settle down. Some rotator drivers report rotation is finished before the rotator has actually stopped. This can cause elongated stars if the next exposure starts immediately
- **Reverse:** activate the reverse calculation of rotation, useful if during Sky PA point the calculate angle not converge to the sky PA requested. This flag can be applied if your driver support the reverse ASCOM option. Changing to this flag need to disconnect and reconnect the setup in Voyager to apply the change.

22.6 Optec Perseus Facility

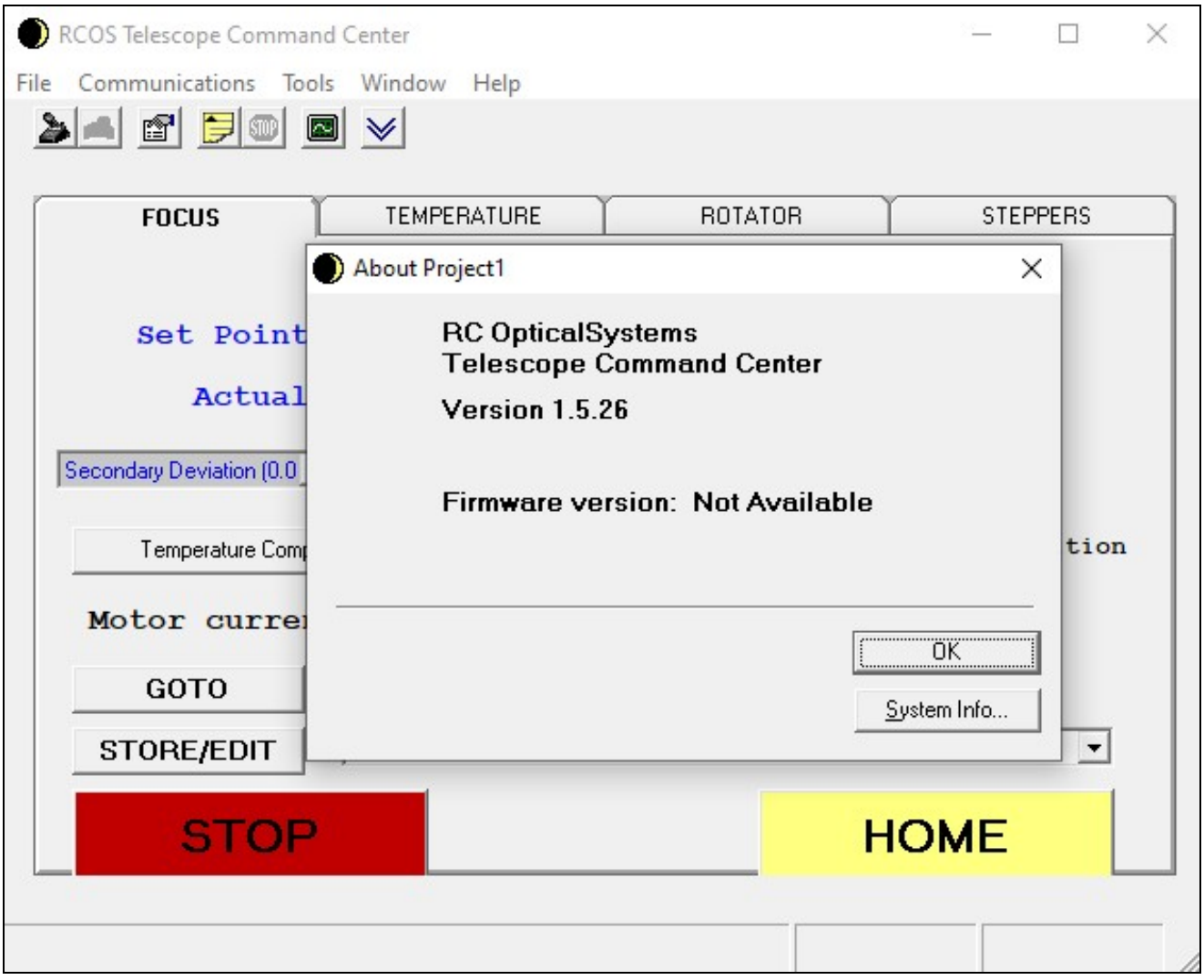
This box allow you to select the ASCOM driver to manage the Optec Perseus system (multi camera selector):



22.7 RCOS Rotator

RCOS rotator driver is not a real ASCOM driver but a COM interface with same named methods and properties.

Please be sure to use the version 1.5.26 of RCOS Telescope Command Center to allow Voyager to connect and manage the rotator and focuser.



Press the ASCOM button to select the driver to use. You must have installed the Optec Persesus Driver.

22.8 Other Setup Pages

```
? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup
```

23 Flat Device Setup

23.1 Color Coding

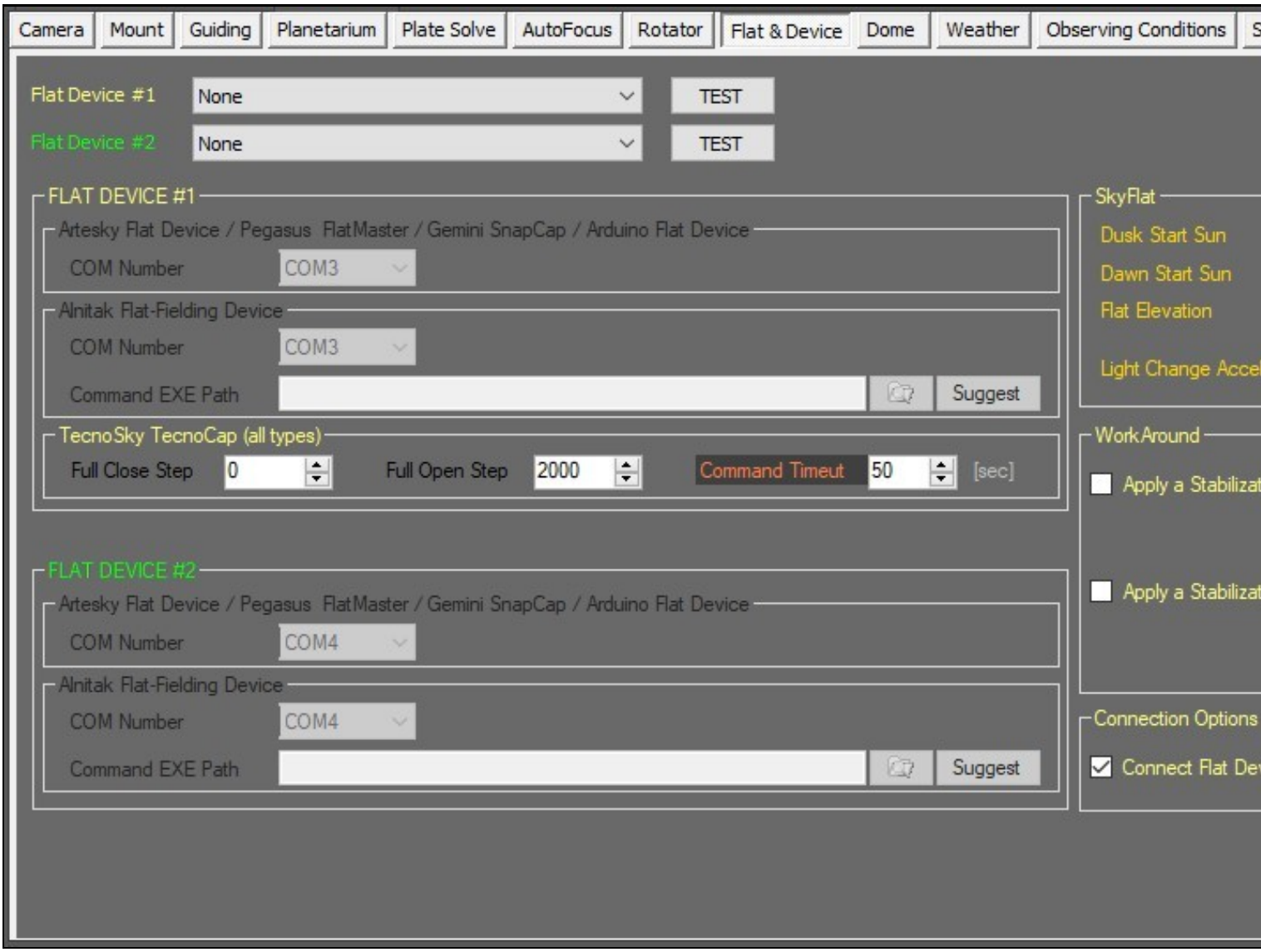
Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

23.2 Flat Device Setup Workspace

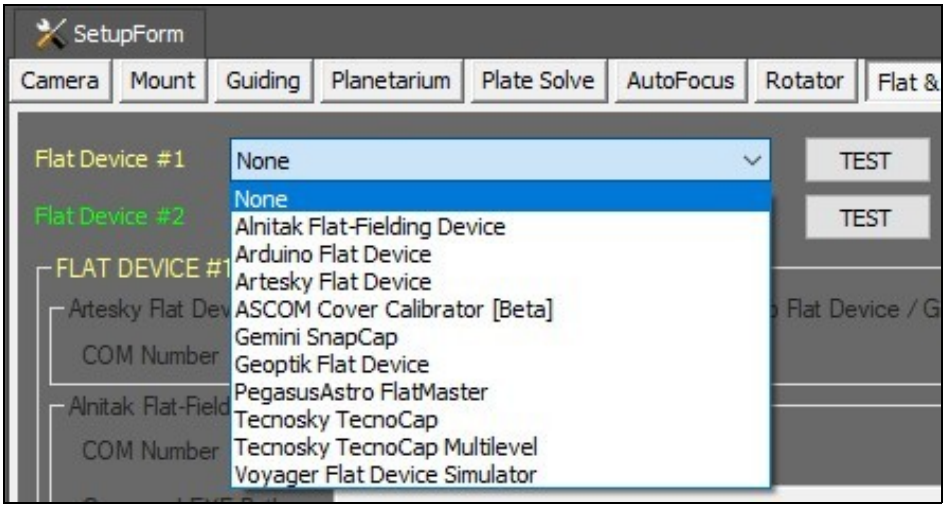
Voyager 2.1.0a and later supports one or two Flat devices. Flat devices are illuminated panels that either fit on the end of your telescope or are mounted on a wall, and provide even illumination for the taking of "Flat frames," used to calibrate your astro images.

Click the Flat Device button in the Setup workspace to display the Flat Device setup window:



23.3 Flat Device #1 Choice

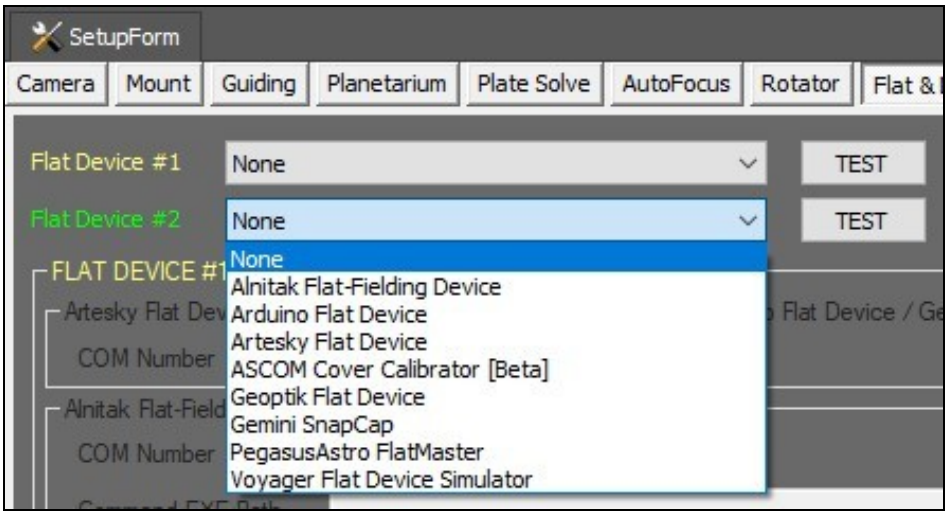
Choose your flat device from the drop-down list at the top of the Flat Device setup window. Use Flat Device #1 to setup a Tecnosky flat devices. All other flat devices are supported by both Flat Device #1 and #2.



- **Flat Device**: Choices include None, Gemini SnapCap, Alnitak Flat-Fielding Device (Flip-Flat), Voyager Flat Device Simulator, Tecnosky TecnoCap, Arduino Flat Device, Tecnosky TecnoCap Multilevel and Artesky Flat Device, PegasusAstro FlatMaster, Geoptik Flat Device
- **TEST**: Click the TEST button and Voyager will test the connection to the flat device. Only the connection is tested, no other functions of the flat device

23.4 Flat Device #2 Choice

Choose your flat device for flat device #2 from the drop-down list.



- **Flat Device**: Choices include None, Gemini SnapCap, Alnitak Flat-Fielding Device (Flip-Flat), Voyager Flat Device Simulator, Arduino Flat Device, Artesky Flat Device, PegasusAstro FlatMaster
- **TEST**: Click the TEST button and Voyager will test the connection to the flat device. Only the connection is tested, no other functions of the flat device

23.5 Artesky Flat Device / Geoptik Flat Device / Pegasus FlatMaster / Gemini SnapCap / Arduino Flat Device COM Port

The Artesky Flat Device / Geoptik Flat Device / Pegasus FlatMaster / Gemini SnapCap / Arduino Flat Device / Geoptik Flat Device panel of the Flat Device Setup workspace is where you specify the COM port used by your device:

- **COM Number**: Choose the COM port number from the drop-down list for your Gemini SnapCap or Arduino flat device.

The Arduino flat device is this one or a compatible device: https://github.com/jwellman80/ArduinoLightbox

Important Note! Make sure Artesky Flat Device, PegasusAstro FlatMaster, Gemini SnapCap or Arduino Flat Device is chosen in the Flat Device field at the top of the workspace

Important Note! After entering the parameters in this panel, click the TEST button at the top of the workspace to verify that Voyager can connect to the device

23.6 Alnitak Flat-Fielding Device

The Alnitak Flat-Fielding Device panel of the Flat Device Setup workspace is where you specify the COM port and location of the EXE file that controls your Alnitak flat device:

- **COM Number**: Choose the COM port number from the drop-down list for your Alnitak flat device.
- **Command EXE Path**: Click the folder icon to browse to the location of the AACmd.exe file. This is the executable program that controls your Alnitak flat device. You must install the software that came with your Alnitak flat device before you can use it from Voyager
- Suggest: Click this button and Voyager will fill out the Command EXE Path field with the default path used in the installation of the Alnitak flat device control software

Important Note! Make sure Alnitak Flat-Fielding Device is chosen in the Flat Device field at the top of the workspace

Important Note! After entering the parameters in this panel, click the TEST button at the top of the workspace to verify that Voyager can connect to the device

23.7 TecnoSky TecnoCap (all types)

The TecnoSky TecnoCap panel of the Flat Device Setup workspace is where you specify configuration parameters for TecnoSky flat devices:

- Full Close Step: The position in steps of the TecnoSky device when it is fully closed
- Full Open Step: The position in steps of the TecnoSky device when it is fully open
- Command Timeout: Maximum time in seconds to wait after issuing a command for the command to complete before considering the operation to have failed

Important Note! Make sure a TecnoSky flat device is chosen in the Flat Device field at the top of the workspace

Important Note! After entering the parameters in this panel, click the TEST button at the top of the workspace to verify that Voyager can connect to the device

23.8 ASCOM Cover Calibrator Device

If you are using an ASCOM Cover Calibrator Device n the Flat Device #1 and/or Flat Device #2 panel:

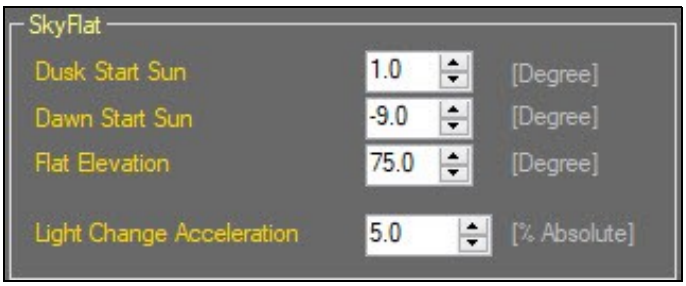
- **Calibrator Actions Timeout**: expressed in milliseconds (1000ms is equal to 1s) set the max time a Voyager actions using the calibrator (light source) will wait for the action to finish, after this time the action will be aborted to avoid hangup.
- **Cover Actions Timeout:** expressed in seconds set the max time a Voyager actions using the cover (cap) will wait for the action to finish, after this time the action will be aborted to avoid hangup.

Important Note! To use an ASCOM Cover Calibrator Device you must have installed at least the ASCOM Platform 6.5 or newest

Important Note! Be sure your device is compatible with the ASCOM Standard before to use with Voyager

23.9 Sky Flat

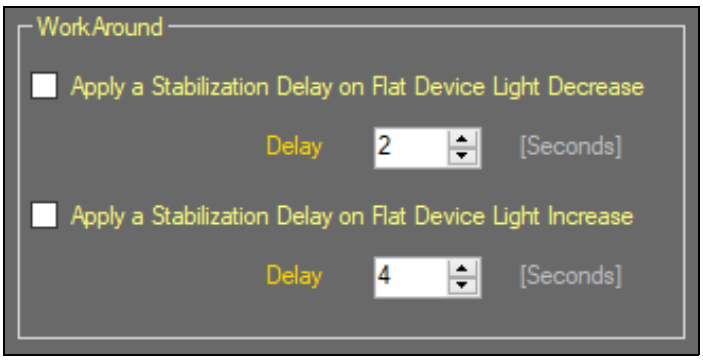
Starting with Voyager 2.1.1a, sky flats are supported. The default parameters should work well, but you can modify them here:



- **Dusk Start Sun**: The solar elevation at which dusk is considered to begin
- **Dawn Start Sun**: The solar elevation at which dawn is considered to begin
- **Flat Elevation**: The altitude to point the telescope when taking sky flats
- **Light Change Acceleration**: The acceleration of changing light conditions for setups with very low focal ratio or unfavorable latitudes

23.10 Workaround

Some workaround to apply during to Auto Flat device tasks. Depends on Flat devices used.



- **Apply a Stabilization Delay on Flat Device Light Decrease**: if Voyager decrease light of flat device panel, during auto flat, will apply a delay before continue with next steps. This to allow electronics to stabilize light brightness.
    - **Delay:** delay after decrease in terms of seconds
- **Apply a Stabilization Delay on Flat Device Light Increase:** if Voyager increase light of flat device panel, during auto flat, will apply a delay before continue with next steps. This to allow electronics to stabilize light brightness.
    - **Delay:** delay after increase in terms of seconds

23.11 Connection Options

Some options to use for Flat devices connection during setup connection in Voyager.

- **Connect Flat Devices Only in Manual Mode**: if checked Flat Devices can be connected to Voyager only in manual mode from startup commands. This is useful if you want to connect the flat device just at finish or begin of your imaging session without disconnect and reconnect all the setup devices.

23.12 Spike-A-Flat

All-Pro Software sells the Spike-A-Flat series of flat panels. http://www.spike-a.com/flatfielders/

To use this from Voyager, install the ASCOM driver available from All-Pro here:
https://adgsoftware.com/alnitak_emu/

The sample Javascript file included with the ASCOM driver download shows the Javascript needed to connect to the Spike-A-Flat's ASCOM driver and set the brightness from 0 to 1023.

Determine the brightness levels needed to create flats with your equipment, and use that brightness level in the SetSwitchValue command. You may need a different value for narrow band and RGB filters.

Here's an example of JavaScript to set the brightness to 75:

```
var X = new ActiveXObject("ASCOM.SpikeAFlatFielder.Switch");
X.Connected = true;
X.SetSwitchValue(0, 75);
```

```
X.Connected = false;
```

Use a text editor such as Notepad to save this code in a file ending with .js, such as SpikeAFlatLevel75.js.

Use a brightness value of 0 to turn the panel off.

```
var X = new ActiveXObject("ASCOM.SpikeAFlatFielder.Switch");
X.Connected = true;
X.SetSwitchValue(0, 0);
X.Connected = false;
```

You can then call these .js files to set the panel brightness before taking your flat frames. You can call them using a DragScript action or from an Auto Flat sequence.

23.13 Other Flat Panel Devices

If you use a flat panel that is not natively supported by Voyager but has an interface you can call from a script file, create script files to turn it on, set the brightness and turn it off. Call those script files using a DragScript action or from an Auto Flat sequence when taking your flat frames.

23.14 Other Setup Pages

```
? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup
```

24 Viking Setup

24.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

24.2 Viking Setup Workspace

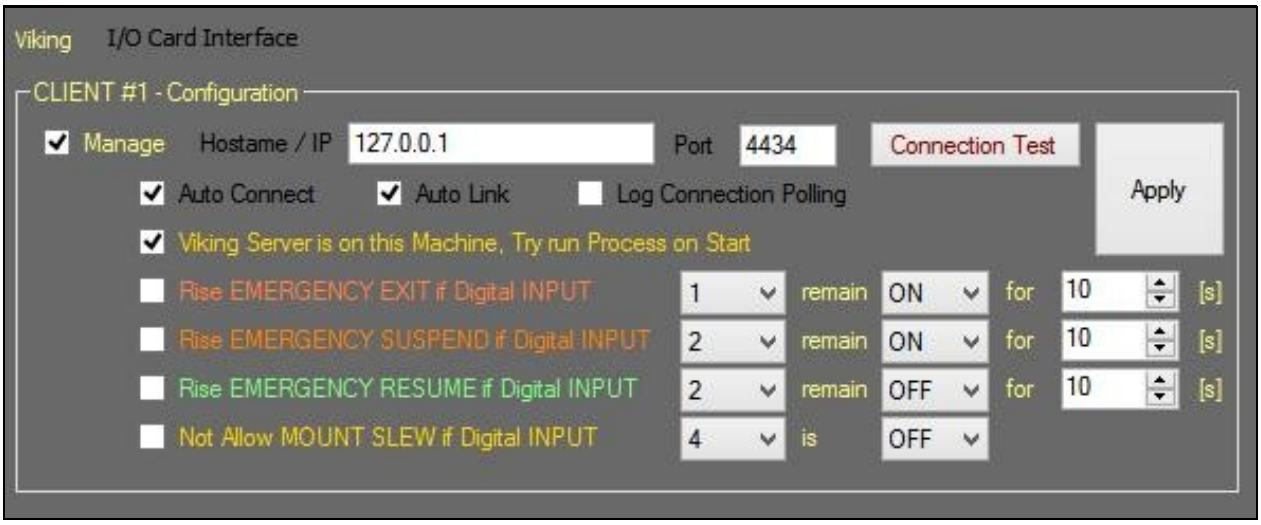
Click the Viking button in the Setup workspace to display the Viking Setup window.

Viking is a companion product to Voyager, also made by Starkeeper.it. Viking provides control of I/O devices in the observatory.

For more information on Viking, visit https://software.starkeeper.it/#viking_section

Important Note! Voyager can manage starting from Voyager 2.2.16j two different Viking Client with the same features. The clients can be on the same PC (and for this you will need a Viking licensed form multi istance) or can be in 2 different PC connected in LAN.

- **Client #1 - Configuration and/or Client #2 - Configuration**
  - **Manage**: Click the Manage checkbox to display the following configuration panel (#1 or #2 client)



- **Hostname / IP and Port**: Enter the hostname or IP address and Port number of the PC running the Viking server software.
- **Connection Test**: Click the Connection Test button to confirm Voyager can connect successfully to the Viking server
- **Apply**: Click the Apply button to apply all settings in this panel to the Viking server
- **Auto Connect**: Check this box to have Voyager connect automatically to the Viking server. Connection to

Viking starts immediately when you start the Voyager application. Auto Connect runs in the background and in case of connection failure, the operation will be re-triggered in a fraction of a minute

- **Auto Link**: When Viking is connected, automatically connect the Viking I/O card device
- **Log Connection Polling**: If checked, Voyager will create log file messages every time it polls the Viking connection. This can generate a large log file.
- **Viking Server is on this Machine**. Try run Process on Start: If checked, Voyager will attempt to start the Viking server software located on this machine when you start the Voyager application
- **Run EMERGENCY EXIT if Digital INPUT**: If checked, Voyager will trigger the Emergency Exit event if the parameters set here are met. Select the Viking Digital Input number to monitor from the first drop-down. Select whether to monitor for the digital input being ON or OFF from the second drop-down. Enter the number of seconds that the selected digital input should remain on or off to trigger the event from the third field.
- **Run EMERGENCY SUSPEND if Digital INPUT**: If checked, Voyager will trigger the Emergency Suspend event if the parameters set here are met. Select the Viking Digital Input number to monitor from the first drop-down. Select whether to monitor for the digital input being ON or OFF from the second drop-down. Enter the number of seconds that the selected digital input should remain on or off to trigger the event from the third field.
- **Run EMERGENCY RESUME if Digital INPUT**: If checked, Voyager will trigger the Emergency Resume event if the parameters set here are met. Select the Viking Digital Input number to monitor from the first drop-down. Select whether to monitor for the digital input being ON or OFF from the second drop-down. Enter the number of seconds that the selected digital input should remain on or off to trigger the event from the third field.

- **Not Allow MOUNT SLEW if Digital INPUT**: If checked, Voyager will check if the digital input status in VIking match with what asked and in case of Mount Slew internally in Voyager the Slew will be refused. This to avoid mount collition to the observatory roof ot simple for general safety situation.

Important Note! Remember to click the Apply button after making changes to these settings
Important Note! If you want to Connect/Disconnect Client to Viking and Link/Unlink Card in Viking and you just configured Voyager to manage the client you must restart Voyager (just one time)

24.3 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup

25 Dome Setup

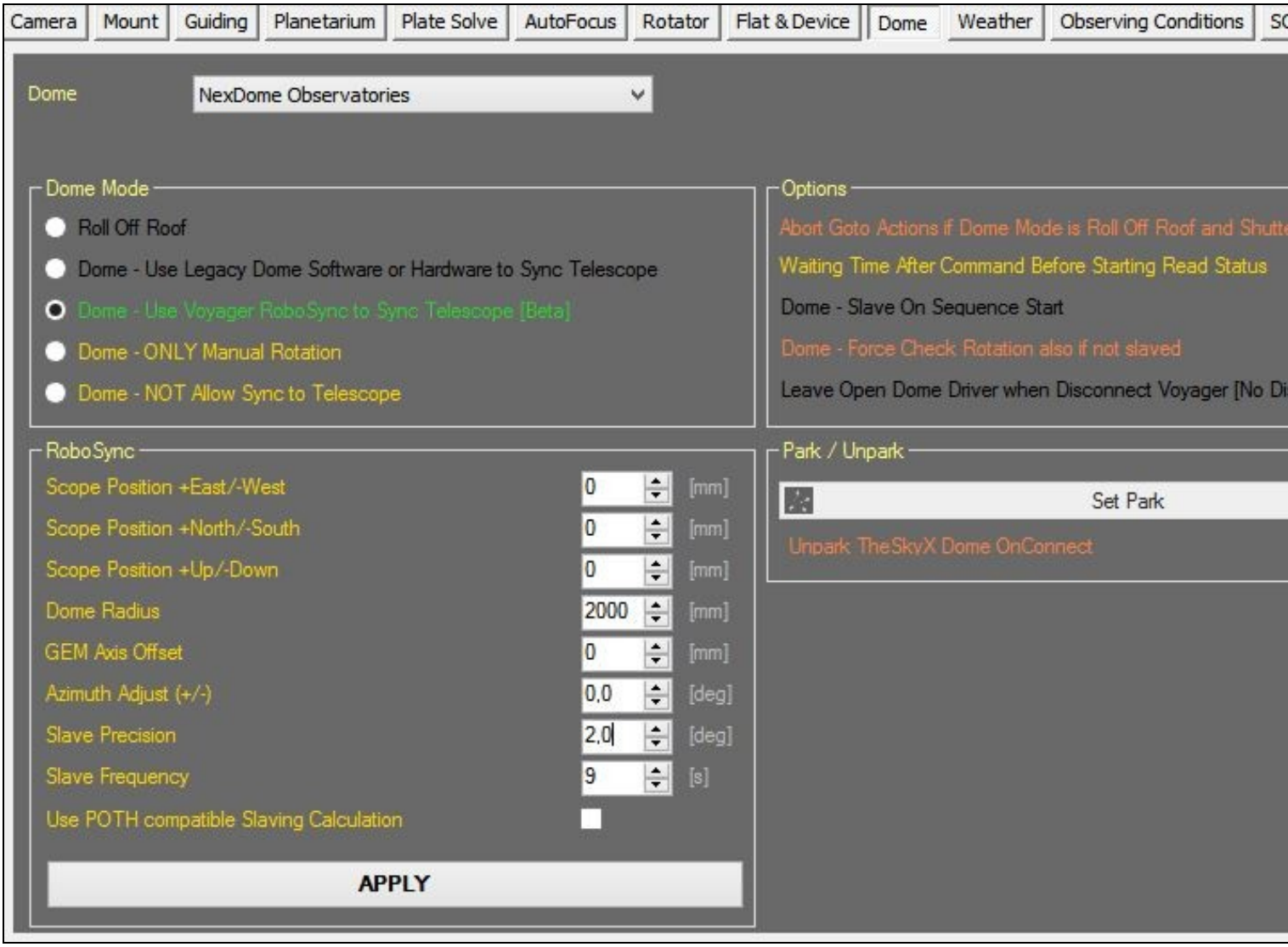
25.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

25.2 Dome Setup Workspace

Click the Dome button to display the Dome Setup window, where you can specify parameters to control a dome or roll-off roof observatory:



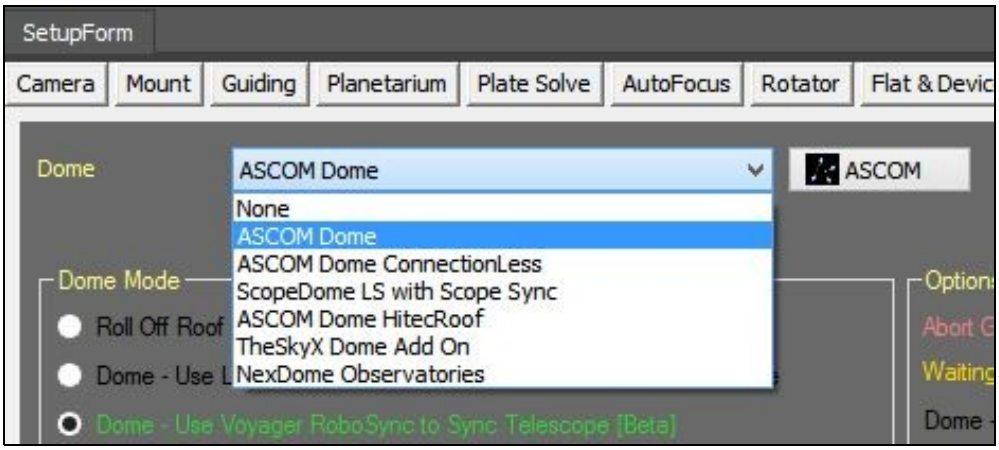
The commands and parameters applicable to your observatory will depend on the capabilities of your dome or roll-off roof and its software driver.

Voyager can open and close a roll-off roof.

Depending on your dome's capabilities, Voyager can:

- Open and close the dome's shutter
- Rotate the dome to a given position
- Park and Unpark the dome
- Set the Park position
- Rotate the dome to a Home position
- Manage the dome's azimuth position to match the connected mount (Voyager RoboSync)

25.3 Dome Choice



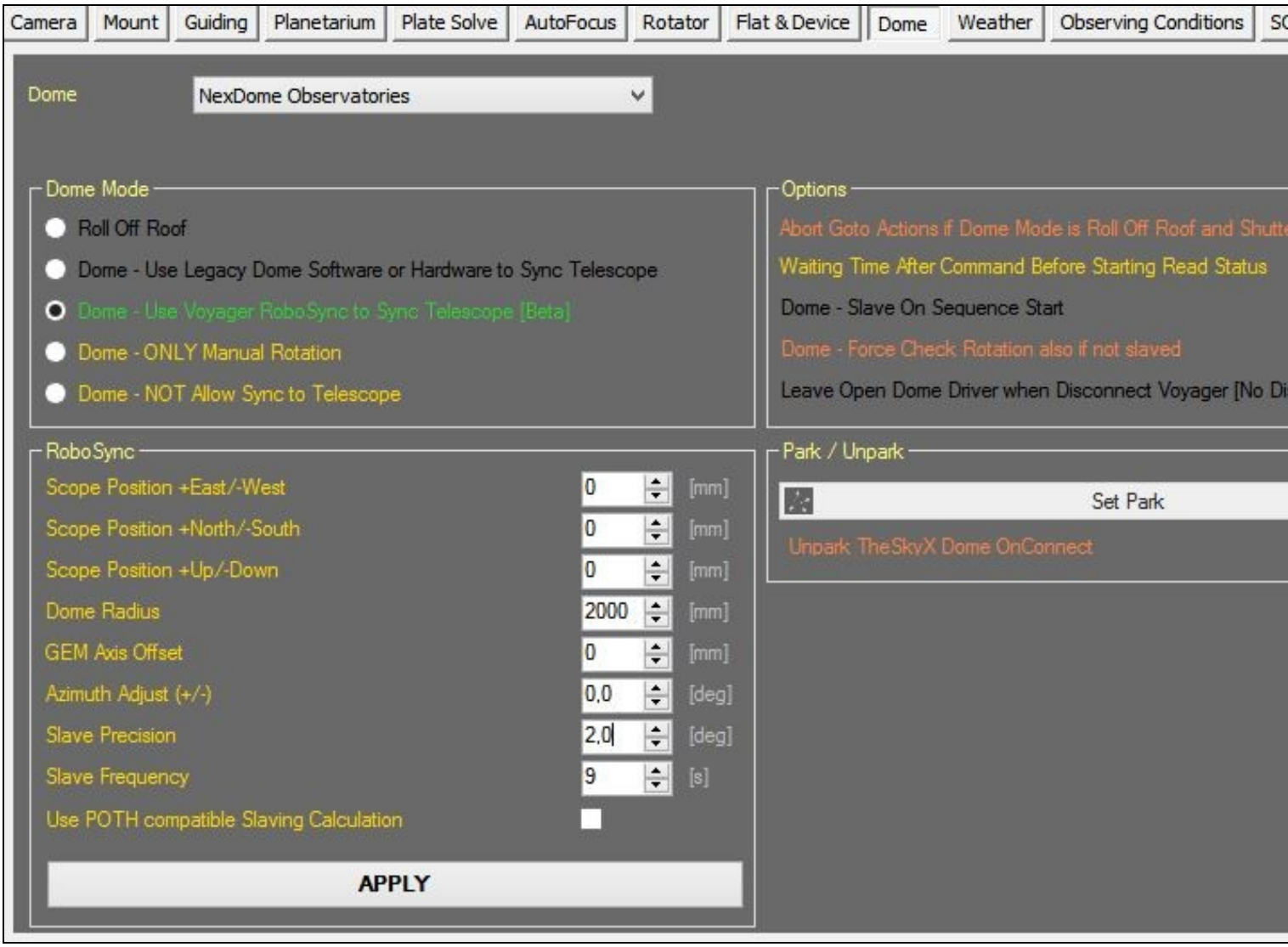
- **Dome**: Select your Dome or roll-off roof driver from the drop-down
- If your dome is controlled by an ASCOM driver, click the ASCOM button and select your dome driver from the drop-down list. Click the Properties button in the ASCOM chooser dialog to set your dome driver's properties

Important Note! If you use TheSkyX Dome Addon, please read the disclaimer text that shows up when you select it very carefully

Important Note! If you want use ASCOM Device HUB please note that this application at his actual release cannot allow external application to work like admin and fail to connect in Voyager. Use RoboSync instead if possible.

25.4 RoboSync, Dome Mode, Options and Park/Unpark

After selecting your dome driver from the Dome drop-down list, fill out the configuration parameters in these panels of the Dome Setup workspace:



- **Dome Mode**:
  - Choose the type of your dome from the radio buttons in this panel
    - **Roll Off Roof** : Your observatory has a roll-off roof, or any type of dome that doesn't have a rotation system
    - **Dome - Use Legacy Dome Software or Hardware to Sync Telescope**: Your dome is able to automatically monitoring the mount's position without commands from Voyager, i.e. the dome azimuth position is slaved to the mount's azimuth position like ScopeDome or TheSkyX Dome with slaved programmed inside TheSkyX Dome Add on.
    - **Dome - Use Voyager RoboSync to Sync Telescope** : Voyager send commands to the dome to move it to the azimuth position matching the current mount's azimuth position using the RoboSync Automata. To use when your Dome doesn't have this kind of internal capability. Avalaible from Voyager release 2.2.3a.
    - **Dome - ONLY Manual Rotation :** any type of dome that opens fully and allow rotation only manual or with manual motor or without driver (with script that move the dome)
    - **Dome - NOT Allow Sync to Telescope** : any type of dome that allow remote command from Voyager to open/close the shutter and rotate the azimuth but for some reason sync to telescope is not allowed by the owner of the Dome
- **Park/Unpark**: Click this button to bring up a wizard that will guide you through setting the Park position for your dome
  - **Unpark TheSkyX Dome OnConnect:** If checked and TheSkyX Dome control is selected, unpark the dome when connecting in Startup
- **Options**:
  - **Abort Goto Actions if Dome Mode is Roll Off Roof and Shutter is Closed**: If checked, any operations intended to move the dome will be aborted if the selected dome mode is "Roll Off

Roof" and the shutter is closed

- **Waiting Time After Command Before Starting Read Status**: Time in seconds to wait after issuing a command to the dome before checking the dome's status. Useful if the dome needs time to start the action so Voyager does not check too soon and think the dome is not responding to the command
- **Dome - Slave On Sequence Start**: When a sequence starts, synchronize the dome's azimuth position with the azimuth position of the mount and remain slaved. This setting Is valid for RoboDome or a dome configured as an AutoSync Dome
- **Dome - Force Check Rotation also if not slaved**: Even if the dome is not slaved to Voyager, check to make sure the dome is not rotating before performing an action that requires the dome to be synced, such as taking an image
- **Leave Open Dome Driver when Disconnect Voyager (No Dispose)**: If checked, Voyager will not force the ASCOM driver to be released if another program is using it

- **RoboSync:**
  - Define the Geometry of your Dome to allow Voyager to calculate the correct azimuth to slave to the telescope position, this data is necessary and must be precise if you want to use RoboSync automata. *Data is compatible with ASCOM POTH and DEVICE HUB slaving system.*
    - **Scope Position +East/-West:** The offset from the center of the intersection of the Right Ascension and Declination axis to the center of the dome. If the RA/Dec intersection is east of the dome center this value is positive. If the RA/Dec intersection is west of this location the value should be negative.. Value is expressed in millimeters
    - **Scope Position +North/-South:** The offset from the center of intersection of the Right Ascension and Declination axis to the center of the dome. If the RA/Dec intersection is north of the dome center this value is positive. If the RA/Dec intersection is south of this location the value should be negative. Value is expressed in millimeters
    - **Scope Position +Up/-Down:** The offset from the center of the intersection of the Right Ascension and Declination axis to the center of the dome.If the RA/Dec intersection is up the dome center this value is positive. If the RA/Dec intersection is down this location the value should be negative. Value is expressed in millimeters
    - **Dome Radius:** The diameter of your dome at the equator. This should be measured from where your slit opening is. For example if your dome is skinned on the outside you would measure from the outside diameter. If it is skinned on the inside you would measure the inside diameter. Value is expressed in millimeters
    - **GEM Axis Offset:** The distance from the center of the Right Ascension axis to the center of the telescope. This value can vary depending on how your scopes are setup on your mount. It is best to use some trial and error here. If the top of your scope is being eclipsed by your dome increase this value. If the bottom of your scope is being eclipsed decrease this value. Value is expressed in millimeters
    - **Azimuth Adjust (+/-):** to the azimuth of Dome calculated by RoboSync will be added this value in Degree. Expressed in Degrees.
    - **Slave Precision:** tollerance to use to decide if move the dome related by difference between calculated RoboSync azimuth of Dome and actual azimuth of Dome. Use a value large enough that not compromise the opening over the telescope, small value mean more frequently movements of Dome. Expressed in Degrees.This will depend on the width of your slit as well as position in the sky. Minimum value is 1.0°Deg
    - **Slave Frequency:** Number of seconds to wait between slew commands. This also will depend on your Allowable Error.The Slave Frequency is a measure of how often the slaving function of RoboSync should consider whether it needs to move the dome to keep the opening over the telescope. These are very dependent on the orientation of the scope and dome themselves. For a telescope with a narrow field-of-view where the shutter is near the end of the telescope, it may be possible to increase the Slave Frequency interval and/ or the Slave Precision (slop) value. Typically, these values should be set as large as possible while still keeping the dome?s opening completely over the pointing position of the telescope.
    - **Use POTH compatible Salving Calculation**: enable this flag if you want to use the original POTH algorithms for calculation
    - **Apply:** press this button to apply the settings about geometry

Important Note! If the "Slave on Sequence Start" box is checked, Voyager will slave to the dome when your Sequence starts. If you don't do a specific command to slave the dome in Voyager, you'll see the message "Slave is unlock from user" in the monitor window.

Important Note! If you create a DragScript to manage all night imaging remember to put a slave on block in the script if you do other mount operations before starting a sequence. Also remember to slave off and park the dome at the end of the script

25.5 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup

26 CommonSetup

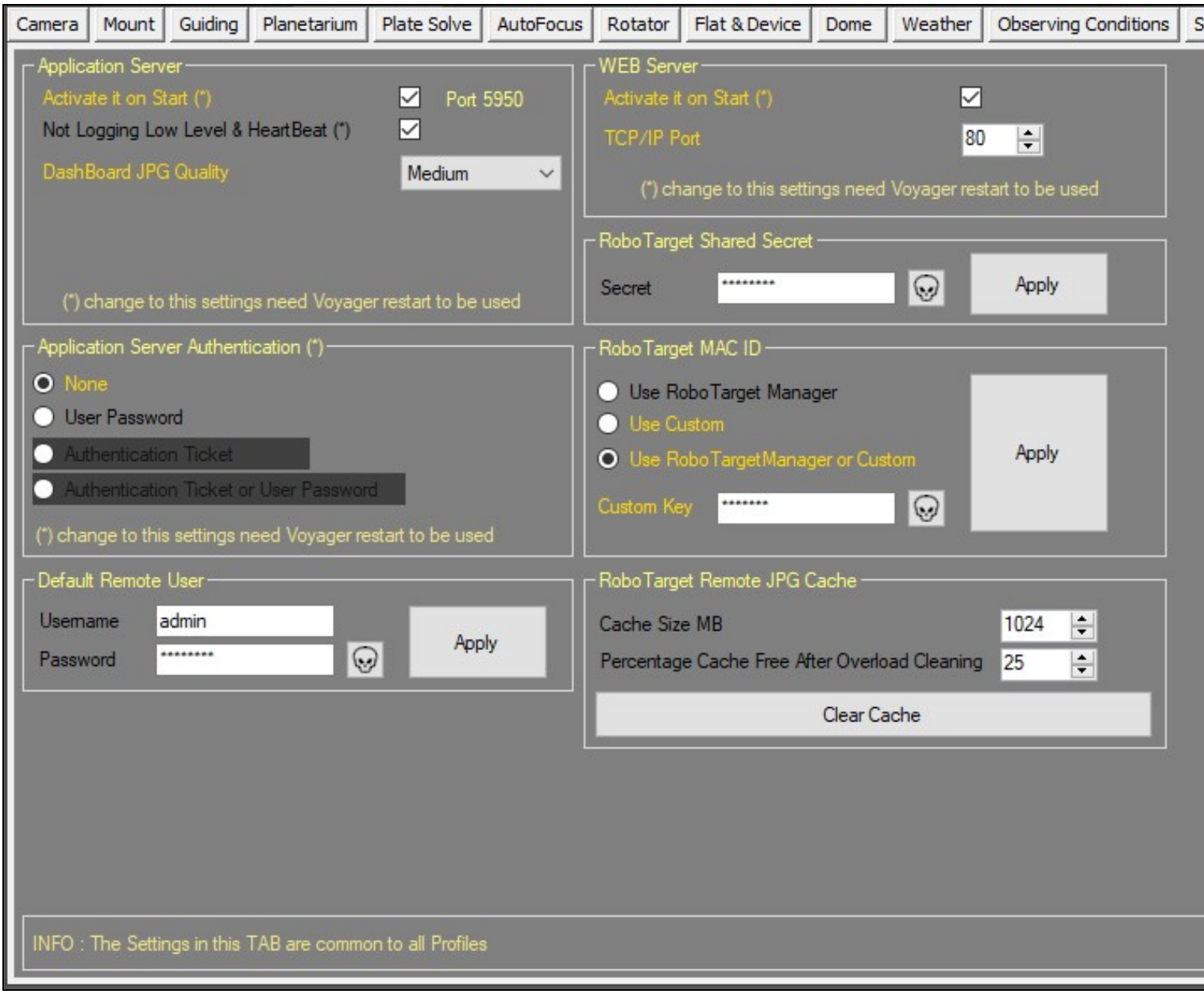
26.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

26.2 Common Workspace

Click the Common button in the Setup workspace to display the Common settings window, which contains miscellaneous settings Common to all Profile. This settings are ineriths in all Profile you will use:



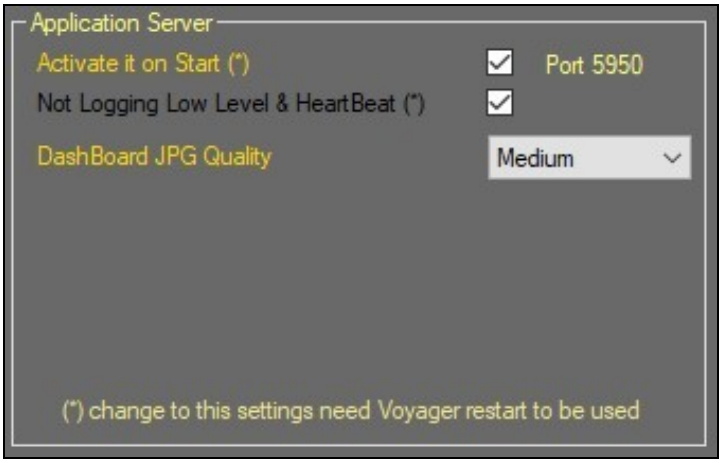
26.3 Application Server

The Application Server panel of the Voyager Setup workspace tells Voyager whether or not to start the bundled Application Server.

The Application Server is bundled with the base version starting with Voyager 2.0.14f (daily build) and 2.1.0 (stable).

Refer to the Application Server section for more information.

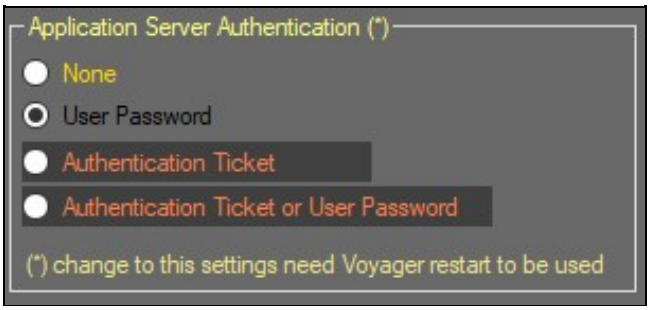
Changes to any of these settings take effect the next time you start Voyager.



- **Activate it on Start (*)**: If checked, start the bundled application server when Voyager starts. This is not checked by default
- **Not Logging Heartbeat(*)**: If checked, do not log the Heartbeat events which occur every 5 seconds. This is checked by default, as there are many heartbeat events per hour and you probably don't want to log them all
- **Dashboard JPG Quality:** Select the desired JPG quality level from the drop-down. Use a lower quality if your connection speed can't support a higher quality, or if you are on a metered connection and wish to reduce the amount of data transferred.

26.4 Application Server Authentication

The Application Server Authentication panel of the Voyager Remote workspace contains parameters for the Authentication metod used by Application Server to allow remote connections:



- **None**: Autenthication will not be done, access to Application server is free.
- **User Password**: Access to Application Server need an authentication with username and password, not other ways are allowed. Credential is store in Voyager actually loaded profile.

- **Authentication Ticket**: A special ticket made by encrypted file or OTP code is needed to access to Application Server (reserved to renting features) and not other ways are allowed.
- **Authentication Ticket or User Password**: Application Server access will be authorized or using the username and passord or ticket/OTP code

Important Note! Authentication for local PC Voyager's applications is not required also if set up. Voyager external application like FITViewer continue to work without need to asking auth stuff.

Important Note! Change to all setting in this box need a Voyager restart to be applied

26.5 Default Remote User

The Default Remote User panel of the Voyager remote workspace contains parameters for authentication of Application Server remote clients:

- **Username**: case sensitive username required to access to the Application Server from external client, if Authentication level need Username and Password
- **Password**: case sensitive password required to access to the Application Server from external client, if Authentication level need Username and Password
- **Skull Button:** toggle between show in clear the password or obfuscated by *
- **Apply:** press the button to apply changes

Important Note! Default credentials are

admin password

Please change it immediately !!!

Important Note! Just define username and password is not enough to protect application server Authentication. You need also to activate authentication using the Application Server Authentication panel settings

26.6 RoboTarget Shared Secret

The RoboTarget Shared Secret panel of the Voyager remote workspace contains encrypt shared secret used in pair with RoboTarget Manager to allow secure encrypt communication between Application server and RoboTarget Manager (RoboTarget Manager is part of the Voyager Advanced/Full Version of Voyager):

- **Secret**: case sensitive text (number, letter, simbols) used By Application Server to rolling encrypt data

communications (local and remote)

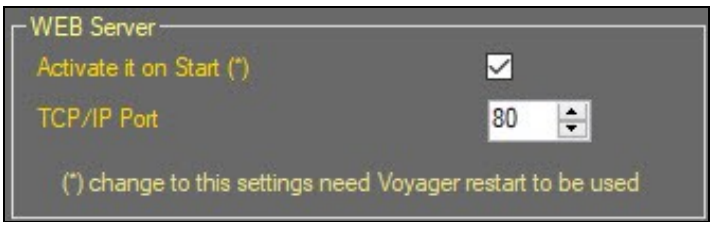
- **Skull Button:** toggle between show in clear the secret or obfuscated by *
- **Apply:** press the button to apply changes

Important Note! Please do not sharing with others the secret. Secret must be match between Voyager and RoboTarget Manger to work correctly. Default is empty, provide your secret as soon as possible.

26.7 Web Server

As an option, Voyager's Web Dashboard can be hosted on the machine running Voyager. If you choose this option, the HTML and supporting files used in the Web Dashboard will be served to your browser via an internal web server included with Voyager. No Internet connection is required with this option.

Alternatively, if you have an Internet connection, you can run the Web Dashboard using the files hosted at http://www.starkeeper.it/wdash/.



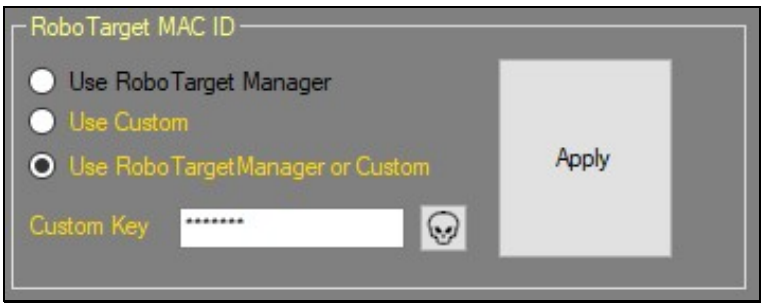
- **Activate it on Start (*):** If checked, Voyager's internal web server will start when you start Voyager. This web server will be used to serve the Web Dashboard files
- **TCP/IP Port:** Select the TCP/IP port on which the web server will listen for a connection. The default is port 80.

For more information on using the Web Dashboard, see https://www.starkeeper.it/wdashinfo/

Important Note! Any changes made in this section will not take effect until you restart Voyager

26.8 RoboTarget MAC ID

Define the way to calculate MAC for RoboTarget Encrypted communication.

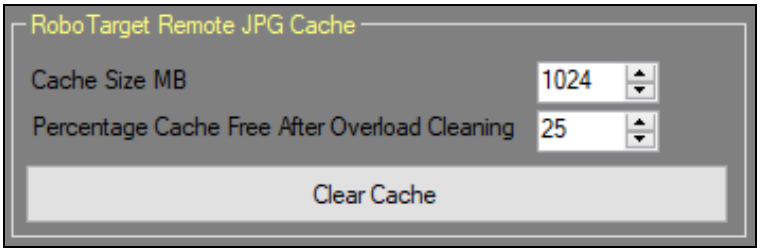


- **Use RoboTarget Manager:** Default choice for who have regular version of Voyager Advanced/Full
- **Use Custom:** use a dedicate MAC key obtained with a NDA. Dedicated to Renter Companies or user with special needed. A custom key is needed
- **Use RoboTargetManager or Custom:** allow use of default MAC or dedicated MAC. A custom key is needed
- **Custom Key:** custome key released to NDA users/company
- **Apply:** press the button to apply changes

Important Note! RoboTarget Manager is part of the Voyager Advanced/Full Version of Voyager

26.9 RoboTarget Remote JPG Cache

Voyager host a cache on folder dedicated to the JPG image created for the Advanced/Full version. Those jpg image are a stretched preview of the FIT just downloaded from camera during RoboTarget acquiring. To allow optimization on creation of this JPG and time distributions to clients a cache is used to retain file on disk until a quota disk is reached.



- **Cache Size MB:** Size in MB of the cache folder to maint on disk
- **Percentage Cache Free After Overload Cleaning:** when a cache is cleaned by the RoboTarget the amount of space use will be the cache size defined in the previous parameter minus the percentage of this size defined inthis parameter (example after cleaning you will have on disk 4GB of cache - 25% of 4GB). On cleaning the oldest fils are deleted permanently to free space.
- **Clear Cache:** allow use of default MAC or dedicated MAC. A custom key is needed

Important Note! RoboTarget Manager is part of the Voyager Advanced/Full Version of Voyager
Important Note! Be sure to not leave cache size with a huge value that can full your disk space and stop working your OS system

-

26.10 Other Setup Pages

```
? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup
```

27 Voyager Remote

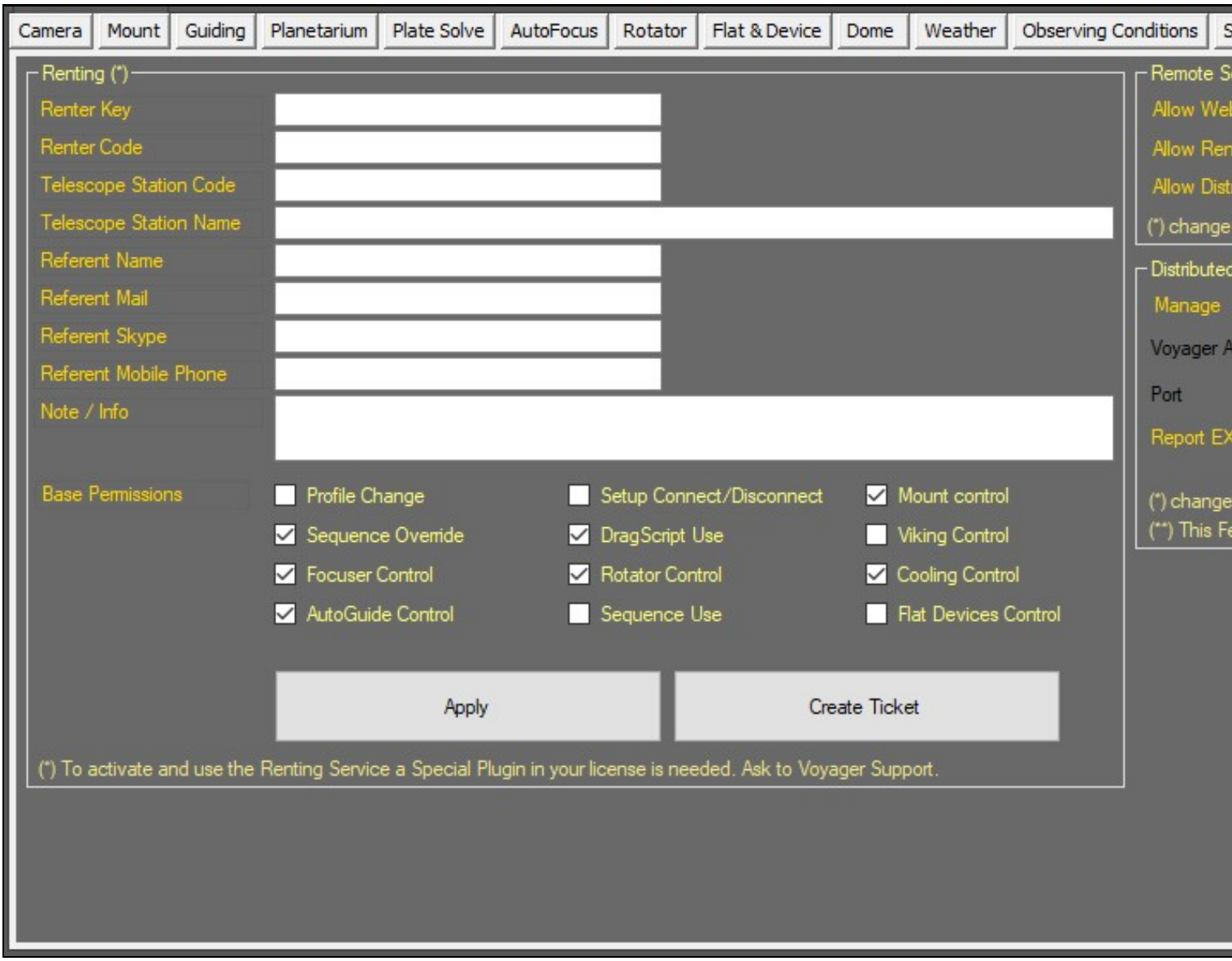
27.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

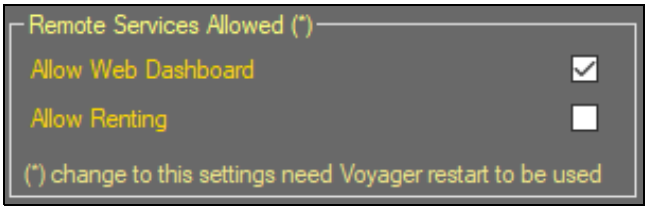
27.2 Voyager Remote Workspace

Click the Remote button in the Setup workspace to display the Remote settings window, which contains miscellaneous settings about Voyager's remote operation:



27.3 Remote Service Allowed

The Remote Service Allowed panel of the Voyager Remote workspace contains parameters for enable/disable fruition of Voyager's remote services:



- **Allow Web Dashboard**: if checked Voyager allow external client to connect to Application Server in Web Dashboard mode. Normal Client are always allowed and cannot be disabled if not stopping the application server service . If checked, allow also the Voyager Web Dashboard service to operate
- **Allow Renting**: if checked allow external client to connect to Application Server in Renting mode. This service need a special Plugin. For more info please contact directly Voyager staff

Important Note! Change to all setting in this box need a Voyager restart to be applied

27.4 Distribuited Emergency Status Client Setup

Use of these features are reserved and a special Plugin is needed. For information about please contact directly Voyager staff

Also check this link for info about the plugin:

https://software.starkeeper.it/voyager-plugins/

27.5 Renting

Use of these features are reserved and a special Plugin is needed. For information about please contact directly Voyager staff

-

27.6 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup

Viking Setup
Voyager Remote
Voyager Setup
Weather Setup
WEB Dashboard Setup

28 Weather Setup

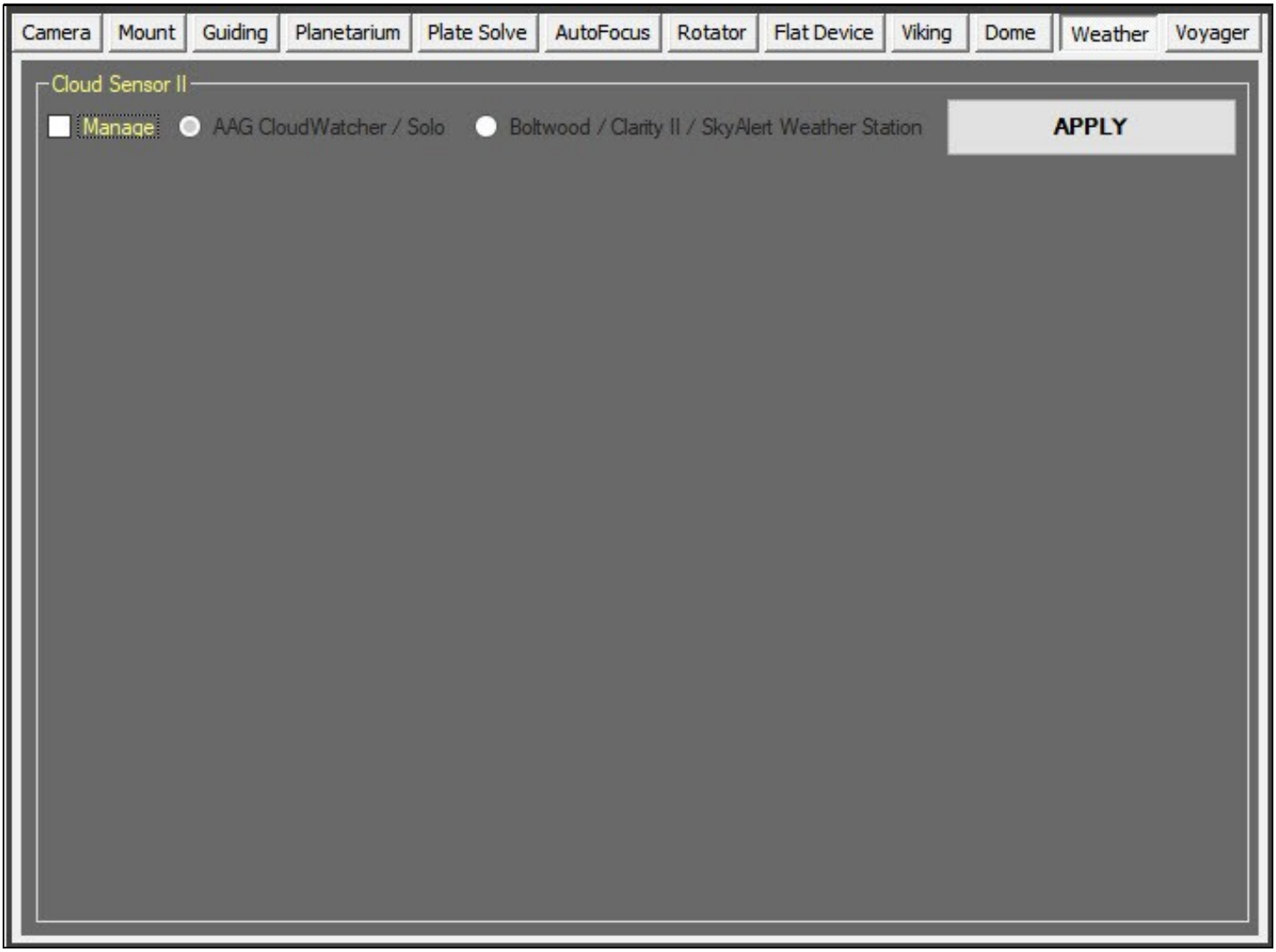
28.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

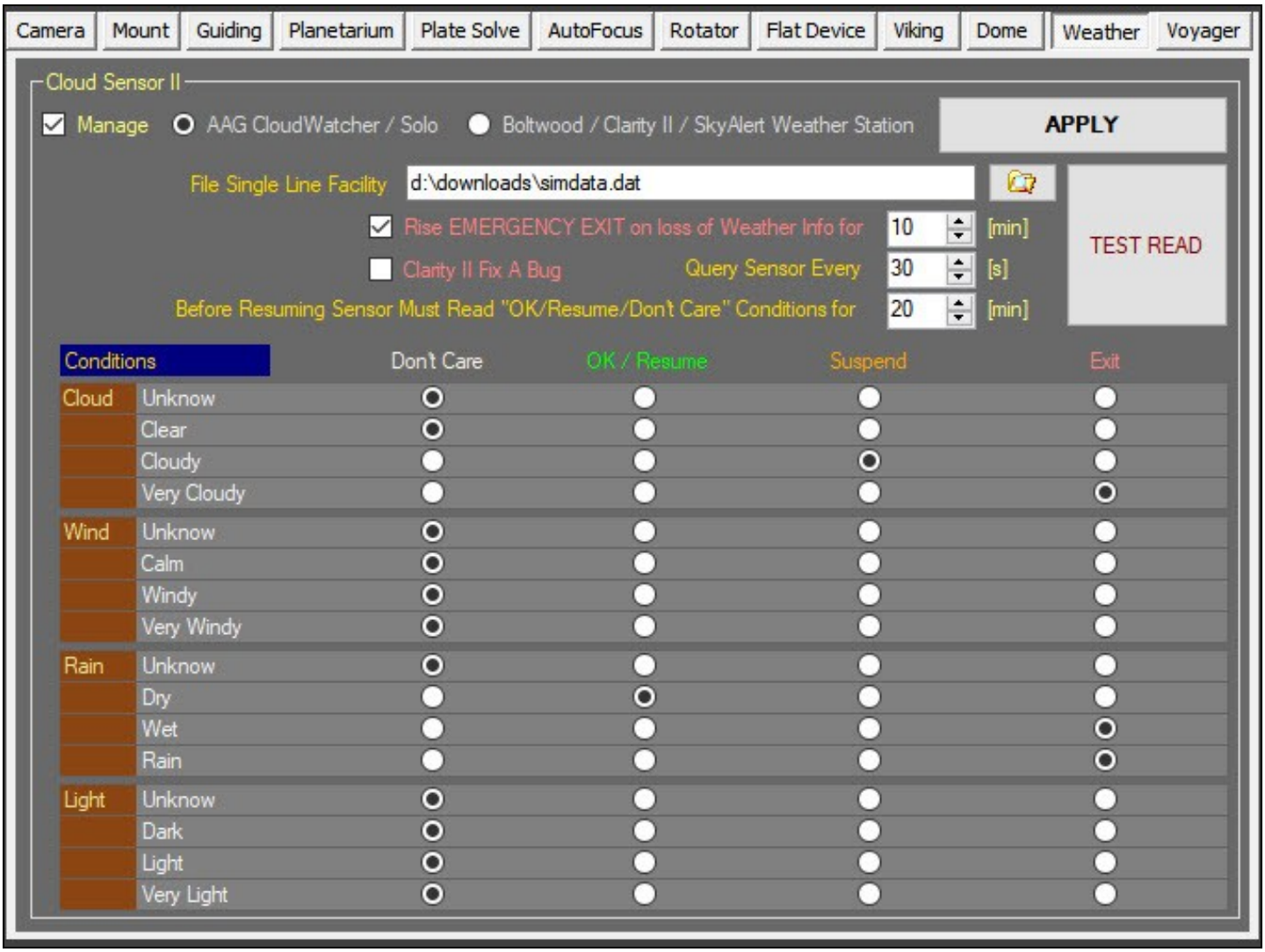
- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

28.2 Weather Setup Workspace

Click the Weather button in the Setup workspace to display the weather setup window:



Click the Manage checkbox if you have a weather sensing device available, and the following configuration window will appear:



- **Cloud Sensor Choice**: Click the radio button to indicate if you have an AAG CloudWatcher / Solo device or a Boltwood / Clarity II / SkyAlert Weather Station or compatible device
- **APPLY**: Click the Apply button to apply the settings in this window to your configuration. **Use the APPLY button every time you change** one or more settings in this dialog window
- **File Single Line Facility**: Your weather device stores weather information in a single line data file. Enter the fully qualified path and filename here, or click the folder icon to browse to the single line data file
- **TEST READ**: Click this button and Voyager will attempt to read the single line data file you have specified, confirming that the filename and path specified is correct and readable. If Voyager cannot read the file, check the pathname and security settings and make sure the file is reachable and readable from this PC
- **Rise EMERGENCY EXIT on loss of Weather Info for**: If checked, Voyager will raise the Emergency Exit event if no weather information is available for this number of minutes. Depending on how you have configured Voyager's actions when the Emergency Exit event is triggered, this could, for example, park your telescope, close the dome, and send you an alert. Note that loss of weather info could occur due to a network error or weather sensor failure.

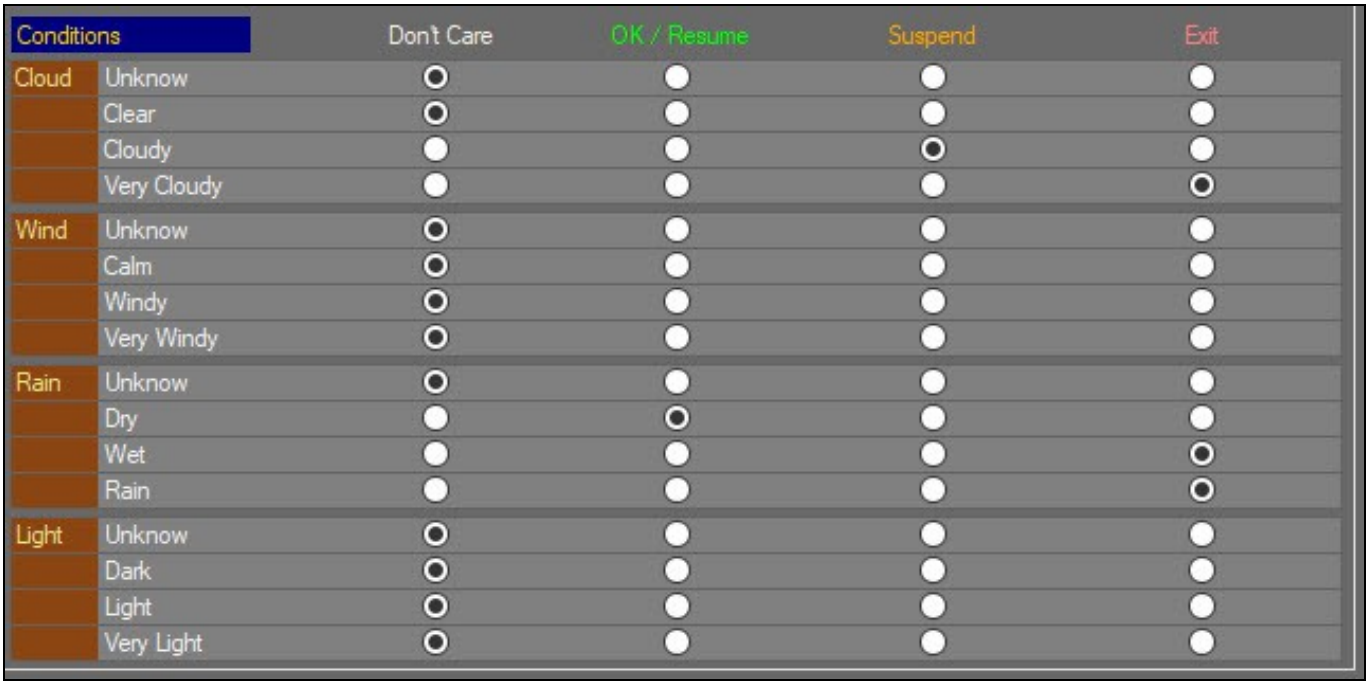
Important Note! The Emergency actions (Suspend,Resume, Exit) work only when a DragScript is running. They don't work in Sequence only mode or when Voyager is in IDLE and when no actions are running or were suspended

- **Clarity II Fix a Bug**: Workaround to fix the lack of a data field in the generated file of some Clarity II devices due to a particular firmware revision. For more info contact support

- **Query Sensor Every**: Number of seconds between polling the sensor for weather information
- **Before Resuming Sensor Must Read "OK/Resume/Don't Care" Conditions for**: When weather conditions change to a state that matches your choice in the "OK / Resume," or "Don't Care," do not resume until this many minutes have passed and the sensor readings continue to match an "OK / Resume" or "Don't Care" choice. For example, if you choose to suspend operations when conditions become cloudy, if they become clear again, they must stay clear for this many minutes until the observing session is resumed. This prevents excessive suspension and resumption operations if conditions are changing quickly.

28.3 Conditions Table

The largest portion of the Weather setup window is devoted to the Conditions Table:



Here you can decide what events should be triggered based on any combination of readings from your weather sensor.

For every possible weather condition, a radio button specifies whether to ignore (Don't Care), resume from a suspended state (OK / Resume), suspend operation (Suspend) or terminate the session (Exit).

Important Note! The event triggered will be the most severe based on the conditions read from the weather device. I.e., if conditions match anything in the Exit column, the EMERGENCY EXIT event will be raised. If no conditions match anything in the Exit column, but something matches in the Suspend column, an EMERGENCY SUSPEND event will be raised. If conditions match something in the OK / Resume column, and no conditions match anything in the Suspend or Exit column, an OK / Resume event will be raised

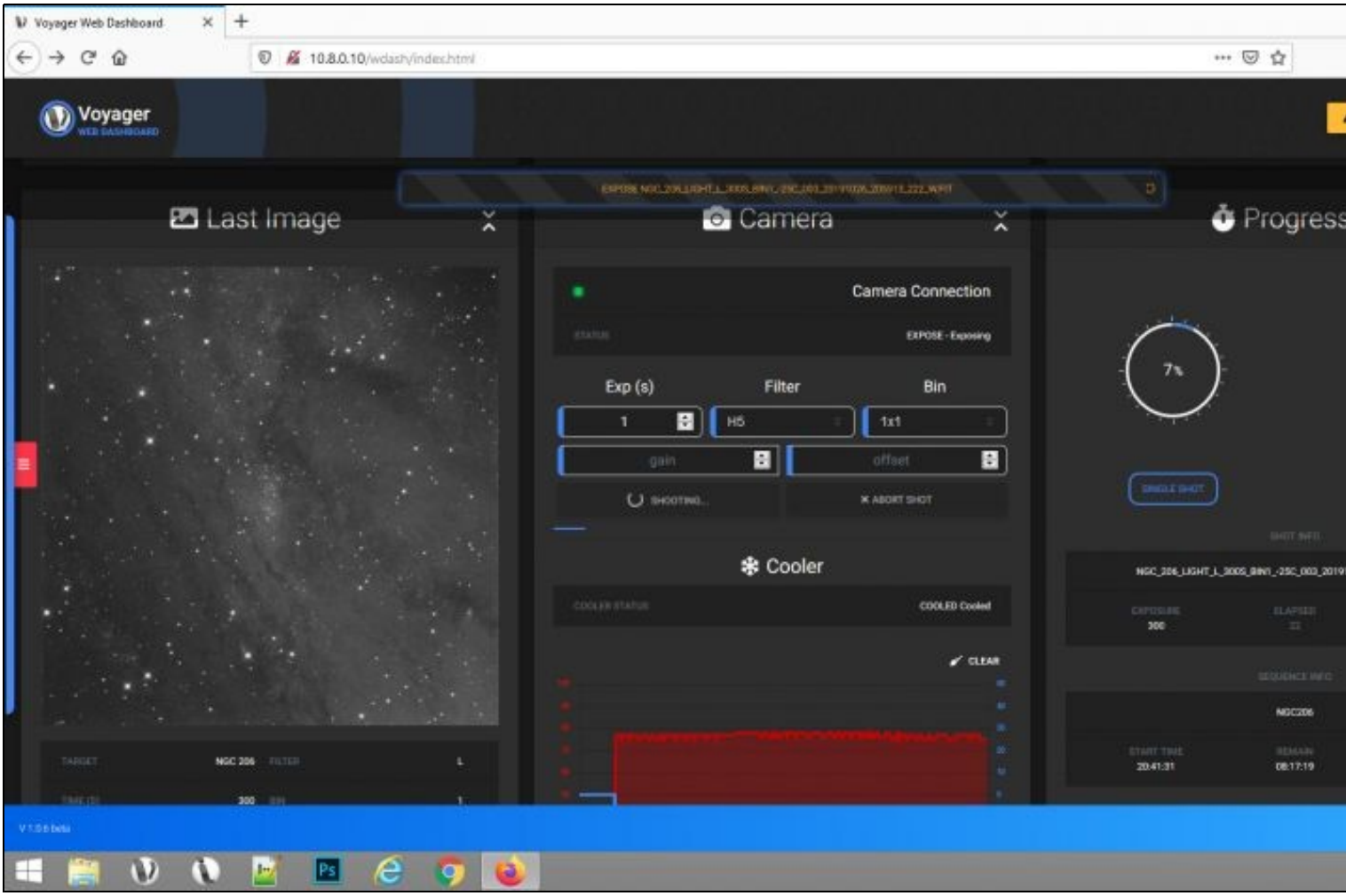
Matching weather conditions cause an event is raised that can be handled with any combination of actions you specify in a DragScript.

- Don't Care: Ignore these conditions - no action is taken when the weather sensor reading is a value with the "Don't Care" radio button selected
- OK / Resume: Raise the RESUME event (Emergency Request) when the weather sensor reads this value for the number of minutes specified in the "Before Resuming Sensor Must Read "OK/Resume/Don't Care" Conditions for" setting **and** no conditions match anything in the Suspend or Exit column
- Suspend: Raise the SUSPEND event (Emergency Request) when the weather sensor reads this value and no conditions read match anything in the Exit column. I.e., an Exit event takes precedence over a Suspend event.
- Exit: Raise the EXIT event (EMERGENCY REQUEST) when the weather sensor reads this value

28.4 Other Setup Pages

```
? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup
```

29 WEB Dashboard Setup



29.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- Gold or Yellow: Use caution when changing as things may not work well or as expected
- Red: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

29.2 Preliminary Operations to allow Web Dashboard use

In order to use the Voyager WEB Dashboard it is necessary to proceed with the following configurations:

- Activate the Application Server on Voyager
- Always in Voyager Application Server flag the voice "Allow Dashboard Service"
- Restart Voyager to apply the changes
- Allow Voyager in OS firewall at prompt first time
- Besure to have configured you firewall (also manually if needed) to forwarding the service to internal/external network

Important Note! Web Dashboard isn't available in DEMO mode.

29.3 Access to Web Dashboard from Internet

You can access to Voyager Web Dashboard using the internet link hosted in Voyager Starkeeper.it official website here or using the IP address or hostname of the remote PC with Voyager Application Server running if you have activated the Voyager Internal Web Server

To allow external access your IP (where Voyager running) must be public , or static with a DynamicDNS system activated. If your IP isdinamyc and under NAT you cannot reach the Web Dashboard, you must change IP policy with your Internet Provider or use a VPN system like OpenVPN, IPVanish or similar.

29.4 Access to Web Dashboard from Internet using Zerotier

If you need to accesso from Internet to a remote Voyager Application Server, a Voyager Web Server or Voyager Web Dashboard and do not have a public IP you can use the zerotier approach.

Zerotier is a free service for creating distribuited private network over Internet, we have this and work wonderfully, we recommend it. We asked to 2 our users to write a paper about how to configure zerotier from zero to reach a remote observatory:

- http://www.starkeeper.it/voyager/zerotier.pdf
- http://www.starkeeper.it/voyager/zerotier2.pdf

29.5 Access to Web Dashboard from Internet

You can access to Voyager Web Dashboard using the internet link hosted in Voyager Starkeeper.it official website here or using the IP address or hostname of the remote PC with Voyager Application Server running if you have activated the Voyager Internal Web Server

To allow external access your IP (where Voyager running) must be public , or static with a DynamicDNS system activated. If your IP isdinamyc and under NAT you cannot reach the Web Dashboard, you must change IP policy with your Internet Provider or use a VPN system like OpenVPN, IPVanish or similar.

29.6 Access to Web Dashboard from local network

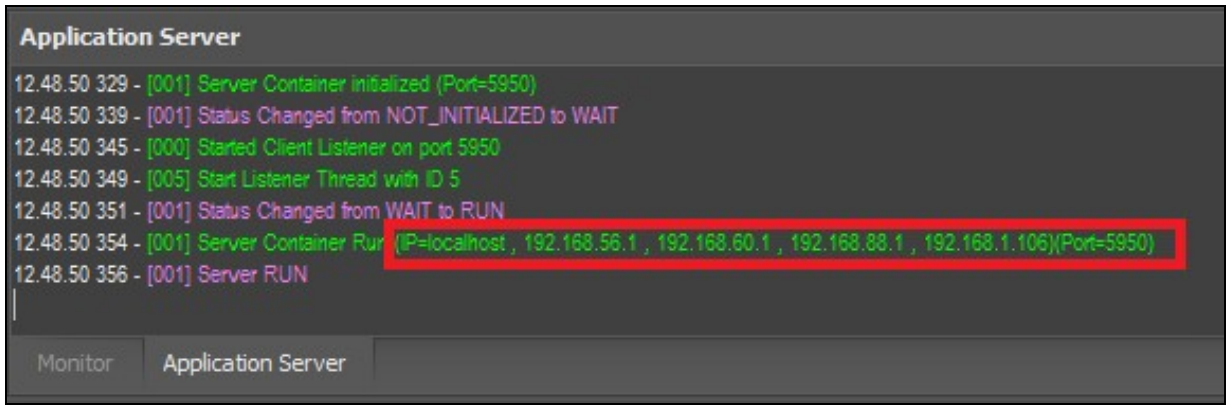
If you are in a private LAN you can access to Voyager Web Dashboard using the internet link hosted in Voyager Starkeeper.it official website hereif Internet is disponible.

If you dont have Internet you must activate the Voyager Internal Web Server , restart Voyager, open you browser (Chrome, FireFox, etc) and insert the IP address of the PC hosting the Voyager Application Server.

29.7 How to choose the IP to insert in the Web Dashboard page to connect in

Some tips on how to choose the IP for connection to dashboard:

- if you are on the same PC where is the Voyager Application Server please just press enter without input anything on IP field (some firewall can exclude this to work, jump to the next point and using IP)
- if you are on the same LAN of the PC Hosting the Voyager Application Server please use the IP listed in the Application Server Monitor Window , after starting Voyager you will see a list of IP addresses like in image. The right one depends on which LAN your client PC are (use from start button in windows the execute function, type cmd and press enter, type ipconfig and then press enter, a list of your PC IP will be showed, choose the class of IP matching the Voyager Application Server IP in the list)

- 

- If for example your PC client have IP 192.168.1.108 please insert in the web dashboard IP field the IP 192.168.1.106
- you can also use the name of the Voyager Application Server PC if this is allowed from your network router protocol

29.8 Secure the Communications between Voyager and Web Dashboard

Actually the communication protocol is in clear, please using a VPN connection if you want to secure access and data exchange.

This is highly recommended if you use for a remote observatory. More about security will be deployed when Web Dashboard will exit from beta period.

29.9 Beta Running and Disclaimer

Also if Web Dashboard is released some months ago and are really stable we are decide to running in beta version.

For each questions and issues please contact us using the official website at Starkeeper.it.

Do not sharing whit everyone data access information and IP address.

29.10 User Manual

https://www.starkeeper.it/wdash/doc/WDashb_Doc_1_0_14_def.pdf

29.11 Other Setup Pages

```
? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
```

Viking Setup
Voyager Remote
Voyager Setup
Weather Setup
WEB Dashboard Setup

30 Observing Conditions Setup

30.1 Observing Conditions Setup

You can connect an Observing Conditions monitor to Voyager and display status of things like temperature, humidity, cloud cover, etc. Open Weather Map is supported via ASCOM, as well as any other device accessible via an ASCOM driver, or a device connected to Viking.

Observing Conditions are displayed in the Observing Conditions widget in the status window, and can be tested with the Update Decimal Number from Observing Conditions DragScript action.

30.2 Color Coding

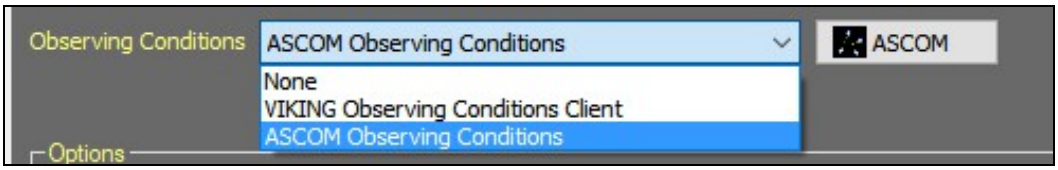
Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

30.3 Observing Conditions Setup Workspace

The Observing Conditions setup worksapce is where you select and configure an observing conditions monitoring device:

- **Observing Conditions**: Select your observing conditions monitoring device from the drop-down list:



- ♦ **None**: No observing conditions monitor is connected
- ♦ **VIKING Observing Conditions Client**: The observing conditions monitor is connected to Viking
- ♦ **ASCOM Observing Conditions**: An ASCOM driver is used to connect to the observing conditions monitor
  - ◊ If an ASCOM driver is used, click the 

 button to configure it for use
  - ◊ Open Weather Map is accessible via the ASCOM option

- ♦ **Options**:
  - ◊ **Linear Regression max angular coeff. to consider trend stationary**: The Observing Conditions status widget displays the current value and a trend indicator. This coefficient value controls whether the trend is shown as stable, increasing or decreasing. Change with caution - you can miss observing condition changes if you set this incorrectly

- **Trend Frame Time Calculation**: Sets the time frame in minutes for the moving average calculation of observing condition trends
- **Remove Temperature from managed data (Viking / SQM Override)**: If checked, delete the temperature data returned from the Observing Conditions monitor - use the value from the Viking /SQM sensor instead
- **Remove SKY Quality from managed data (Viking / SQM Override)**: If checked, delete the Sky Quality data returned from the Observing Conditions monitor - use the value from the Viking /SQM sensor instead
- **Remove Humidity from managed data (Viking / SQM Override)**: If checked, delete the humidity data returned from the Observing Conditions monitor - use the value from the Viking /SQM sensor instead
- **Remove Dev Point from managed data (Viking / SQM Override)**: If checked, delete the Dev Point data returned from the Observing Conditions monitor - use the value from the Viking /SQM sensor instead
- **Remove Pressure from managed data (Viking / SQM Override)**: If checked, delete the Pressure data returned from the Observing Conditions monitor - use the value from the Viking /SQM sensor instead
- **Ignore VIKING Observing Conditions Data**: If checked, observing conditions data coming from VIKING will not override the Observing Conditions Data of main control
- **Ignore SQM Observing Conditions Data**: If checked, observing conditions data coming from SQM control will not override the Observing Conditions Data of main control

30.4 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup

31 SQM Setup

31.1 SQM Setup

You can connect an SQM (Sky Quality Monitor) sensor device to Voyager and display values such as sky brightness. The values will be displayed in the Observing Conditions widget, and can be transferred into a decimal number DragScript variable with the Update Decimal from Observing Conditions action.

31.2 Color Coding

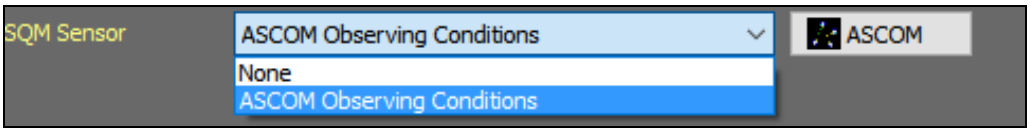
Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

31.3 SQM Setup Workspace

The Observing Conditions setup worksapce is where you select and configure an SQM sensor:

- **SQM Sensor**: Select your SQM sensor device from the drop-down list:



- ♦ **None**: No SQM monitor is connected
- ♦ **ASCOM Observing Conditions**: An ASCOM driver is used to connect to the SQM sensor
  - ◊ If an ASCOM driver is used, click the ASCOM button to configure it for use
- ♦ **Options**:
  - ◊ **Remove Temperature from managed data (Observing Conditions Override)**: If checked, delete the temperature data returned from the SQM sensor - use the value from the Observing Conditions monitor instead
  - ◊

Important Note! SQM data cannot be used to generate an Emergency Exit because it is not reliable due to driver management and communication with the SQM device

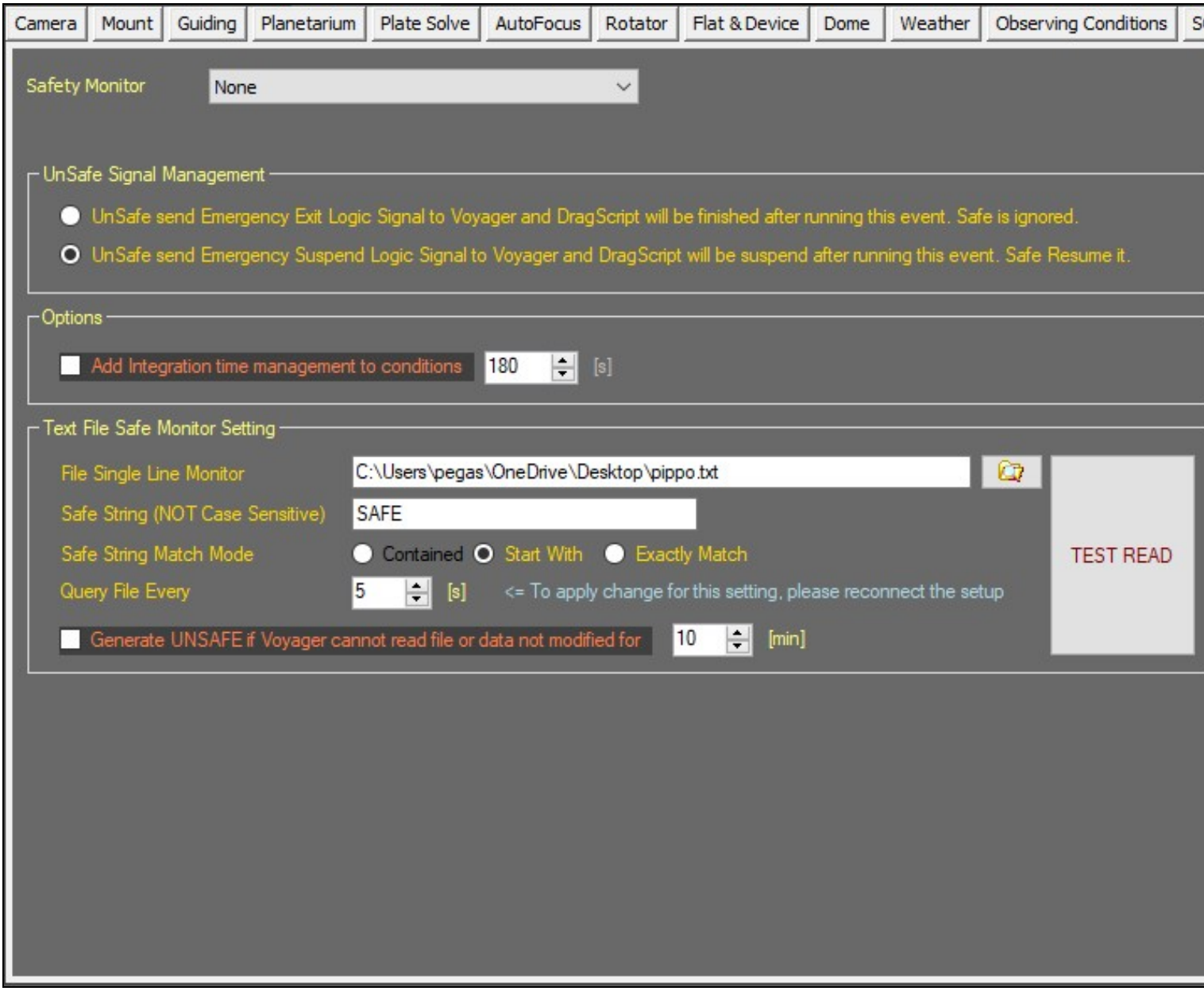
31.4 Other Setup Pages

```
? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup
```

32 Safety Monitor Setup

32.1 Safety Monitor Setup Workspace

Click the Safety Monitor button in the Setup workspace to display the Safety Monitor setup window:



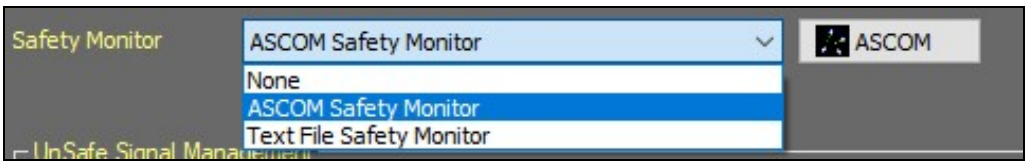
32.2 Color Coding

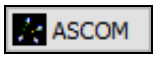
Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- Gold or Yellow: Use caution when changing as things may not work well or as expected
- Red: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

32.3 Safety Monitor Choice

Choose your Safety Monitor driver from the Safety Monitor drop-down list:

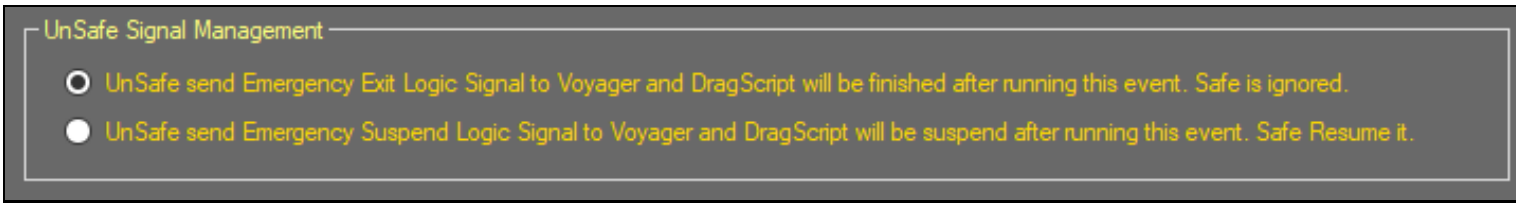


Click the 

button to configure your Safety Monitor's ASCOM driver.

32.4 UnSafe Signal Management

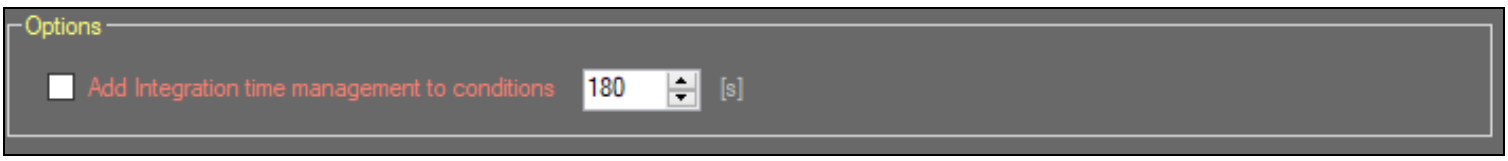
Choose how Voyager should react to an UnSafe signal from the Safety Monitor:



- **UnSafe send Emergency Exit Logic Signal to Voyager and DragScript will be finished after running this event. Safe is ignored**: If an UnSafe signal is sent to Voyager by the Safety Monitor, a running DragScript will be immediately interrupted and control will pass to the actions in the DragScript Emergency Exit block. The DragScript will terminate once the actions in the Emergency Exit block are executed. A later Safe signal from the Safety Monitor will be ignored. Visit the the DragScript Examples section to see how these DragScript blocks work in an actual DragScript.
- **UnSafe send Emergency Suspend Logic Signal to Voyager and DragScript will be suspend after running this event. Safe Resume it**: If an UnSafe signal is sent to Voyager by the Safety Monitor, a running DragScript will be immediately interrupted and control will pass to the actions in the DragScript Emergency Suspend block. DragScript execution will be suspended once the actions in the Emergency Suspend block are executed. A later Safe signal from the Safety Monitor will cause an Emergency Resume signal to the DragScript, and control will pass to the actions in the DragScript Emergency Resume block. Visit the the DragScript Examples section to see how these DragScript blocks work in an actual DragScript.

32.5 Safety Manager Options

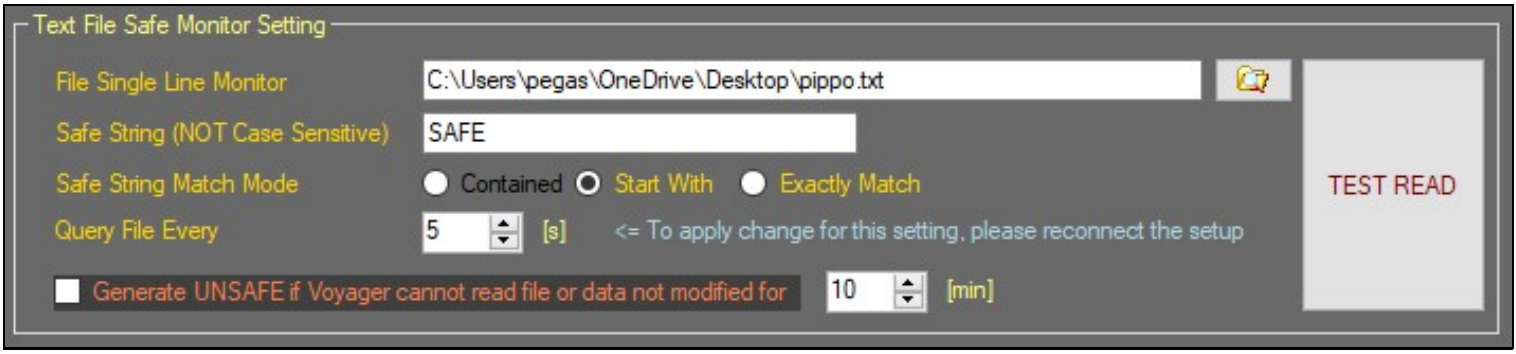
Optional Safety Manager configuration choices:



- **Add Integration time management to conditions**: If checked, the number of seconds selected in the counter field must elapse before a change of Safety Monitor status will be acted on by Voyager. This is useful if your safety monitor driver does not already include such a function. It can avoid rapid switching between performing Safe and UnSafe emergency event actions if the safe conditions are changing quickly. However, if your safety monitor is already delaying and you add a delay here, you could delay acting on an important UnSafe event such as rain starting, so be careful when using this option

32.6 Text File Safe Monitor

You may optionally read the status of SAFE and UNSAFE from a text string placed in a single-line file updated by programs external to Voyager. This is useful for Observatories shared between multiple setups.



- **File Single Line Monitor:** The text file to be monitored by Voyager for an SAFE or UNSAFE indication. Type in a fully qualified filename or select the file by clicking the folder icon.
- **Safe String (NOT Case Sensitive):** When Voyager reads the File Single Line Monitor file, if it contains this text string, the safety monitor condition will be considered SAFE. If this text string is not found, the safety monitor condition is considered UNSAFE
- **Safe String Match Mode:** Define how to search the Safe String in the text.
    - **Contained:** string in every position of word text and also in a part of word
    - **Start With:** the word text must start exactly with the string
    - **Exactly Match:** word must match exactly the string
- **Query File Every:** The number of seconds between checks of the single line monitor file
- **Generate UNSAFE if Voyager cannot read file or data not modified for:** If Voyager cannot read the single line monitor file or if it has not been written to for this many minutes, consider the safety monitor condition to be UNSAFE. This protects against conditions which may make the single line monitor file unreadable or outdated, such as network or file system failures, or failures of the program that should be updating the single line file

Important Note! Be careful about string match mode. For example if you use SAFE like string and Contained method the word UNSAFE and the word SAFE will return to you the SAFE condition because each of the words contains the text SAFE.

33 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup

34 Voyager Setup

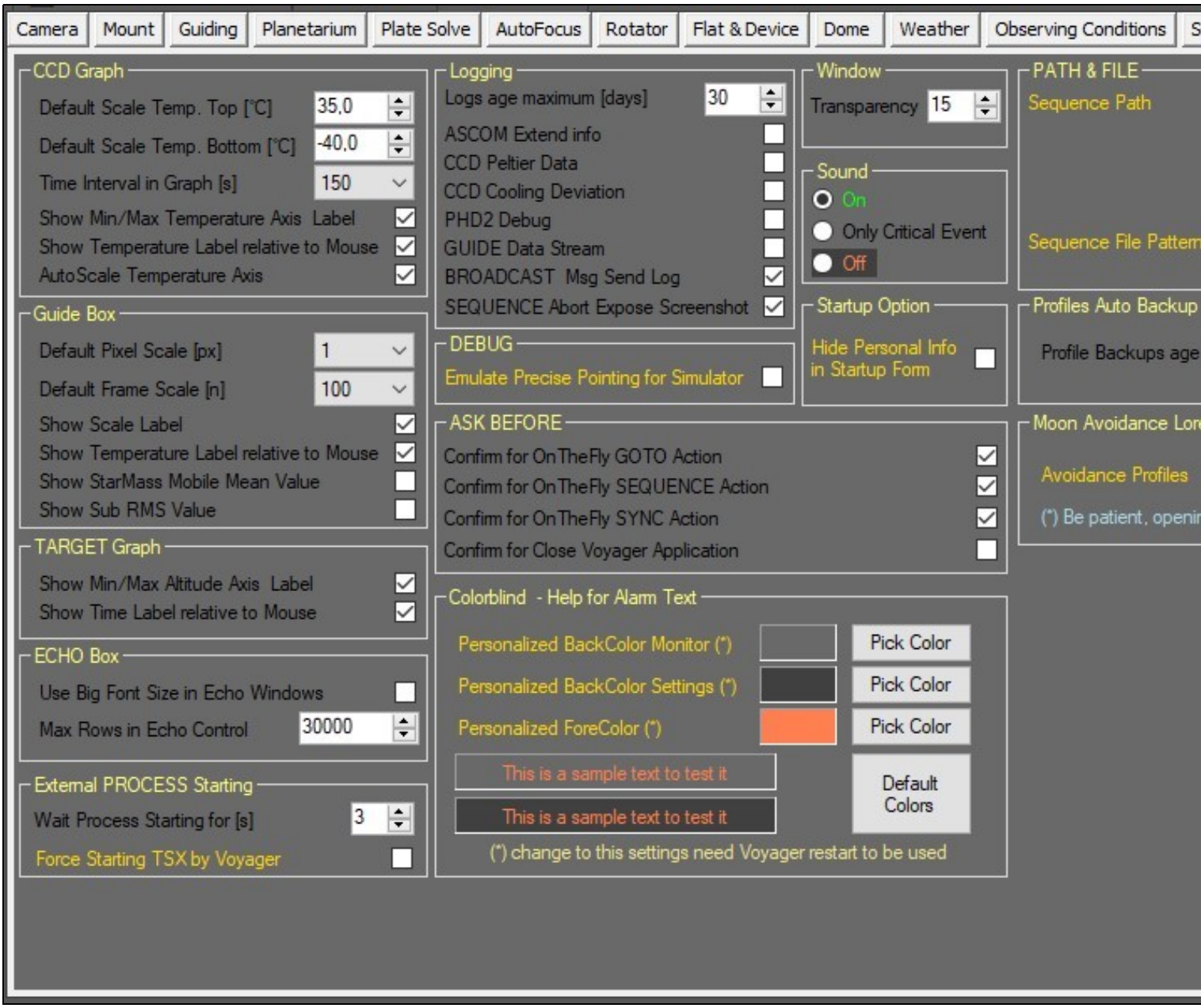
34.1 Color Coding

Throughout the Setup workspace, Voyager uses color to indicate the following:

- **Black**: A normal setting
- **Gold or Yellow**: Use caution when changing as things may not work well or as expected
- **Red**: Use extreme care when changing this setting - the wrong value can damage your equipment or the imaging session may fail

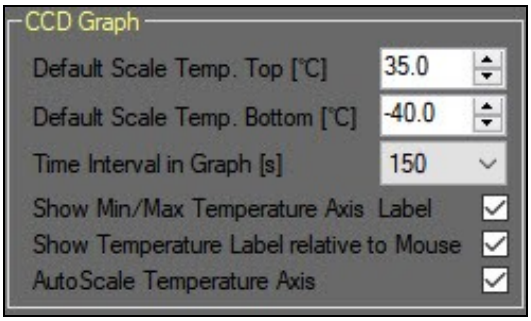
34.2 Voyager Setup Workspace

Click the Voyager button in the Setup workspace to display the Voyager settings window, which contains miscellaneous settings about Voyager's operation:



34.3 CCD Graph

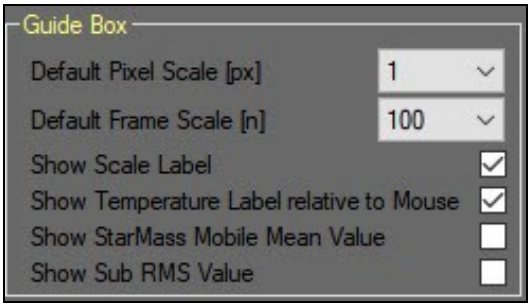
The CCD Graph panel of the Voyager setup workspace contains parameters for the CCD Widget displayed in the Status Window



- **Default Scale Temp. Top (°C)**: Default value for the top of the temperature scale, in °C
- **Default Scale Temp. Bottom (°C)**: Default value for the bottom of the temperature scale, in °C
- **Timer Interval in Graph**: Total time represented by the X axis of the graph in seconds
- **Show Min/Max Temperature Axis Label**: If checked, display the white boxes with the values represented by the top and bottom of the Y axis (temperature) of the CCD Widget displayed in the Status Window
- **Show Temperature Label relative to Mouse**: If checked, hovering the mouse shows the temperature of the point under the mouse cursor in the CCD Widget displayed in the Status Window
- **AutoScale Temperature Axis**: If checked, automatically scale the values of the top and bottom of the Y axis (temperature) of the CCD Widget displayed in the Status Window so the displayed values fit in the widget

34.4 Guide Box

The Guide Box panel of the Voyager setup workspace contains parameters for the Guide Widget displayed in the Status Window:

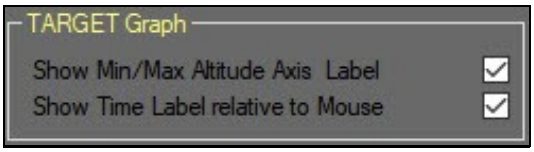


- **Default Pixel Scale**: The number selected from the drop-down box represents the number of pixels, +/-, represented by the Y axis scale of the Guide Widget displayed in the Status Window. For example, a value of 1 here means the top of the graph represents a guide error of +1 pixels, and the bottom of the graph represents a guide error of -1 pixels
- **Default Frame Scale**: The number of guiding frames (exposures) represented by the X axis of the graph
- **Show Scale Label**: If checked, the values of Default Pixel Scale and Default Frame Scale are displayed in white boxes at the top and bottom respectively of the Guide Widget displayed in the Status Window
- **Show Temperature Label relative to Mouse**: If checked, when the mouse is hovered over the Guide Widget displayed in the Status Window, a white box pops up over the graph and shows the temperature represented by the mouse pointer location
- **Show StarMass Mobile Mean Value**: If checked, the moving average of the StarMass value is displayed in the Guide Widget displayed in the Status Window

- **Show Sub RMS Value**: If checked, the RMS value of the current guide exposure is displayed in the Guide Widget displayed in the Status Window

34.5 TARGET Graph

The TARGET Graph panel of the Voyager setup workspace contains parameters for the Target Widget displayed in the Status Window



- **Show Min/Max Altitude Axis Label**: If checked, label the Y axis (altitude) of the Target Widget displayed in the Status Window with the values of the bottom and top lines of the graph
- **Show Time Label relative to Mouse**: If checked, hovering the mouse over the Target Widget displayed in the Status Window pops up a box with the value corresponding to the X axis (time) value of the mouse pointer position

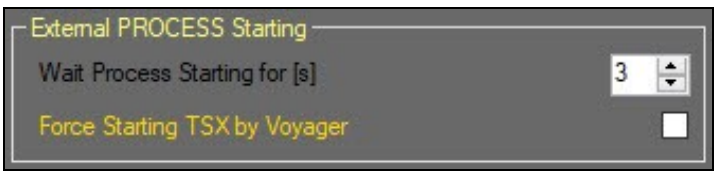
34.6 ECHO Box

The ECHO Box panel of the Voyager Setup workspace contains settings for the Monitor Window, formerly known as the Echo box.

- **Use Big Font Size in Echo Windows**: If checked, use large fonts in the Monitor Window, which is the window where status messages appear for running actions

34.7 External PROCESS Starting

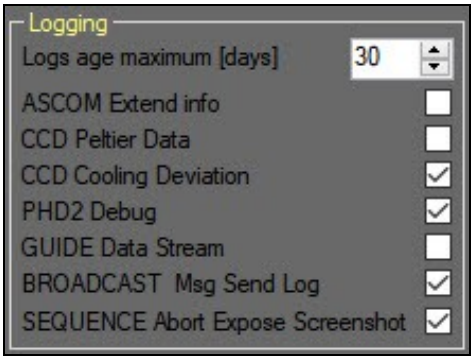
The External PROCESS Starting panel of the Voyager Setup workspace contains information relative to starting processes external to Voyager:



- **Wait Process Starting for**: Number of seconds to wait after starting a process external to Voyager, e.g. PHD2 guiding software, TheSkyX planetarium or Maxim DL camera control
- **Force Starting TSX by Voyager:** If you have trouble with Voyager starting TheSkyX by its normal method (Windows 10 DCOM), try checking this box and Voyager will use an alternate method to start TheSkyX

34.8 Logging

The Logging panel of the Voyager Setup workspace contains settings that control what is saved in the Voyager log file, and for how long:



- **Logs age maximum**: The length of time to store information in Voyager logs in days, after the selected time the oldest log file will be deleted from disk
- **ASCOM Extend info**: If checked, extended information from ASCOM devices is stored in the log
- **CCD Peltier Data**: If checked, CCD sensor cooling data is stored in the log
- **CCD Cooling Deviation**: If checked, CCD sensor deviation from the desired value is stored in the log
- **PHD2 Debug**: If checked, PHD2 guiding software debug information is stored in the log
- **GUIDE Data Stream**: If checked, the stream of information received from the guiding software is stored in the log
- **BROADCAST Msg Send Log**: If checked, broadcast messages are stored in the log . Broadcast message are internal messages between controls that manage the setup
- **SEQUENCE Abort Expose Screenshot**: If checked, when a sequence is aborted, a screenshot is taken and stored in the log . The screenshot will be stored in the screenshot directory with the other directories of Voyager like the log directory. A reference to the name of the saved screenshot will be added also to the actual log file

34.9 Window and Sound

The Window and Sound panels of the Voyager Setup workspace contain settings for Voyager's window transparency and sounds:

- **Window**:
  - **Transparency**: A number between 0 and 30 controlling the transparency of Voyager's Main Windows
- **Sound**:
  - **On/Off/Only Critical Event**: Controls whether Voyager plays a sound through the PC's sound card - On = always, Off= never, Only Critical Event = only when critical events occur. Critical events are all the events reported in red in the Monitor window

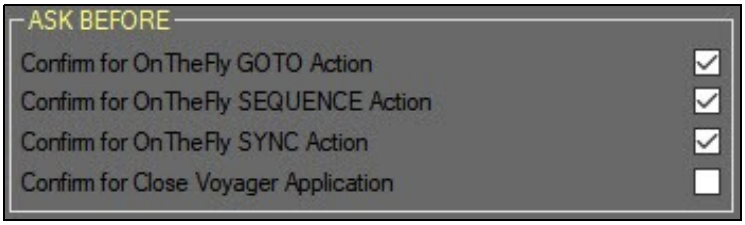
34.10 DEBUG

The DEBUG panel of the Voyager Setup workspace has settings to help with debugging:

- **Emulate Precise Pointing for Simulator**: If checked, Voyager will skip precision pointing actions and do only the normal goto (slew) actions. This is useful when testing a sequence with a simulator, as most simulators cannot perform plate solves

34.11 ASK BEFORE

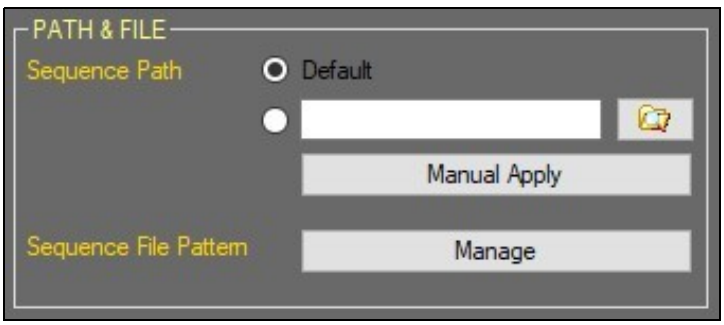
The ASK BEFORE panel of the Voyager Setup workspace has settings controlling whether Voyager confirms various actions before performing them:



- **Confirm for OnTheFly GOTO Action**: If checked, Voyager will ask confirmation before performing a goto action from the OnTheFly workspace
- **Confirm for OnTheFly SEQUENCE Action**: If checked, Voyager will ask confirmation before running a Sequence from the OnTheFly workspace
- **Confirm for OnTheFly SYNC Action**: If checked, Voyager will ask confirmation before running a Sync action from the OnTheFly workspace
- **Confirm for Close Voyager Application**: If checked, Voyager will ask confirmation closing down

34.12 PATH & FILE

The PATH panel of the Voyager Setup workspace instructs Voyager where to save images

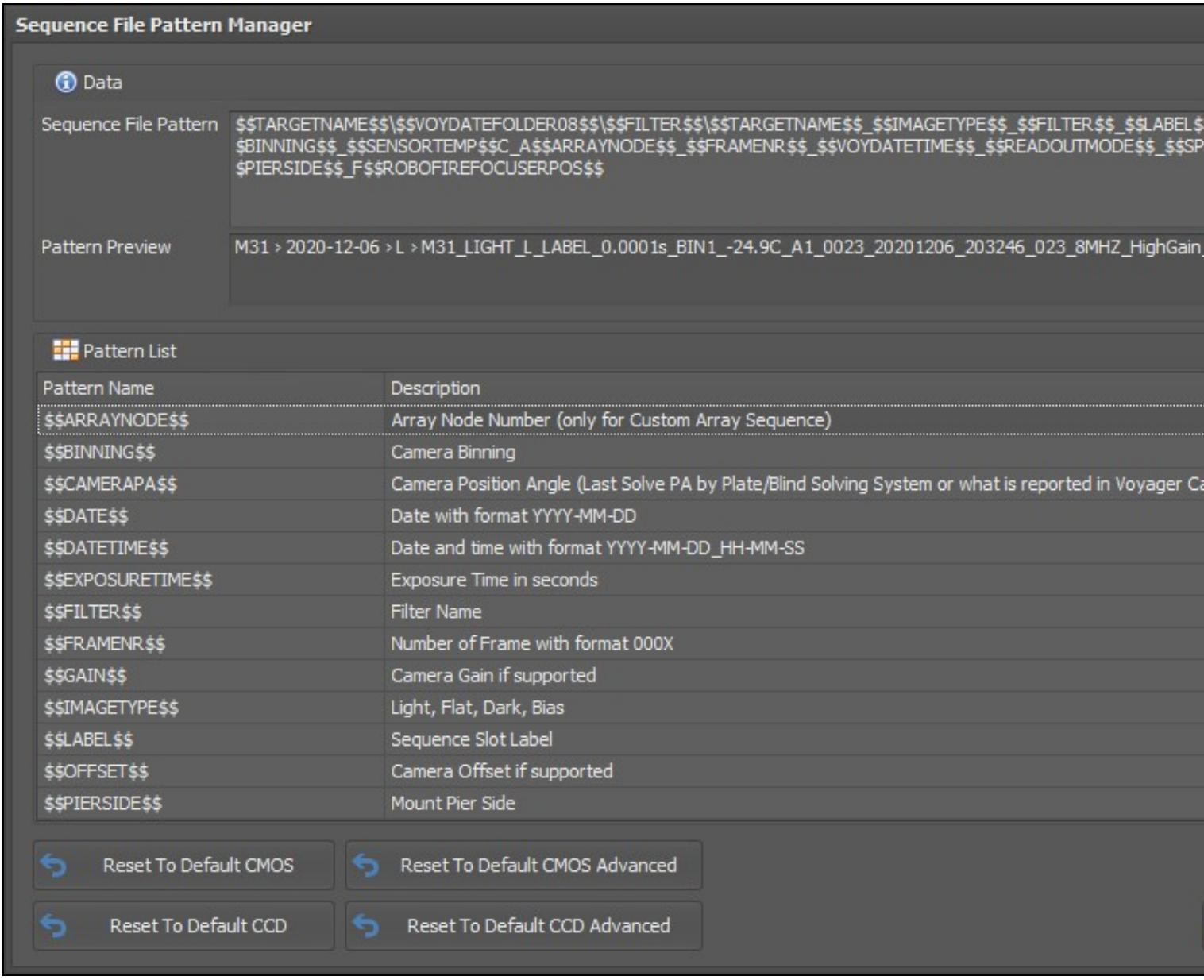


- **Sequence Path**:
  - **Default**: Voyager saves images in the default location, which will be in your Windows Documents folder: \Documents\Voyager\Sequence\<target name>
  - **Specific**: Click the second radio button and click the folder icon. Browse to the path where you want images saved
  - **Manual Apply**: edit manually or with copy and paste and press Manual Apply button
- **Sequence File Pattern:**

- **Manage:** press this button to open the FILE PATTERN manager window where you can define rules for sub foldering and file naming of the various kind of sequences in Voyager (not test shot or dragscript FIT file)

34.13 File Pattern Manager

Form version 2.2.14j of Voyager users can change the file naming and subfoldering logic of all the kind of Sequences usable in Voyager (Sequence, Mosaic Research & Survey, Array Sequence). Setting about are stored on the profile, different profile can handle different sub foldering and file naming. To open the manager you can press the manage button in the FILE & PATH box of Voyager Setup, tab Voyager.



Special string starting and ending with $$ chars indicated a key tag (pattern) to be replaced with the related information, more info about each syngle key tag in the pattern list. You can arrange a list of this pattern and combine them with normal chars to obtain a result in file namig reported in the preview.

You can manage also the sub foldering using the / or \ char to separate file naming pattern to a dir pattern, for sure you can add more than one level of sub foldering adding more \ chars. You can use pattern for foldering and/or fixed text.

The are some special commands to allow you to obtain a defaults set of patterns to use, default is something really similar to what Voyager do with the default naming.

Important Note! You cannot apply file pattern rules to the FIT file obtained with Test Shot, plate solving and DragScript Shot.

Important Note! Default naming is Voyager is the default for each sequence, you must chose the option in each single sequence configuration to enable the file pattern naming

Important Note! If you use File Pattern sub foldering and naming in a sequence the automation usually done by Voyager to create a folder with the target name will be not more utilized. YOU WILL MUST PROVIDE foldering for Target in your pattern !!

34.13.1 Data

- **Sequence File Pattern**: This is the pattern file string saved in the profile, you can edit the string directly writing the $$ tag or text or / char to one or more subfolder. You can also double click on one tag on the Pattern List to add text in the end of Sequence File Pattern field
- **Pattern Preview:** this is readonly field where Voyager report the equivalent sub foldering and file naming relative to the file pattern field and a demo data simulated inside the manager. The ? char indicates a folder separation

34.13.2 Pattern List

This grid will contains alphabetical ordered all the $$ tag usable for create a File Pattern, double click on the needed row to copy the Pattern Name to the Sequence File Pattern field.

- **Pattern Name:** $$ tag string can be used for compose the File Pattern, case sensitive
- **Description:** short description about what kind of data will be replaced to the tag if avalaible

34.13.3 Commands

- **Reset to Default CMOS**: replace the actual Sequence File Pattern field with a default pattern specialized to CMOS camera really similar to the sub foldering and file naming used by original Voyager sequence action logic,
- **Reset to Default CCD**: replace the actual Sequence File Pattern field with a default pattern specialized to CCD/DSLR camera really similar to the sub foldering and file naming used by original Voyager sequence action logic,
- **Reset to Default CMOS Advanced**: replace the actual Sequence File Pattern field with a default pattern specialized to CMOS camera really similar to the sub foldering and file naming used by original Voyager sequence action logic, more sub foldering will be added and managed instead of the default CMOS pattern
- **Reset to Default CCD Advanced**: replace the actual Sequence File Pattern field with a default pattern specialized to CCD/DSLR camera really similar to the sub foldering and file naming used by original Voyager sequence action logic, more sub foldering will be added and managed instead of the default CCD/DSLR pattern
- **Cancel:** restore the Sequence File Pattern field to the previuos version before edit begin
- **Apply:** apply change saving the Sequence File Pattern field in the actual profile

- **Exit Manager:** If you want to exit from the Manager press the X button on the top right corner of the window.

34.13.4 Example

For a pattern file like this:

$$TARGETNAME$$\$$VOYDATEFOLDER08$$\$$FILTER$$\$$TARGETNAME$$_$$IMAGETYPE$$_$$FILTER$$_$$LABEL$$_

$$EXPOSURETIME$$s_BIN$$BINNING$$_$$SENSORTEMP$$C_A$$ARRAYNODE$$_$$FRAMENR$$_$$VOYDATETIME$$_$$READOUTMODE$$

_$$SPEED$$_RPA$$ROTATORPA$$_$$PIERSIDE$$_F$$ROBOFIREFOCUSERPOS$$

You will obtain a sub foldering and file naming system like this:

M31 ? **2020-12-06** ? **L** ?
M31_LIGHT_L_LABEL_0.0001s_BIN1_-24.9C_A1_0023_20201206_203246_023_8MHZ_HighGain_RPA123.45_W_F30187

where the bolded text is a subfolders. When some tag cannot be replaced with the related data Voyager will put a null space or a "Unknow" text string.

34.14 Profiles Auto Backup

Voyager auto save a backup copy of Profiles Folder in a special Folder called ProfileBackup. See for more info the Voyager Folders structure

- **Profile Backups age maximum [days]:** age of old backup max allowed in terms of day

Voyager backup automatically the Profiles folder at each startup and when an update online from Voyager will be started.

Voyager remove the oldest out of agebackup at the startup after a fresh backup of actual profile folder.

34.15 Startup Option

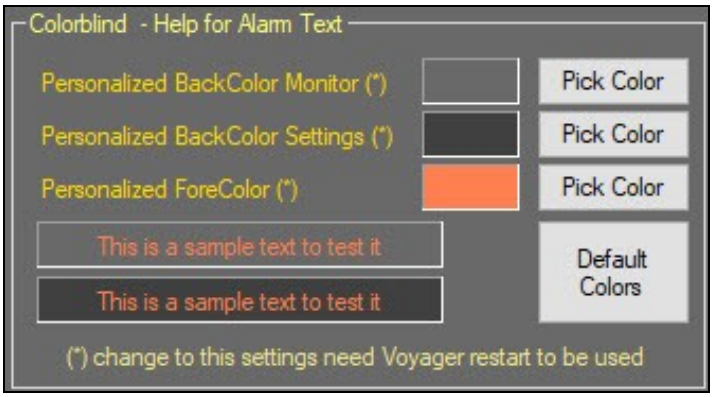
As of Voyager 2.1.4a, you can choose to hide personal info from the startup form.

- **Hide Personal Info in Startup Form**: If checked, the startup form (splash screen) shown when Voyager starts up will not contain your name or the Voyager serial number - it will look similar to this:

- 

34.16 Colorblind - Help for Alarm Text

Allows customization of colors used in Alarm notifications - the normally red text that indicates an error has occurred

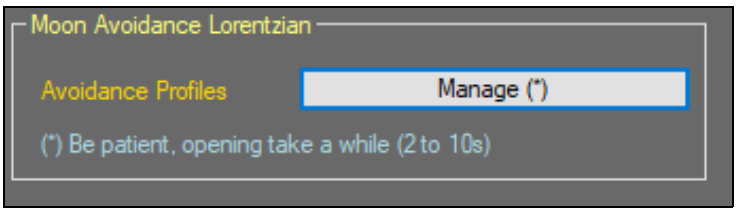


- Personalized BackColor Monitor (*): Click the Pick Color button and choose a color to use for the background color of the Monitor window.
- Personalized BackColor Settings (*): Click the Pick Color button and choose a color to use for the background color of Alarm (error) text in Setup
- Personalized ForeColor (*): Click the Pick Color button and choose a color to use for the foreground color of Alarm (error) text in both Setup and the Monitor window
- Default Colors: Click to return to the Default Color scheme

Important Note! Changes to any of these color settings requires a Voyager restart to take effect

34.17 Moon Avoidance Lorentzian

Define a mode to avoid moon based on Lorentzian distribution formula using Distance between moon and object and width of Lorentzian period (default half of the moon period aka 14days). The distance calculated will be used by RoboTarget Scheduler to define if a target is elegible.



- **Avoidance Profiles:** There are 3 profile of distance: broadband for LRGB filters, narrow band and free (low consideration of moon distance). Each of this profile can be edited in terms of parameters of Lorentzian distribution or in terms of altitude for each single Moon Phase.
- **Manage(*)**: opening the Avoidance windows manager. Be patient, opening take a while (2s to 10s) depends on your PC resources

- **A**: profile for Broad Band Filters (LRGB)
- **B**: profile forNarrow Band Filters
- **C**: profile Free with very low impact of moon distance
- **Distance:** one of the two parameters of the Lorentzian Distribution. Means the distance max used by formula at maximum phase of moon
- **Width:** softness of curve far from the 100% moon phase, more is short the width more there will be an accentuated peak with flatness data before the 100% of moon phase. Start using 14 that is also the half of the moon period
- **Generate table:** Create automatically the list of moon phase <-> altitude tuple from 0 to 100%
- **Data Table:** the list of moon phase <-> altitude tuple from 0 to 100%. You can manual edit the value one by one if you have patience
- **Chart:** chart drawing tih the moon phase on the x axis and the minimum distance allowed between target and moon

- **Reset All:** By default the value are like in image perfect and balanced for the porpouse of creation (values validated by more than one advanced users). Click here to report all the profiles to the default values
- **Apply:** save the changing on Voyager profile file on disk
- **Close:** close the windows manager

Important Note! This features is reserved to Voyager Advanced and Full version
Important Note! Do not change the default valued if you do not understand what Lorentzian distribution is

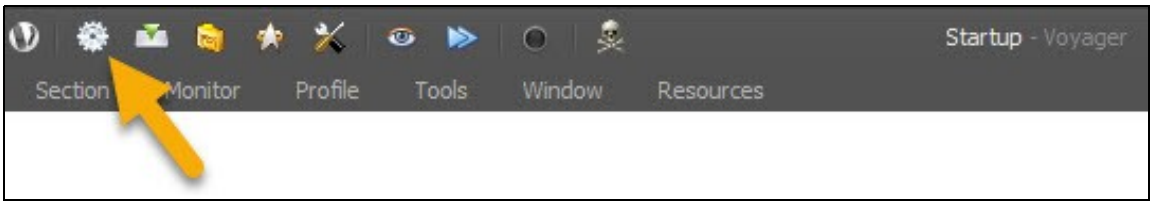
34.18 Other Setup Pages

? Setup
  Array
  ASCOM.DSLR
  AutoFocus Setup
  Camera Setup
  CommonSetup
  Dome Setup
  Flat Device Setup
  Guiding Setup
  Mount Setup
  Observing Conditions Setup
  Planetarium Setup
  Plate Solve Setup
  Rotator Setup
  Safety Monitor Setup
  Setup
  SQM Setup
  Viking Setup
  Voyager Remote
  Voyager Setup
  Weather Setup
  WEB Dashboard Setup

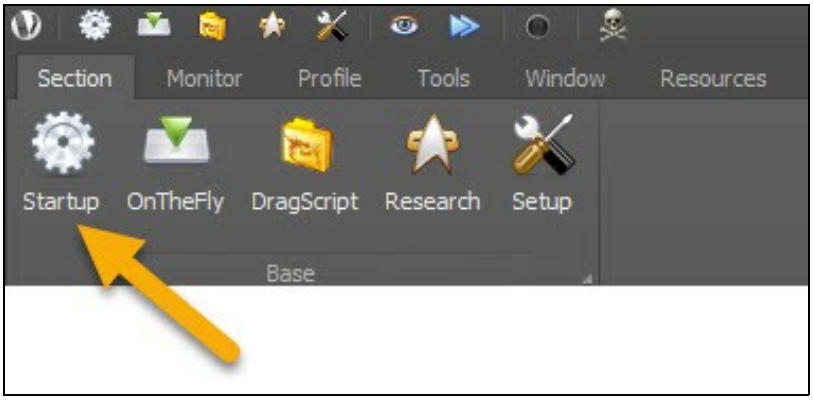
35 Startup

The Startup workspace is where you connect Voyager to the equipment and software used to run your session.

You can reach the Startup workspace two ways:



1. Click the gear icon in the top command bar

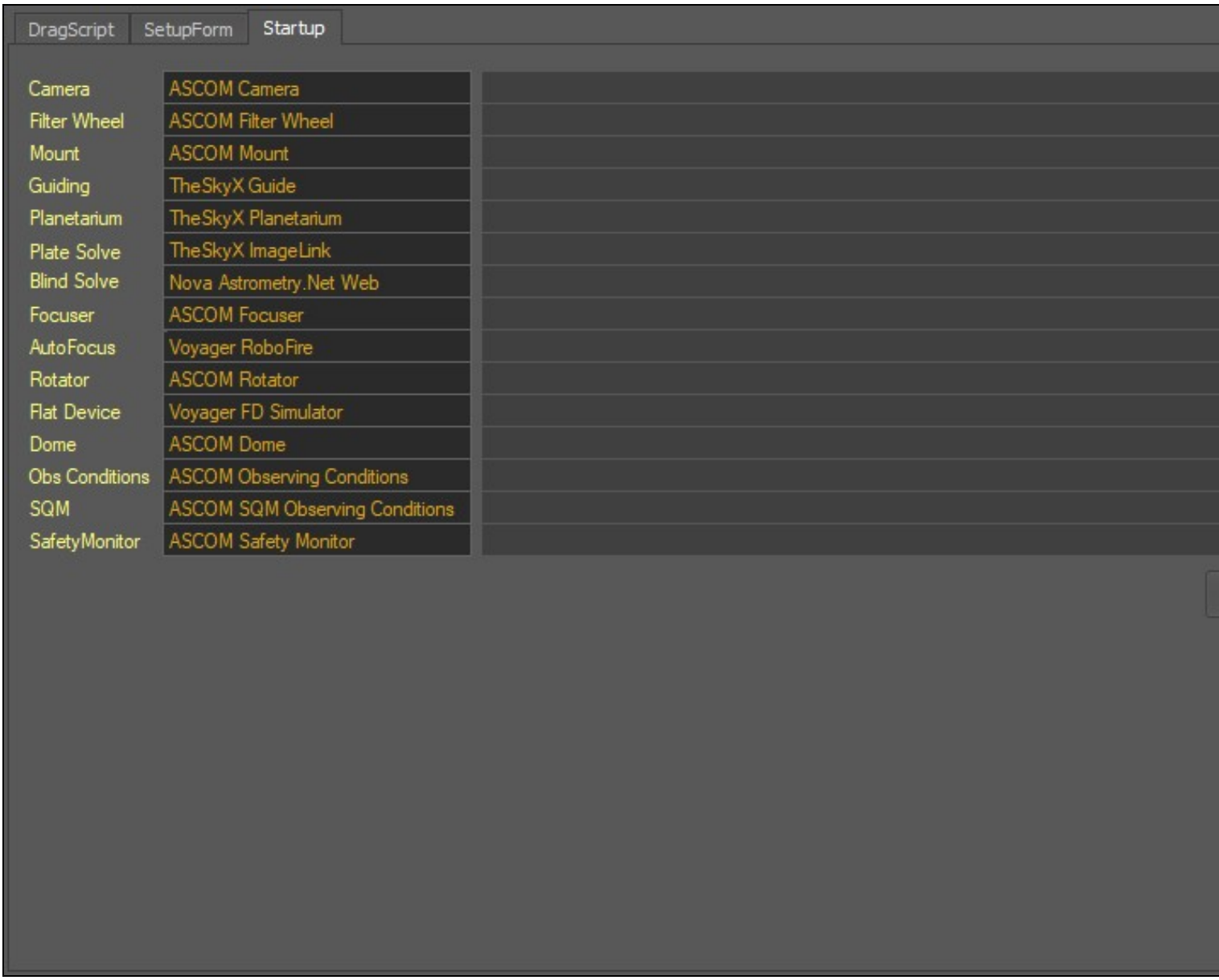


2. Click the Section menu and then the Startup gear icon

35.1 Startup Workspace

The Statup workspace lists all the types of equipment and software you can connect to with Voyager, followed by the name of the device type you chose in the respective setup form for the current Profile.

When Voyager is disconnected from your gear, the Startup workspace looks like this, but of course with the names of devices, device drivers and software you chose in setup of the current Profile.



- CONNECT: Click this button and Voyager attempts to connect to all of your equipment and software
- DISCONNECT: Click this button and Voyager attempts to disconnect from all of your connected equipment and software

Important Note! To avoid connection problems, start Voyager first, before all other software. Make sure Voyager is running as an administrator. Let Voyager start all the other programs. If you start another program in user mode outside of Voyager, Windows may not allow Voyager to connect to it.

Connection takes place sequentially starting with the Camera device and continuing to the Dome.

As of Voyager 2.0.14e, buttons to connect and disconnect individual components have been added at the far right of each equipment line.

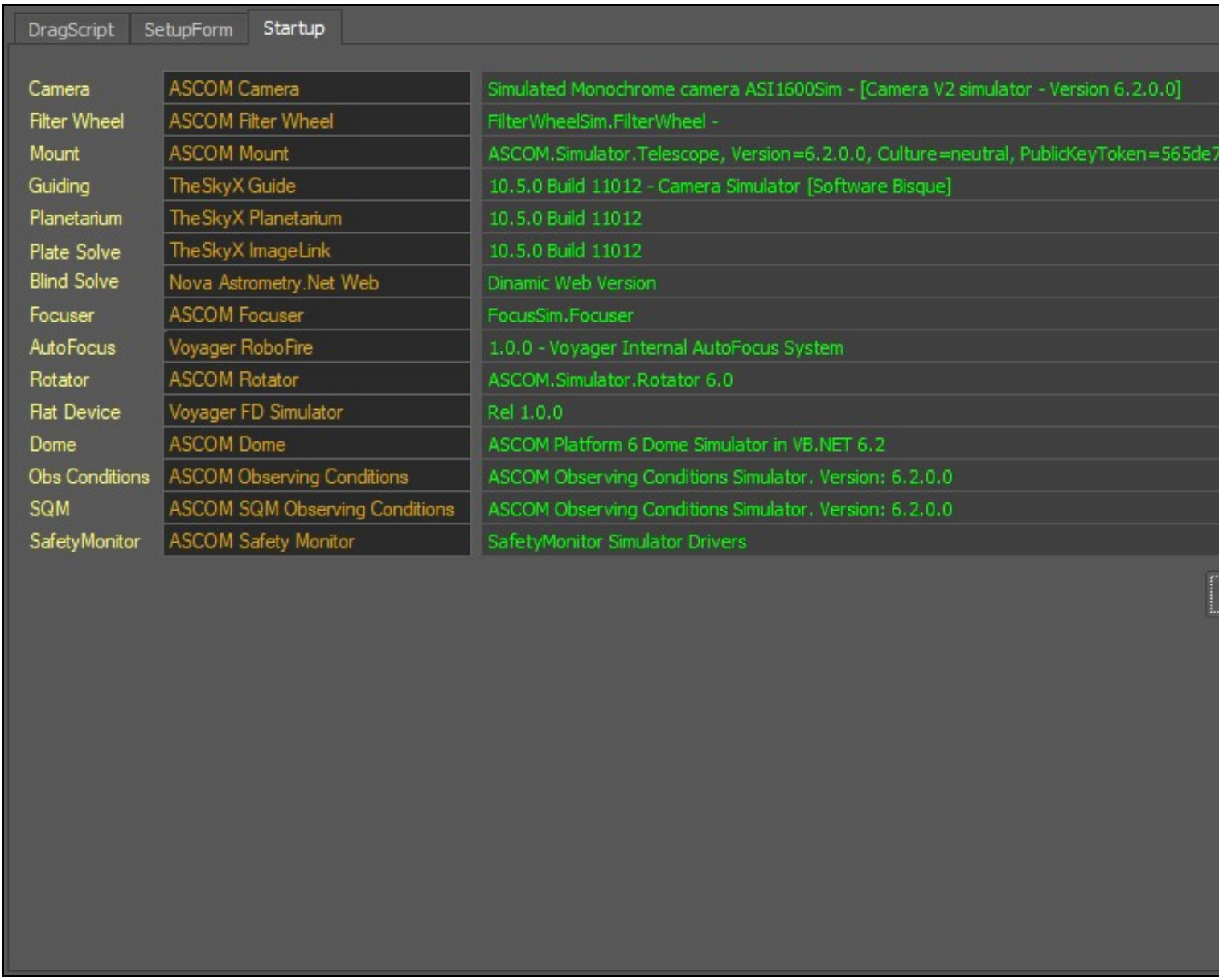
In Voyager 2.0.14e, only the SafetyMonitor button works. Click it to connect only the SafetyMonitor. This can be useful in connection with a DragScript to monitor conditions and Suspend or Resume operations based on UnSafe and Safe signals from the safety monitor without the need to keep all your equipment connected. If you use this, make sure your Emergency Resume block in your DragScript contains the action to connect all equipment.

In Voyager 2.2.4c, Planetarium was added to single connection controls. Click it to connect only the Planetarium. This can be useful to retrieve target information for sequence without connecet all the setup

In Voyager 2.2.10, Flat Device #1 e #2 was added to single connection controls. Click it to connect only the Flat Device 1# and/or 2#. This can be useful when is time to take flat sub without before having the device connected.

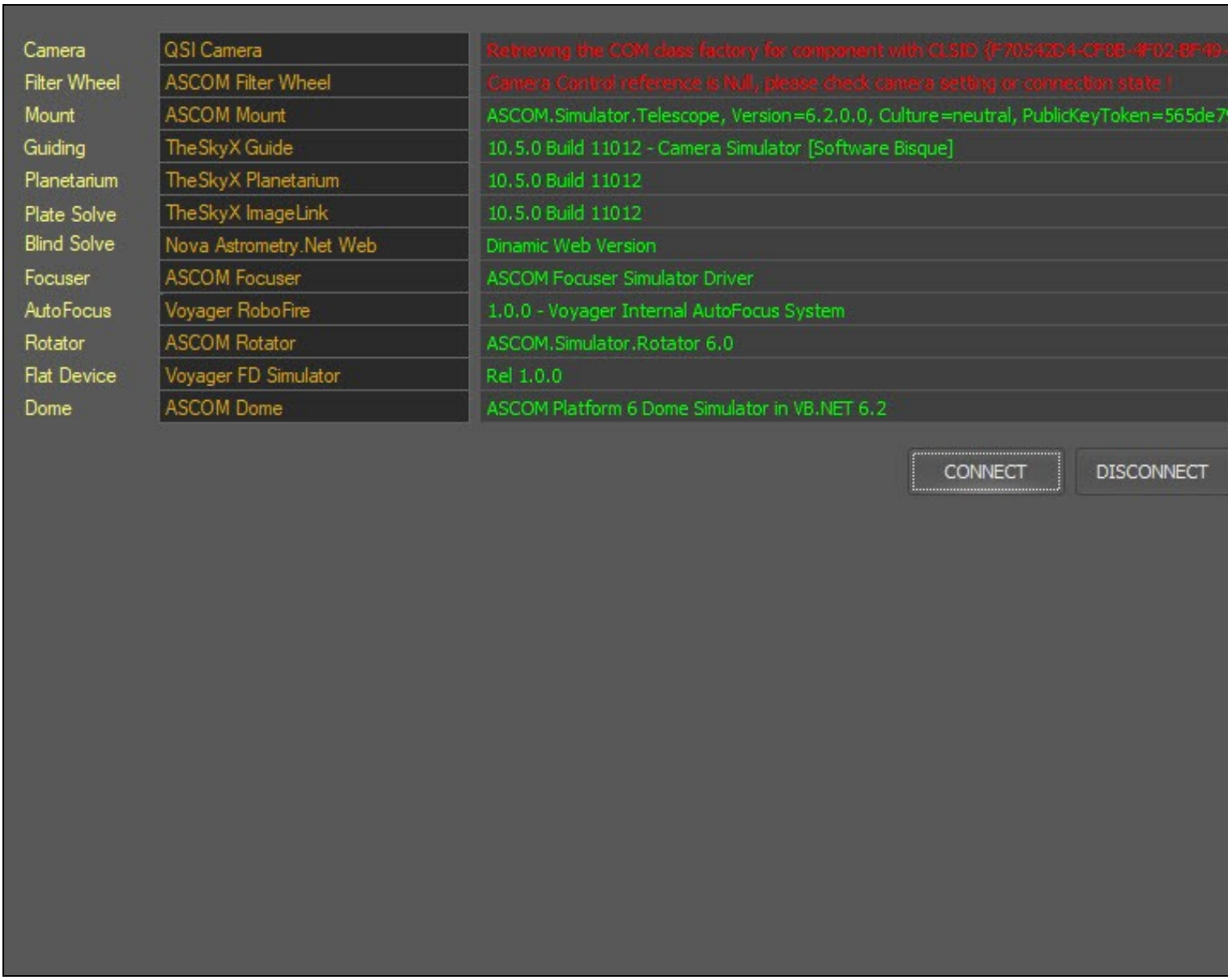
35.2 Startup Workspace - Successful Connections

If Voyager connects successfully to your configured equipment and software, the driver names and version numbers, if known, appear in green in the third column of the Startup workspace:



35.3 Startup Workspace - Unsuccessful Connections

If Voyager is unable to connect to a device or piece of software, a red error message will appear indicating the problem and if possible, suggesting a solution:



In this example, a QSI Camera was selected in the Camera Setup workspace, but no QSI camera was connected to this computer. Voyager shows a red error message for the camera and filter wheel indicating it was unable to connect.

Important Note! If Voyager is terminated abruptly either by the user or a software error, with equipment and software still connected, control of that equipment and software will be interrupted. No graceful disconnect or shutdown will happen and the operation of the equipment and software may continue to function based on the last command from Voyager.

35.4 Command Line Arguments to Launch DragScript

You can automatically launch a DragScript when you start Voyager from the command line with the syntax:

- Voyager2.exe /run:"fully qualified script filename"

Example:

- Voyager2.exe /run:"C:\documents\pippo\voyager\script\script.vos"

You can also automatically launch a DragScript when you start Voyager from the command line without using the path but only file name, the file will be loaded from the default Voyager DragScript folder:

- Voyager2.exe /rundefault:"fully qualified script filename"

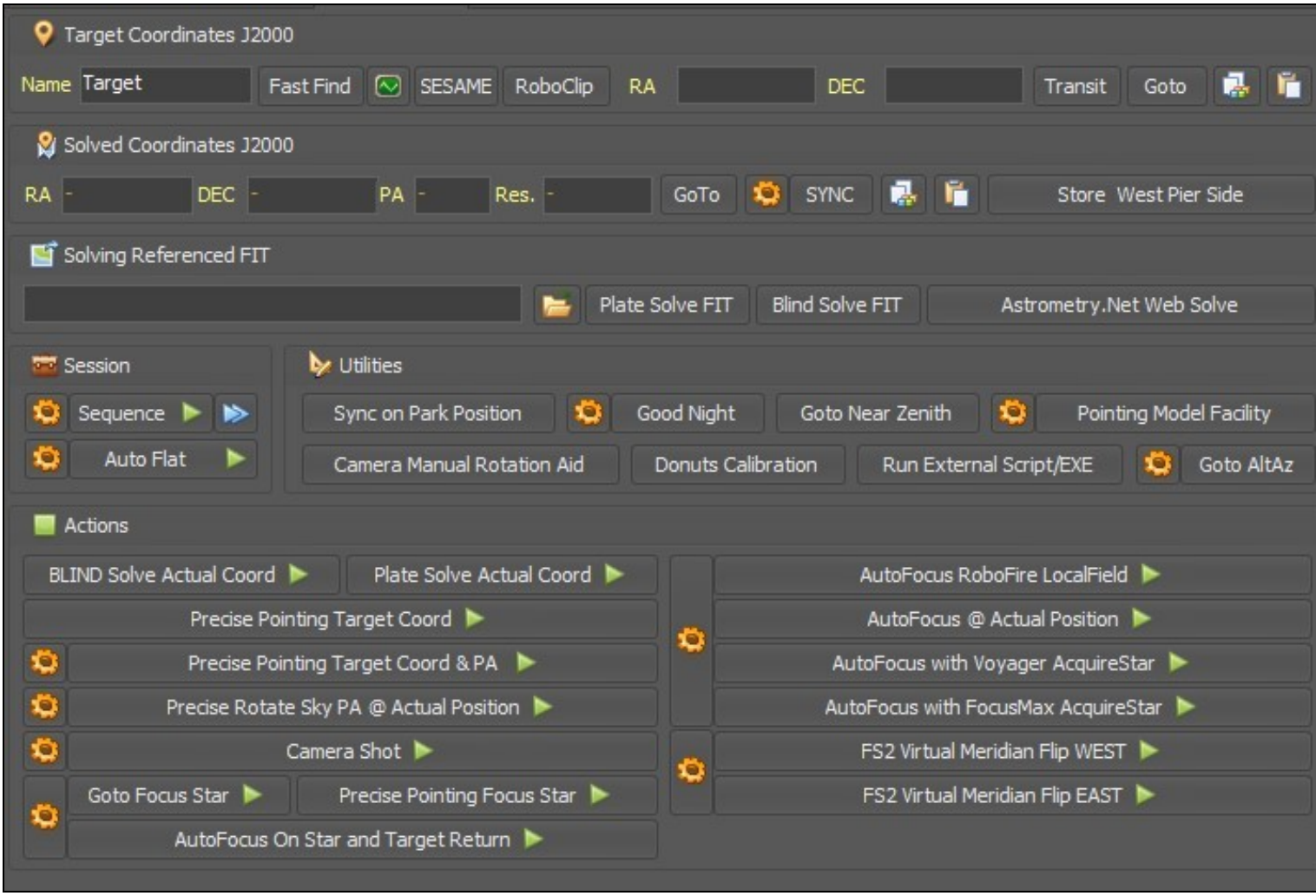
Example:

- Voyager2.exe /rundefault :"script.vos"

36 OnTheFly

36.1 OnTheFly Workspace

The OnTheFly workspace is the main Voyager workspace for performing actions in real time, as opposed to from a DragScript, Voyager's scripting language.



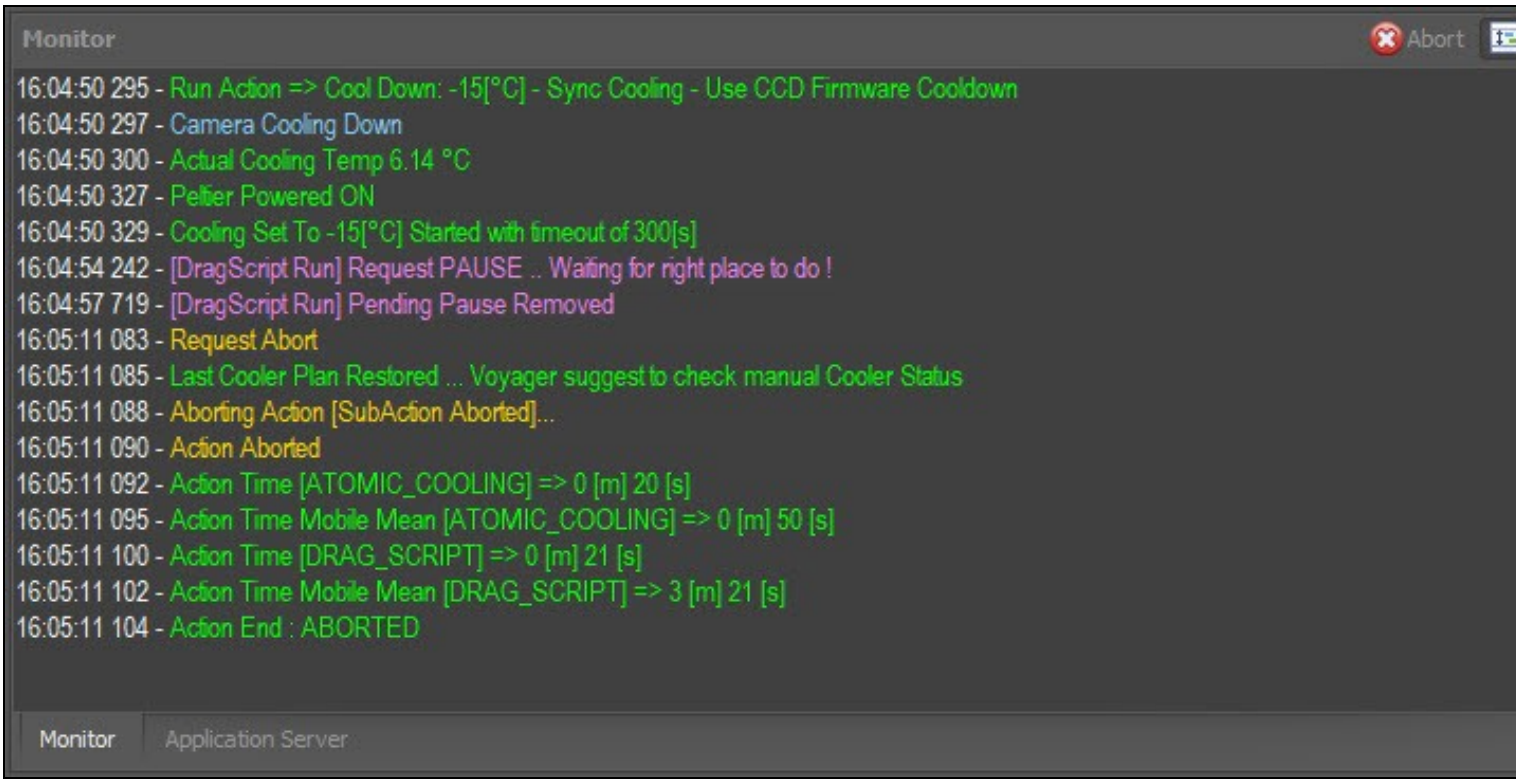
In OnTheFly, you can do many things, including:

- Find coordinates for a target object by name
- Plate solve or blind solve an existing FITS image
- Enter desired RA and DEC coordinates
- Slew your telescope to these coordinates (goto)
- Sync the mount with coordinates
- Create and run an imaging session for a target, with one or more filters and exposures and many configurable options
- Create and run a session to automatically take flat exposures
- Run an external EXE or script
- Slew the scope to a specified RA and DEC, take an exposure, plate solve the result, and re-slew until the plate solved position is within a specified error tolerance ("precision pointing")
- Perform an autofocus operation

The OnTheFly workspace contains both **simple** and **compound** actions. Simple actions, such as slewing the mount to a target, make use of one piece of equipment or software. Simple actions are used when you are operating your equipment manually, one operation at a time.

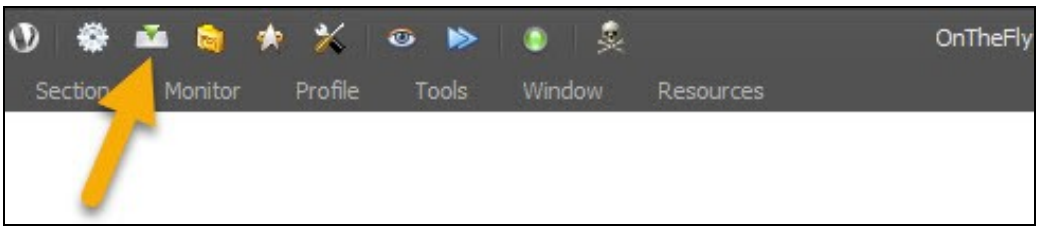
Compound actions automate more complex functions such as taking a series of images with a sequence. When executing a compound action, Voyager orchestrates the operation of multiple pieces of equipment and software, taking appropriate actions based on responses from individual components. E.g., if a weather sensor is attached, Voyager may suspend a sequence on bad weather and resume when weather improves.

Status of executing actions is shown in the Monitor Window. See that section of the Wiki for important information, such as message color coding, regarding messages that appear in the Monitor Window.

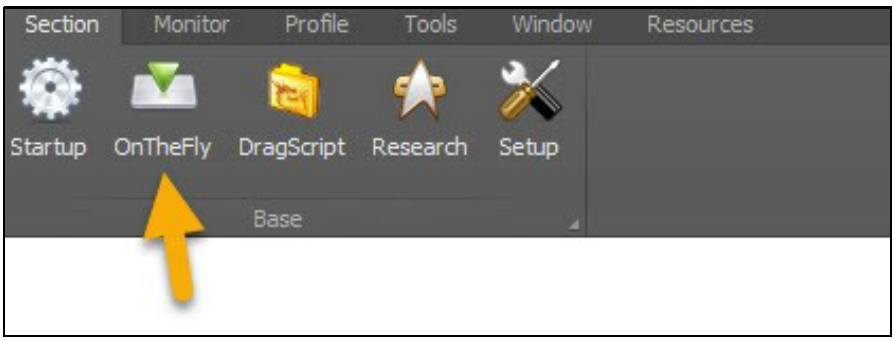


36.2 Entering the OnTheFly Workspace

You can enter the OnTheFly workspace two different ways:



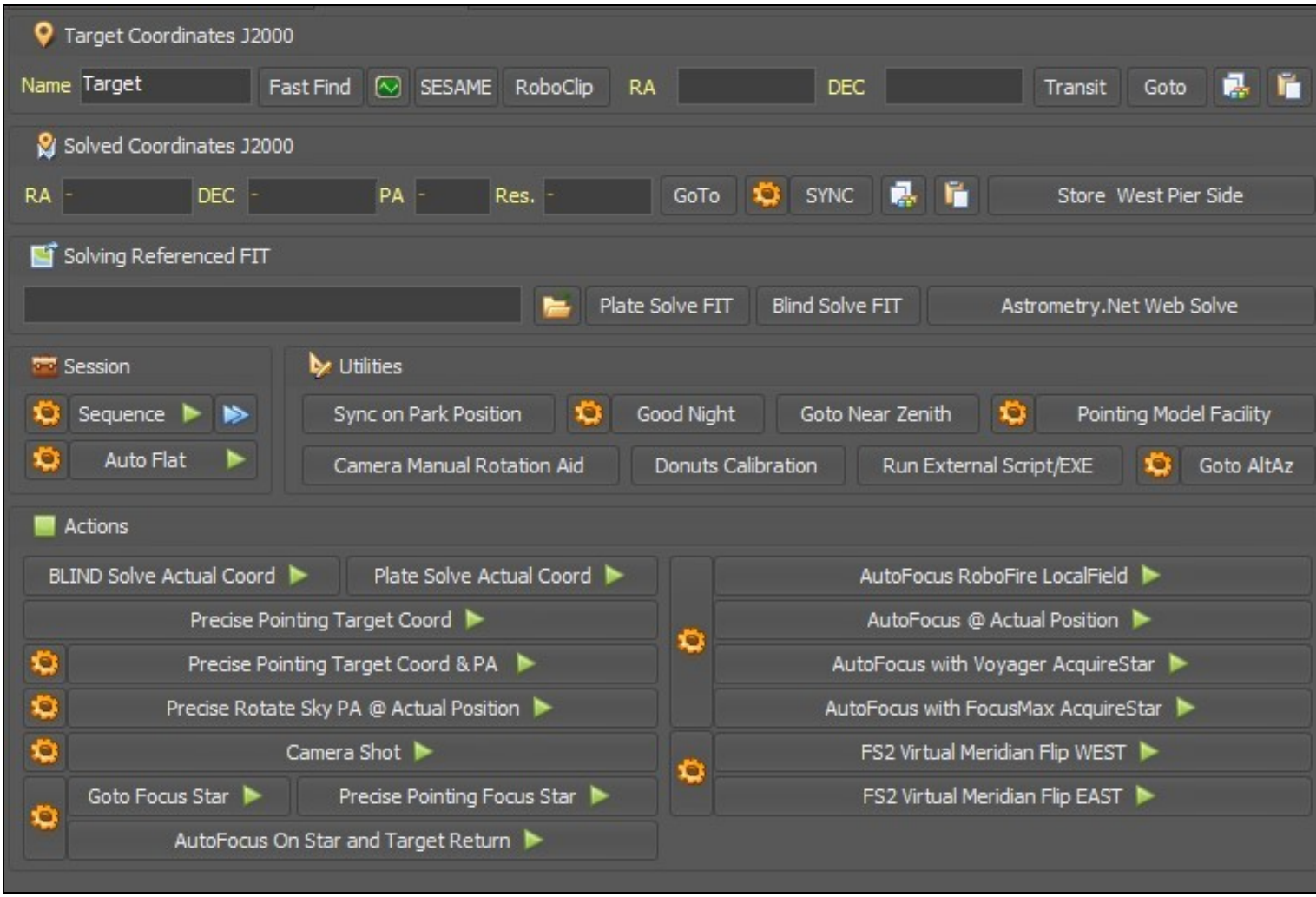
1. Click the OnTheFly icon in the command bar at the top of the window



2. Click the Section menu and then click the OnTheFly icon in the ribbon menu

36.3 OnTheFly Workspace Screen

When you enter the OnTheFly workspace, you will see a display similar to this:



The OnTheFly workspace is divided into the following areas:

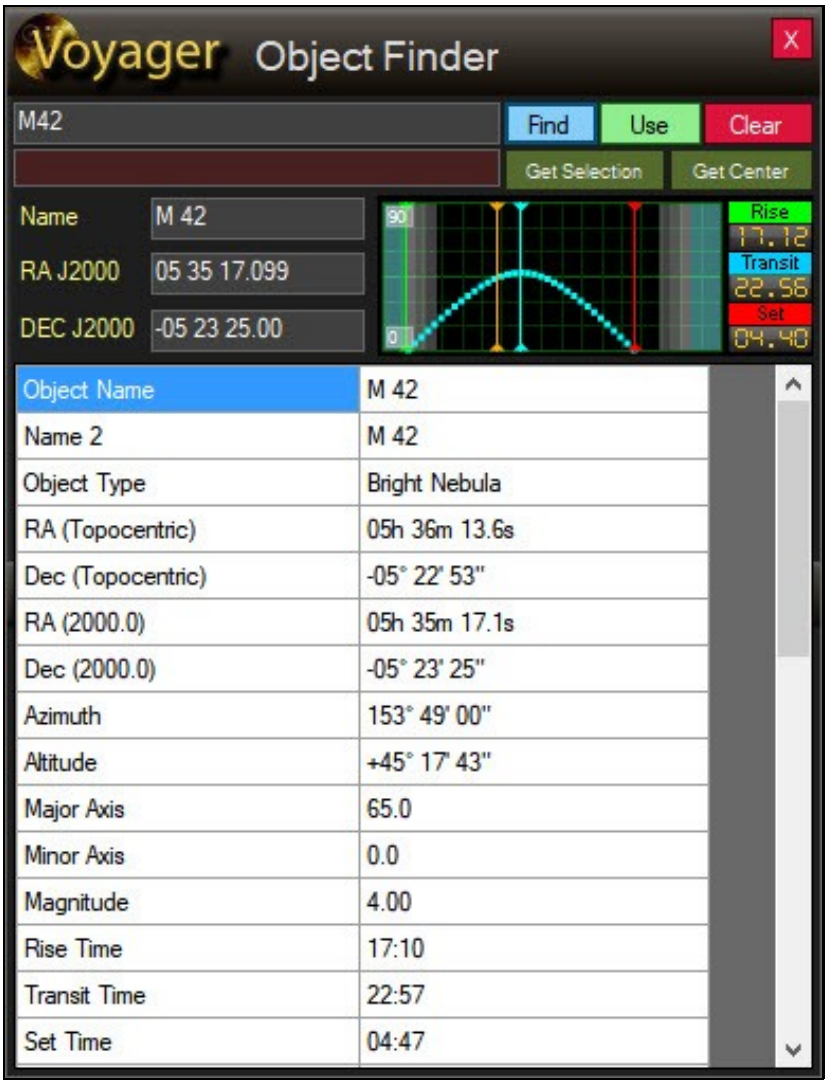
- Target Coordinates J2000
- Solved Coordinates J2000
- Solving Referenced FIT
- Session
- Utilities
- Actions

We will go over each of these areas in the follow sections.

36.4 Target Coordinates J2000

The Target Coordinates J2000 area lets you search for a target by name and slew to it:

- **Name**: Type the name of an object whose coordinates you want to find. All possible notations are accepted including those of your connected planetarium software or online catalog. Naming must follow the ones in the planetarium you are using for Fast Find. For Sesame naming convertion you can look in this page http://cds.u-strasbg.fr/cgi-bin/Sesame
- **Fast Find**: Click the Fast Find button to search for the object in the "Name" field. If found, its J2000 coordinates will populate the RA and DEC boxes. Fast FInd use the control planetarium configured in Voyager setup
- **SESAME**: Click this button to perform a lookup of the object in the "Name" field in the SESAM name resolver database. If found, the object's coordinates appear in a pop-up box. Click OK to enter those coordinates in the RA and DEC fields
- **RA and DEC**: Right Ascension and Declination of the object in the "Name" field. The RA and DEC fields can be filled out manually, or by the Fast Find,  Object Finder, or SIMBAD lookup
- **Transit**: force to redraw transit graph if the target name and RA and DEC field was fullfilled
- **Goto**: Slew the mount to the listed RA and DEC coordinates. This is a simple goto, not precision pointing (where a plate solve and re-slew if needed occurs)
-  : click left button to copy the RA and DEC coordinates to clipboard, click the right button to paste the RA and DEC coordinates on the clipboard in the Target coordinates
-  : Click this button to bring up the Voyager Object Finder, in this example, it is already populated with the results of a search for M42:



- **Find**: Type the name of an object to lookup in the field at the top and click the Find button to search for information on the object
- **Use**: Use this results of the search as the current target (puts the coordinates in the Target Coordinates J2000 RA and DEC fields) and close the window
- **Clear**: Clear the results of the search
- **Get Selection**: Populate the RA J2000 and DEC J2000 field with the coordinates of the selected object in planetarium (if one is selected)
- **Get Center**: Populates the RA J2000 and DEC J2000 fields with the coordinates of the center of the field where the telescope is currently pointing
- The graph to the right of the Name, RA J2000 and DEC J2000 fields has the same information as the Target widget in the Status window. See that documentation for a detailed discussion. In short, the graph shows the altitude of the target object over the hours of darkness, with the red and green lines representing the target's rise and set time, the blue line representing transit time, and the gold line representing the current time
- If the search succeeds, the data table contains extensive information about the target object. Note that you may have to use the scroll bar on the right to see all the information Not all information is available for every object:
    - **Object Name**: Primary object ID / name
    - **Name 2:** Secondary object ID / name
    - **Object Type**: Type of object: list of object type depends on the planetarium control you have choose, refer to his manual
    - **RA (Topocentric)**: Object's Right Ascension based on observer's location
    - **Dec (Topocentric)**: Object's Declination based on observer's location
    - **RA (2000.0)**: Object's J2000 Right Ascension
    - **Dec (2000.0)**: Object's J2000 Declination

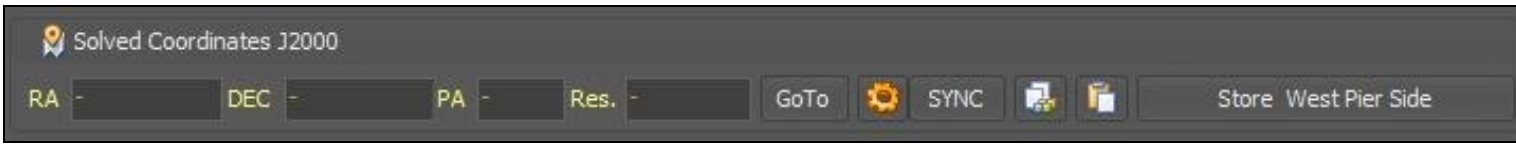
- **Azimuth**: Object's azimuth position at the time of the search
- **Altitude**: Object's altitude at the time of the search
- **Major Axis**: Size of the object's major axis in minutes, if available
- **Minor Axis**: Size of the object's minor axis in minutes, if available
- **Magnitude**: Object's magnitude (brightness)
- **Rise Time**: Local time that the object rises above the local horizon
- **Transit Time**: Local time that the object crossed the meridian
- **Set Time**: Local time that the object sets below the local horizon
- **Hour Angle**: Object's distance from the meridian - negative is before the meridian, positive is after
- **Air Mass**: Relative amount of the atmosphere that light from the object is passing through to the observer's location. 1.0 is directly overhead. 2.0 means the object has to pass through twice as much atmosphere to reach the observer. The less atmosphere between the observer and the object, the better the image
- **Sun Distance (au):** Object's distance from our Sun in AU - astronomical units
- **Name 3...X**: Additional catalog designations for the object
- **Spectral**: Objects spectral data if available
- **Flamsteed-Bayer**: Catalog ID if available
- **Source Catalog**: Source for the information in this table
- **Date**: Observer's local date
- **Time**: Observer's local time
- **Constellation**: Constellation in which the object appears
- **Constellation (Abgrev.)**: Abbreviation of the constellation in which the object appears
- **Magnitude B**: Object's magnitude with a B filter
- **Magnitude V**: Object's magnitude with a V filter
- **Screen X**: coordinates X in pixel in planetarium windows
- **Screen Y**: coordinates Y in pixel in planetarium windows
- **Parallax**: Object's parallax (change in position at opposite ends of the Earth's orbit around the sun)
- **Proper Motion RA**: Object's motion against the background stars in RA
- **Proper Motion Dec**: Object's motion against the background stars in Dec
- **Position Error RA**: Calculated object position error in RA
- **Position Error Dec**: Calculated object position error in Dec
- **Sidereal Time**: Current sidereal time
- **Julian Date**: Current Julian Date
- **Click Distance**: if is a click selection the object retrivied the distance from the clik point and the closest recognized object in planetarium
- **Light Years**: Object's distance in light years
- **Parsecs**: Object's distance in parsecs
- **Catalog Number**: Object's catalog number
- **Constellation Number**: Constellation number of object's constellation

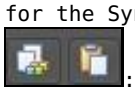
- Click the red X in the top right corner to close the window without using the search results as the new target coordinates

Important Note! Observer's latitude and longitude is taken from the information returned by the mount and is important information to determine object rise, transit and set time. Please be sure this is set up properly in your mount and can be accessed from the mount driver.

36.5 Solved Coordinates J2000

The Solved Coordinates J2000 panel of the OnTheFly workspace contains coordinates of the most recent plate solved image and some action buttons that can be taken with respect to those coordinates:



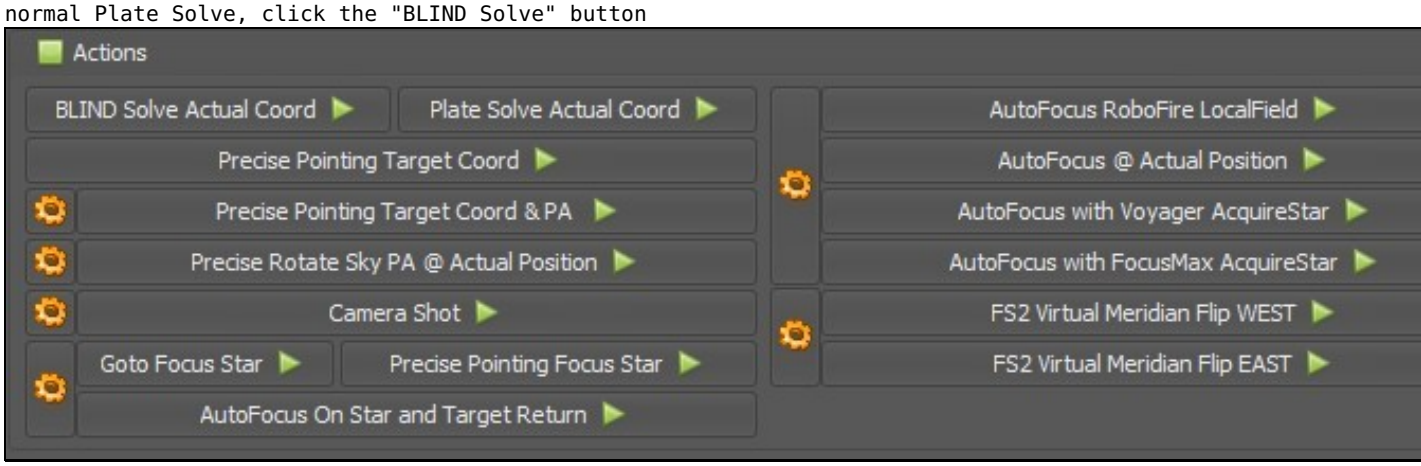
- **RA, DEC, PA and Res**: The coordinates (RA and Dec), position angle (PA), and resolution (image scale in arc-seconds/pixel) of the last image that was manually plate solved
- **GoTo**: Click this button to slew the mount to the RA and Dec positions given here. This is a simple command to slew the mount, not precision pointing with a plate solve and error correction or rotator move
- **SYNC**: Issue a Sync command to the mount with the RA and Dec coordinates from these fields. This is a useful way to synchronize your mount at the start of the night. Slew the mount so it has a clear view of the sky, take an image, plate solve it, and then Sync the mount with this command. Now subsequent GoTo operations should be close to the intended target, assuming your mount's polar alignment is good
-  : this button move to orange backcolor the RA and DEC field and allow to insert manually a coord for the Sync
-  : click left button to copy the RA and DEC coordinates to clipboard, click the right button to paste the RA and DEC coordinates on the clipboard in the Solved coordinates
- **Store West Pier Side**: Click this button to inform Voyager that the mount is on the west side of the pier, pointing east of the meridian. This is only done once at the first use of the mount's profile so Voyager can understand the actual pier side relative to the information returned by the mount's driver when using the ASCOM pier side report (see Mount Setup). If your mount setup tells Voyager to infer pier side from the current scope position, this is not needed.

36.6 Blind Solve and Sync

It is useful to perform a blind solve and sync ("or blind sync") operation at the beginning of a session, especially if you have just set things up and your mount is not yet performing accurate slews (Go To's).

You can do this from OnTheFly and also from a DragScript.

From OnTheFly:

- Slew to a part of the sky where you can take an image with enough stars to do a plate solve
- If your mount's reported position is accurate enough to do a normal Plate Solve, click the "Plate Solve Actual COORD" button
- If the normal Plate Solve fails, or if your mount's reported position is not accurate enough to do a normal Plate Solve, click the "BLIND Solve" button
- 

- Once you have a successful plate solve, click the SYNC button
- 

Important Note! Some mounts do not accept SYNC commands. In this case you can still do the Plate Solve or Blind Solve so Voyager knows where your mount is pointing. This will speed up future slews, but you should still use precision pointing to ensure accurate positioning

36.7 Solving Referenced FIT

This panel of the OnTheFly workspace is for plate solving and blind solving a FITS file. This can be useful if you want to slew the mount to the same position that was used to take an image in the past where you have the FITS file. Plate solve or blind solve the FITS file with this panel, store the solved coordinates in the Solved Coordinates J2000 panel, and then issue a GOTO or Precise Pointing command from the OnTheFly workspace to line the scope up perfectly with the previously taken image.

By "Referenced FIT" we mean FITS files with header values of XPIXSZ, YPIXSZ, FOCALLEN, OBJCTRA, or OBJCTDEC. The values indicate X and Y size of the pixels in microns, the optical system's focal length, and the presumed coordinates of the center of the image.

Important Note! Maxim DL writes the pixel size and focal length values in the FITS file if it is configured in Maxim DL as telescope characteristics, and object coordinates only if the telescope has been connected with Maxim DL's Observatory control. Voyager writes these fields and others into all FITS files it creates.

- **Folder icon**: Click the folder icon and browse to find a FITS file that you want to plate solve or blind solve with either a local solver or nova.astrometry.net
- **Plate Solve FIT**: Plate solve the FITS file using the locally configured plate solver such as PinPoint, TheSkyX ImageLink, All Sky Plate Solver, or PlateSolve2
- **Blind Solve FIT**: Blind solve the FITS file using the locally configured blind solver such as All Sky Plate Solver or TheSkyX ImageLink All Sky
- **Astrometry.Net Web Solve**: Blind solve the FITS file using the nova.astrometry.net website. This requires an Internet connection

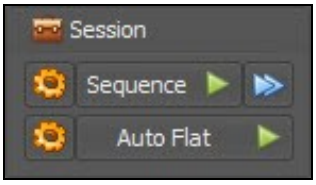
36.8 Session

Voyager can run an automated imaging session, in which one or more exposures are taken using one or more filters of a single target image, along with a complete set of instructions to manage Cooling, Pointing, Tracking, Plate Solving, Meridian Flip, Guiding including Dithering, Autofocus, and error management. Voyager can also run multiple sequences inside a DragScript, which offers complete startup to shutdown control of a full night's imaging of multiple targets.

Voyager can also run automated sessions to obtain the flat images used in image calibration. A flat session can include multiple filters and an arbitrary number of exposures through each filter. During a flat session, Voyager can manage a flat fielding device, and automatically determine the necessary exposure length to achieve the desired image brightness (ADU).

36.9 Running a Sequence

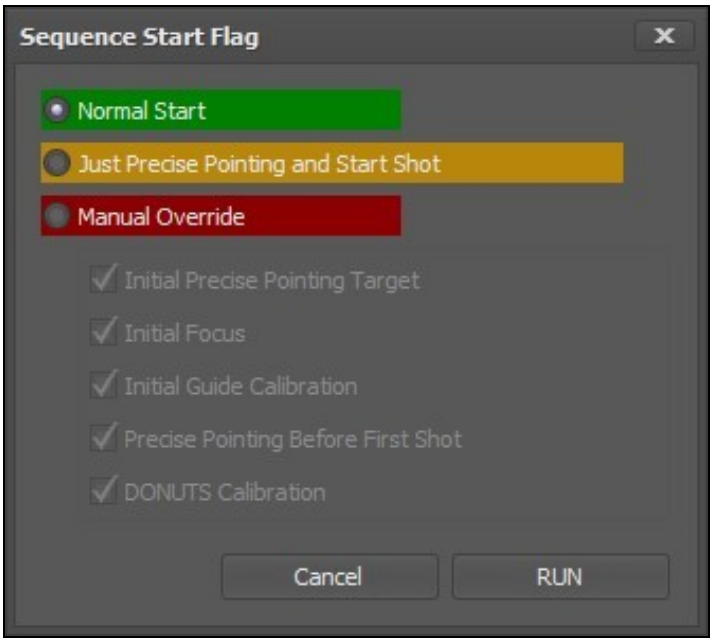
The Session panel of the OnTheFly workspace contains controls to define and run sequences for imaging targets and creating flats.



-  : Click the top gear icon to bring up the Sequence Configuration dialog. See the Sequence Configuration page for more information on creating a sequence

- **Sequence**: Click the Sequence button with the single green triangle to start the sequence. If the Confirm for OnTheFly Sequence box is checked in Voyager Setup, a pop-up window will ask for confirmation before starting the sequence

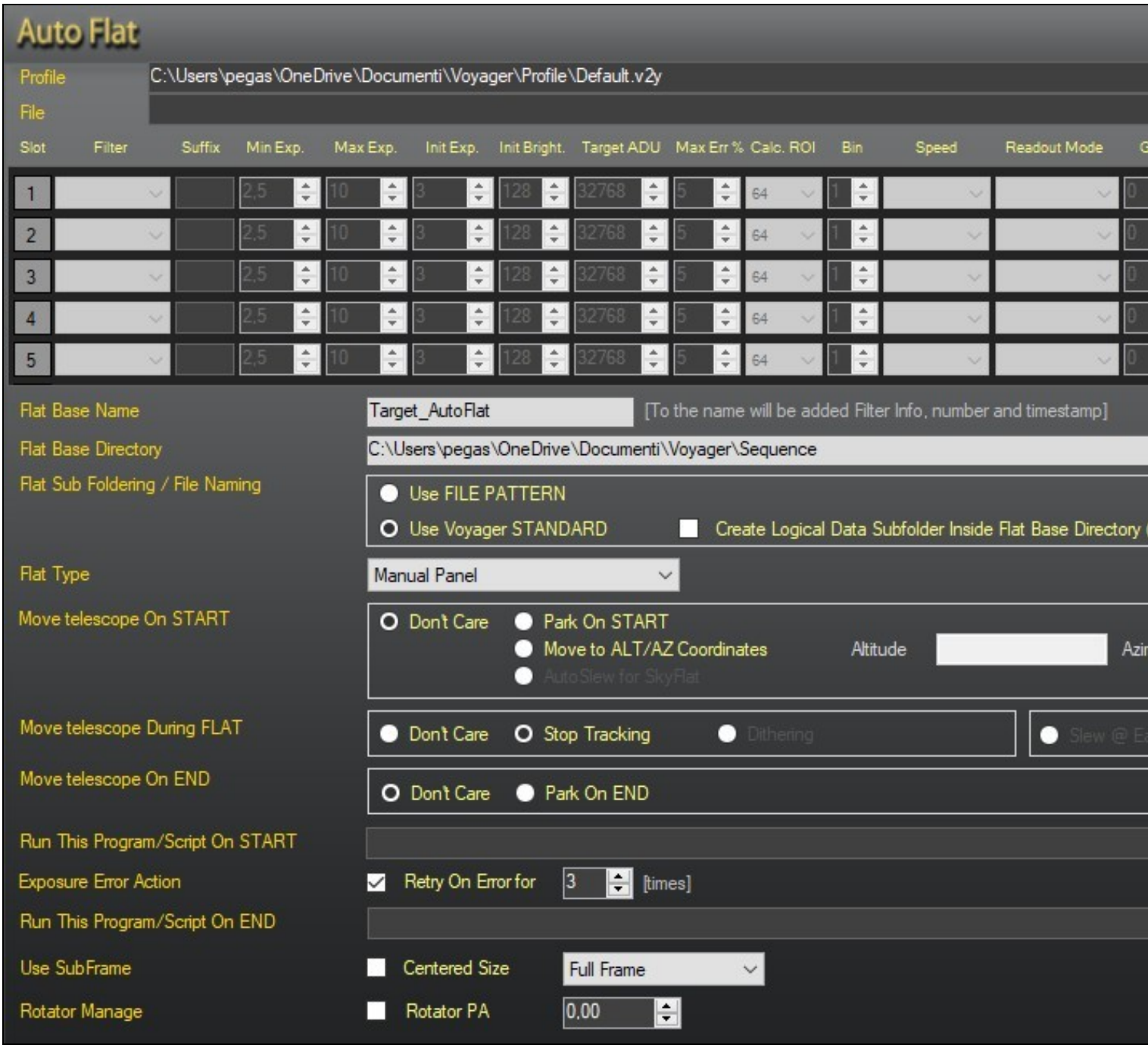
-  : Click the double-blue triangle icon to start the sequence with additional startup options:



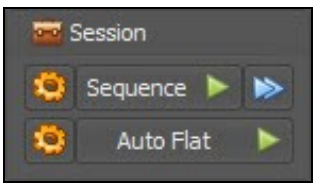
- **Normal Start**: Just start the sequence, same as if you clicked the Sequence button with the green triangle
- **Just Precise Pointing and Start Shot**: Perform a precision pointing action (slew, plate solve, re-slew if needed to correct errors) and then start taking exposures. This is useful if you know that you don't have to do some of the time consuming actions associated with running the sequence with all options, such as doing an autofocus operation.
- **Manual Override**: Gives you fine control over specific actions to perform or not when running the sequence:
    - **Initial Precise Pointing Target**: If checked, before doing anything else, perform precision pointing to the target coordinates
    - **Initial Focus:** If checked, perform an initial autofocus before starting the sequence
    - **Initial Guide Calibration**: If checked, instruct the guiding software to perform a calibration run before starting the sequence
    - **Precise Pointing Before First Shot**: If checked, perform a precision pointing action before taking the first exposure. Done to correct any significant pointing errors introduced by Guide Calibration or AutoFocus Goto
    - **DONUTS Calibration:** if Checked, perform a Donuts Calibration when necessary if requested on Sequence Configuration

36.10 Taking Automatic Flats

-  : Click the bottom gear icon to bring up the Auto Flat configuration dialog:



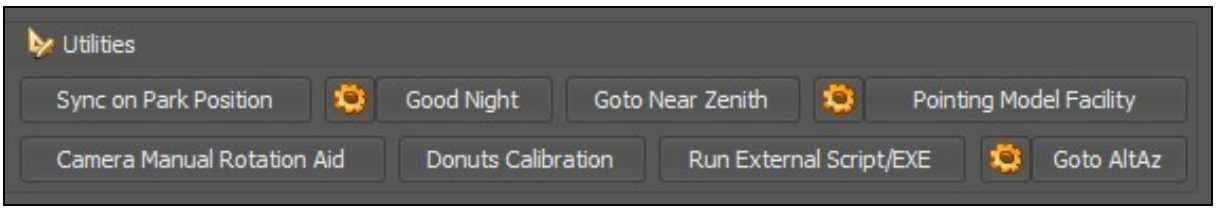
See the Auto Flat page of the Wiki for detailed information the Auto Flat configuration dialog



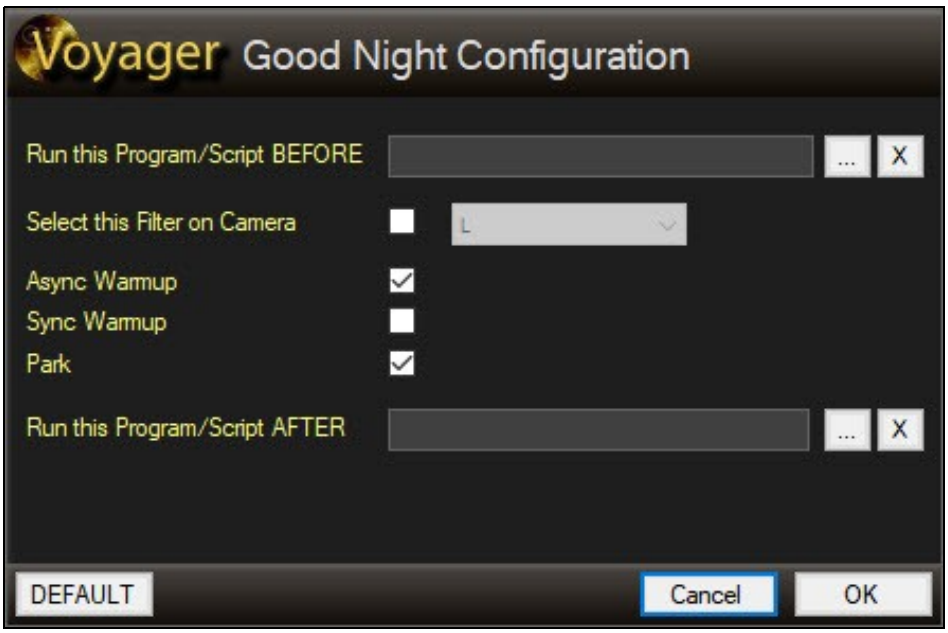
Auto Flat: Click the Auto Flat button with the green triangle to run the Auto Flat session

36.11 Utilities

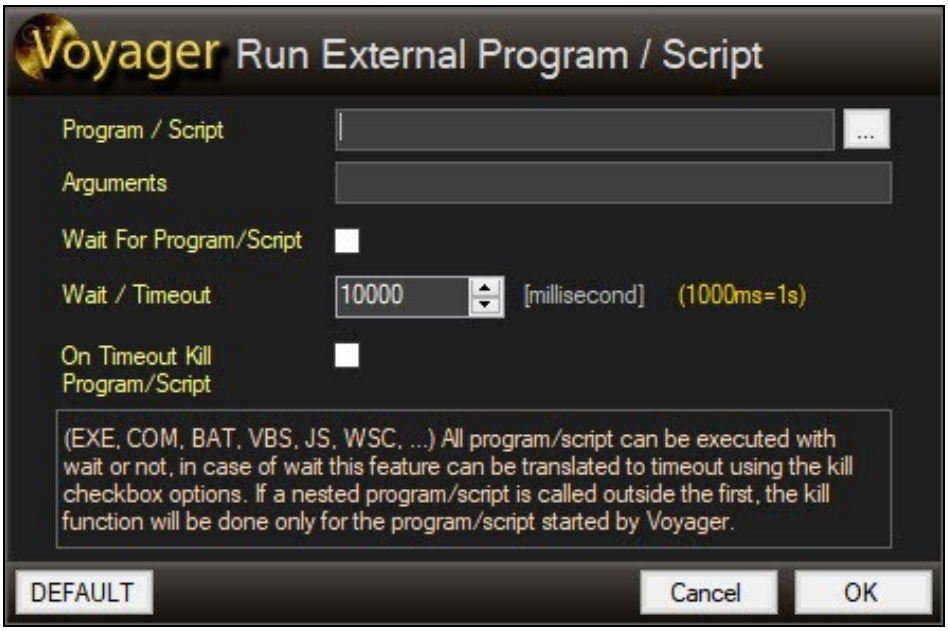
The Utilities panel of the OnTheFly workspace contains several miscellaneous operations:



- **Sync on Park Position**: Works only if Simulate Parking is selected in Park / Unpark panel of the the Mount Setup dialog. Attempts to Sync the mount to the coordinates supplied in the "Simulate Parking" setup, so be sure the mount is in this position before clicking this button. Just do a Sync, to use with a mount driver that lost its position when powered up, for example the FS2 system
-  : Click the gear icon to the left of the Good Night button to bring up the Good Night configuration dialog where you can define actions to take place on clicking the Good Night button. This is intended to be the last thing you do when shutting down for the night.

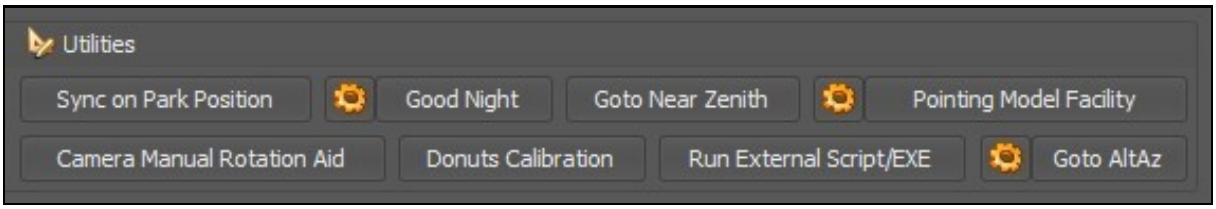


- **Run this Program/Script BEFORE**: Click the button with "..." to bring up the Run External Program / Script dialog - see below for information about this dialog. Defines an arbitrary program or script to run at the start of the Good NIght operation
- **Select this Filter on Camera**: If checked, move the filter wheel to the specified filter
- **Async Warmup**: If checked, send a command to the camera to warm up the sensor and immediately continue with the next step of the Good Night operation (do not wait for the warm up to finish)
- **Sync Warmup**: If checked, send a command to the camera to warm up the sensor and wait until the warm up finishes before continuing with the next step of the Good Night operation
- **Park**: Park the mount
- **Run this Program/Script AFTER**: Click the button with "..." to bring up the Run External Program / Script dialog - see below for information about this dialog. Defines an arbitrary program or script to run at the end of the Good NIght operation

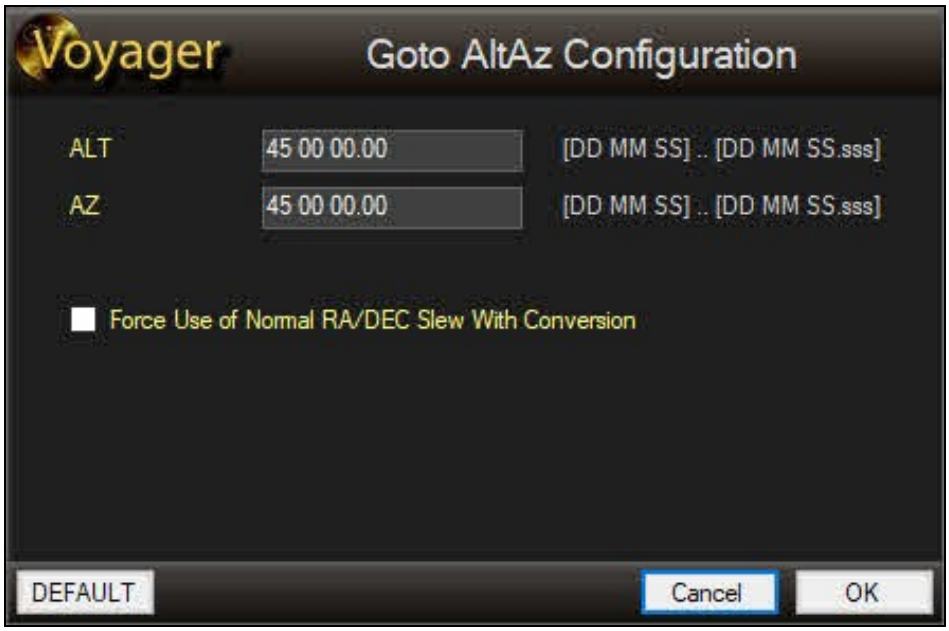


- **Program/Script**: Click the "..." button to select the program or script to run
- **Arguments**: Command line arguments to be passed to the program or script when invoking it
- **Wait For Program/Script**: If checked, wait for the program or script to return before continuing (synchronous execution)
- **Wait / Timeout**: If Wait for Program/Script is checked, this is the number of milliseconds to wait until timing out
- **On Timeout Kill Program/Script**: If checked, and the "Wait for Program/Script" option is checked, and the "Wait / Timeout" time period has elapsed, terminate the external program or script

- Continuing with the Utilities Panel:

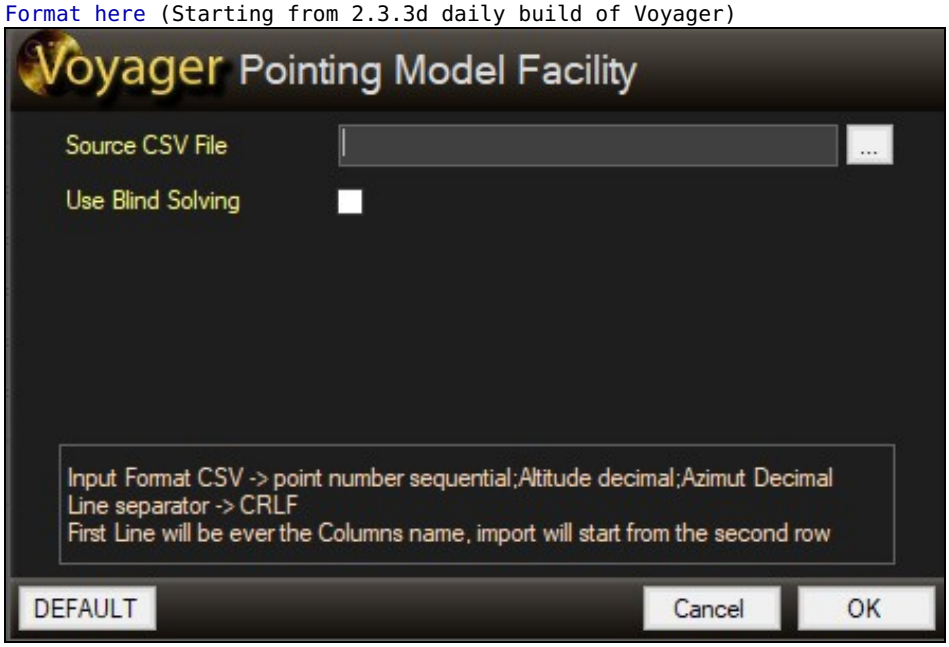


- **Goto Near Zenith**: Slew the mount to a position pointing near the zenith (directly overhead)
- **Camera Manual Rotatorion Aid:** opening the tool to aid user to rotate manually the camera at desired Sky PA. Go to Tool explanation
- **Donuts Calibration:** perform a Donuts calibrations (Donuts is a suite for advanced research alghoritms)
- **Run External Script/EXE**: Run an arbitrary external program or script
- **Goto AltAz**: Slew the mount to the position configured by clicking the gear icon to the left of the Goto AltAz button
-  : Click the gear icon to the left of the Goto AltAz button to configure the action taken when pressing the Goto AltAz button

- 

  - **ALT**: Altitude in DD:MM:SS.sss to slew the mount to when clicking the Goto AltAz button
  - **AZ**: Azimuth in DD:MM:SS.sss to slew the mount to when clicking the Goto AltAz button
  - **Force Use of Normal RA/DEC Slew with Conversion**: If checked, convert the specified ALT and AZ coordinates to equivalent RA and DEC coordinates and issue a Goto RA / DEC command to the mount. Use this if your mount does not accept a Goto ALT / AZ command
  - **Default**: Restore the Default settings for this dialog
  - **Cancel**: Exit this dialog without making changes
  - **OK**: Save changes and exit this dialog

- **Pointing Model Facility**: Read a list of point ALT/AZ from a CSV file where to slew and solve it. At finish will create a file DAT (text format) with all the data about the point and the solved position. Format here (Starting from 2.3.3d daily build of Voyager)

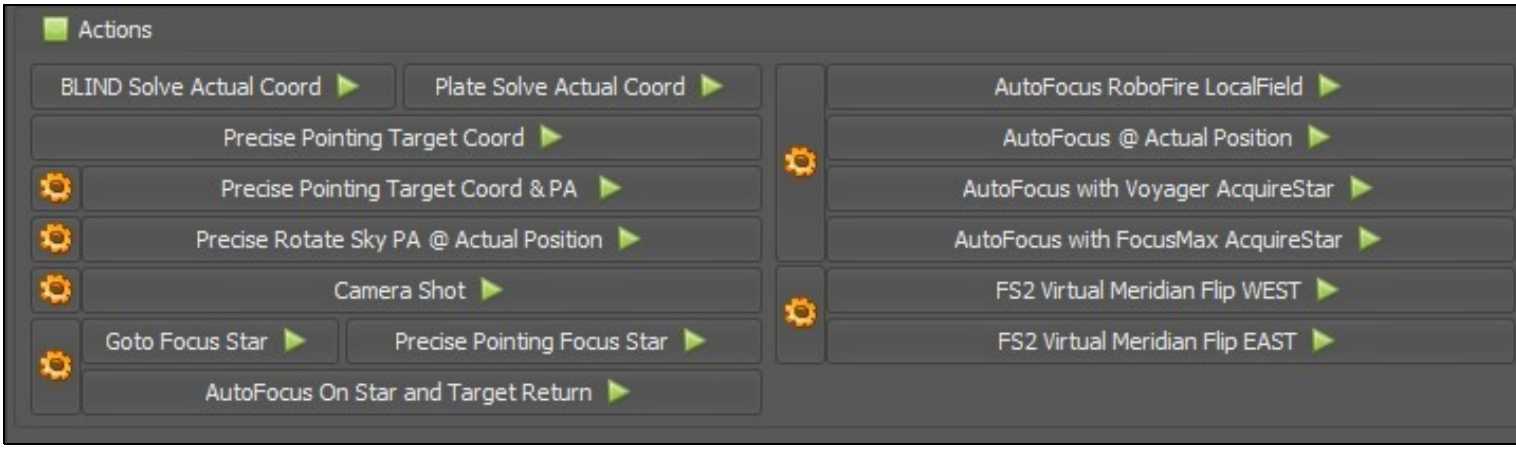


  - **Source CSV file:** path location and file name of the CSV file where is listed the ALT/AZ point to slew and solve (format is point number;Altitude decimal;Azimut decimal .. line separator is CRLF .. first row must contains name of columns, import stat from the 2nd row) a file example here
  - **Use Blind Solving:** use blind solving if the moiunt is not aligned or the pointing error is not compatible with a simple Plate solving.

Important Note! The value set in Goto AltAz Configuration is stored in the current profile. If you slew to a single AltAz value during your sessions, once configured you won't have to enter the Alt Az value, just click the Goto AltAz button.

36.12 Actions

The Actions panel of the OnTheFly workspace contains immediate actions you take to perform plate solving, autofocus, single image exposures and FS2 Virtual Meridian flip operations:



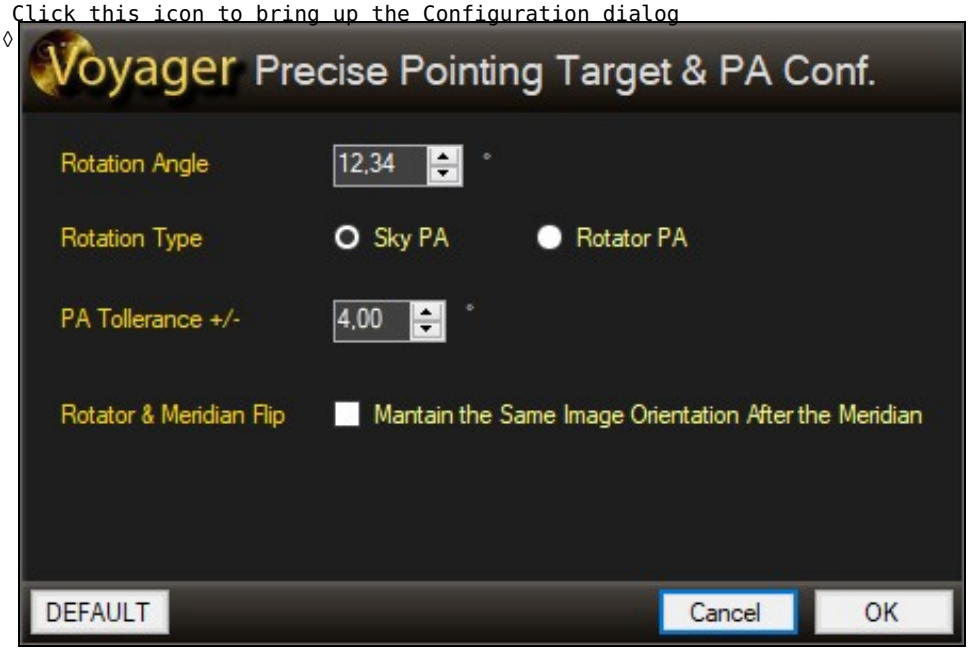
36.13 Plate Solve Actions

- **BLIND Solve**: Click this button to take an exposure with the selected plate solve settings at the current scope location and submit it to your selected blind solving method
- **Plate Solve Actual Coord**: Click this button to take an exposure with the selected plate solve settings at the current scope location and submit it to your selected plate solving method
- **Precise Pointing Target Coord**: Click this button to perform a precision pointing operation to the coordinates given in the Target Coordinates J2000 panel of this workspace. No rotator task with this action. The precision pointing operation commands the mount to:

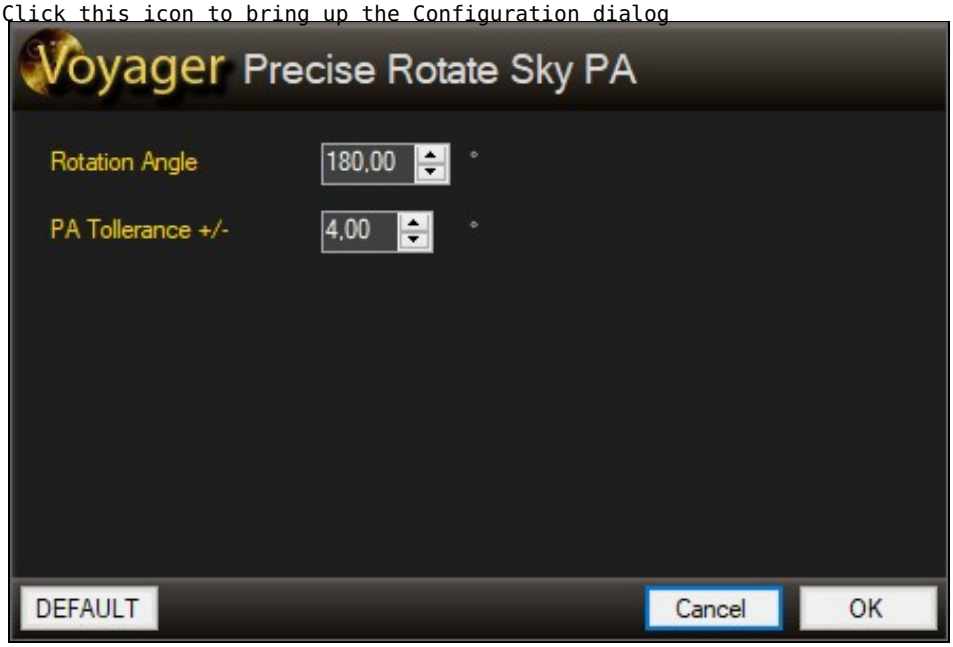
1. Slew to the target coordinates
2. Take an exposure using the selected plate solve settings
3. Plate solve the image. If the plate fails, try to blind solve the image if the "Use Blind Solving If Plate Failed on Precise Pointing" option is checked in Plate Solve Setup, Plate Solving Watchdog
4. Determine the offset between the target coordinates and the plate solved coordinates and compare it to the Precision Pointing Max Allowed Error in Mount setup
5. If the error is greater than the max allowed error, issue a slew command to the mount to move it to correct the error
6. Repeat steps 2 through 5 until the error is less than the max allowed error

- **Precise Pointing Target Coord & PA**: Click this button to perform a precision pointing operation to the coordinates given in the Target Coordinates J2000 panel of this workspace and precision rotating of

rotator to the PA given in setting form of the action.

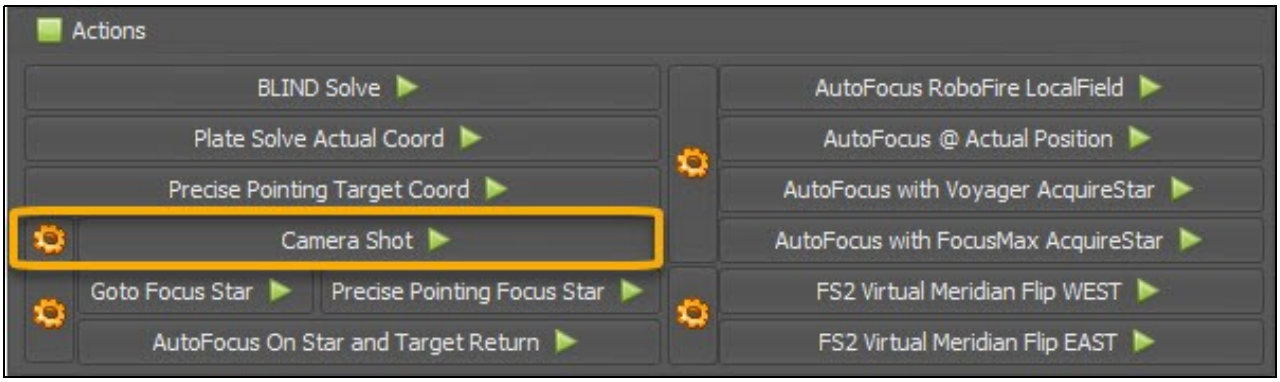
-  : Click this icon to bring up the Configuration dialog
  - 

    - **Rotation Angle:** an arbitrary angle that can be a Rotator PA or Sky PA, depends on following setting.
    - **Rotation Type:** define if the rotation angle is the rotator angle (rotator PA) reported from the driver (and with offset if asked to Voyager in Sync) or the Sky angle (Sky PA) chosen with web dashboard VirtualFOV or planetarium or another system. If you select Sky PA Voyager will use the Plate solve PA result to rotate the rotator to the right angle. If you select the Rotator PA Voyager will just rotating rotator using drive angle at desidered value, no correction using the plate solved PA will be done
    - **PA Tollerance +/-:** if the PA of rotator is inside the interval given the position will be declared ok and rotator will not be rotate.
    - **Rotator & Meridian Flip:** "Mantain the Same Image Orientation After the Meridian" if checked force Voyager to shot the target with same orientation in the images taken before anf after meridian. In this case if you have chosen Rotator PA like Rotation type the rotator will be flipped if the mount is after the meridian, if you chosen Sky PA the PA will retained also after the meridian triggering a rotator flip.Use this flag is useful also to use always the same guide star in case of use of OAG or system with high focal lenght.
    - **Default:** for default settings
    - **Cancel:** to exit from then form without changing not
    - **OK:** to store the parameters
- The precision pointing operation commands the mount to:
    - Slew to the target coordinates
    - Rotate to the Rotation angle if you choose Rotator PA or wait for the first solved image to check the Sky PA and the virtual offset to apply (this operation also will check for your meridian side to understand if is necessary to flip rotator)
    - Take an exposure using the selected plate solve settings
    - Plate solve the image. If the plate fails, try to blind solve the image if the "Use Blind Solving If Plate Failed on Precise Pointing" option is checked in Plate Solve Setup, Plate Solving Watchdog
    - Determine the offset between the target coordinates and the plate solved coordinates and compare it to the Precision Pointing Max Allowed Error in Mount setup
    - Determine if its necessary to rotate again the rotator to get the right PA in case of Sky PA mode requested
    - If the error is greater than the max allowed error, issue a slew command to the mount to move it to correct the error
    - Repeat steps 2 through 5 until the error is less than the max allowed error and PA of rotator in tollerance

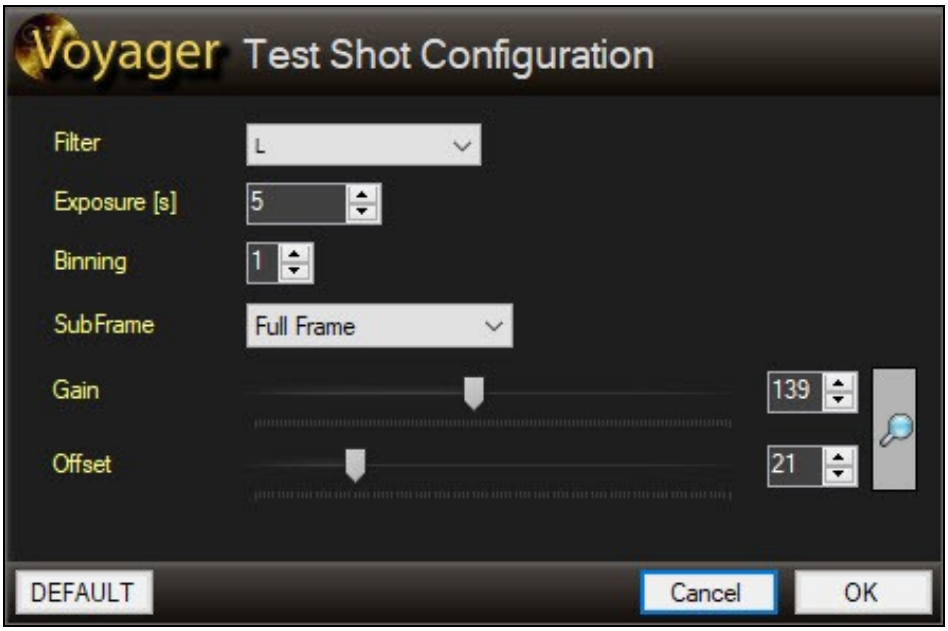
- **Precise RotateSky PA @ Actual Position**: Click this button to perform a precise rotate to the SKY PA given in setting form of the action without moving mount from actual position.
-  : Click this icon to bring up the Configuration dialog
  - 

  - **Rotation Angle:** an arbitrary angle of Sky PA
  - **PA Tollerance +/-:** if the PA of rotator is inside the interval given the position will be declared ok and rotator will not be rotate.
  - **Default:** for default settings
  - **Cancel:** to exit from then form without changing not
  - **OK:** to store the parameters
- The precise rotate Sky PA operation commands to:
  - Take an exposure using the selected plate solve settings
  - Plate solve the image. If the plate fails, try to blind solve the image if the "Use Blind Solving If Plate Failed on Precise Pointing" option is checked in Plate Solve Setup, Plate Solving Watchdog
  - Determine the offset between the target coordinates and the plate solved coordinates and compare it to the Precision Pointing Max Allowed Error in Mount setup
  - Determine if its necessary to rotate again the rotator to get the right PA
  - Repeat steps 1 through 4 until the PA of rotator is in tollerance

36.14 Camera Actions



- **Camera Shot**: Take an exposure at the current scope position using the settings selected by clicking the adjacent gear icon
  -  : Click this icon to bring up the Test Shot Configuration dialog



- **Filter**: Select the filter to use for the test shot
- **Exposure**: Enter the exposure time in seconds for the test shot
- **Binning**: Select the binning to use for the test shot
- **SubFrame**: Select the size of the image to use for the test shot from the drop down list

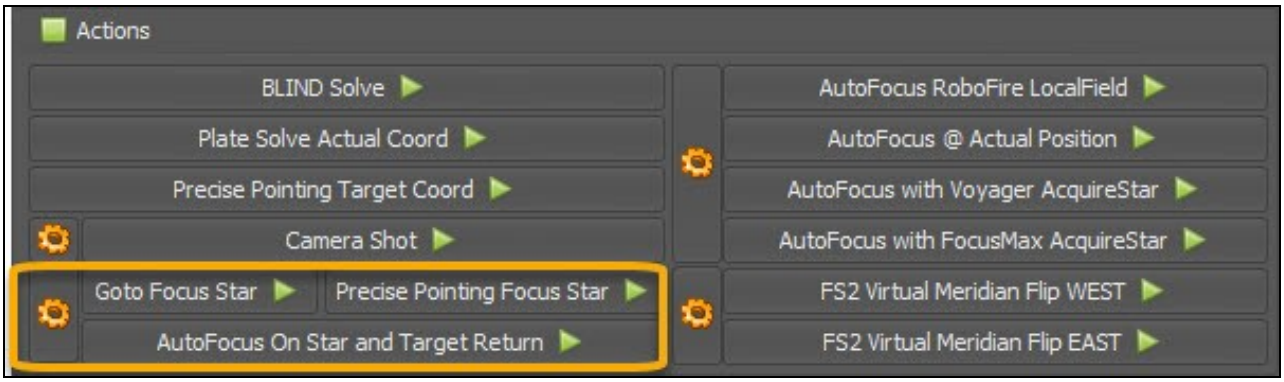
If you are using the ASI Camera native driver (not ASCOM) which allows setting Gain and Offset, the following two settings appear:

- **Gain:** Set the ASI Camera gain value to the number in the spinner control. Click the magnifying glass icon to select Gain from a preset
- **Offset:** Set the ASI Camera offset value to the number in the spinner control. Click the magnifying glass icon to select Offset from a preset

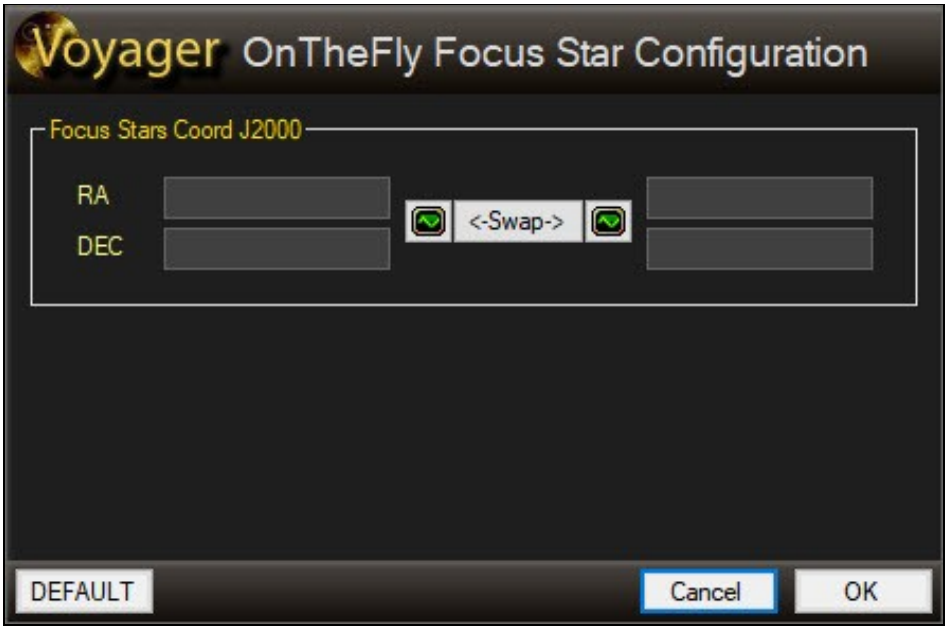
- **DEFAULT**: Change settings to the default values (Default is first filter in wheel, 10s , binning 1 and full frame)
- **Cancel**: Close the window without saving changes
- **OK**: Save changes and close the window

36.15 Focus Star Actions

Voyager can automatically choose a focus star, or you can specify one manually. The Focus Star actions are where you manually choose the focus star. The AutoFocus actions, described beow, are where Voyager automatically chooses a focus star.



-  : Brings up the **OnTheFly Focus Star Configuration** dialog:



-  **:** Click the icon to bring up the Object Finder dialog and type in the name or catalog ID of your desired focus star
- **Left and Right RA and DEC Coordinates**: The RA and DEC focus star coordinates on the left are used before the meridian. The focus star coordinates on the right are used after the meridian.
- **<-Swap->**: You can store the coordinates of two different focus stars. Click the <-Swap-> button to swap the coordinates. The Goto Focus Star, Precise Pointing Focus Star, and AutoFocus on Star and Target Return buttons use these coordinates.

- **Goto Focus Star**: Click this button to slew to the focus star coordinates. If the mount is pointing before the meridian, the focus star coordinates on the left will be used. If the mount is pointing after the meridian, the focus star coordinates on the right will be used
- **Precise Pointing Focus Star**: Click this button to perform a precision pointing operation to the focus star coordinates. Precision pointing will slew to the star, take an exposure, plate solve, and re-slew until the actual position is within the error tolerance specified in setup. Before meridian star coords will be used if mount is actually before meridian or viceversa after meridian star coords.
- **AutoFocus On Star and Target Return**: Click this button to perform a precision pointing operation to the focus star's coordinates, perform an autofocus operation, and then return to the target coordinates as designated in the Target Coordinates J2000 panel in this workspace. Before meridian star coords will be used if mount is actually before meridian or viceversa after meridian star coords.

♦

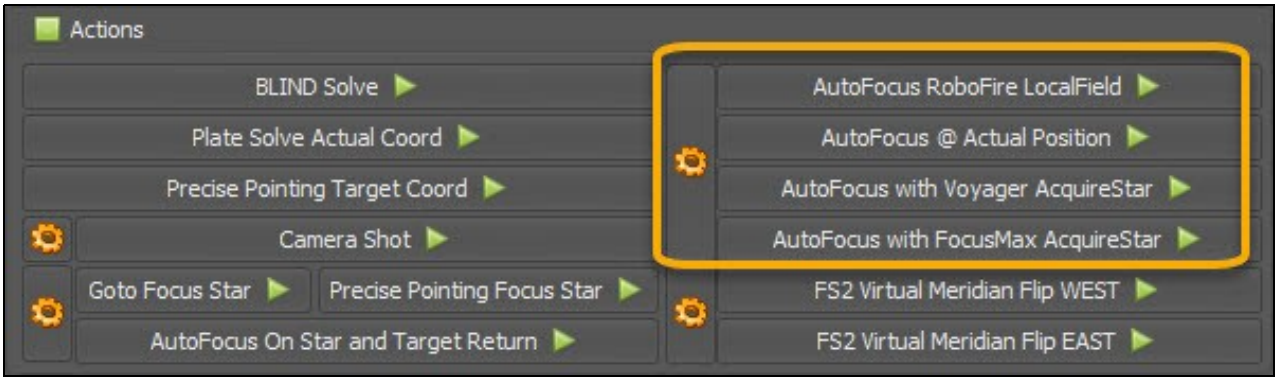
36.16 AutoFocus Actions

There are two videos for AutoFocus:

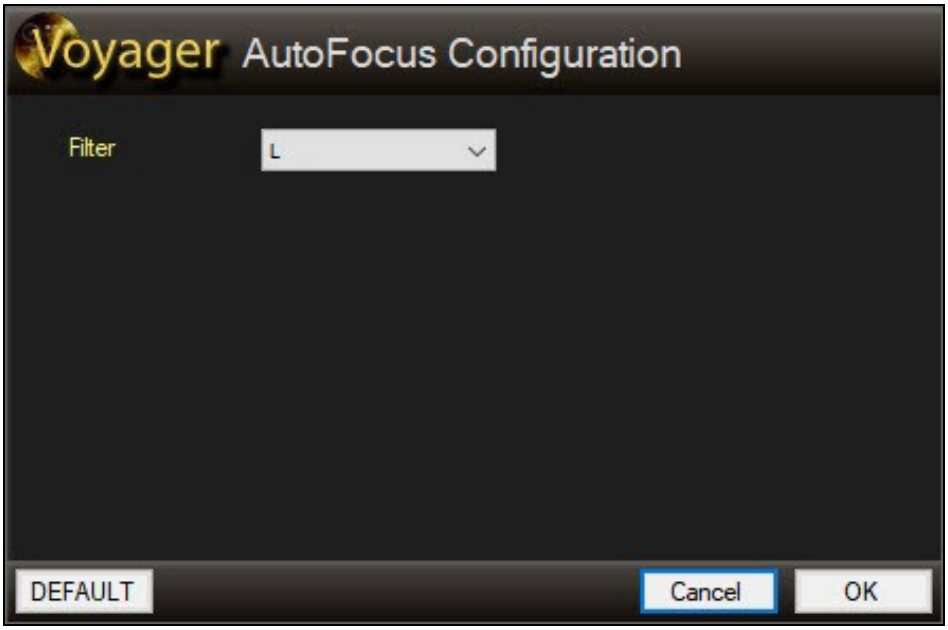
AutoFocus Setup and First Light Wizard

AutoFocus

The AutoFocus actions can perform LocalField (multiple star) and VCurve (single star) autofocus operations. The VCurve operations can be performed at the current scope position, or with either Voyager or FocusMax AcquireStar, which selects a suitable focus star based on your autofocus setup settings.



-  : Brings up the AutoFocus Configuration dialog from which you can select the filter to use in these AutoFocus Actions.



- ♦ **Filter**: Choose the filter to use with AutoFocus from the dropdown list
  ♦ **DEFAULT**: Sets the filter to the default setting , default filter setting is the first filter in the wheel
  ♦ **Cancel**: Close the window without saving changes
  ♦ **OK**: Save the settings and close the window

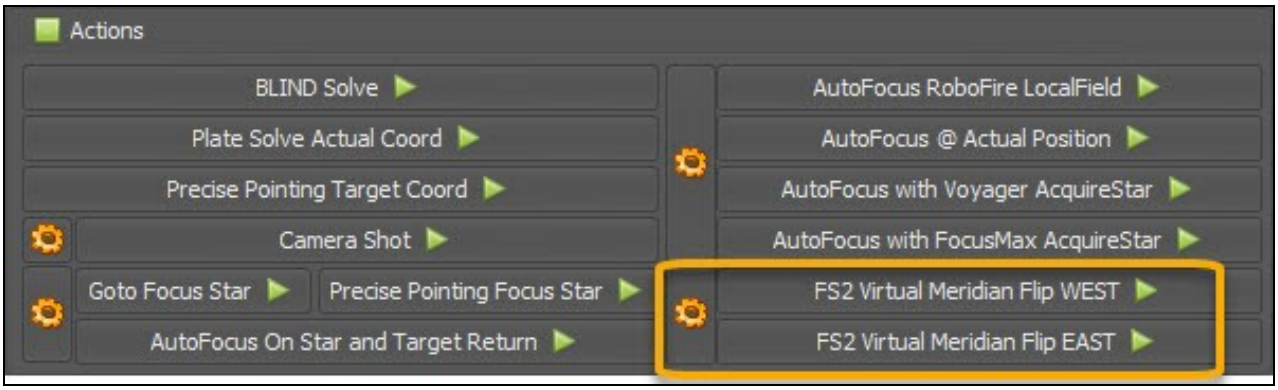
- **AutoFocus RoboFire LocalField**: Click this button to perform a LocalField (multiple star) autofocus operation at the current scope position

- **AutoFocus @ Actual Position**: Perform a VCurve (single star) autofocus operation using a suitable star at the current scope position
- **AutoFocus with Voyager AcquireStar**: Use Voyager's AcquireStar routine to move to a suitable focus star based on your autofocus setup settings. Perform a VCurve (single star) autofocus operation on that star and then return to the current target.
- **AutoFocus with FocusMax AcquireStar**: Use FocusMax's AcquireStar routine to move to a suitable focus star. You must configure FocusMax's AcquireStar routine in FocusMax before executing this command. Then perform an autofocus operation. A FocusMax autofocus only will be performed .. non an Robostar or other autofocus type will allowed to use

Important Note! If LocalField focus fails with an out-of-memory exception, try using a smaller Region of Interest or larger binning (e.g. binning 2x2)

36.17 FS2 Virtual Meridian Flip Actions

Important Note! These actions are ONLY FOR FS2 MOUNT SYSTEMS! Please DO NOT USE with other mounts!!! There is a serious risk of damage if you do!



-  : Brings up the FS2 Virtual Meridian Flip window:

- ♦ **Azimuth for WEST FLIP (DD MM SS)**: degrees to use for enter in WEST flip
  ♦ **Azimuth for EAST FLIP (DD MM SS)**: degrees to use for enter in EAST flip

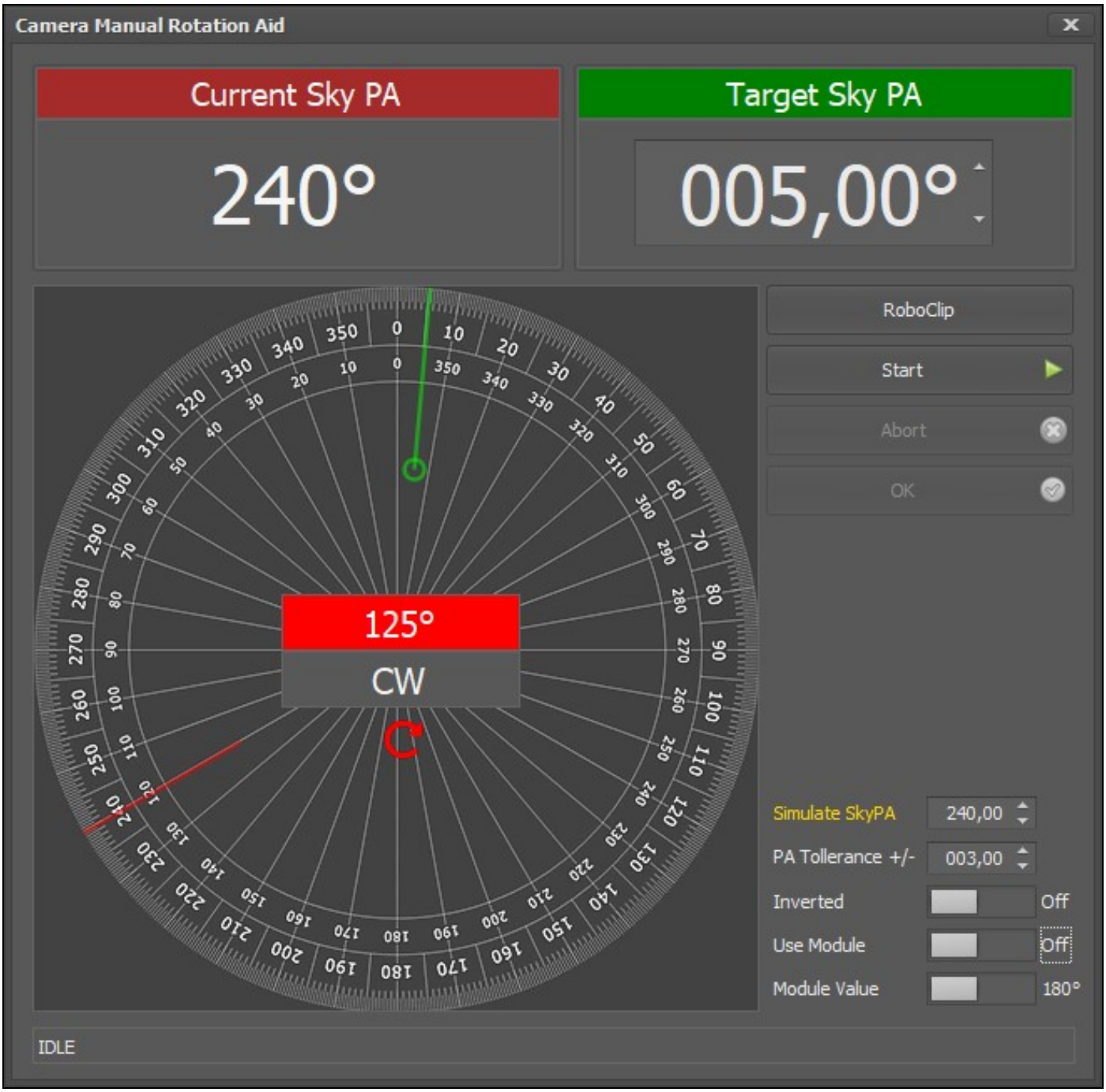
- **Altitude (DD MM SS)**: degress to use for simulating meridian flip
- **Move North For**: to simulate meridian flip
- **Move South For**: to simulate meridian flip
- **Do Final Blind Solving and Sync**: When the Virtual Meridian flip finishes, perform a blind solve and sync operation to ensure Voyager knows where the mount is actually pointing
- **Default**: Fills out the fields in this window with the default settings, default value is on the image above
- **Cancel**: Close the window without saving any settings
- **OK**: Save settings and close the window

- **FS2 Virtual Meridian Flip WEST**: Perform an FS2 Virtual Meridian Filp operation (mount starts or finishes on the WEST side)
- **FS2 Virtual Meridian Flip EAST**:Perform an FS2 Virtual Meridian Filp operation (mount starts or finishes on the EAST side)

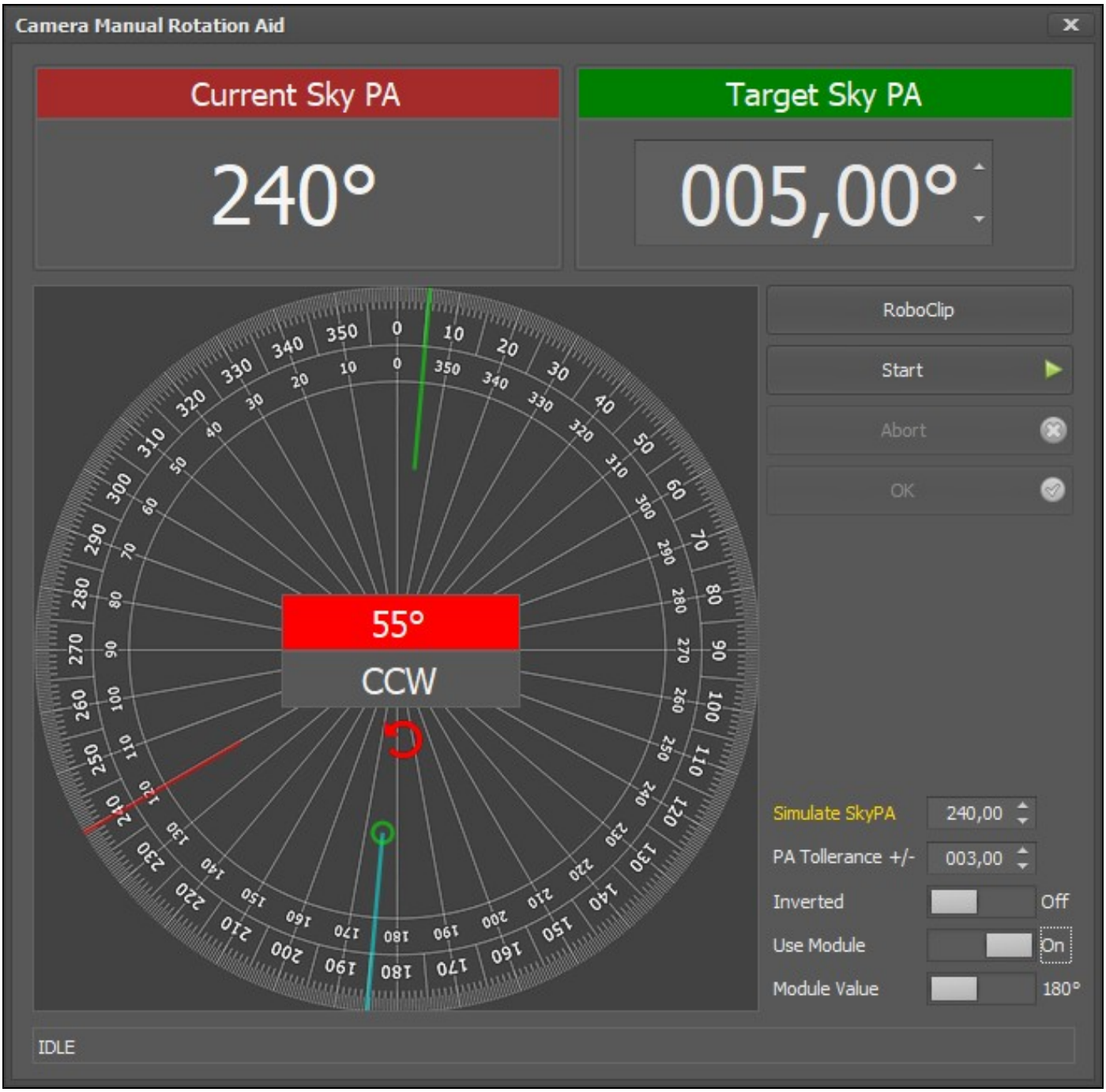
36.18 Camera Manual Rotation Aid Tool

This tool allow to manually position the camera to the desired Sky Position Angle using the plate solving action and calculation the offset rotation and direction to apply manually to the camera to reach the target Sky PA. You will found it in **OnTheFly Section**, box **Utilities**, command button **Camera Manual Rotation Aid**

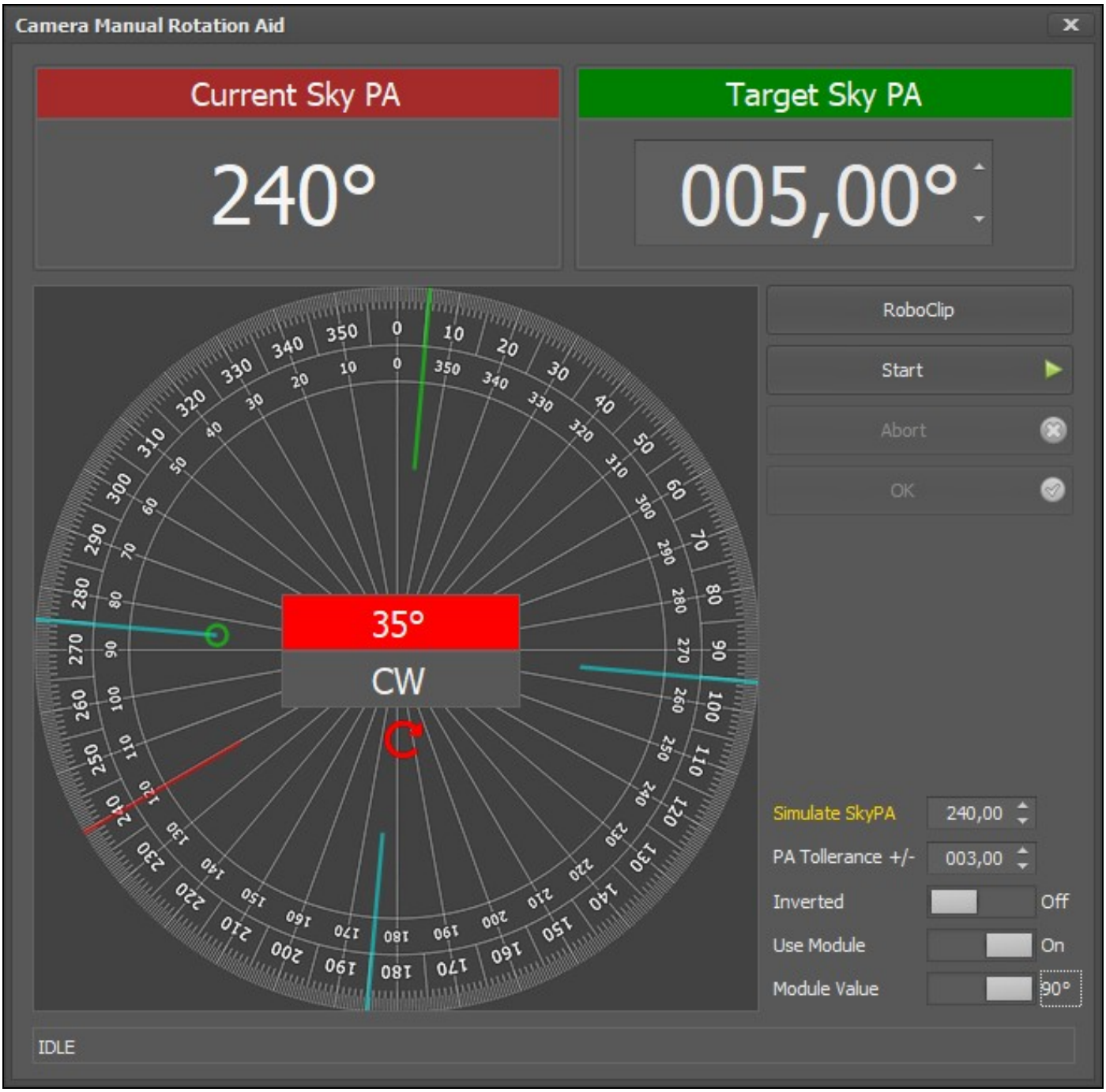
Default Mode:



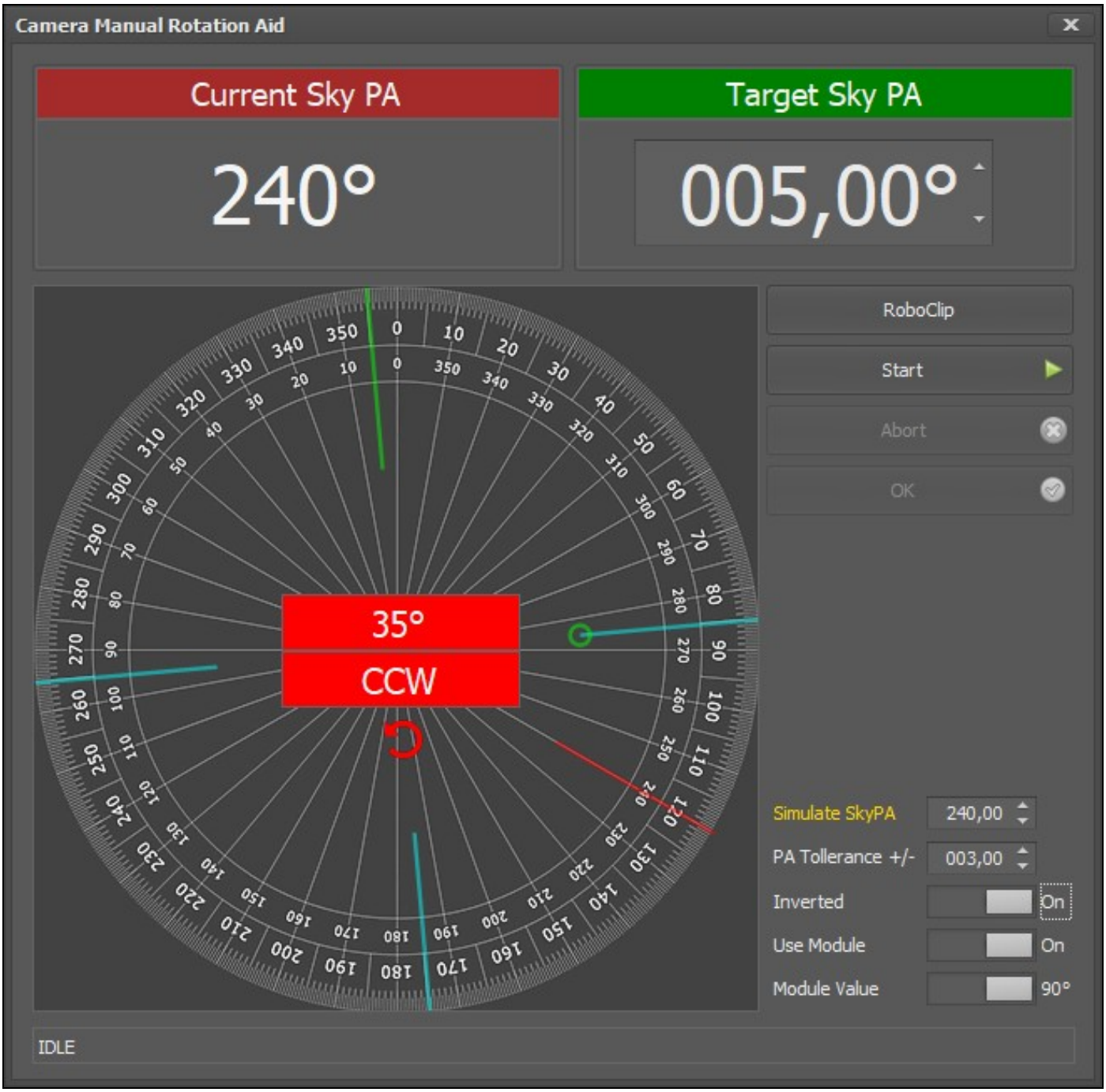
Module Mode 180°:



Module Mode 90°:



Inverted Module Mode 90°:



LEGEND:

- red line is the Current Sky PA
- green line is the Target Sky PA
- cyano line is the module angles if module mode is activated
- green circle is angle used by Voyager to report adjustment error to apply and direction to use (more closest to reach)

Current Sky PA: report the last solved Sky Position Angle from the Plate Solving system called with Start command. At least one Start request m ust be done to have a valid value

Target Sky PA: report the last target Position Angle saved in memory or retrieved by using RoboClip or manually edited. This will be the reference to calculate rotation offset and direction to manually apply to the camera

Virtual Rotator Image and adjust field: report a circle graded in degrees clockwise image. Green line shot the Target Sky PA, red line the Current Sky PA. First field at center up report the offset in degree to rotate the camera to get perfect alignment of Camera SkyPA to Target Sky PA (background is red if the error is over the PA Tollerance, green if error is inside the error tollerance). The second field in center down report the direction to use to reach alignment , CW or CCW (backgound is red if the rotation is declared inverted on settings). All the fields will be update automatically at each change of current sky PA or Target Sky PA.

RoboClip: Select the target PA from RoboClip

Start: Starting the Plate Solving action on actual place to retrieve the Sky PA of your camera. You must have camera, telescope and Palte solving system configured and connected in Voyager.

Abort: Abort the running Plate Solving action

OK: declare finished the operations of alignment of camera with success.

Simulate SkyPA: if edited this field override the Current Sky PA, useful for simple test of tools and discovery functionalities

PA Tollerance +/-: error allowed in terms of misalignment between Sky PA of Camera and Target Sky PA, value is store in Profile

Inverted: select inverted ON if you experience and increasing of the error if you rotate camera of value requeste and in direction requested, value is store in Profile. When inverted the graduated scale is the internal one.

Use Module: use this option if you dont want to take care of vertical and/or horizontal flip of the image. Voyager will calculate 180° or 90° module angle and will show the more closest to reach, the select angle will be used to give to you the error adjustment and the rotation direction

Module Value: select module angle value between 90° (*4 angles for squared sensors*) or 180° (*2 angles for rectangular sensors*)

To operate follow this steps:

- set the PA Tollerance desired value (just one time, setting will be recorded in profile)
- use Simulate SkyPA spin edit if you want to do some trial test without solving
- Be sure to have the setup connected
- Choose from RoboClip the Target if you don have yet choosed outside the Tool windows, or manually input
- Press the Start button to start the plate solving of actual location
- Wait for answer on Solved PA
- Look at adjust angle field to apply offset and direction, if the offset angle background is red rotate camera
- Reiterate with Start and Plate solve until you reach green background on adjust angle field
- **use inverted if you see the adjustment increase the error instead to decrease (setting will be recorded in profile)**
- when you are in green situation press the OK button and tool will be closed, your camera have the right rotation
- if you want you can press Abort during plate solving task to stop the action

Important Note! Remember that in most cases rotating the camera manually without the aid of a properly checked and calibrated rotator can lead to the loss of collimation and orthogonality of the System. Your images could be severely affected. Do this task at your own risk.

37 Sequence Configuration

A Sequence is a set of exposures of a single target. It can include repeated exposures using multiple filters and exposure lengths.

In addition to specifying the number and type of exposures to take, you can specify many additional actions and settings, including

- Sequence start delays
- Cooling settings
- Pointing retries
- Plate solving on or off
- Tracking stops and starts
- Meridian flip management
- Guiding and dithering settings
- Exposure delays and subframe size
- Autofocus actions
- Error and sequence end actions

One or more sequences can be included in a DragScript to completely automate an imaging session.

Sequences are stored by default in the ConfigSequence folder of your Voyager directory, but you are free to store them anywhere.

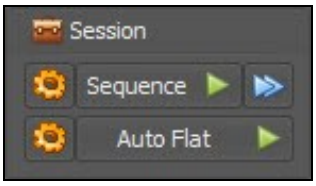
As of Voyager 2.0.14e (daily build) and 2.1.0 (stable), you can edit sequences while actions are running. You can invoke the sequence and flat sequence editor from the Tools and Editor menu to do this.

A running sequence will use the sequence that was defined at the time it started running. You can edit a sequence while it is running, but the changes will not take effect until you stop and restart the sequence.

Important Note! You must have a profile defined and loaded to configure a sequence. As of Voyager 2.0.14e, you no longer need to have equipment connected, just a profile defined and active. If you are using a Voyager version earlier than 2.0.14e, create a profile using ASCOM simulators if you would like to create and edit sequences without connecting to your equipment. The simulators are bundled with the ASCOM platform and all the settings relevant to a sequence can be set in the simulators

37.1 Defining a Sequence

Sequences are defined by clicking the gear  icon next to the Sequence button in the Session panel of the OnTheFly workspace:



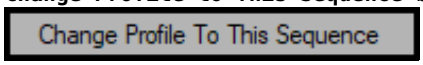
Sequences are run by clicking the Sequence button with the green triangle next to it. 

Sequences start-up options can be specified by clicking the button with two blue triangles 

37.2 Sequence Configuration Dialog

The sequence configuration dialog comes up after you click the gear  icon next to the Sequence button:

- **Target Name**: Enter the name of the object you want to image and click Fast Find. Voyager will look up the J2000 coordinates in the connected Planetarium software and if found, enter them in the RA and DEC fields at the top right of this dialog window.
- **Fast Find**: Click the Fast Find button to do a quick lookup of the target name entered in the Target Name field
-  : Click this icon to bring up the Object Finder. The Object Finder is documented in the Target Coordinates J2000 section. Coordinates found with the Object Finder can be entered into the RA and DEC fields for the Sequence
- **SESAME**: Enter a target in the Target Name field and click this button to do a SESAME search for the object. If found, a pop-up window displays object information returned from SESAME
- **ROBOCLIP**: Open RoboClip Windows Manager to retrieve customized targets on shared database
- **RA** and **DEC**: The Right Ascension and Declination coordinates for the sequence target. Populated automatically by the Fast Find / Object Finder / SIMBAD controls, or entered manually.

- **COPY and PASTE:** copy the RA and DEC data from fields to the clipboard, paste the RA and DEC data in clipboard into the rispective field in sequence configurator
- **Rotation Angle:** an arbitrary angle that can be a Rotator PA or Sky PA, depends on rotator tab setting. Always put the PA needed before the meridian .
  Important Note! Always put the PA needed before the meridian
- **Profile:** The equipment profile associated with this sequence. A new sequence will default to using the currently active profile. You can create and edit sequences for non-active profiles by clicking the **Change Profile to This Sequence** button in the title bar of this window
- 

Change Profile To This Sequence: Brings up a dialog window from which you can associate sequences with a profile. See Change Sequence Profile section below for discussion of this process
-  **Reset Sequence Data**: Caution! Clicking this button resets all information in the sequence. If you have not saved it, your sequence data will be lost and you will have to start over
-  **Open Sequence File**: Click this file to load the data from a saved sequence into the Sequence Configuration window
-  **Save Sequence File**: Click this file to save the data from the Sequence Configuration window to the file of your choice
-  **Cancel and Discard Changes**: Click this button to close the Sequence Configuration window and discard any changes made since it was opened
- **Refresh Filter Synoptic**: Refresh the visual representation of the filters used in order by this sequence - this information appears in the space below the sequence elements and above the sequence configuration tabbed windows
- **OK**: Click the OK button to save your changes and close the Sequence Configuration window
-

Important Note! If you wish to set the Position Angle of your sequence target, you need use either the MoveTo command button in the Rotator widget or the RotatorMoveTo command in a DragScript

37.3 Change Sequence Profile

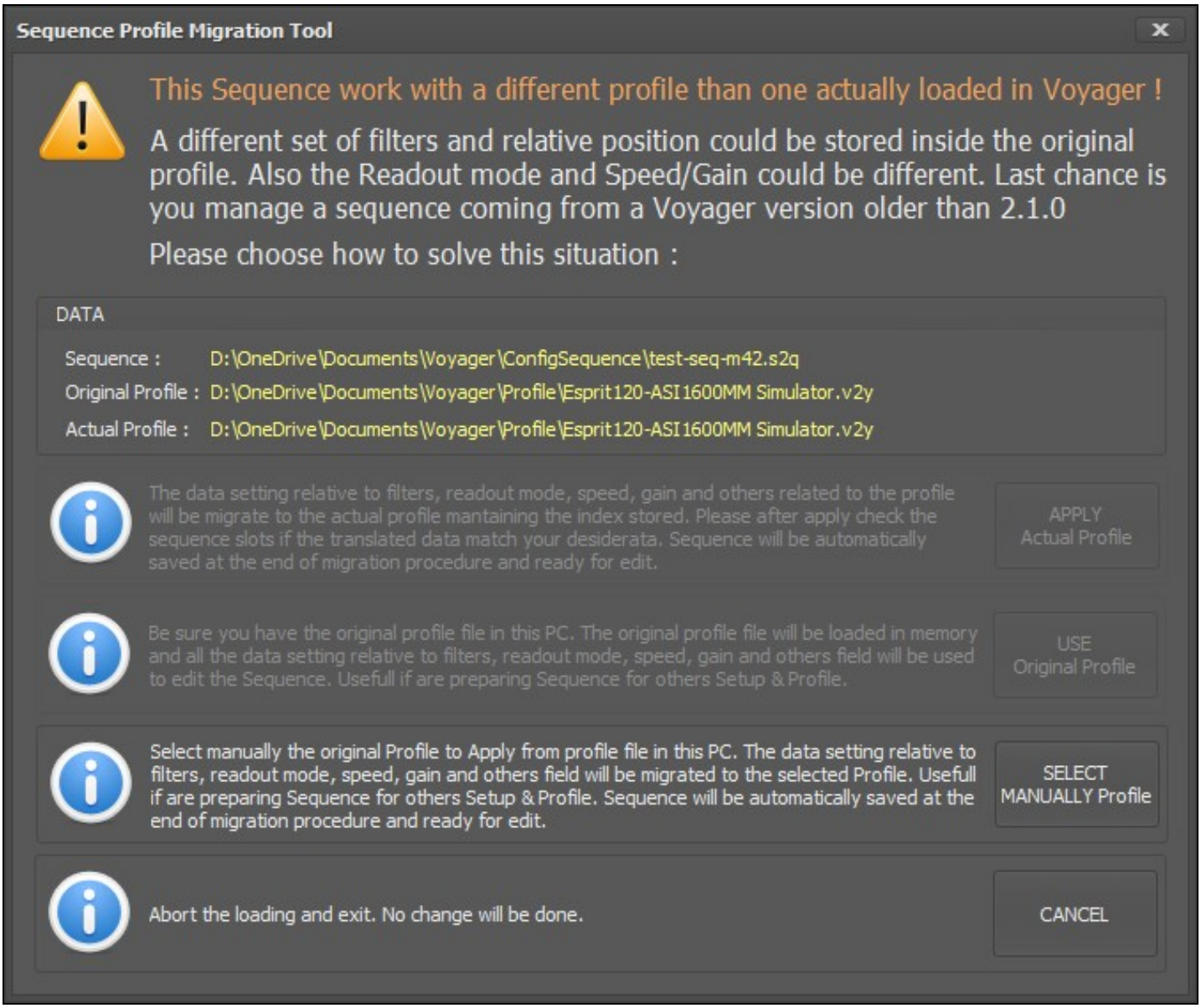
As of Voyager 2.0.14e (daily build) or 2.1.0 (stable build), you can create and edit sequences with the profile of your choice.

If you only edit or create sequences for the active profile, there is no need to use this dialog window. The active profile is used, and the filename of the active profile will be stored with the sequence when you save it.

By default, a new sequence will be created using the currently active profile, which is displayed on the right at the top of the Voyager main window.

References to the "Actual" profile mean the currently active profile in Voyager.

If you want to create or edit a sequence using a different profile from the currently active one, click the **Change Profile to This Sequence** button in the Sequence Configuration title bar to bring up this dialog:



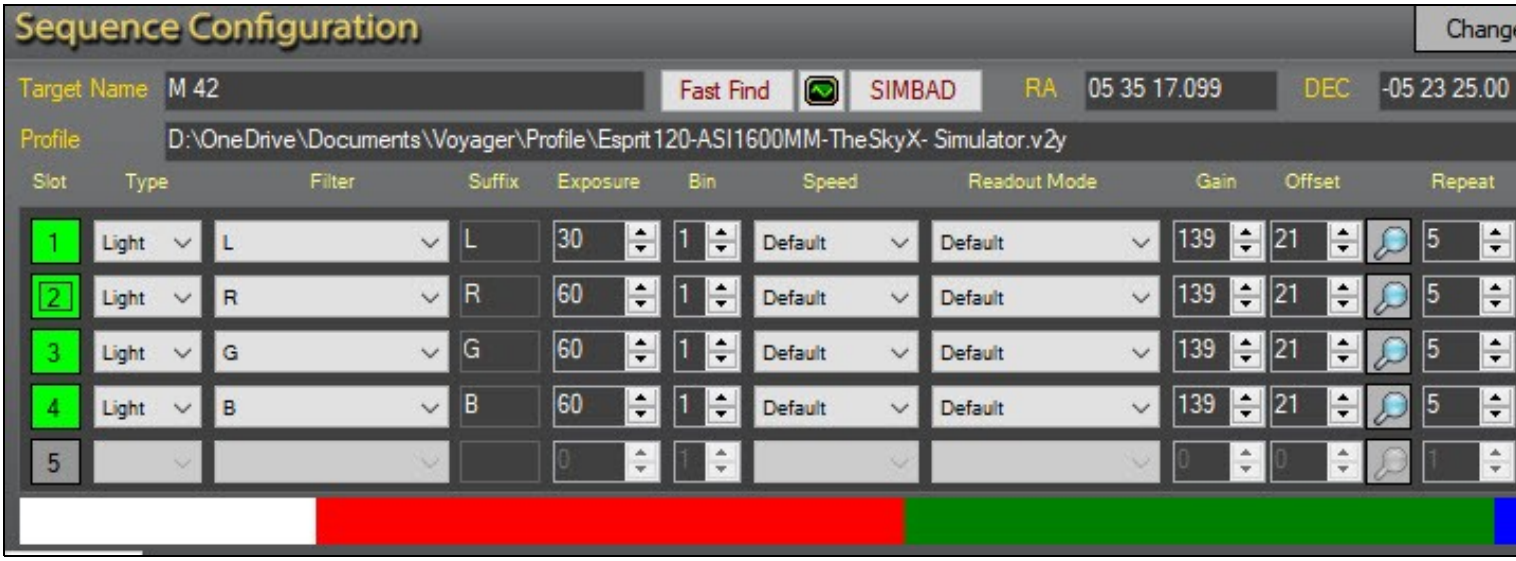
Important Note! If you are editing a sequence created with Voyager prior to version 2.0.14e, the profile is not stored with the sequence so Voyager doesn't know which profile was used to create it. If you want to use the active profile, you can just cancel from the dialog and continue editing the sequence. The profile name will be stored in the sequence the next time you save it to disk.

- **Data**:
  - **Sequence**: The sequence file currently being worked on. If you have created a new sequence and it has not yet been saved, this field will be blank
  - **Original Profile**: The profile stored with the sequence file
  - **Actual Profile**: The profile currently loaded and active in Voyager
- **APPLY Actual Profile**: Ignore the profile stored in the sequence file and use the currently active profile in Voyager. If settings such as filters are different between the two profiles, carefully review your sequence elements and make sure you are using the desired filters, speed and readout mode
- **USE Original Profile**: Use the profile stored in the sequence file for things like filters, camera gain and readout. This is useful if you want to edit a sequence for a different profile than the currently active one.
- **SELECT MANUALLY Profile**: Opens a file browsing dialog and you can select any profile. The selected profile will be used to supply information such as filters, camera readout and gain settings when

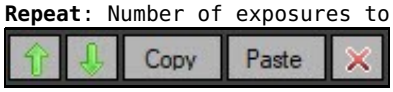
editing this sequence, and the selected profile will be stored in the sequence file when you save it
- **CANCEL**: Abort and close this window without saving changes

37.4 Sequence Elements

The Sequence Elements panel of the Sequence Configuration dialog tells Voyager about the exposures you want to take of your target:



- **Slot**: Click the gray buttons in the Slot column and they turn green indicating that slot is active - the information in that row (slot) of the Sequence Elements table will be used when you run the sequence
- **Type**: Exposure type: Light, Bias or Dark
- **Filter**: Filter for this exposure. Available filters come from the connected profile in the Camera Setup area
- **Suffix**: Enter any text you would like to include in the image filename.
- **Exposure**: Length of the exposure in seconds
- **Bin**: Binning level for this exposure. Available binning levels come from the connected profile in the Camera Setup area
- **Speed**: ISO for DSLR's
- **Readout Mode**: Select a Readout Mode from the drop-down list. Readout Modes are retrieved from your camera if your camera driver provides them. The Readout Mode section of the Camera Setup page explains how to retrieve them
- **Gain:** If you are using the ASI Camera native driver supplied by Voyager (**not** the ASI ASCOM driver), you can enter the Gain for this sequence element. This will be grayed out if you are not using Voyager's ASI Camera native driver.
- **Offset:** If you are using the ASI Camera native driver supplied by Voyager (**not** the ASI ASCOM driver), you can enter the Offset for this sequence element. This will be grayed out if you are not using Voyager's ASI Camera native driver.
- **Important Note!** If you are using a sequence with the ASI Camera native driver that was first defined with a different camera, all Gain and Offset values will be initially set to 0/0. Make sure you change these to the desired settings and save the sequence before running.

-  : Click the magnifying glass icon to select the Gain and Offset from the presets defined in the ASI Camera native driver setup.
- **Repeat**: Number of exposures to take
- 

:
    - Up arrow moves this row up one position; Down arrow moves this row down one position; X clears the information from this row

- **Copy Button**: Click Copy to copy the sequence element information from the row containing the Copy button
- **Paste Button**: After clicking Copy on a row, click Paste on a new row to paste the sequence element information to the row containing the Paste button
- Use copy and paste to quickly set up the sequence elements for a number of rows that only differ in a couple of values, such as the filter choice

- The scroll bars on the right can be used to scroll the window up and down if you have more rows than show in the main window

The colored bar under the Sequence Elements is called the Filter Synoptic. It represents the filters used when the sequence runs, in the order they will be used. The length of each color bar is proportional to the length of exposures taken with that filter.

In this example, we take five 30 second images with the L filter - which corresponds to the white part of the bar. Then five each of red, green and blue, 60 seconds each. This is how our sequence will use filters when the "Group By Slot" option is chosen as the Sequence Mode in the Sequence Tab. If we chose "cyclic Round" instead, the sequence will take one image with each filter and then move on to the next, like this:

Important Note! Image filenames by default include: Target Name, Type, Exposure, Binning, Sensor Temperature (cooling), sequence number, filter, date and time, position angle, and pier side. If using a driver that supports Gain and Offset, they are also included in the file name. Use the Suffix field in the Sequence Elements to add other information

Important Note! You cannot set any values in a row unless you click the gray Slot number at the start of the row first. It turns green indicating the slot is active, and then you can enter values in that row

Once you have set up your Target Name and Sequence Elements, click through the tabs at the bottom of the dialog to specify the way Voyager should handle other elements such as Cooling, Guiding, etc. during the execution of this sequence.

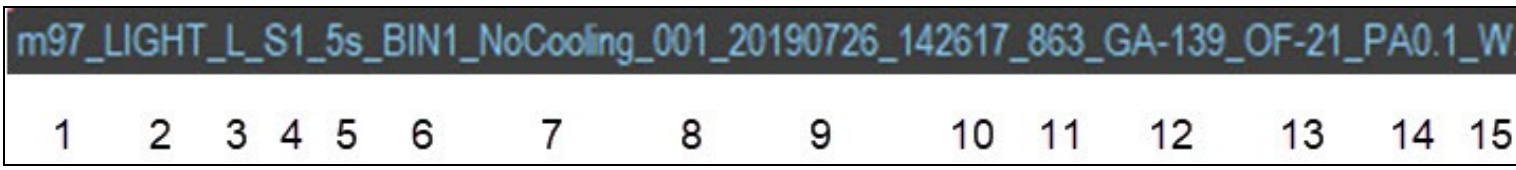
37.5 Sequence Image Filenames

Starting from version 2.2.14j Voyager have also a File Pattern way to define sub foldering and file naming.

Here explaned the default folder and naming system.

The image filenames are generated automatically by Voyager. The number of fields can vary depending on your connected equipment - e.g. if you don't have a rotator configured, you won't have the Position Angle field.

Here's an example filename with a description of the fields.

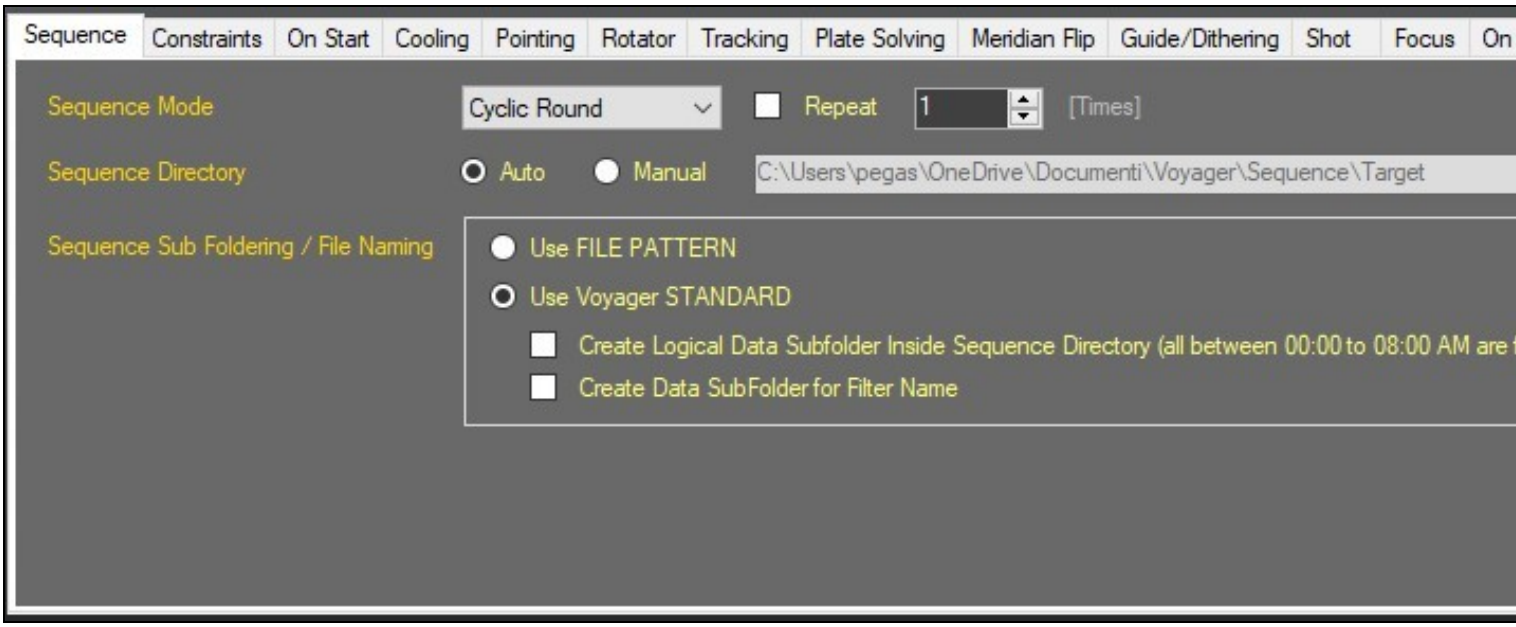


1. Target name
2. Type of exposure: Light, Dark, or Bias
3. Filter Name: Filter Name for cameras with filter wheels - blank if the contents of the Suffix field

equals one of your filter names
4. Suffix: Whatever you type in the suffix field of the Sequence element; example here is G139 to represent Gain of 139
5. Exposure length
6. Binning level
7. Sensor temperature or "No_Cooling" if Voyager is not managing cooling during the Sequence
8. Sequence number: a sequential number generated automatically when Voyager takes a new image
9. Date: YYYYMMDD
10. Time: HHMMSS
11. MS: millisecond portion of the time the image was taken
12. Gain: Gain value if you are using Voyager's ASI Camera native driver
13. Offset: Offset value if you are using Voyager's ASI Camera native driver
14. Position Angle if a rotator is defined in Setup
15. Position relative to Meridian: E = East or W = West
16. File type: FIT for a FITS file

37.6 Sequence Tab

The Sequence tab of the Sequence Configuration window tells Voyager how to cycle through your exposures, where to store images, and other sequence constraints:



- **Sequence Mode**: Choose Cyclic Round or Group By Slot from the drop-down list
  - **Cyclic Round**: Voyager will take one exposure using the parameters of a slot, then move to the next slot and take one exposure, etc. E.g. if you have one slot for each filter of L, R, G and B, Voyager would take one L exposure, then one R, then G, then B, then cycle back around to L and repeat until the total number of exposures specified in the Repeat box are taken.
  - **Group By Slot**: Voyager will take the number of exposures specified in the Repeat column for each slot before moving on to the next slot
  - **Repeat**: If checked, Voyager will loop back and run the sequence again. It will be run the number of times specified in the Repeat counter field
- **Sequence Directory**: Where to save images taken during this sequence
  - **Auto / Manual**: Choose Auto and Voyager will automatically create a sequence directory using the base folder specified in Voyager Setup and the Target Name. Choose Manual and you can type in any folder for your images, or click the Select button and browse to a directory to choose that one
  - **Create Logical Data Subfolder Inside Sequence Directory (all between 00:00 to 08:00 AM are from yesterday)**: Check this box to create a subfolder, named with the date of the start of the sequence. All images from this sequence are stored in the subfolder, including any taken after midnight until 8AM local time

- **Create Data SubFolder for Filter Name:** Check this box to create subfolders named with the filters used for this sequence. Images taken by this sequence are stored in the subfolder with the name matching the filter used for the image. New as of Voyager 2.1.2e

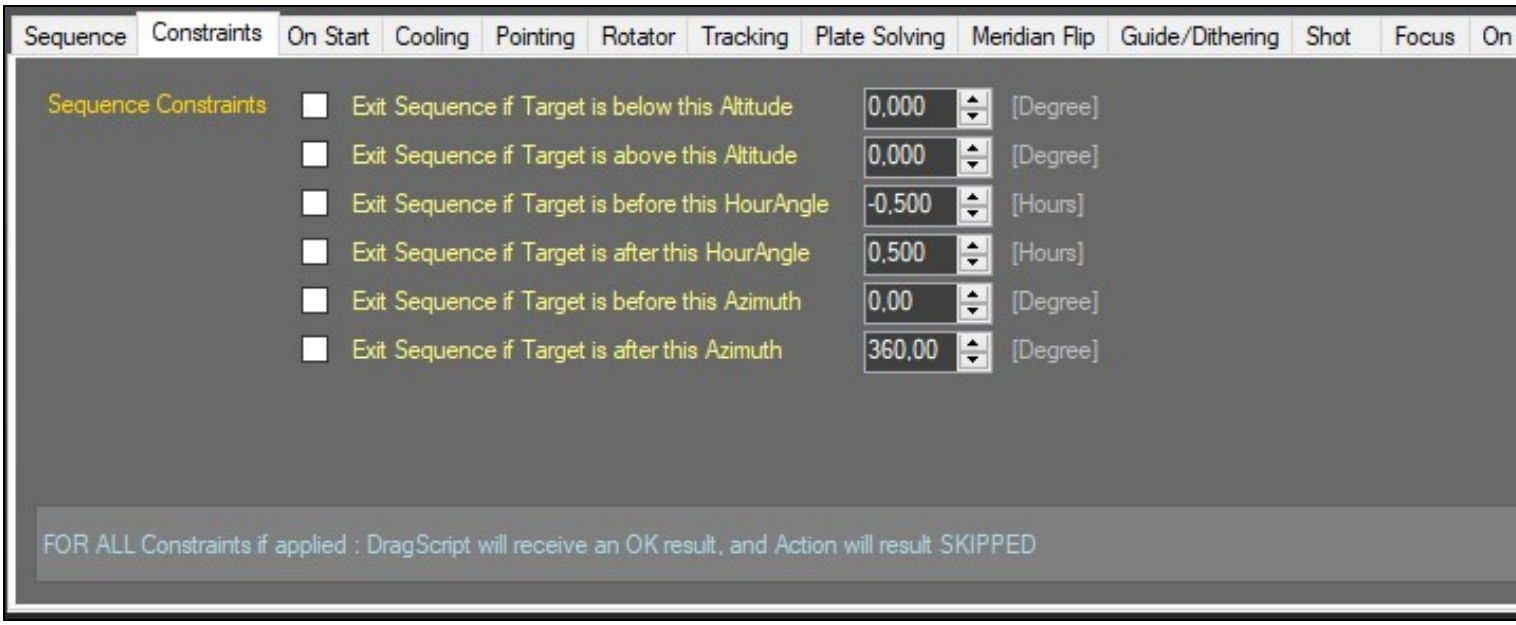
- **Sequence Sub Foldering / File Naming:** selection of the sub foldering and file naming method
  - **Use FILE PATTERN:** flag this checkbox to activate sub foldering and file naming with File Pattern method (please configure the file pattern in the File Pattern Manager)
  - **Use Voyager STANDARD:** flag this checkbox (this choice is the default for a new sequence) to use the original sub foldering and file naming system adopted by Voyager from the beginning
    - **Create Logical Data Subfolder Insside Sequence Directory (all between 00:00 to 08:00 AM are from yesterday) :** Check this box to create a subfolder, named with the date of the start of the sequence. All images from this sequence are stored in the subfolder, including any taken after midnight until 8AM local time
    - **Create Data Subfolder for Filter Name:** create a sub folder with the target name

Important Note! The Cyclic Round setting is best if you have to get as many images as possible from each filter in a single Sequence run. For example, you have traveled to a dark site and just want to get as much data as possible in one night. The Group By Slot setting is the most time efficient as no time is spent changing filters between each exposure. However, if clouds move in or you run out of time, you may not get data from all filters in a single session with this setting

Important Note! Use Group By Slot with Repeat to have some of the advantages of both modes (Cyclic Round and Group By Slot). For example, set the sequence to take 5 images with each filter, select Group By Slot, and Repeat to as many times as you want. Now you will get some images with each filter, but you won't spend as much time changing filters over the course of the sequence.

37.7 Constraints Tab

The Sequence tab of the Sequence Configuration window tells Voyager how to cycle through your exposures, where to store images, and other sequence constraints:



- **Sequence Constraints**:
  - **Exit sequence if Target is below this Altitude**: If checked, automatically end the sequence if target drops below the given altitude in degrees. If the sequence is running in a DragScript, return to DragScript with an OK result (no error, successful sequence termination,skipped status

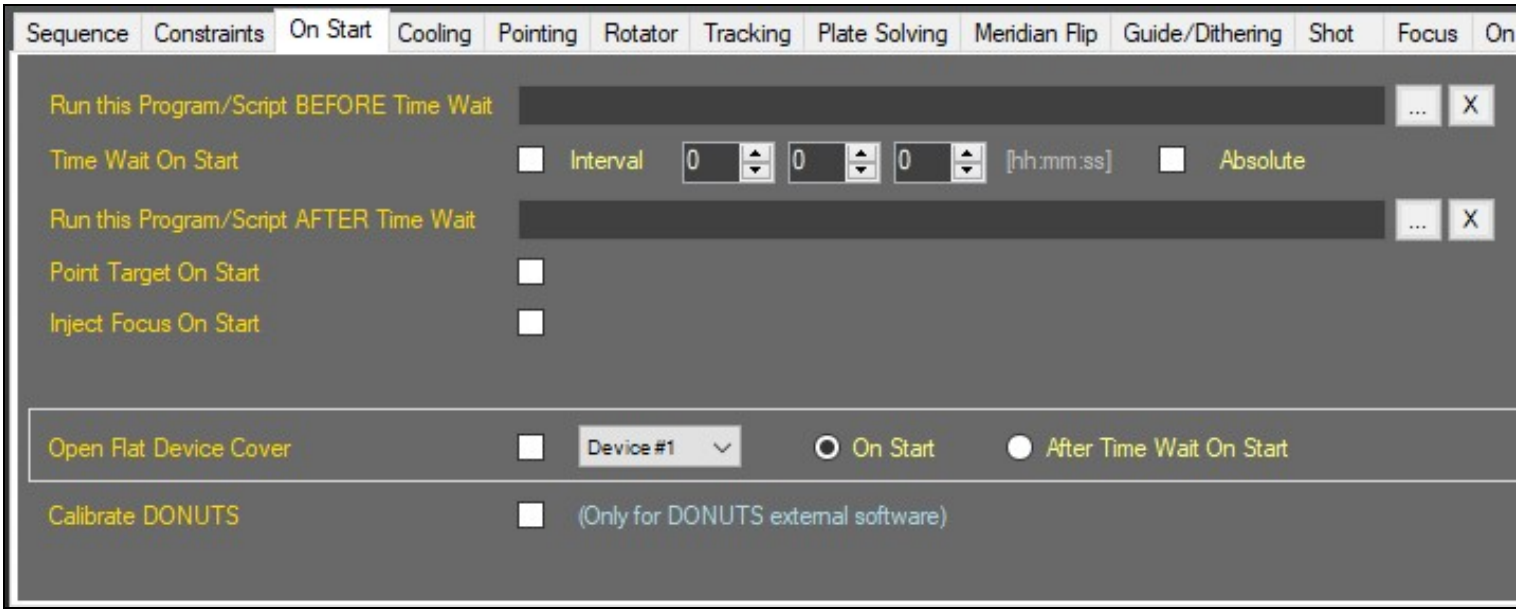
will be set)

- **Exit sequence if Target is above this Altitude**: If checked, automatically end the sequence if target rises above the given altitude in degrees. If the sequence is running in a DragScript, return to DragScript with an OK result (no error, successful sequence termination,skipped status will be set)
- **Exit sequence if Target is before this HourAngle:** If checked, automatically end the sequence if target is before the hour angle (hours from the meridian) specified in the spinner control. If the sequence is running in a DragScript, return to DragScript with an OK result (no error, successful sequence termination,skipped status will be set)
- **Exit sequence if Target is above this HourAngle**: If checked, automatically end the sequence if target is after the hour angle (hours from the meridian) specified in the spinner control. If the sequence is running in a DragScript, return to DragScript with an OK result (no error, successful sequence termination,skipped status will be set)
- **Exit sequence if Target is before this Azimuth:** If checked, automatically end the sequence if target is before the azimuth angle specified in the spinner control. If the sequence is running in a DragScript, return to DragScript with an OK result (no error, successful sequence termination,skipped status will be set)
- **Exit sequence if Target is after his Azimuth:** If checked, automatically end the sequence if target is after the azimuth angle specified in the spinner control. If the sequence is running in a DragScript, return to DragScript with an OK result (no error, successful sequence termination,skipped status will be set)
- **Use External Interval Angle:** if each the azimuth constraints will be cheched you can decide with this flag to use external angle instead of internal angle between before and after azimuth. Example if you choose 70° before and 150° after with out external flag this mean sequence run if angle is between 70 and 150°, if you chec it and invert to external sequence will be terminate if azimuth is between 70 and 150°

Important Note! The hour angles can be negative or positive. The ending hour angle must be greater than the starting hour angle.

37.8 On Start Tab

The On Start tab of the Sequence Configuration window is where you can specify things to do before starting the sequence:



- **Run this Program/Script BEFORE Time Wait**: Click the box with "..." to bring up the Run External Program

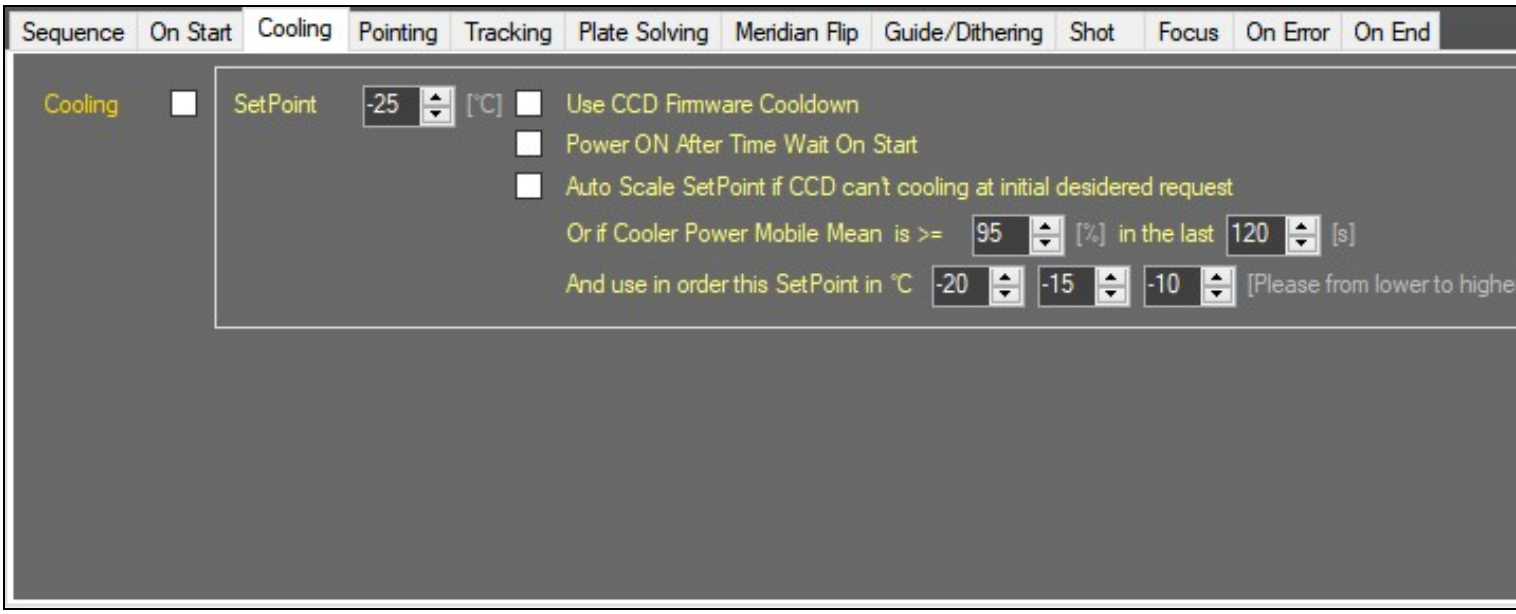
/ Script window to browse to a program or script to run before the "Time Wait on Start" interval. **Note:** this field is used to run an external Windows program or script, not a Voyager DragScript. Run your Sequence from the DragScript, not the other way around.

- **Time Wait On Start**: Specify if Voyager should delay before starting the sequence
  - **NOTE:** The first checkbox, the one after **Time Wait On Start** and before **Interval**, must be checked if you want Voyager to wait either an Interval OR until an Absolute time. This checkbox is linked to "Time Wait on Start" and the default is to wait for an Interval
    - **Interval**: Check the box before **Interval** and enter the amount of time to wait in HH:MM:SS in the three scrolling fields. Voyager will wait this amount of time before starting the sequence
    - **Absolute**: Check the box before **Interval** AND check the box before **Absolute**. Enter the actual time in HH:MM:SS at which Voyager should start running the sequence
- **Run this Program/Script AFTER Time Wait**: Click the box with "..." to bring up the Run External Program / Script window to browse to a program or script to run after the "Time Wait on Start" interval. **Note:** this field is used to run an external Windows program or script, not a Voyager DragScript. Run your Sequence from the DragScript, not the other way around.
- **Point Target On Start**: Check to perform a precision pointing operation at sequence start
- **Inject Focus on Start**: Check to perform an autofocus operation at sequence start
- **Open Flat Device Cover**: Check to open the flat device at sequence start
  - **On Start**: Open the flat device cover as soon as the sequence is executed - do not wait if there is a "Time Wait On Start" specified
  - **After Time Wait on Start**: Open the flat device cover after the Time Wait On Start interval has elapsed
- **Calibrate DONUTS:** Check to perform a calibration operation in Donuts Process (an algorithm suite and application for advanced research)

Important Note! If the sequence is run from a DragScript, only the Point Target on Start field is used. The other fields must be specified with DragScript actions

37.9 Cooling Tab

The Cooling tab of the Sequence Configuration window is where you specify CCD cooling (Peltier) for the sequence:



- **Cooling**: Check this box to manage cooling via this Sequence. If you don't check this box and have cooling set before running the sequence, no changes to cooling will be made
- **SetPoint**: Enter the desired sensor temperature (SetPoint) for your CCD cooler
  - **Use CCD Firmware Cooldown**: If checked, just command the desired temperature to the CCD cooler

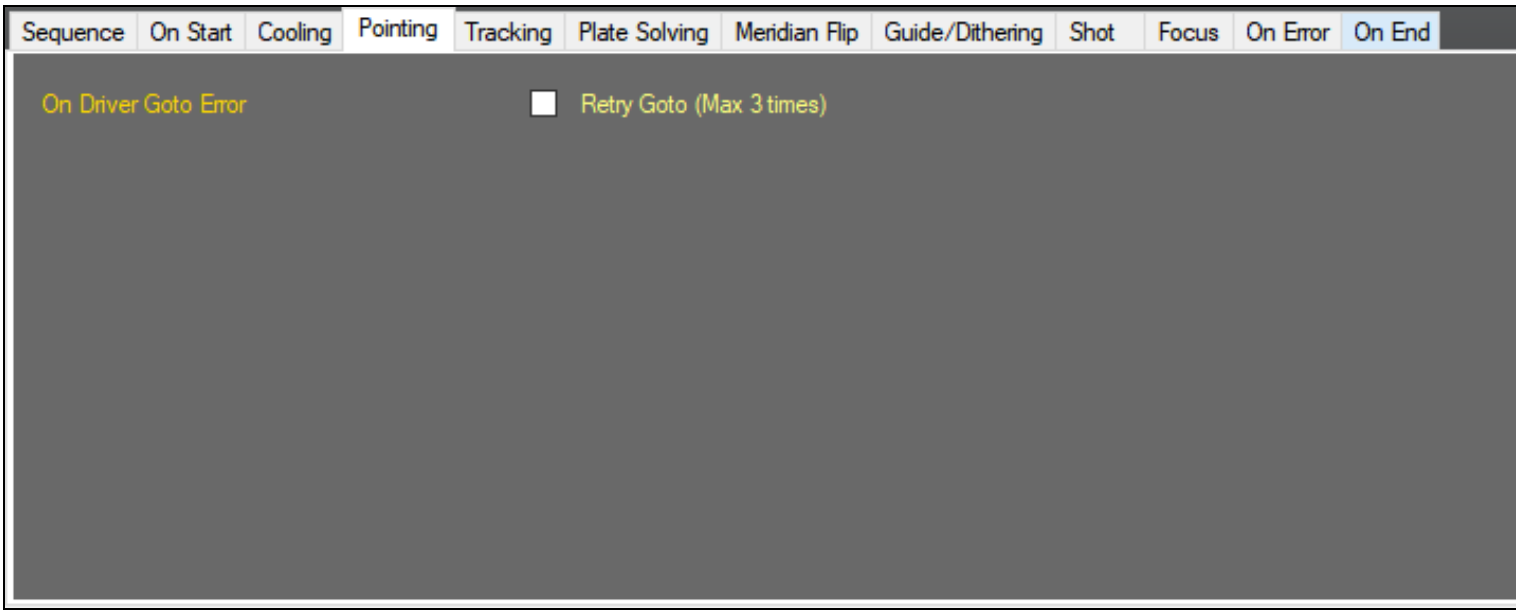
and let the cooler's firmware decide how quickly to ramp to that temperature

- **Power ON After Time Wait On Start**: If checked, send a command to turn CCD cooler power on after the Time Wait On Start interval has elapsed
- **Auto Scale SetPoint if CCD can't cooling at initial desired request**: If checked, if the CCD cooler fails to reach the desired temperature within the time specified in Camera Setup, or within the power usage constraints listed below, try again with successively warmer temperatures as specified below
  - **Or if Cooler Power Mobile Mean is >=**: Begin the auto scaling operation if the moving average of the cooler power in use was greater than or equal to the specified percentage for the "in the last" number of seconds
  - **And use in order this SetPoint in °C**: Use these temperatures in the order specified for auto scaling. The temperatures should be progressively warmer (higher numbers) from left to right

Important Note! If you see "NoCooling" in the file name created by Voyager, it means the "Cooling" checkbox in the Cooling tab of the Sequence is unchecked. This means you have cooling on in the camera but the Voyager Sequence is not managing it. If an error has been returned from the camera's cooling system, you would see UNK text instead of NoCooling.

37.10 Pointing Tab

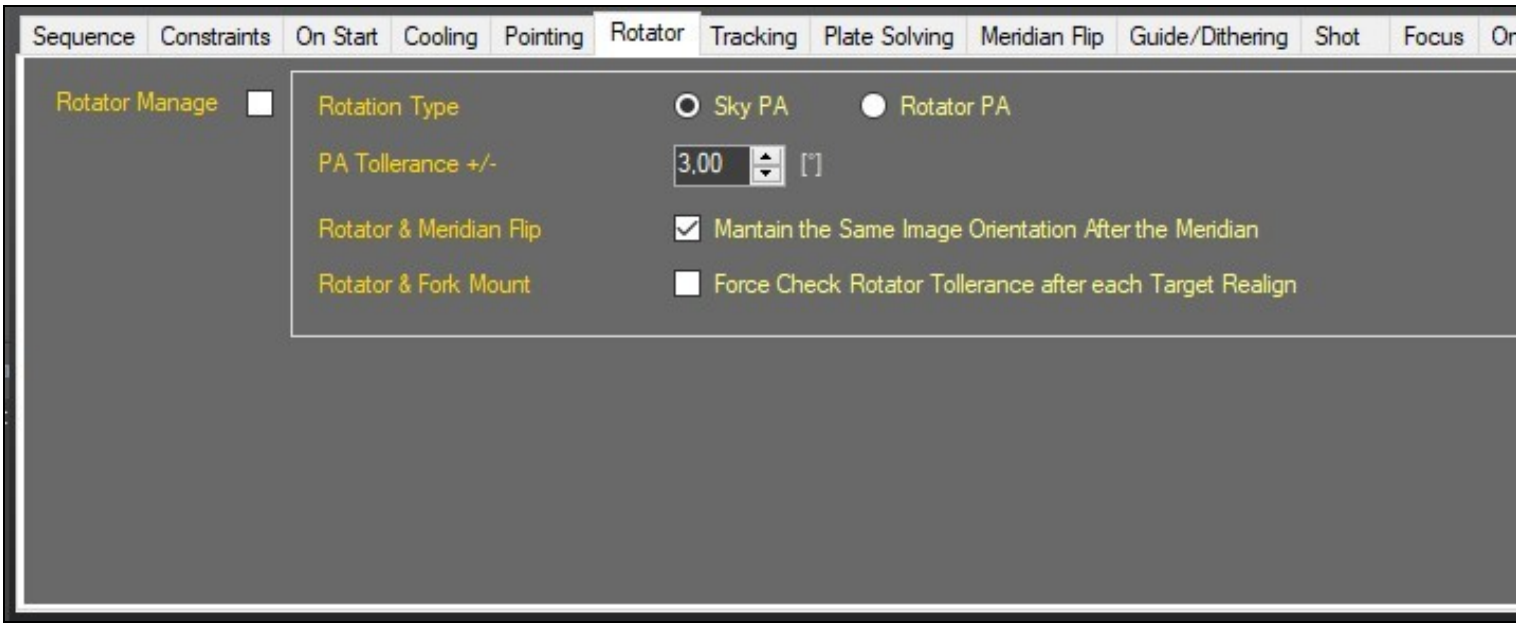
The Pointing tab of the Sequence Configuration window is where you specify additional parameters for any Pointing operations performed during the sequence:



- **On Driver Goto Error**: If the mount driver returns an error when Voyager commands a Goto (slew) operation, retry the operation up to a maximum of 3 times

37.11 Rotator Tab

The Rotator tab of the Sequence Configuration window is where you specify additional parameters for your rotator's actions during the sequence:



- **Rotator Manage:** if check rotator's action will be managed during the sequence framing the target with the PA specified and other all the others flag available
- **Rotator Type:** define if the rotation angle is the rotator angle (rotator PA) reported from the driver (and with offset if asked to Voyager in Sync) or the Sky angle (Sky PA) chosen with web dashboard VirtualFOV or planetarium or another system. If you select Sky PA Voyager will use the Plate solve PA result to rotate the rotator to the right angle. If you select the Rotator PA Voyager will just rotating rotator using drive angle at desidered value, no correction using the plate solved PA will be done
- **PA Tollerance +/-:** specified the tollerance in degree about the PA accepted like ok (example 180° +/-3° will accept 177° to 183°)
- **Rotator & Meridian Flip:** "Mantain the Same Image Orientation After the Meridian" if checked force Voyager to shot the target with same orientation in the images taken before anf after meridian.Use of this flag is useful also to use the same guide star in case of use of OAG with high focal lenght.
- **Rotator & Fork Mount:** if enabled force Voyager to check rotator tolleranze after each Target realign, useful for fork mount with derotator system

Important Note! Rotator management will be done only done in this two points of the sequence:

- at first precise pointing, so flag the ?Point target on start? in the start tab of the sequence configurator

- at meridian change

Important Note! In sequence always put the PA needed before the meridian

SKY PA:

the solving of the SKY PA changes by 180 ° if the mount is after the meridian and has made the flip even if the rotator has not m

if you ask to keep the orientation of the Voyager image according to the meridian in which the mount is located, it behaves like

before the meridian it maintains the same SKY PA set in the sequence (net of fine adjustments)
after the meridian it maintains the same SKY PA set in the sequence, this means that the plate solving of the image shows a PA of

if you do NOT request to keep the orientation of the Voyager image based on the meridian in which the mount is located, it behave

before the meridian it maintains the same SKY PA set in the sequence
after the meridian the requested SKY PA will be flipped by 180 °, this means that the plate solving of the image shows an already

ROTATOR PA:

SKY PA is not taken into consideration at all, therefore plate solving does not affect the rotator

if you ask to keep the orientation of the Voyager image according to the meridian in which the mount is located, it behaves like

before the meridian it maintains the same ROTATOR PA set in the sequence
after the meridian the required ROTATOR PA will be flipped by 180 ° in order to have the image not rotated and the rotator will t

if you do NOT request to keep the orientation of the Voyager image based on the meridian in which the mount is located, it behave

before the meridian it maintains the same ROTATOR PA set in the sequence
after the meridian it keeps the same ROTATOR PA set in the sequence, the image will be flipped but the rotator will not be flippe

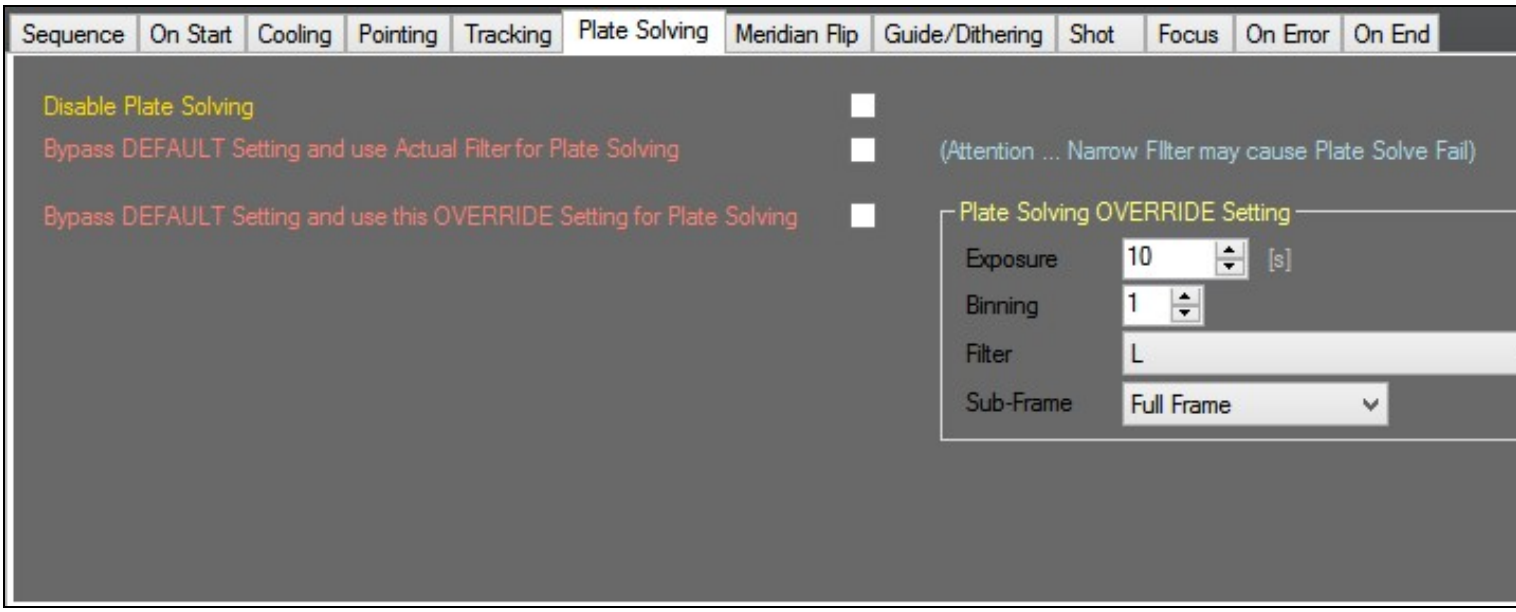
37.12 Tracking Tab

The Tracking tab of the Sequence Configuration window is where you specify additional parameters for your mount's tracking actions during the sequence:

- **Tracking Stop Watchdog**: If checked, if tracking stops during the sequence, attempt to restart tracking the specified number of times
- **Tracking Start**: If checked, stop tracking when the sequence is started, and start tracking only after the Time Wait On Start interval has elapsed

37.13 Plate Solving Tab

The Tracking tab of the Sequence Configuration window is where you specify additional parameters for plate solving during the sequence:

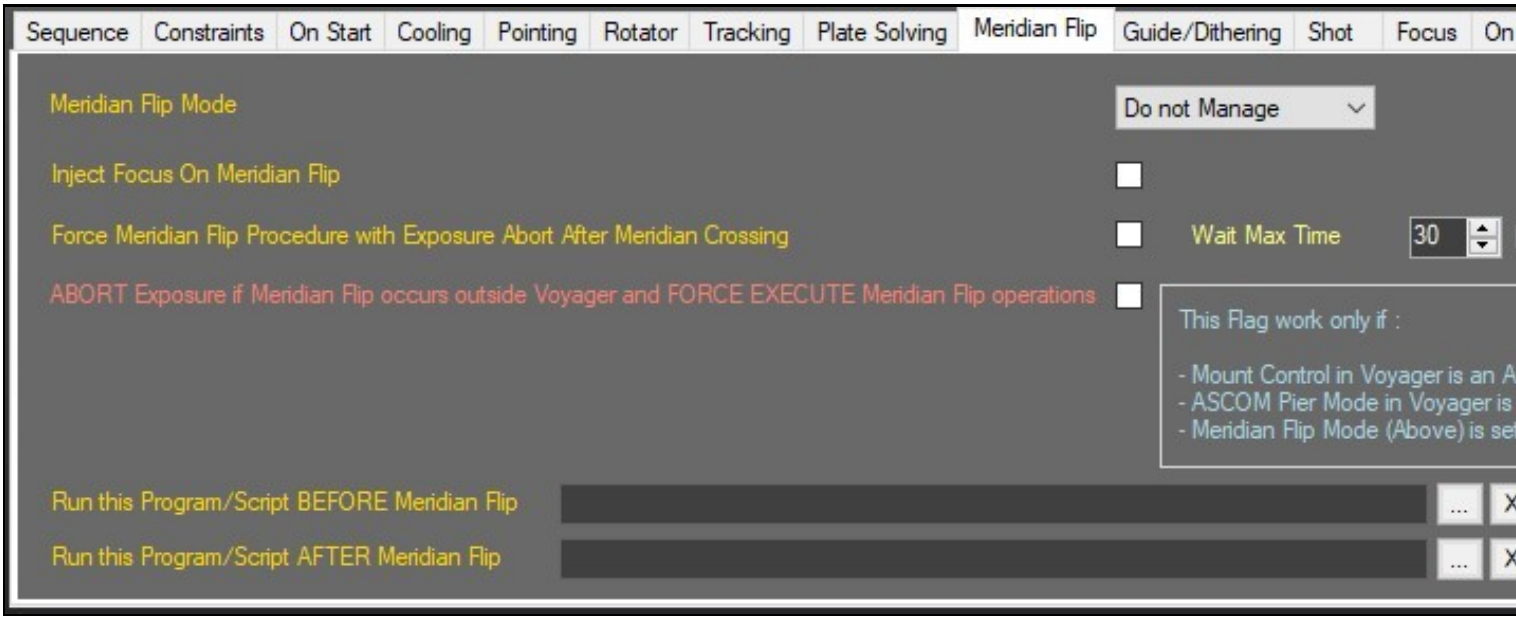


- **Disable Plate Solving**: If checked, do not perform plate solving during the sequence. If this is checked, precision pointing can not be done, only unverified goto's of the mount
- **Bypass DEFAULT Setting and use Actual Filter for Plate Solving**: If checked, the filter in use for image exposures will be used for plate solving, regardless of the settings specified in Plate Solve setup
- **Bypass DEFAULT Setting and use this OVERRIDE Setting for Plate Solving:** if checked, the filter used for plate solving will be the one in Plate Solving OVERRIDE Setting Box. Usefull when you use a 2 subset of filter narrow / broadbrand of different tichkness, this mean different focus. Remember to enlarge time or increase (or do togheter) binning in case of use of narrow band filter.

Important Note! Using a narrow band filter may cause plate solving to fail, as the resulting image may be too dim to have stars that the plate solving routine can locate in the image

37.14 Meridian Flip Tab

The Meridian Flip tab of the Sequence Configuration window is where you specify additional parameters for meridian flip management during the sequence:



- **Meridian Flip Mode**: Choose Do Not Manage, Halt on Flip Time or Manage from the drop-down list

    - **Do Not Manage**: Voyager will not perform any meridian flip management during the sequence - it will not monitor mount position near the meridian while the mount is tracking
    - **Halt on Flip Time**: When Voyager determines it is time to flip the mount, the sequence will be halted. If you have tracking safety stop enabled in Voyager the mount will be halted. Otherwise, set a limit in your mount configuration settings to stop tracking
    - **Manage**: Voyager will monitor the mount position relative to the meridian and perform a meridian flip as needed, as specified in Mount Setup
- **Inject Focus On Meridian Flip**: If checked, perform an autofocus after the meridian flip completes
- **Force Meridian Flip Procedure with Exposure Abort After Meridian Crossing**: If checked, Voyager will abort any exposure in progress and force a meridian flip after the Wait Max Time number of minutes has elapsed past the meridian. This time should be greater than the "Do Flip After Mount Crossing Meridian By" number of minutes you set the GEM Meridian Flip manager in Mount Setup. This could be used as a safety value to make sure your mount never tracks further than this amount of time past the meridian.
- **ABORT Exposure if Meridian Flip occurs outside Voyager and FORCE EXECUTE Meridian Flip Operations**: If checked, Voyager will notice if a meridian flip has occurred external to Voyager (not initiated by Voyager) and perform the meridian flip operations. This option only works if:
    - Mount control in Voyager is via ASCOM
    - ASCOM Pier Mode setting in Voyager is either ASCOM Normal or ASCOM Inverted
    - Meridian Flip Mode setting on this tab is Manage
- **Run this Program/Script BEFORE Meridian Flip**: Click the box with "..." to bring up the Run External Program / Script window to browse to a program or script to run before the "Meridian Flip" action **Note:** this field is used to run an external Windows program or script, not a Voyager DragScript. Run your Sequence from the DragScript, not the other way around. **Avoid use of long time running script/executable to prevent pier crash and damage to your setup.**
- **Run this Program/Script AFTER Meridian Flip**: Click the box with "..." to bring up the Run External Program / Script window to browse to a program or script to run after the "Meridian Flip" action **Note:** this field is used to run an external Windows program or script, not a Voyager DragScript. Run your Sequence from the DragScript, not the other way around.

Important Note! If you choose Do Not Manage, please be sure your mount's firmware and/or driver software handles meridian flips automatically and prevents equipment damaging pier crashes
Important Note! If you choose Force Meridian Flip with Exposure Abort..., make sure your mount can track the specified Max Wait Time number of minutes past the meridian without an equipment damaging pier crash

Important Note! As of Voyager 2.1.4a, Sequences contain a new Watchdog for the control of meridian flip repetitions. After a certain number of attempts by Voyager to change the meridian, the Sequence stops. If this occurs when the Sequence is running in a DragScript, the Sequence ends with an ERROR

37.15 Guide/Dithering Tab

The Guide/Dithering tab of the Sequence Configuration window is where you specify additional parameters for guiding and dithering management during the sequence. The settings in Guiding Setup are used unless these settings override them.

- **Guide Star Selection Method**: Choose how the guide star should be selected
  - **Voyager RoboGuide**: Voyager's own RoboGuide algorithm, as specified in Guiding Setup, will be used to select a guide star. If RoboGuide cannot find a suitable guide star, Voyager will retry with the guiding software's own guide star selection process if it has one
  - **Native Guide Control**: Use the guiding software's own star selection method
- **Calibrate Guide**: If checked, perform a Guiding Calibration step at the start of the sequence. Use the exposure time in the spinner control in seconds and binning level for the guide software's calibration routine
  - **Recalibrate Every X Minute:** if activate will force Voyager to recalibrate guiding at interval defined in minutes in the min fields, useful for fork mount with also derotating system
- **Guiding**: If checked, enable Guiding for this sequence. Use the exposure time in the spinner control in seconds and binning level for the guide software's guiding exposures. Enter zero for the exposure time if you want to use your guide software's automatic mode, if it has one
  - **AO Centering**: Choose None, Every Exposure or Every X Exposure from the drop-down list. This setting only works if you have an AO (Adaptive Optics) guide unit connected and your AO supports mirror homing
    - **None**: Never perform AO Centering
    - **Every Exposure**: Perform AO Centering after every exposure
    - **Every X Exposure**: Specify X = number of exposures between AO Centering operations
- **Star Lost Detection**: If checked, the maximum allowed percentage of time that the guide star can be lost without considering guiding to have failed
- **Dithering**: If checked, specify the max number of pixels to move during a dithering operation. Note: this works with or without guiding enabled.
  - **Max Deviation:** value in pixel of max ditherinng allowed, dithering pixel are randomly choosed according a spiral virtual path
  - **Every X Exposure**: If Dithering is checked, dither every X exposures, where X is the value of the counter field
  - **Use Maxim MultiStar Dithering:** if your guide control in Voyager is Maxim DL 6.x and newest and you have MultiStar option activated in Maxim Guide setting (track box) Voyager will manage for you a different way to do dithering for using multistar algorithm of Maxim. Movement of mount will be done without using GuideStarMove method and a new full image of guide sensor will be acquired.
- **Realign to Target**: If checked, perform a precision pointing operation after this number of minutes has elapsed. This is useful if you are doing unguided exposures and want to re-center your target every so often
- **Donuts Recenter:** if checked instead of normal realign to target the Donuts process will be used to realign the referenced frame
  - **Every X Exposure**: If Donuts Recenter is checked, recenter every X exposures with Donuts , where X is the value of the counter field

Important Note! If the Guiding checkbox is not checked, the sequence runs without Guiding.
Important Note! Dithering will use the guiding software's routine if guiding is enabled and dithering is available from the guiding software. If guiding is not enabled, dithering will be performed by Voyager

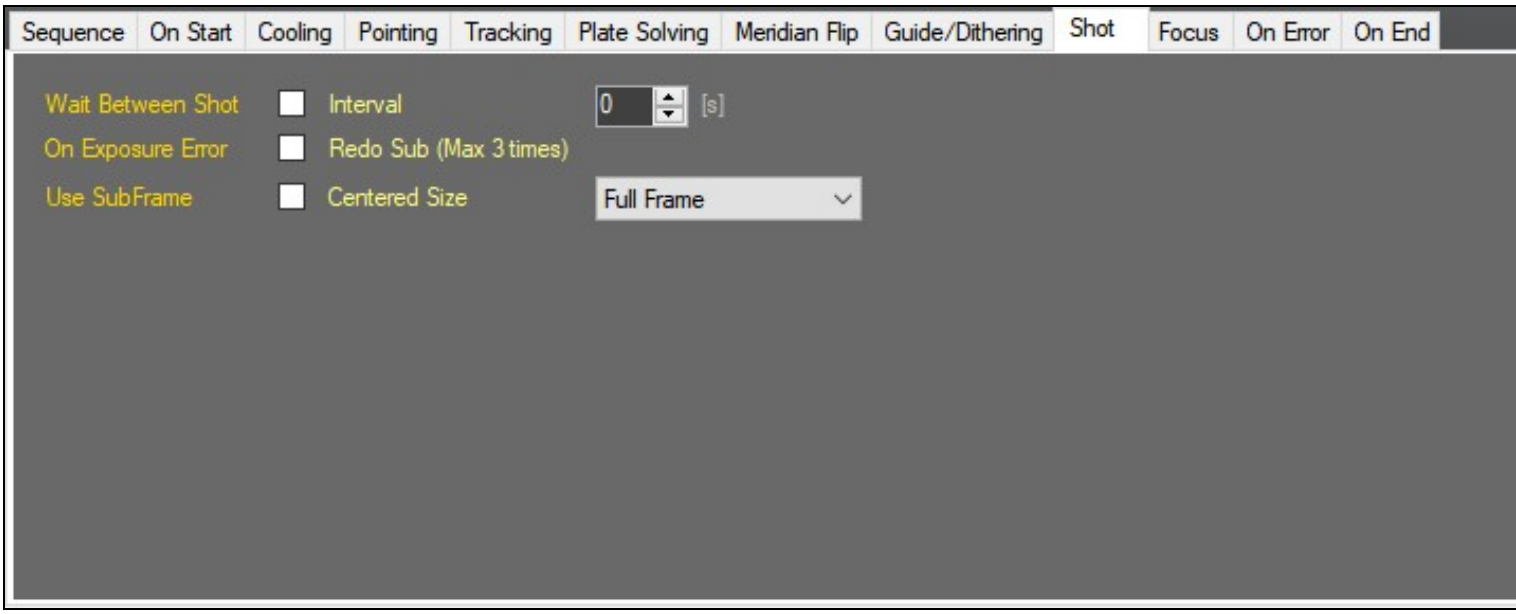
Important Note! As of Voyager 2.1.1g, lack of calibration performed via Voyager is signaled as a Warning and does not cause the Sequence to end with an Error.

To use the previously saved guider calibration in PHD2, OPEN PHD2 APPLICATION !, go to advanced setup, select tab Guiding and check the box ?Auto Restore Calibration?.

For the automatic management of the guide vector at meridian change, the mount must also be connected to PHD2 and must provide Meridian Side data. Follow the instructions in PHD2. In this mode Voyager cannot guarantee the correct functioning guiding after a meridian change.

37.16 Shot Tab

The Shot tab of the Sequence Configuration window is where you specify additional parameters for image exposures:

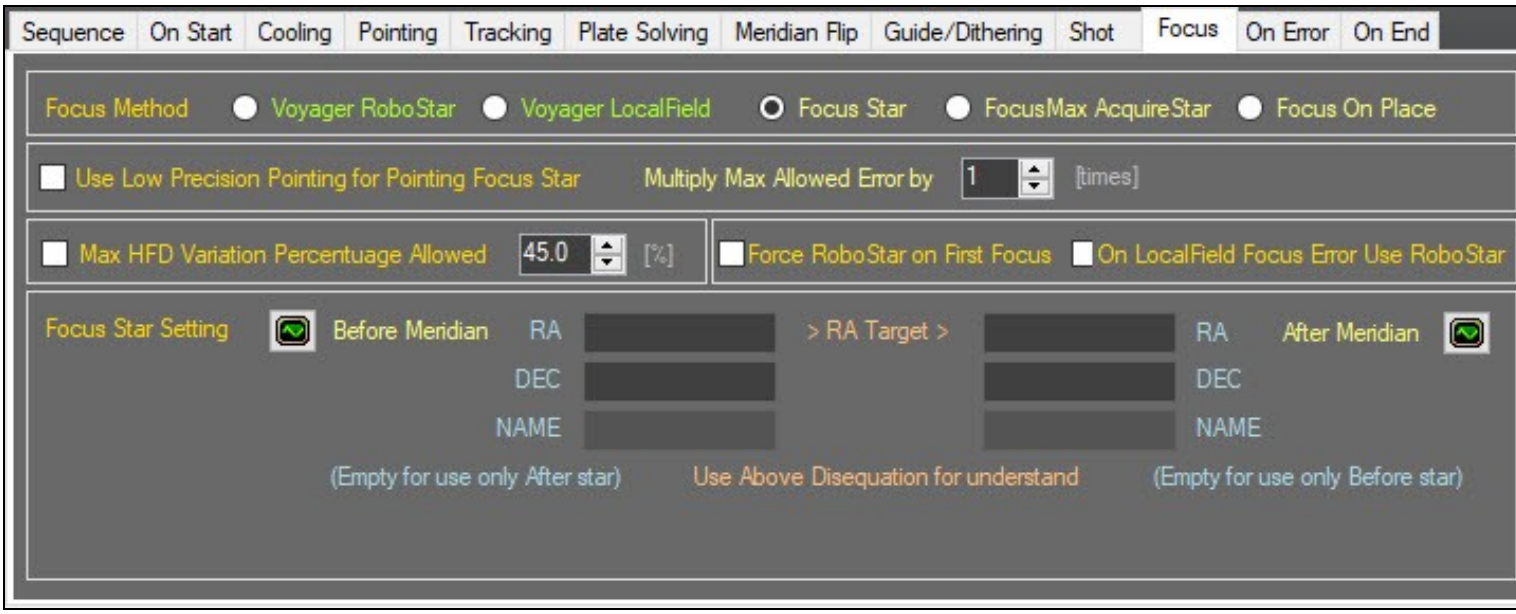


- **Wait Between Shot**: If checked, wait the specified number of seconds after each exposure before beginning the next. May be useful for some cameras that need a pause before the next command is sent to take an exposure
- **On Exposure Error**: If checked, if an exposure results in an error, try to re-take the exposure up to 3 times
- **Use SubFrame**: If checked, use a centered subframe of the size selected from the drop-down list: Full Frame, 1/2 size, 1/4 size, 1/8 size, 1/16 size or CUSTOM size.
    - **CUSTOM Size**: If you choose custom size from the drop-down, a counter appears from which you can choose any percentage value for your subframe size

37.17 Focus Tab

The Focus tab of the Sequence Configuration window is where you specify additional parameters for autofocus operations. The settings in AutoFocus setup are used unless these settings override them.

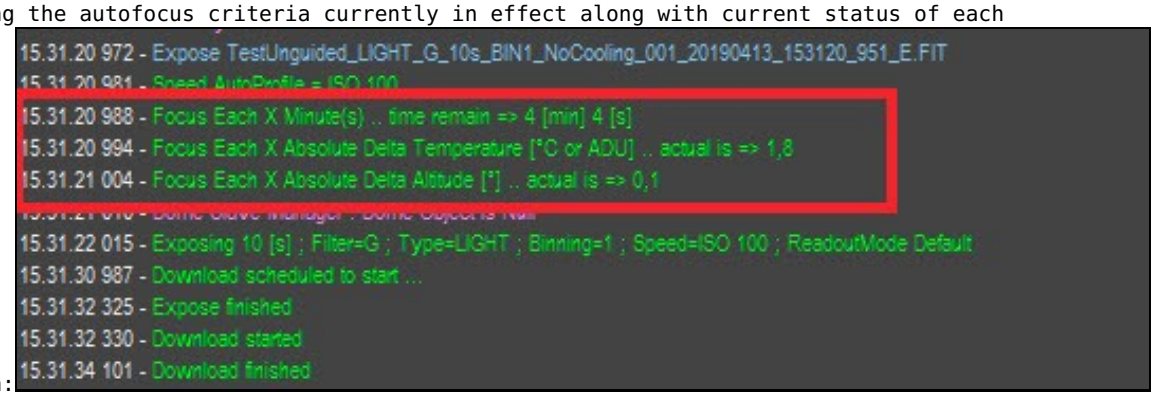
The Focus Tab was revised in Voyager 2.1.1f to make room for additional Focus Triggers, reflected here:



- **Focus Method**: Choose the autofocus method to use during the sequence
  - **Voyager RoboStar**: Use Voyager's RoboStar method to select the star for autofocus operation. If you are using TheSkyX @Focus2, @Focus3, or FocusMax, make sure they are not configured to also move to a focus star.
  - **Voyager LocalField**: Use Voyager's LocalField multiple-star autofocus operation
  - **Focus Star**: Use the focus star specified by the Focus Star panel below and use Voyager's VCurve single-star autofocus operation
  - **FocusMax AcquireStar**: Use FocusMax for autofocus and request that it use its own AcquireStar method to select a star for autofocus
  - **Focus On Place**: Autofocus using a suitable star, if one can be found, in the current field of view
- **Use Low Precision Pointing for Pointing Focus Star**: If checked, relax the error tolerance for precision pointing to the focus star.
  - **Multiple Max Allowed Error by**: If Use Low Precision Pointing is checked, multiply the error tolerance specified in Mount Setup by the number of times specified in the counter. E.g., if you specified an error tolerance of 10 arc-secs in Mount Setup, and a "5" here, the focus star precision pointing operation would stop when the error was less than 50 arc-secs.
- **Max HFD Variation Percentage Allowed**: If checked, the maximum percent variation of the focus star's HFD (Half Flux Diameter) at final focus between the current and previous autofocus action. Larger values are considered an autofocus failure and will raise an ERROR. If **Retry Focus for Watchdog** is checked in Autofocus Setup, the autofocus will be retried the up to the number of times specified in that setup field
- **Force RoboStar** on First Focus: If checked, use the RoboStar operation on first autofocus to find a suitable focus star and perform a VCurve autofocus operation
- **On LocalField Focus Error use RoboStar**: If checked, if a LocalField autofocus operation fails, try RoboStar to find a suitable focus star and perform a VCurve autofocus operation
- **Focus Star Setting**: Specify a star to use for autofocus before the meridian, after the meridian, or at all times.
  - If only the left column - **Before Meridian** - is filled out, that star is used for the entire sequence.
  - If both columns are filled out, the coordinates on the left are used before the meridian and the star on the right is used after the meridian
    -  : Click this icon to bring up the Object Finder and search for your focus star by name. The Object Finder will populate the RA, DEC and NAME fields from the search result
- **Focus Filter**:
  - **Use Actual Filter**: Autofocus using the filter for the currently running slot of the sequence
  - **Use Default Filter**: Choose the default filter to use for autofocus operations. If nothing else overrides this selection, use the filter selected from the drop-down list.
- **Focus Trigger**: Check one or more boxes to determine the condition(s) that trigger an autofocus

- **Focus By Slot**: If checked, and if the sequence mode is **Group By Slot**, autofocus at the start of every new sequence slot.
- **Focus Each X Exposure**: If checked, focus every X exposures, where X is the counter value.
- **Focus Each X Minutes**: If checked, focus every X minutes, where X is the counter value. This can be especially useful if your sequence mixes slots with very different exposure lengths.
- **Focus Each X Delta °C or Delta ADU:** If checked, focus every X degrees °**C** change of temperature or change of ADU value reported by the focuser chosen in Setup. Check your focuser documentation to see whether it reports temperature or a value of ADU that is related to temperature. Then choose the counter value based on how much the number returned by the focuser changes when you need to rerun autofocus.
- **Focus Each X Delta Degrees of Altitude**: If checked, focus every time the target's altitude changes by the specified number of degrees

As of Voyager 2.1.1f, new Monitor Window information lines have been added at the start of each exposure explaining the autofocus criteria currently in effect along with current status of each criterion:



Important Note! If you check more than one Focus Trigger box, autofocus will be performed whenever any of the checked criteria are met. E.g., you could focus both every 30 minutes and every filter change and every 2 degrees temperature change.

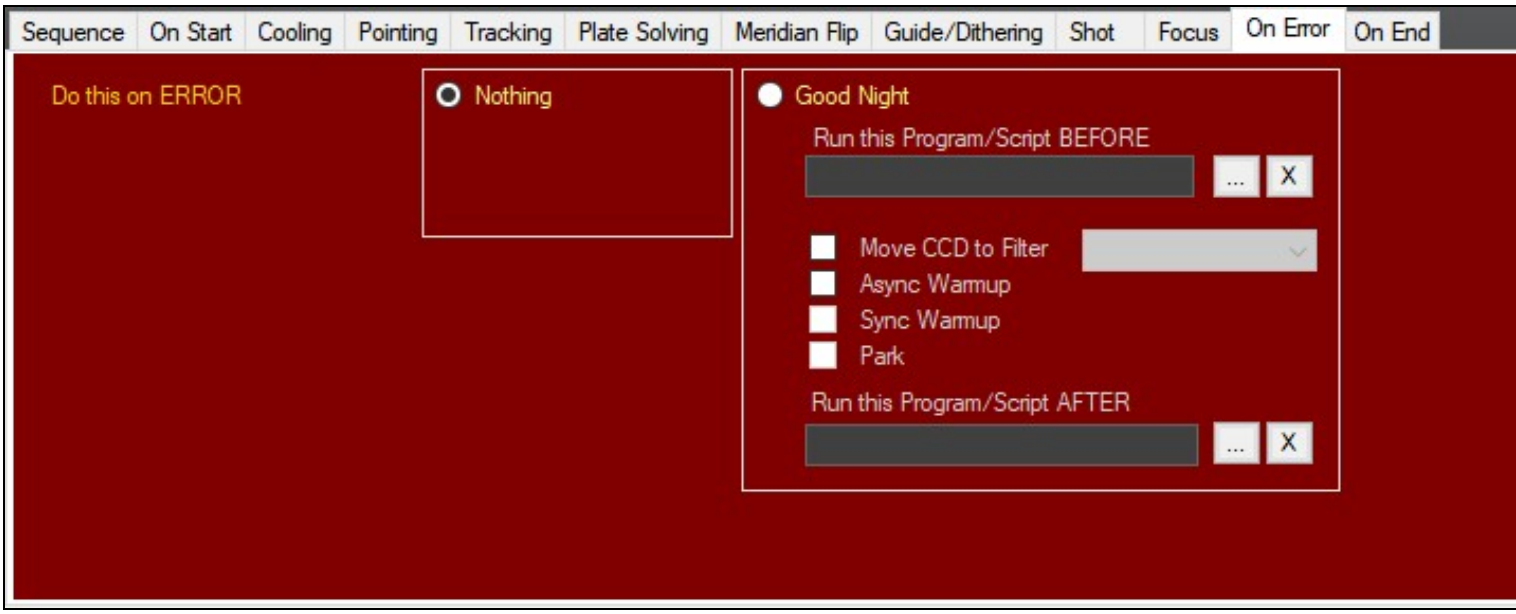
Important Note! If no Focus Trigger boxes are checked, autofocus will only be performed at times specified in other areas, such as in the On Start and Meridian Flip tabs. If none of those boxes are checked, no autofocus will be performed during the Sequence run

Important Note! Both Voyager's RoboStar and FocusMax's AcquireStar methods may move the mount to the focus star, perform the autofocus, and move back to the target. These operations can provide a better autofocus by choosing a more suitable star than any in the current field of view. However, they will spend more time to move the mount to the focus star and back compared to focusing on the best star in the field of view

Important Note! Low Precision Pointing can save considerable time during your sequence and in many cases there is no need for high precision pointing to goto a focus star

37.18 On Error Tab

The On Error tab of the Sequence Configuration window is where you specify actions Voyager should take if an error is raised during a sequence:



- **Do this on ERROR**:
  - **Nothing** - if this radio button is checked, Voyager will not take any action when an error happens
  - **Good Night**: if this radio button is checked, Voyager will perform the following shutdown actions:
    - **Run this Program/Script BEFORE**: Click the "..." button to choose an external program or script to run at the start of the Good Night operation. Click the X button to clear this field. **Note:** this field is used to run an external Windows program or script, not a Voyager DragScript. Run your Sequence from the DragScript, not the other way around.
    - **Move CCD to Filter**: If checked, move the filter wheel to the filter selected from the drop-down list
    - **Async Warmup**: If checked, send a command to the CCD cooler to warm the sensor, and do not wait for the warmup operation to complete
    - **Sync Warmup**: If checked, send a command to the CCD cooler to warm the sensor, and wait for the warmup operation to complete
    - **Park**: If checked, park the mount
    - **Run this Program/Script AFTER**: Click the "..." button to choose an external program or script to run at the end of the Good Night operation. Click the X button to clear this field. **Note:** this field is used to run an external Windows program or script, not a Voyager DragScript. Run your Sequence from the DragScript, not the other way around.

Important Note! If the sequence is run from a DragScript, the information in the On Error tab is not used. Instead, the DragScript instructions for managing the Error condition are used

37.19 On End Tab

The On End tab of the Sequence Configuration window is where you specify actions Voyager should take at the end of a sequence:

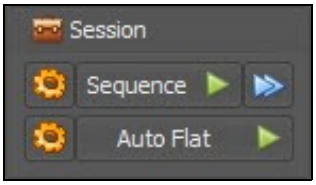
- **Force Sequence End Timer**: If checked, end the sequence after the time Interval specified has elapsed (HH:MM:SS)
    - **Absolute**: If checked, end the sequence at the absolute time indicated in the counter fields (HH:MM:SS)
    - **Finish Running Exposure**: If checked, finish any exposure in progress when the Force Sequence End Timer is triggered
- **Do this at END**:
    - **Nothing**: If this radio button is selected, do nothing at the end of the sequence
    - **Warmup**: If this radio button is selected, warmup the CCD cooler at the end of the sequence
        - **Sync Warmup**: If checked, wait for the warmup to finish. If not checked, send the warmup command to the cooler and don't wait
- **Good Night**: if this radio button is checked, Voyager will perform the following shutdown actions at the end of the sequence:
    - **Run this Program/Script BEFORE**: Click the "..." button to choose an external program or script to run at the start of the Good Night operation. Click the X button to clear this field. **Note:** this field is used to run an external Windows program or script, not a Voyager DragScript. Run your Sequence from the DragScript, not the other way around.
    - **Move CCD to Filter**: If checked, move the filter wheel to the filter selected from the drop-down list
    - **Async Warmup**: If checked, send a command to the CCD cooler to warm the sensor, and do not wait for the warmup operation to complete
    - **Sync Warmup**: If checked, send a command to the CCD cooler to warm the sensor, and wait for the warmup operation to complete
    - **Park**: If checked, park the mount
    - **Close Flat Device Cover**: If checked, close the specified flat device cover
    - **Run this Program/Script AFTER**: Click the "..." button to choose an external program or script to run at the end of the Good Night operation. Click the X button to clear this field. **Note:** this field is used to run an external Windows program or script, not a Voyager DragScript. Run your Sequence from the DragScript, not the other way around.
        -

Important Note! If the sequence is run from a DragScript, the On End tab information is not used. The DragScript instructions for end time and what to do after the sequence ends are followed instead

38 Auto Flat

38.1 Auto Flat Configuration

The Auto Flat configuration window of the OnTheFly workspace is where you configure sequences to take flat images.



To bring up the Auto Flat configuration window, click the gear icon next to the Auto Flat button in the Session panel of the OnTheFly workspace.

Voyager will automatically scale your exposure time to reach your Target ADU within the Max Err%, between the Min Exp. and Max Exp. times you specify.

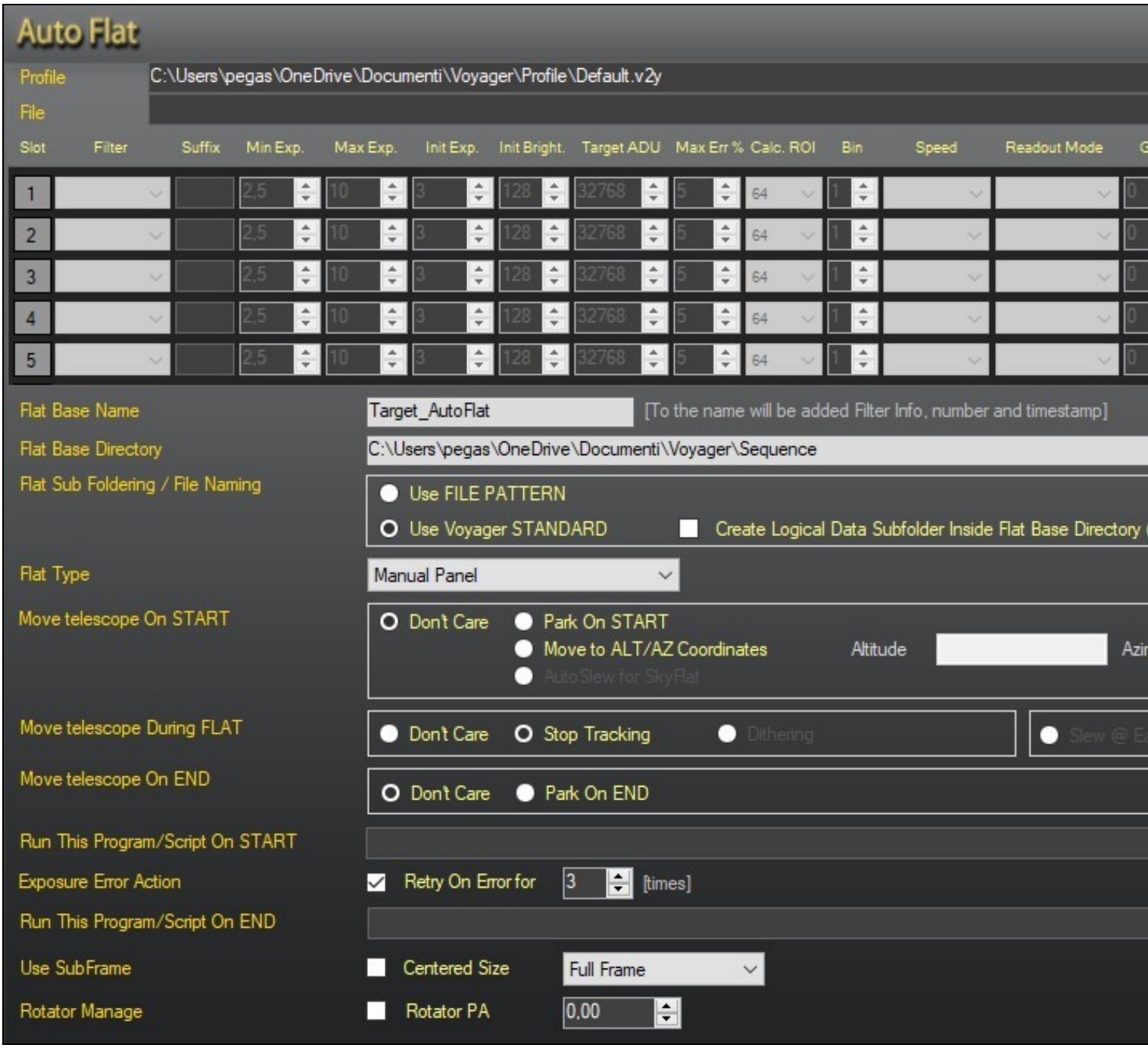
Voyager will take multiple flats ("Repeat" number of flats) with each filter.

Once configured, you can run the Auto Flat sequence by clicking the Auto Flat button with the green triangle, or by calling the Flat operation in a DragScript.

As of Voyager 2.0.14e (daily build) or 2.1.0 (stable), you can choose the profile assigned to an Auto Flat sequence and edit sequences defined with profiles other than the currently active one. Values such as the filters, camera speed and readout mode are derived from the profile. Also, as of these Voyager releases, you no longer need to be connected to your equipment to create or edit an Auto Flat sequence. You only need to have a profile loaded, or choose one with the Change Profile to This Sequence button. You can also edit your Auto Flat sequences while actions are running.

Important Note! If Voyager can't find an acceptable exposure length for your Auto Flats, increase the ROI and/or increase the error tolerance. The ADU of a small ROI can vary quite a lot with a sensor with many pixels.

By default, the profile currently loaded and active in Voyager is used.



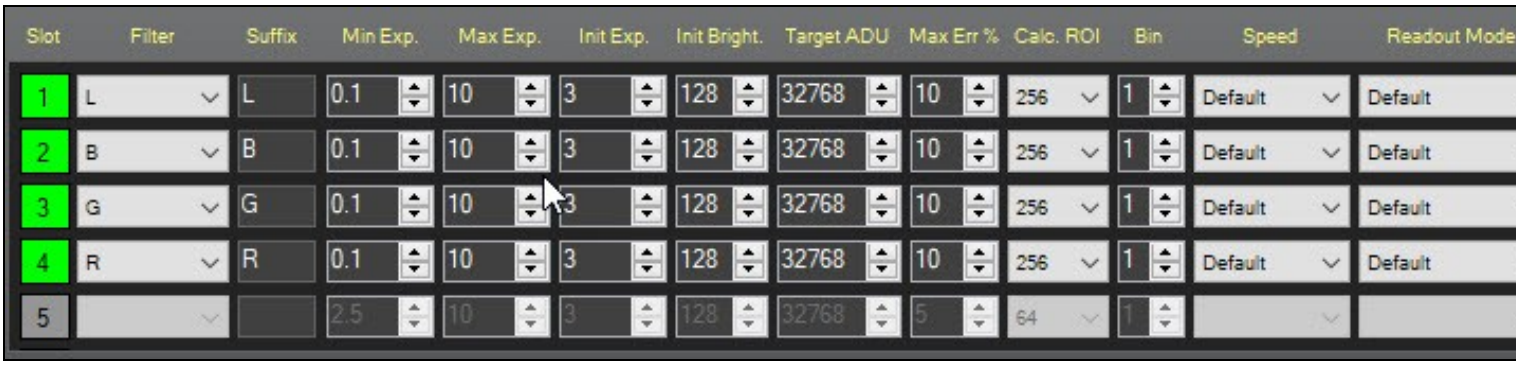
- 

Change Profile to This Sequence: Brings up a dialog window from which you can change the profile assigned to this sequence. See Change Sequence Profile section below for discussion of the migration process
-  **Reset Sequence Data**: Caution! Clicking this button resets all information in the Auto Flat sequence. If you have not saved it, your Auto Flat sequence data will be lost and you will have to start over
-  **Open Sequence File**: Click this file to load the data from a saved Auto Flat sequence file into the Auto Flat configuration window
-  **Save Sequence File**: Click this file to save the data from the Auto Flat Configuration window to the file of your choice

-  **Cancel Changes and Close Window**: Click this button to close the Auto Flat Configuration window and discard any changes made since it was opened
- **OK**: Click the OK button to save your changes and close the Auto Flat Configuration window

38.2 Flat Elements

The Flat Elements panel of the Auto Flat configuration window is where you specify the filters, exposure goals in ADU, and number of flat images to take for each filter:



In this example, 10 flats will be taken for filters L, R, G and B, with Voyager adjusting exposure times to reach a target ADU (average brightness) of 32768, plus or minus 5%.

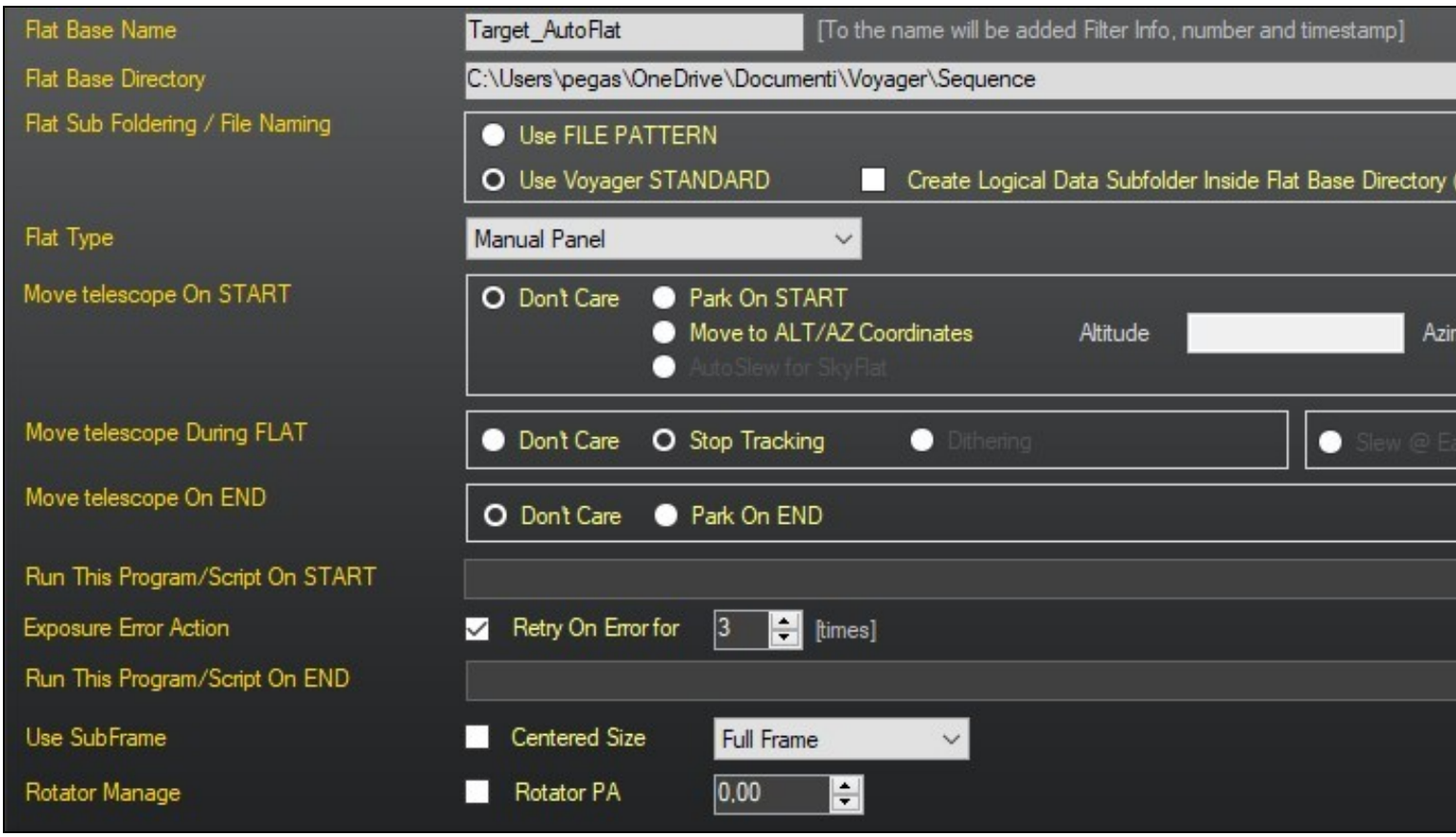
- **Slot**: Click the number to "activate" the slot. A gray number means the slot will not be run. A green number means the slot will run.
- **Filter**: Choose the filter to use for this slot from the drop-down list
- **Suffix**: Optionally enter a character string to include in the flat file name. In this example, the filter name is specified and will be included in each flat file name.
- **Min Exp.**: Minimum exposure length in seconds
- **Max Exp.**: Maximum exposure length in seconds
- **Init Exp.**: Initial exposure length in seconds. Voyager will try to achieve the Target ADU, within the Max Err percentage, by varying the exposure time, starting with this value, but staying between the Min Exp. and Max Exp.
- **Init Bright**: Initial panel brightness setting for your flat device
- **Target ADU**: Desired ADU value for your flat file - a measure of brightness. Generally around half your sensor's maximum ADU is considered a reasonable value here
- **Max Err%**: Maximum deviation percentage from the Target ADU, plus or minus, for a successful flat exposure to be taken
- **Calc. ROI**: Choose a Region of Interest (ROI) from the drop-down list or use the default. If "No" is chosen, use the entire frame to calculate ADU (this slows down finding the proper exposure time) . If a number is chosen, calculate the frame's ADU mean value by looking at this Region Of Interest. The larger your sensor or the more light curvature in your optics, the larger your ROI must be to avoid larger fluctuations in the calculated exposure times
- **Bin**: Binning level to use for this flat exposure. Should match the binning used for your light frames
- **Speed**: Choose from the drop-down list. Allowed values are Auto Profile and ISO numbers. Auto Profile uses the speed set in Camera Setup for the flat frame exposures
- **Readout Mode**: Choose from the drop-down list. A list will be shown if your CCD driver allows Voyager to retrieve this information from your camera
- **Gain:** If you are using the ASI Camera native driver supplied by Voyager (**not** the ASI ASCOM driver), you can enter the Gain for this sequence element. This will be grayed out if you are not using Voyager's ASI Camera native driver.
- **Offset:** If you are using the ASI Camera native driver supplied by Voyager (**not** the ASI ASCOM driver), you can enter the Offset for this sequence element. This will be grayed out if you are not using Voyager's ASI Camera native driver.
- **Important Note!** If you are using a sequence with the ASI Camera native driver that was first defined with a different camera, all Gain and Offset values will be initially set to 0/0. Make sure you change these to the desired settings and save the sequence before running.

- Click the magnifying glass icon to select the Gain and Offset from the presets defined in the ASI Camera native driver setup.
- **Repeat**: The number of flat frames to take
-  : Up arrow moves this row up one position; Down arrow moves this row down one position; X clears the information from this row
- The scroll bars on the right can be used to scroll the window up and down if you have more rows than show in the main window

38.3 Auto Flat Options and Operations

The lower portion of the Auto Flat configuration window contains other options for the flat sequence. Depending on the Flat Type you select, the options will change slightly.

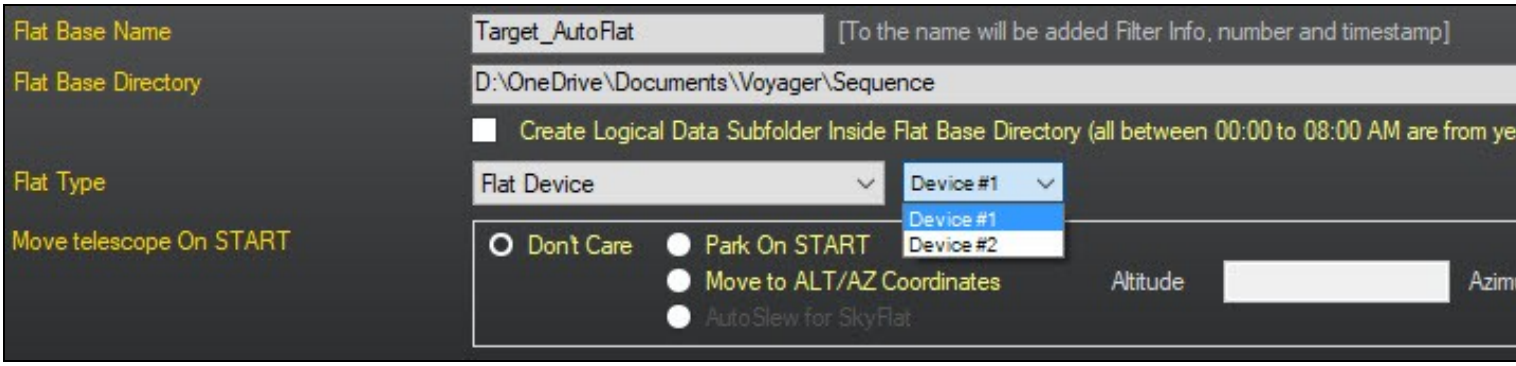
Here is the way the options look if you choose either **Flat Device** or **Manual Panel**:



- **Flat Base Name**: This text will be used as the first part of the flat file names. It will be appended with the Filter name, flat number and timestamp
- **Flat Base Directory**: Folder for saving your flat files. Enter the directory name, or click the Select button to browse to it
- **Flat Sub Foldering / File Naming:** selection of the sub foldering and file naming method
    - **Use FILE PATTERN:** flag this checkbox to activate sub foldering and file naming with File Pattern method (please configure the file pattern in the File Pattern Manager)
    - **User Voyager STANDARD:** flag this checkbox (this choice is the default for a new sequence) to use the original sub foldering and file naming system adopted by Voyager from the beginning
        - **Create Logical Data Subfolder Inside Flat Base Directory**: If checked, Voyager will automatically create a subfolder based on the date inside the specified Flat Base Directory. Flats taken between midnight and 8AM local time will be stored in the same directory as yesterday's subfolder. If you are taking both dusk and dawn flats, all flats

will be in the same subfolder.

- **Flat Type**: Choose the type of flat from the drop-down list
  - **Manual Panel**: A light panel that is not controllable by Voyager. It is either fixed on the wall and you point your scope at it by using the Move telescope to this ALT/AZ Coordinates field, or is placed on top of the scope before you run your flats
  - **Flat Device**: A light source configured in Flat Device Setup. If you choose Flat Device as your Flat Type, a drop-down list appears from which you can select Flat Device #1 or Flat Device #2. Choose the Flat Device you want to use for this Auto Flat sequence. See Flat Device Setup for more info on configuring one or two Flat Devices.



-
  - **Sky Dawn**: Take flat frames using the morning sky at dawn. See the Sky Flats section below
  - **Sky Dusk**: Take flat frames using the evening sky at dusk. See the Sky Flats section below
- **Move telescope on START**: Specify how Voyager should treat the mount at the start of the auto flat sequence
  - **Don't Care:** Don't change anything, if the mount was parked, it stays parked. If it was tracking, it will continue tracking. If not tracking, it stays not tracking
  - **Park on Start**: Park the mount at the start of the auto flat sequence
  - **Move to Alt/Az Coordinates:** Slew the mount to the specified Altitude and Azimuth coordinates at the start of the auto flat sequence. One reason to use this is to point the scope to a fixed light source, normally a flat panel attached to the observatory wall
  - **AutoSlew for Sky Flat**: If you choose Dawn or Dusk sky flats as your Flat Type, the option to Autoslew for SkyFlat will appear. This is the default choice - and the recommended choice - for sky flats. Voyager will slew to the most appropriate spot in the sky to take your sky flats
- **Move telescope During FLAT:** Choose how Voyager should move the mount - or not - during the auto flat sequence
  - **Don't Care**: Don't change anything, if the mount was parked, it stays parked. If it was tracking, it will continue tracking. If not tracking, it stays not tracking
  - **Stop Tracking:** Stop the mount from tracking at the start of the auto flat sequence
  - **Dithering:** If you choose Dawn or Dusk sky flats as your Flat Type, the option for Dithering will appear. If selected, Voyager will dither the scope while taking sky flats. If any stars are out while you are taking flats, dithering will help your processing software to remove the stars when stacking your flat frames
- **Move Telescope On END**: Specify how Voyager should treat the mount at the end of the auto flat sequence
  - **Don't Care**: Don't change anything, if the mount was parked, it stays parked. If it was tracking, it will continue tracking. If not tracking, it stays not tracking
  - **Park on END**: Park the mount at the end of the auto flat sequence
- **Run this Program/Script On START:** Click the box with "..." to bring up the Run External Program / Script window to browse to a program or script to run at the start of the Auto Flat sequence. Click the X box to clear the field so no program or script is run. One example of how this field may be used is to run an external program that turns on your flat panel if it cannot be configured as a Flat Device.
- **Stop Tracking During Flat**: If checked, command the mount to stop tracking while taking flats
- **Exposure Error Action**: If checked, retry the specified number of times in case of an error
- **Park On END**: Park the mount at the end of the Auto Flat sequence
- **Run This Program/Script on END**: Click the box with "..." to bring up the Run External Program / Script window to browse to a program or script to run at the end of the Auto Flat sequence. Click the X box to clear the field so no program or script is run. One example of how this field may be used is to run an external program that turns off your flat panel if it cannot be configured as a Flat Device.

- **Use SubFrame**: If checked, use a centered subframe of the size selected from the drop-down list: Full Frame, 1/2 size, 1/4 size, 1/8 size, 1/16 size or CUSTOM size.
    - **CUSTOM Size**: If you choose custom size from the drop-down, a counter appears from which you can choose any percentage value for your subframe size
- **Rotator Manage:** if checked Voyager will manage the rotator at beginning of action, rotating it to the PA choosen
    - **PA:** PA to use for Rotator during Auto Flat action execution. No Plate solving and adjust or sync. Just simple rotation to the PA

38.4 Fixed Length Flats - Dark Flat Matching

If you would prefer to take fixed exposure length flats, e.g. if you are using a CMOS camera and calibrate your flats with matching length flat darks, you can do this with Auto Flat by:

- Determine the exposure length for your flats
- Set the Min Exp = Max Exp = Init Exp = desired exposure length
- Set the Max Err% to 100
- Set Target ADU to half your camera's max ADU, e.g. 32767 if your max ADU is 65535 (16 bit)

Set everything else as you would for variable length flats, and run the Auto Flat sequence.

And if you have a software adjustable brightness light panel you can set the flat duration and Voyager will adjust the brightness of the panel until you get the right flat. Very useful to be able to match duration of flat darks to the flats.

For taking autoscaled dark library based on time you can also use the DagScript you will found here:

https://forum.starkeeper.it/t/collect-calibration-fits-in-one-session/2666/1

38.5 Sky Flats

As of Voyager 2.1.1a, sky flats are supported. Sky flats are taken at dusk and/or at dawn, pointing the telescope at about 75 degrees elevation and azimuth roughly opposite the sun.

Choose the type of flats, Sky Dawn or Sky Dusk, from the Flat Type drop-down box:

You can configure the solar elevation at which dawn and dusk commence in the SkyFlat section of Flat Device Setup. The defaults should work well.

For dawn flats, the sky is getting brighter as time goes on, so you need to shoot your flats using your filters in order of decreasing transparency to sky light. You are taking pictures of a blue sky, so a likely order is L - B - G - R and if you have narrowband, O - H - S.

For dusk flats, the sky is getting darker as time goes on, so you need to shoot your flats using your filters in order of increasing transparency to sky light. The likely order is the opposite of dawn - first narrowband

if you need those flats, S - H - O, then broadband R - G - B - L.

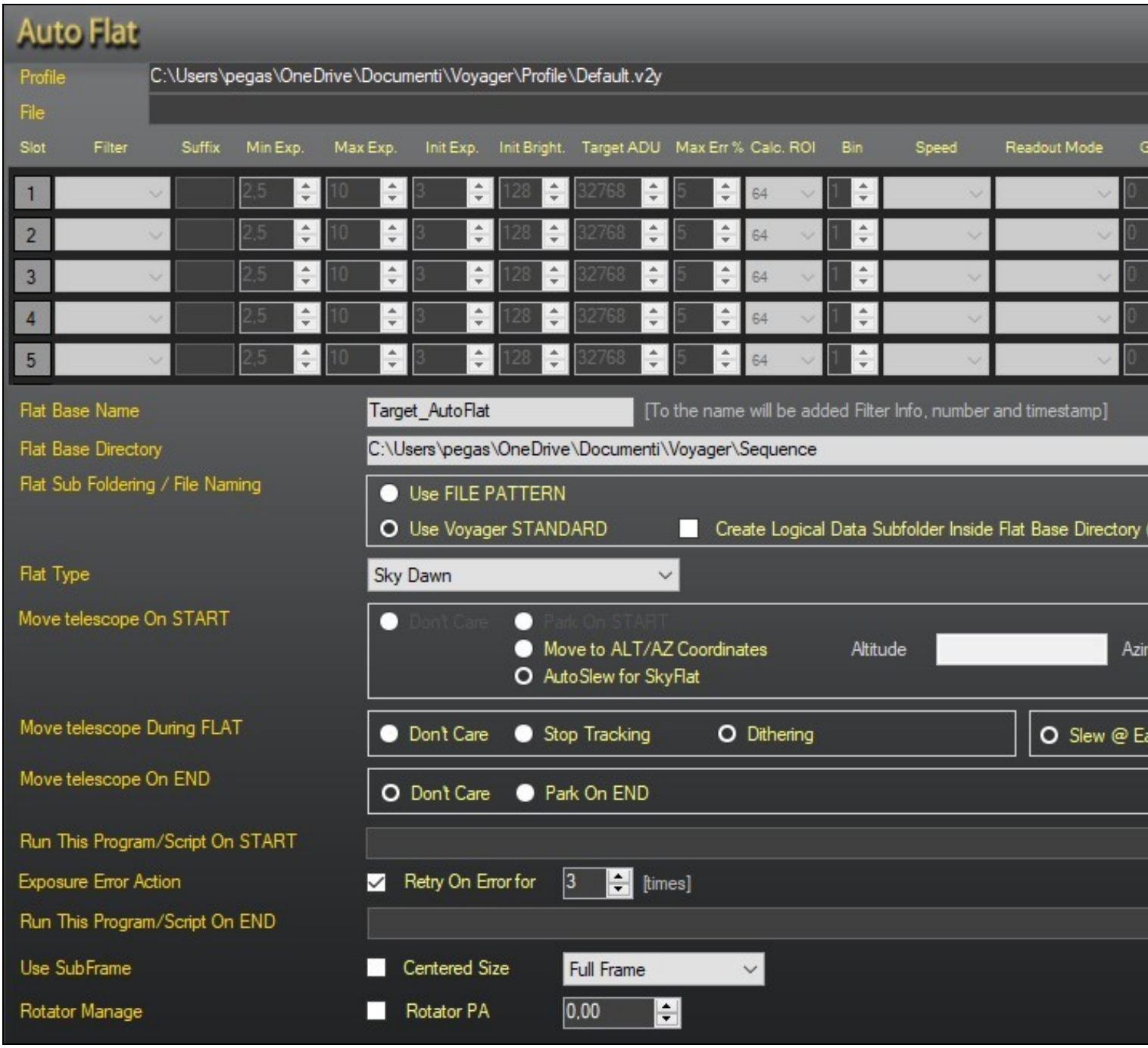
Your combination of telescope, camera and perhaps filters will determine the appropriate settings for minimum, maximum and initial exposure, as well as Target ADU, Maximum Error% and ROI (Region of Interest).

See the Auto Flat Elements section above for definition of these settings.

You need to experiment to determine what works best for your setup, but some considerations:

- The sky's brightness is changing rapidly at dawn and dusk, so shorter exposures are more likely to lie within your specified ADU error range
- For flats, your ADU value just needs to be somewhere in the linear response range of your sensor. In most cases, the middle of the range with a 10% error will work.
- If your camera has a lot of pixels, increasing the ROI from the default will help Voyager find the right exposure length. The average brightness over a small ROI changes more from frame to frame than a larger ROI
- The number of flats you can take for each filter will depend on your exposure length and your camera's download speeds. If your sequences are not finishing for one or more filters, consider taking fewer flats for those filters, or changing their order in the sequence so you can use a shorter exposure length
- You may need to take both dawn and dusk flats to get enough flats for each filter
-

Here is an example Auto Flat sequence for dawn flats:



- **Move telescope on START:** AutoSlew for SkyFlat is recommended - Voyager will slew the telescope to a good position for taking sky flats
- **Move telescope During Flat:** Dithering is a good choice here - if there are any stars bright enough to show up in your flats, they will appear in different positions so they can be eliminated when you stack your flats for processing
- **Slew @ Each Flat**: Voyager will make a small move between flats to keep the scope pointed at a position in the sky that will reduce gradients
- **Slew Only @ Filter Change**: Voyager will only slew between filters. Staying pointed at the same part of the sky may produce more gradients in your flats, so use this with caution. It may help if you have trouble getting enough sky flats during the available twilight

Important Note! Auto Flat with Sky Flats will wait up to 6 hours for dawn or dusk to begin. If you need to wait longer than 6 hours, use the Wait Dusk or Wait Dawn action in a DragScript

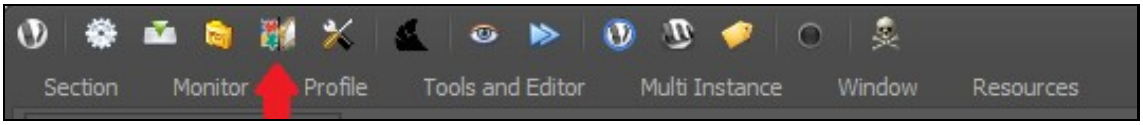
39 Research Survey

39.1 Research & Survey Mosaic Section

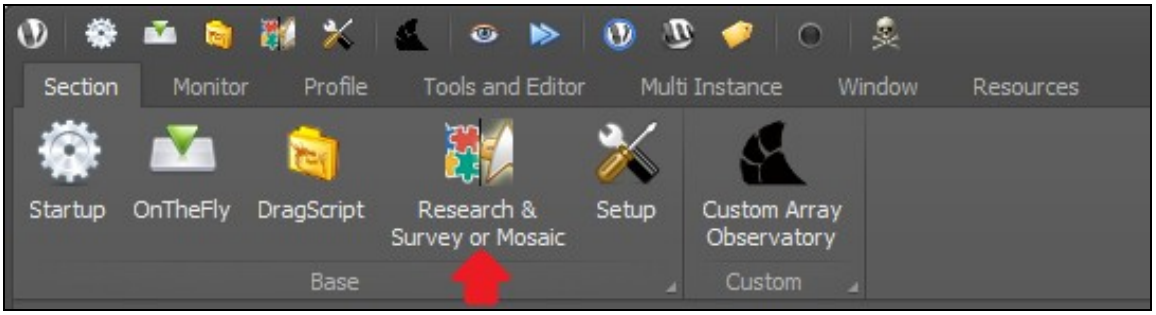
The Research & Survey Mosaic section lets you take a series of images of one or more targets at different times mantaining a complex constraints in a really simple way. For example, :

- **Exoplanets** .. you may be looking for exoplanets, and want to image the same stars with known exoplanets several times a night
- **Asteroids and Comets** .. you may also use the research and survey to look for moving objects, such as asteroids or comets
- **Supernovae Galaxies Survey** .. or perhaps you want to take images of a number of galaxies every night, looking for supernovae.
- **Messier Marathons** .. you may want to catch all the visible in the night Messier objects.
- **Mosaic** .. you can also shot incredible Mosaic of Deep Sky using togheter with the Voyager VirtualFOV facilities based on Web Dashboard

You can enter the Research & Survey Mosaic section two different ways:



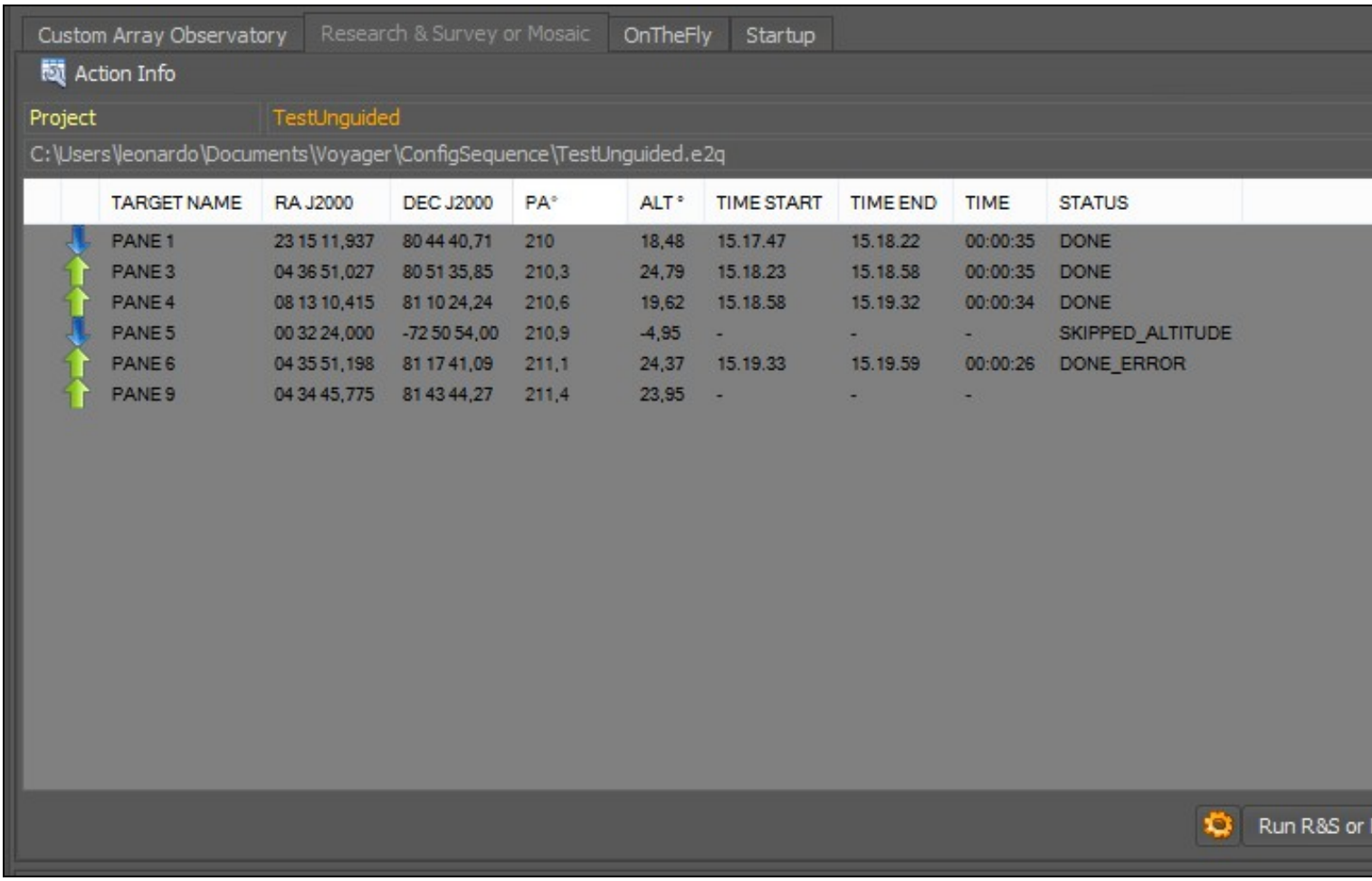
- From the Command Bar at the top of the Voyager window, click the icon pointed at by the red arrow



- From the Section menu, click the Research menu item on the ribbon

39.2 Research & Survey Mosaic Workspace

Once you enter the Research & Survey Mosaic workspace, if you have some targets defined for your research survey mosaic, your workspace will look something like this:



- **Action Info**: This panel displays information about the Research & Survey Mosaic sequence that has been configured by clicking the gear  icon.
- The values shown in the first lines of this window depend on how you have configured the sequence. We will explain what the fields mean by using the field values from this screen shot:
  - **Project**: The type of Survey ... for now this is a fixed value
  - **TestUnguided**: The value of the Research Name field in the Research & Survey Mosaic configuration
  - **C:\Users\leonardo\Documents\Voyager\ConfigSequence\TestUnguided.e2q**: If a Research & Survey Mosaic sequence file has been loaded, this is its pathname and filename. This will default to the values you specified when you installed Voyager, but it can be anywhere that you manually chose when you saved the file
- **Sequence Target Table**: This table shows the targets and progress if the sequence is running (as in this example) or has completed.
  - **BLUE/GREEN ARROW ICON**: up pointing if object is rising before meridian, down if passed meridian and going to set
  - **TARGET NAME**: Name from the data table in the Research & Survey Mosaic sequence configuration
  - **RA J2000**: RA coordinates of the target from the data table in the Research & Survey Mosaic sequence configuration
  - **DEC J2000**: DEC coordinates of the target from the data table in the Research & Survey Mosaic sequence configuration
  - **PA°:** Position Angle of the Target to use to manage the rotator position (Sky PA or Rotator PA depends on setting in the Rotator configuration Tab
  - **ALT**: Altitude of the target at the time the sequence exposures were started
  - **TIME START**: Starting time when the exposures of this object were taken
  - **TIME END**: Time when the exposures of this object finished
  - **TIME**: Elapsed time to complete the exposures
  - **STATUS**: Blank if nothing has run, DONE if this step is complete, RUNNING if it is currently

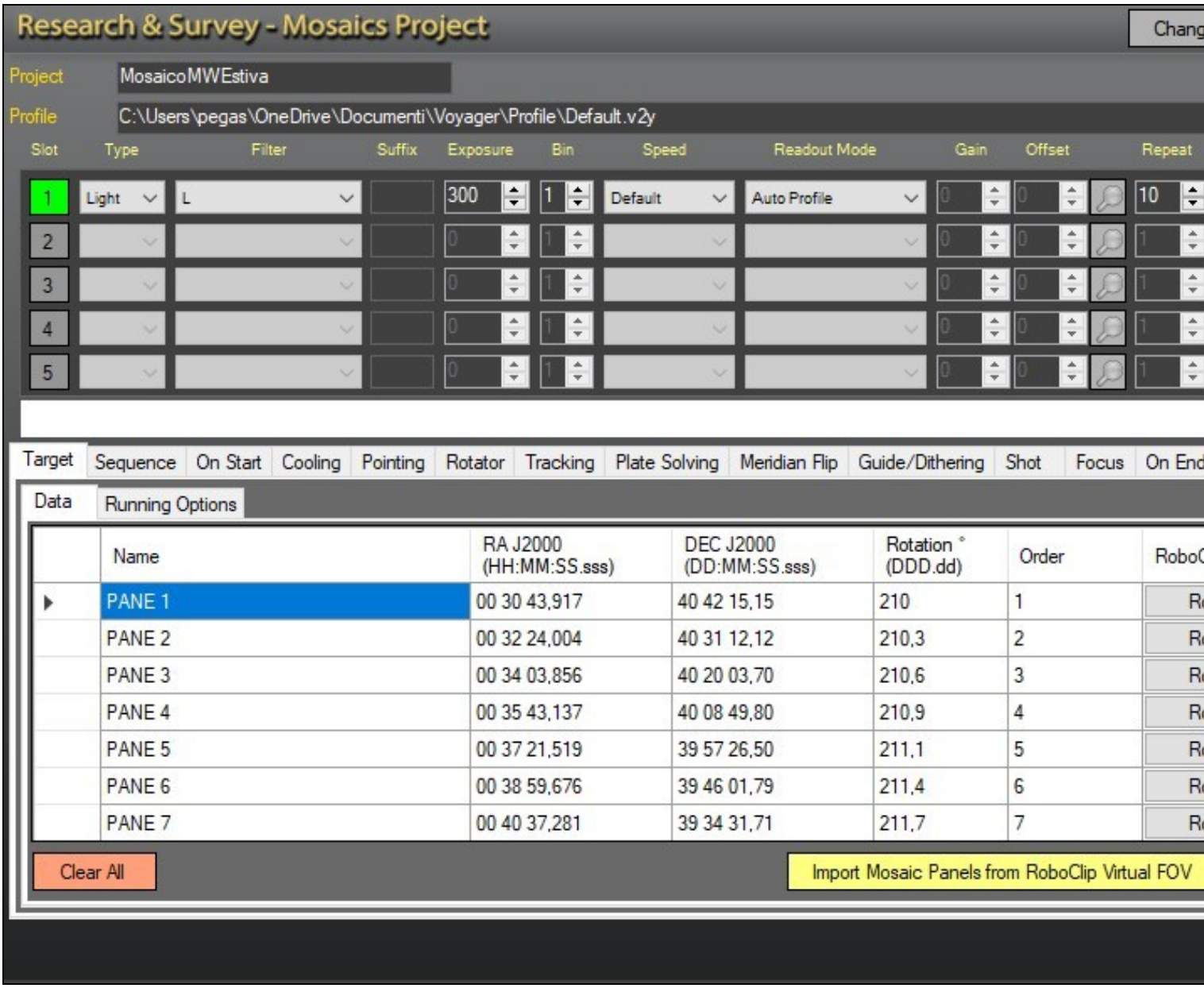
running, SKIPPED_ALTITUDE if step bypassed for low altitude, DONE_ERROR is completed with an error

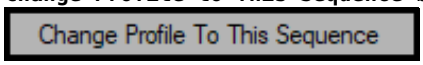
Important Note! Each target will be listed once in this panel, regardless of whether you are running the exposures once or multiple times in a loop, which you can choose in the Research & Survey Mosaic configuration window. The times and status reflect the last running values, the altitudes are updated every 30 seconds.

39.3 Research & Survey Mosaic Configuration

Most of the settings are the same as the Sequence Configuration window so this will be familiar if you have set up sequences before.

As for Voyager 2.2.13f you can edit and import the Rotation of the Target (Sky PA or Rotator PA). As of Voyager 2.0.14e (daily build) or 2.1.0 (stable build), you can edit sequences associated with any profile, not just the one currently loaded and active in Voyager. The "Change Profile To This Sequence" button in the title bar of this window brings up the dialog to do this.



- **Project**: Any name you would like to use to identify your configuration
- **Profile**: The equipment profile associated with this sequence. A new sequence will default to using the currently active profile. You can create and edit sequences for non-active profiles by clicking the **Change Profile to This Sequence** button in the title bar of this window
- 

Change Profile to This Sequence: Brings up a dialog window from which you can change the profile assigned to this sequence. See Change Sequence Profile section for discussion of the migration process
-  **Reset Sequence Data**: Caution! Clicking this button resets all information in the sequence. If you have not saved it, your sequence data will be lost and you will have to start over
-  **Open Sequence File**: Click this file to load the data from a saved sequence into the Research & Survey Mosaic Configuration window
-  **Save Sequence File**: Click this file to save the data from the Research & Survey Mosaic Configuration window to the file of your choice
-  **Cancel and Close Window**: Click this button to close the Research & Survey Mosaic Configuration window and discard any changes made since it was opened

- **Refresh Filter Synoptic**: Refreshes the filter synoptic display - the color bar under the Sequence Elements table that represents the amount of time and order of shots taken by filter color
- **OK**: Click the OK button to save your changes and close the Research & Survey Mosaic Configuration window

39.4 Change Sequence Profile

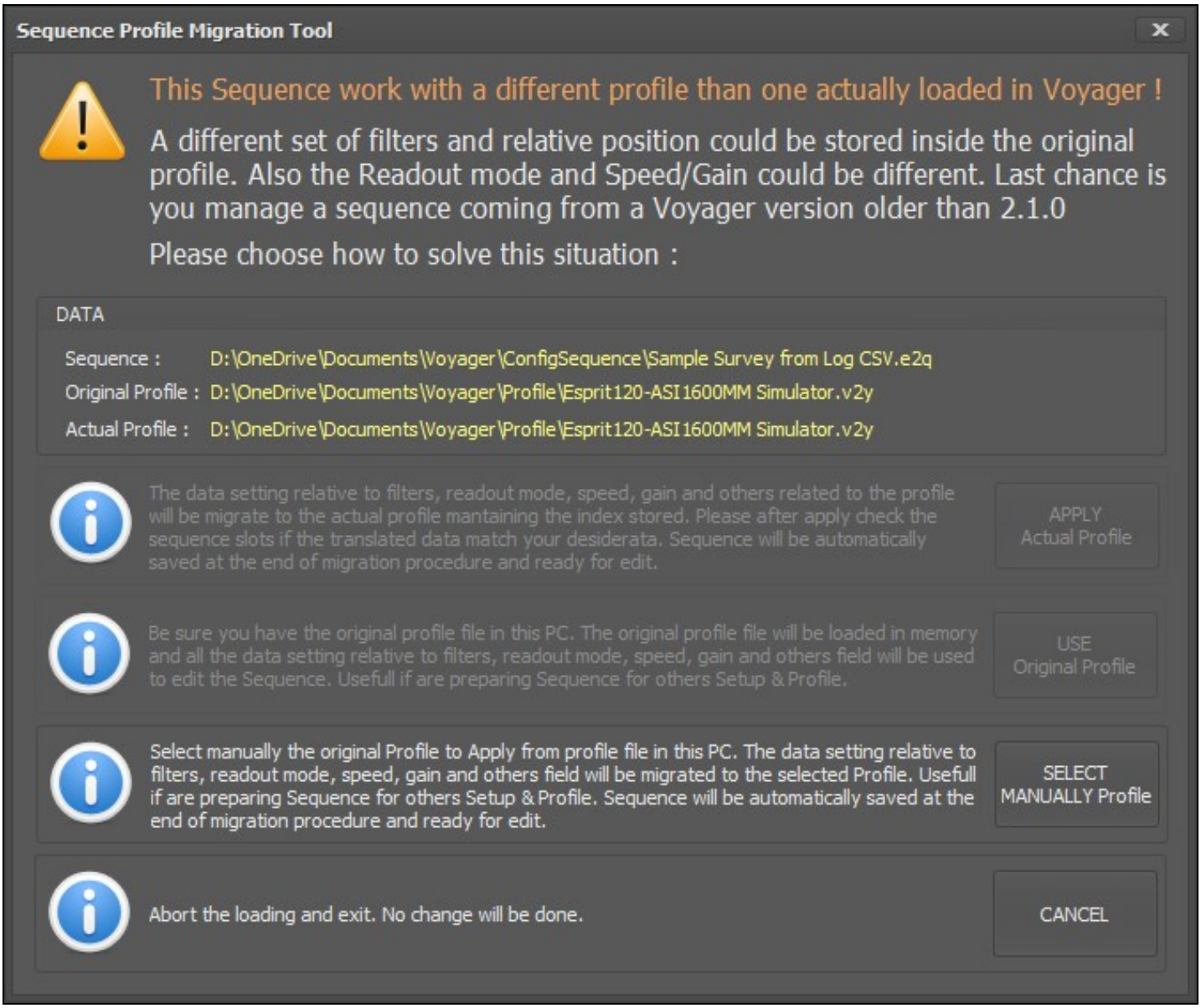
As of Voyager 2.0.14e (daily build) or 2.1.0 (stable build), you can create and edit sequences with the profile of your choice.

If you only edit or create sequences for the active profile, there is no need to use this dialog window. The active profile is used, and the filename of the active profile will be stored with the sequence when you save it.

By default, a new sequence will be created using the currently active profile, which is displayed on the right at the top of the Voyager main window.

References to the "Actual" profile mean the currently active profile in Voyager.

If you want to create or edit a sequence using a different profile from the currently active one, click the **Change Profile to This Sequence** button in the Sequence Configuration title bar to bring up this dialog:



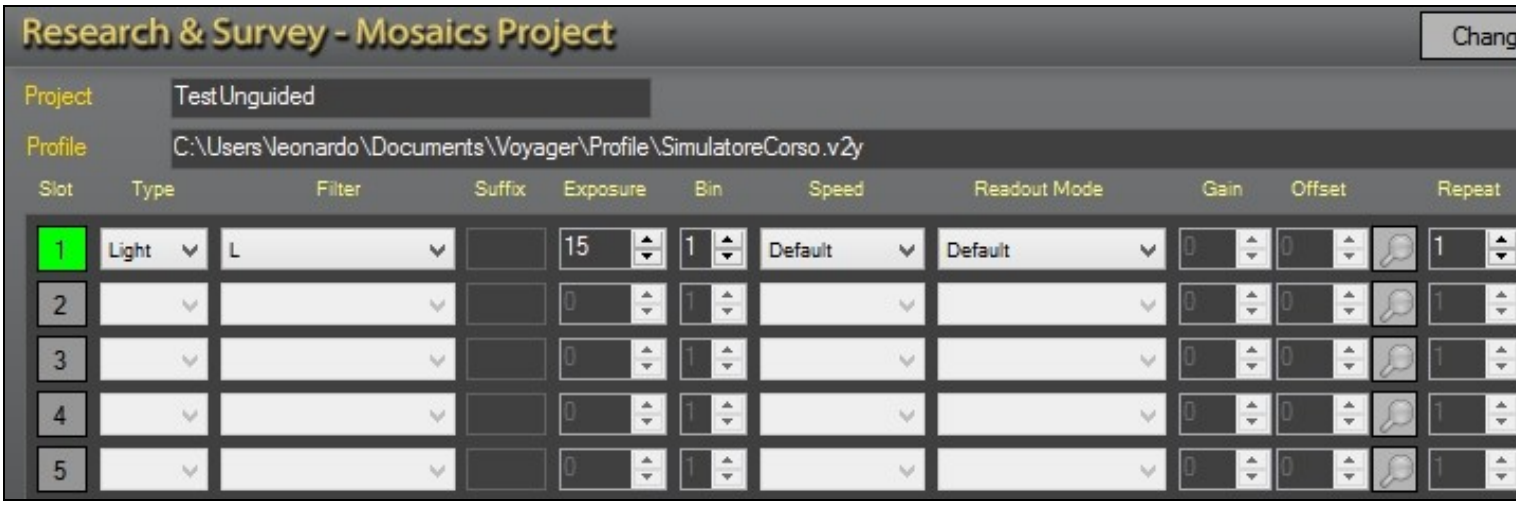
Important Note! If you are editing a sequence created with Voyager prior to version 2.0.14e, the profile is not stored with the sequence so Voyager doesn't know which profile was used to create it. If you want to use the active profile, you can just cancel from the dialog and continue editing the sequence. The profile name will be stored in the sequence the next time you save it to disk.

- **Data**:
  - **Sequence**: The sequence file currently being worked on. If you have created a new sequence and it has not yet been saved, this field will be blank
  - **Original Profile**: The profile stored with the sequence file
  - **Actual Profile**: The profile currently loaded and active in Voyager
- **APPLY Actual Profile**: Ignore the profile stored in the sequence file and use the currently active profile in Voyager. If settings such as filters are different between the two profiles, carefully review your sequence elements and make sure you are using the desired filters, speed and readout mode
- **USE Original Profile**: Use the profile stored in the sequence file for things like filters, camera gain and readout. This is useful if you want to edit a sequence for a different profile than the currently active one.
- **SELECT MANUALLY Profile**: Opens a file browsing dialog and you can select any profile. The selected profile will be used to supply information such as filters, camera readout and gain settings when

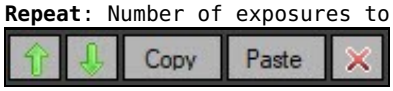
editing this sequence, and the selected profile will be stored in the sequence file when you save it
- **CANCEL**: Abort the sequence profile changes and close this window without saving changes

39.5 Sequence Elements

The Sequence Elements panel of the Research & Survey Mosaic configuration window is where you define the exposures to take for each target:



- **Slot**: Click the gray buttons in the Slot column and they turn green indicating that slot is active - the information in that row (slot) of the Sequence Elements table will be used when you run the sequence
- **Type**: Exposure type: Light, Bias or Dark
- **Filter**: Filter for this exposure. Available filters come from the connected profile in the Camera Setup area
- **Suffix**: Enter any suffix you would like to include in the image filename. The name of your filter is a good choice.
- **Exposure**: Length of the exposure in seconds
- **Bin**: Binning level for this exposure. Available binning levels come from the connected profile in the Camera Setup area
- **Speed**: ISO for DSLR's
- **Readout Mode**: Select a Readout Mode from the drop-down list. Readout Modes are retrieved from your camera if your camera driver provides them. The Readout Mode section of the Camera Setup page explains how to retrieve them
- **Gain:** If you are using the ASI Camera native driver supplied by Voyager (**not** the ASI ASCOM driver), you can enter the Gain for this sequence element. This will be grayed out if you are not using Voyager's ASI Camera native driver.
- **Offset:** If you are using the ASI Camera native driver supplied by Voyager (**not** the ASI ASCOM driver), you can enter the Offset for this sequence element. This will be grayed out if you are not using Voyager's ASI Camera native driver.
- **Important Note!** If you are using a sequence with the ASI Camera native driver that was first defined with a different camera, all Gain and Offset values will be initially set to 0/0. Make sure you change these to the desired settings and save the sequence before running.

-  : Click the magnifying glass icon to select the Gain and Offset from the presets defined in the ASI Camera native driver setup.
- **Repeat**: Number of exposures to take
- 

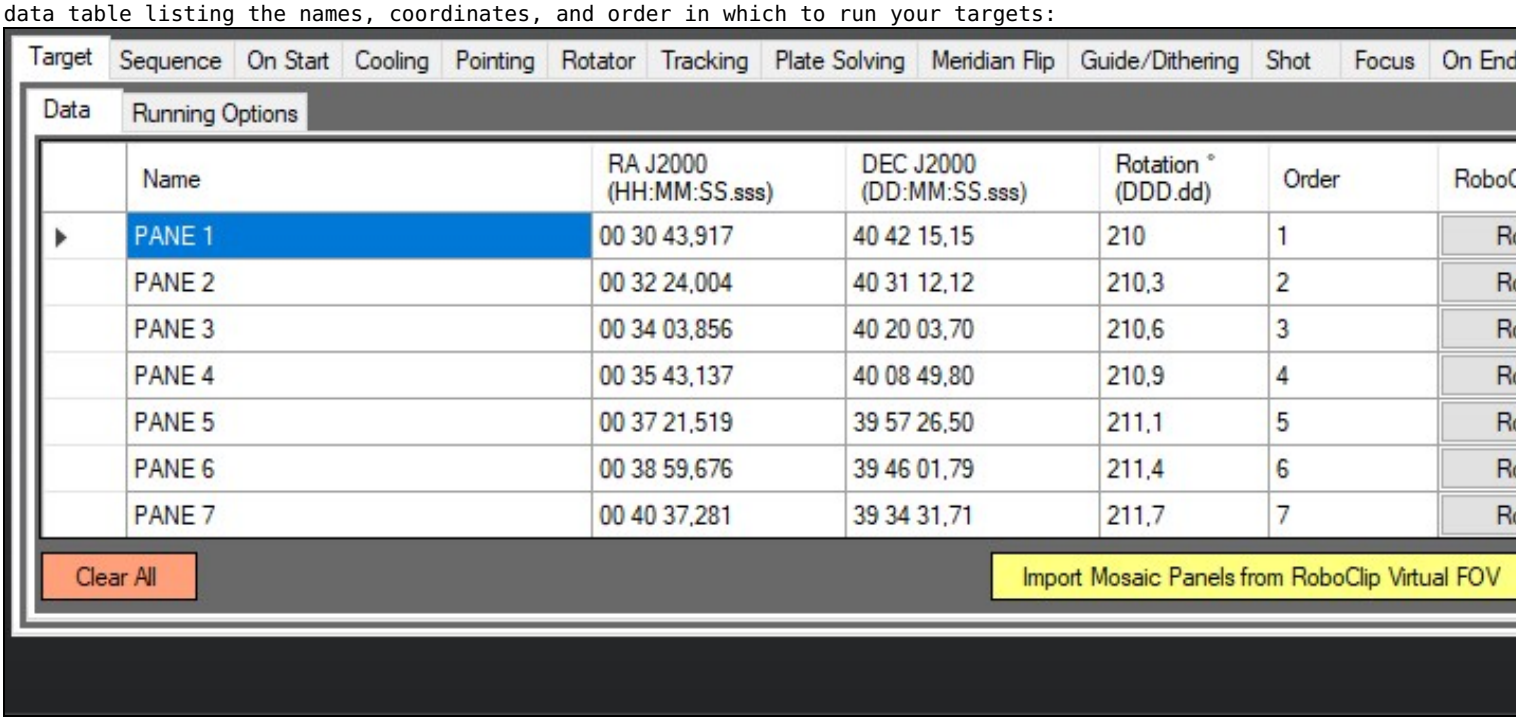
:
  - Up arrow moves this row up one position; Down arrow moves this row down one position; X clears the information from this row
  - **Copy Button**: Click Copy to copy the sequence element information from the row containing the Copy button
  - **Paste Button**: After clicking Copy on a row, click Paste on a new row to paste the sequence

element information to the row containing the Paste button
    - Use copy and paste to quickly set up the sequence elements for a number of rows that only differ in a couple of values, such as the filter choice
    - The scroll bars on the right can be used to scroll the window up and down if you have more rows than show in the main window
- The color bar under the Sequence Elements is the "Filter Synoptic." This is a visual representation of the amount of time spent imaging each filter, in the order that the filters will be used. In this example, the red, green and blue filters are used in sequence, with an equal amount of time spent shooting each filter (60 seconds). The color bars have an equal size for each color, representing 60 seconds of red, 60 seconds of green, and 60 seconds of blue.

Important Note! Gain and Offset are only available when using the Voyager ASI or QHY Camera native driver. They are not available if you use the ASCOM driver

39.6 Target Tab

The Target Tab of the Research & Survey Mosaic configuration window contains two sub-tabs. The first one is a data table listing the names, coordinates, and order in which to run your targets:

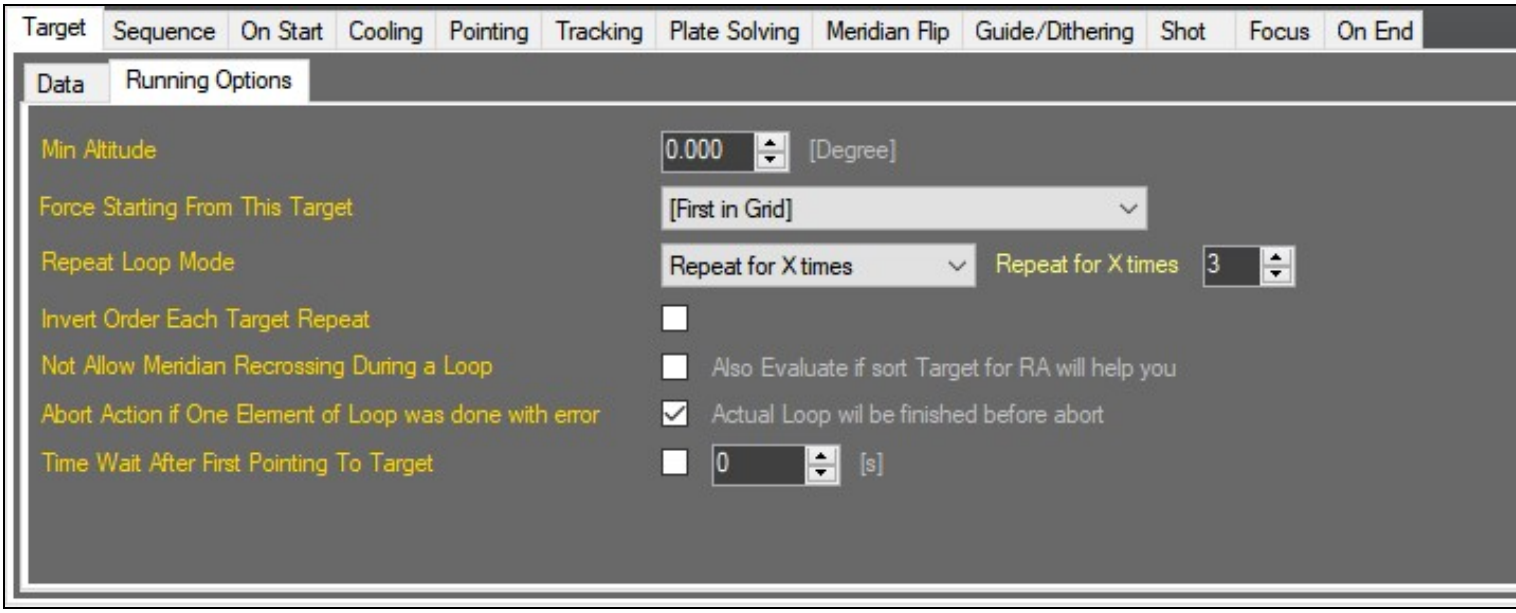


- **Name**: Enter the name of your target
- **RA J2000**: Enter the RA of your target
- **DEC J2000**: Enter the DEC of your target
- **Rotation °**: Enter the Rotation angle used by Voyager to positioning the rotator. Can be Sky PA or Rotator PA, depends on how you configure it in the Rotator configuration tab
- **Order**: Enter a number representing the order in which your target should be run. If no value is entered here, targets run in the order listed
- **RoboClip:** opening the RoboClip for import a single target from the database (not a mosaic with Virtual FOV)
- **Remove:** Remove the target from the Data panel
- **Disabled:** If checked, the Research & Survey Mosaic Sequence will not be run for this target. The target will be skipped and reported in the dashboard area
- **Clear All**: Click this button to clear the target data table
- **Import Mosaic Panels from RoboClip Virtual FOV:** import your targets as panels of mosaic from RoboClip in one click. The target in RoboClip must be a Mosaic created with Voyager's Virtual FOV facility
- **Import Targets from CSV file**: Import your targets from a CSV file with four columns formatted like this. The first line with column names is mandatory. You can have as many lines as you want in your CSV file.
    - TARGET;RA;DEC;ORDER

- IC10;00 20 24.33;+59 18 06.7;1
- IC166;06 27 05.37;+59 05 03.5;2
- Here's a sample file with the correct import format: log.csv

- **Verify Data**: Click this button after editing the list to apply your settings - this does not validate the data, it merely makes your changes active
- **Refresh Filter Synoptic**: Refreshes the filter synoptic display - the color bar under the Sequence Elements table that represents the amount of time and order of shots taken by filter color

The second sub-tab of the Target tab is Running Options:

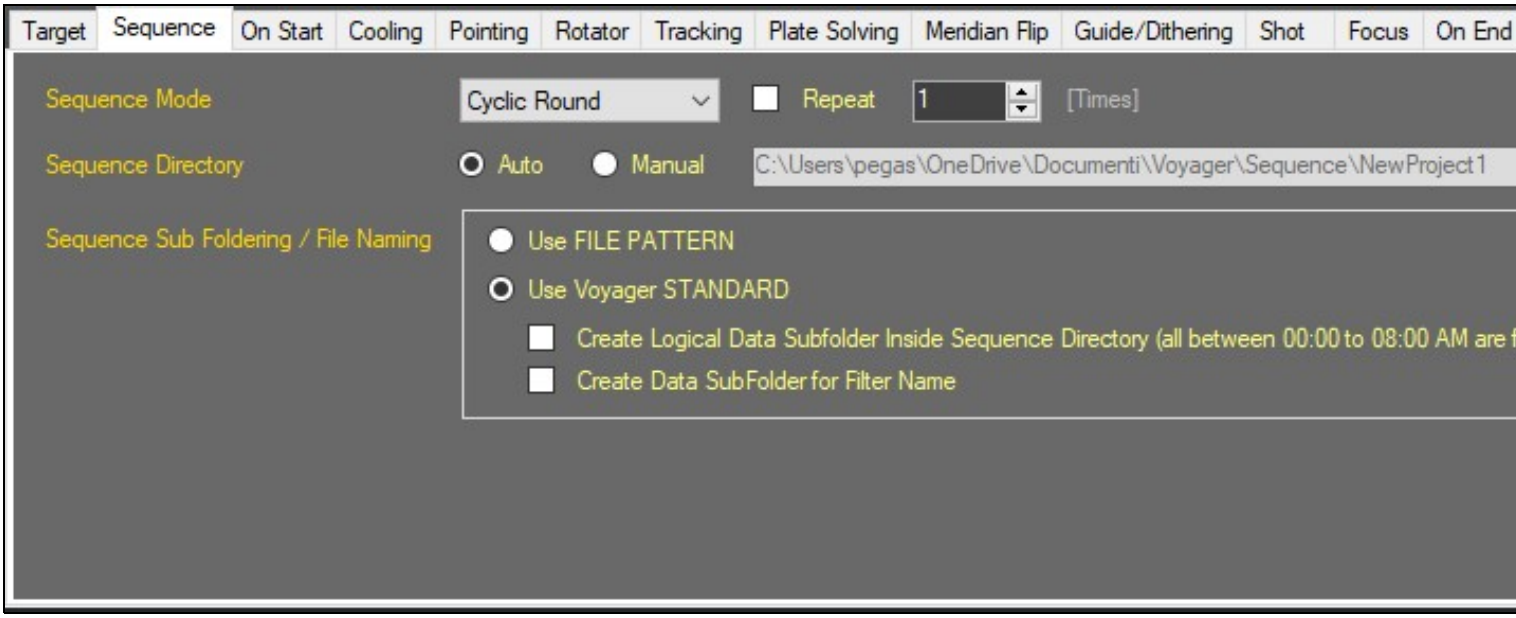


- **Min Altitude**: The minimum altitude in degrees at which exposures will be taken of the target. When the target is below this altitude, it will be skipped in the sequence
- **Force Starting from This Target**: Choose a target from the drop-down list to start the sequence with exposures of it
- **Repeat Loop Mode**: Choose a loop mode from the drop-down list
  - **Just One Time**: Run the sequence once for each target in the data table
  - **Repeat for X times**: Run the sequence X times, where X is the value entered in the "Repeat for X times" counter field on the right
  - **Infinite Loop**: Run the sequence continuously until either all targets are below the "Min Altitude" value, or the time interval specified in the On End tab has elapsed - or the absolute end time has been reached
- **Invert Order Each Target Repeat**: If checked, when running the sequence more than once on the targets in the data table, reverse the order in which they are run for each loop. E.g., if the targets are T1, T2, T3, run them in that order on the first loop, and then T3, T2, T1 on the second, etc.
- **Not Allow Meridian Recrossing During a Loop**: If checked, if the meridian is crossed during a loop, skip any targets on the opposite side of the meridian during this loop. When the loop executes the next time, the meridian will be crossed and those targets will run.
- **Abort Action if One Element of Loop was done with error**: If checked, if an error occurs on a single target in a loop, the loop will be finished and then the sequence will abort
- **Time Wait After First Pointing to Target**: If checked, wait the number of seconds specified after initially pointing to a target. This allows the mount to settle after moving and before exposures begin

Important Note! Ordering your targets by RA may help with your survey if it minimizes the need to cross the meridian and do a time-consuming meridian flip

39.7 Sequence Tab

The Sequence tab of the Research & Survey Mosaic window is where you specify how the slots should be ordered and where images should be stored:

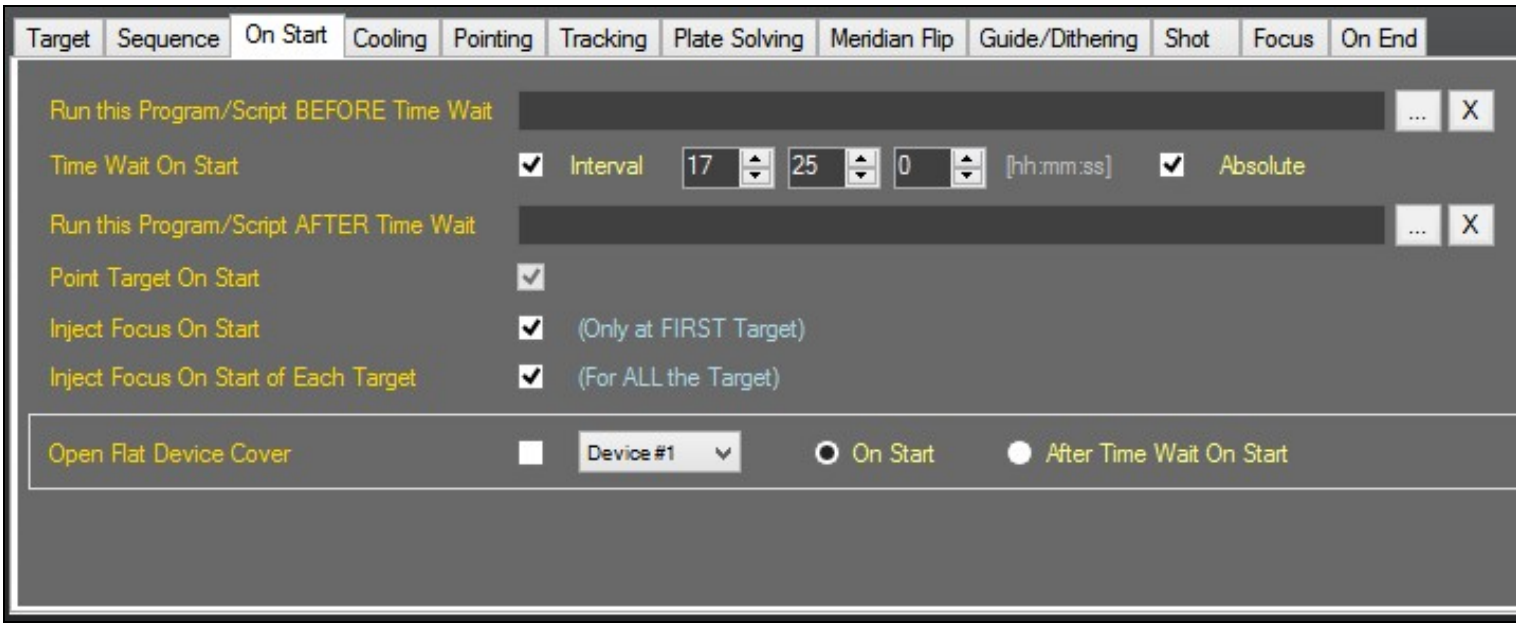


- **Sequence Mode**: Choose Cyclic Round or Group By Slot from the drop-down list
  - **Cyclic Round**: Voyager will take one exposure using the parameters of a slot, then move to the next slot and take one exposure, etc. E.g. if you have one slot for each filter of L, R, G and B, Voyager would take one L exposure, then one R, then G, then B, then cycle back around to L and repeat until the total number of exposures specified in the Repeat box are taken.
  - **Group By Slot**: Voyager will take the number of exposures specified in the Repeat column for each slot before moving on to the next slot.
- **Sequence Directory**: Where to save images taken during this sequence
  - **Auto / Manual**: Choose Auto and Voyager will automatically create a sequence directory using the base folder specified in Voyager Setup and the Target Name. Choose Manual and you can type in any folder for your images, or click the Select button and browse to a directory to choose that one
  - **Create Logical Data Subfolder Inside Sequence Directory (all between 00:00 to 08:00 AM are from yesterday)**: Check this box to create a subfolder, named with the date of the start of the sequence. All images from this sequence are stored in the subfolder, including any taken after midnight until 8AM local time

- **Sequence Sub Foldering / File Naming:** selection of the sub foldering and file naming method
  - **Use FILE PATTERN:** flag this checkbox to activate sub foldering and file naming with File Pattern method (please configure the file pattern in the File Pattern Manager)
  - **Use Voyager STANDARD:** flag this checkbox (this choice is the default for a new sequence) to use the original sub foldering and file naming system adopted by Voyager from the beginning
    - **Create Logical Data Subfolder Insside Sequence Directory (all between 00:00 to 08:00 AM are from yesterday) :** create a subfolder under the target folder with a YYYY-MM-DD format , file within 00:00 to 08:00 wil be put in a folder from the previous day date
    - **Create Data Subfolder for Filter Name:** create a sub folder with the target name

39.8 On Start Tab

The On Start tab of the Research & Survey Mosaic configuration window is where you can specify things to do before starting the sequence:

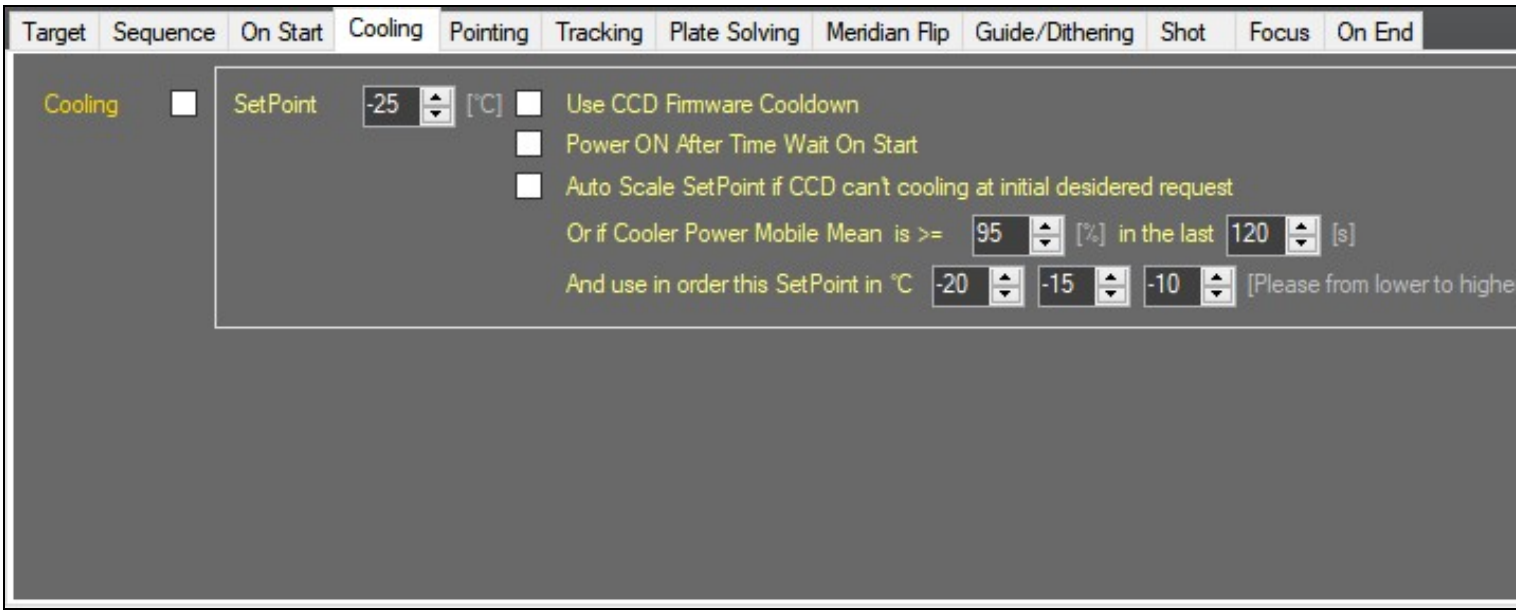


- **Run this Program/Script BEFORE Time Wait**: Click the box with "..." to bring up the Run External Program / Script window to browse to a program or script to run before the "Time Wait on Start" interval
- **Time Wait On Start**: Specify if Voyager should delay before starting the sequence
    - **Interval**: Check this box and enter the amount of time to wait in HH:MM:SS in the three scrolling fields. Voyager will wait this amount of time before starting the sequence
    - **Absolute**: Check this box and enter the actual time in HH:MM:SS at which Voyager should start running the sequence
- **Run this Program/Script AFTER Time Wait**: Click the box with "..." to bring up the Run External Program / Script window to browse to a program or script to run after the "Time Wait on Start" interval
- **Point Target On Start**: Check to perform a precision pointing operation at sequence start
- **Inject Focus on Start**: Check to perform an autofocus operation at first target of sequence at start
- **Inject Focus on Start of Each Target:** Check to perform an autofocus operation at start of each target sequence
- **Open Flat Device Cover**: Check to open the flat device at sequence start
    - **On Start**: Open the flat device cover as soon as the sequence is executed - do not wait if there is a "Time Wait On Start" specified
    - **After Time Wait on Start**: Open the flat device cover after the Time Wait On Start interval has elapsed

Important Note! If the Research & Survey Mosaic sequence is run from a DragScript, only the Point Target on Start field is used. The other fields must be specified with DragScript actions

39.9 Cooling Tab

The Cooling tab of the Research & Survey Mosaic configuration window is where you specify CCD cooling (Peltier) for the sequence:



- **Cooling**: Check this box to manage cooling via this Sequence. If you don't check this box and have cooling set before running the sequence, no changes to cooling will be made.
- **SetPoint**: Enter the desired sensor temperature (SetPoint) for your CCD cooler
    - **Use CCD Firmware Cooldown**: If checked, just command the desired temperature to the CCD cooler and let the cooler's firmware decide how quickly to ramp to that temperature
    - **Power ON After Time Wait On Start**: If checked, send a command to turn CCD cooler power on after the Time Wait On Start interval has elapsed
    - **Auto Scale SetPoint if CCD can't cooling at initial desired request**: If checked, if the CCD cooler fails to reach the desired temperature within the time specified in Camera Setup, or within the power usage constraints listed below, try again with successively warmer temperatures as specified below
        - **Or if Cooler Power Mobile Mean is >=**: Begin the auto scaling operation if the moving average of the cooler power in use was greater than or equal to the specified percentage for the "in the last" number of seconds
        - **And use in order this SetPoint in °C**: Use these temperatures in the order specified for auto scaling. The temperatures should be progressively warmer (higher numbers) from left to right

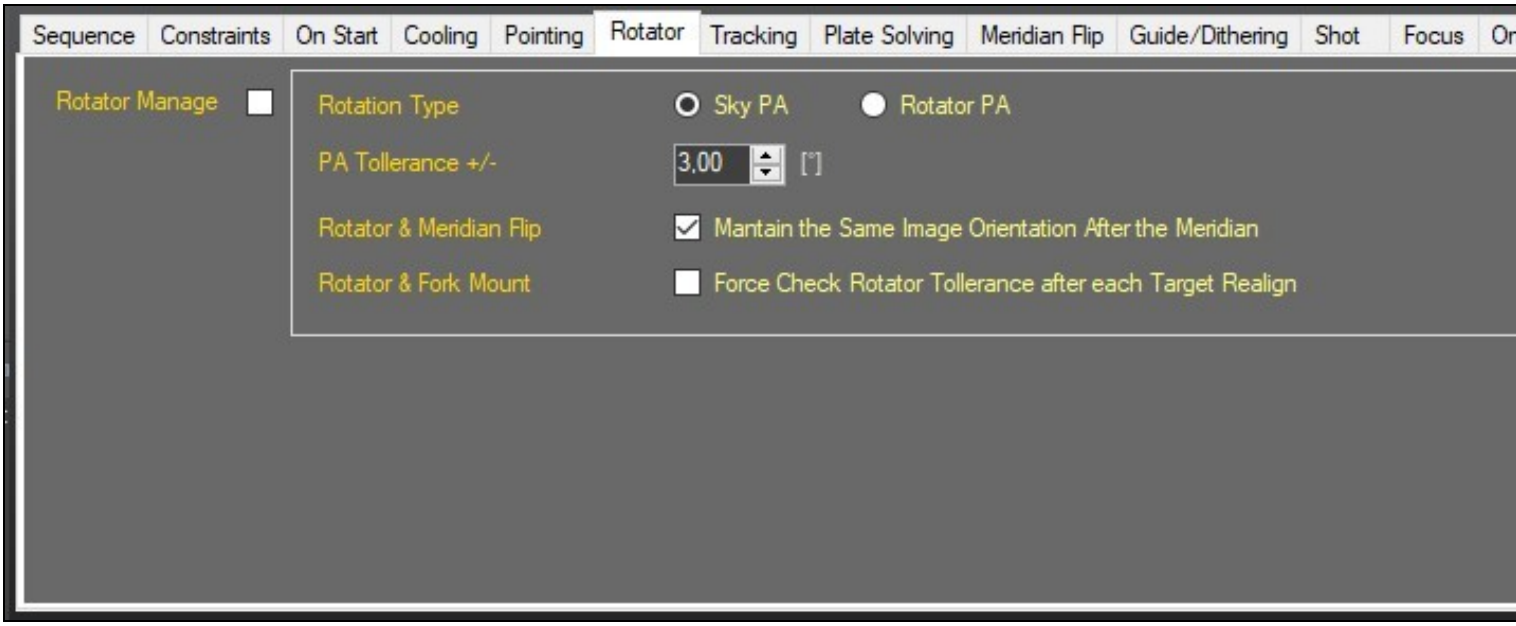
39.10 Pointing Tab

The Pointing tab of the Research & Survey Mosaic configuration window is where you specify additional parameters for any Pointing operations performed during the sequence:

- **On Driver Goto Error**: If the mount driver returns an error when Voyager commands a Goto (slew) operation, retry the operation up to a maximum of 3 times
- **Meridian Flip Watchdog:** if checkd abort the sequence of running target if Voyager try for the times indicated to do a Meridian Flip but mount report wrong side of Pier or side of pier calculated is wrong

39.11 Rotator Tab

The Rotator tab of the Sequence Configuration window is where you specify additional parameters for your rotator's actions during the sequence:



- **Rotator Manage:** if check rotator's action will be managed during the sequence framing the target with the PA specified and other all the others flag available
- **Rotator Type:** define if the rotation angle is the rotator angle (rotator PA) reported from the driver (and with offset if asked to Voyager in Sync) or the Sky angle (Sky PA) chosen with web dashboard VirtualFOV or planetarium or another system. If you select Sky PA Voyager will use the Plate solve PA result to rotate the rotator to the right angle. If you select the Rotator PA Voyager will just rotating rotator using drive angle at desidered value, no correction using the plate solved PA will be done

- **PA Tollerance +/-:** specified the tollerance in degree about the PA accepted like ok (example 180° +/-3° will accept 177° to 183°)
- **Rotator & Meridian Flip:** "Mantain the Same Image Orientation After the Meridian" if checked force Voyager to shot the target with same orientation in the images taken before anf after meridian. In this case if you have chosen Rotator PA like Rotation type the rotator will be flipped if the mount is after the meridian, if you chosen Sky PA the PA will retained also after the meridian triggering a rotator flip.Use this flag is useful also to use always the same guide star in case of use of OAG or system with high focal lenght.
- **Rotator & Fork Mount:** if enabled force Voyager to check rotator tolleranze after each Target realign, useful for fork mount with derotator system

Important Note! Rotator management will be done only done in this two points of the sequence:

- at first precise pointing, so flag the ?Point target on start? in the start tab of the sequence configurator

- at meridian change

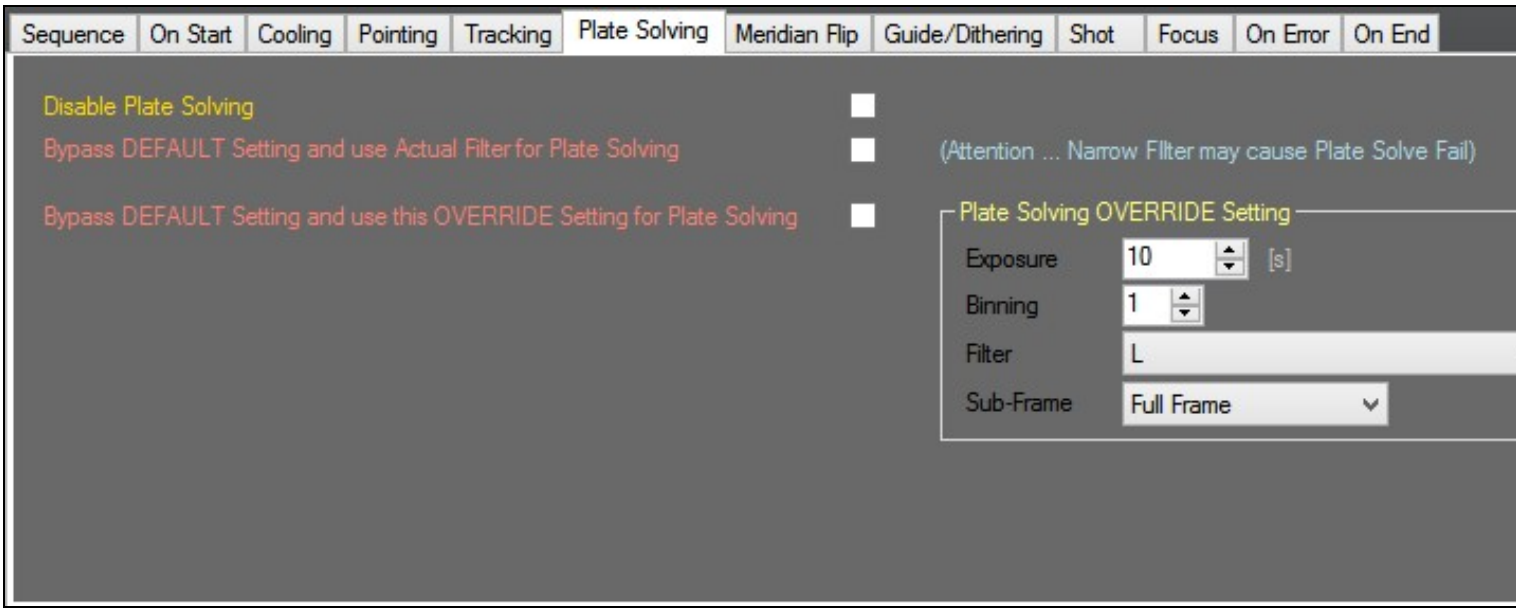
39.12 Tracking Tab

The Tracking tab of the Research & Survey Mosaic Configuration window is where you specify additional parameters for your mount's tracking actions during the sequence:

- **Tracking Stop Watchdog**: If checked, if tracking stops during the sequence, attempt to restart tracking the specified number of times
- **Tracking Start**: If checked, stop tracking when the sequence is started, and start tracking only after the Time Wait On Start interval has elapsed

39.13 Plate Solving Tab

The Plate Solving tab of the Research & Survey Mosaic Configuration window is where you specify additional parameters for plate solving during the sequence:



- **Disable Plate Solving**: If checked, do not perform plate solving during the sequence. If this is checked, precision pointing can not be done, only unverified goto's of the mount
- **Bypass General Setting and use Actual Filter for Plate Solving**: If checked, the filter in use for image exposures will be used for plate solving, regardless of the settings specified in Plate Solve setup

Important Note! Using a narrow band filter may cause plate solving to fail, as the resulting image may be too dim to have stars that the plate solving routine can locate in the image

39.14 Meridian Flip Tab

The Meridian Flip tab of the Research & Survey Mosaic Configuration window is where you specify additional parameters for meridian flip management during the sequence:

- **Meridian Flip Mode**: Choose Do Not Manage, Halt on Flip Time or Manage from the drop-down list
  - **Do Not Manage**: Voyager will not perform any meridian flip management during the sequence - it will not monitor mount position near the meridian while the mount is tracking

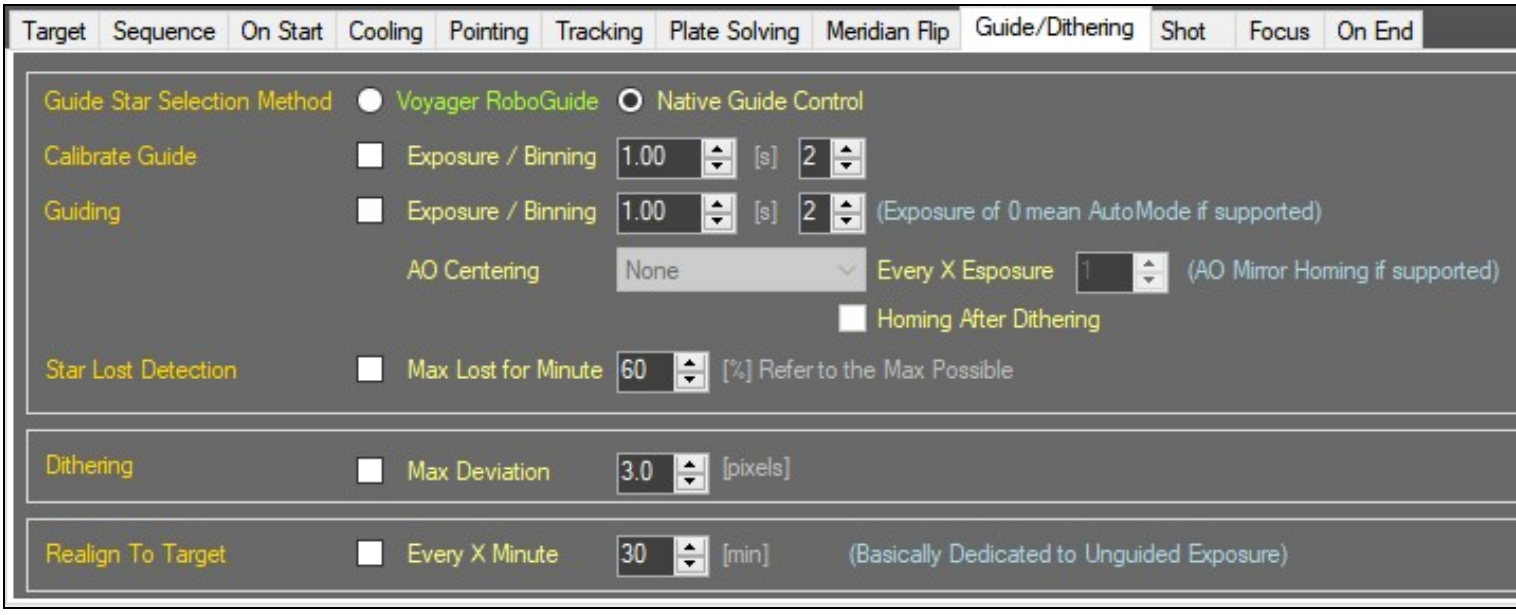
- **Halt on Flip Time**: When Voyager determines it is time to flip the mount, the sequence will be halted. If you have tracking safety stop enabled in Voyager the mount will be halted. Otherwise, set a limit in your mount configuration settings to stop tracking
- **Manage**: Voyager will monitor the mount position relative to the meridian and perform a meridian flip as needed, as specified in Mount Setup

- **Flip Rotator On Meridian Flip**: If checked, if a rotator is attached, flip the rotator 180 degrees after a meridian flip so the image's position angle is maintained
- **Inject Focus On Meridian Flip**: If checked, perform an autofocus after the meridian flip completes
- **Force Meridian Flip Procedure with Exposure Abort After Meridian Crossing**: If checked, Voyager will abort any exposure in progress and force a meridian flip after the Wait Max Time number of minutes has elapsed past the meridian
- **ABORT Exposure if Meridian Flip occour outside Voyager and FORCE EXECUTE Meridian Flip operations:** if checked Voyager try to recognize a change of pier outside Voyager and start the operation needed and/or asked in Voyager for the meridian flip. The flag work only if the mount control in Voyager is an ASCOM Driver, ASCOM Pier mode in Voyager is setting like ASCOM Normal or ASCOM Inverted and Meridian Flip Mode (Above) is setting like MANAGED

Important Note! If you choose Do Not Manage, please be sure your mount's firmware and/or driver software handles meridian flips automatically and prevents equipment damaging pier crashes
Important Note! If you choose Force Meridian Flip with Exposure Abort..., make sure your mount can track the specified Max Wait Time number of minutes past the meridian without an equipment damaging pier crash

39.15 Guide/Dithering Tab

The Guide/Dithering tab of the Research & Survey Mosaic Configuration window is where you specify additional parameters for guiding and dithering management during the sequence. The settings in Guiding Setup are used unless these settings override them.



- **Guide Star Selection Method**: Choose how the guide star should be selected
  - **Voyager RoboGuide**: Voyager's own RoboGuide algorithm, as specified in Guiding Setup, will be used to select a guide star. If RoboGuide cannot find a suitable guide star, Voyager will retry with the guiding software's own guide star selection process if it has one
  - **Native Guide Control**: Use the guiding software's own star selection method
- **Calibrate Guide**: If checked, use this exposure in seconds and binning level for the guide software's calibration routine
- **Guiding**: If checked, use this exposure in seconds and binning level for the guide software's guiding

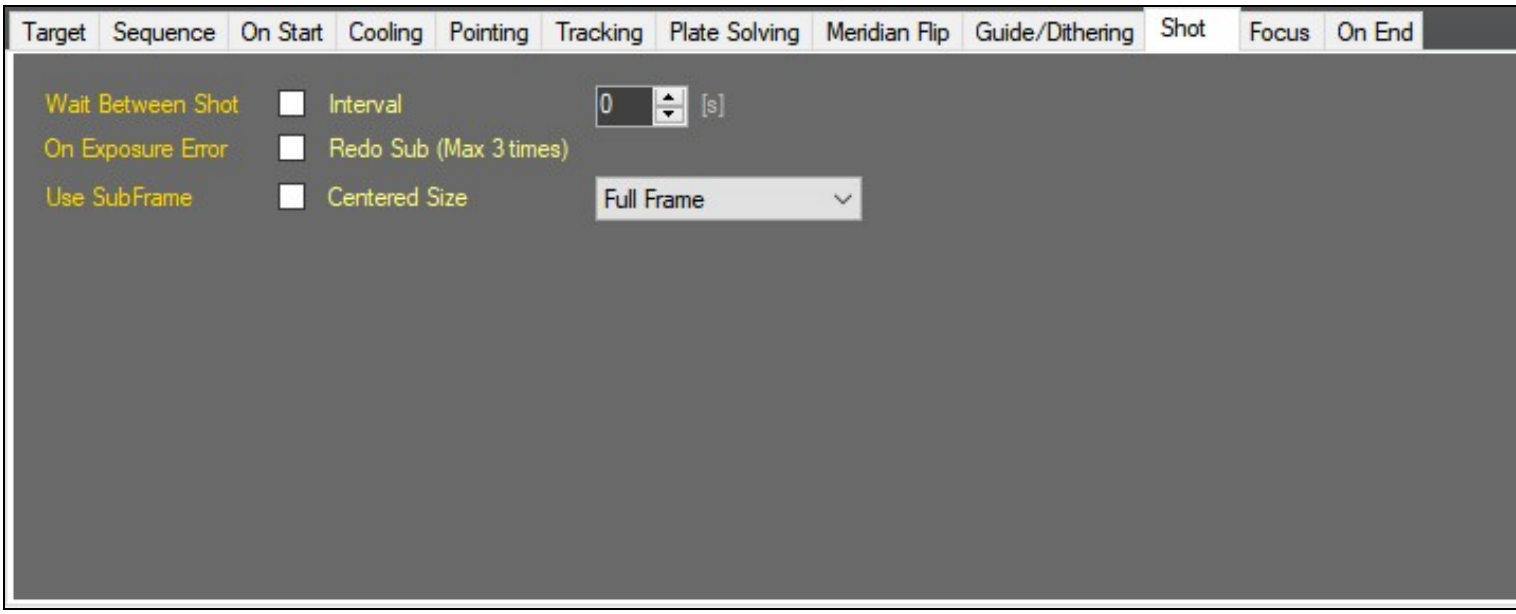
exposures. Enter zero for the exposure time if you want to use your guide software's automatic mode, if it has one

- **AO Centering**: Choose None, Every Exposure or Every X Exposure from the drop-down list. This setting only works if you have an AO (Adaptive Optics) guide unit connected and your AO supports mirror homing
  - **None**: Never perform AO Centering
  - **Every Exposure**: Perform AO Centering after every exposure
  - **Every X Exposure**: Specify X = number of exposures between AO Centering operations

- **Star Lost Detection**: If checked, the maximum allowed percentage of time that the guide star can be lost without considering guiding to have failed
- **Dithering**: If checked, specify the max number of pixels to move during a dithering operation
- **Realign to Target**: If checked, perform a precision pointing operation after this number of minutes has elapsed. This is useful if you are doing unguided exposures and want to re-center your target every so often

39.16 Shot Tab

The Shot tab of the Research & Survey Mosaic Configuration window is where you specify additional parameters for image exposures:

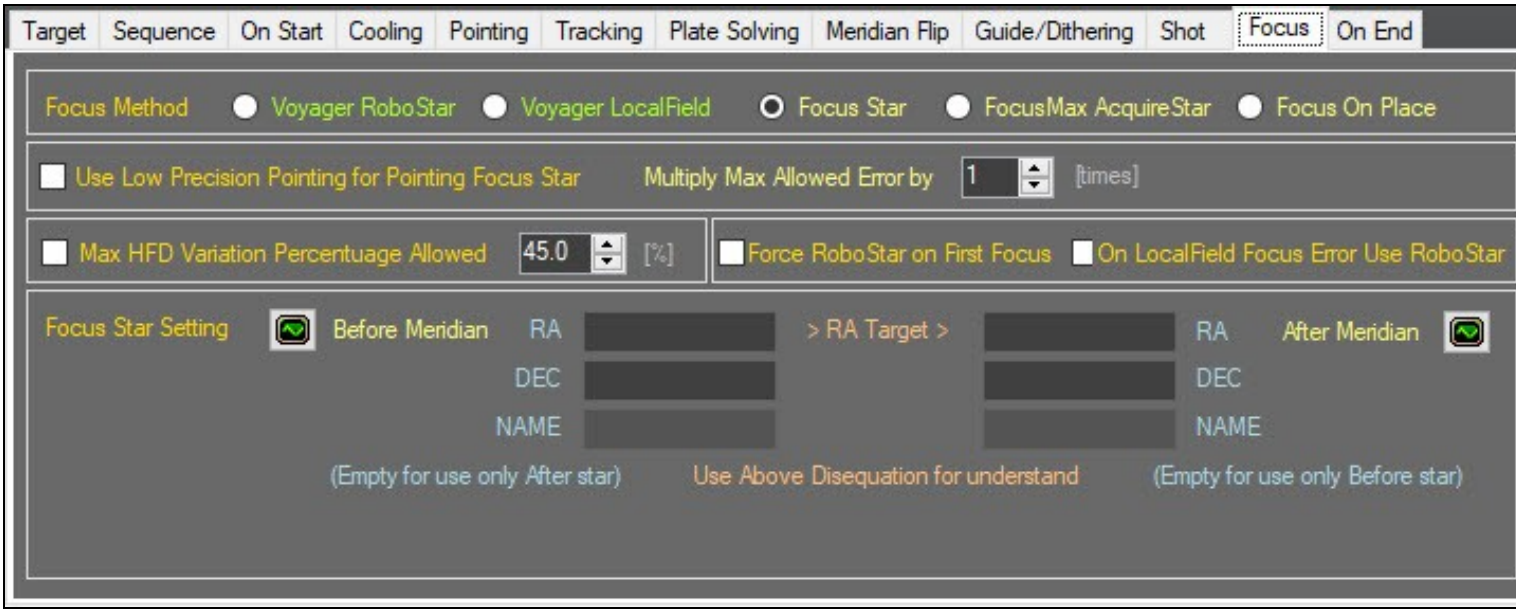


- **Wait Between Shot**: If checked, wait the specified number of seconds after each exposure before beginning the next. May be useful for some cameras that need a pause before the next command is sent to take an exposure
- **On Exposure Error**: If checked, if an exposure results in an error, try to re-take the exposure up to 3 times
- **Use SubFrame**: If checked, use a centered subframe of the size selected from the drop-down list: Full Frame, 1/2 size, 1/4 size, 1/8 size, 1/16 size or CUSTOM size.
  - **CUSTOM Size**: If you choose custom size from the drop-down, a counter appears from which you can choose any percentage value for your subframe size

39.17 Focus Tab

The Focus tab of the Research & Survey Mosaic Configuration window is where you specify additional parameters for autofocus operations.

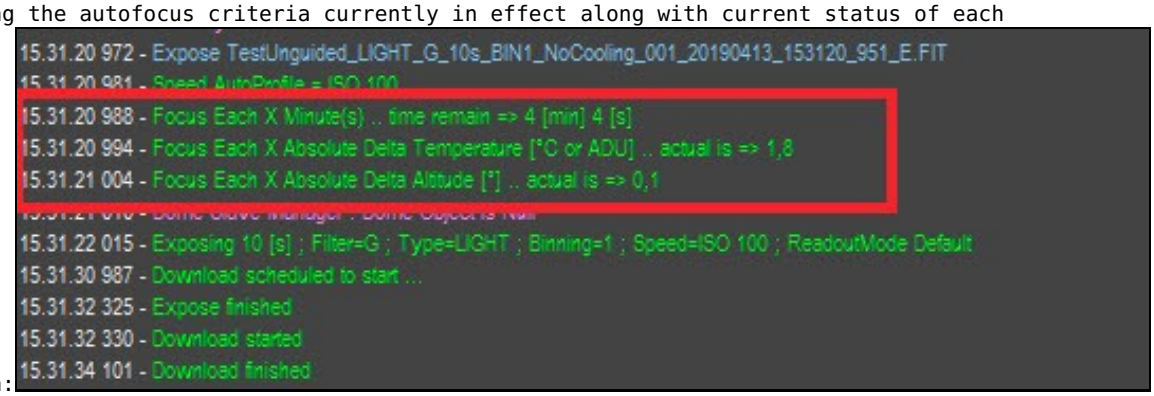
The settings in AutoFocus setup are used unless these settings override them.



- **Focus Method**: Choose the autofocus method to use during the sequence
  - **Voyager RoboStar**: Use Voyager's RoboStar method to select the star for Voyager's single-star VCurve autofocus operation
  - **Voyager LocalField**: Use Voyager's LocalField multiple-star autofocus operation
  - **Focus Star**: Use the focus star specified by the Focus Star panel below and use Voyager's VCurve single-star autofocus operation
  - **FocusMax AcquireStar**: Use FocusMax for autofocus and request that it use its own AcquireStar method to select a star for autofocus
  - **Focus On Place**: Autofocus using a suitable star, if one can be found, in the current field of view
- **Use Low Precision Pointing**: If checked, relax the error tolerance for precision pointing to the focus star.
  - **Multiple Max Allowed Error by**: If Use Low Precision Pointing is checked, multiply the error tolerance specified in Mount Setup by the number of times specified in the counter. E.g., if you specified an error tolerance of 10 arc-secs in Mount Setup, and a "5" here, the focus star precision pointing operation would stop when the error was less than 50 arc-secs.
- **Max HFD Variation Percentage Allowed**: Maximum amount of variation of the focus star's HFD (Half Flux Diameter) allowed. Larger values are considered an autofocus failure
- **Force RoboStar** on First Focus: If checked, use the RoboStar operation on first autofocus to find a suitable focus star and perform a VCurve autofocus operation
- **On LocalField Focus Error use RoboStar**: If checked, if a LocalField autofocus operation fails, try RoboStar to find a suitable focus star and perform a VCurve autofocus operation
- **Focus Star Setting**: Specify a star to use for autofocus before the meridian, after the meridian, or at all times.
  - If only the left column - **Before Meridian** - is filled out, that star is used for the entire sequence.
  - If both columns are filled out, the coordinates on the left are used before the meridian and the star on the right is used after the meridian
    -  : Click this icon to bring up the Object Finder and search for your focus star by name. The Object Finder will populate the RA, DEC and NAME fields from the search result
- **Focus Filter**:
  - **Use Actual Filter**: Autofocus using the filter for the currently running slot of the sequence
  - **Use Default Filter**: Choose the default filter to use for autofocus operations. If nothing else overrides this selection, use the filter selected from the drop-down list.
- **Focus Trigger**: Check one or more boxes to determine the condition(s) that trigger an autofocus
  - **Focus By Slot**: If checked, and if the sequence mode is **Group By Slot**, autofocus at the start of every new sequence slot.

- **Focus Each X Exposure**: If checked, focus every X exposures, where X is the counter value.
- **Focus Each X Minutes**: If checked, focus every X minutes, where X is the counter value. This can be especially useful if your sequence mixes slots with very different exposure lengths.
- **Focus Each X Delta °C or Delta ADU:** If checked, focus every X degrees °**C** change of temperature or change of ADU value reported by the focuser chosen in Setup. Check your focuser documentation to see whether it reports temperature or a value of ADU that is related to temperature. Then choose the counter value based on how much the number returned by the focuser changes when you need to rerun autofocus.
- **Focus Each X Delta Degrees of Altitude**: If checked, focus every time the target's altitude changes by the specified number of degrees

- As of Voyager 2.1.1f, new Monitor Window information lines have been added at the start of each exposure explaining the autofocus criteria currently in effect along with current status of each criterion:



Important Note! If you check more than one Focus Trigger box, autofocus will be performed whenever any of the checked criteria are met. E.g., you could focus both every 30 minutes and every filter change and every 2 degrees temperature change.

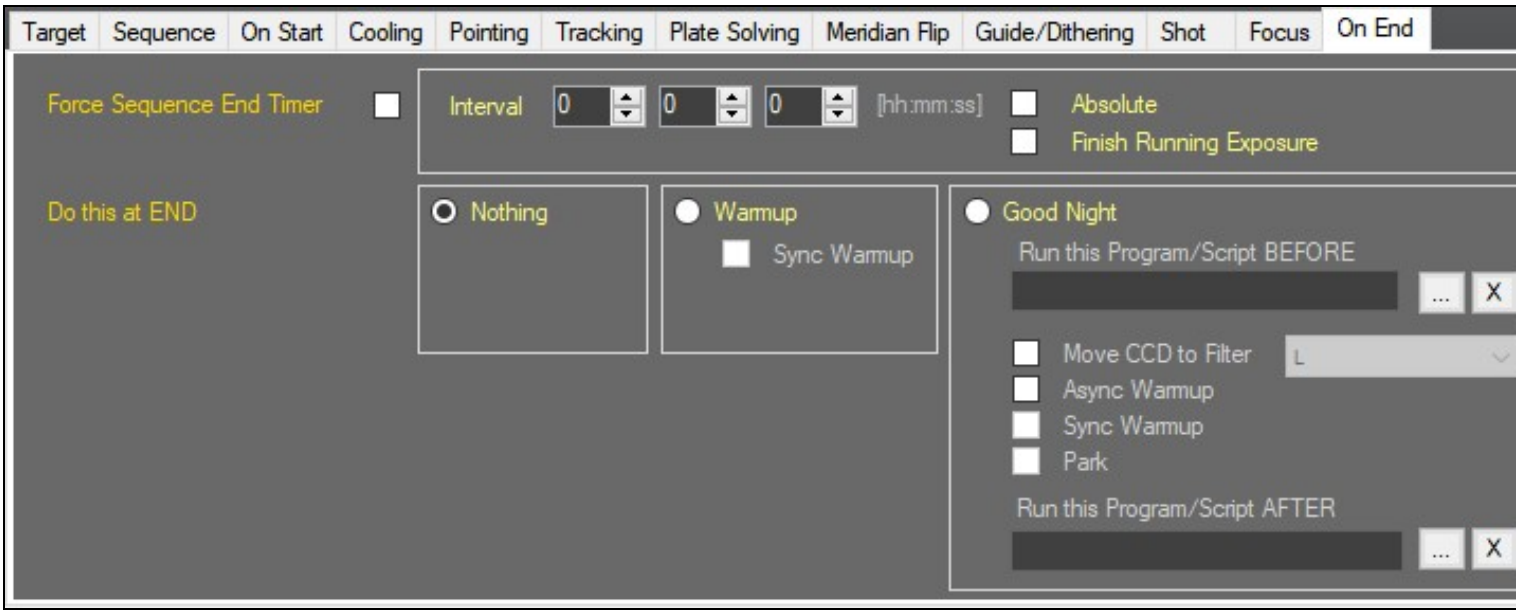
Important Note! If no Focus Trigger boxes are checked, autofocus will only be performed at times specified in other areas, such as in the On Start and Meridian Flip tabs. If none of those boxes are checked, no autofocus will be performed during the Sequence run

Important Note! Both Voyager's RoboStar and FocusMax's AcquireStar methods may move the mount to the focus star, perform the autofocus, and move back to the target. These operations can provide a better autofocus by choosing a more suitable star than any in the current field of view. However, they will spend more time to move the mount to the focus star and back compared to focusing on the best star in the field of view

Important Note! Low Precision Pointing can save considerable time during your sequence and in many cases there is no need for high precision pointing to goto a focus star

39.18 On End Tab

The On End tab of the Research & Survey Mosaic Configuration window is where you specify actions Voyager should take at the end of a sequence:



- **Force Sequence End Timer**: If checked, end the sequence after the time Interval specified has elapsed (HH:MM:SS)
  - **Absolute**: If checked, end the sequence at the absolute time indicated in the counter fields (HH:MM:SS)
  - **Finish Running Exposure**: If checked, finish any exposure in progress when the Force Sequence End Timer is triggered
- **Do this at END**:
  - **Nothing**: If this radio button is selected, do nothing at the end of the sequence
  - **Warmup**: If this radio button is selected, warmup the CCD cooler at the end of the sequence
    - **Sync Warmup**: If checked, wait for the warmup to finish. If not checked, send the warmup command to the cooler and don't wait
- **Good Night**: if this radio button is checked, Voyager will perform the following shutdown actions at the end of the sequence:
  - **Run this Program/Script BEFORE**: Click the "..." button to choose an external program or script to run at the start of the Good Night operation. Click the X button to clear this field
  - **Move CCD to Filter**: If checked, move the filter wheel to the filter selected from the drop-down list
  - **Async Warmup**: If checked, send a command to the CCD cooler to warm the sensor, and do not wait for the warmup operation to complete
  - **Sync Warmup**: If checked, send a command to the CCD cooler to warm the sensor, and wait for the warmup operation to complete
  - **Park**: If checked, park the mount
  - **Run this Program/Script AFTER**: Click the "..." button to choose an external program or script to run at the end of the Good Night operation. Click the X button to clear this field

Important Note! If the Research & Survey Mosaic sequence is run from a DragScript, the On End tab information is not used. The DragScript instructions for what to do after the sequence ends are followed instead

40 FIT Viewer

Starting with Version 2.1.3, Voyager includes a FIT viewer that displays images after they have been downloaded from your camera.

The FIT Viewer is a native 64bit application that are able to manage all the memory and resources of you PC without 4GB limitations.

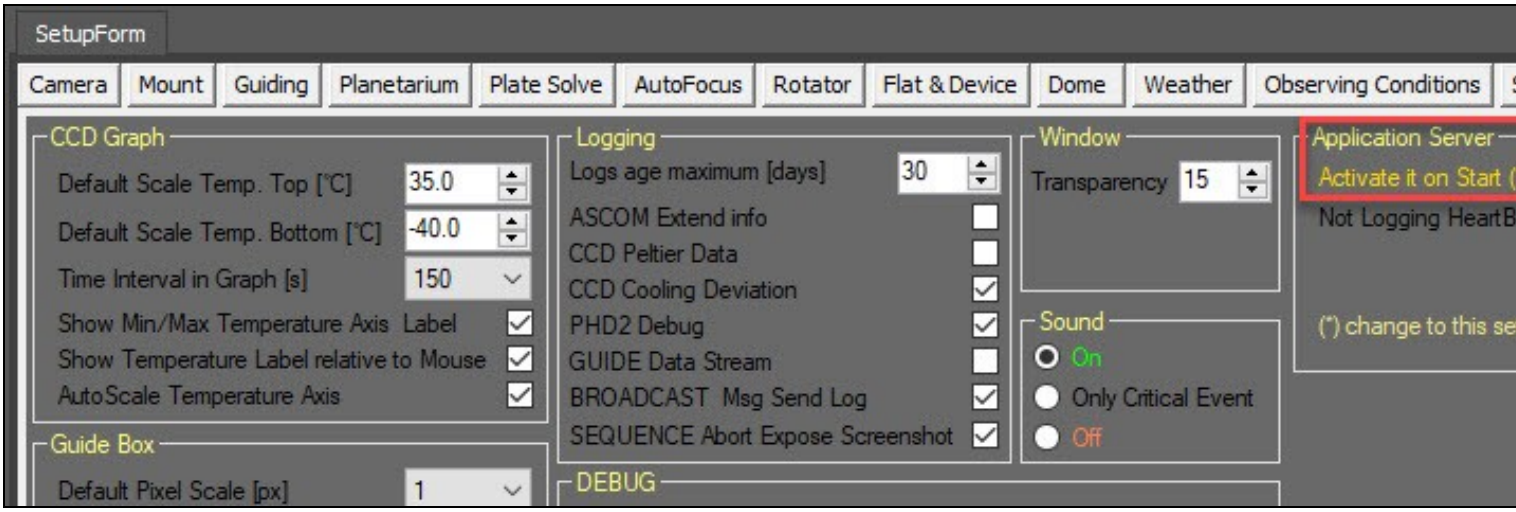
40.1 FIT Viewer Setup

The FIT Viewer is installed automatically along with Voyager. It communicates with Voyager via the Application Server inside of Voyager, so that must be enabled to use the FIT Viewer.

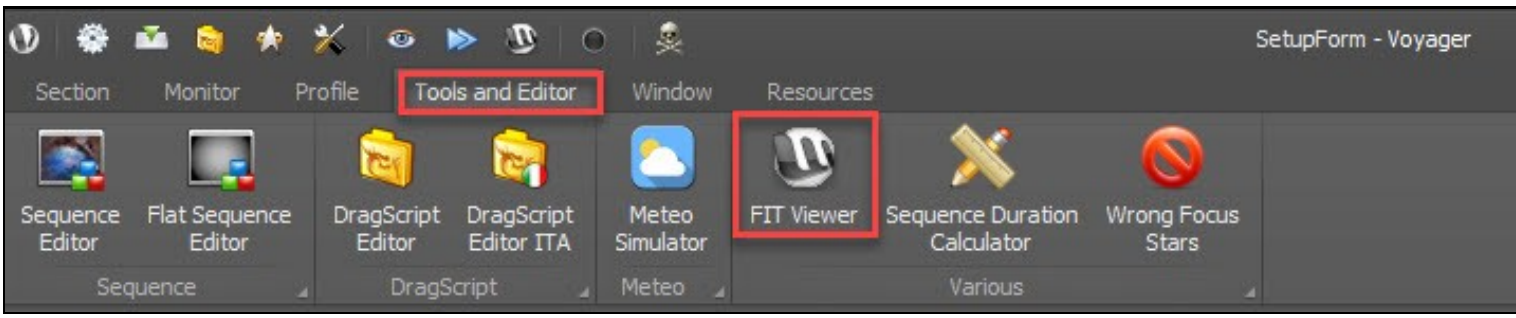
You only need to do this once unless you change to a new profile.

To enable the Application Server, open Voyager's Setup workspace and click the Voyager button.

If the **Activate on Start** box in the Application Server panel is not checked, check it, shut down Voyager, and restart Voyager.



To start the FIT Viewer, click the FIT Viewer button in the Tools and Editor ribbon menu:

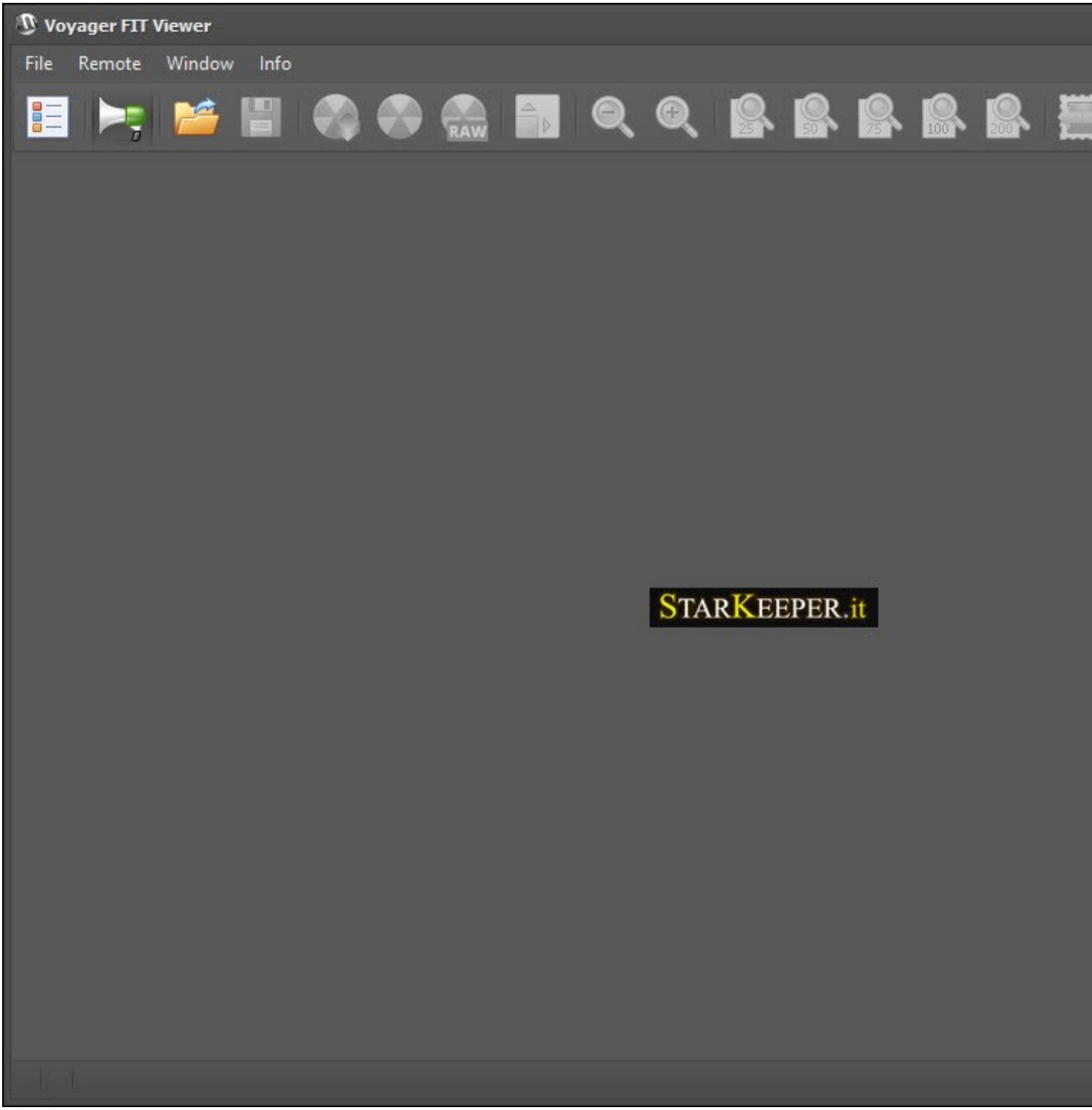


The FIT Viewer runs in its own window so you can view a full size image without having to share screen space with Voyager itself.

In keeping with Voyager's "Reliability is First Priority" theme, it runs in its own process space, so you can view your images, change the screen stretch, etc., with no interference to Voyager's core job - acquiring images.

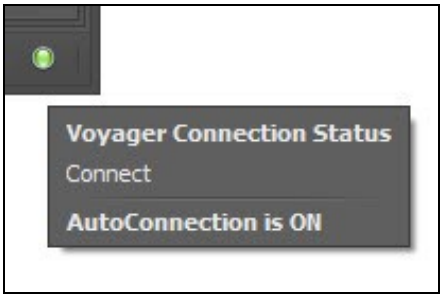
40.2 FIT Viewer Settings

The FIT Viewer comes up in its own Window:

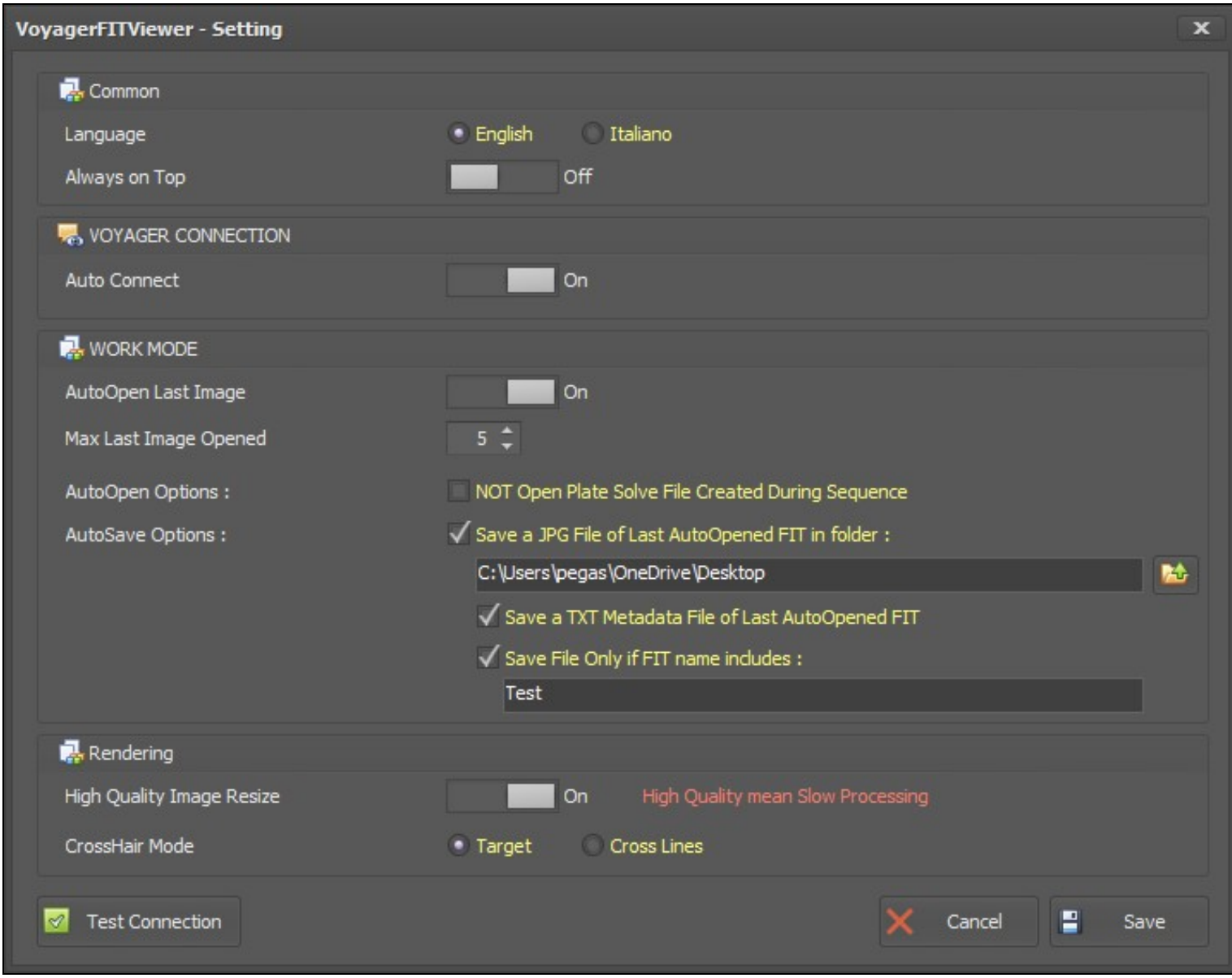


The FIT Viewer communicates with Voyager via port 5950 by default. The Windows firewall software may ask you to allow Voyager to communicate with the Viewer - accept this to continue.

At the lower right corner you will find an "LED" that will be Green if the FIT Viewer is connected to Voyager, and Red if AutoConnect is on and the Viewer is not connected to Voyager. It is Gray if AutoConnect is off. Hover your mouse over the LED to see connection and AutoConnect status:



Click Settings from the File menu to examine the FIT Viewer settings panel:



- **Common**
  - **Language:** Click English or Italiano to choose the interface language used by the FIT Viewer
  - **Always on Top:** On to have the FITViewer window always on top to the other on Desktop, Off to use like a normal window overlay

- **Voyager Connection** - this section specifies how the FIT Viewer communicates with Voyager
  - **Auto Connect:** Click the button to choose On, the default and recommended setting, or Off. If you choose Off here, you must manually connect to Voyager using the Remote -> Connect menu selection
- **Work Mode** - this section specifies how images are opened by the FIT Viewer
  - **AutoOpen Last Image:** Click the button to choose On, the default and recommended setting, or Off
    - **On:** The last image downloaded by Voyager from your camera is automatically displayed by the FIT Viewer
    - **Off:** The last image downloaded by Voyager is not automatically displayed. You must open an image manually using the Folder open icon on the toolbar
  - **Max Last Image Opened:** Specify the maximum number of images to automatically keep open in tabs in the FIT Viewer. In this example, the last five images downloaded to Voyager will be displayed in FIT Viewer tabs. The maximum number of images you can have open is limited by available memory. Astrophotography images can be rather large, so you should experiment if you want to keep more images available in tabs. You can always open images later using the folder open icon. **NOTE:** this only applies to images opened automatically after being downloaded to Voyager. You can open as many images manually as you wish, and you must close them manually as well.
  - **AutoOpen Options:**
    - **NOT Open Plate Solve File Created During Sequence**: If checked, images taken during a Sequence to perform plate solving are not opened in the FIT Viewer
  - **AutoSave Options:**
    - **Save a JPG File of Last AutoOpened FIT in folder**: If checked, save the STF stretch in JPG format of the last FIT opened automatically by the Viewer. You can select the folder in which to save the JPG. The fixed name is LastSTFAutoOpenImage.jpg
      - **Save a TXT Metadata File of Last AutoOpened FIT in folder**: If checked save a TXT file with lines reporting data about some FIT Headers info
      - **Save File Only if FIT name includes**: If checked save of JPG/TXT files will be filtered (only if the name fit the filter)
- **Rendering**
  - **High Quality Image Resize:** Click the button to turn this option on or off.
    - **Off:** The default and recommended setting is off. The slower, higher quality image resize is not used. We only recommend the high quality resize option if you are using the FIT Viewer to resize and save a changed image for later use
    - **On:** A slower running, higher quality processing is used to resize images. Only recommended if you wish to save the resized image for future use
  - **CrossHair Mode:** Click Target for circular crosshair icon or Cross Lines for a precise centering purpose crosshair icon
- **Test Connection:** Click this button to test the connection to Voyager. If the connection fails, check in Voyager to make sure the Application Server is enabled, and that you have restarted Voyager since enabling it. If it still fails to connect, it is likely that your Windows or third party software firewall is blocking the connection attempt. Enabling Voyager in that software should fix the problem.

40.3 Window Arrangement

The FIT Viewer has the same controls available for rearranging the elements of the screen to suit your taste. For example, you could move the list of open files from a tab to its own separate area at the left or bottom of the screen.

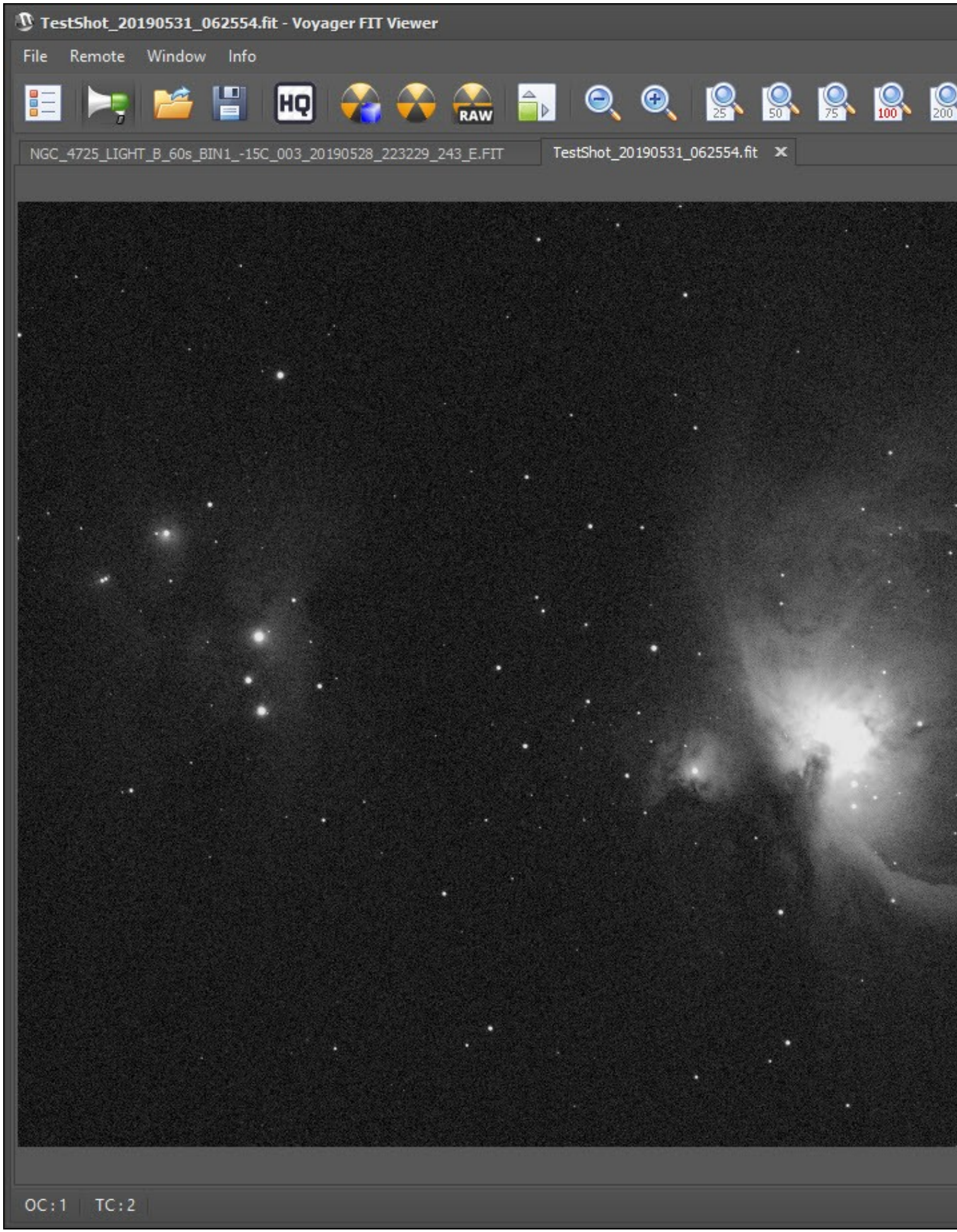
See the Window Arrangement section of the Wiki to understand how to drag and drop areas of the FIT Viewer screen - it works the same way as with Voyager.

40.4 Using the FIT Viewer

With the default settings, whenever a new image is downloaded to Voyager it will be opened in the FIT Viewer. The most recent X images will be available in tabs, where X is the "Max Last Image Opened" value in the File -> Settings dialog.

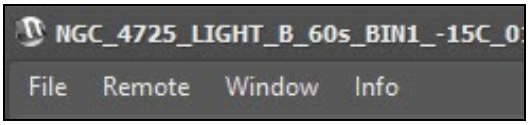
Once an image is open in the FIT Viewer, toolbar icons are un-grayed and available to manipulate the image. To the right of the image you will find Image Statistics, an image Histogram display with adjustment sliders, and

a FIT Header listing.


TestShot_20190531_062554.fit - Voyager FIT Viewer
File
Remote
Window
Info
HQ
RAW
25
50
75
100
200
NGC_4725_LIGHT_B_60s_BIN1_-15C_003_20190528_223229_243_E.FIT
TestShot_20190531_062554.fit
OC : 1
TC : 2

40.5 FIT Viewer Menu

The FIT Viewer menu is near the top left of the FIT Viewer window.



It contains the following choices:

- **File:**
  - **Setting:** Open the FIT Viewer Setting dialog
  - **Exit:** Exit the FIT Viewer program
- **Remote:**
  - **AutoConnect:** Select to toggle AutoConnect on or off. A checkmark is displayed next to AutoConnect if it is On. Determines whether the FIT Viewer will automatically attempt to connect to Voyager when started. If the connection cannot be made within 15 seconds, AutoConnect times out and you can use the viewer manually. This setting is On by default and that is the recommended setting for using the FIT Viewer to see images as they are downloaded to Voyager.
  - **Connect:** If AutoConnect is Off and the FIT Viewer is not currently connected to Voyager, this option is available. Click to connect to Voyager
  - **Disconnect:** If AutoConnect is Off and the FIT Viewer is currently connected to Voyager, this option is available. Click to disconnect from Voyager
- **Window:**
  - **Close all Windows:** Close all open image tabs
- **Info:**
  - **About:** Displays the Viewer version number

40.6 FIT Viewer Toolbar

The FIT Viewer Toolbar has the following controls

1. Opens a tab containing a listing of the open files. Double click an entry to open that tab and view that image
2. Toggles on or off the automatic downloading of files newly received by Voyager
3. Open a FIT file directly from your disk
4. Save a modified FIT file back to disk. Any changes made to that FIT file will be saved in the new file, so use a new filename and don't overwrite your original file unless that is your intention
5. Toggle between High Quality image resize mode (slower) and fast mode. HQ mode is best for Bayered (one shot color, raw) images but turn HQ off for best performance and mono images
6. Apply a screen stretch to the open FIT image using the algorithm documented for PixInsight(tm)'s default auto stretch
7. Apply a screen stretch using a slightly darker background than the previous control (#5)
8. Show the raw, unstretched image
9. Adjust the zoom factor so the image fits the available window space
10. Zoom out
11. Zoom in
12. Adjust the zoom factor to 25% of full size

13. Adjust the zoom factor to 50% of full size
14. Adjust the zoom factor to 75% of full size
15. Adjust the zoom factor to 100% of full size
16. Adjust the zoom factor to 200% of full size
17. Flip the image horizontally
18. Flip the image vertically
19. Rotate the image counter-clockwise 90 degrees
20. Rotate the image clockwise 90 degrees
21. Place the red target icon in the middle of the image

- PixInsight is a trademark of Pleiades Astro LLC https://pixinsight.com

40.7 FIT Viewer Status Bar

At the bottom of the FIT Viewer window you will see this status bar:

- **OC**: The count of images opened automatically after they were downloaded by Voyager
- **TC:** The total count of open images included those opened automatically and opened manually
- **Scale**: The current zoom factor of the displayed image
- **Image (-,-) pix**: X,Y coordinate value of the mouse cursor relative to the image itself. Top left corner is 0,0
- **Screen (-,-) pix**: X,Y coordinate value of the mouse cursor relative to the displayed image window on the screen. Top left corner is 0,0
- **Rel**: Version number
- **LED**:
    - **Green** = AutoConnect is on and FIT Viewer is connected to Voyager
    - **Red** = AutoConnect is on and FIT Viewer is NOT connected to Voyager
    - **Gray** = AutoConnect is off

40.8 Pan and Zooming Your Image

Mouse Wheel Zoom: In addition to the Zoom controls described in the previous section, you can change the zoom level with the mouse wheel.

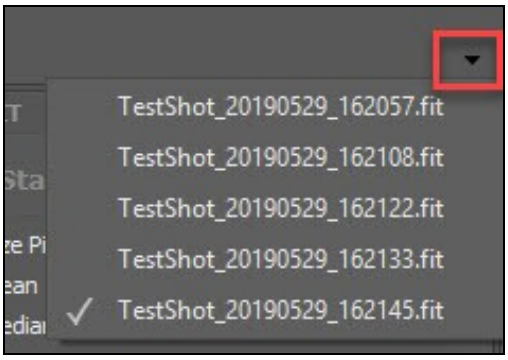
Panning with the Mouse: If the image is zoomed in so less that 100% is showing, you can left click and drag with the mouse to pan the image

Zoom to a Selection with the Mouse: Right click on an image and drag to define a rectangle. The contents of that rectangle will zoom to fill the window

Zoom to Mouse Click: Double click on the image and it will center where you clicked and zoom in on that area of the image

40.9 FIT Viewer Window List

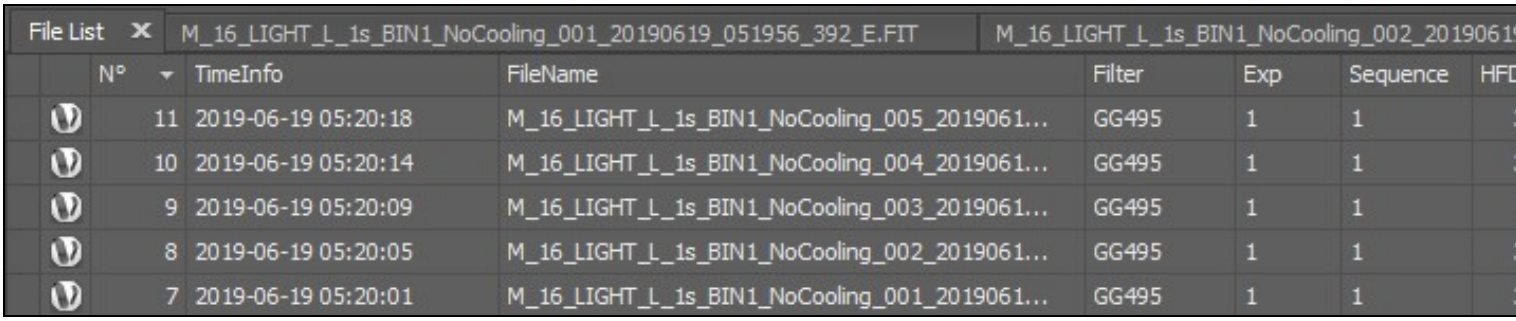
Click the small down arrow at the far right of the bar containing tabs for each open window and a list of all open tabs appears. Click the one you wish to view.



If more tabs are open than can be shown in the available space, right and left arrow icons appear. Click them to scroll through the open tabs.

40.10 FIT Viewer File List

 Click the icon on the far left of the toolbar to open a tab with the list of open image files



- Double-click any item in the list to open the tab containing that image and view it
- Click the heading of any column to sort the list by that column

The columns contain the following information:

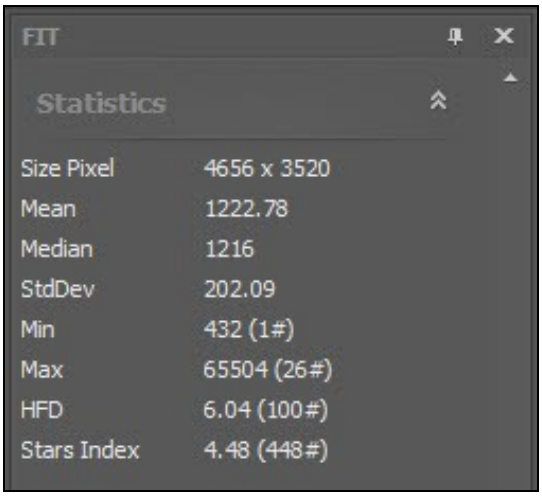
- **No:** An icon indicating the origin of the image - the V icon if it came from Voyager, a folder icon if from a manual file open. Also the image number, a sequential integer corresponding to the order in which the image was opened
- **TimeInfo:** The time at which the image was opened. This will roughly correspond to the time the image was downloaded to Voyager if it was opened automatically after download
- **FileName:** The name of the file on disk holding the image
- **Filter:** The filter used to take the image, from the FITS header
- **Exp:** Exposure length of the image in seconds, from the FITS header
- **Sequence:** Number of the Sequence that was used to take the image if it was taken with a Sequence run
- **HFD:** Average half-flux diameter of the stars found in the image
- **Stars Index:** This is value of the number of predicted stars divided by the number of stars used for computing the HFD. This index goes lower as the sky conditions get worse, and goes higher as they improve
- **Sequence:** Target name from the Sequence used to take this image, if it was taken with a Sequence run
- **Path:** Folder containing the image file

At the bottom of the file list there are buttons to manage the list and view the most recent image added to the list:

- **Clear list:** Empties the list (but does not close all the open windows)
- **Restore List Order:** Puts the list back in the original order, showing the most recently opened image first
- **Select Last Image**: Selects the image most recently opened or downloaded from Voyager
- **Show Last Image:** Shows the image most recently opened or downloaded from Voyager

40.11 Image Statistics

Image Statistics are displayed on the top right side of the FIT Viewer.

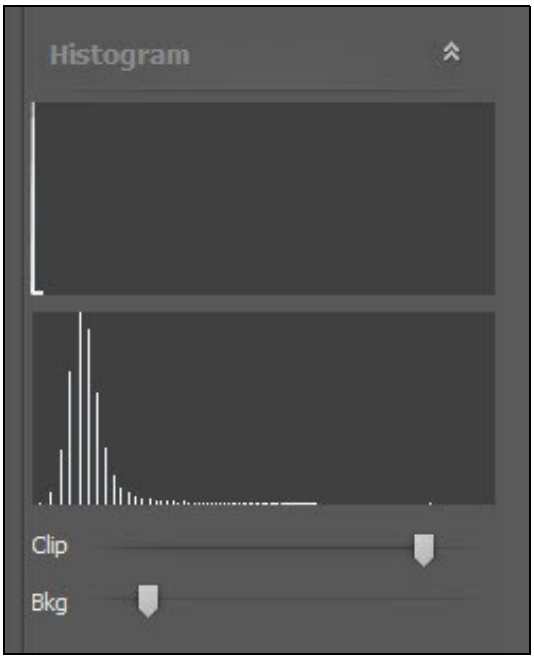


Note: You can click the double-up arrow icon to "roll-up" this window and then click it again to open it

- **Size Pixel:** Image size in pixels, width x height
- **Mean:** Mean ADU value of the pixels in the image (average brightness of your raw data)
- **Median**: Median ADU value of the pixels in the image
- **StdDev:** Standard Deviation of the ADU value of the pixels in your image
- **Min:** ADU value of the dimmest pixel in your image, and in ()'s, the number of pixels with that value
- **Max:** ADU value of the brightest pixel in your image, and in ()'s, the number of pixels with that value
- **HFD:** The average HFD (Half Flux Diameter) of the stars in your image
- **Stars Index:** The stars index is the number of predicted stars divided by the number of stars used in the HFD calculation. Voyager's AI predicts the number of stars (the number in parentheses). As sky conditions improve, this number gets larger. As sky conditions get worse, this number gets lower

40.12 Histogram

Input and output histograms and controls are displayed on the middle right of the FIT Viewer window:



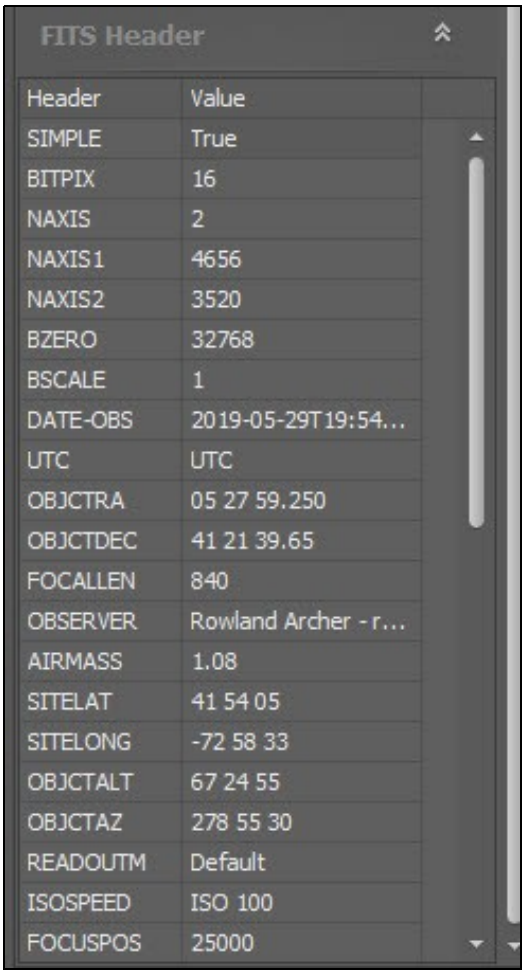
- **Top window:** shows the histogram of the raw image file currently displayed in the viewer
- **Lower window:** shows the histogram of the stretched image based on the currently applied stretch
- **Clip:** Click and drag this slider control to the left to clip more of the brighter pixels in your image. Notice that the image looks dimmer when you drag left, and brighter when you drag right.
- **Bkg:** Click and drag this slider control to the left to clip more of the dimmer pixels in your image.

40.13 FITS Header

A table showing the values in the image's FITS header is displayed on the bottom right of the FIT Viewer:

The actual content of this window depends on your image. FITS header values are not 100% standard and your camera driver is likely to insert different values from the ones you see here.

Use the scroll bar on the right to move the table up and down and see all the header values.


FITS Header
Header
Value
SIMPLE
True
BITPIX
16
NAXIS
2
NAXIS1
4656
NAXIS2
3520
BZERO
32768
BSCALE
1
DATE-OBS
2019-05-29T19:54...
UTC
UTC
OBJCTRA
05 27 59.250
OBJCTDEC
41 21 39.65
FOCALLEN
840
OBSERVER
Rowland Archer - r...
AIRMASS
1.08
SITELAT
41 54 05
SITELONG
-72 58 33
OBJCTALT
67 24 55
OBJCTAZ
278 55 30
READOUTM
Default
ISOSPEED
ISO 100
FOCUSPOS
25000

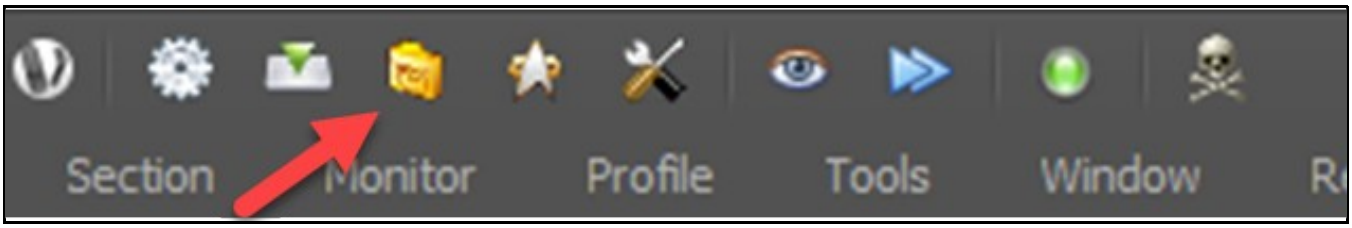
41 DragScript

Voyager has three ways to perform actions and take images:

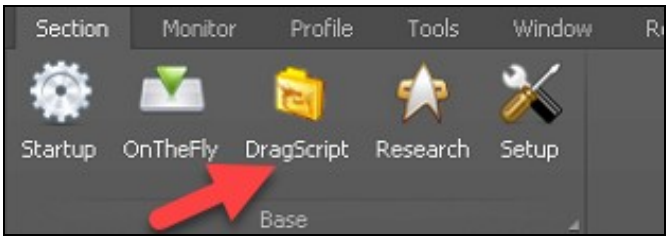
1. Using the buttons in the OnTheFly workspace and the Commands window to perform immediate actions such as an autofocus, plate solve, or camera shot
2. Running a sequence from either the OnTheFly or Research & Survey workspaces. An OnTheFly Sequence performs a set of actions and takes a series of images of a single target; a Research & Survey Sequence takes a given set of exposures of one or more targets, optionally in a loop
3. Using a DragScript to automate a complete imaging session from startup to shutdown, including one or more sequences. The DragScript offers the most flexibility and automation, and is the method of choice to run unattended, all-night automated imaging sessions

41.1 DragScript Workspace

The DragScript workspace can be entered two different ways:

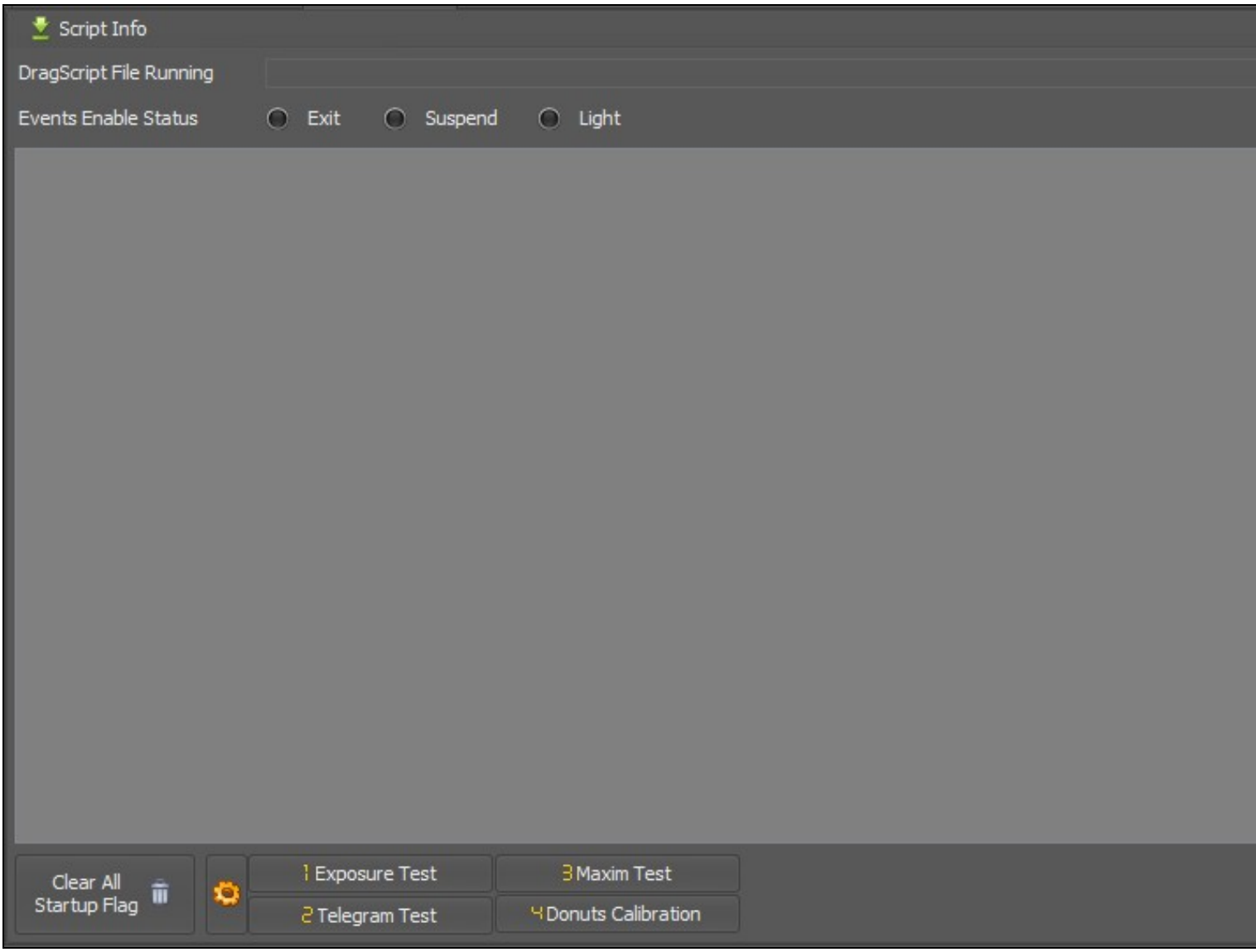


Click the icon pointed at by the red arrow in the Command Bar at the top of the Voyager window



Or, click the Section menu and then click the DragScript icon from the Section ribbon

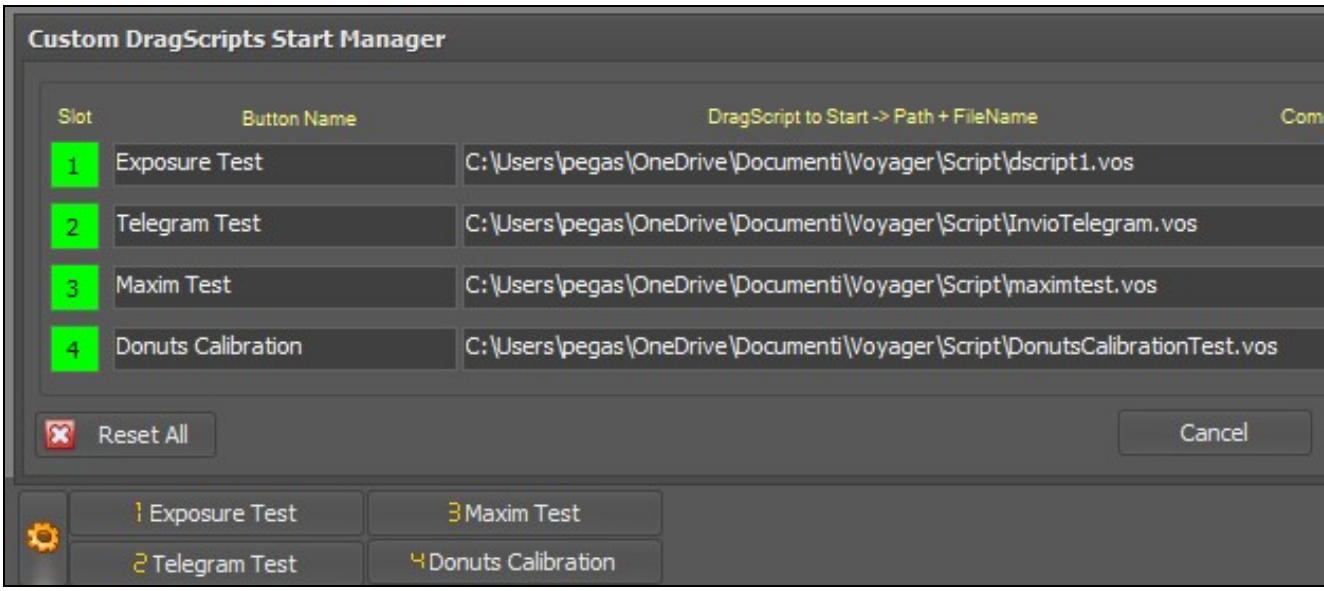
When you first enter the DragScript workspace, if there is no script loaded, it will look like this:



Once a script is loaded, it will fill the light gray area in the middle of this workspace.

- **DragScript File Running:** report the actually loaded DrgScript file to execute or running
- **Events Enable Status:** show the actual enable status of the Emergency Events (Exit, Suspend, Light). The status are reported only if the DragScript is running

- **Clear All Startup Flag**: Resets all Sequence block flags set by running the script so you can run it again from the start. See Setting Sequence Options from a DragScript below to see the optional flags you can set by right clicking on a sequence block in a DragScript . This button resets all those flags and starts the DragScript with sequences running in their normal default mode.
-  (Starting from Voyager 2.3.5s) Click the left gear icon to manage the 4 customizable start button for your own dragscript file. The 4 buttons have a number icon and the name is the one you have chosen in Manager. When you press the button the related DragScript file will be loaded and runned. (The names in the above image are just for example)

- 

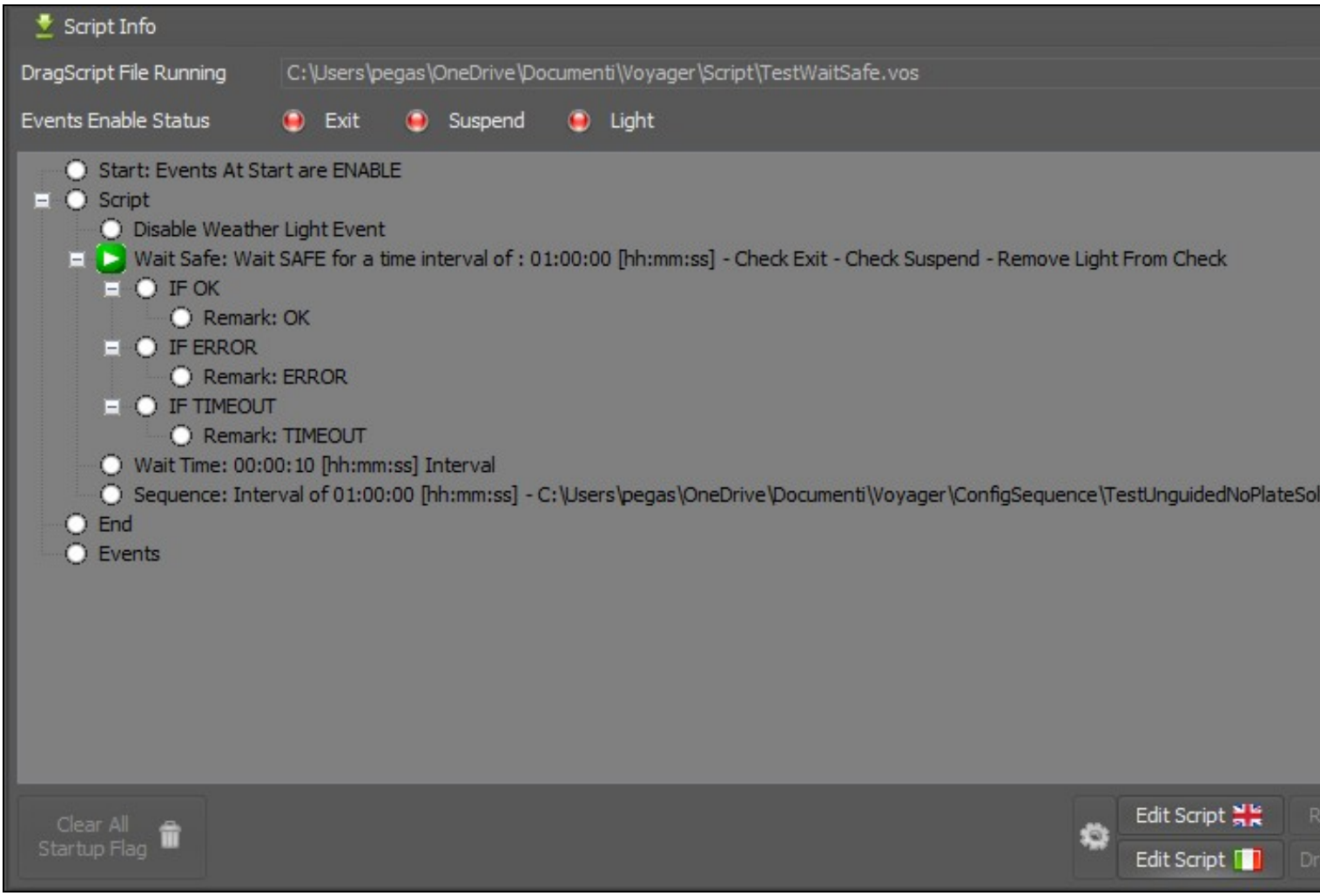
  - **Slot:** one of the 4 available for customized start
  - **Button Name:** define the string will be used like caption in button
  - **DragScript to Start:** define the dragscript file name and path to start at button press
  - **Reset All:** reset all slot data
  - **Cancel:** exit from the manager
  - **Save & Exit:** save the configurations on the profile and exit from manager

Select the DragScript from the file explorer of WIndows

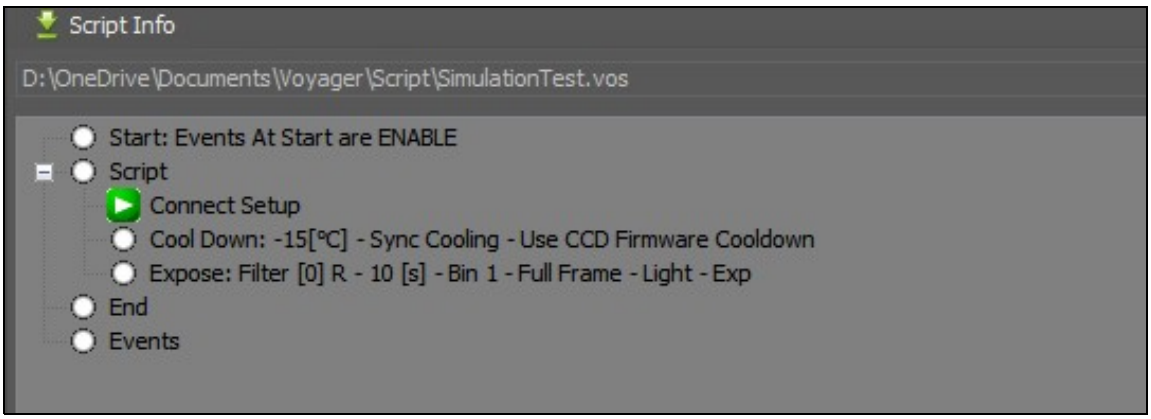
- Reset the slot data

-  Click the right gear icon to select and load a DragScript from the files saved on your disk
- **Edit Script**: Bring up the script editor. The button with a British flag brings up the English language editor. The button with an Italian flag brings up the Italian language version of the editor. If a script has been opened in this workspace using the gear icon, it will be loaded in the editor for use.
- **Reload Script**: Loads the script you selected with the gear icon fresh from disk. Click this button after making changes and saving them to disk with the DragScript editor.
- **DragScript Run**: Run the DragScript loaded in this workspace with the gear icon

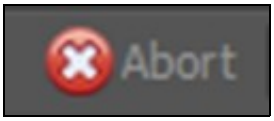
Once you load a script by clicking the gear icon, the script appears in the workspace like this:



After you click DragScript Run to run the script, an arrow will appear next to the currently executing action:

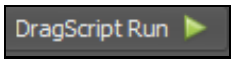


Messages related to the running DragScript will appear in the Monitor window so you can follow the progress of the script in detail:



Click the Abort button to stop the running script. There may be a brief delay until the currently running action can be interrupted

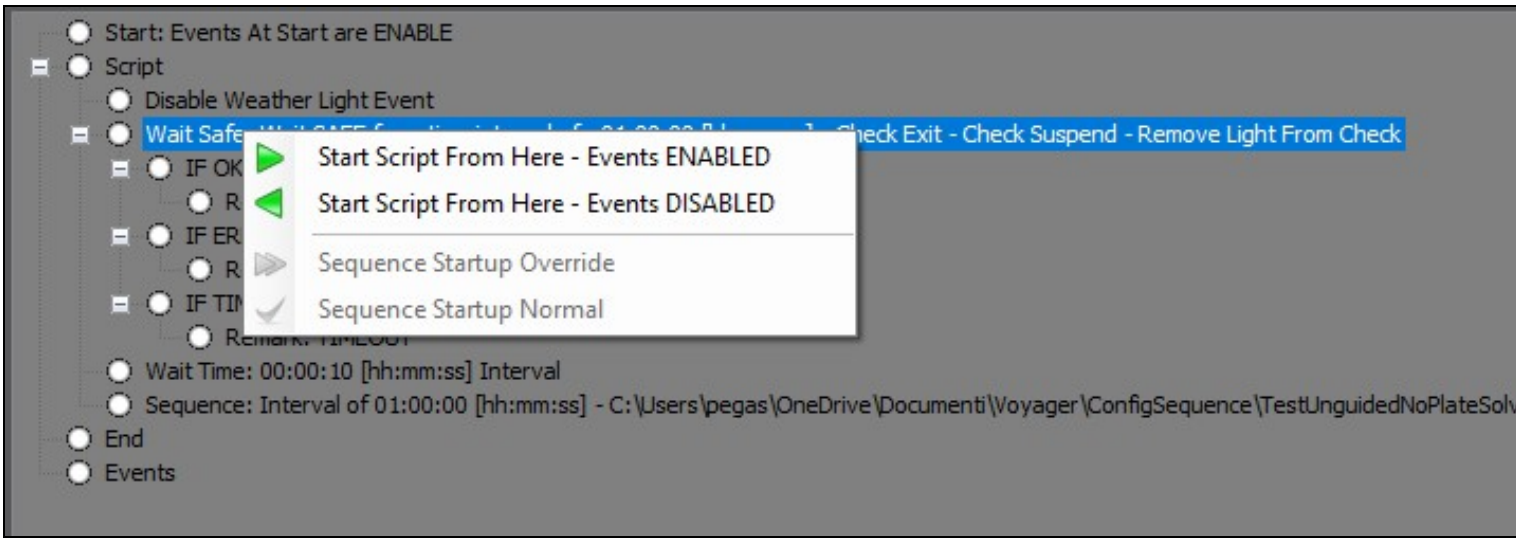
41.2 DragScript: Starting from an Arbitrary Line

Clicking the DragScript Run button 

starts execution from the beginning of the DragScript.

You can also start the script from an arbitrary line.

Right-click on the line where you'd like to start execution. A menu appears:



- **Start Script from Here - Events ENABLED**: Click to begin DragScript execution from the selected line and force the Emergency Suspend, Resume and Exit events ENABLED
- **Start Script from Here - Events DISABLED**: Click to begin DragScript execution from the selected line and force the Emergency Suspend, Resume and Exit events DISABLED

When Emergency Events are disabled they will not be managed also if execution blocks provided in your DragScript.

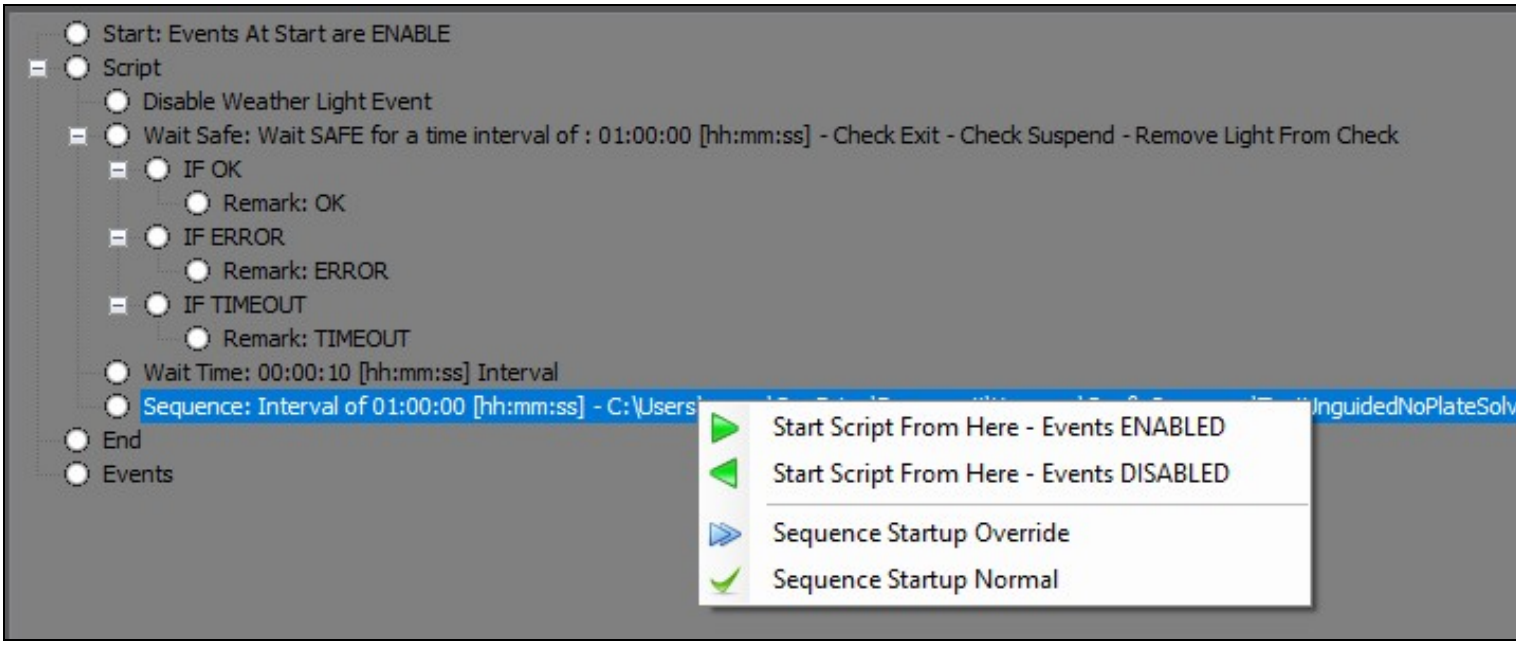
Use the Disable.... Enable... events to change enabled status (Events Control Block)

These two choices are available for any line in the DragScript.

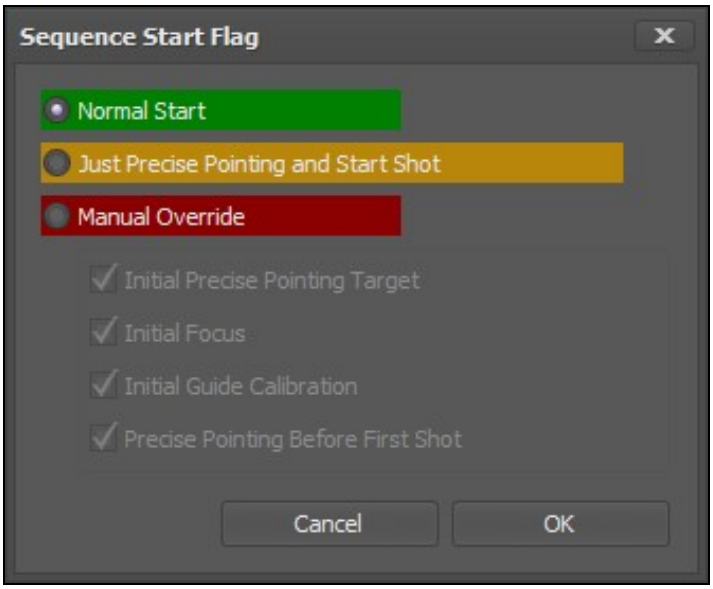
41.3 Setting Sequence Options from a DragScript

If you right-click on a Sequence or Research & Survey line in the DragScript. two more choices are available, Sequence Startup Override and Sequence Startup Normal. These can be used to override the options configured in the Sequence Start tab, or to clear the override. This override is only applied temporarily to the DragScript. They will be cleared when you shutdown Voyager.

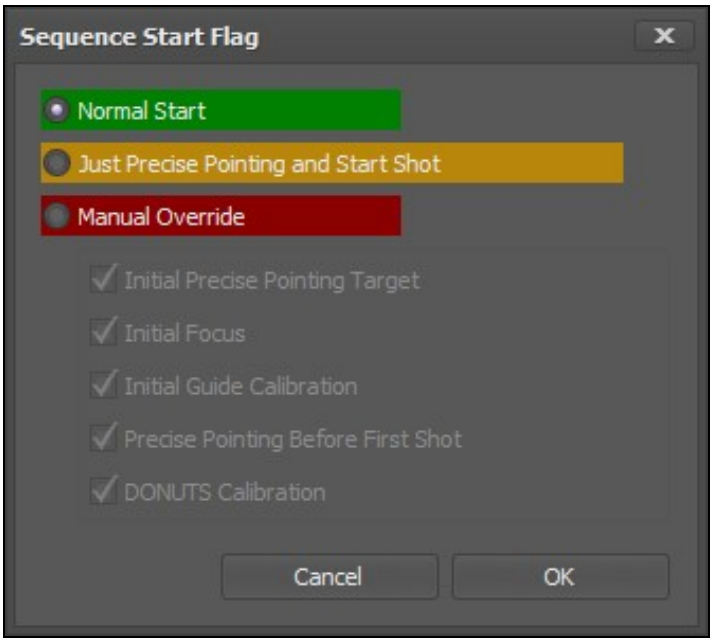
Important Note! Sequence Startup Override and Sequence Startup Normal create or clear a temporary startup override on the selected Sequence or Research & Survey line. They do not run the sequence - use the Start Script from Here or DragScript Run options to do that



- **Sequence Startup Override**: Click to start the DragScript from the Sequence (or Research & Survey) line with options:



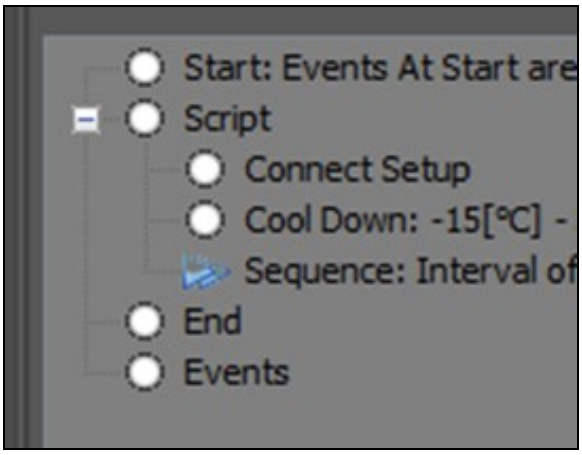
- **Normal Start**: Start the sequence using the options configured in the Sequence Start tab
- **Just Precise Pointing and Start Shot**: Use Precise Pointing to center the target and then begin taking exposures
- **Manual Override**: Gives you fine control over specific actions to perform or not when running the sequence:



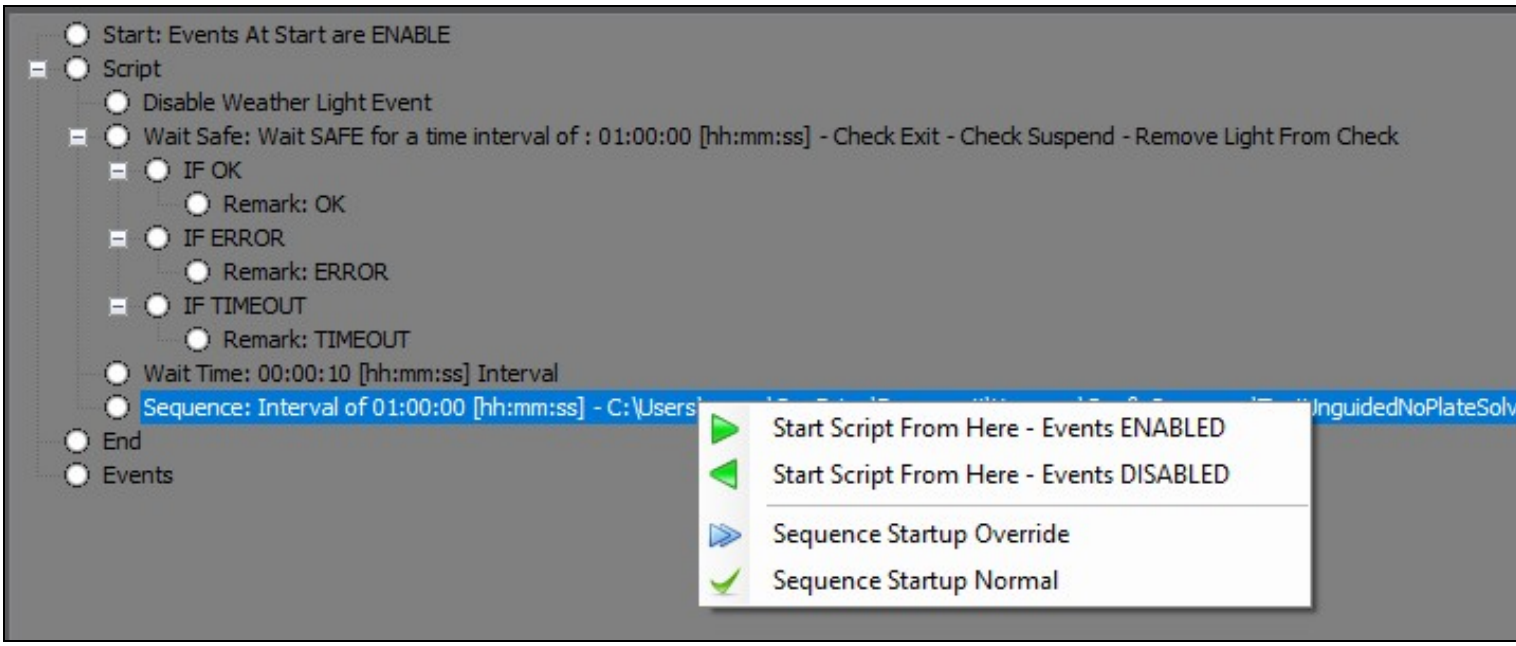
- **Initial Precise Pointing Target**: If checked, before doing anything else, perform precision pointing to the target coordinates

- **Initial Focus:** If checked, perform an initial autofocus before starting the sequence
- **Initial Guide Calibration**: If checked, instruct the guiding software to perform a calibration run before starting the sequence
- **Precise Pointing Before First Shot**: If checked, perform a precision pointing action before taking the first exposure. Done to avoid that Guide Calibration or focus goto introduce a significant pointing error
- **DONUTS Calibration:** if Checked, perform a Donuts Calibration when necessary if requested on Sequence Configuration

If an override is in effect, two blue triangles appear before the Sequence line:



To clear the Override, right click the line and choose the Sequence Startup Normal menu option:



41.4 Starting a DragScript from the Command Line

You can automatically launch a DragScript when you start Voyager from the command line with the syntax:

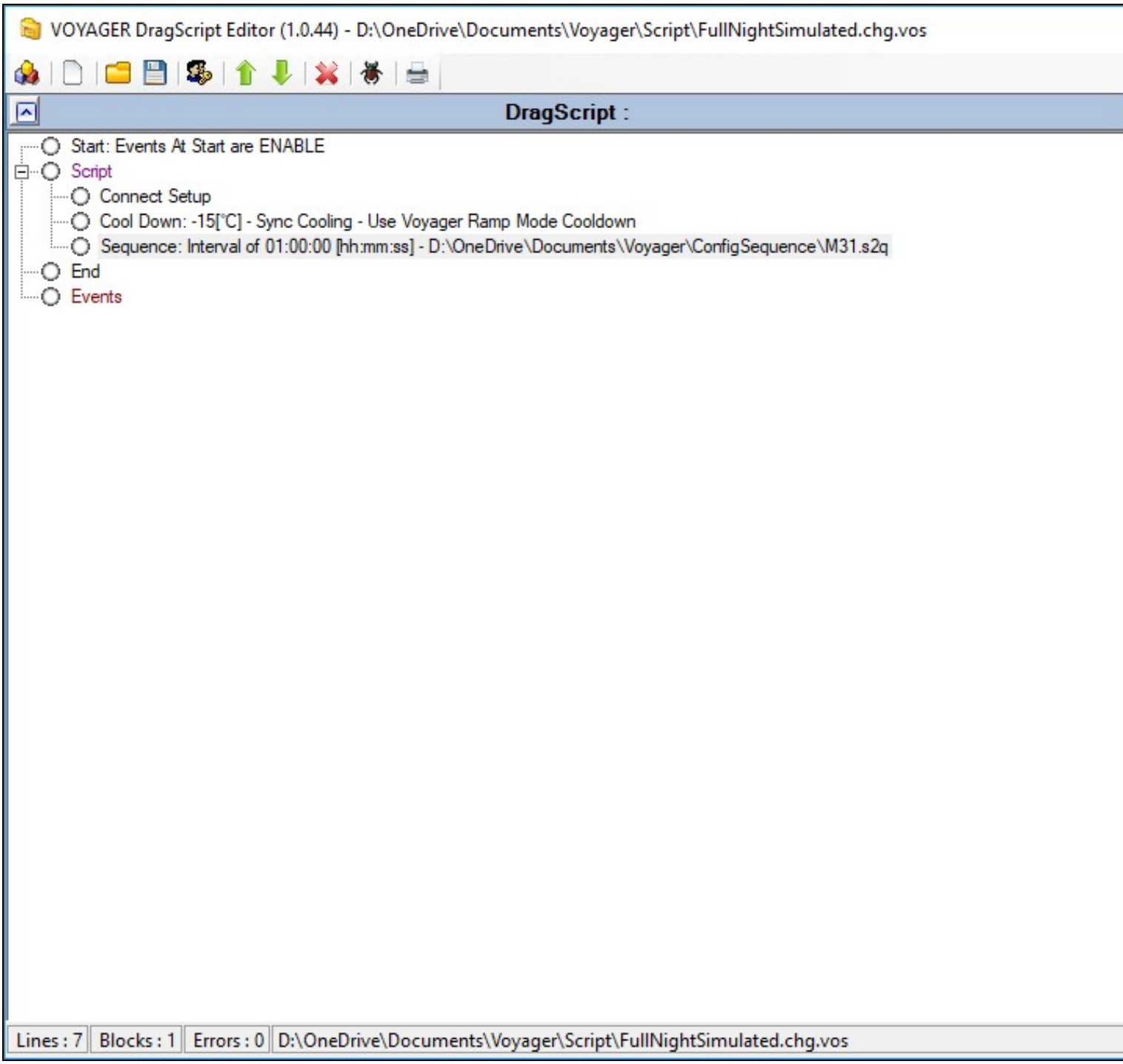
- Voyager2.exe /run:"fully qualified script filename"

Example:

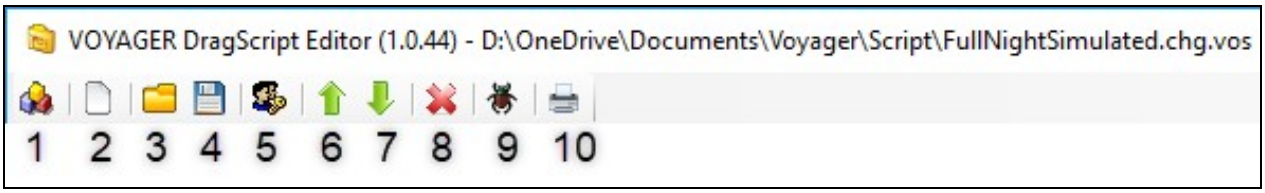
- Voyager2.exe /run:"C:\documents\pippo\voyager\script\script.vos"

41.5 DragScript Editor

Clicking the Edit Script button will bring up the DragScript editor in its own window. In this screen capture, the script loaded in the DragScript workspace above is automatically loaded in the editor for you:



At the top of the DragScript Editor window are icons to perform the following actions:



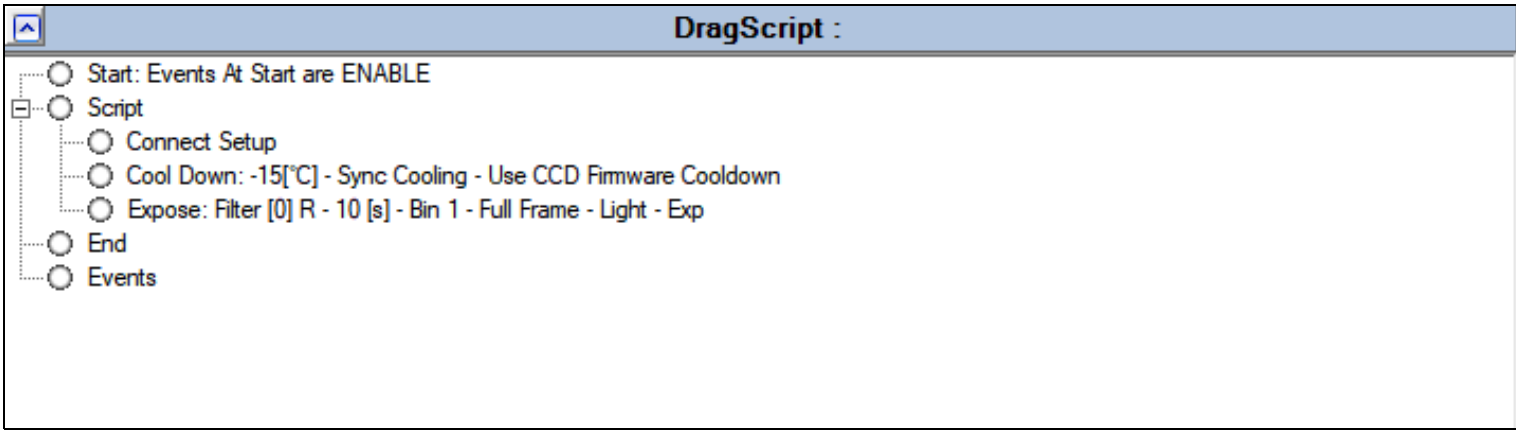
1. Select one of the pre-loaded scripts that are installed automatically with Voyager. These can be a good starting point to help you understand how scripts are structured and used
2. Reset the editor to have a blank (empty) script. Even an "empty" script has several sections:
    1. Start: Specifies whether Events are enabled or disabled when the script starts. Double click this script element to bring up a dialog box and choose the setting
    2. Script: The bulk of your script actions are contained between the Script and End labels

        3. End: The End label marks the end of your DragScript
        4. Events: This optional section holds your actions to take when an Emergency Suspend, Exit or Resume event is raised during script execution
    3. Load a DragScript from disk
    4. Save a DragScript to disk
    5. Save a DragScript to disk but **remove all private data** - example: email login information stored in a Send Email action. Use this setting to save a copy of your DragScript before sharing it with other people or posting on a forum (new as of Voyager 2.1.4a)
    6. Click a script element to select it, then click the green up arrow to move it upwards in your script
    7. Click a script element to select it, then click the green down arrow to move it downwards in your script
    8. Click a script element to select it, then click the red X to delete it
    9. Click to debug the script by running it under the DragScript Simulator
    10. Click to save the script to a plain text format file, suitable for printing

Important Note! As of Voyager 2.0.14e (daily build) and 2.1.0 (stable), if you close the DragScript editor without saving a script that has been created or modified without first being saved, you will be prompted to save the DragScript or confirm that you wish to close the editor without saving it first

41.6 DragScript Elements

The DragScript window contains the script you are currently editing. Drag items from the Editor Elements window on the right and drop them on the section where you want them to go, and they will be added to your script.



You can drag a block onto the Script, an existing block, or any of the IF decision actions.

You can drag any element to a block IF or a block DO action.

The easiest way to see where you can drop a new element is to watch the cursor shape while you are dragging the new element onto the DragScript. It will be the international "Not" sign - a circle with a slash through it - if you cannot drop the new element at that spot. It will be an arrow with a little rectangle attached if that is a legal spot to drop the new element.

If the cursor doesn't change, you are probably using the DragScript editor on a remote PC and your remote viewer, such as TeamViewer, has been set to not change the local mouse pointer to match the remote machine's mouse pointer.

OR -- on Windows 10, if your remote machine does not have a mouse enabled, the mouse pointer won't change shape. To fix this:

1) Right click the Windows button on the remote PC's desktop (not on your local PC)

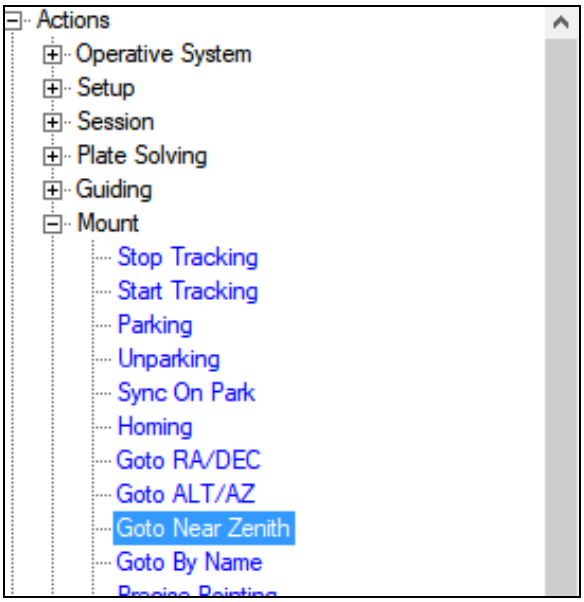
2) Click Settings

3) Type "Mouse Keys" in the search box and select "Turn Mouse Keys On or Off"

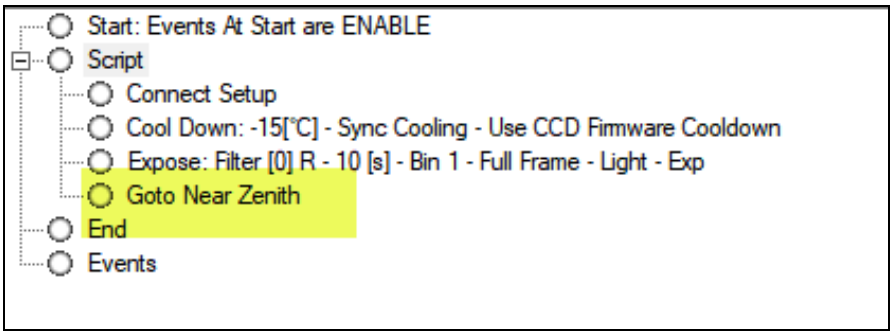
4) Turn Mouse Keys on

Here's a brief example. Let's say we want to add the action Goto Near Zenith before the Expose: action in the above script.

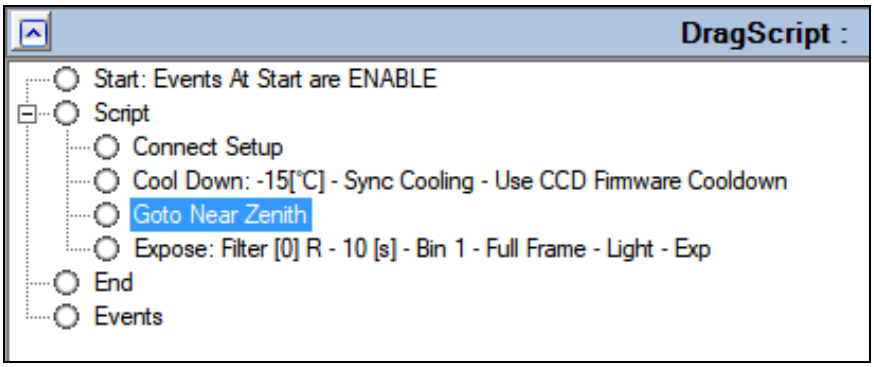
- Click the plus sign next to the Mount label in the Editor Elements box to show all available mount actions. Click Goto Near Zenith and drag it to the Script label in the DragScript window:



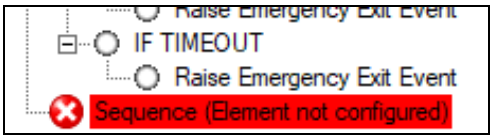
- After you drop it on the Script label in the DragScript window, it will be added as the last action in that section:



- Click Goto Near Zenith and then click the green up arrow icon in the toolbar at the top of the window to move the selected action up to where you want it to run



- Some DragScript actions require additional configuration before they will run. In that case, the element will be highlighted in red. Double-click it to bring up the dialog box, fill it out, and click OK to complete configuration of the element.

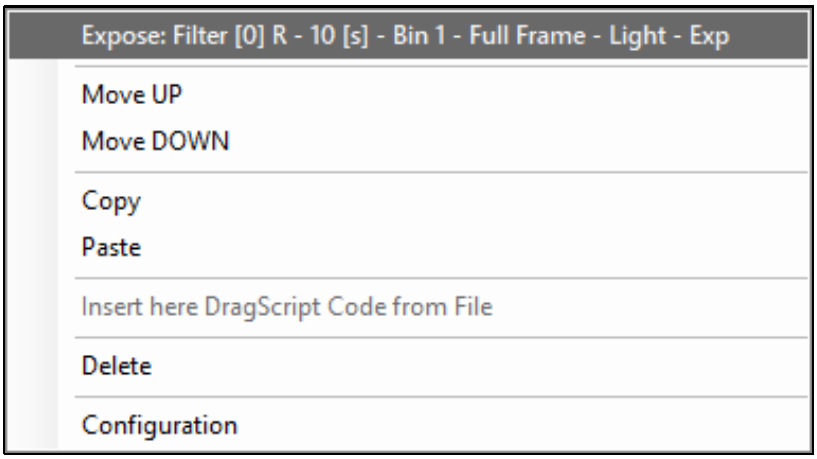


- When you are finished making your changes, save your script using the Save icon  .
- Return to the DragScript workspace in Voyager and click Reload Script to load the updated script with your changes

41.6.1 Editing a DragScript

Once you have created your initial DragScript by dragging elements from the right window to the script window, you can modify your script in several ways:

- Click an element to highlight it, then use the green Up/Dn arrows in the command bar to move it up or down, or the red X to delete it
- Double click a configurable element to open its configuration window. Make your changes and click the OK button to save them or Cancel to discard them
- Right click an element to bring up this menu:



- Move UP/Move Down: Click to move the selected element up or down in the script
- Copy: Copy the selected element to the clipboard
- Paste: Paste the clipboard contents at the mouse cursor
- Delete: Delete the selected element
- Configuration: Open the element's configuration window if it has one

Important Note! The target of a Drag and Drop must be a top level element such as Script, Block, End, Events, IF OK/ERROR/TIMEOUT, etc. The mouse cursor will be the international not symbol (circle with diagonal line) if you cannot drop the element at that location. A gray rectangle is added to the mouse cursor when it is hovering over a suitable target

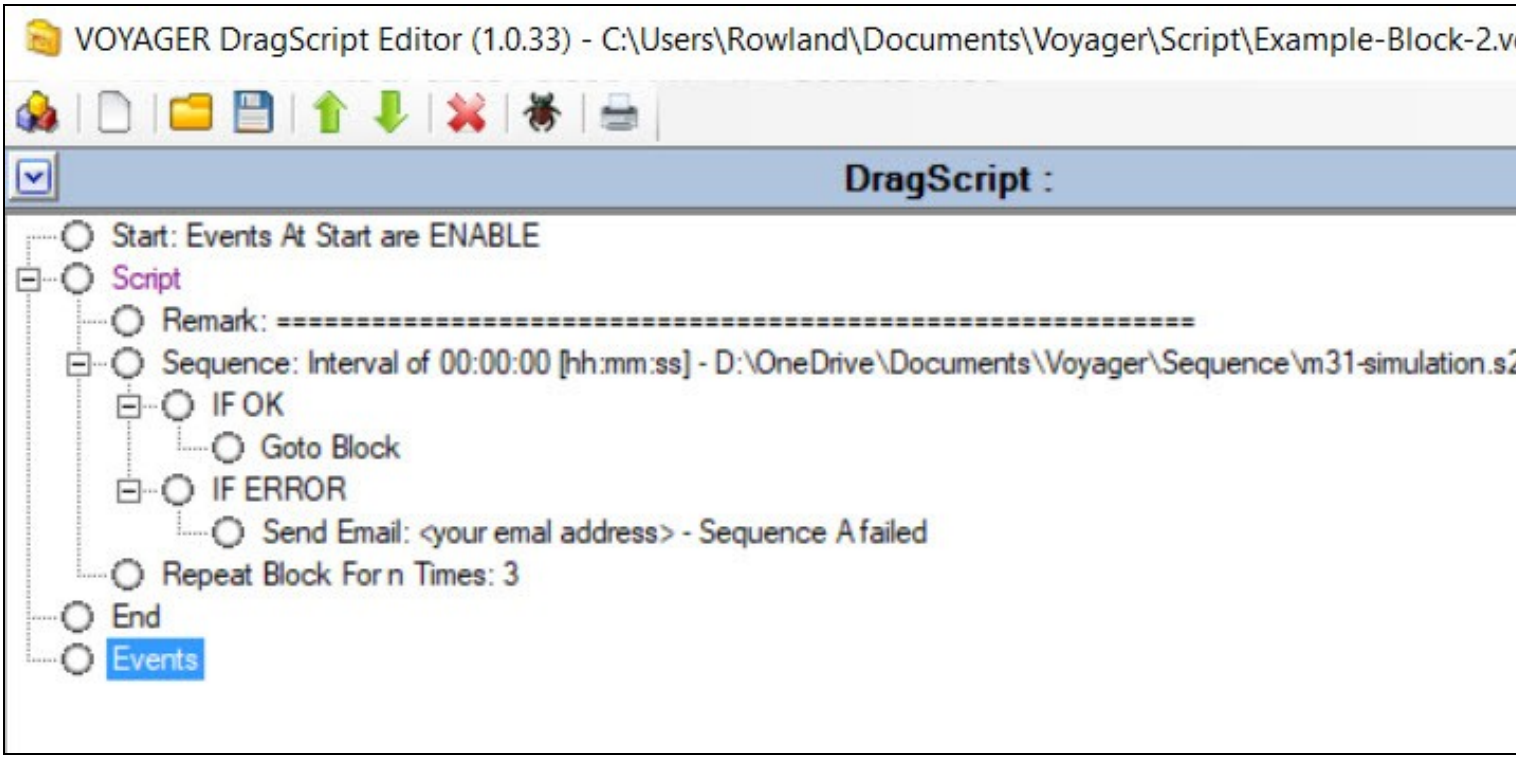
Important Note! If you are using a remote desktop such as Teamviewer and having trouble with Drag and Drop, try Copy and Paste to place an element at any indent level in the script, e.g. at the end of an existing IF OK block

41.7 Inserting a DragScript from a File

If you have a fragment of DragScript code that you would like to use in several places in your script, or one that you frequently use in different scripts, you can create the DragScript fragment, save it to a file, and then insert it and modify it as many times as necessary into your final script.

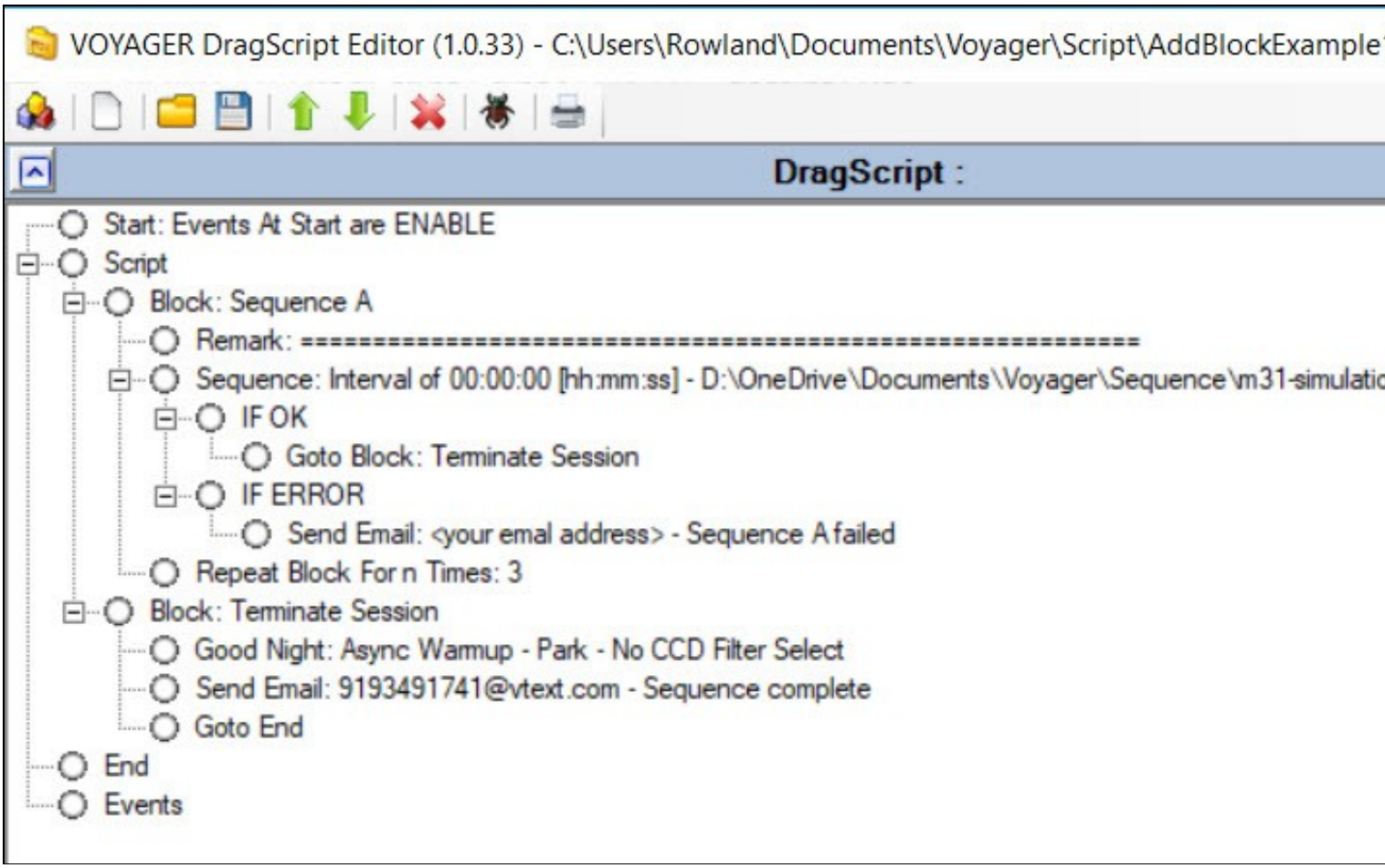
For example, we created this script to run a sequence, check for success, and go to the next block if OK, else send an email notifying us of the problem and try again, three times.

Note that we created this DragScript code directly in the main Script block. When we insert this later into another DragScript, a block is automatically created to hold the new fragment, so we don't need to put this in a block now:

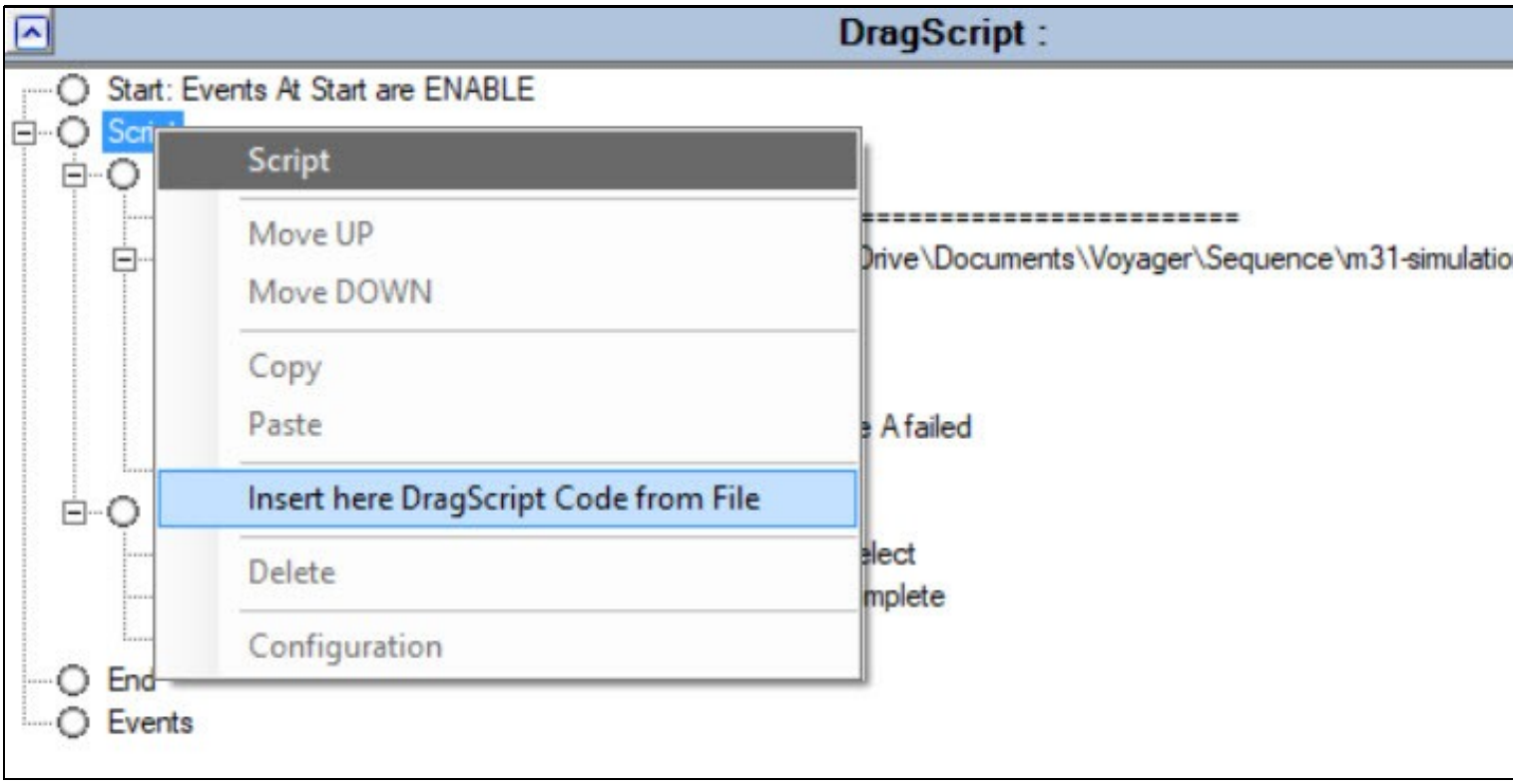


We saved this script to a file called Example-Block-2.

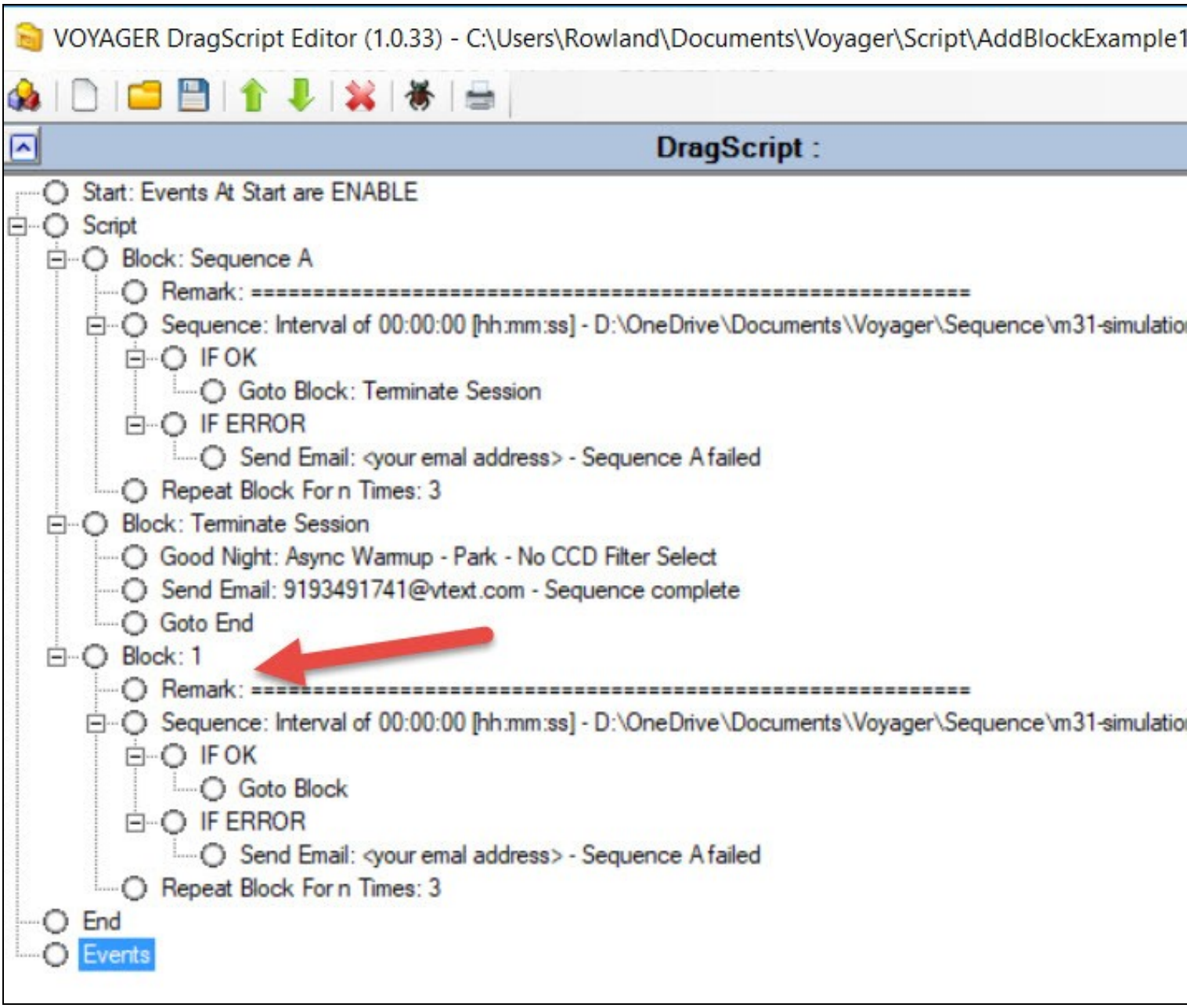
Now we open the script to which we want to add this fragment:



Right click on the Script block tag and select Insert DragScript from File. Choose the file containing the DragScript fragment we saved above and click Open:



The DragScript fragment is added in a new block at the end of the Script block. Highlight the new Block tag (Block 1 in this example), use the up/down arrow toolbar icons to move the block to your desired location. Edit the block as required and don't forget to save your changed script.



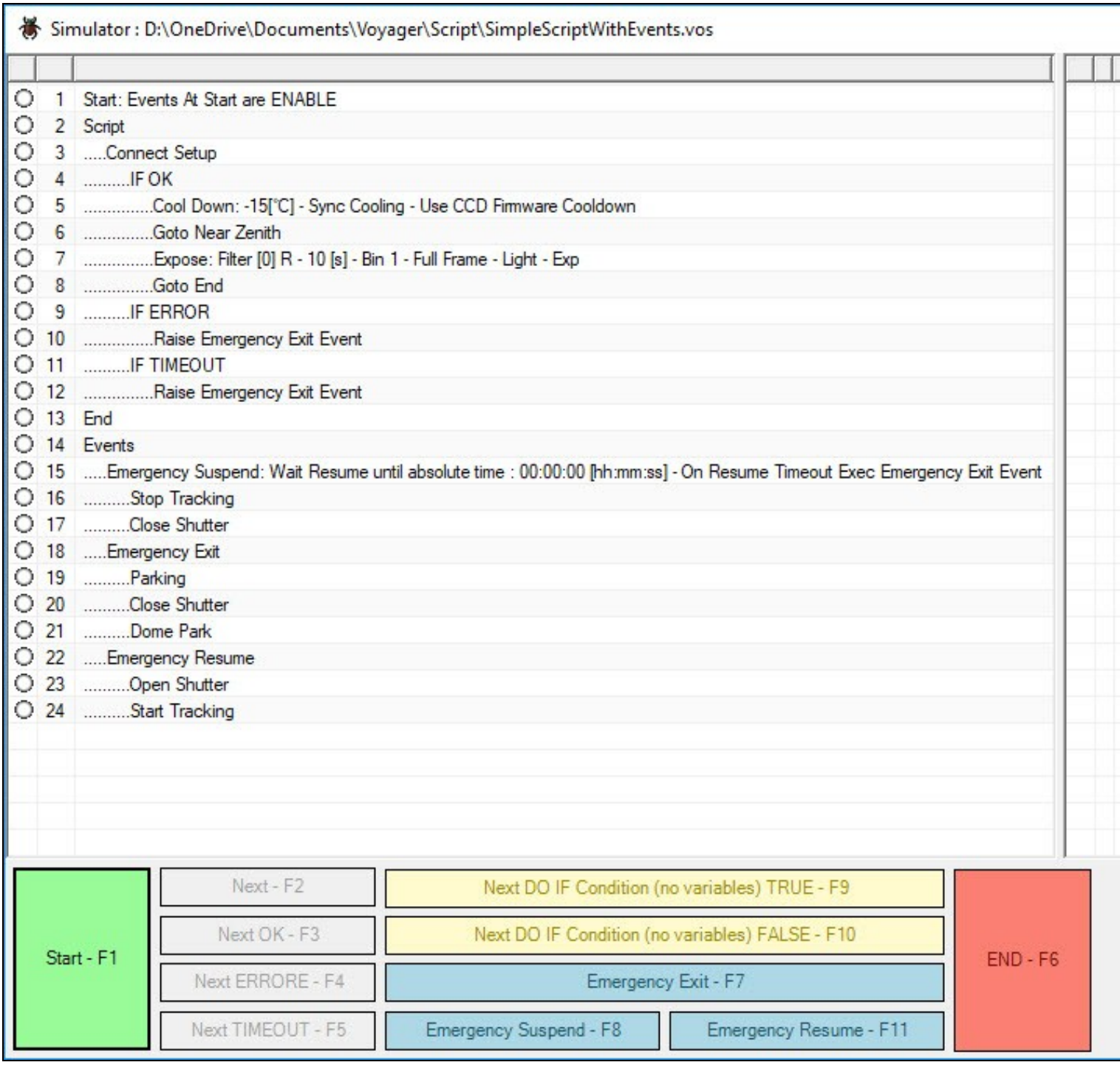
41.8 DragScript Simulator

Click the  icon in the toolbar to debug the loaded script in the DragScript simulator.

The Simulator lets you understand how control will flow in your script after each action is completed, whether with an OK outcome (success), an error, or a timeout.

It also shows you the control flow when an Emergency Exit, Emergency Suspend or Emergency Resume event are raised.

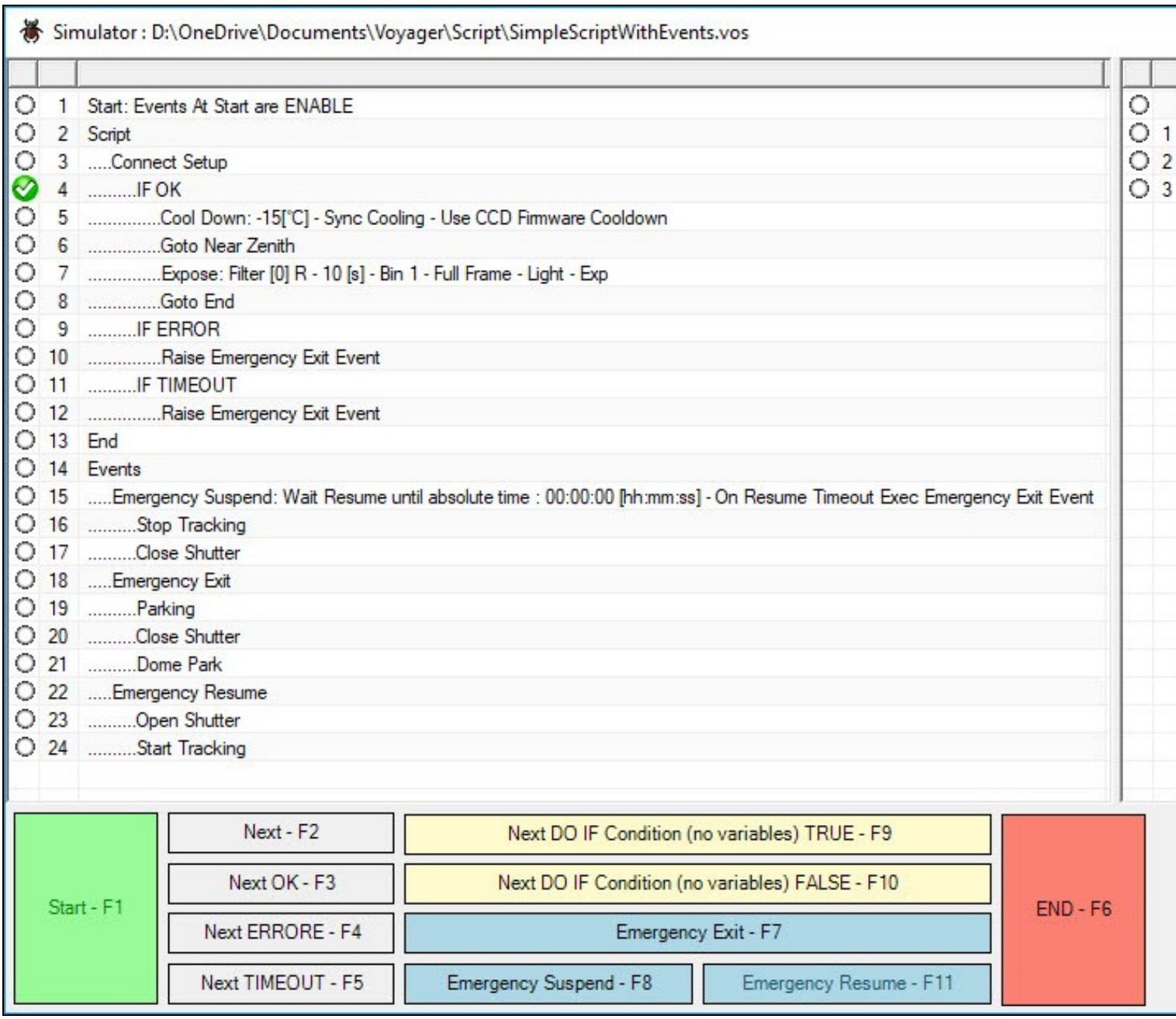
No actions are executed during the simulator session. This is just to understand the flow of control of your script under different conditions.



- The panel on the left contains the script to simulate. It contains the currently loaded script in the editor.
- For this example we have added very simple event handling to the script shown above in the DragScript Editor section. For example, if a Weather Event is configured to raise an Emergency Suspend on cloudy weather, and an Emergency Exit if it starts raining:
    - **Emergency Suspend**: Voyager will command the mount to stop tracking and close the observatory shutter (or roll-off roof if that's the type of observatory)
    - **Emergency Exit**: Voyager will command the mount to park, close the shutter or roll-off roof, and park the dome
    - **Emergency Resume**: Voyager will open the shutter and command the mount to resume tracking
-

- **Important Note!** In a production DragScript, you should check if operations in an Emergency Suspend and Emergency Exit block succeed, and if not, send a notification (SMS or Email) so you can take manual action to prevent equipment damage

- The script also demonstrates how the OK, ERROR and TIMEOUT results of an action are handled. In this example, Voyager would attempt to Connect to your setup.
    - If the Connect is successful (**IF OK**), the script will cool the CCD, slew to near the zenith, and take an exposure.
    - If the Connect Setup returns an error (**IF ERROR**) or times out (**IF TIMEOUT**), the script will raise an Emergency Exit event and the steps outlined above for Emergency Exit will be done
- **Start - F1**: Click this button or press the F1 key to start the simulation. When you start the simulation, the Next buttons are activated and messages start to appear in the window on the right. In the next screenshot, we can see the results after pressing Start - F1 and then Next - F2 (or Next OK - F3) three times:



- **Next - F2**: Click this button or press the F2 key to move to the next line of the script without raising any events

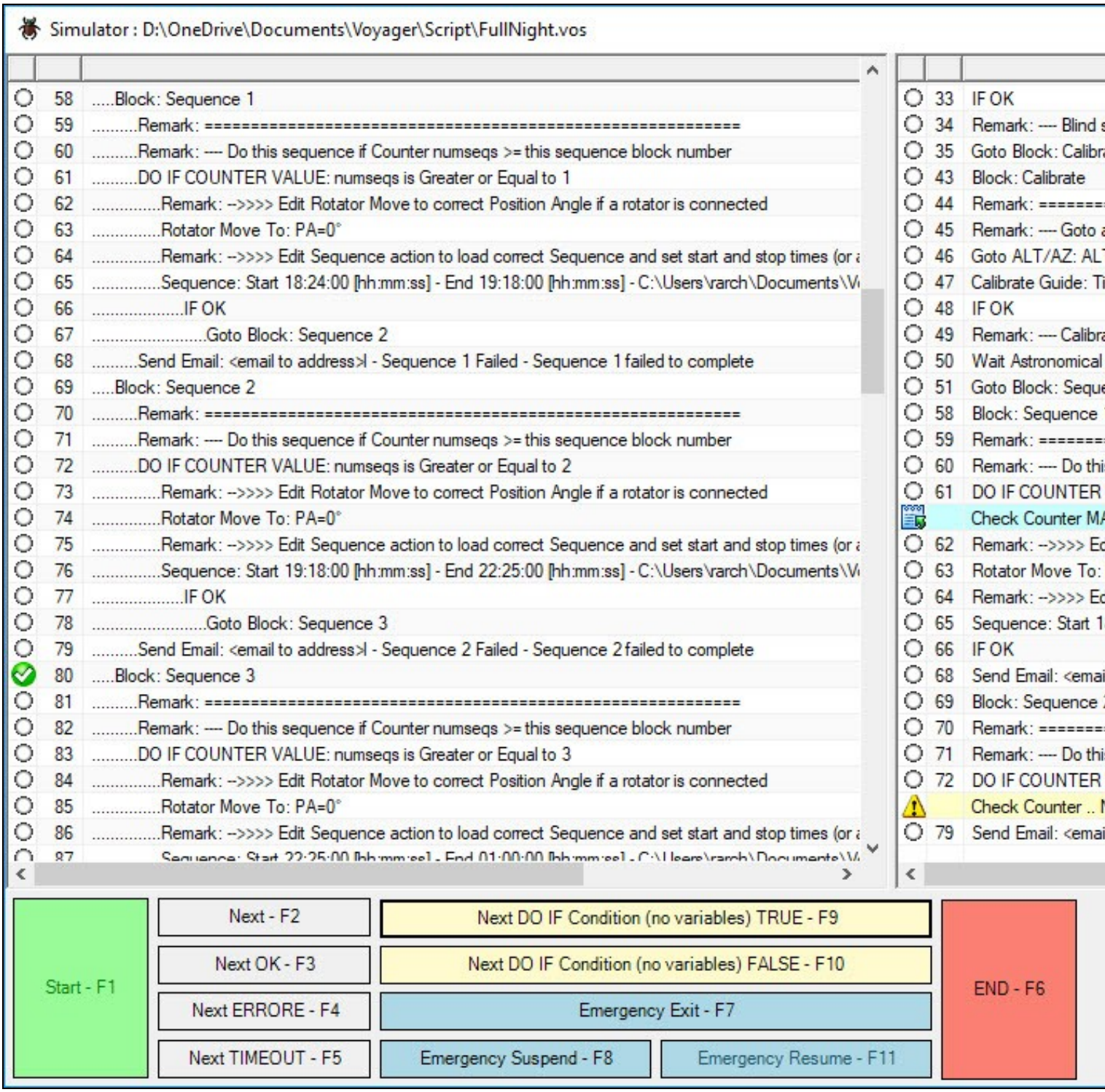
- **Next OK - F3**: Click this button or press the F3 key to simulate successful completion of the current line of the script and move to the next line that will be executed
- **Next ERROR - F4**: Click this button or press the F4 key to signal an ERROR has occurred while executing the current line of the script. Then press Next and the trace window on the right will show the path of execution after the ERROR was raised
- **Next TIMEOUT - F5**: Click this button or press the F5 key to signal a TIMEOUT has occurred while executing the current line of the script. Then press Next and the trace window on the right will show the path of execution after the TIMEOUT was raised
- **Next DO IF Condition (no variables) TRUE - F9**: Press this button or the F9 key to simulate execution of a DO IF conditional statement that evaluates to TRUE. The DO IF Condition should not contain variables.
- **Next DO IF Condition (no variables) FALSE - F10**: Press this button or the F10 key to simulate execution of a DO IF conditional statement that evaluates to FALSE. The DO IF Condition should not contain variables.
- **Emergency Exit - F7**: Click this button or press F7 to simulate an Emergency Exit event. Then press Next and the trace window on the right will show the path of execution after the Emergency Exit event was raised
- **Emergency Suspend - F8**: Click this button or press F8 to simulate an Emergency Suspend event. Then press Next and the trace window on the right will show the path of execution after the Emergency Suspend event was raised
- **Emergency Resume - F11:** Click this button or press F11 to simulate an Emergency Resume event. Then press Next and the trace window on the right will show the path of execution after the Emergency Resume event was raised
- **END - F6**: Click this button or press the F6 key to end the simulation

Important Note! In addition to tracing the flow of control in the simulator's right window, a green check mark appears next to the currently executing line (simulated) in the left pane, as seen in the previous screenshot

Checking COUNTER values in the DragScript Simulator

As of Voyager 2.1.1c, the DragScript simulator will display the results of testing counter variables in a DO IF COUNTER VALUE statement.

In this example, the variable numseqs was set equal to 1 at the start of the DragScript.



- The Next OK button was pressed repeatedly to step through the DragScript
- After line 61, since numseqs = 1, the DO IF COUNTER VALUE is Greater or Equal to 1 test succeeds
- The next line is highlighted blue and the phrase Counter MATCH tells you that the test succeeded and the actions in the DO IF block will be executed
- After line 72, since numseqs = 1, the DO IF COUNTER VALUE is Greater or Equal to 2 test fails
- The next line is highlighted yellow and the phrase NOT MATCH != 1 tells you that the test failed and the actions in the DO IF block will not be executed

To learn about the individual DragScript elements, visit the DragScript Elements page.

42 DragScript Environment Variables

Evironment Variables are built int variables that user cas use in DragScript without creating. Name of Environment Variables starting with $$. To help on use them there is a window list where to copy the name in the DragScript Editor.

42.1 Environment Variables List Form

Click on the 

icon in the main menù of Viking to open the Environment Variables List:

Environment Variables List

Label		Type	Group	Description
$$EMEVENT_EXIT_LASTREASON	Copy	String	Emergency Events	Last Reason (Source and weather s
$$EMEVENT_EXIT_LASTTIME	Copy	String	Emergency Events	Last DateTime of an EXIT Emergen
$$EMEVENT_SUSPEND_LASTREASON	Copy	String	Emergency Events	Last Reason (Source and weather s
$$EMEVENT_SUSPEND_LASTTIME	Copy	String	Emergency Events	Last DateTime of an SUSPEND Em
$$PERSEUS_FIRMWARE	Copy	String	OPTEC Perseus	Firmware Version
$$PERSEUS_ISHOMED	Copy	Counter	OPTEC Perseus	Report if Device is Homed (0=false,
$$PERSEUS_PORT	Copy	Counter	OPTEC Perseus	Actual Selected Port (0=error, X=por
$$PERSEUS_PORT1NAME	Copy	String	OPTEC Perseus	Port 1 Name
$$PERSEUS_PORT2NAME	Copy	String	OPTEC Perseus	Port 2 Name
$$PERSEUS_PORT3NAME	Copy	String	OPTEC Perseus	Port 3 Name
$$PERSEUS_PORT4NAME	Copy	String	OPTEC Perseus	Port 4 Name
$$RTEVENT_CODE	Copy	Counter	RoboTarget Events	RoboTarget Event Code
$$RTEVENT_CODE_TEXT	Copy	String	RoboTarget Events	RoboTarget Event Code Text
$$RTEVENT_OPTIONAL_TEXT	Copy	String	RoboTarget Events	Optional Event Text
$$RTEVENT_RUN_UID	Copy	String	RoboTarget Events	UID Run
$$RTEVENT_TARGET	Copy	String	RoboTarget Events	Actual Target Name
$$RTEVENT_TARGET_SET	Copy	String	RoboTarget Events	Set Name of Actual Target
$$RTEVENT_TARGET_SET_TAG	Copy	String	RoboTarget Events	Set Tag of Target
$$RTEVENT_TARGET_SET_UID	Copy	String	RoboTarget Events	UID Set of Actual Target
$$RTEVENT_TARGET_TAG	Copy	String	RoboTarget Events	Target Tag
$$RTEVENT_TARGET_UID	Copy	String	RoboTarget Events	UID Actual Target
$$RTEVENT_TYPE	Copy	Counter	RoboTarget Events	RoboTarget Event Type Code
$$RTEVENT_TYPE_TEXT	Copy	String	RoboTarget Events	RoboTarget Event Type Code Text
$$SEQUENCE_FAIL_STATUS	Copy	Counter	Sequence	Reason why the last executed sequ

- **Label**: name of Variable to use in DragScript
- **Type:** type of DragScript variable
- **Group:** label to identify a group / category of environment
- **Description:** description of the variable meaning and definitio on various values if needed
- **Copy:** to copy in clipboard the variable label for using in DragScript various blocks configuration

42.2 Environment Variables List

$$EMEVENT_EXIT_LASTREASON	Copy String	Emergency Events	Last Reason (Source and weather string) of an EXIT Emergency Event if occourred since Voyager is started (string)
$$EMEVENT_EXIT_LASTTIME	Copy String	Emergency Events	Last DateTime of an EXIT Emergency Event if occourred since Voyager is started (string)
$$EMEVENT_SUSPEND_LASTREASON	Copy String	Emergency Events	Last Reason (Source and weather string) of an SUSPEND Emergency Event if occourred since Voyager is started (string)
$$EMEVENT_SUSPEND_LASTTIME	Copy String	Emergency Events	Last DateTime of an SUSPEND Emergency Event if occourred since Voyager is started (string)
$$PERSEUS_FIRMWARE	Copy String	OPTEC Perseus	Firmware Version
$$PERSEUS_ISHOMED	Copy Counter	OPTEC Perseus	Report if Device is Homed (0=false, 1=true, -1=error)
$$PERSEUS_PORT	Copy Counter	OPTEC Perseus	Actual Selected Port (0=error, X=port index from 1 to 4)
$$PERSEUS_PORT1NAME	Copy String	OPTEC Perseus	Port 1 Name
$$PERSEUS_PORT2NAME	Copy String	OPTEC Perseus	Port 2 Name
$$PERSEUS_PORT3NAME	Copy String	OPTEC Perseus	Port 3 Name
$$PERSEUS_PORT4NAME	Copy String	OPTEC Perseus	Port 4 Name
$$SEQUENCE_FAIL_STATUS	Copy Counter	Sequence	Reason why the last executed sequence in DragScript exit out due to an error NO_ERROR = 0 UNKNOW_ERROR = 1 START_ERROR = 2 SETUP_NOT_CONNECTED = 3 CANNOT_LOAD_SEQUENCE_FILE = 4 TARGET_POINTING_DATA_ERROR = 5 TIME_START_END_CALCULATION_ERROR = 6 NO_NIGHT_CONDITION = 7 INTERNAL_ERROR = 8 GUIDE_CALIBRATION_ERROR = 9

PRECISE_POINTING_ERROR = 10

ACQUIRE_GUIDE_STAR_ERROR = 11

MERIDIAN_FLIP_WATCHDOG_RETRY_END = 12

START_GUIDING_RETRY_END_ERROR = 13

FSM_UNKNOW_STATUS = 14

TELESCOPE_NOT_CONFIGURED_CONNECTED_ERROR = 15

CAMERA_NOT_CONFIGURED_CONNECTED_ERROR = 16

ROTATOR_NOT_CONFIGURED_CONNECTED_ERROR = 17

GUIDE_NOT_CONFIGURED_CONNECTED_ERROR = 18

GUIDE_EMPASS_ERROR = 19

GUIDE_BINNING_NOT_SUPPORTED_ERROR = 20

SEQUENCE_EMPTY_ERROR = 21

SEQUENCE_NOT_PLANNED_ERROR = 22

FOLDER_CREATION_ACCESS_ERROR = 23

DOME_SLAVE_ERROR = 24

FLAT_DEVICE_ERROR = 25

TIME_WAIT_ERROR = 26

EXEC_EXTERNAL_ERROR = 27

COOLING_ERROR = 28

DONUTS_ERROR = 29

GUIDE_RESET_ERROR = 30

GOTO_ERROR = 31

ROTATOR_ERROR = 32

AUTOFOCUS_ERROR = 33

GUIDE_START_ERROR = 34

MOUNT_PARKED_ERROR = 35

MOUNT_TRACKING_STOPPED_WATCHDOG_RETRY_END = 36

CAMERA_SHOT_ERROR = 37

DITHERING_ERROR = 38

GUIDE_STOP_ERROR = 39

GOODNIGHT_ERROR = 40

FILTER_WRONG_INDEX= 41

The variables start with $$RTEVENT.... are dedicated to Voyager Advanced and Full version. Refer to the dedicated documentation.

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43 About Plugin

Regardless of the type of license it is possible to activate plugins in Voyager for particular functions.

Plugins are additional features to the basic Voyager functions in common with all license types. They give access to a subset of operations and management of a particular type, developed specifically for the purpose.

To activate the plugins **you must first of all already have a Voyager license** and then purchase the Plugin directly from the Voyager website in the dedicated section by providing the Voyager installation serial number. The Voyager team will send you an updated license with the purchased Plugin unlocked.

The plugins follow the same principles of use as normal windows licenses. Each purchase of a plugin entitles you to install it on up to 3 PCs.

43.1 List of actual plugin:

- Distributed Emergency

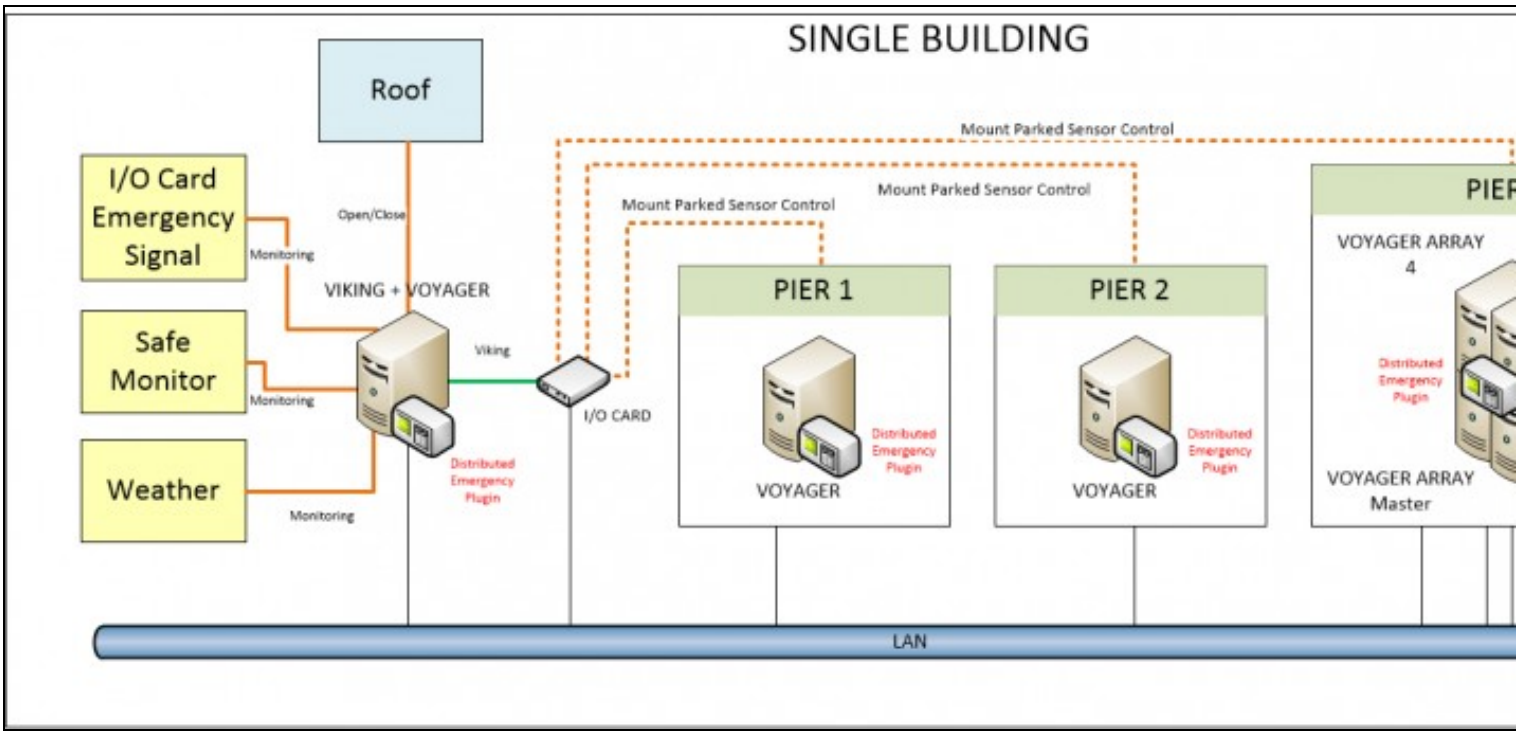
44 Distributed Emergency

44.1 Description

This plugin allows you to centralize and distribute the emergency data coming from monitoring systems such as the Weather, I / O cards via Viking and ASCOM Safe or TEXT Safe type controls. Centralized data can be used by all Voyager installations present as an instance or as an element in the Observatory's LAN network.

This plugin is useful for managing single buildings used as observatories or telescope farms where there are several Piers, each managed by its Voyager installation. There will be a Voyager master who will only deal with the centralized reading, interpretation and distribution of Emergency data that with a dedicated 24h / 24h DragScript running (included in plugin purchase) every day will take care of the opening / closing of the roof, the suspension and resume and the exit for emergency distributed to all Voyager connected.

The connections between the Voyager distributor and the clients are self-restoring and with a fail-over system



An example of Distributed Emergency Plugin applied to single building for a telescope farm

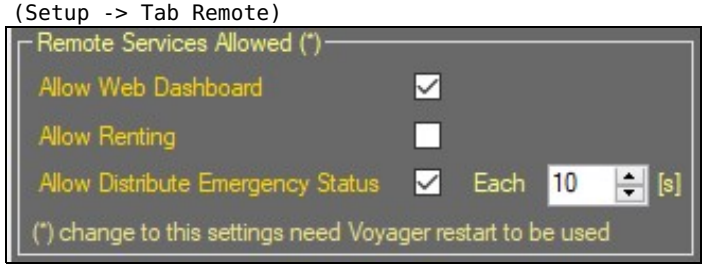
44.2 General Installation

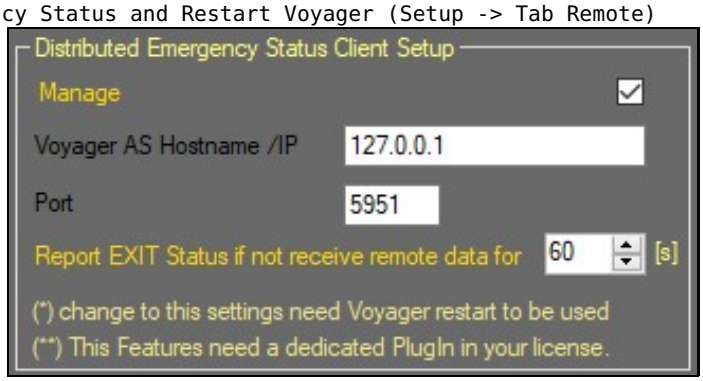
Like all Voyager's Plugin you must purchase it separtely and import in Voyager the new license file. Import of the new license file will unlock the features requested from plugin, a restart of Voyager application is necessary to enable plugin after license import.

44.3 This Plugin Installation

- Install plugin (importing the new license file) on the MASTER Voyager will manage the Distributed Emergency Status
- Install plugin on all the Voyager Clients will be use the Distributed Emergency Status.
- To check if you have the Plugin installed look at Splash windows at Voyager start, you should found it on the list of plugin

- 

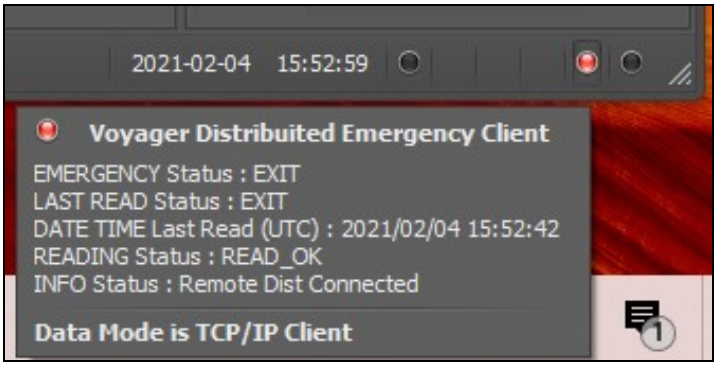
- Assure you have the MASTER Voyager and CLIENT Voyager on LAN in the same Network
- Allow in Router policy and firewall rules to reach the port 5950 (or the port for Voyager Application server used) on The MASTER Voyager
- Be sure to have Application Server Active on the MASTER Voyager
- Configure MASTER Voyager to get data from Weather system, Viking I/O system and ASCOM Safe system (one or all or at your needed). Refer to the base setup configuration of Voyager for this task
- Configure MASTER Voyager to allow Distributed Emergency Status using the Application Server and Restart Voyager (Setup -> Tab Remote)
  - 

  - Check the flag **Allow Distribute Emergency Status** to allow system works
  - **Each** parameters expressed in seconds define frequency of updating of remote client status, default is 10s (Distributed Emergency status will be send to all client each 10s)
  - **Important Note!** All change to this settings will need a Voyager restart
- Configure the CLIENTS to connect as CLIENT to the MASTER Voyager and manage and use the Distribute Emergency Status and Restart Voyager (Setup -> Tab Remote)
  - 

  - **Manage:** check this flag to enable CLIENT management, connection to MASTER Voyager and reading of Distributed Emergency Status
  - **Voyager AS Hostname/IP:** 127.0.0.1 or localhost if the MASTER Voyager is on the same PC or the IP

address or DNS name of the PC where is the MASTER Voyager

- **Port:** 5950 is the default, this is the port the MASTER Voyager Application Server, you can refer to the MASTER Voyager configuration in setup under Voyager tab.
- **Report EXIT Status if not receive remote data for [s]:** if the CLIENT doesn't receive any status from the MASTER Voyager an Emergency Exit status will be generate, default is 60s
  Important Note! This is really important to understand, if the CLIENT lost communication with MASTER Voyager the operation will be stopped on the PIER. Provide signal to alert you on the CLIENT DragScript in case of Emergency Event execution
- **Important Note!** All change to this settings will need a Voyager restart

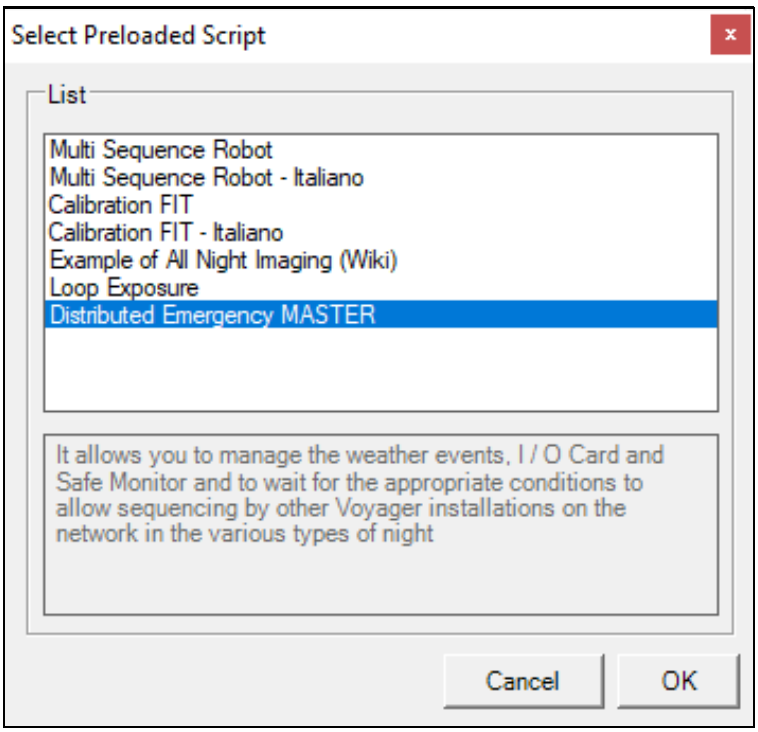
- Test CLIENTS connection using the ToolTip way, ,be sure to see the info Status of each CLIENT Voyager in "Remote Dist Connected"
  - 

  - **LED:** red = disconnect status or EXIT status ; yellow SUSPEND ; green SAFE ; black : Not configured
  - **EMERGENCY Status:** distributed emergency status
  - **LAST READ Status:** last distributed emergency status received from MASTER Voyager
  - **DATE TIME Last Read:** Datetime of last Read received
  - **READING Status:** status of reading service
  - **INFO Status:** inf about connection and eventually warning and error

44.4 Personalize and Start the MASTER Voyager dedicated DragScript

MASTER Voyager must use a special DragScript to distribute the Emergency Status correctlly.

You will found it in the DragScript Editor Preloaded Script under "Distributed Emergency MASTER" :

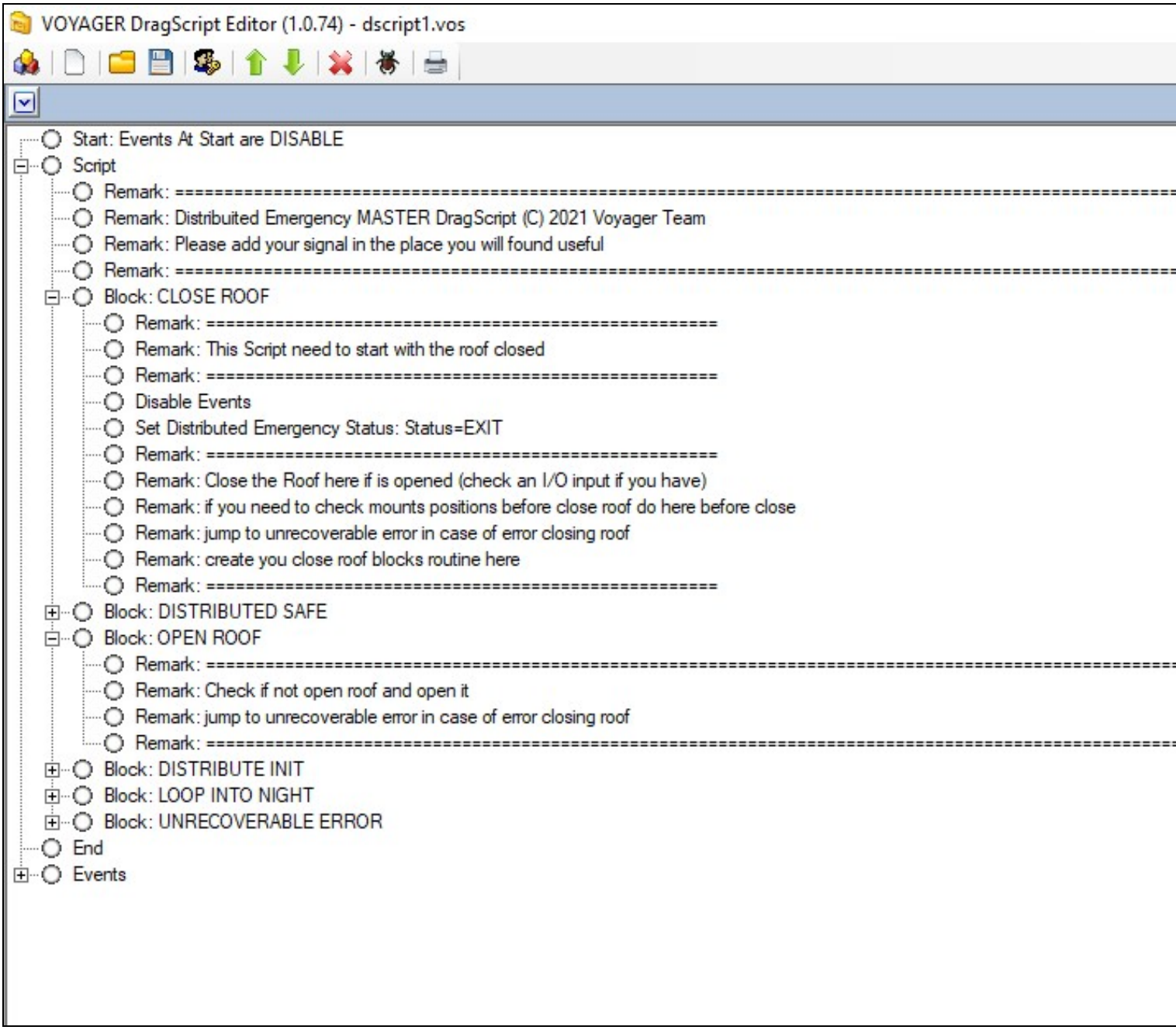


Please open it and personalize the parts dedicated to open and close the Roof that is task different for each users.

Important Note! This DragScript need to have the Roof closed at beginning for safety reasons. You will found that the first task to do is implementing the Roof closing.

Porpouses of DragScript are:

- report EXIT (Unsafe) if timing is not in the night (you can define constraints and offset)
- report SAFE if timing is on the Night and Emergency status (weather - I/O cards - safe monitor) is SAFE
- report EXIT / SUSPEND / RESUME if timing is on the Night and Emergency status (weather - I/O cards - safe monitor) is NOT SAFE
- managing the supend/resume/exit events locally to open/close the roof for all (waiting the right positon of mounts if needed)
- run forever restarting DragScript Itself



Important Note! Be sure to check the mount position (if for example is parked) before open/close the ROOF. We suggest to use a dedicate I/O sensor to connect to the VIKING system installed in the MASTER Voyager. The plugin doesn't check the ASCOM parking status of remote CLIENT because is considered not SAFE.
Important Note! Manage the UNRECOVERABLE Error, this error is something that compromise the normal running of the DragScript like : problem on opening roof, problem on closing roof. In this case add your signal to be informed and check as soon as possible status of building to avoid critical damages.
Important Note! Be sure to add signal (email, SMS or others) to the DragScript to inform you about the tasks, especially in case of Failure.

DragScript is perpetual if not exit for UNRECOVERABLE ERROR, so adjust only the night constraints and leave it running.

44.5 CLIENT Voyager DragScript Consideration

Use a DragScript in the CLIENT Voyager that manage the Events, in the Events not manage the roof but just the mount (parking) if needed.

We suggest to use WAIT SAFE block to read the distributed status and starting with operations.

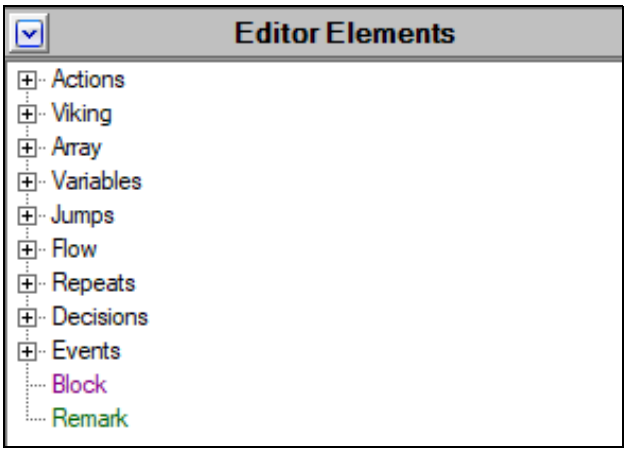
We inform you that using the Distributed Emergency Status potentially you cannot necessary reading the night info and running until you have SAFE the imaging.

Important Note! Also if you can on the CLIENT Voyager reading weather or others source locally we suggest to not do and using only the Distributed Emergency Status. This to avoid any glitch in system management.

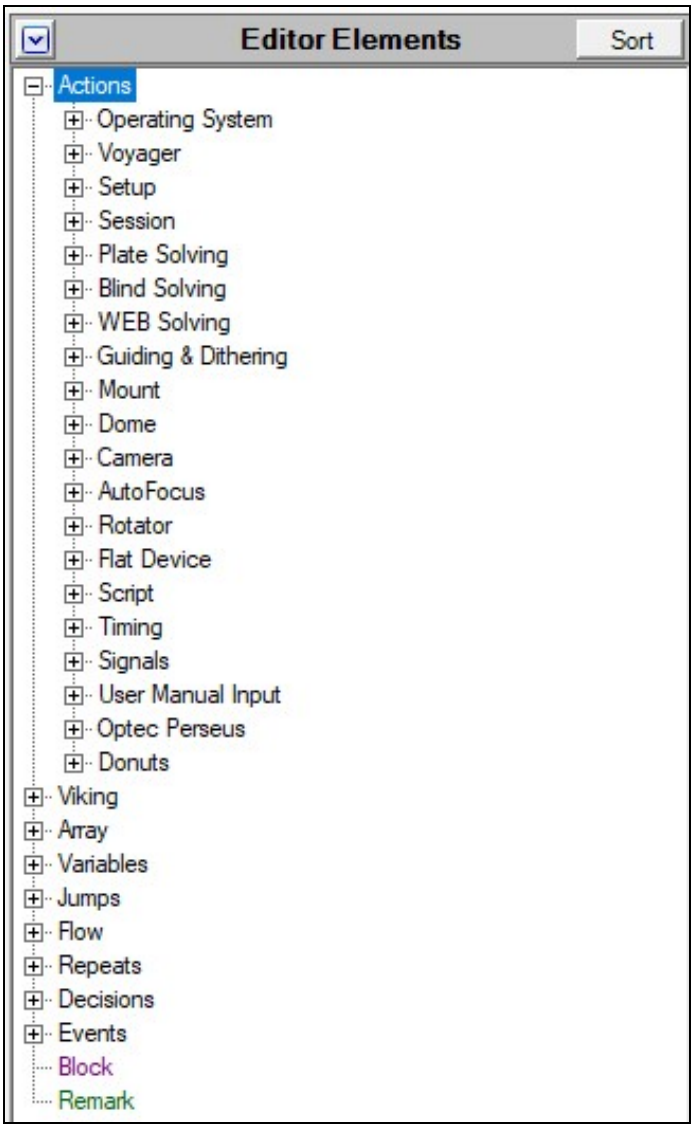
45 DragScript Elements

The DragScript "language" is composed of blocks that are dragged from the list on the right side of the DragScript editor to the script being created or edited on the left.

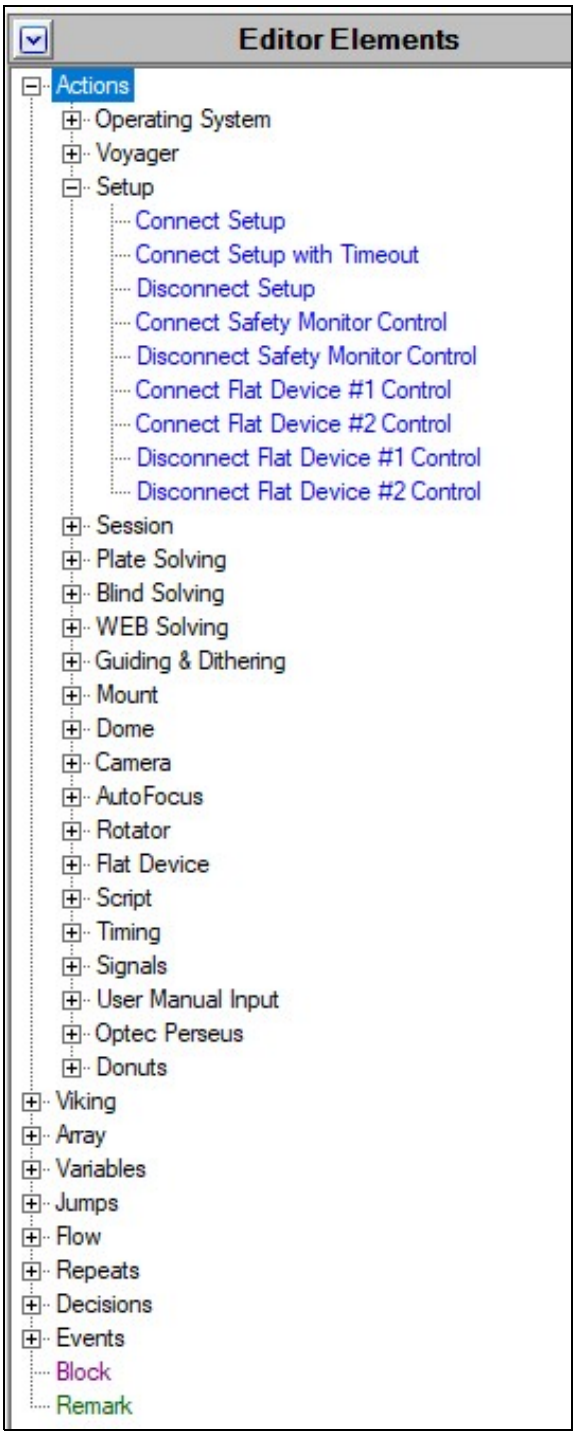
Each category of element is organized in list that can be expanded or contracted by clicking the "+" or "-" next to the element category name:



E.g., if you click the + in front of Actions, the list expands like this:



As you can see in the case of Actions, there are further subcategories of actions, and clicking the + in front of one of them expands it again:



Here, the list of Setup actions is fully expanded and we see three choices that we can drag to the active script: Connect Setup, Connect Setup with Timeout, and Disconnect Setup

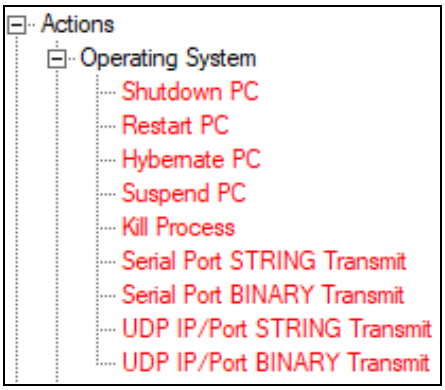
For the remainder of this page, we will describe the available DragScript elements. New elements are added periodically and will be documented in the release notes and here.

Press Sort button to listing all the categories and blocks in alphabetical order.

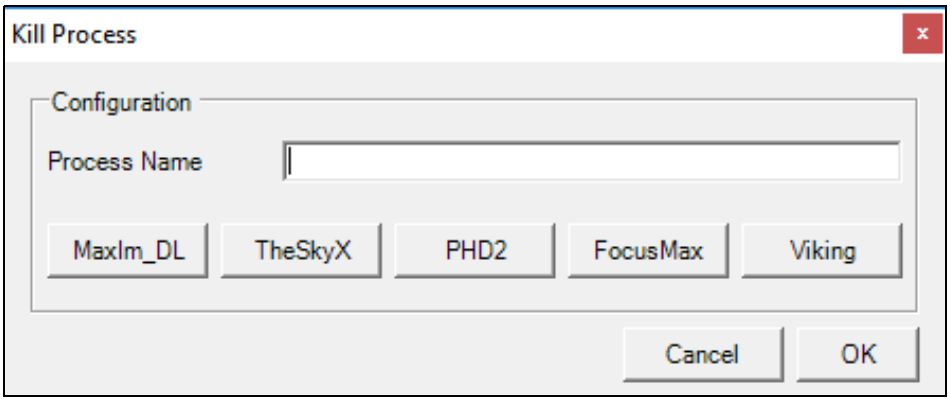
45.1 DragScript Actions

45.1.1 Operating System

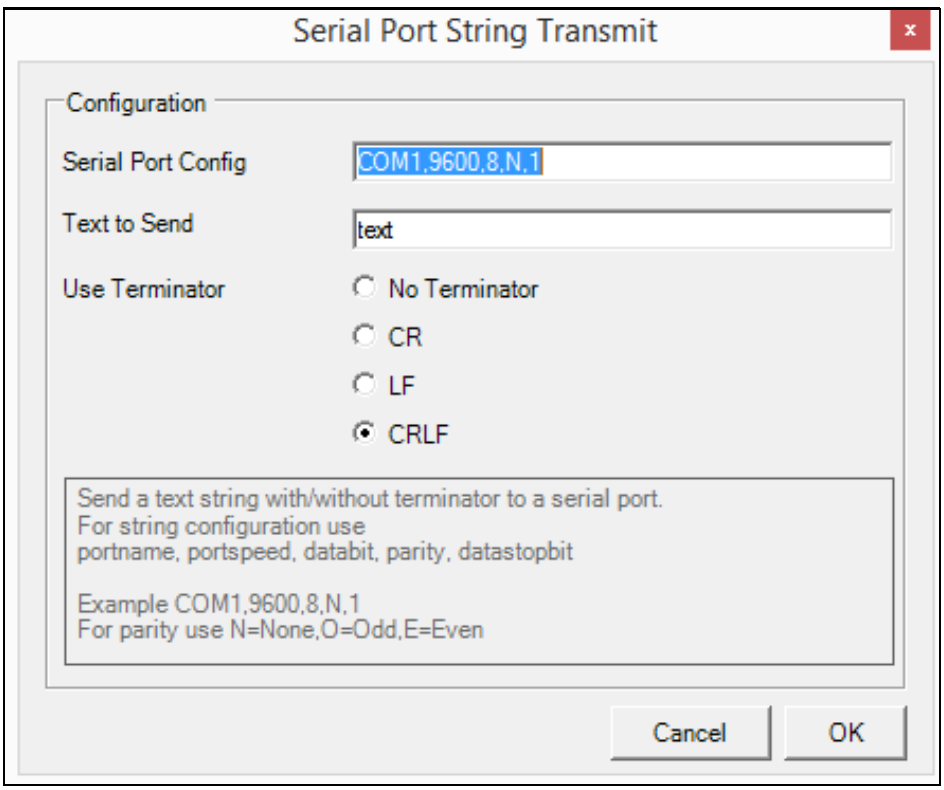
The Operating System actions control the PC running Voyager:



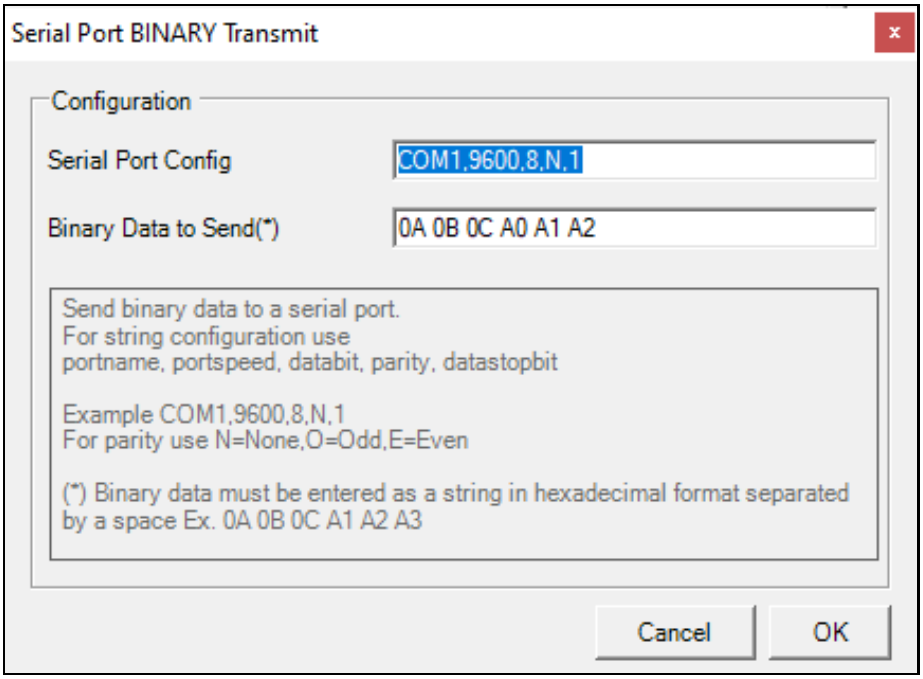
- **Shutdown PC**: Shutdown the PC running Voyager
- **Restart PC**: Restart (reboot) the PC running Voyager
- **Hybernate PC:** Hybernate the PC running Voyager (only in OS that support it)
- **Suspend PC:** Susend the PC running Voyager (only in OS that support it)
- **Kill Process**: Kill a process on the PC running Voyager. Either type in the Process name or click one of the buttons to use a preconfigured process name.



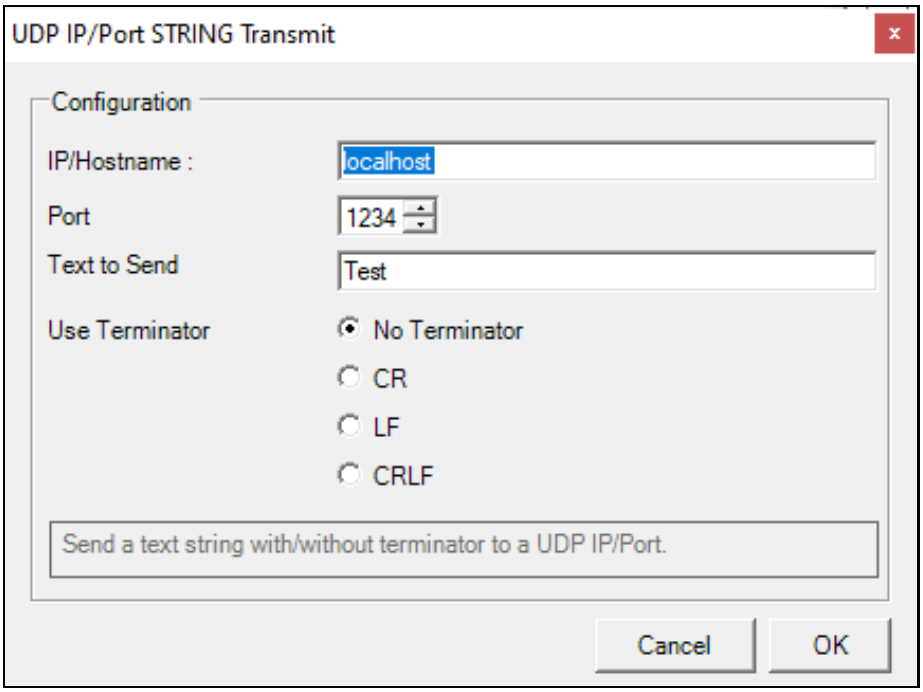
- **Serial Port STRING Transmit**: Send a text string with a terminator (if necessary) to an RS232 Serial Port



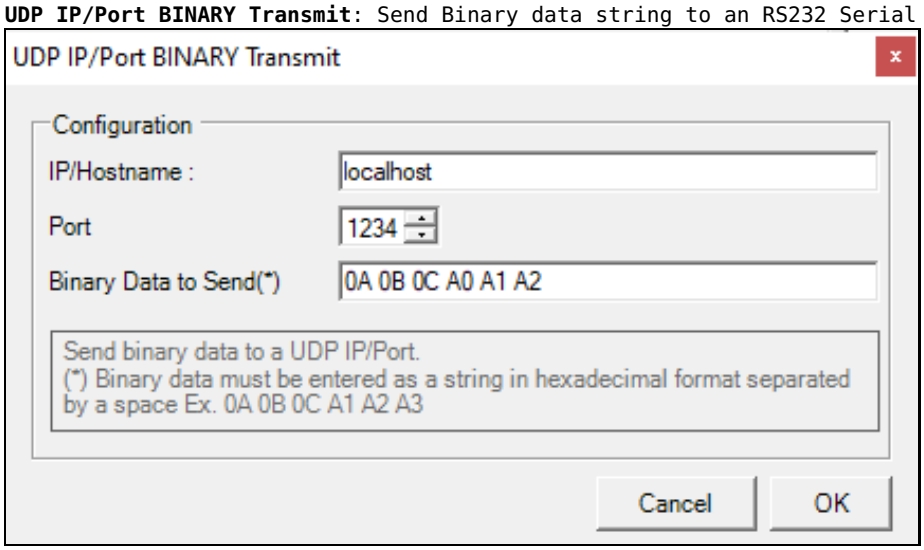
- **Configuration**
  - **Serial Port Config**: insert the string used to configure and open the serial port (portname,portspeed,databit,parity,datastopbit) for parity use N=None O=Odd E=Even (Example COM1,9600,8,N,1)
  - **Text to Send**: input the text to send to the serial port
  - **Use Terminator**: indicate if you want to use a terminator or not. CR = carriage return, LF=Line feed
- **Serial Port BINARY Transmit**: Send Binary data string to an RS232 Serial Port



- **Configuration**
  - **Serial Port Config**: insert the string used to configure and open the serial port (portname,portspeed,databit,parity,datastopbit) for parity use N=None O=Odd E=Even (Example COM1,9600,8,N,1)
  - **Binary Data To Send(*):** input the binary data to send to the serial port. Binary Data must be entered ad a string in hexadecimal format separated (Example 0A 0B 0C A1 A2 A3)
- **UDP IP/Port STRING Transmit**: Send a text string with a terminator (if necessary) to an UDP Port



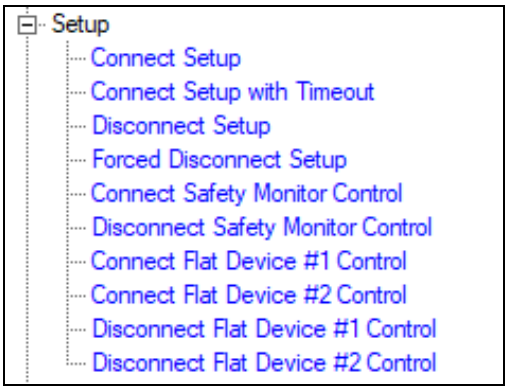
- **Configuration**
  - **IP/Hostname**: IP or hostname of PC where to send data
  - **Port:** UDP port number to use for transmission
  - **Text to Send**: input the text to send to the UDP Port
  - **Use Terminator**: indicate if you want to use a terminator or not. CR = carriage return, LF=Line feed
- **UDP IP/Port BINARY Transmit**: Send Binary data string to an RS232 Serial Port
-



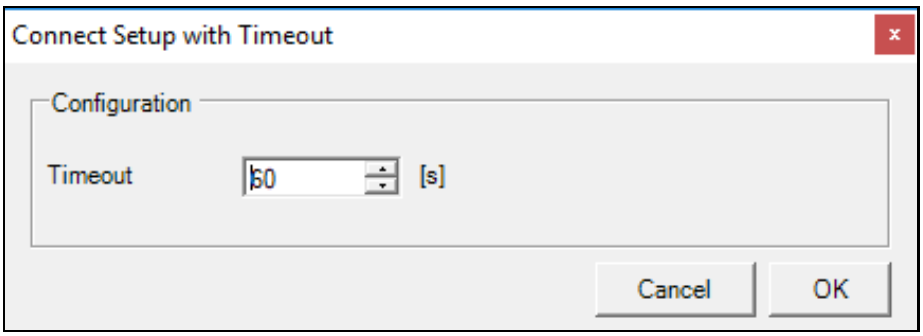
- **Configuration**
  - **IP/Hostname**: IP or hostname of PC where to send data
  - **Port:** UDP port number to use for transmission
  - **Binary Data To Send(*):** input the binary data to send to the serial port. Binary Data must be entered ad a string in hexadecimal format separated (Example 0A 0B 0C A1 A2 A3)

45.2 Setup

Setup actions control connecting and disconnecting to your equipment and software:



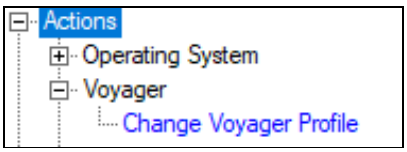
- **Connect Setup**: Commands Voyager to connect to the equipment and software in the currently selected Profile
- **Connect Setup with Timeout**: Command Voyager to connect to the equipment in the currently selected Profile. Voyager will timeout if connection does not complete within the specified number of seconds:



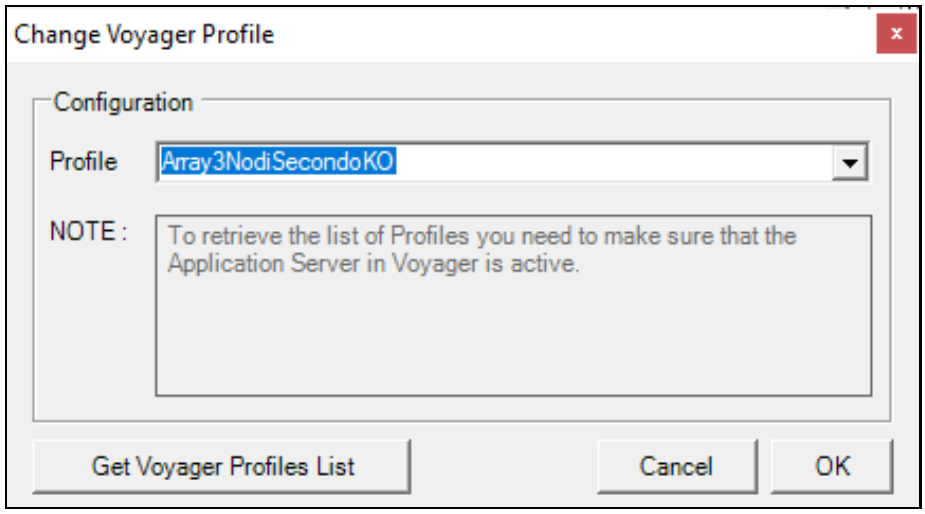
- **Disconnect Setup**: Command Voyager to disconnect from the equipment and software in the currently selected Profile
- **Force Disconnect Setup**: Command Voyager to forcefully disconnect the Seup without checking if the previous connection was actually successful (all setup checks connected regularly)
- **Connect Safety Monitor Control**: Connect only the Safety Monitor control. This is useful for monitoring conditions prior to connecting all your equipment
- **Disconnect Safety Monitor Control**: Disconnect only the Safety Monitor control
- **Connect Flat Device #1 / #2 Control**: Connect only the Flat Device #1/#2. This is useful for switch on the flat device only when needed
- **Disconnect Flat Device #1 / #2 Control**: Disconnect only the Flat Device #1/#2 control

45.3 Voyager

Interaction with Voyager Application:



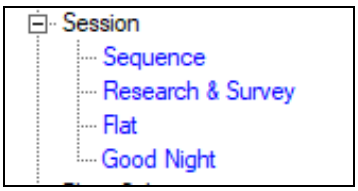
- **Change Voyager Profile**: will allow changing of profile from DragScript. Voyager must have the setup not connect or action will failed.



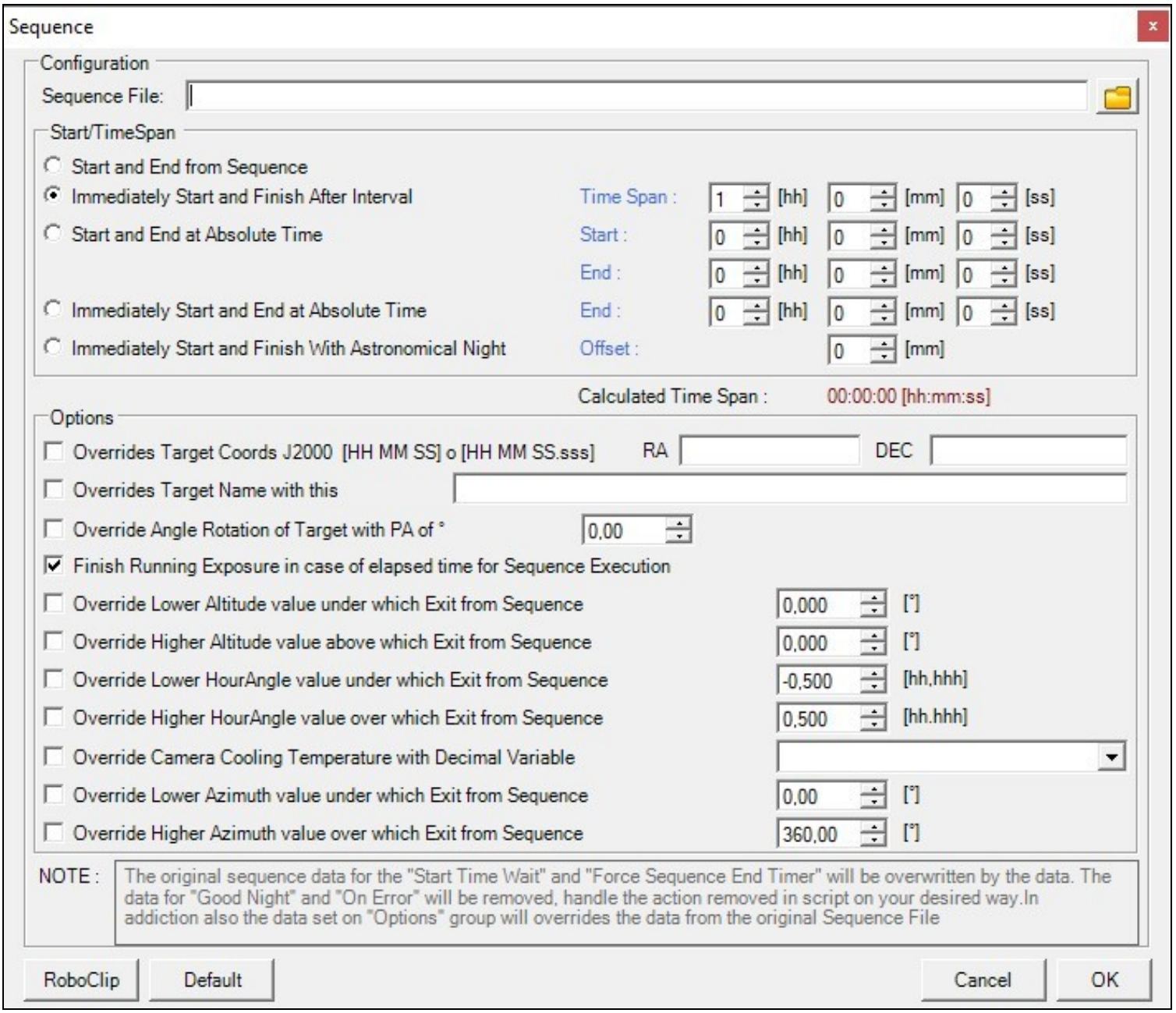
- **Profile:** Profile select, and list of all profile if retrieved from Voyager
- **Get Voyager Profiles List:** listg of profiles will be retrieved directly from Voyager using the Application Server. Male sure that the Application Server in Voyager is active
- **OK**: Click to save your changes and close the window
- **Cancel**: Click to discard your changes and close the window

45.4 Session

Session actions run sequences to acquire images, flat frames, and shutdown ("Good Night") your system:



- **Sequence**: Run a Sequence with options:



- **Configuration Panel**:
  - Click the folder icon to select the Sequence file to run. Create your Sequence files in Voyager's OnTheFly workspace
  - **Start/TimeSpan**: Click one of the radio buttons to use that option to tell when to start and end the sequence. This is one way to have Voyager image this target until a specific time is reached, or an interval has elapsed. It is a good idea to specify an ending time here, or a minimum altitude in the Sequence definition or the Options field below, so Voyager will not continue trying to take images after the object has set
    - **Start and End from Sequence:** Use the start and end times specified in the sequence definition file. The start time comes from the On Start tab and the end time comes from the On End tab
    - **Immediately Start and Finish After Interval**: Start the sequence immediately and end it after the HH:MM:SS amount of time specified with the Time Span: counter fields
    - **Start and End at Absolute Time**: Voyager should wait until the specified Start: time and end the sequence at the specified End: time.

- ◊ **Immediately Start and End at Absolute Time**: Start the sequence immediately and end it at the time specified in the counter fields
- ◊ **Immediately Start and Finish With Astronomical Night**: Start the sequence immediately and finish it at Astronomical Night's end, offset +/- by the number of minutes set in the Offset: counter field

- **Calculated Time Span**: Voyager will show how much time this sequence will take with the chosen Start/TimeSpan option if you choose Start and End at Absolute time. It is not possible to calculate this if you choose one of the "Immediately Start" options

♦

Important Note! Enter time in 24 hour format using local time - or the time zone on the computer running Voyager. That's the time that will be used in doing these calculations. Midnight is 00:00:00. 10 pm local time is 22:00:00. 3 AM is 03:00:00.

Important Note! Note: If the Start: time is more than 12 hours in the future, Voyager will start the sequence, assuming that the start time has passed already in the current night. For example, if you specify a start time of 20:00:00 and it is now 20:15:00, Voyager will start the sequence

Important Note! If the End time is more than 12 hours in the future, Voyager will assume the End time has already passed for the night and end the sequence. For example, if a sequence has a Start time of 20:00:00 and an End time of 21:00:00 and the current time is 22:00:00, Voyager will end the sequence

Important Note! Times entered here will override any start or end times defined in the Sequence file. The times you define when you create the sequence are used for OnTheFly running of the Sequence, not for DragScript execution

Important Note! The Start and End times are checked at the beginning of running a sequence and the sequence exits with status OK if the current time is outside the Start and End time window

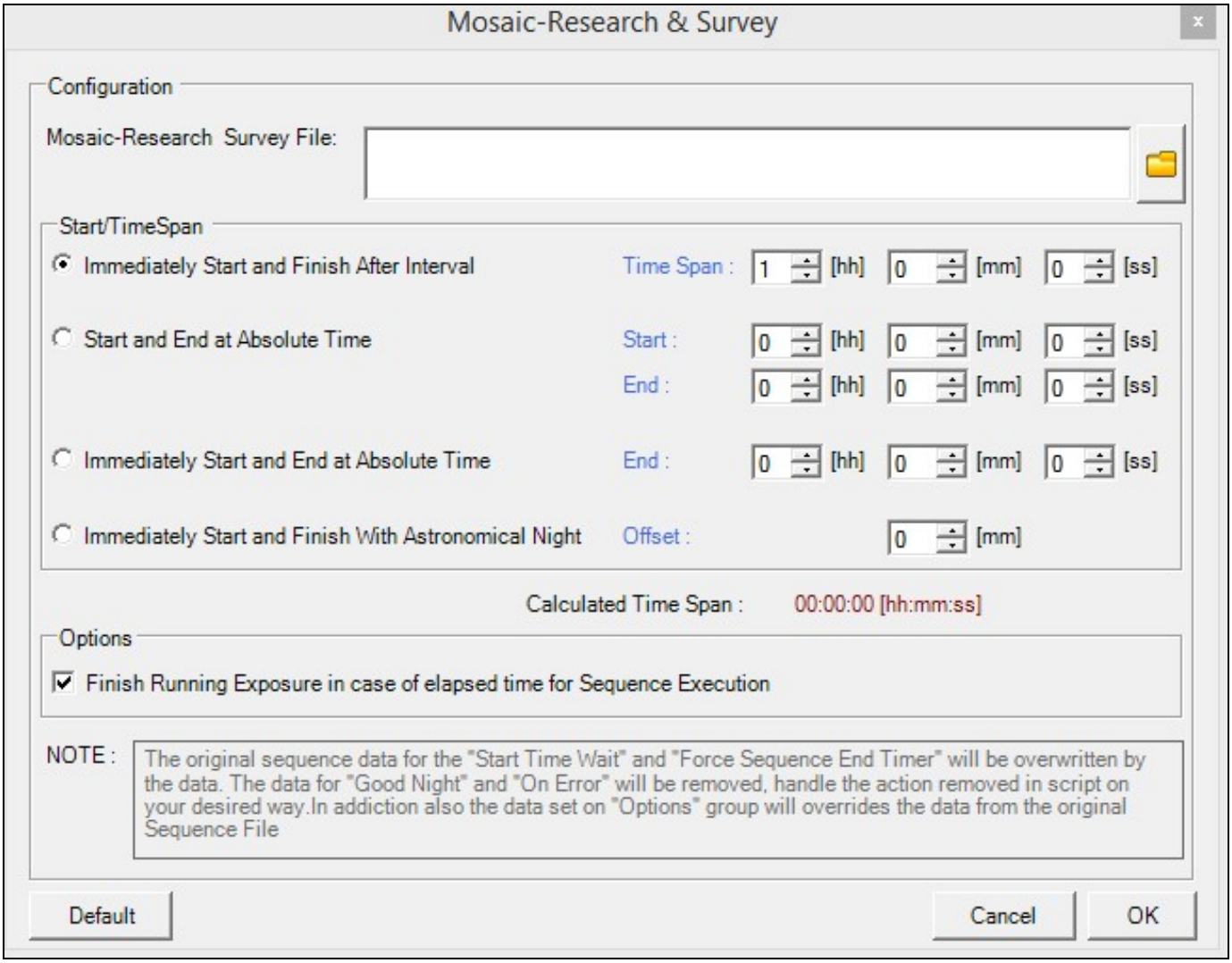
- ♦ **Options**: Check the boxes to select any of these options:
  - ◊ **Overrides Target Coords J2000**: If checked, the RA and DEC coordinates are used instead of those in the sequence file. RA coordinates are in HH MM SS and DEC coordinates are HH MM SS.sss
  - ◊ **Overrides Target Name with this**: If checked, the name entered in the field will be used as the target name, which is part of the file name
  - ◊ **Override Angle Rotation of Target with PA of°:** if checked , if in the sequence the rotator is managed, this flag force the Rotation Angle to the value selected. The other rotator settings in sequence will not be changed.
  - ◊ **Finish Running Exposure in case of elapsed time for Sequence Execution**: If checked, an exposure in progress will be allowed to finish if it starts before the sequence end time but finishes after the sequence end time
  - ◊ **Override Lower Altitude value under which Exit from Sequence**: If checked, if the sequence target sets below the altitude given here, the sequence will end. This value will override the minimum altitude value chosen in the sequence file
  - ◊ **Override Higher Altitude value above which Exit from Sequence**: If checked, if the sequence target rises above the altitude given here, the sequence will end. This value will override the maximum altitude value chosen in the sequence file
  - ◊ **Override Lower HourAngle value under which Exit from Sequence:** If checked, if the sequence target HourAngle are lower the value given here, the sequence will end. This value will override the Lower HourAngle value chosen in the sequence file
  - ◊ **Override Higher HourAngle value over which Exit from Sequence:** If checked, if the sequence target HourAngle are higher the value given here, the sequence will end. This value will override the Higher HourAngle value chosen in the sequence file
  - ◊ **Override Camera Cooling Temperature with Decimal Variable:** if checked for colling temperature will be used the value inside the decimal variable selected in the drop-box

combo box control

- ◊ **Override Lower Azimuth value under which Exit from Sequence:** If checked, if the sequence target Azimuth are lower the value given here, the sequence will end. This value will override the Lower Azimuth value chosen in the sequence file
- ◊ **Override Higher Azimuth value over which Exit from Sequence:** If checked, if the sequence target Azimuth are higher the value given here, the sequence will end. This value will override the Higher Azimuth value chosen in the sequence file
- ◊ **Use External Interval Angle:** if each the azimuth constraints will be cheched you can decide with this flag to use external angle instead of internal angle between before and after azimuth. Example if you choose 70° before and 150° after with out external flag this mean sequence run if angle is between 70 and 150°, if you chec it and invert to external sequence will be terminate if azimuth is between 70 and 150°

- ♦ **Default**: Click this button to populate this window with the default options
- ♦ **OK**: Click to save your changes and close the window
- ♦ **Cancel**: Click to discard your changes and close the window

- **Research & Survey**: Run a Research & Survey sequence with options

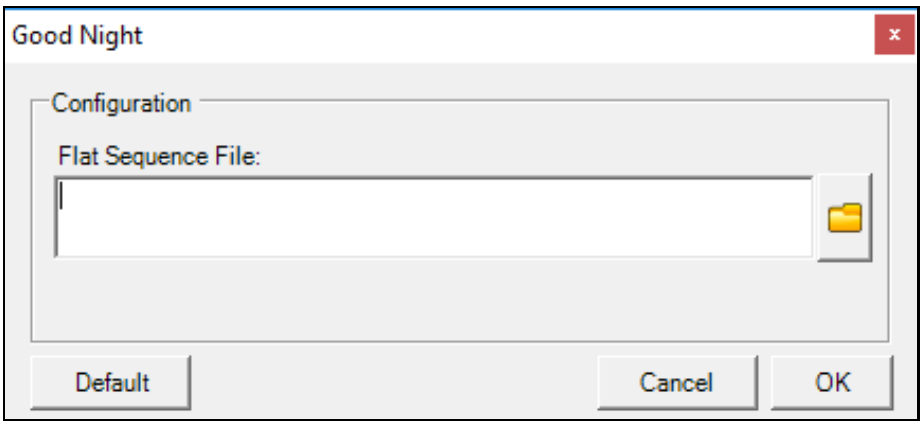


- **Configuration Panel**:
  - ♦ Click the folder icon  to select the Research & Survey sequence file to run. Create your sequence files in Voyager's Research & Survey workspace
  - ♦ TYPO: Star/TimeSpan should be Start/TimeSpan
  - ♦ **Start/TimeSpan**: Click one of the radio buttons to use that option to tell when to start and end the Research & Survey sequence. This is one way to have Voyager image this target until a specific time is reached, or an interval has elapsed. It is a good idea to specify an ending

time here, or a minimum altitude in the Research & Survey sequence definition or the Options field below, so Voyager will not continue trying to take images after the object has set
    - ◊ **Immediately Start and Finish After Interval**: Start the sequence immediately and end it after the HH:MM:SS amount of time specified with the Time Span: counter fields
    - ◊ **Start and End at Absolute Time**: Voyager should wait until the specified Start: time and end the sequence at the specified End: time.
    - ◊ **Immediately Start and End at Absolute Time**: Start the sequence immediately and end it at the time specified in the counter fields
    - ◊ **Immediately Start and Finish With Astronomical Night**: Start the sequence immediately and finish it at Astronomical Night's end, offset +/- by the number of minutes set in the Offset: counter field
  - ♦ **Calculated Time Span**: Voyager will show how much time this sequence will take with the chosen Start/TimeSpan option if you choose Start and End at Absolute time. It is not possible to calculate this if you choose one of the "Immediately Start" options
- **Options**:
  - ♦ **Finish Running Exposure in case of elapsed time for Sequence Execution**: If checked, an exposure in progress will be allowed to finish if it starts before the sequence end time but finishes after the sequence end time
  - ♦ **Default**: Click this button to populate this window with the default options
  - ♦ **OK**: Click to save your changes and close the window
  - ♦ **Cancel**: Click to discard your changes and close the window

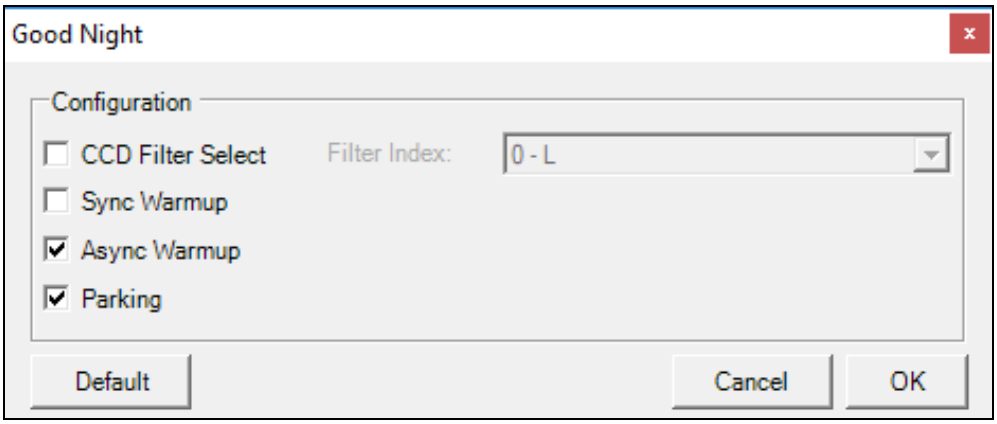
Important Note! See the Important Notes above in the Sequence discussion to understand how Voyager treats the values in the time fields when they have already passed in tonight's session or if they are also specified in the Research & Survey sequence definition file

- **Flat**: Run an Auto Flat sequence. Configure the Auto Flat sequence files in the OnTheFly workspace



- Click the folder icon  and choose the Auto Flat sequence file to run. Configure the Auto Flat sequence files in the OnTheFly workspace
- TYPO: Configuration dialog says "Good Night" but should be Auto Flat
- **Default**: Click this button to populate this window with the default options (blanks out the Flat Sequence File field)
- **OK**: Click to save your changes and close the window
- **Cancel**: Click to discard your changes and close the window

- **Good Night**: Run a series of one or more shutdown actions:



- **CCD Filter Select**: Moves the filter wheel to the filter chosen from the drop-down box on the right
- **Sync Warmup**: Send the CCD cooler a warmup command and wait until it finishes
- **Async Warmup**: Send the CCD cooler a warmup command and continue execution without waiting for it to finish
- **Parking**: Park the mount as specified in Mount Setup

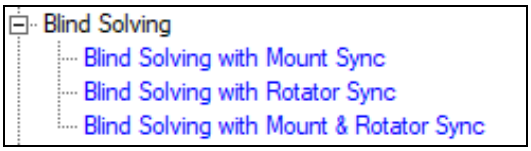
45.5 Plate Solving

Plate Solving actions perform a plate solving action as defined in the Plate Solving setup of the active profile:

- **Plate Solving** : Perform a plate solve action at the current scope location using the Plate Solve software defined in the Plate Solving setup of the active profile. *Mount will not be synched*
- **Plate Solving with Mount Sync:** Perform a plate solve action at the current scope location using the Plate Solve software defined in the Plate Solving setup of the active profile. *Send a Sync command to the mount unless you have chosen to not send a Sync command to your mount in Mount Setup. You may lost pointing model if you have one and your driver not allow additional and external sync*
- **Plate Solving with Rotator Sync:** Perform a plate solve action at the current scope location using the Plate Solve software defined in the Plate Solving setup of the active profile. *Mount will not be synched.* Also perform a Sync of the rotator to the PA solved.
- **Plate Solving with Mount & Rotator Sync:** Perform a plate solve action at the current scope location using the Plate Solve software defined in the Plate Solving setup of the active profile. *Send a Sync command to the mount unless you have chosen to not send a Sync command to your mount in Mount Setup. You may lost pointing model if you have one and your driver not allow additional and external sync.* Also perform a Sync of the rotator to the PA solved.

45.6 Blind Solving

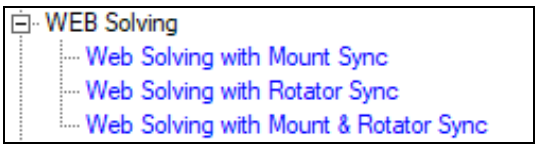
Blind Solving actions perform a plate solving action as defined in the Plate Solving setup of the active profile:

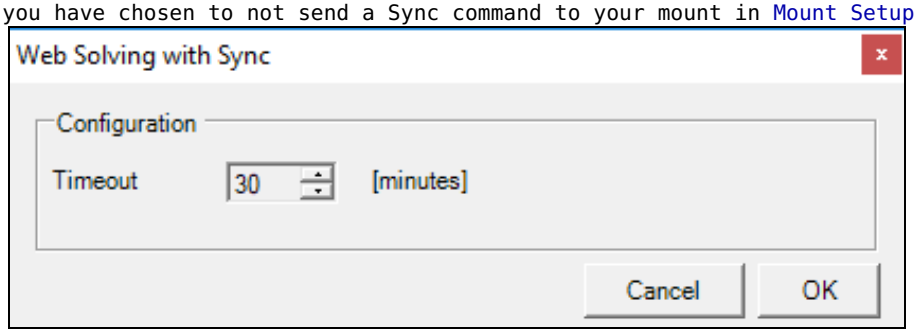


- **Blind Solving with Mount Sync:** Perform a blind solve action at the current scope location using the Plate Solve software defined in the Plate Solving setup of the active profile. *Send a Sync command to the mount unless you have chosen to not send a Sync command to your mount in Mount Setup. You may lost pointing model if you have one and your driver not allow additional and external sync*
- **Blind Solving with Rotator Sync:** Perform a blind solve action at the current scope location using the Plate Solve software defined in the Plate Solving setup of the active profile. *Mount will not be synched.* Also perform a Sync of the rotator to the PA solved.
- **Blind Solving with Mount & Rotator Sync:** Perform a blind solve action at the current scope location using the Plate Solve software defined in the Plate Solving setup of the active profile. *Send a Sync command to the mount unless you have chosen to not send a Sync command to your mount in Mount Setup. You may lost pointing model if you have one and your driver not allow additional and external sync.* Also perform a Sync of the rotator to the PA solved.

45.7 WEB Solving

Plate Solving actions perform a plate solving action as defined in the Plate Solving setup of the active profile:



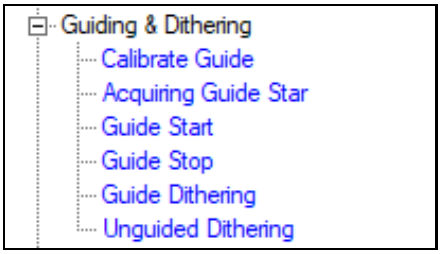
- **Web Solving with Sync**: Perform a web blind solve action at the current scope location using the nova.astrometry.net site. An active Internet connection is required. Send a Sync command to the mount unless you have chosen to not send a Sync command to your mount in Mount Setup
  - 

    - **Timeout**: Specify the number of minutes Voyager should wait after initiating the Web Solve before timing out. Use an IF TIMEOUT decision action to define what to do if the web solve times out

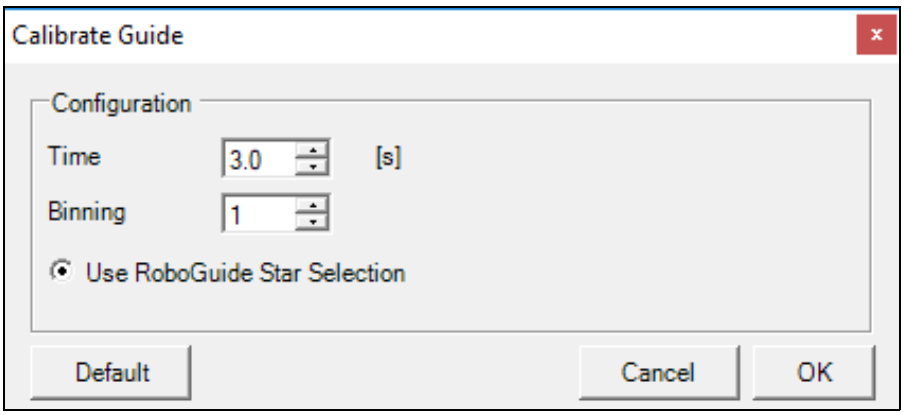
- **Web Solving with Rotator Sync:** Perform a web blind solve action at the current scope location using the Plate Solve software defined in the Plate Solving setup of the active profile. *Mount will not be synched.* Also perform a Sync of the rotator to the PA solved.
- **Web Solving with Mount & Rotator Sync:** Perform a web blind solve action at the current scope location using the Plate Solve software defined in the Plate Solving setup of the active profile. *Send a Sync command to the mount unless you have chosen to not send a Sync command to your mount in Mount Setup. You may lost pointing model if you have one and your driver not allow additional and external sync.* Also perform a Sync of the rotator to the PA solved.

45.8 Guiding

Guiding actions send commands to the guide software:

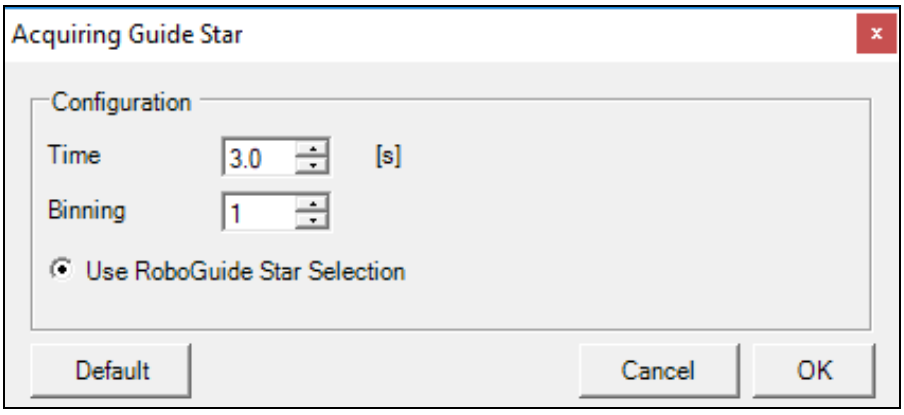


- **Calibrate Guide**: Command the guide software to perform a calibration action. It is recommended to include a Calibrate Guide action at the start of your sequence unless you are sure that your guider is calibrated from a previous session. Double click to bring up the configuration window:



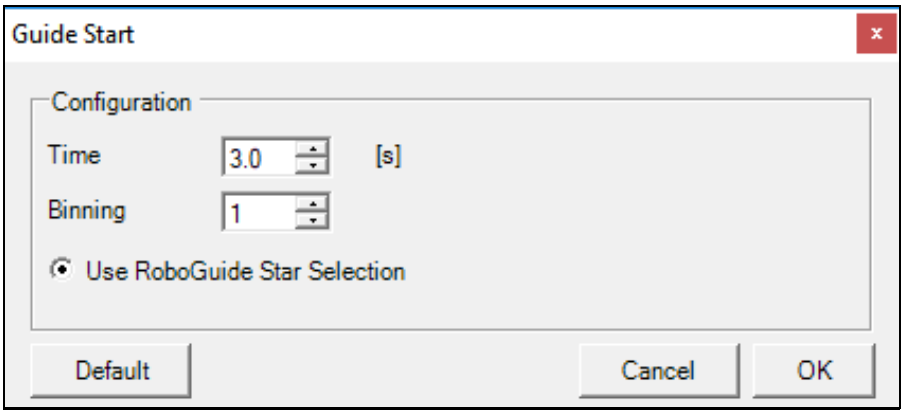
- **Time**: Exposure time for Calibration exposures by the guiding software
- **Binning**: Binning level for Calibration exposures by the guiding software
- **Use RoboGuide Star Selection**: If selected, use Voyager's RoboGuide process to choose a guide star for the Calibration action. This is mandatory at this time since some guiding software cannot select a guide star.
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Acquiring Guide Star**: Commands the guiding software to select a guide star. Double click to bring up the configuration window:



- **Time**: Exposure time for guide star acquisition exposures by the guiding software
- **Binning**: Binning level for guide star acquisition exposures by the guiding software
- **Use RoboGuide Star Selection**: If selected, use Voyager's RoboGuide process to choose a guide star. This is mandatory at this time since some guiding software cannot select a guide star.
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

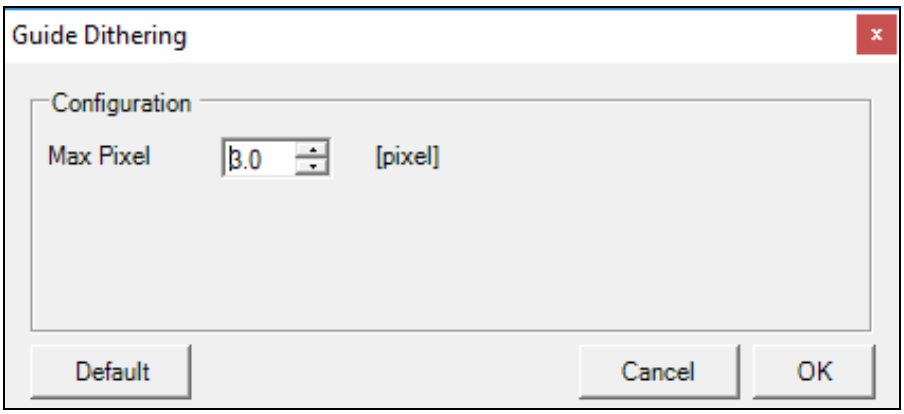
- **Guide Start**: Commands the guiding software to begin guiding. Double click to bring up the configuration window:



- **Time**: Exposure time for guiding exposures by the guiding software
- **Binning**: Binning level for guiding exposures by the guiding software
- **Use RoboGuide Star Selection**: If selected, use Voyager's RoboGuide process to choose a guide star. This is mandatory at this time since some guiding software cannot select a guide star.
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

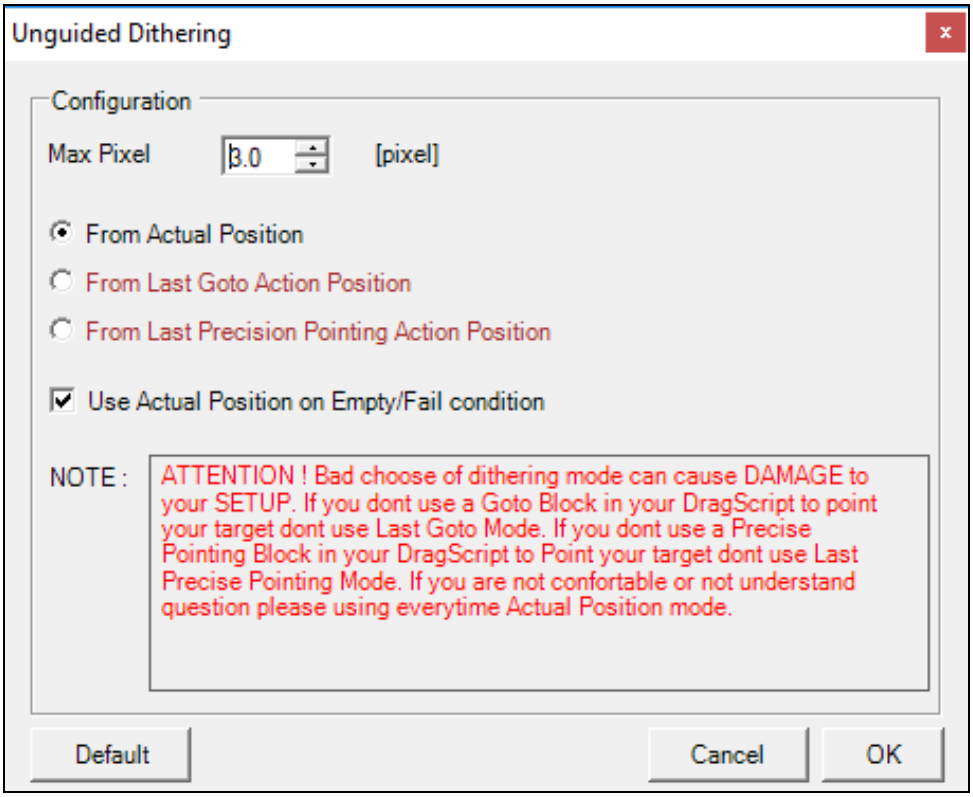
- **Guide Stop**: Command the guiding software to stop guiding

- **Guide Dithering**: Command the guiding software to perform a dithering action. Dithering is used to move the mount a tiny random amount in a random direction - usually only a couple of pixels. This prevents hot or cold pixels in your sensor from showing up in the same position in all of your images, making it easier to remove hot or cold pixels when stacking your images. Double click to bring up the configuration window:



- **Max Pixel**: Specify the maximum number of pixels that a dithering operation can move the mount
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

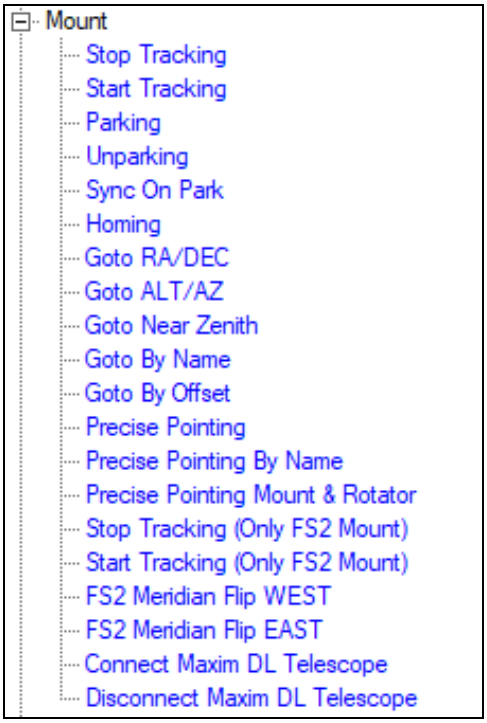
- **Unguided Dithering**: Perform a dithering action directly, vs. Guide Dithering which sends a dithering command to the guide software. Dithering is used to move the mount a tiny random amount in a random direction - usually only a couple of pixels. This prevents hot or cold pixels in your sensor from showing up in the same position in all of your images, making it easier to remove hot or cold pixels when stacking your images.



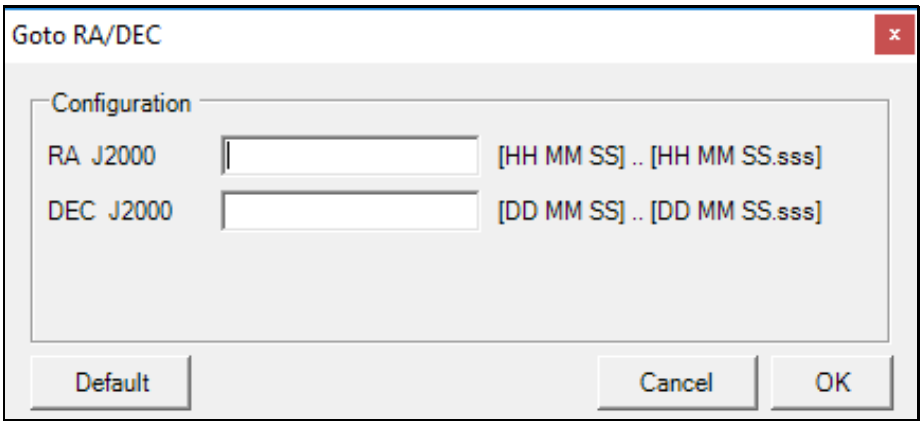
- **Max Pixel**: Specify the maximum number of pixels that a dithering operation can move the mount
- **From Actual Position**: This is the safest and default choice - it sends a command to move the mount up to the specified number of pixels from the current position. This should be a small movement, as the recommended number of pixels to dither is 3
- **From Last Goto Action Position**: Send a command to move the mount a random number of pixels up to **Max Pixel** in a random direction relative to the position of the last Goto action. This should only be used following a successful Goto action in your DragScript. You can damage your mount if you use this without a successful Goto action preceding it.
- **From Last Precision Pointing Action Position**: Send a command to move the mount a random number of pixels up to **Max Pixel** in a random direction relative to the position of the last Precision Pointing action. This should only be used following a successful Precision Pointing action in your DragScript. You can damage your mount if you use this without a successful Precision Pointing action preceding it.
- **Use Actual Position on Empty/Fail condition**: If checked, if the position reported by the Last Goto Action or Last Precision Pointing Action is empty, or if the Last Goto Action or Last Precision Pointing Action ended with an error, use the Actual Position of the mount as the starting point for dithering. In other words, don't attempt to dither based on the Last Goto action position or the Last Precision Pointing action position if either of those positions is empty, as this would send a command to the mount that could cause a pier crash and/or damage to your equipment. **Highly recommend leaving this checked.**
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

45.9 Mount

Mount actions send commands to the mount defined in the Mount setup of the active profile:

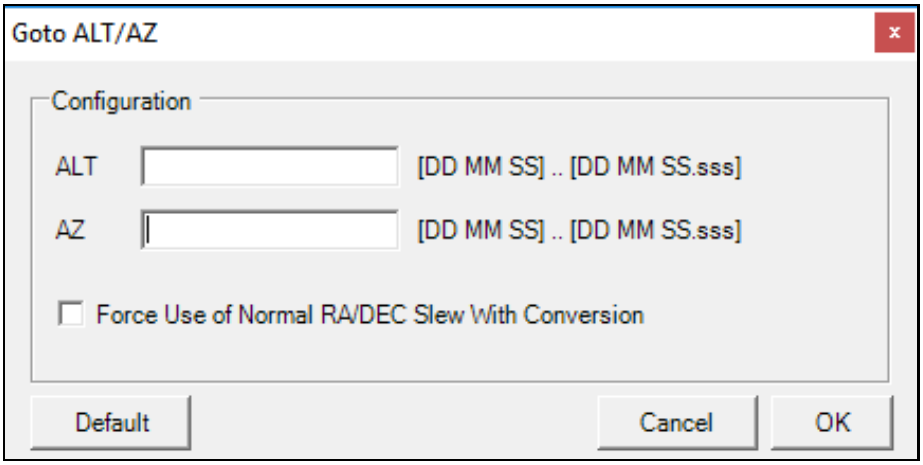


- **Stop Tracking**: Command the mount to stop tracking
- **Start Tracking**: Command the mount to start tracking
- **Parking**: Command the mount to slew to the Park position
- **Unparking**: Command the mount to Unpark
- **Sync on Park**: Command the mount to save the current position as the Park position
- **Homing**: Command the mount to move to the Home position (depends on the driver if the command will work, not all drivers have this command implemented !)
- **Goto RA/DEC**: Command the mount to move to the specified RA and DEC coordinates (J2000)



- **RA J2000**: Enter the RA coordinates in HH MM SS or HH MM SS.sss
- **DEC J2000**: Enter the RA coordinates in DD MM SS or DD MM SS.sss
- **Default**: Use the default settings: clears the RA and DEC fields
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Goto ALT/AZ**: Command the mount to move to the specified Altitude and Azimuth coordinates

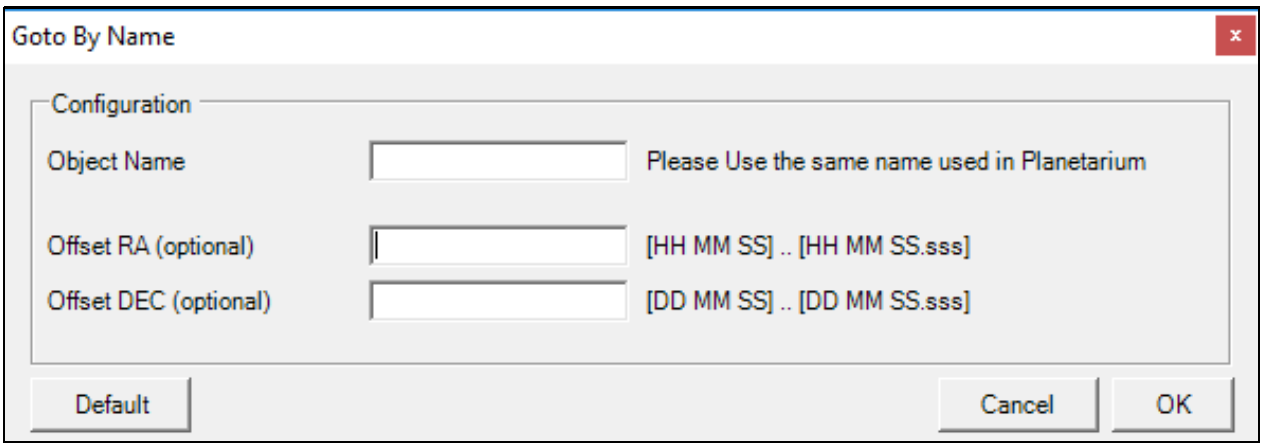


- **ALT:** Enter the Altitude coordinates in DD MM SS or DD MM SS.sss
- **AZ**: Enter the Azimuth coordinates in DD MM SS or DD MM SS.sss
- **Force Use of Normal RA/DEC Slew With Conversion**: If checked, convert the requested ALT and AZ values to RA and DEC values and send a goto RA/DEC command to the mount
- **Default**: Use the default settings: clears the AZ and ALT fields
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Goto Near Zenith**: Command the mount to move to a point close to the current Zenith (directly overhead).

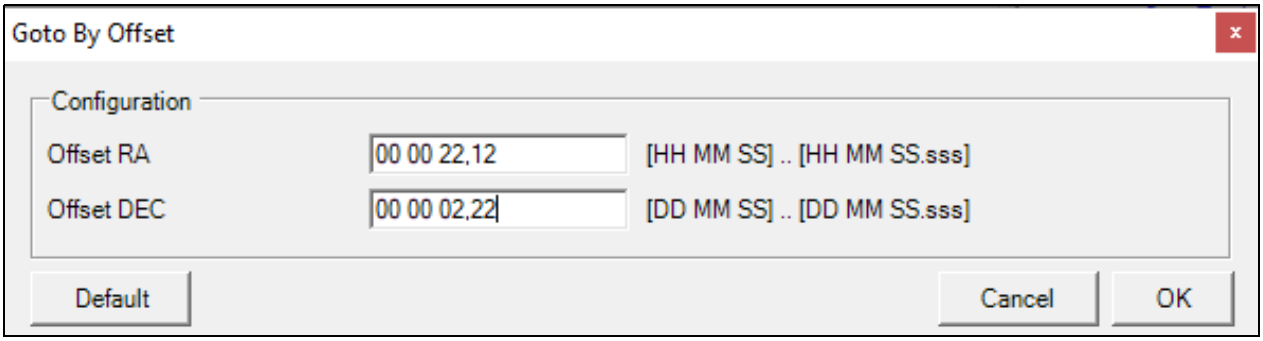
Important Note! Goto Near Zenith followed by a Blind Solving with Sync action is a good way to initialize your mount's pointing model at the start of a session. It is only a single point, but if your mount is accurately polar aligned, doing this before the first Precise Pointing operation may helps the Precise Pointing to succeed

-
- **Goto By Name**: Command the mount to move to an object by name with an optional RA and DEC offset. This action requires Voyager to be connected to the Planetarium software defined in the current profile. The Object Name must match a name that can be successfully searched in the connected Planetarium software.



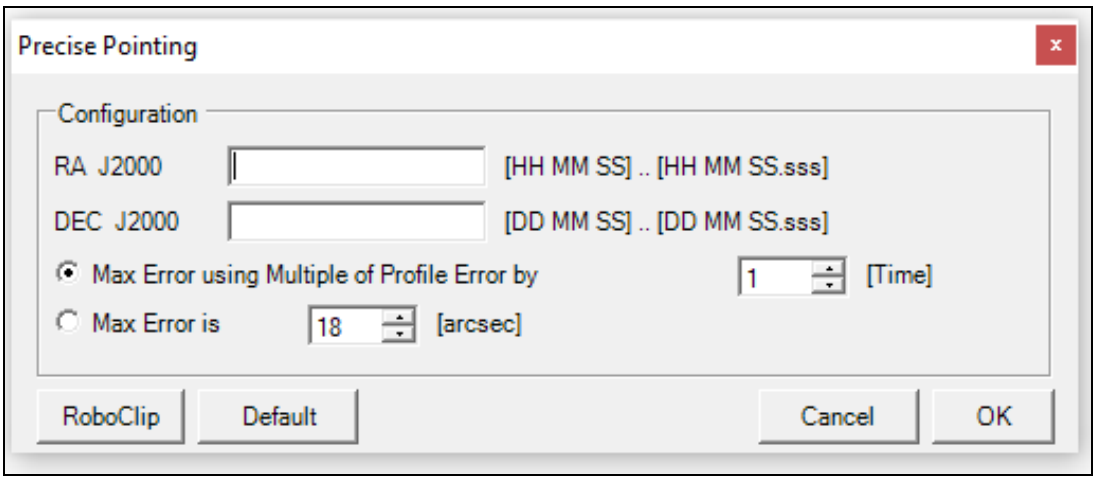
- **Object Name**: Name of the object to goto. Must be a name that can be successfully searched in the connected Planetarium software
- **Offset RA (optional)**: An optional +/- offset in HH MM SS or HH MM SS.sss to be added or subtracted from the RA coordinates returned by the Planetarium software
- **Offset DEC (optional)**: An optional +/- offset in DD MM SS or DD MM SS.sss to be added or subtracted from the DEC coordinates returned by the Planetarium software

- **Goto By Offset**: Command the mount to move from actual position by an RA and DEC offset.



- **Offset RA** : +/- offset in HH MM SS or HH MM SS.sss to be added or subtracted from the actual RA coordinates
- **Offset DEC** : +/- offset in DD MM SS or DD MM SS.sss to be added or subtracted from the actual DEC coordinates

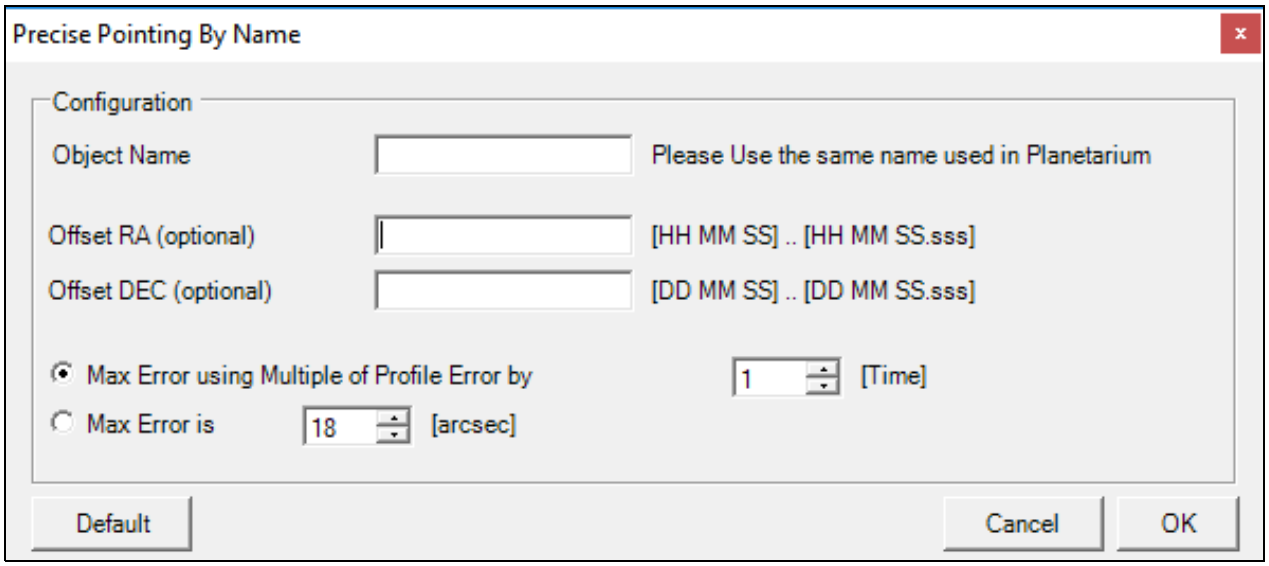
- **Precise Pointing**: Command the mount to perform a precise pointing operation to the specified RA/DEC coordinates - slew to the object, plate solve to get actual coordinates, re-slew to correct pointing error:



- **RA J2000**: Enter the RA coordinates in HH MM SS or HH MM SS.sss
- **DEC J2000**: Enter the DEC coordinates in DD MM SS or DD MM SS.sss
- **Max Error using Multiple of Profile Error by**: If selected, multiply the maximum allowed pointing error by the number specified in the counter field. E.g., if the Precision Pointing Max Allowed Error specified in Mount Setup is 50 arc-seconds, a value of 2 in the counter field here would change the maximum pointing error to 100 arc-seconds. Precise pointing returns an OK (success) result when the error is less than the Max Error.
- **Max Error is**: If selected, use the value specified in the counter field as the maximum pointing error in arc-seconds. Precise pointing returns an OK (success) result when the error is less than the Max Error.
- **RoboClip:** open RoboClip manager windowd and allow to select a target,
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

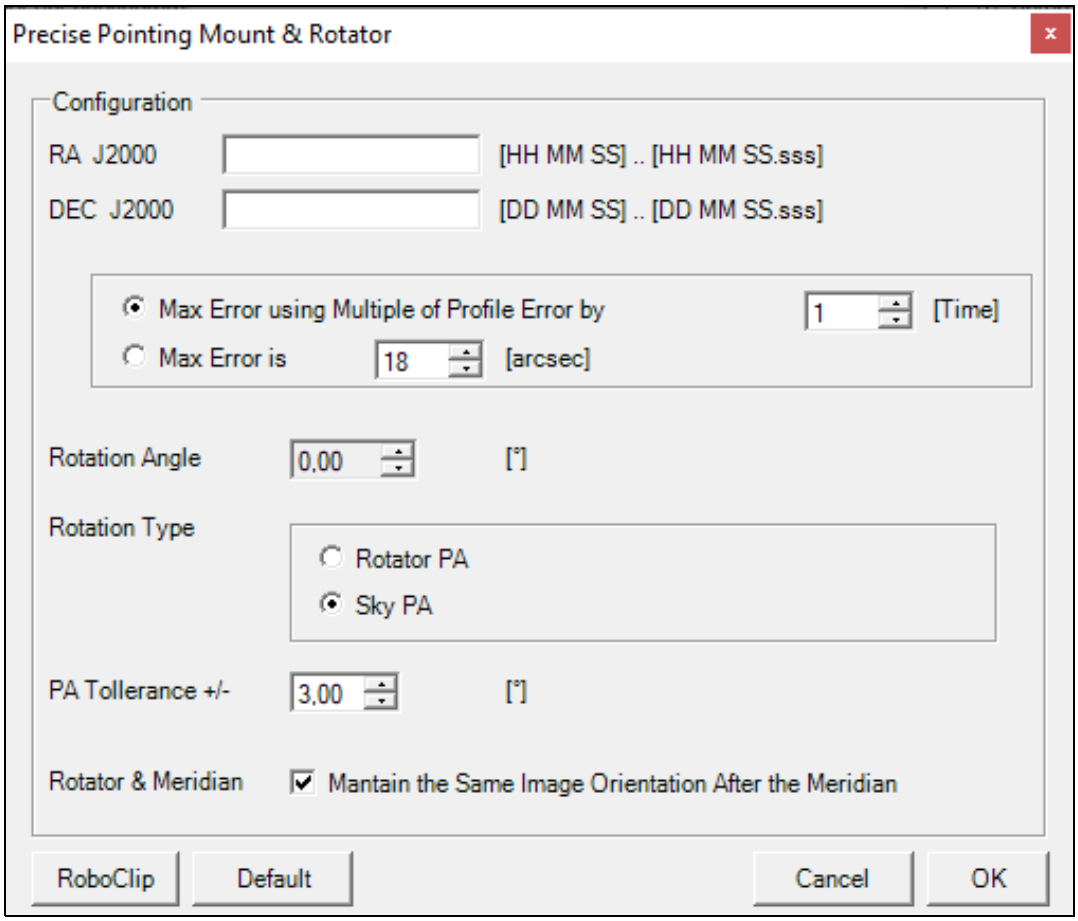
- **Precise Pointing by Name**: Command the mount to perform a precise pointing operation to the specified

named object - slew to the object, plate solve to get actual coordinates, re-slew to correct pointing error. This action requires Voyager to be connected to the Planetarium software defined in the current profile. The Object Name must match a name that can be successfully searched in the connected Planetarium software.

- 

  - **Object Name**: Name of the object to goto. Must be a name that can be successfully searched in the connected Planetarium software
  - **Offset RA (optional)**: An optional +/- offset in HH MM SS or HH MM SS.sss to be added or subtracted from the RA coordinates returned by the Planetarium software
  - **Offset DEC (optional)**: An optional +/- offset in DD MM SS or DD MM SS.sss to be added or subtracted from the DEC coordinates returned by the Planetarium software
  - **Max Error using Multiple of Profile Error by**: If selected, multiply the maximum allowed pointing error by the number specified in the counter field. E.g., if the Precision Pointing Max Allowed Error specified in Mount Setup is 50 arc-seconds, a value of 2 in the counter field here would change the maximum pointing error to 100 arc-seconds. Precise pointing returns an OK (success) result when the error is less than the Max Error.
  - **Max Error is**: If selected, use the value specified in the counter field as the maximum pointing error in arc-seconds. Precise pointing returns an OK (success) result when the error is less than the Max Error.
  - **Default**: Use the default settings
  - **OK**: Save changes and close the window
  - **Cancel**: Discard changes and close the window

- **Precise Pointing Mount & Rotator**: Command the mount to perform a precise pointing operation to the specified named object - slew to the object, plate solve to get actual coordinates, re-slew to correct pointing error, rotating the rotator and align to the requested PA within the specified tollerance.



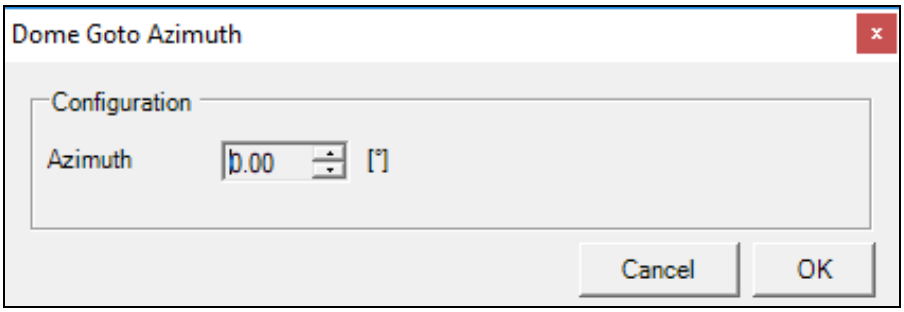
- **RA J2000**: Enter the RA coordinates in HH MM SS or HH MM SS.sss
- **DEC J2000**: Enter the DEC coordinates in DD MM SS or DD MM SS.sss
- **Max Error using Multiple of Profile Error by**: If selected, multiply the maximum allowed pointing error by the number specified in the counter field. E.g., if the Precision Pointing Max Allowed Error specified in Mount Setup is 50 arc-seconds, a value of 2 in the counter field here would change the maximum pointing error to 100 arc-seconds. Precise pointing returns an OK (success) result when the error is less than the Max Error.
- **Max Error is**: If selected, use the value specified in the counter field as the maximum pointing error in arc-seconds. Precise pointing returns an OK (success) result when the error is less than the Max Error.
- **Rotation Angle:** an arbitrary angle that can be a Rotator PA or Sky PA, depends on following setting.
- **Rotation Type:** define if the rotation angle is the rotator angle (rotator PA) reported from the driver (and with offset if asked to Voyager in Sync) or the Sky angle (Sky PA) chosen with web dashboard VirtualFOV or planetarium or another system. If you select Sky PA Voyager will use the Plate solve PA result to rotate the rotator to the right angle. If you select the Rotator PA Voyager will just rotating rotator using drive angle at desidered value, no correction using the plate solved PA will be done
- **PA Tollerance +/-:** if the PA of rotator is inside the interval given the position will be declared ok and rotator will not be rotate.
- **Rotator & Meridian Flip:** "Mantain the Same Image Orientation After the Meridian" if checked force Voyager to shot the target with same orientation in the images taken before anf after meridian. In this case if you have chosen Rotator PA like Rotation type the rotator will be flipped if the mount is after the meridian, if you chosen Sky PA the PA will retained also after the meridian triggering a rotator flip.Use this flag is useful also to use always the same guide star in case of use of OAG or system with high focal lenght.
- **RoboClip:** open RoboClip manager windowd and allow to select a target, with RA and DEC will be also acquired the PA
    - **Default**: Use the default settings
    - **OK**: Save changes and close the window
    - **Cancel**: Discard changes and close the window

- **Stop Tracking (Only FS2 Mount)**: Command an FS2 mount to stop tracking
- **Start Tracking (Only FS2 Mount)**: Command an FS2 mount to start tracking
- **FS2 Meridian Flip WEST**: Command an FS2 mount to perform a meridian flip to the West
- **FS2 Meridian Flip EAST**: Command an FS2 mount to perform a meridian flip to the East
- **Connect Maxim Telescope**: Connect the Telescope/Mount defined in Maxim DL configuration (you must have camera configured in Voyager like Maxim DL)
- **Disconnect Maxim Telescope**: Disconnect the Telescope/Mount defined in Maxim DL configuration (you must have camera configured in Voyager like Maxim DL)
  Important Note! The FS2 Mount commands should only be used if your mount is controlled by the Astro Electronic FS2 motor control system. Using these commands with other mounts may fail and cause damage to the mount and other equipment

45.10 Dome

Dome actions send commands to the dome defined in the Dome Setup area of the active profile:

- **Open Shutter**: Command the dome's shutter or the observatory's roll-off roof to open
- **Close Shutter**: Command the dome's shutter or the observatory's roll-off roof to close
- **Dome Slave ON**: Send a command to the dome software to "Slave" to the mount. The dome's azimuth position will track with the mount's movements in azimuth
- **Dome Slave OFF**: Send a command to the dome software to turn off "Slave" to the mount. The dome's azimuth position will stop tracking the mount's azimuth movements
- **Dome Goto Azimuth**: Command the Dome to rotate to the specified Azimuth



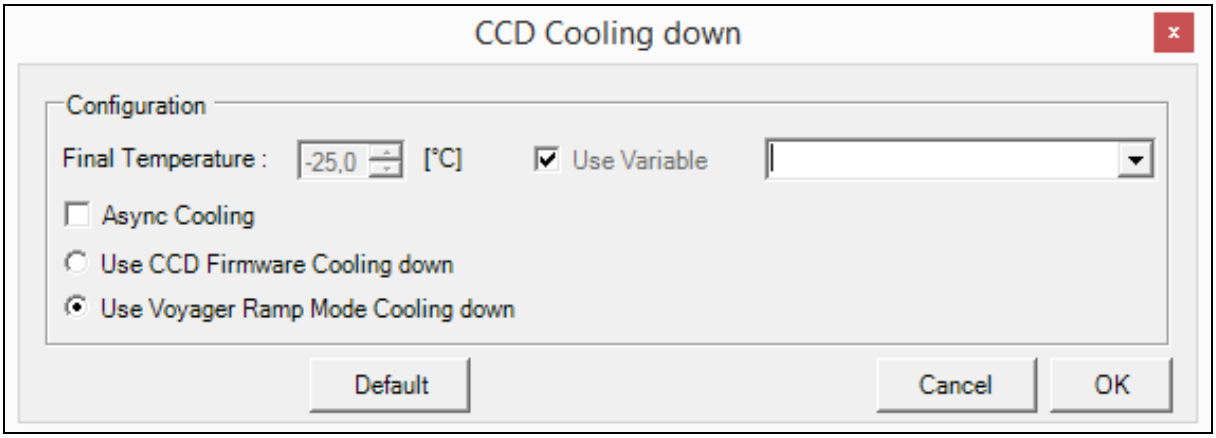
- **Azimuth**: Azimuth position the mount should move to in degrees
- **Cancel**: Discard changes and close the window
- **OK**: Save changes and close the window

- **Dome Find Home**: Command the dome to find its Home position. If your dome supports the Find Home command, the dome moves to a known position
- **Dome Park**: Send a Park command to the dome.
- **Dome Unpark:** Send an Unpark command to the dome

45.11 Camera

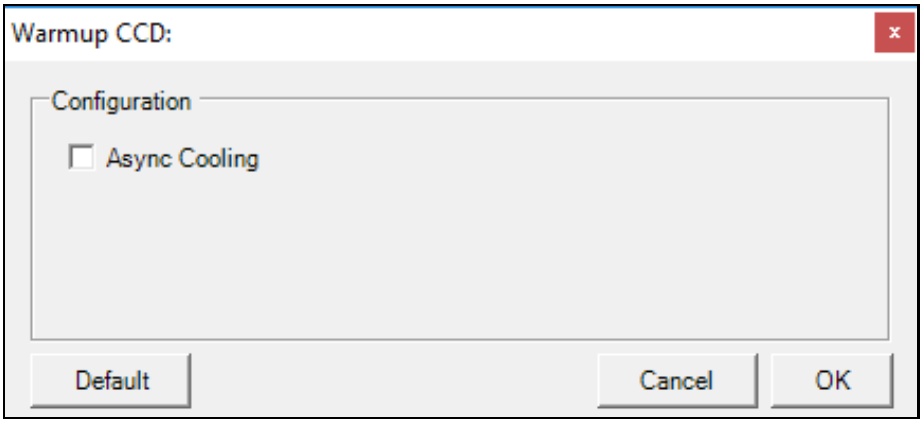
Camera actions can control the camera's cooling system and take exposures

- **Cool Down**: Command the camera's cooling system to cool down to a desired temperature:



- **Final Temperature**: Desired sensor temperature in °C
- **Use Variable:** check this flag if you want to set the cooling temperature reading the value inside the variable selectable in the drop-down combo instead to use a fixed value
- **Async Cooling**: If checked, command the cooling system to go to the Final Temperature and do not wait for the cooling system to report that it has reached the desired temperature
- **Use CCD Firmware Cooldown**: If selected, let the CCD's cooling system manage the speed of the cooldown process
- **Use Voyager Ramp Mode Cooldown**: If selected, let Voyager's cooldown process manage the speed of the cooldown process. Voyager's process is defined in Camera Setup
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

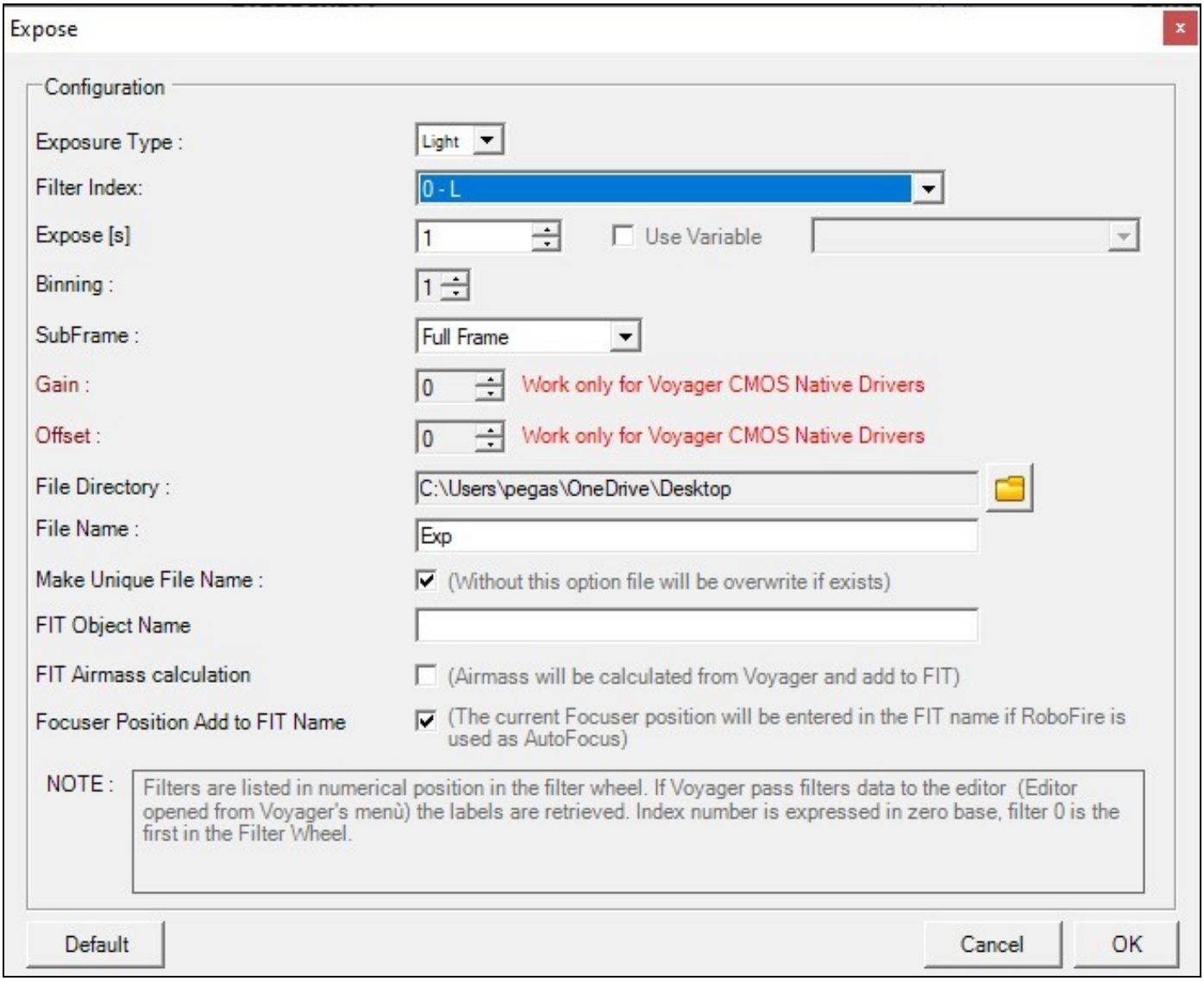
- **Warmup**: Command the camera's cooling system to warmup



- **Async Cooling**: If checked, command the camera's cooling system to warmup and do not wait for the warmup

operation to finish
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Expose**: Take an exposure



- **Exposure Type**: Choose Light, Bias, Dark or Flat from the drop-down list
- **Filter Index**: Choose the filter for the exposure from the drop-down list
- **Expose**: Enter the exposure length in seconds in the counter field
- **Use Variable:** select if you want to get the exposure time from the decimal variable selected in the near list control
- **Binning**: Select the binning level for the exposure from the counter field
- **SubFrame**: Select the frame size from the drop-down list: Full Frame, 1/2, 1/4, 1/8, 1/16 or CUSTOM. If you select CUSTOM subframe size, enter the desired subframe size in percent in the counter field that appears
- **Gain:** Set the camera's Gain value to the number in the spinner control. Works only if you are using the ASI Camera native driver.
- **Offset:** Set the camera's Offset value to the number in the spinner control. Works only if you are using the ASI Camera native driver.
- **File Directory**: Click the folder icon to select the folder where Voyager should save the image resulting

from this exposure

- **File Name**: Enter the file name to use when saving the image resulting from this exposure
- **Make Unique File Name**: If checked, add a suffix to the file name if needed to avoid overwriting an existing file
- **FIT Object Name**: The name to use to populate the OBJECT field in the FITS header
- **FIT Airmass calculation**: Compute the current airmass value and add to the FITS file header. Airmass is the amount of atmosphere you are imaging through. It is one when imaging directly overhead, and increases as you image closer to the horizon.
- **Focuser Position Add to FIT Name:** add the focuser position to the FIT name, only if you are using RoboFire like Autofocus control in Voyager
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **TheSkyX/64 Camera FW Reconnect**: Reconnect camera and filterwheel if the control used for camera in Voyager is TheSkyX or TheSky64

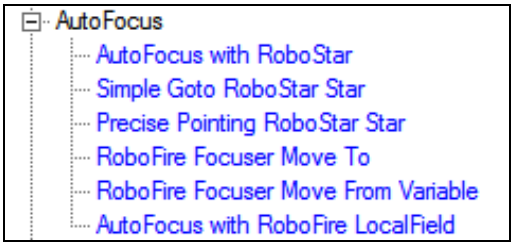
Important Note! Dragscript editor doesn?t have access to profile configuration, for this reason you dont find setting about readout mode and speed in exposure block. Exposure block use auto mode of readout mode and default speed mode. This mean chooses are based on shot type and binning. It retrieve automatically the correct values you set up on Voyager camera setting tab.

Important Note! Filter labels are shown in this dialog if the DragScript editor is opened from Voyager and filter labels are defined in the current profile. Otherwise only filter indexes are shown. The first filter is index zero (0)

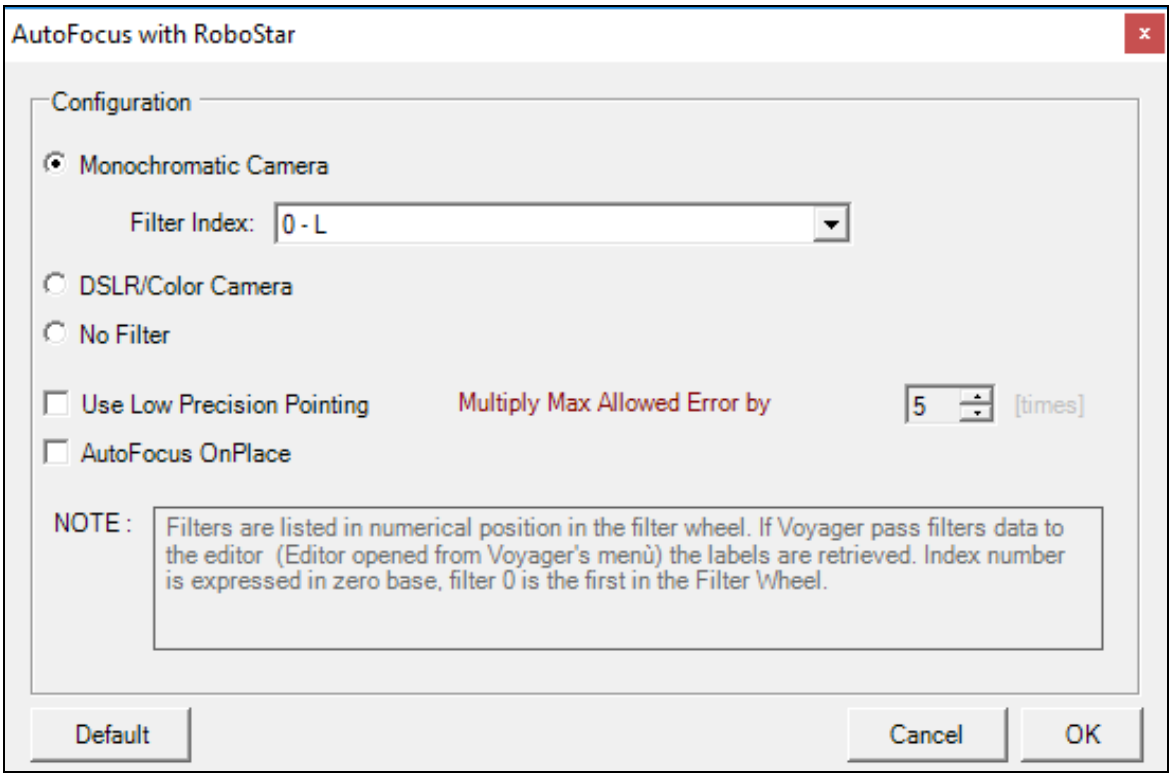
Important Note! If you check the use variable flag the exposure time used for the exposure will be added to the name of FIT file

45.12 AutoFocus

These DragScript commands perform Voyager's autofocus operations:

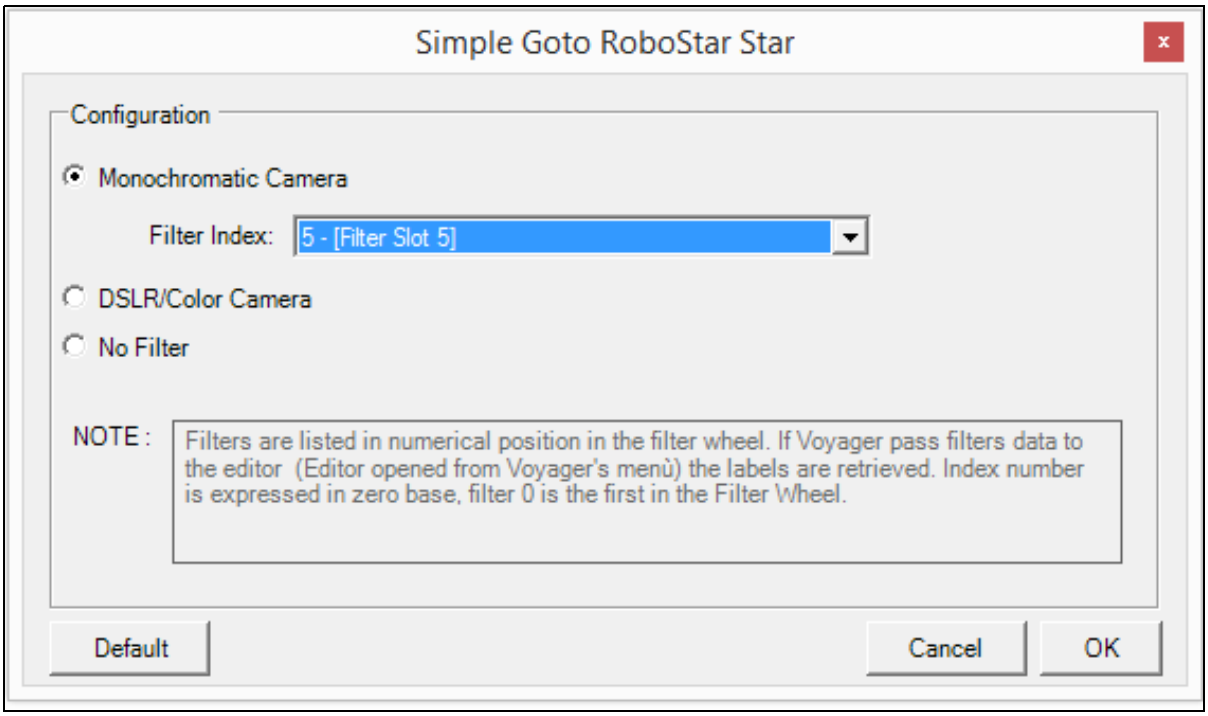


- **AutoFocus with RoboStar**: perform an autofocus operation using Voyager's RoboStar method to choose the focus star:



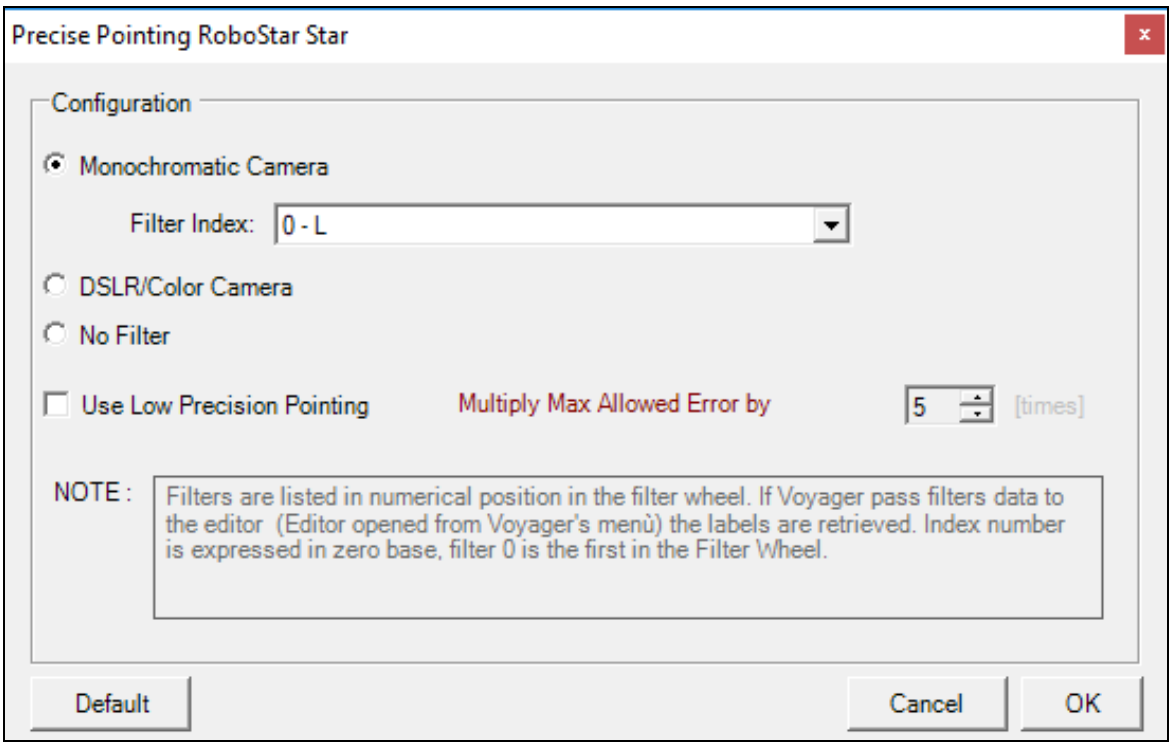
- **Monochromatic Camera**: Select if a monochrome camera is connected. Select a filter to use for the autofocus operation from the drop-down list
- **DSLR/Color Camera**: Select if a DSLR or Color (OSC) camera is connected
- **No Filter**: Select if a monochrome camera is connected without filters
- **Use Low Precision Pointing**: If checked, Voyager's RoboStar operation will slew to the focus star with a more relaxed precision pointing operation. Specify the multiple for the maximum allowed precision pointing error in the counter field. E.g., if the precision pointing max allowed error configured in Mount Setup is 50 arc-seconds, a "Multiple Max Allowed Error by" setting of two would relax the maximum allowed pointing error to 100 arc-seconds
- **AutoFocus OnPlace**: Perform the autofocus operation at the current scope location. Do not use RoboStar to select a focus star
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Simple Goto RoboStar Star**: Perform a simple goto operation to move the mount to the focus star selected by RoboStar:



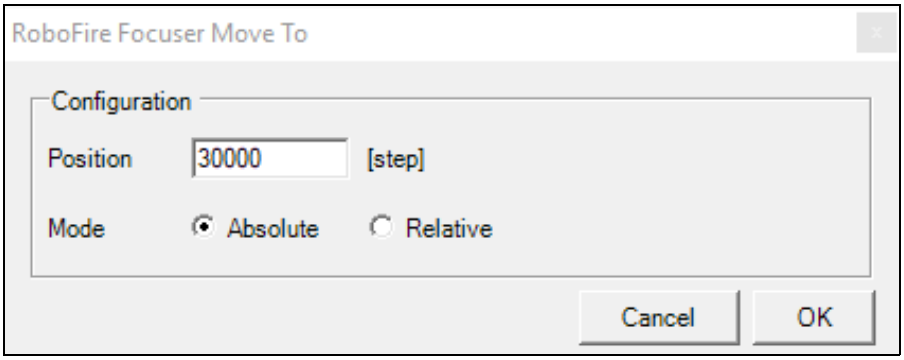
- **Monochromatic Camera**: Select if a monochrome camera is connected. Select a filter to use for the precise pointing operation from the drop-down list
- **DSLR/Color Camera**: Select if a DSLR or Color (OSC) camera is connected
- **No Filter**: Select if a monochrome camera is connected without filters
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Precise Pointing RoboStar Star**: Perform a precise pointing operation to move the mount to the focus star selected by RoboStar:



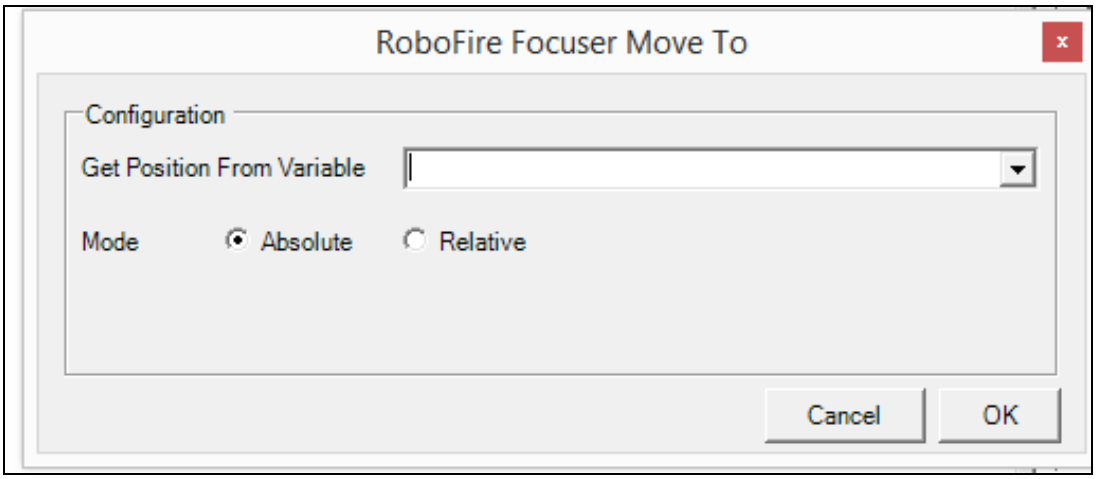
- **Monochromatic Camera**: Select if a monochrome camera is connected. Select a filter to use for the precise pointing operation from the drop-down list
- **DSLR/Color Camera**: Select if a DSLR or Color (OSC) camera is connected
- **No Filter**: Select if a monochrome camera is connected without filters
- **Use Low Precision Pointing**: If checked, Voyager will slew to the focus star with a more relaxed precision pointing operation. Specify the multiple for the maximum allowed precision pointing error in the counter field. E.g., if the precision pointing max allowed error configured in Mount Setup is 50 arc-seconds, a "Multiple Max Allowed Error by" setting of two would relax the maximum allowed pointing error to 100 arc-seconds
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **RoboFire Focuser Move To**: Move the focuser to a specified absolute or relative position:



- **Position**: Desired focuser position in steps
- **Mode**: Choose absolute or relative
    - **Absolute**: Command the focuser to move to the specified position. Your focuser must support absolute positioning.
    - **Relative**: Command the focuser to move in or out by the specified number of steps. Negative numbers move the focuser IN and positive move it out, unless you specify "Reverse Focuser Direction" in Autofocus Setup
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

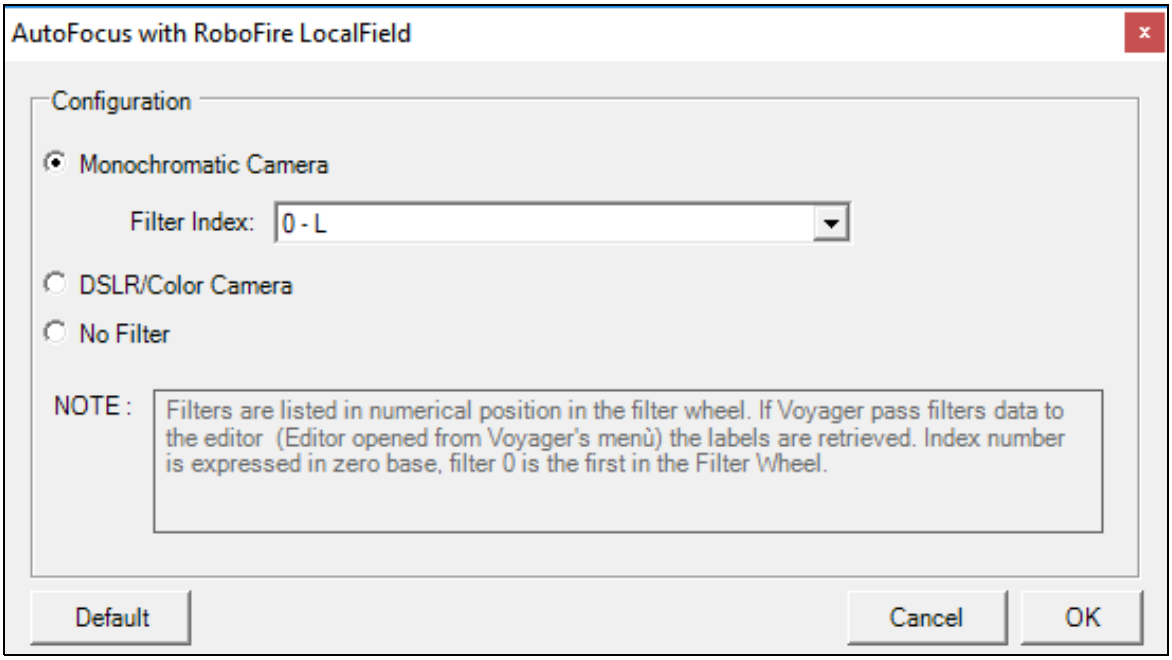
- **RoboFire Focuser Move From Variable**: Move the focuser to an absolute or relative position stored in a variable:



- **Get Position From Variable**: select the variable that contains the position
- **Mode**: Choose absolute or relative
  - **Absolute**: Command the focuser to move to the specified position. Your focuser must support absolute positioning.
  - **Relative**: Command the focuser to move in or out by the specified number of steps. Negative numbers move the focuser IN and positive move it out, unless you specify "Reverse Focuser Direction" in Autofocus Setup
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

Important Note! Be sure to select the right Variable and that the variable is valorized before using this block or you can lost focus. Be sure also to have inserted limits on RoboFIre configuration to avoid damage to your focuser.

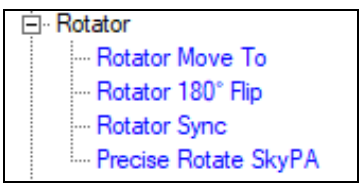
- **AutoFocus with RoboFire LocalField**: Perform Voyager's LocalField (multiple star) autofocus routine



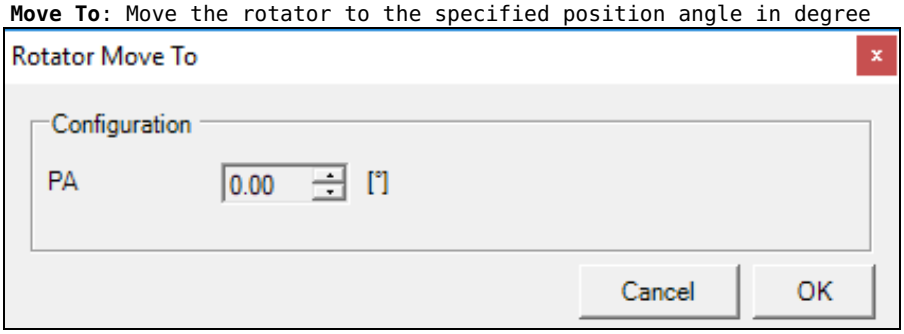
- **Monochromatic Camera**: Select if a monochrome camera is connected. Select a filter to use for the precise pointing operation from the drop-down list
- **DSLR/Color Camera**: Select if a DSLR or Color (OSC) camera is connected
- **No Filter**: Select if a monochrome camera is connected without filters
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

45.13 Rotator

Rotator actions can move the rotator to a specified Position Angle or flip the rotator 180 degrees:

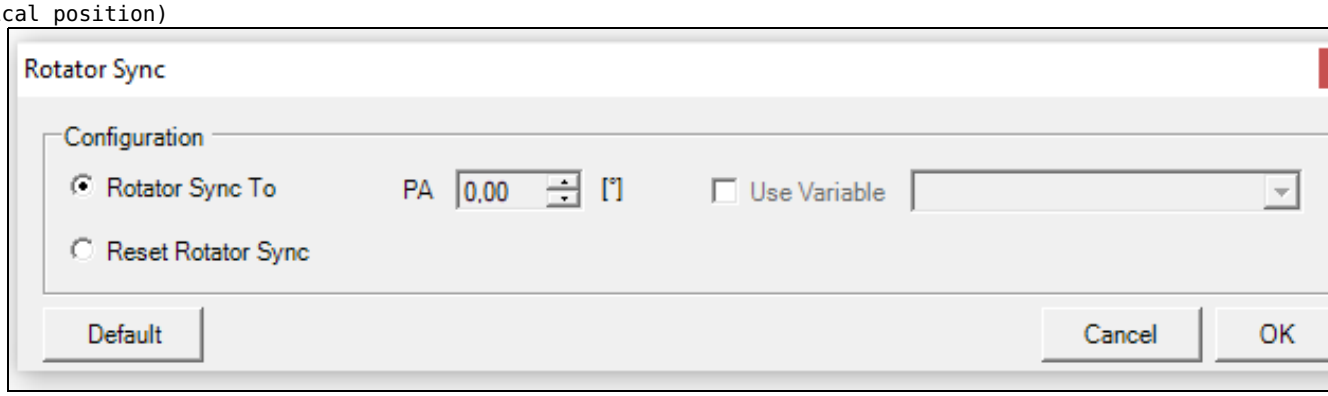


- **Rotator Move To**: Move the rotator to the specified position angle in degree



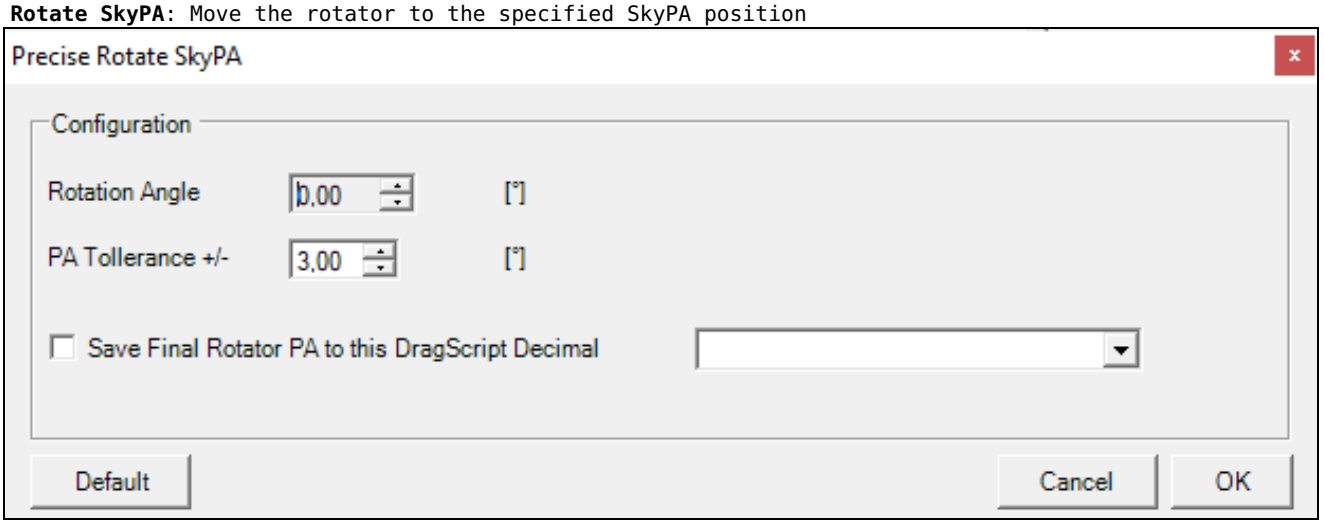
  - ◊ **PA**: Move the rotator to this Position Angle in degrees
  - ◊ **OK**: Save changes and close the window
  - ◊ **Cancel**: Discard changes and close the window

- **Rotator 180° Flip**: Move the rotator to a position 180 degrees opposite its current position
- **Rotator Sync**: Synchronize the mechanical position to the submitted position (create an offset to the mechanical position)



  - ◊ **Rotator Sync To:** with this option Voyager will sync the rotator PA to the PA in the next field
  - ◊ **PA:** Position Angle to use for sync
  - ◊ **Use Variable:** get PA value from the selected variable
  - ◊ **Reset Rotator Sync:** with this option Voyager will reset the Sync (remove the offset applied to the mechanical position of rotator)
  - ◊ **Default:** reset all parameters in the form to the default values
  - ◊ **Cancel:** exit from the configuration form without saving anything
  - ◊ **OK:** accept the inserted value and store data

- **Precise Rotate SkyPA**: Move the rotator to the specified SkyPA position



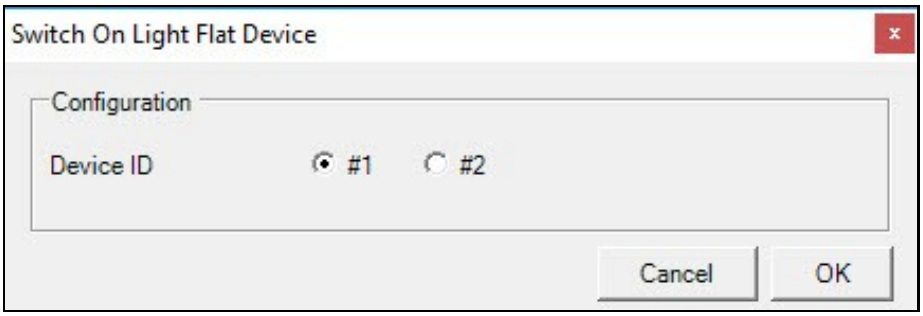
  - ◊ **Rotation Angle**: SKY PA in degree to use for positioning the rotator
  - ◊ **PA Tollerance +/-**: max allowed difference in degree between solved PA and requested PA

- ◊ **Save Final Rotator PA to this DragScript Decimal:** if flagged save the Rotator PA degree of pointing (if positioned ok) to the decimal variable selected in the combobox
- ◊ **OK**: Save changes and close the window
- ◊ **Cancel**: Discard changes and close the window

45.14 Flat Device

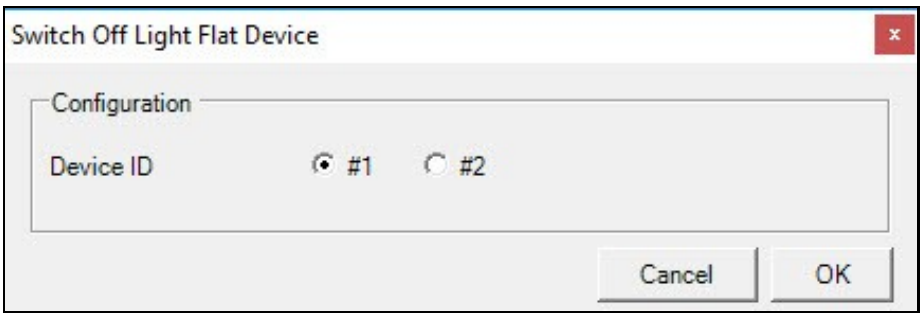
Flat Device commands can open and close the flat device cover:

- **Open Flat Device Cover**: Command the flat device to open
- **Close Flat Device Cover**: Command the flat device to close
- **Switch On Light Flat Device**: Turn the light on for the specified Flat Device



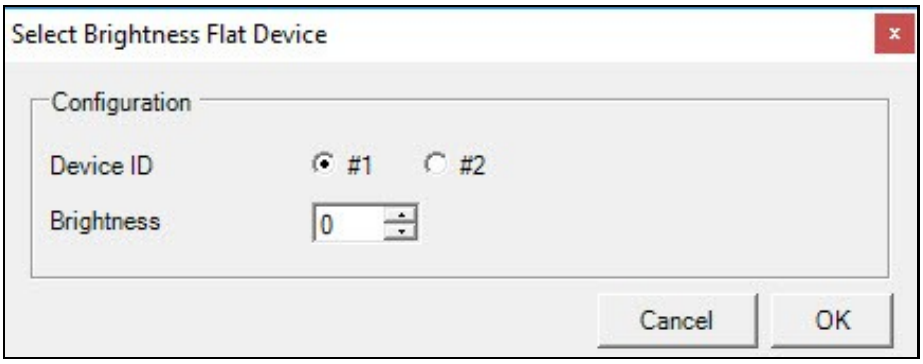
- **Device ID**: Choose the Flat Device number to control with this command. See Flat Device Setup for more information on flat devices.

- **Switch Off Light Flat Device**: Turn the light off for the specified Flat Device



- **Device ID**: Choose the Flat Device number to control with this command. See Flat Device Setup for more information on flat devices.

- **Select Brightness Flat Device**: Set the brightness level for the specified Flat Device.

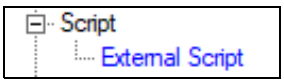


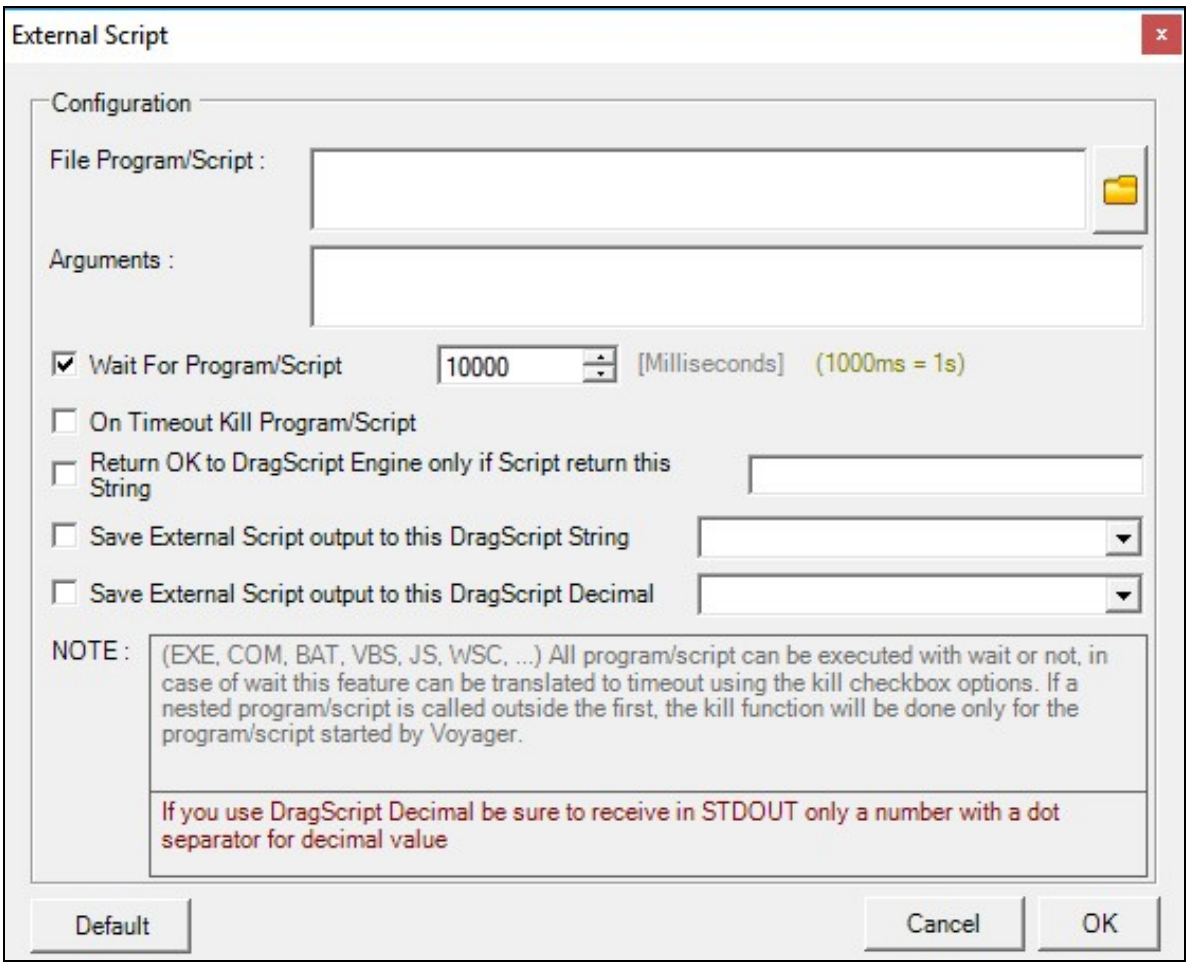
- **Device ID**: Choose the Flat Device number to control with this command. See Flat Device Setup for more information on flat devices.
- **Brightness**: Brightness level for the specified Flat Device.

Important Note! If you have a flat device that can open and close, don't forget to issue an Open Flat Device command in your DragScript before taking exposures including plate solving and autofocus!

45.15 Script

The Script action can run an external script or program:





- **File Program/Script**: Click the folder icon to select the program or script to run
- **Arguments**: Command line arguments to be passed to the program or script when invoking it

- **Wait For Program/Script**: If checked, wait for the program or script to return before continuing (synchronous execution)
- **On Timeout Kill Program/Script**: If checked, and the "Wait for Program/Script" option is checked, and the "Wait / Timeout" time period has elapsed, terminate the external program or script
- **Return OK to DragScript Engine only if Script return this**: If checked, the script or program must return the value specified in the text field in order for this action to be considered a success and return OK
- **Save External Script output to this DragScript String**: If checked, store the value that the external script or program returns in STDOUT to the DragScript string variable chosen from the drop-down list
- **Save External Script output to this DragScript Decimal**: If checked, store the value that the external script or program returns in STDOUT to the DragScript decimal number variable chosen from the drop-down list
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

Important Note! Voyager will only terminate the specified program or script when the timeout period expires. If the called program calls other programs, they will not be terminated by Voyager

Important Note! If the value returned from STDOUT is stored in a DragScript decimal number, be sure that the number returned uses a period as the decimal point separator

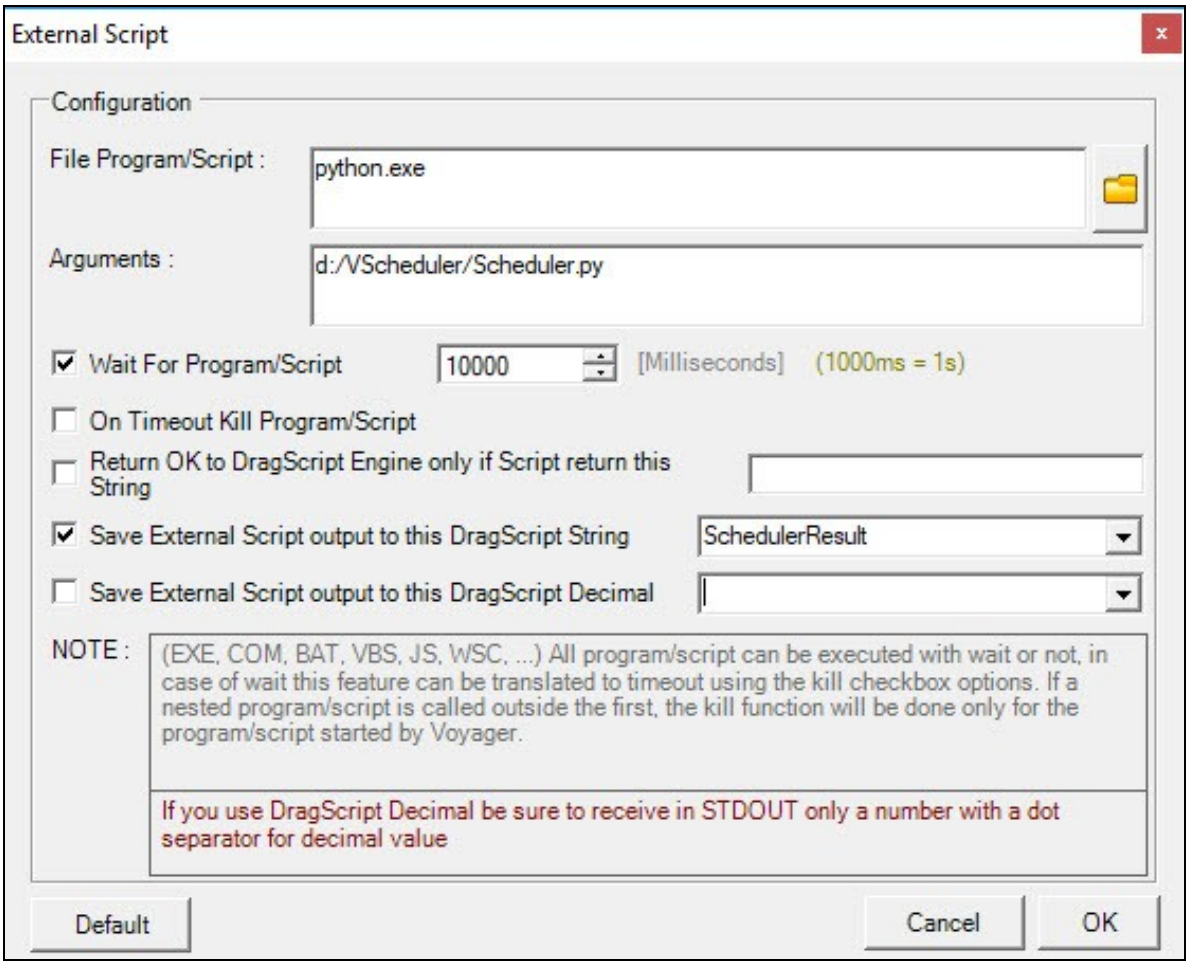
Example of Use

In this example, we call a Python script located in the directory d:\VScheduler\Scheduler.py, and wait up to 10 seconds for the script to complete.

The Python script writes a value to STDOUT with this code:

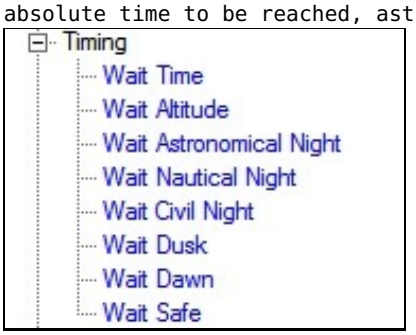
```
import sys

sys.stdout.write('RUN')

sys.stdout.flush()
```

We store that value in the SchedulerResult DragScript string variable. We can then make decisions in the DragScript using the DO IF STRING VALUE statement.

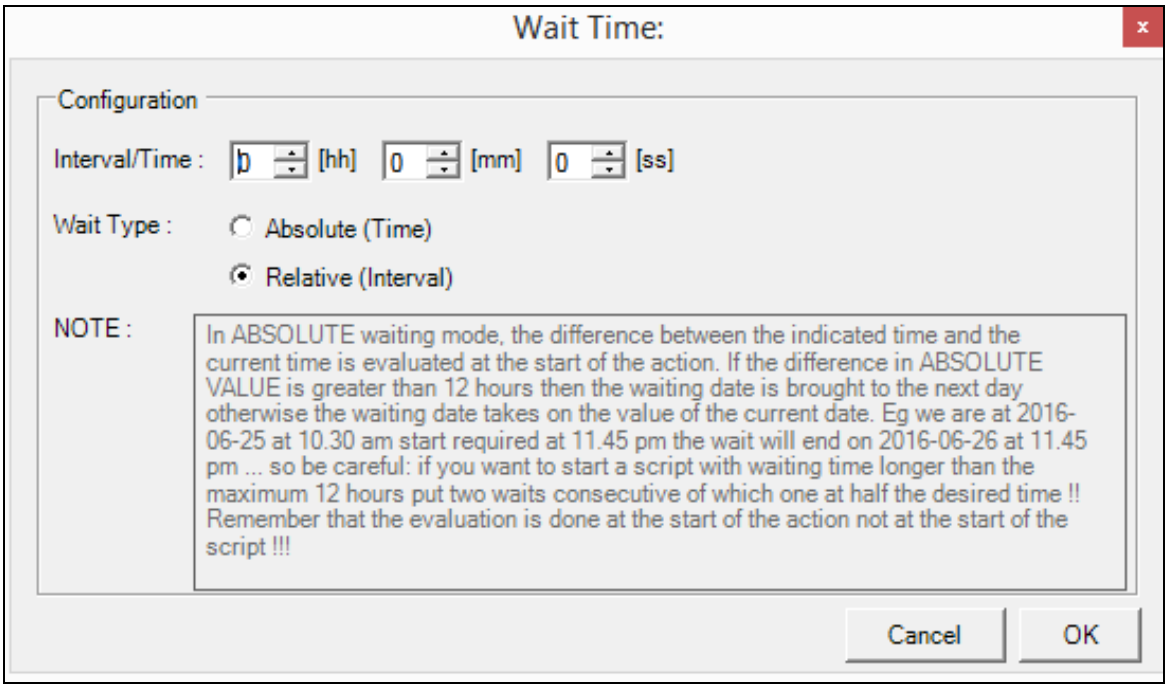


45.16 Timing

Timing actions inform DragScript to wait before performing an action. You can wait for a time interval, an absolute time to be reached, astronomical night with an offset, or for an object to reach a desired altitude:

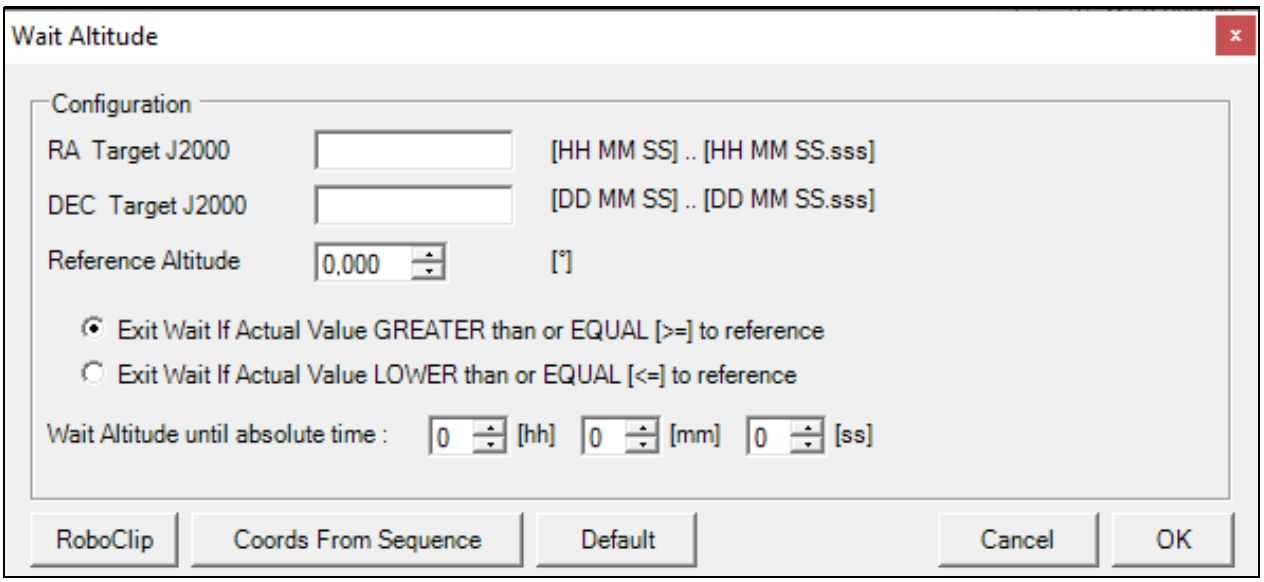


- **Wait Time**: Wait for a specified time to arrive or to elapse



- **Interval/Time**: Enter a time in HH MM SS.
- **Wait Type**: Chose Absolute or Relative
  - **Absolute**: Wait until this absolute time is reached. If the time specified is more than 12 hours in the future, Voyager will assume this time has passed and will not wait. For example, if the specified time is 20:00:00 and this action is executed at 20:15:00, Voyager will not wait because that would cause a wait until tomorrow night, which is probably not what you intended
  - **Relative**: Wait for this amount of time to elapse
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Wait Altitude**: Wait until the object at the given RA and DEC coordinates reaches the specified altitude, either rising or setting:

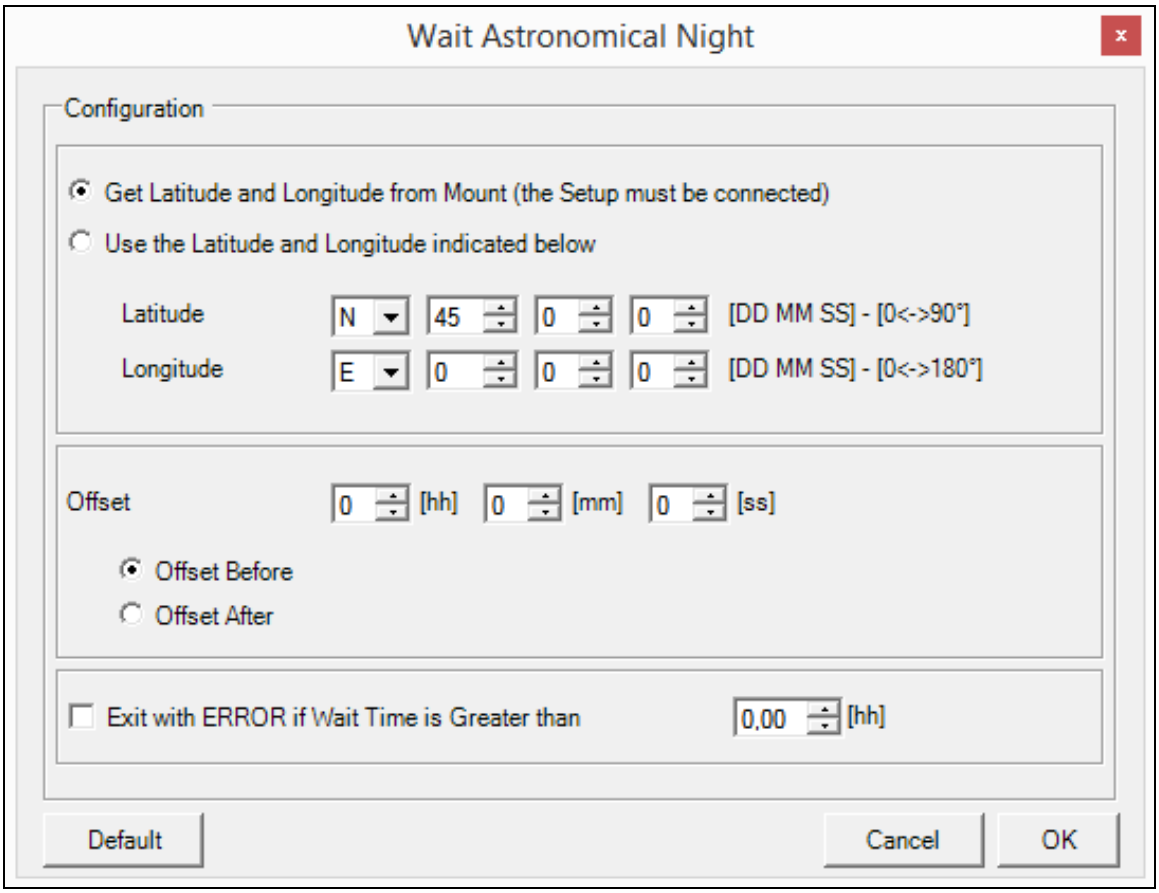


- **RA Target J2000**: RA coordinates of the object you want to reach the Reference Altitude in HH MM SS or HH MM SS.sss
- **DEC Target J2000**: DEC coordinates of the object you want to reach the Reference Altitude in DD MM SS or

DD MM SS.sss

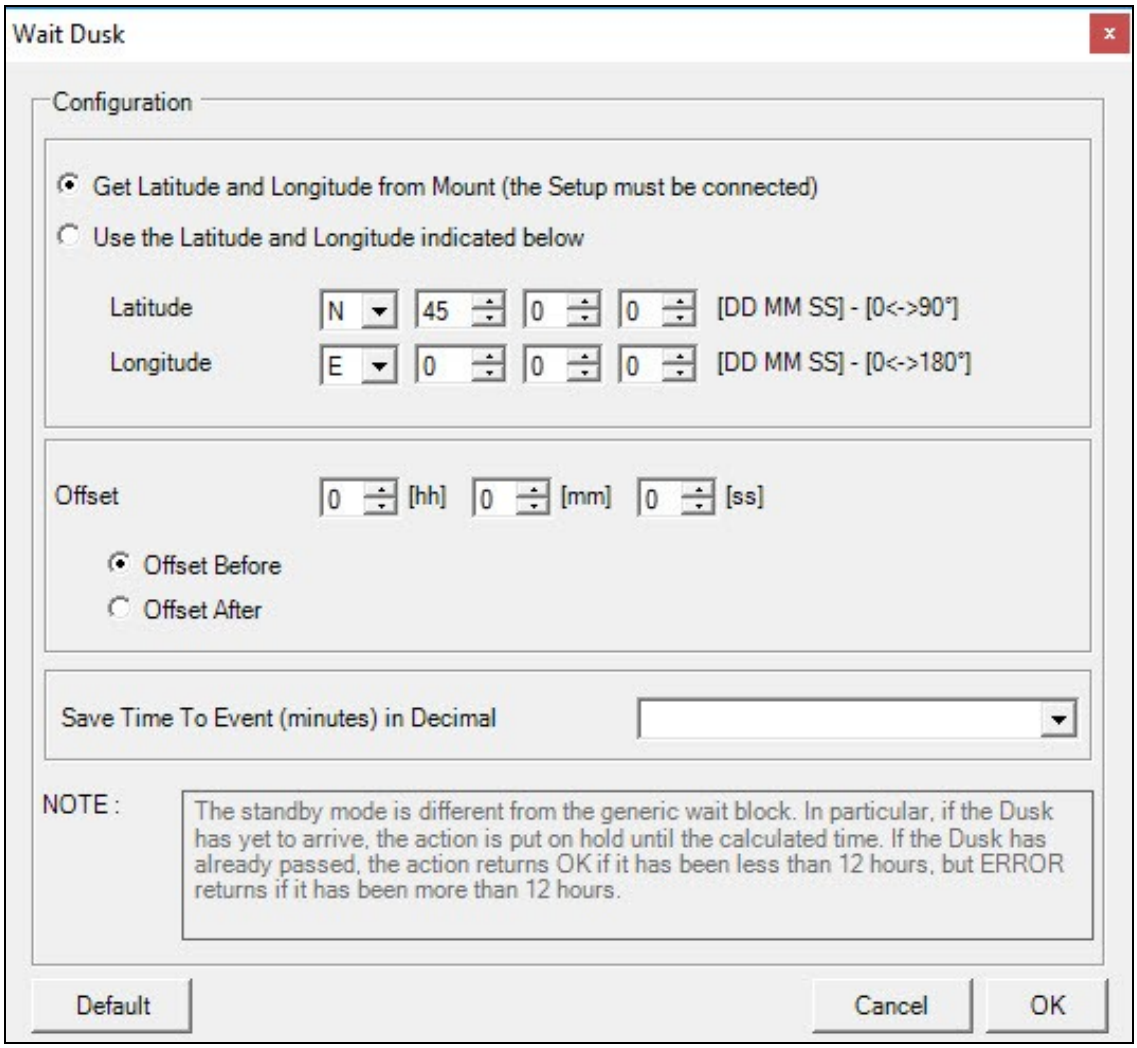
- **Reference Altitude**: Altitude to reach in degrees
- **Exit Wait if Actual Altitude GREATER than or EQUAL (>=) to reference**: Wait until the target rises above the reference altitude
- **Exit Wait if Actual Altitude LOWER than or EQUAL (>=) to reference**: Wait until the target sets below the reference altitude
- **Wait Altitude until absolute time**: The Wait Altitude operation will terminate when this time is reached, whether or not the target has reached the reference altitude. This is usually done to end the wait with morning light
- **RoboClip:** load RA and DEC from RoboClip catalog
- **Coords From Sequence:** load RA and DEC from a sequence file
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

-
- **Wait Astronomical/Nautical/Civil Night**: Wait until astronomical/nautical/civil night, with an optional offset:



- **Get Latitude and Longitude from Mount**: Retrieve the current latitude and longitude from the connected mount, which must support this command. This location is used, along with the current date, to determine the time that night begins
- **Use the Latitude and Longitude indicated below**: Specify your current latitude and longitude in the fields below. This location is used, along with the current date, to determine the time that night begins
- **Offset**: Time in HH MM SS
    - **Offset Before**: If selected, exit the wait this amount of time before night
    - **Offset After**: If selected, exit the wait this amount of time after night

- **Exit with ERROR if Wait Time is Greater than:** if this option is flag the DragScript will exit with Error if the time wait for the begin of the next astronomical night is greater than the value in hour expressed in the numeric edit. Useful if you want to detect that the actual night is already finished and the dragscript can exit otherwise without this flag the next astrnomical night will be waited
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window
- **Wait Dusk**

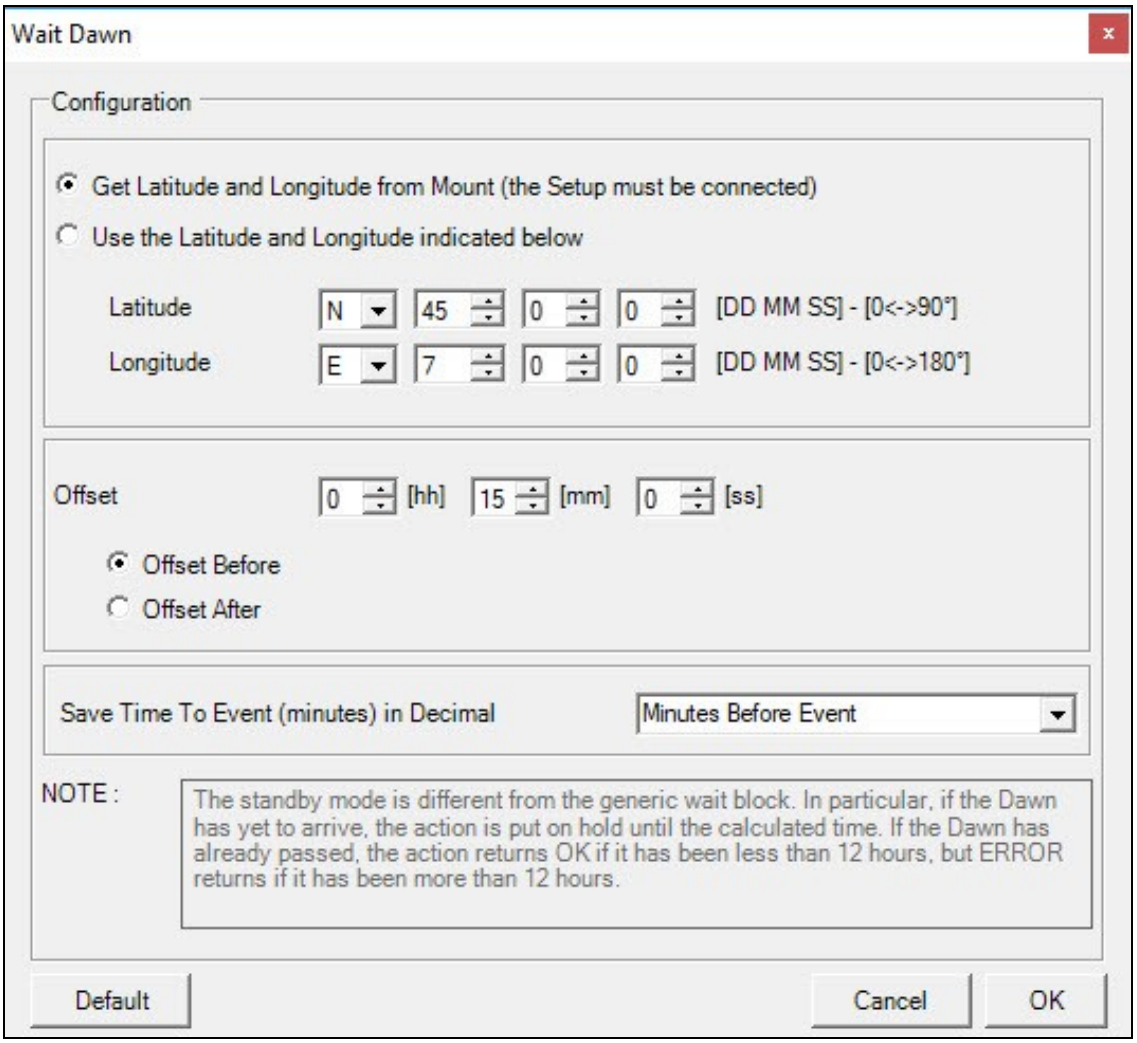


- **Get Latitude and Longitude from Mount**: Retrieve the current latitude and longitude from the connected mount, which must support this command. This location is used, along with the current date, to determine the time that dusk begins
- **Use the Latitude and Longitude indicated below**: Specify your current latitude and longitude in the fields below. This location is used, along with the current date, to determine the time that dusk begins
- **Offset**: Time in HH MM SS
    - **Offset Before**: If selected, exit the wait this amount of time before dusk
    - **Offset After**: If selected, exit the wait this amount of time after dusk
- **Save Time to Event (minutes) in Decimal**: Save the computed time until Dusk in a decimal variable. See the DragScript example below for one way to use this.
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

You can configure the time at which dusk begins in the SkyFlat section of Flat Device Setup.

Important Note! If dusk (plus or minus the offset if one is specified) has already passed, Wait Dusk returns OK if it has been less than 12 hours since dusk, else it returns ERROR if has been more than 12 hours

- **Wait Dawn**



- **Get Latitude and Longitude from Mount**: Retrieve the current latitude and longitude from the connected mount, which must support this command. This location is used, along with the current date, to determine the time that dawn begins
- **Use the Latitude and Longitude indicated below**: Specify your current latitude and longitude in the fields below. This location is used, along with the current date, to determine the time that dawn begins
- **Offset**: Time in HH MM SS
    - **Offset Before**: If selected, exit the wait this amount of time before dawn
    - **Offset After**: If selected, exit the wait this amount of time after dawn
- **Save Time to Event (minutes) in Decimal**: Save the computed time until dawn in a decimal variable. See the DragScript example below for one way to use this.
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

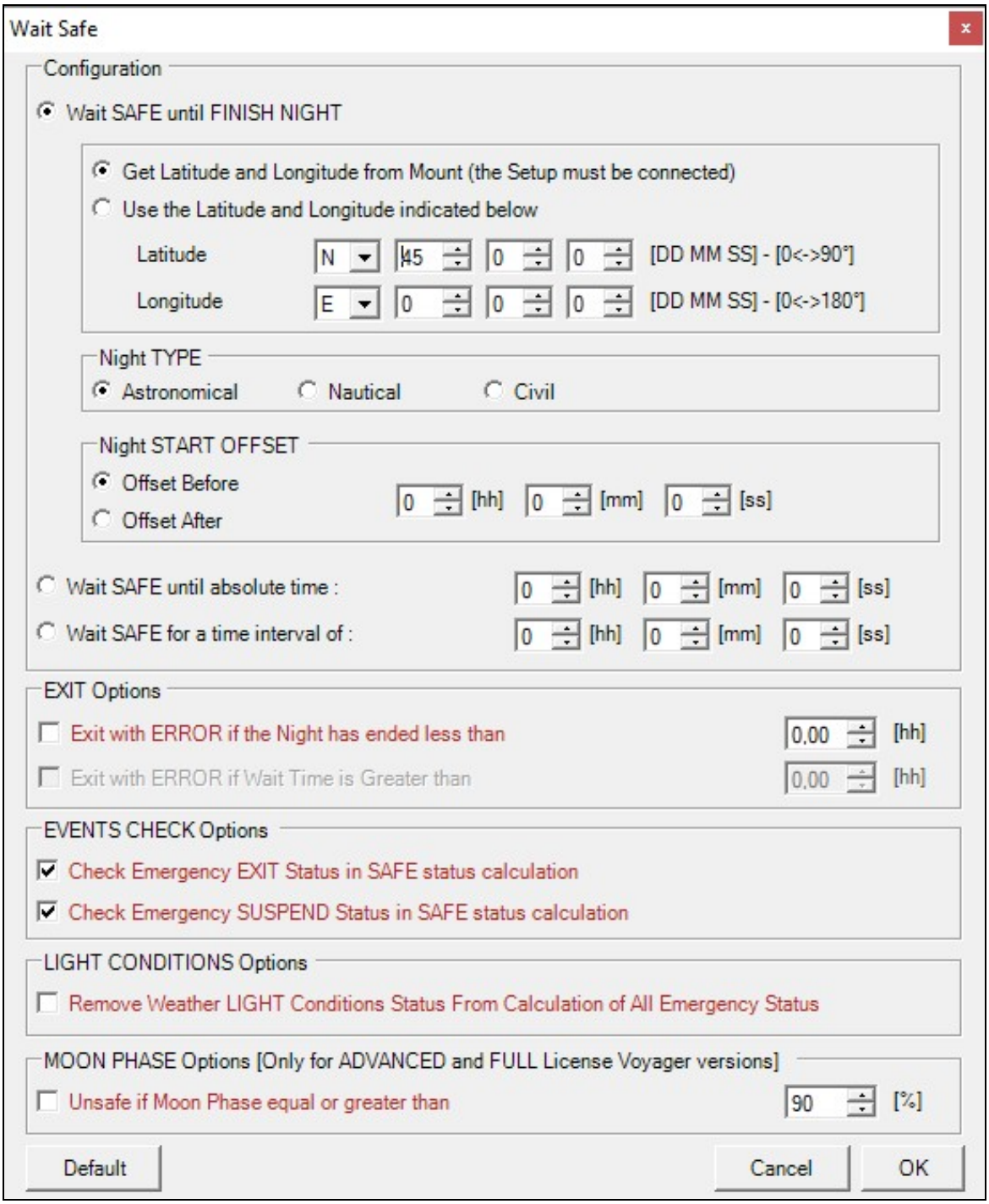
You can configure the time at which dawn begins in the SkyFlat section of Flat Device Setup.

Important Note! If dawn (plus or minus the offset if one is specified) has already passed, Wait Dawn returns OK

if it has been less than 12 hours, else ERROR if more than 12 hours

-
- **Wait Safe**: Wait Safe Condition wait the safe condition before allow dragscript to execute net instruction. During the wait the events like Emergency Exit and Emergency suspend will be disabled and not managed. Just to remember you emergency events can coming from Viking I/O, Safe Monitor control, Weather Condition control. Like said this action will forcing event disable until exit for timeout or for safe. So be sure to have the observatory on the right configuration to avoid weather damage (closed and all parked). This action allow Voyager to run forever DragScript in case of no emergency exit. Can wait a time or an interval or the presence of astronomical/nautical/civil night, with an optional offset. Usually this is the first action in a script, its a good thing to put the Start node in Event disabled mode when you are manage the events in your DragScript. Also remember that the event at exit of this action will be restored to the original status, if they are disabled they will be leave disable or viceversa. We suggest also generally in dragscript to disable events during an atomic tasks like the opening observatory and connect setup to avoid interruption not really needed with impredictable results. If the action finish for wait will produce a status of TIMEOUT to the DragScript, if the action finish for one of the exit options will produce a status of ERROR to the DragScript, if the action found a SAFE status inside the wait option will produce a status of OK to the DragScript. You can decide if repeat the the action in a never ending loop (if you use night this mean to wait for the next night if you not check the exit ERROR options) or simple end the DragScript if you start DragScript night by Night. Rember that an Emergency Exit in any case will exit the DragScript.

Important Note! Wait SAFE Cannot be used inside the Event Manager (Exit, Suspend, Resume)



- **Wait SAFE until finish Night**: this option wait SAFE status until on eof specified kind of Nights is finished
  - **Get Latitude and Longitude from Mount**: Retrieve the current latitude and longitude from the connected mount, which must support this command. This location is used, along with the current date, to determine the time that astronomical night begins and end
  - **Use the Latitude and Longitude indicated below**: Specify your current latitude and longitude in the fields below. This location is used, along with the current date, to determine the time that astronomical night begins and end
  - **Night TYPE:** the night to wait between Astronomical (Astrophotographers dark night -18° sun) , Nautical (-12° sun), Civil (-6° sun)
  - **Offset**: Time in HH MM SS
    - **Offset Before**: If selected, exit the wait this amount of time before astronomical night
    - **Offset After**: If selected, exit the wait this amount of time after astronomical night
- **Wait SAFE until absolute time**: this option wait SAFE status until the absolute time you put inside the

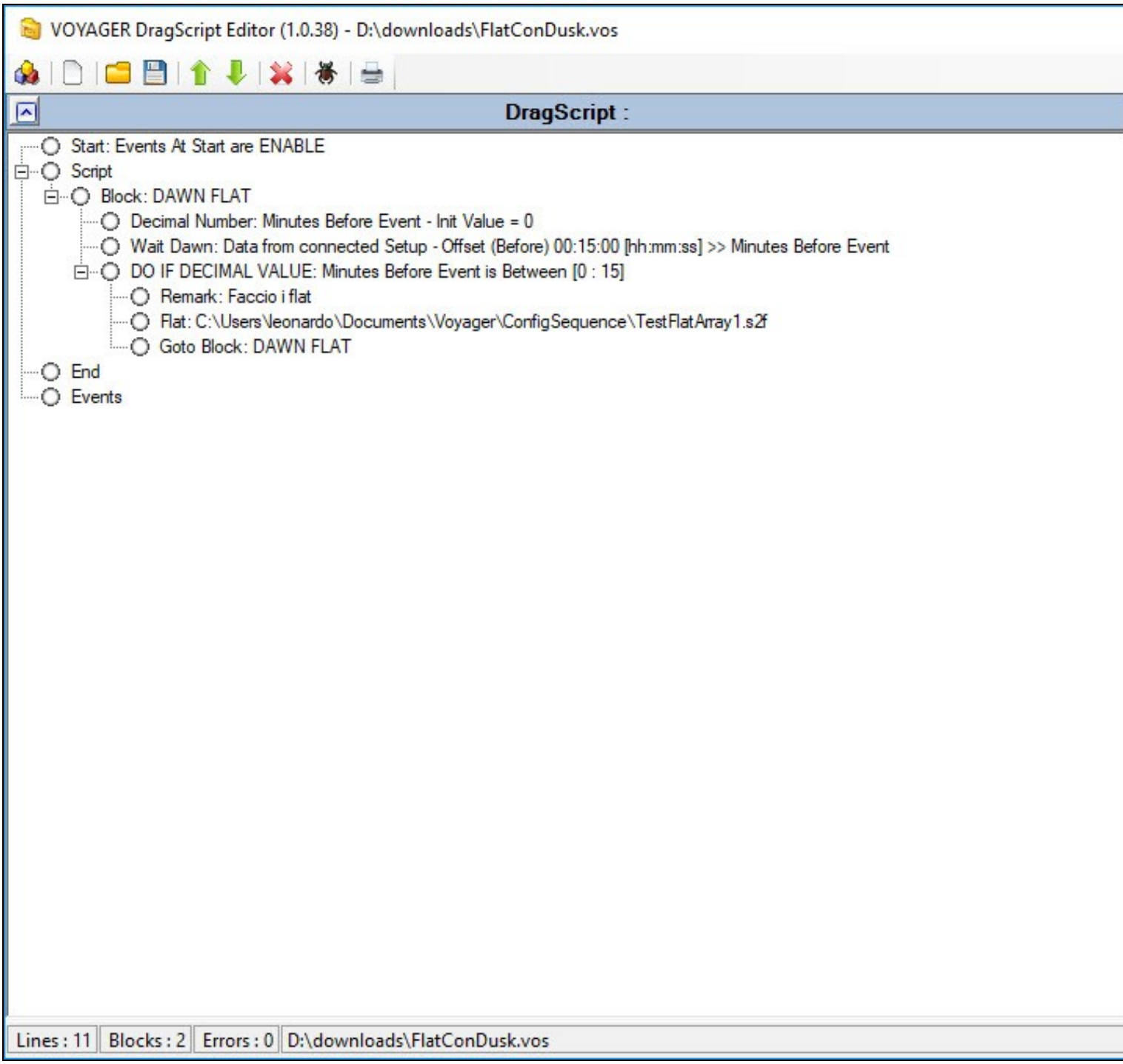
hh mm ss field

- **Wait SAFE for a time interval of:** this option wait SAFE status until the amount of time in the interval will be elapsed
- **EXIT Options:** with this options you can decide to exit with ERROR it the conditions inside is true
    - **Exit with ERROR if the Astronomical Night has ended less than:** if this option is flag the DragScript will exit with Error if the astronomical night is ended by the time in hh field. This work and be active only if you use Wais SAFE with astronomical night. This flag enabled prevento to wait for the next night if the night is finished and you want to shutdown all without wait the next night.
    - **Exit with ERROR if Wait Time is greater than:** if this option is flag the DragScript will exit with EORR if the time to wait is greater than the value in the hh field. This option is active only if you choose the Wait SAFE until absolute time. Useful if you dont wait over a certain time span.
- **EVENT CHECK options:** with this option you can decide to remove from processing status of SAFE some kind of events that will be ignored (event in any case are disable during the wait safe action)
    - **Check Emergency Exit Status in SAFE status calculation:** if unchecked the condition that throw an Emergency Status will be ignored in calculation of SAFE Staus . ATTENTION !! this is a way really dangerous for your setup .. use only if you want to wait safe in particular condition , particular timing and for particular tasks
    - **Check Emergency SUSPEND Status in SAFE status calculation:** if unchecked the condition that throw an Emergency Status will be ignored in calculation of SAFE Staus . ATTENTION !! this could be a way really dangerous for your setup .. use only if you want to wait safe in particular condition , particular timing and for particular tasks.
- **LIGHT CONDITIONS options:** with this option you can decide to remove from processing status of SAFE the LIGHT Conditions status
    - **Remove Weather LIGHT Conditions Status From Calculation of All Emergency Status:** if unchecked the LIGHT conditions from Weather system will be not used to calculate the SAFE Status. Usefull if you want to open the dome with the light approaching the night time and do skyflat. For the Dawn flat you can decide to disable the LIGHT event using dedicated block
- **MOON PHASE Options** (Only for ADVANCED and FULL License Voyager versions): useful to ignore Safe status if the Moon Phase is over certains value
    - **Unsafe if Moon Phase equal or greater than:** if checked Voyager will check the Moon Phase and if the value is equal or greater than the one indicated will return Unsafe to Emergency Events system
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

45.17 Using the Time to Event Value in a DragScript

Here's an example of using the **Save Time to Event (minutes)** value in a DragScript.

The basic idea is that you can decide whether or not to execute any actions based on how many minutes there are until or after dawn or dusk.



The decimal variable "**Minutes Before Event**" is initialized to 0.

The **Wait Dawn: Data from connected Setup - Offset (Before) 00:15:00 [hh:mm:ss]>>Minutes Before Event** action waits until 15 minutes before dawn, and then puts the value 15 into the variable **Minutes Before Event**

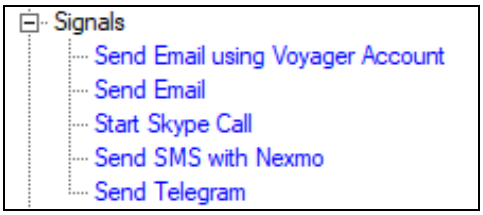
The **DO IF DECIMAL VALUE** block will execute if the **Minutes Before Event** variable is between 0 and 15. If not, control passes to the End block.

The **Goto Block: DAWN FLAT** statement sends control back to that block, and the minutes before or after dawn are computed again and stored in the **Minutes Before Event** variable.

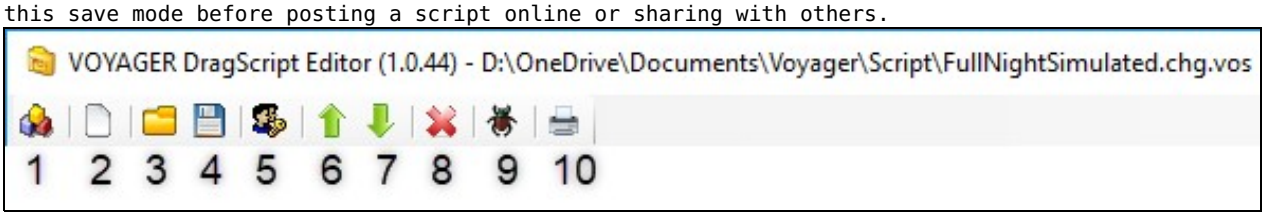
If it is after dawn when the **Wait Dawn** action runs, the value stored in **Minutes Before Event** will be negative, and the **DO IF DECIMAL VALUE** statement will not run.

45.18 Signals

Signals actions let you send notifications via email, Skype or SMS:

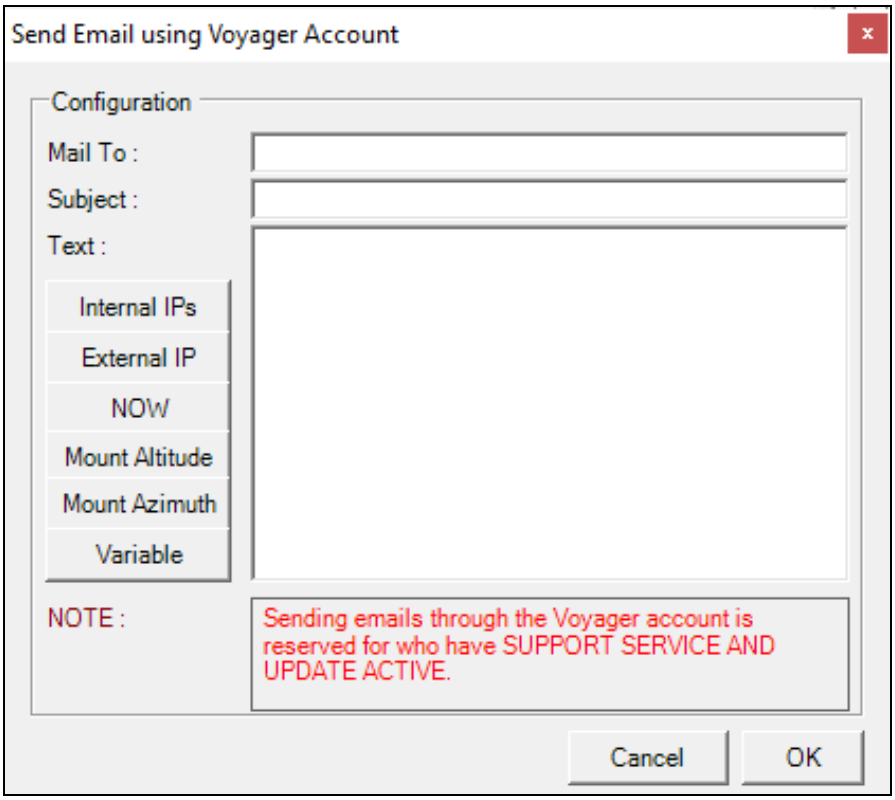


Important Note! As of Voyager 2.1.4a, you can use the Save without Personal Info button to save a copy of your DragScript with all personal info (email addresses, email account logins, phone numbers, etc.) deleted. Use this save mode before posting a script online or sharing with others.



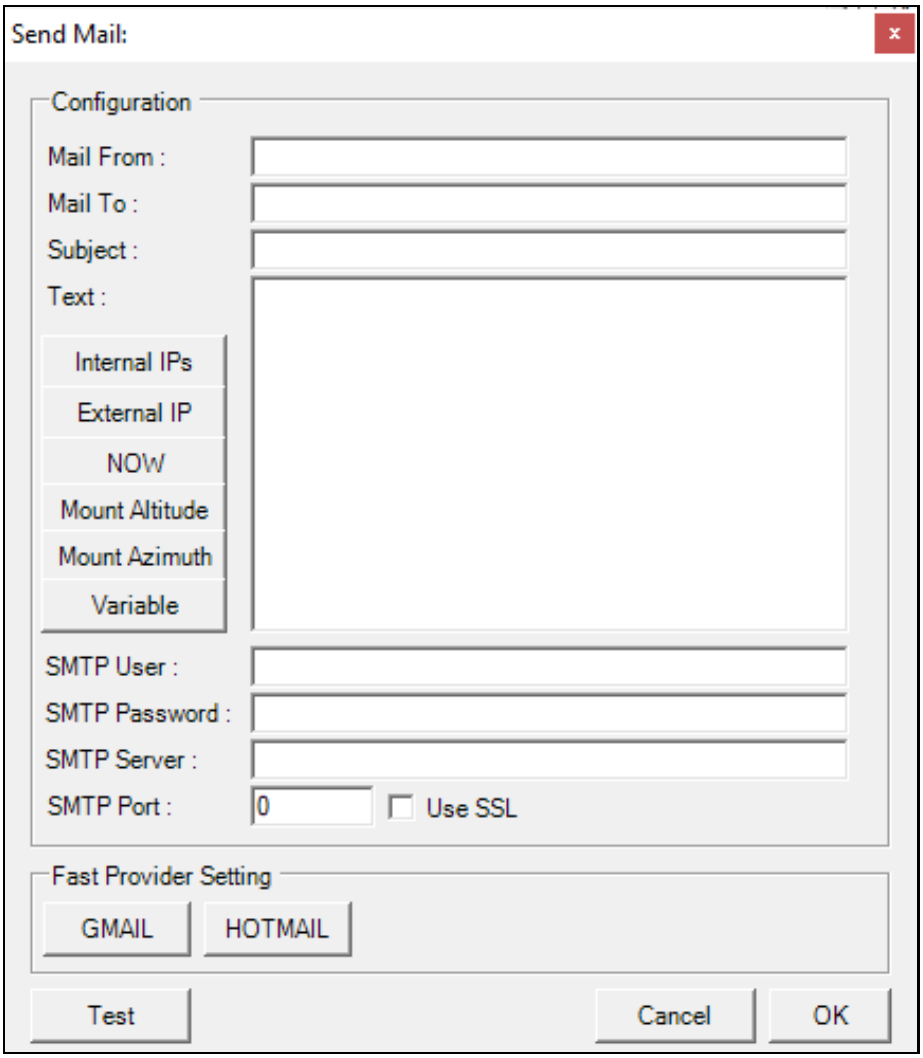
Use button 5 to save your DragScript with the personal info deleted for any of the actions in this group (Signals).

- Send Email using Voyager Account: Send an email using Voyager's email account. You must have an active support and update Voyager license to use this option and an Internet connection



- **Mail to**: Email address to send to
- **Object**: Subject line of email TYPO: Should be Subject instead of Object
- **Text**: Body of email
- **Cancel**: Discard changes and close the window
- **OK**: Save changes and close the window
- **JOLLY Strings**:there are some special strings called jolly that can be used in mail text and will be replaced with some data from Voyager environment or DragScript variables
    - **Internal IPs:** ##INTERNAL-IP## write a list of all internal IPs avalaible in the system
    - **External IP**: ##EXTERNAL-IP## write a list of external IP assigned to your PC(router) if you have internet connection up
    - **NOW**: ##NOW## write the actual date and time
    - **Mount Altitude**: ##MOUNT-ALT## write the actual altitude of Telescope Mount if connected
    - **Mount Azimuth**: ##MOUNT-AZ## write the actual azimuth of Telescope Mount if connected
    - **Variable**: ##VAR-name## where you must replace the *name* with the real name of your variable (case sensitive) , write the actual value of you variable (decimal, string or counter)

- **Send Email**: Send an email notification using a specified email server and account. Requires an Internet connection

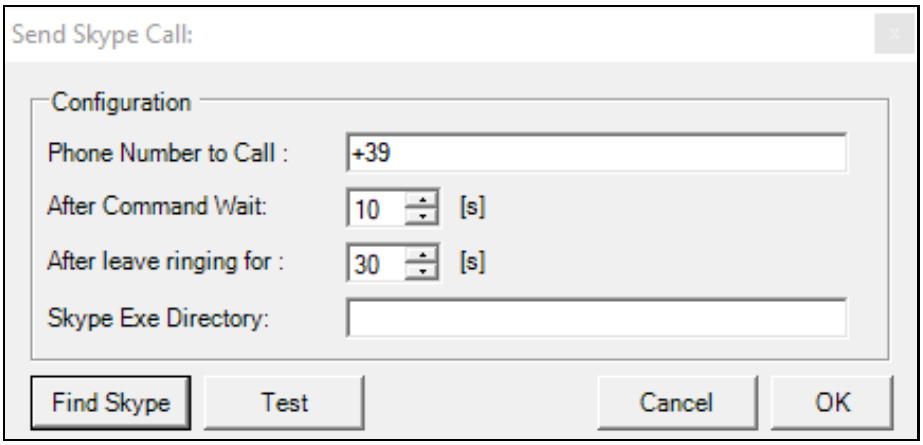


- **Mail From**: Email address this message is from
- **Mail to**: Email address to send to
- **Object**: Subject line of email TYPO: Should be Subject instead of Object
- **Text**: Body of email

- **SMTP User**: Username to login to SMTP (mail) server. Check with your local ISP or network administrator if you don't know how to login to your SMTP server to send email
- **SMTP Password**: Password to login to your SMTP (mail) server
- **SMTP Server**: Hostname or IP address of your SMTP (mail) server
- **SMTP Port**: Port number of your SMTP (mail) server
- **Use SSL**: If checked, use an SSL (secure) connection to your mail server
- **GMAIL**: Click this button to use the SMTP server and port information for Google Gmail
- **HOTMAIL**: Click this button to use the SMTP server and port information for Microsoft Hotmail
- **Cancel**: Discard changes and close the window
- **OK**: Save changes and close the window

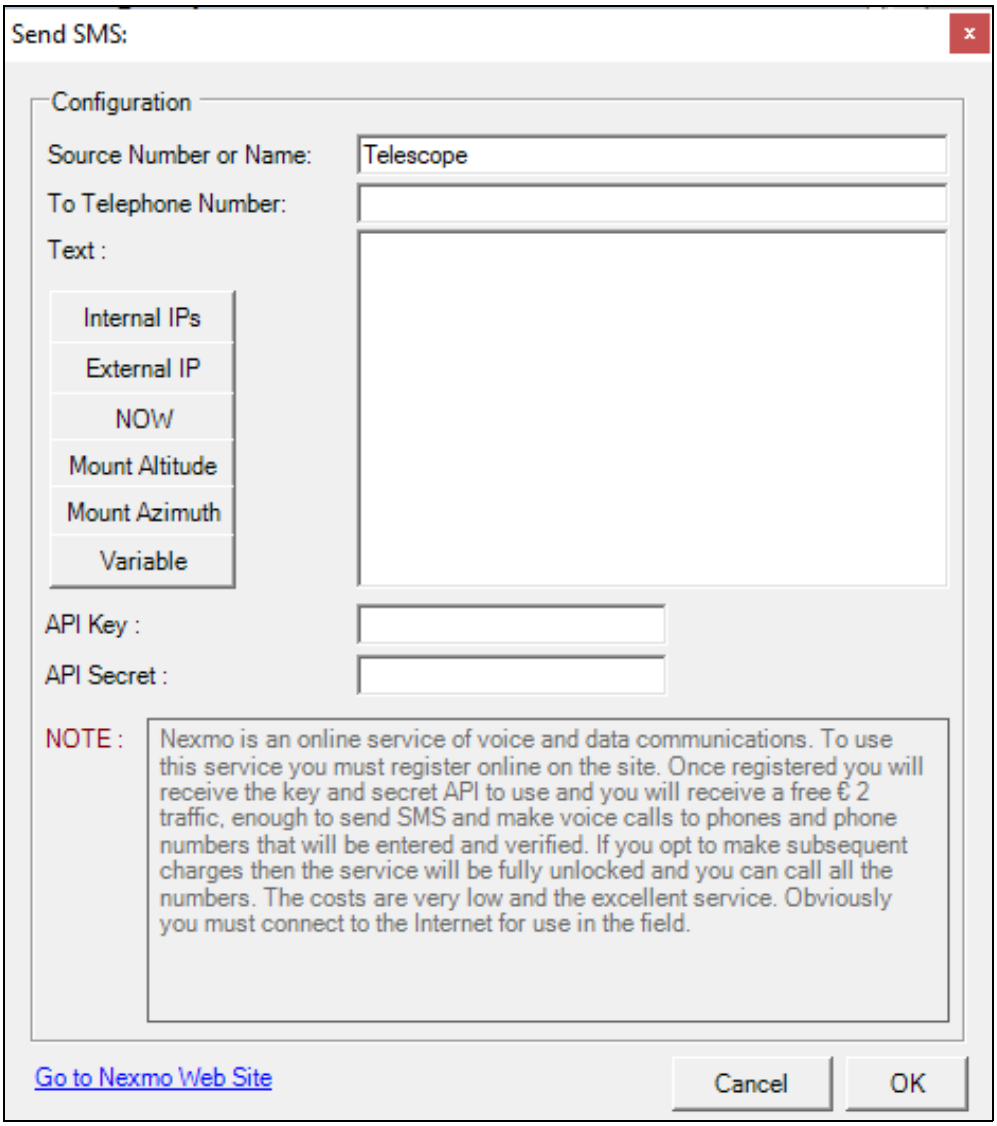
- **JOLLY Strings**:there are some special strings called jolly that can be used in mail text and will be replaced with some data from Voyager environment or DragScript variables
    - **Internal IPs:** ##INTERNAL-IP## write a list of all internal IPs avalaible in the system
    - **External IP**: ##EXTERNAL-IP## write a list of external IP assigned to your PC(router) if you have internet connection up
    - **NOW**: ##NOW## write the actual date and time
    - **Mount Altitude**: ##MOUNT-ALT## write the actual altitude of Telescope Mount if connected
    - **Mount Azimuth**: ##MOUNT-AZ## write the actual azimuth of Telescope Mount if connected
    - **Variable**: ##VAR-name## where you must replace the *name* with the real name of your variable (case sensitive) , write the actual value of you variable (decimal, string or counter)

- **Start Skype Call**: Start a Skype call from the computer running Voyager. Requires an Internet connection



- **Phone Number to Call**: Phone number or Skype name to call using Skype
- **After Command Wait**: Time in seconds to wait after sending the command before timing out if no response from Skype
- **After leave ringing for**: Time in seconds to wait after Skype places the call and the remote phone starts to ring
- **Skype Exe Directory**: Location of Skype program on this computer
- **Find Skype**: Look for Skype program on this computer and fill out the Skype Exe Directory if found
- **Test**: Try to make a Skype call using the information in this dialog window
- **Cancel**: Discard changes and close the window
- **OK**: Save changes and close the window

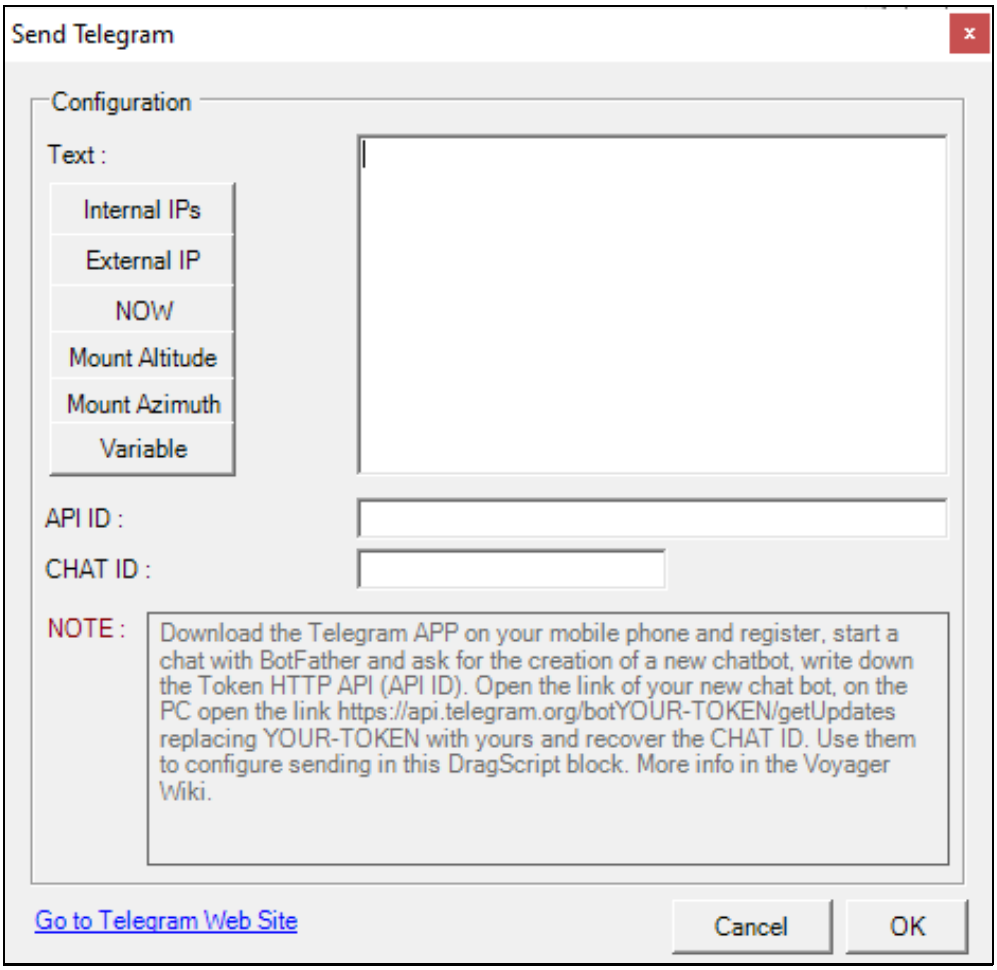
- **Send SMS with Nexmo**
    - Send an SMS (text message) using the Nexmo service: https://www.nexmo.com/ Requires an Internet connection.



- **Source Number or Name**: Phone number of sender, or name of sender. For country like USA this is a constraint to use (phone number) to avoid error in transmission (from Voyager version 2.2.1d)
- **To Telephone Number**: Phone number to send SMS message to
- **Text**: Body of SMS messages
- **API Key**: API Key for Nexmo service - you must sign up at https://www.nexmo.com/ to get an API key and secret
- **API Secret**: API Secret for Nexmo service
- **Cancel**: Discard changes and close the window
- **OK**: Save changes and close the window

- **JOLLY Strings**:there are some special strings called jolly that can be used in mail text and will be replaced with some data from Voyager environment or DragScript variables
  - **Internal IPs:** ##INTERNAL-IP## write a list of all internal IPs avalaible in the system
  - **External IP**: ##EXTERNAL-IP## write a list of external IP assigned to your PC(router) if you have internet connection up
  - **NOW**: ##NOW## write the actual date and time
  - **Mount Altitude**: ##MOUNT-ALT## write the actual altitude of Telescope Mount if connected
  - **Mount Azimuth**: ##MOUNT-AZ## write the actual azimuth of Telescope Mount if connected
  - **Variable**: ##VAR-name## where you must replace the *name* with the real name of your variable (case sensitive) , write the actual value of you variable (decimal, string or counter)

Important Note! Nexmo is an online service that offers voice and data communication. To use Nexmo from Voyager you must register at their site at https://www.nexmo.com

- **Send Telegram**
  - Send an message using Telegram service chatbot: https://www.telgram.org/ Requires an Internet connection.
  - 

- **Text**: message
- **API ID**: API ID (token create during the chatbot) of your Telegram user
- **Chat ID**: ID number assigned to chatbot created, you can get opening the link https://api.telegram.org/bot<YOUR_TOKEN>/getUpdates
- **Cancel**: Discard changes and close the window
- **OK**: Save changes and close the window

- **JOLLY Strings**:there are some special strings called jolly that can be used in mail text and will be replaced with some data from Voyager environment or DragScript variables
  - **Internal IPs:** ##INTERNAL-IP## write a list of all internal IPs avalaible in the system
  - **External IP**: ##EXTERNAL-IP## write a list of external IP assigned to your PC(router) if you have internet connection up
  - **NOW**: ##NOW## write the actual date and time
  - **Mount Altitude**: ##MOUNT-ALT## write the actual altitude of Telescope Mount if connected
  - **Mount Azimuth**: ##MOUNT-AZ## write the actual azimuth of Telescope Mount if connected
  - **Variable**: ##VAR-name## where you must replace the *name* with the real name of your variable (case sensitive) , write the actual value of you variable (decimal, string or counter)

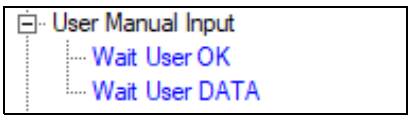
Guide to obtain API ID and Chat ID :

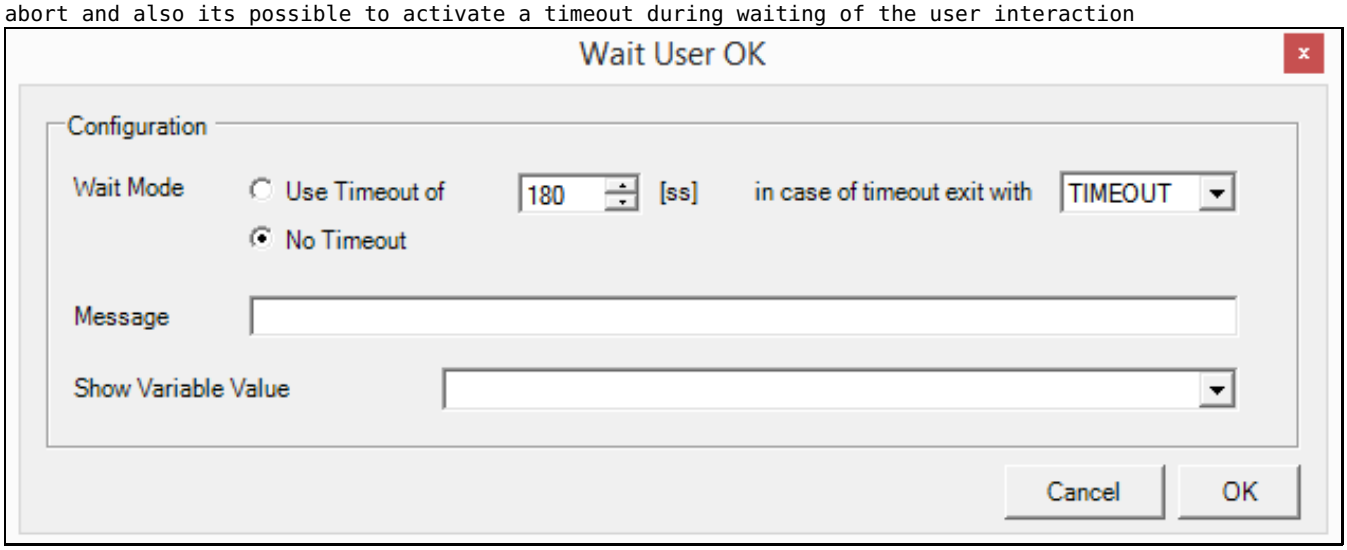
1. Download the Telegram APP on your mobile phone and register
2. Open a chat with @BotFather and type /newbot to create a new private bot

3. You will be asked for a friendly name - choose whatever you like, e.g. VoyagerMessages
4. You will be given an "API Token" - save this somewhere - it is what you will enter as the API ID in your DragScript action, as shown above
5. In your browser (can be on a desktop, doesn't have to be on your phone) open the link https://api.telegram.org/botYOUR-TOKEN/getUpdates replacing YOUR-TOKEN with the API Token
6. You will get a short message that starts with {"ok":true. It won't have the Chat ID yet - this is OK
7. Go back to Telegram and find the last message from @BotFather that starts with "Congratulations on your new bot. You will find it at ..." Click on that link and a new message room will open in Telegram, talking to your bot
8. Type at least one message - a simple "hello" will do
9. Go back to the browser page you opened in step 5 and hit reload - now you should see more characters including a long number after "from":{"id": That number is the Chat ID, which you use in your DragScript Send Telegram action as shown above
10. If you don't see the Chat ID, try sending a couple more messages to your bot in Telegram and then quickly reload your browser until you get the ID
11. That's it - you can now use the API ID and Chat ID to send Telegram messages from your DragScript

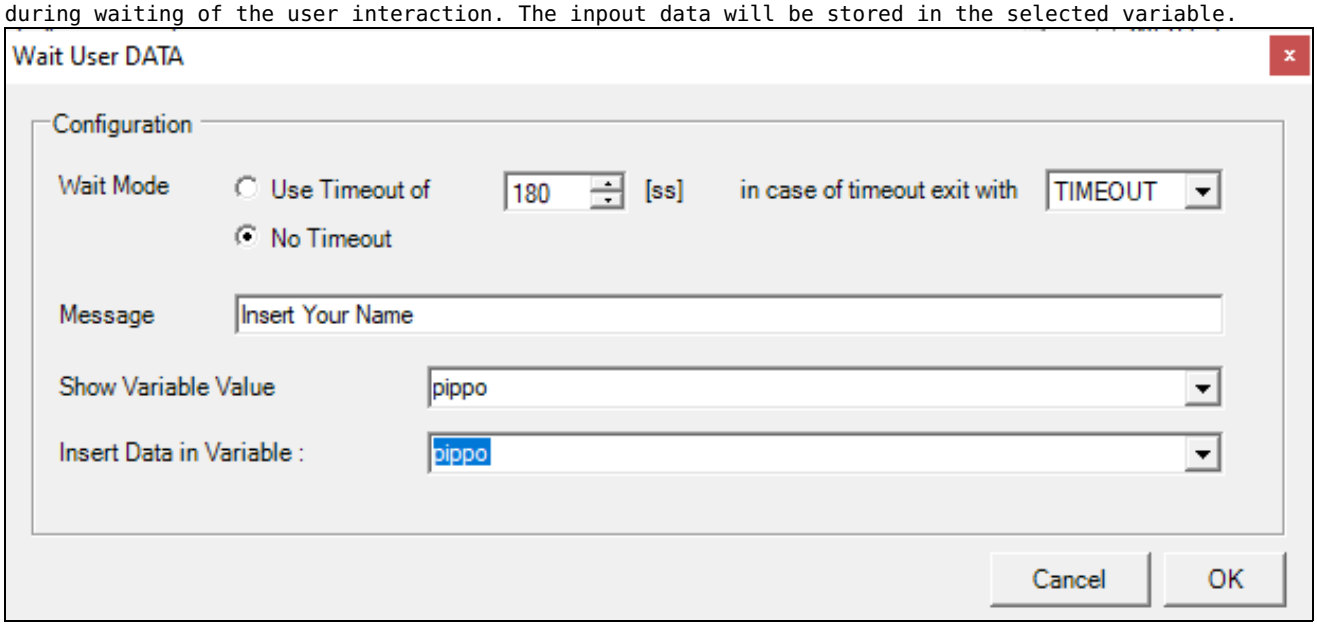
45.19 User Manual Input

User manual input actions allow interactions between Voyager and the user:



- **Wait User OK**: Ask to the user with a windows prompt to press a button on the screen to continue or to abort and also its possible to activate a timeout during waiting of the user interaction
- 

- **Wait Mode**: how the wait will be work
- **Use Timeout of:** with this option the wait will finish in anycase after the seconds selected
- **In case of timeout exit with:** if the Use timeout of option will be used then exit can be selected between TIMEOUT or OK action result, this result will be usable in the DragScript using the IF condition related to actions
- **No Timeout:** with this option the wait will be for ever until physically user press the button on the screen
- **Message:** show a text message inside window prompt to the user
- **Show Variable Value:** show a text rappresentation of the variable selected inside window prompt to the user

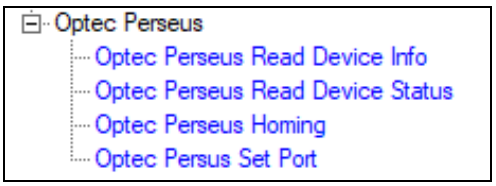
- **Wait User DATA**: Ask to the user with a windows prompt to input data (DECIMAL,STRING, COUNTER depends on type of variable used for storage) to continue or to abort and also its possible to activate a timeout during waiting of the user interaction. The inpout data will be stored in the selected variable.
- 

- **Wait Mode**: how the wait will be work
- **Use Timeout of:** with this option the wait will finish in anycase after the seconds selected
- **In case of timeout exit with:** if the Use timeout of option will be used then exit can be selected between TIMEOUT or OK action result, this result will be usable in the DragScript using the IF condition related to actions
- **No Timeout:** with this option the wait will be for ever until physically user press the button on the screen
- **Message:** show a text message inside window prompt to the user
- **Show Variable Value:** show a text rappresentation of the variable selected inside window prompt to the user
- **Insert Data in Variable:** the data in input from the user will be stored in the selected DragScript variable (variable must be declared before use it in DragScript). Based on type of DragScript Variable the edit mask of input field will be adapted.

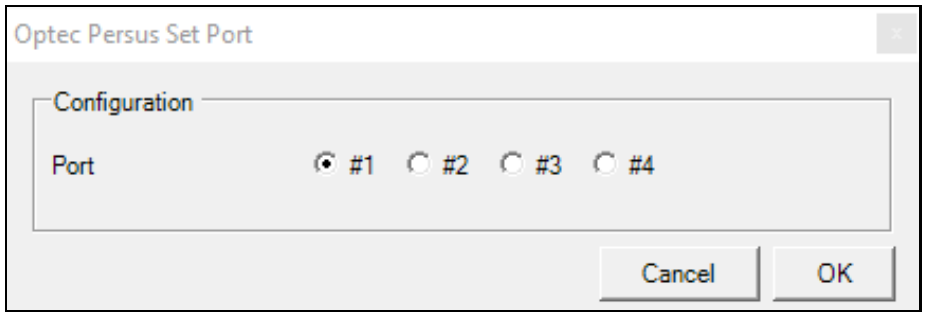
Important Note! if you using No Timeout option you must be really to be present in front of your PC to continue

45.20 Optec Perseus

Optec Perseus actions allow to interact with the hardware Port Instrument Selector from Optec :



- **Optec Perseus Read Device Info**: ask information about device and save it in environment variables of DragScript
- **Optec Perseus Read Device Status**: ask status of device and save it in environment variables of DragScript
- **Optec Perseus Homing**: command to device to Homing
- **Optec Perseus Set Port:** rotate device to select the port selected index

♦ 

♦ **Port:** port index to select

Important Note! ASCOM Switch driver of Optec Perseus must be installed in order to allow working the DragScript Blocks

45.21 Donuts

Donuts actions allow to interact with the software Donuts developed by Kames MacCormac, used for advanced research pointing, code here https://github.com/jmccormac01/Donuts :

- **Donuts Calibration**: ask to Donuts process to performe a Calibration using camera and mount

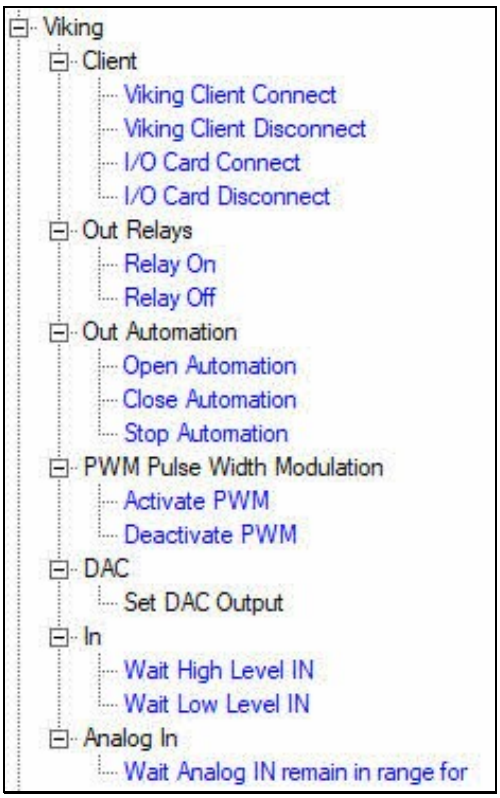
46 DragScript Other Elements

In addition to the primary DragScript Actions, which do things like slewing the mount and running a sequence, DragScript elements can control other observatory functions, such as Starkeeper.it's companion product, Viking, which monitors and controls observatory I/O devices. Custom observatory control elements are also listed here, but they will not be of general interest.

46.1 Viking

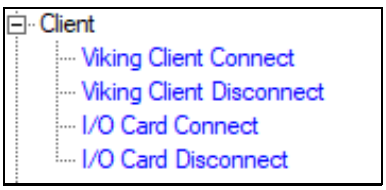
These elements send commands to Voyager's companion product, Viking. Viking monitors and controls I/O devices in the observatory.

For more information on Viking, visit https://voyagerastro.com/products/viking

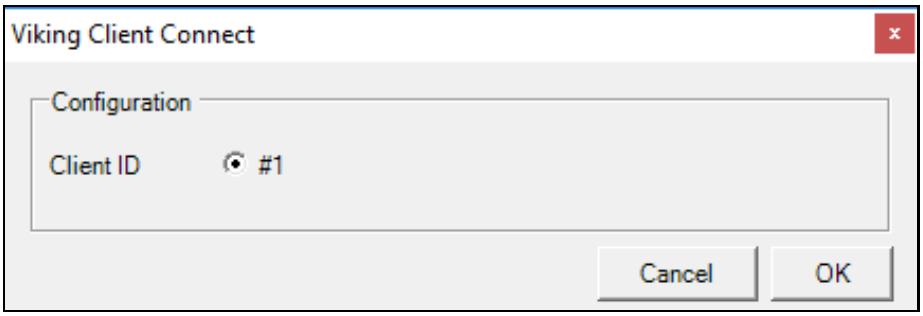


46.1.1 Viking Client

These commands connect to Viking and to Viking I/O cards. Refer to Viking Setup for further information on configuring Voyager to communicate with Viking.

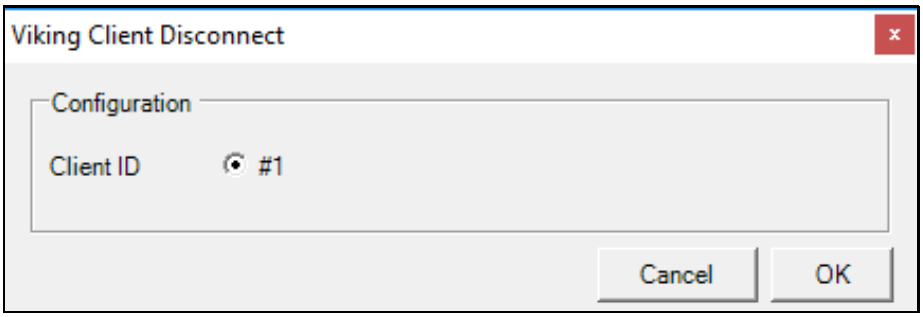


- **Viking Client Connect**: Connect to the Viking software



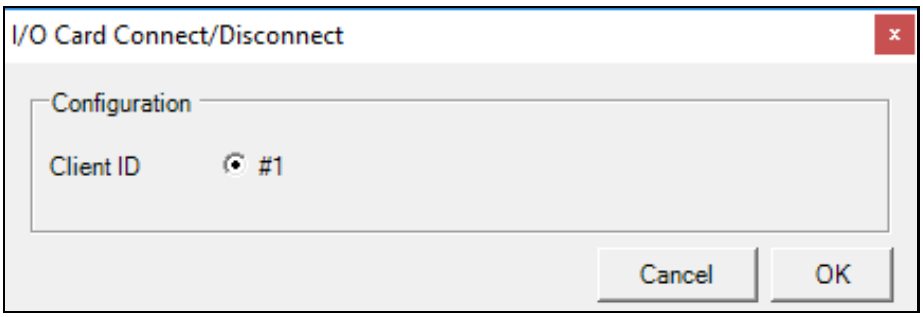
- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

- **Viking Client Disconnect**: Disconnect from the Viking software



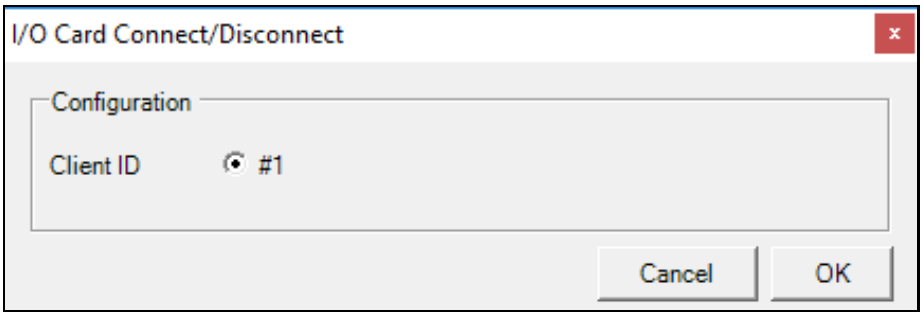
- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

- **I/O Card Connect**: Connect to Viking's I/O card



- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

- **I/O Card Disconnect**: Disconnect from Viking's I/O card:

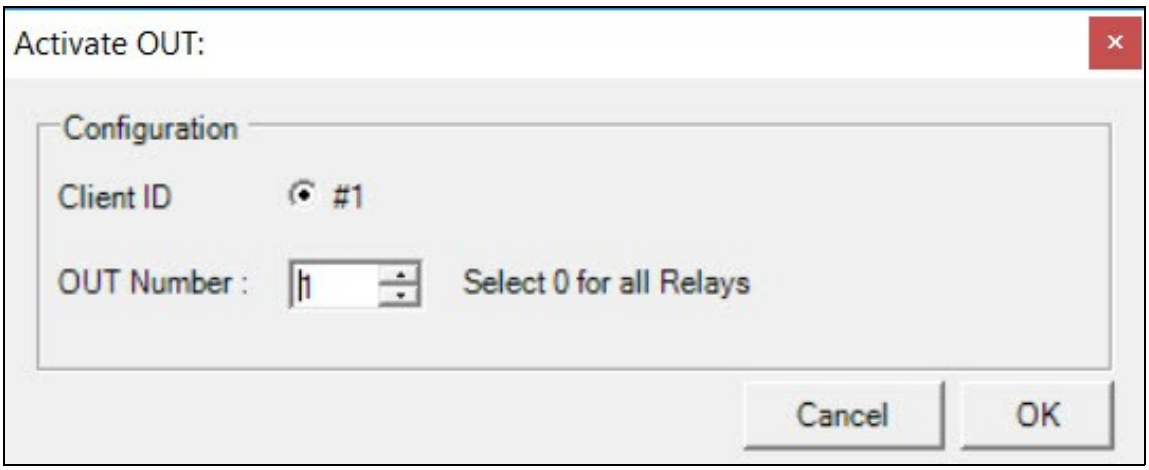


- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

46.1.2 Out Relays

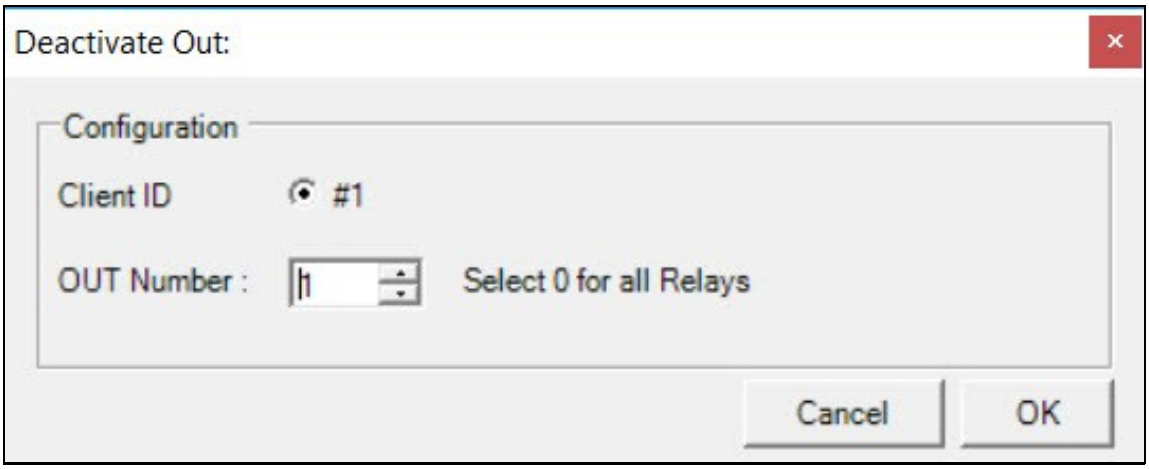
Out Relay commands turn I/O relays connected to Viking on or off:

- **Relay On**: Command Viking to turn a relay on



- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **OUT Number**: Relay number to turn on. Enter 0 to turn on all the relays
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

- **Relay Off**: Command Viking to turn a relay off



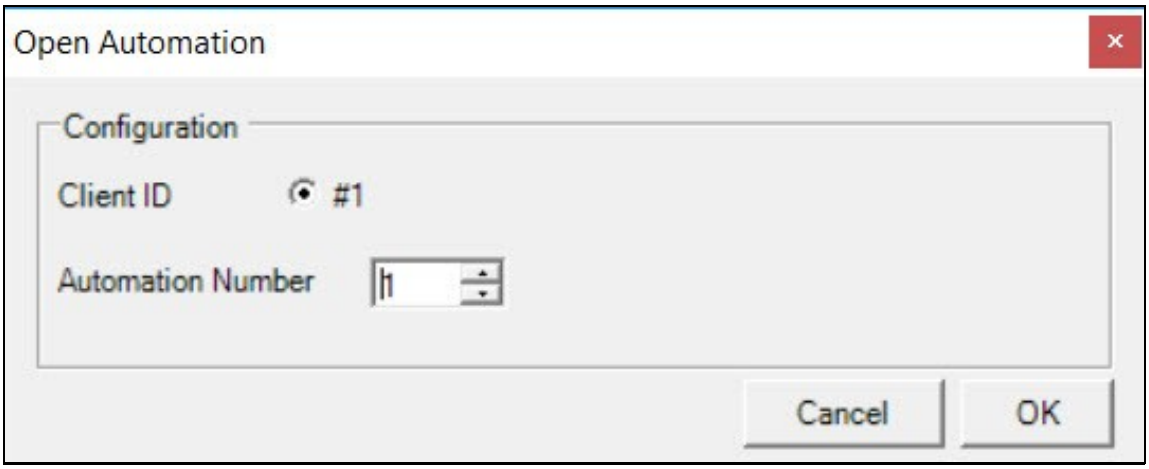
- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **OUT Number**: Relay number to turn off. Enter 0 to turn off all the relays
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

46.1.3 Out Automation

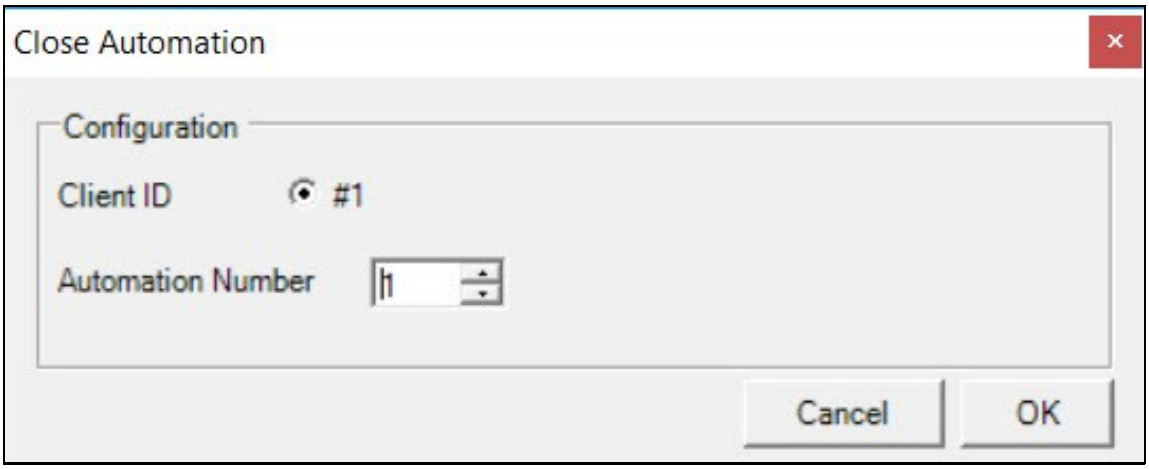
Automation actions control I/O devices with three states: Open, Close and Stop. One piece of hardware that supports three states is the MyHome Bticino device https://www.bticino.com/solutions/home-automation/

The main use of this device is to control a motor that could be used, for example, to open or close a window shade, or stop it at a particular position. You may use this type of device in your observatory control to do something such as open and close a roll-off roof.

- **Open Automation**:

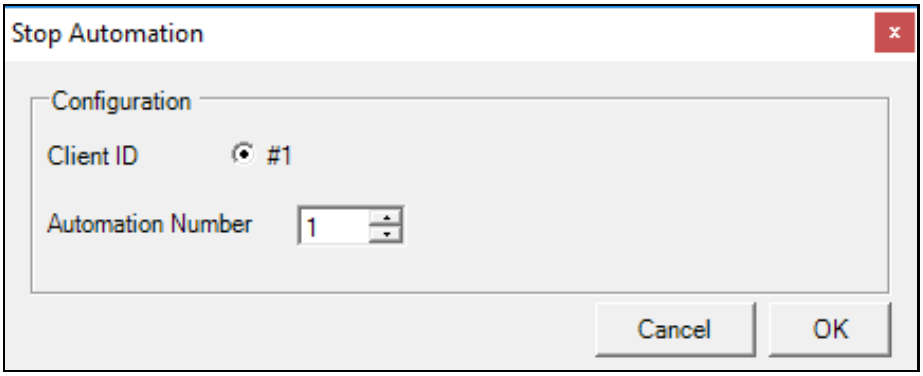


- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **Automation Number**: Number of automation device to open
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window
- **Close Automation**:



- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **Automation Number**: Number of automation device to close
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

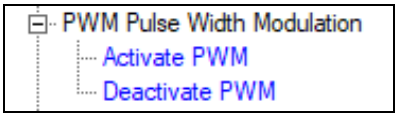
- **Stop Automation**: Stop the specified Viking automation's execution



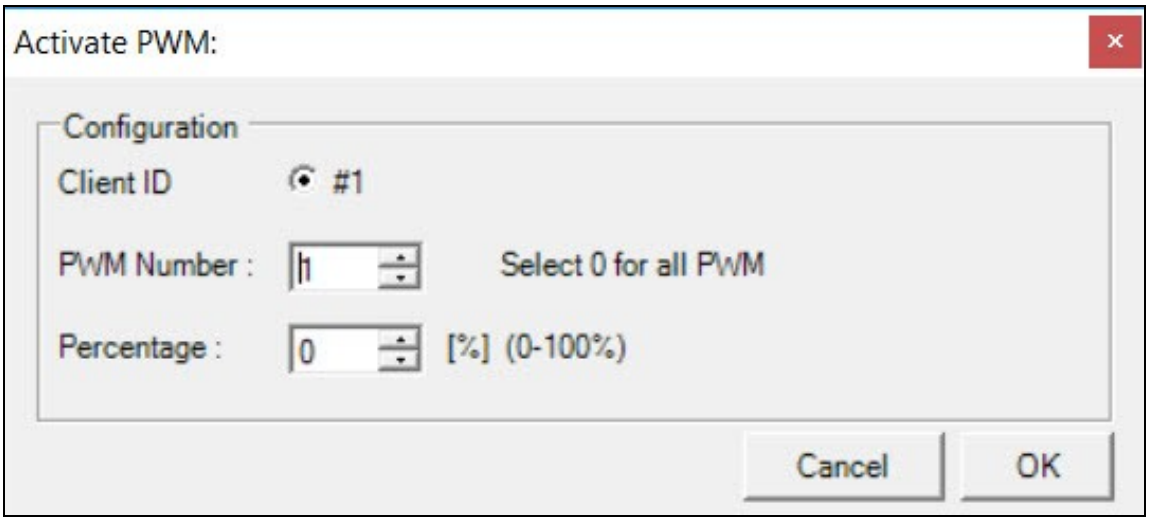
- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **Automation Number**: Number of automation device to stop
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

-

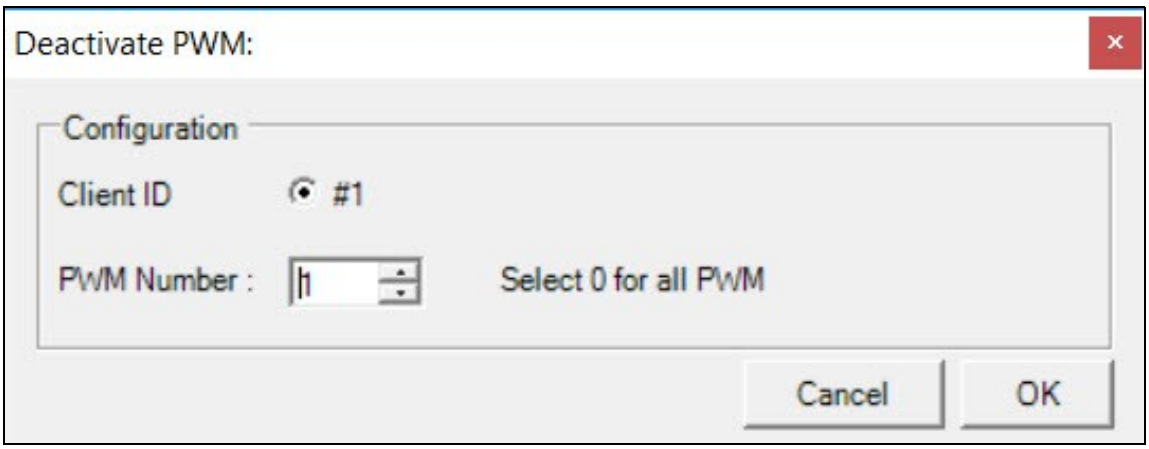
46.1.4 PWM Pulse Width Modulation



- **Activate PWM**: Set the value of a pulse width modulation device and activate it:



- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **PwM Number**: Enter the number of the PWM device to control. Enter 0 to send this command to all PWM devices
- **Percentage**: Set the PWM device to this level, specified as a percentage from 0-100%
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window
- **Deactivate PWM**: Deactivate a pulse width modulation device:

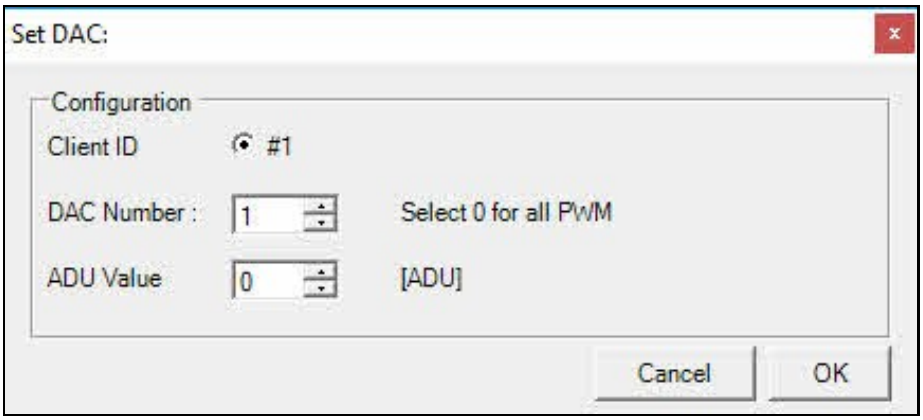


- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **PwM Number**: Enter the number of the PWM device to deactivate. Enter 0 to send this command to all PWM devices
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

46.1.5 DAC

This action is the setup for the DAC output to Viking.

- **Set DAC Output**:

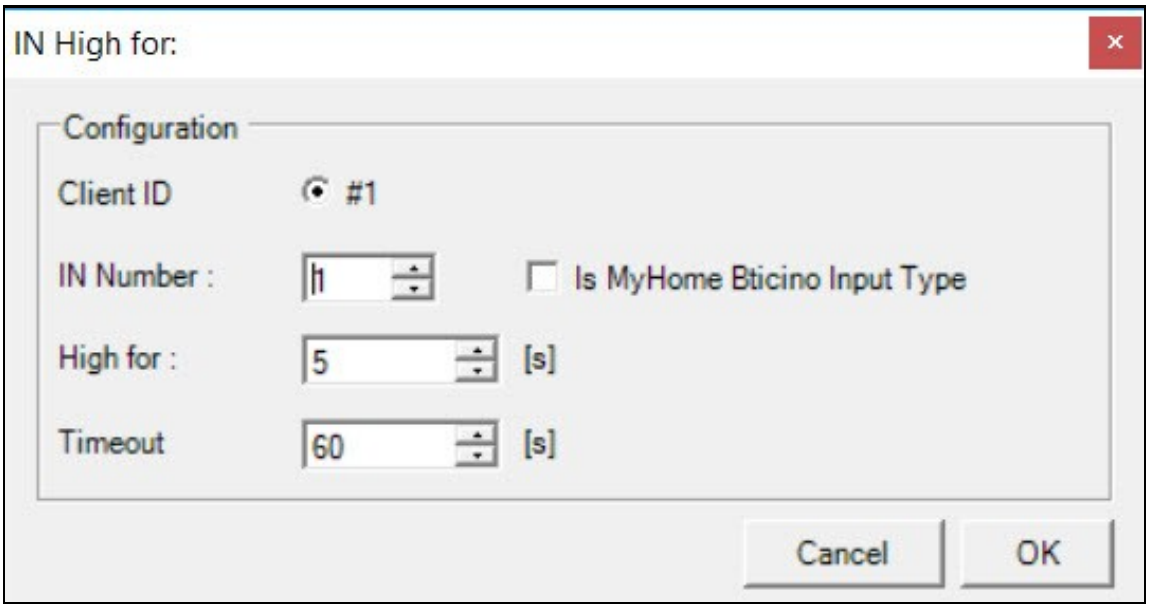


- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **DAC Number**: Enter the number of the DAC device to use. Enter 0 to send this command to all PWM devices
- **ADU Value**: Analog to Digital Unit conversion factor. E.g., if the DAC can output 5VDC max and ADU resolution is 1024 ADU, 512 ADU is 2.5VDC
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

46.1.6 In

These actions monitor inputs to Viking.

- **Wait High Level IN**: Wait until the specified Viking input remains at a high level for the given amount of time:

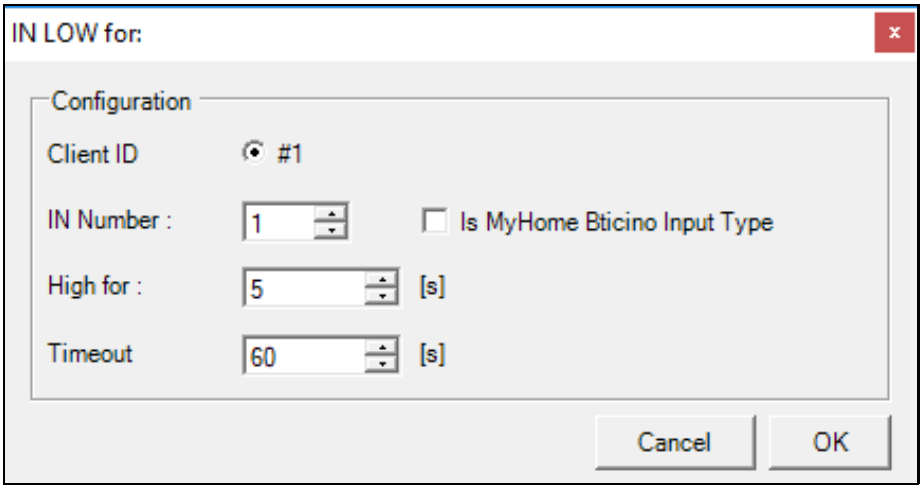


- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **IN Number**: IN device to monitor for a high status
- **Is MyHome Bticino Input Type**: If checked, the input to monitor is a MyHome Bticino device

https://www.bticino.com/solutions/home-automation/

- **High for**: Number of seconds for the device to remain in a high state to exit the wait
- **Timeout**: Number of seconds to wait before timing out the wait
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

- **Wait Low Level IN**: Wait until the specified Viking input remains at a low level for the given amount of time:

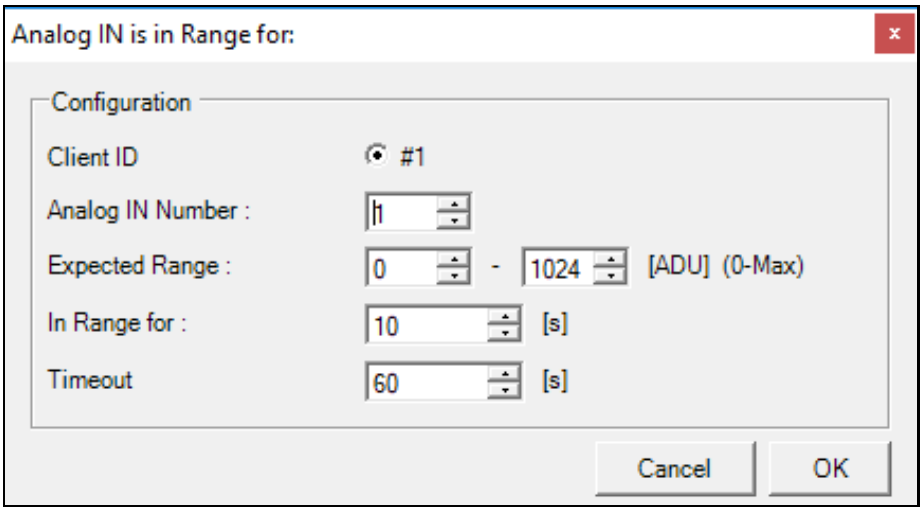


- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **IN Number**: IN device to monitor for a low status
- **Is MyHome Bticino Input Type**: If checked, the input to monitor is a MyHome Bticino device https://www.bticino.com/solutions/home-automation/
- **Low for**: Number of seconds for the device to remain in a Low state to exit the wait (TYPO: Field label should be "Low for:")
- **Timeout**: Number of seconds to wait before timing out the wait
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

46.1.7 Analog In

Analog In actions monitor analog input values to Viking.

- **Wait Analog IN remain in range for**: Wait until an analog input to Viking remains within the given range for the specified time:



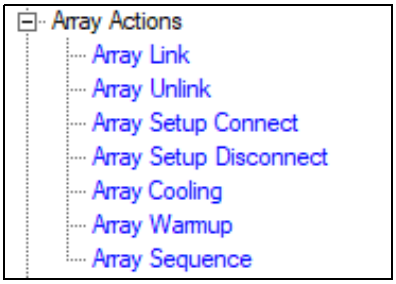
- **Client ID**: Select the client ID to use when communicating to Viking. Currently this is pre-selected to Client ID #1
- **Analog IN Number**: Analog IN device to monitor
- **Expected Range**: Specify the minimum and maximum values of the desired range
- **In Range for**: Amount of time in seconds the monitored Analog IN value must remain within the Expected Range for the wait to end
- **Timeout**: Number of seconds to wait before timing out the wait
- **OK**: Save the settings and close the window
- **Cancel**: Discard changes and close the window

46.2 Array Observatory

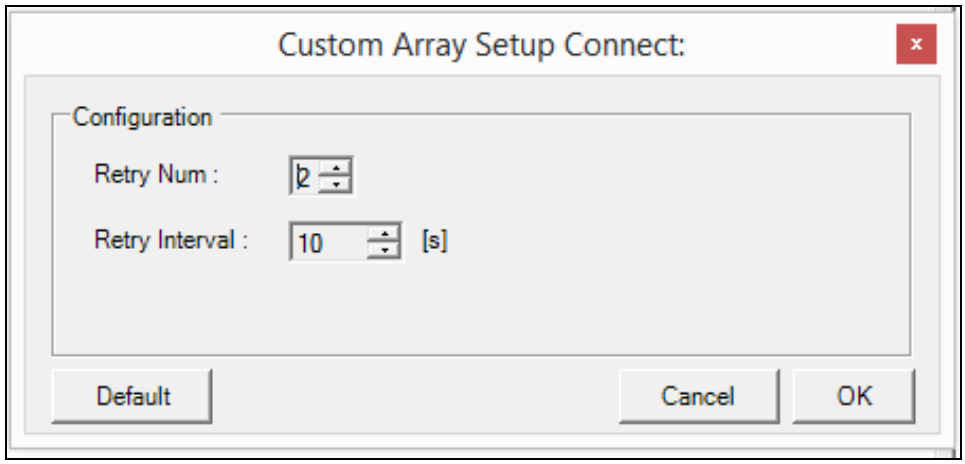
Custom Array Observatory control elements for manage Voyager array version.

46.2.1 Array Actions

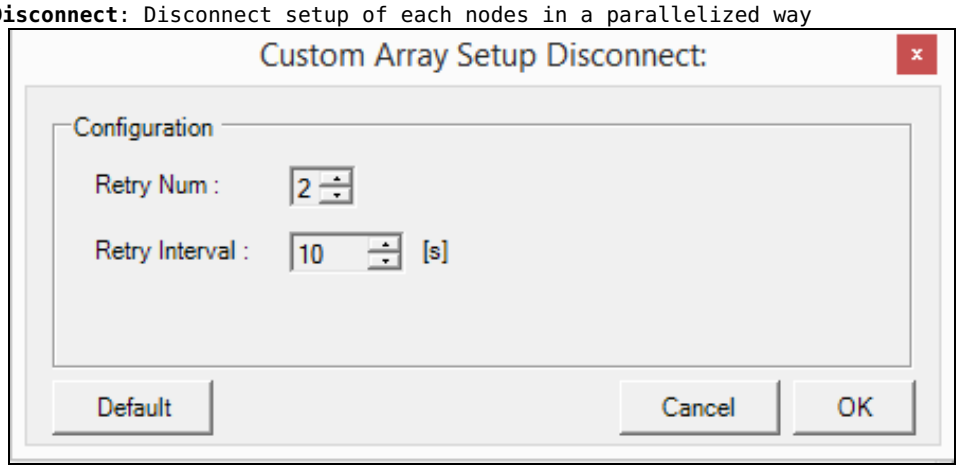
These commands manage multinode parallels actions for Array



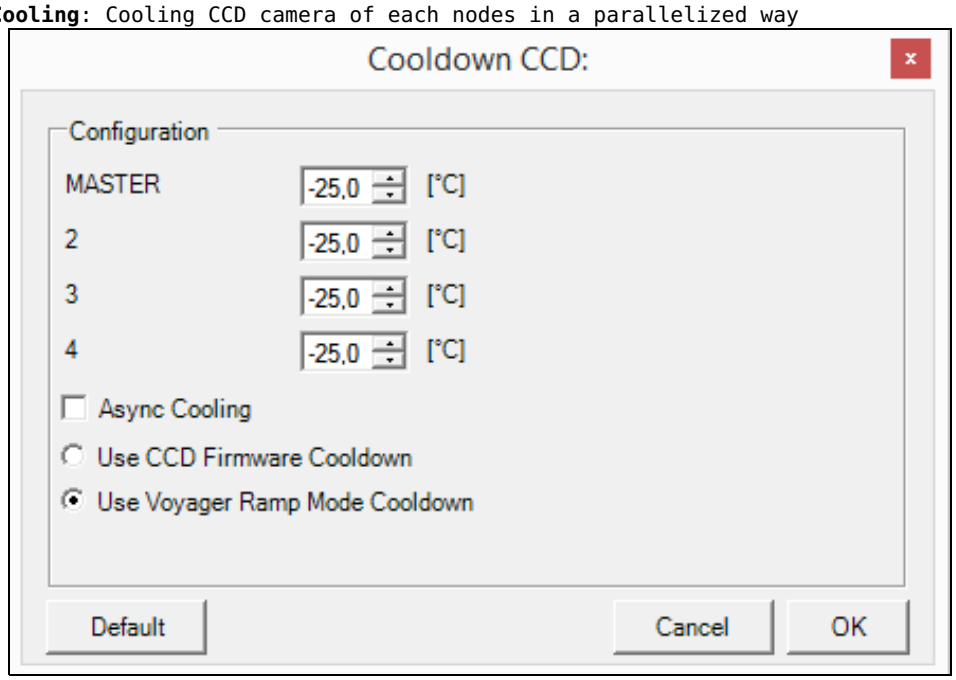
- **Array Link**: Link the Array establishing the communications between MASTER and SLAVE
- **Array Unlink**: Unlink the Array closing the communications between MASTER and SLAVE
- **Array Setup Connect**: Connect setup of each nodes in a parallelized way



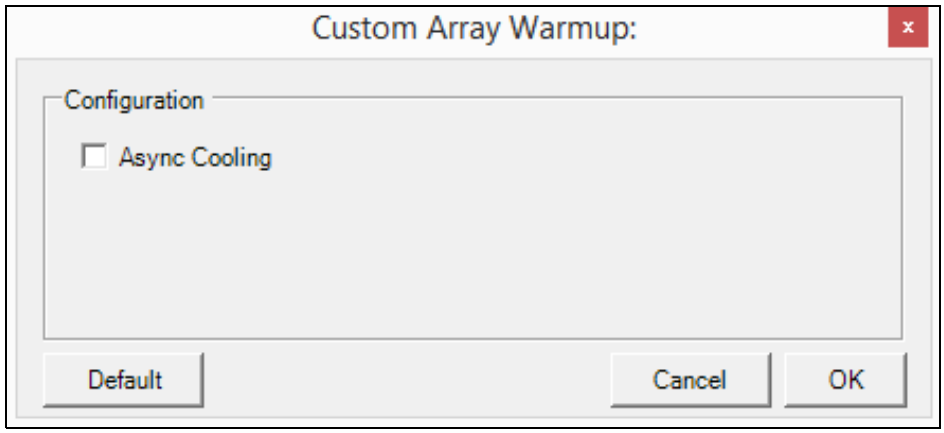
- **Array Disconnect**: Disconnect setup of each nodes in a parallelized way



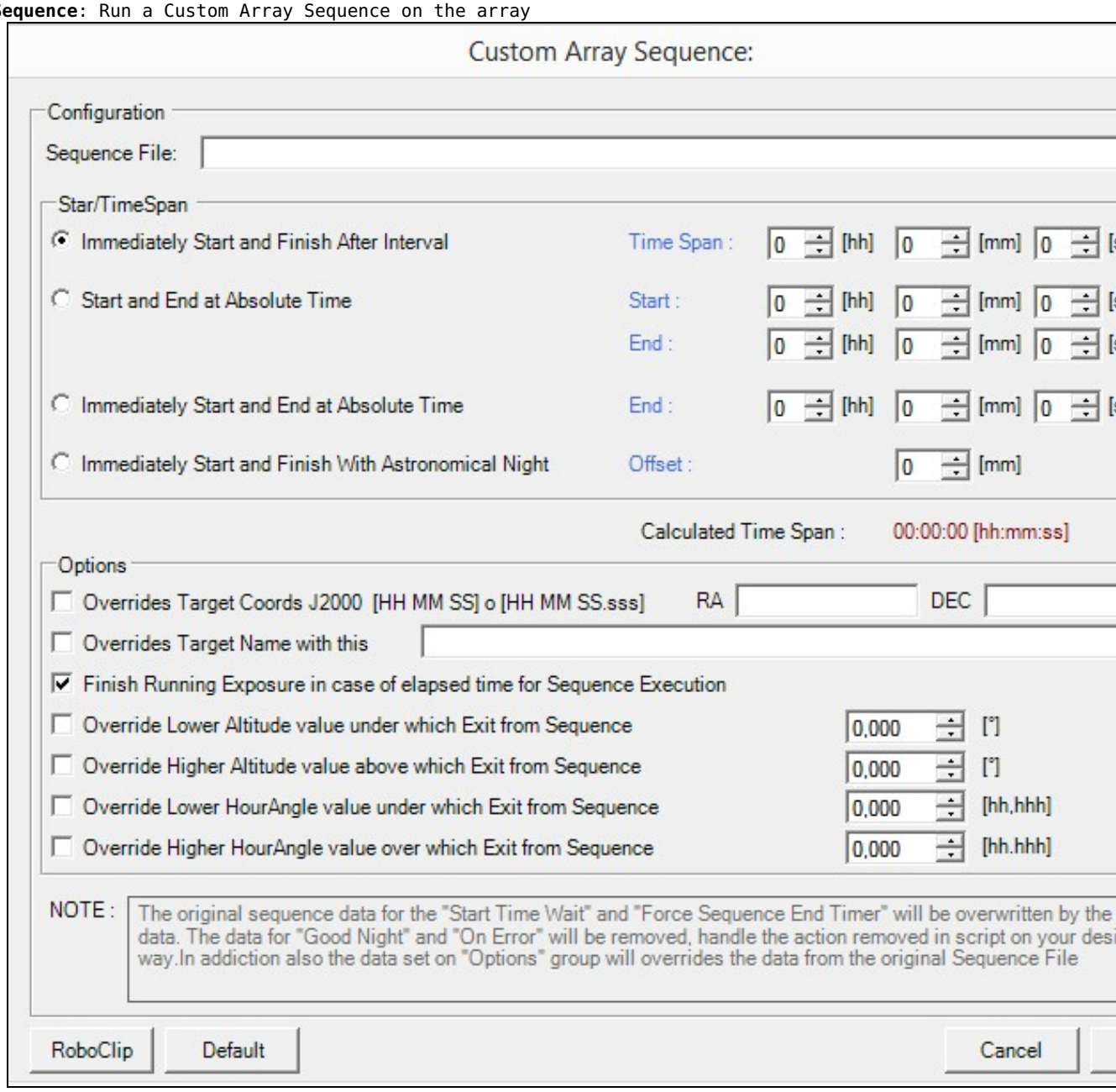
- **Array Cooling**: Cooling CCD camera of each nodes in a parallelized way



- **Array Warmup**: Warmup CCD camera of each nodes in a parallelized way

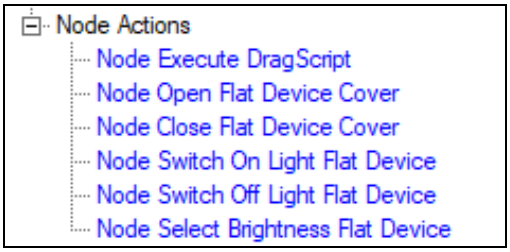


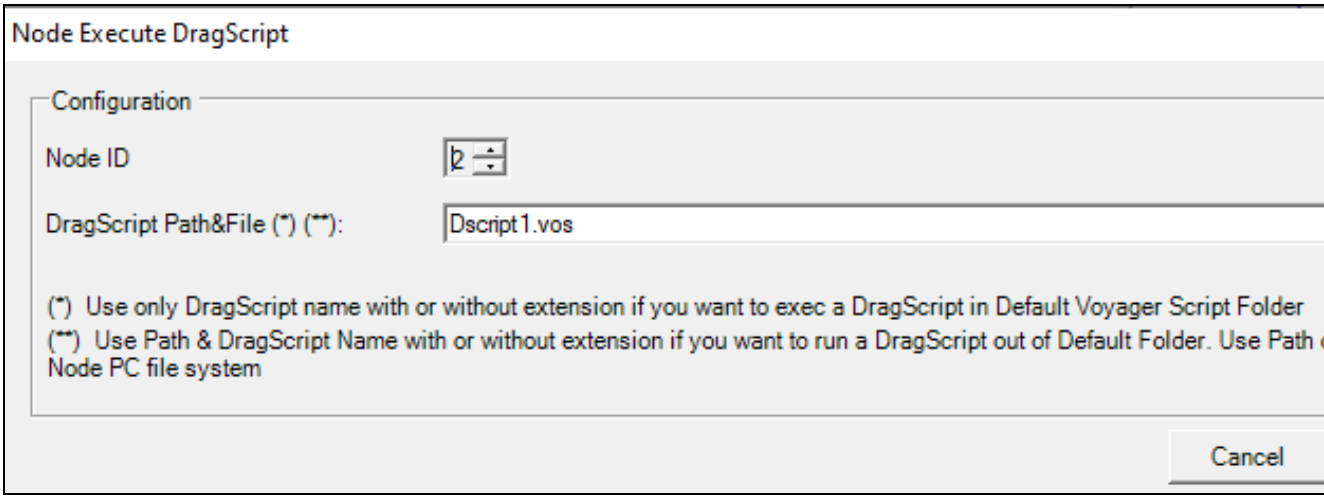
- **Array Sequence**: Run a Custom Array Sequence on the array



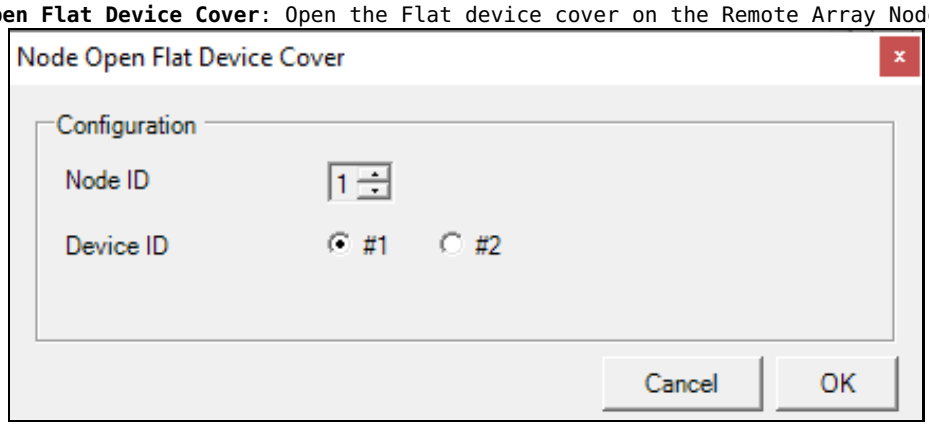
46.2.2 Node Actions

These commands manage single node actions for Array

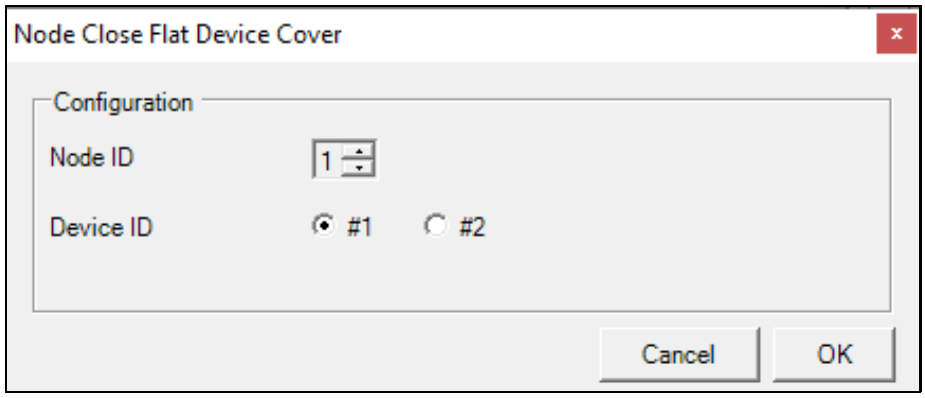


- **Node Execute DragScript**: Run a DragScript Self Contained with not interaction with DragScript Session WIndows in Voyager. In SLAVE nodes of the Array (not in MASTER). Action will wait the remote DragScript to end
  - 

  - **Node ID:** ID of the SLAVE node where the DragScript will be executed
  - **DragScript Path&File:** Path and Name or only Name of the DragScript to execute. If only name will be edited the dragscript will be searched in the default script directory of the Voyager SLAVE PC. If the field contains path and file name the specified path will be used, you must use the SLAVE PC path file system

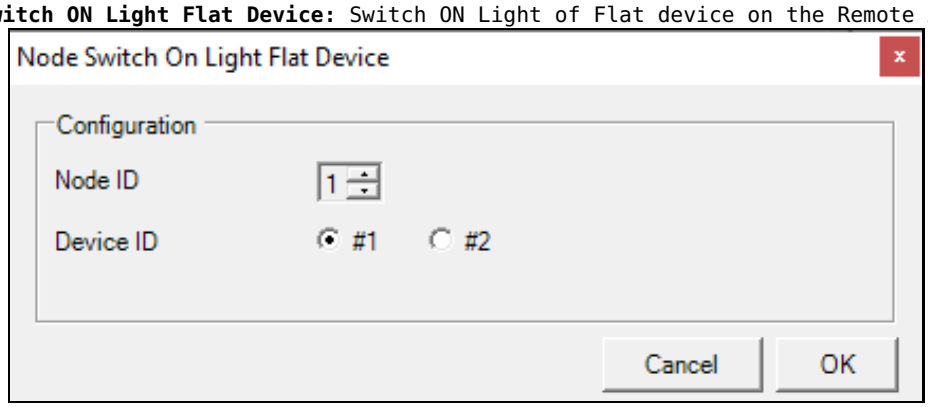
- **Node Open Flat Device Cover**: Open the Flat device cover on the Remote Array Node
  - 

  - **Node ID:** ID of the SLAVE node where the DragScript will be executed
  - **Device ID:** ID of the Flat Device to use (1 or 2)
- **Node Close Flat Device Cover**: Close the Flat device cover on the Remote Array Node



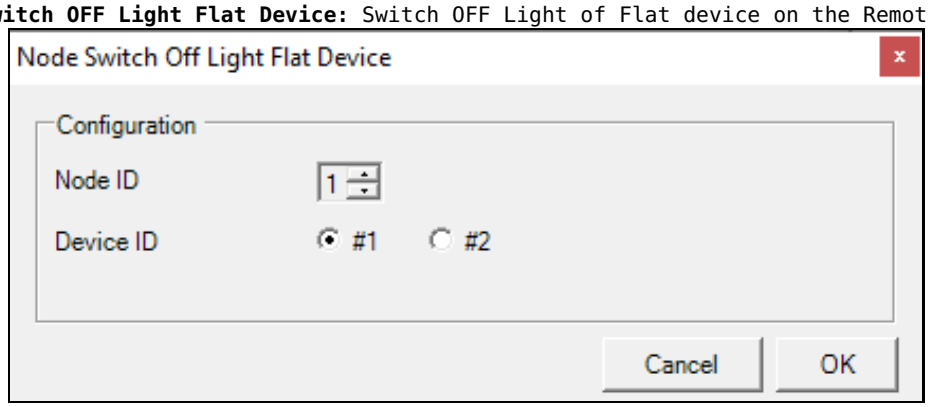
- **Node ID:** ID of the SLAVE node where the DragScript will be executed
- **Device ID:** ID of the Flat Device to use (1 or 2)

- **Node Switch ON Light Flat Device:** Switch ON Light of Flat device on the Remote Array Node



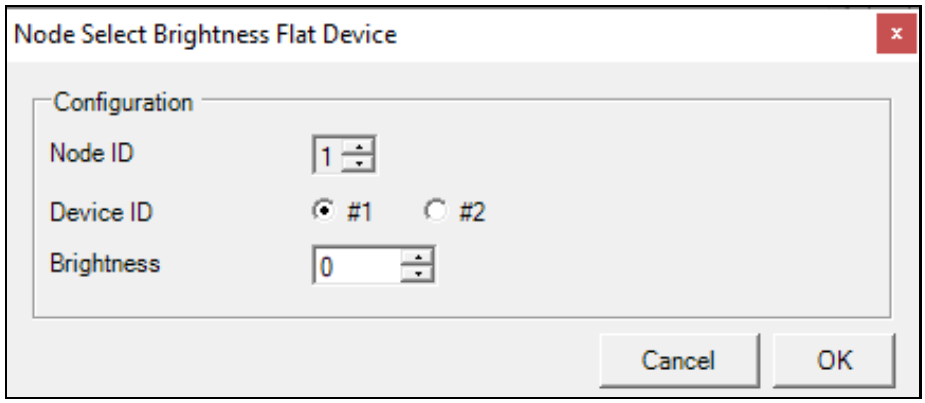
- **Node ID:** ID of the SLAVE node where the DragScript will be executed
- **Device ID:** ID of the Flat Device to use (1 or 2)

- **Node Switch OFF Light Flat Device:** Switch OFF Light of Flat device on the Remote Array Node



- **Node ID:** ID of the SLAVE node where the DragScript will be executed
- **Device ID:** ID of the Flat Device to use (1 or 2)

- **Node Select Brightness Flat Device:** Select Light Brightness level of Flat device on the Remote Array Node



- **Node ID:** ID of the SLAVE node where the DragScript will be executed
- **Device ID:** ID of the Flat Device to use (1 or 2)

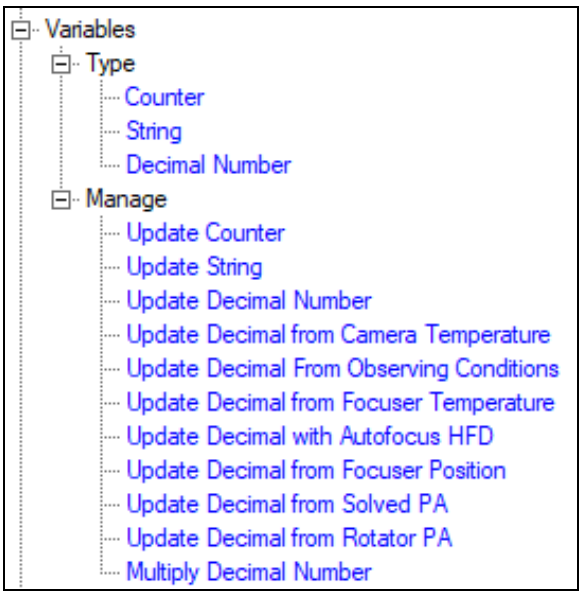
- **Brightness:** value to set of the light brightness on remote Flat device

47 DragScript Flow of Control

These DragScript elements control the flow of execution through your script. You can use the DragScript Simulator to test how control will flow when the DragScript actions complete with OK, ERROR or TIMEOUT status, and when Emergency Suspend, Resume and Exit events happen.

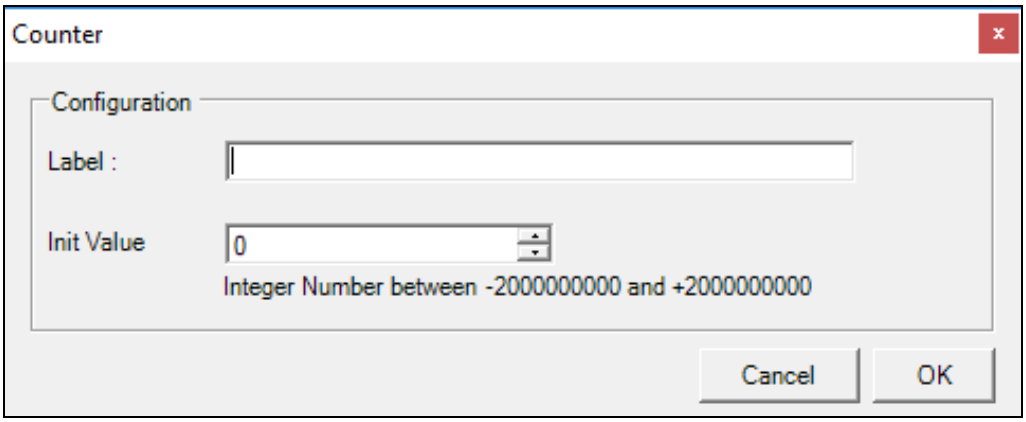
47.1 Variables

DragScript has several variable types: counters (integers), string variables and decimal numbers. They must be declared with the Counter, String or Decimal Number actions before they can be used. You can set and change their values, and then make decisions to execute DragScript actions based on their value. For example, you may build a script that runs from zero to ten sequences based on the value of a counter variable you set at the start of the script.



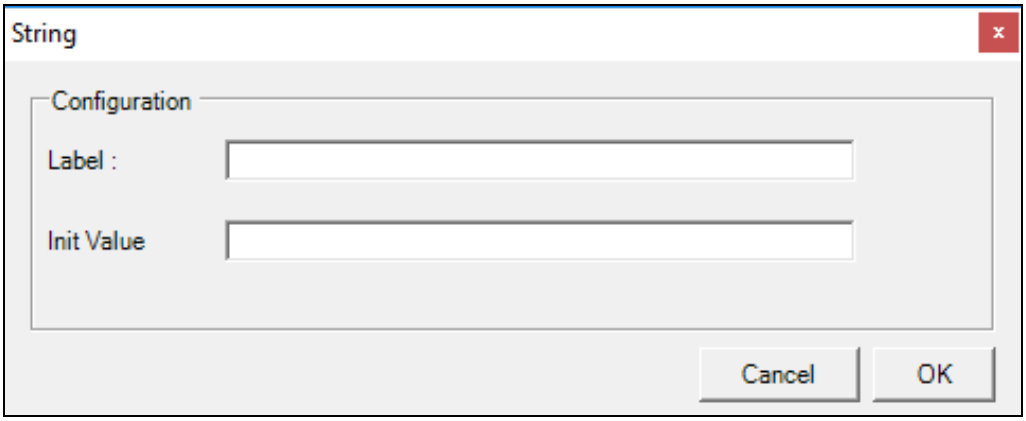
47.1.1 Type

- **Counter**: Declare a counter (integer) variable and give it an initial value. You must declare a variable before using it



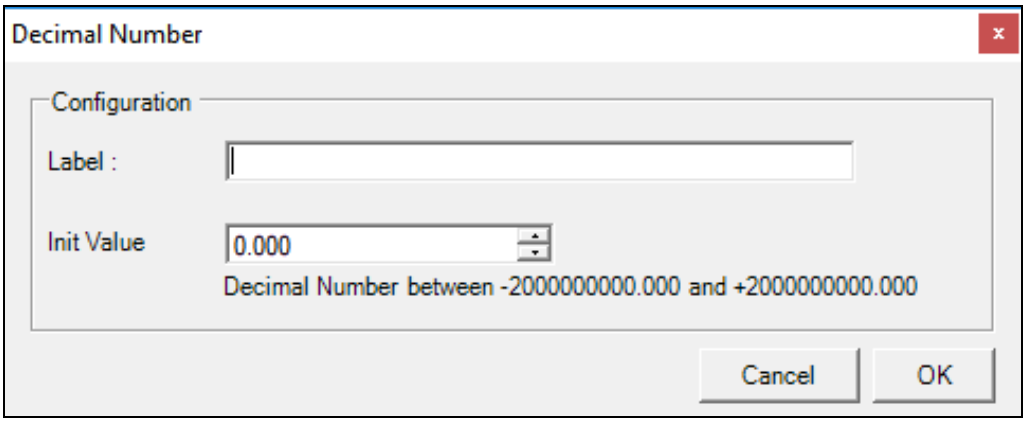
- **Label**: The name for this counter variable. There are no restrictions on length or legal characters, so just use something that makes sense for your control flow
- **Init Value**: Initial value for the counter. Must be an integer between -2,000,000,000 and +2,000,000,000
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **String**: Declare a string variable and give it an initial value. You must declare a variable before using it



- **Label**: The name for this string variable
- **Init Value**: Initial value for the string
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

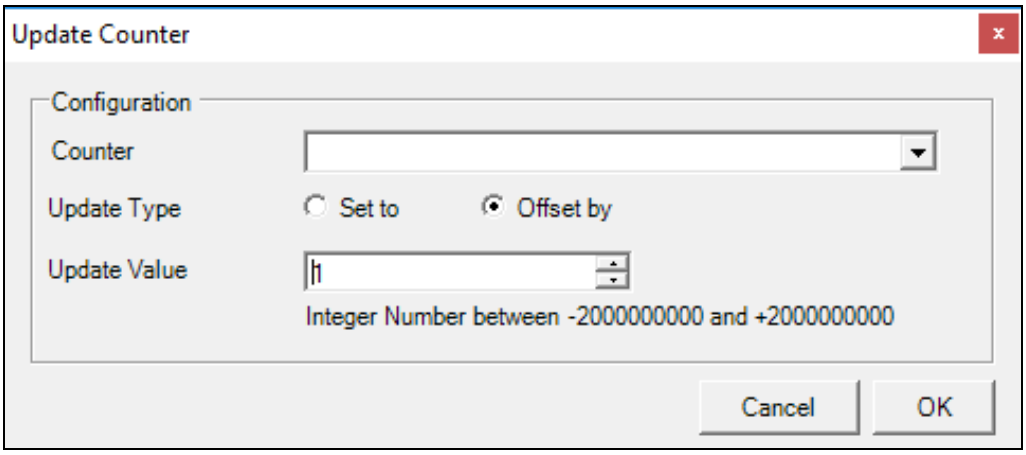
- **Decimal Number**: Declare a decimal number variable and give it an initial value. You must declare a variable before using it



- **Label**: The name for this decimal number variable
- **Init Value**: Initial value for the decimal number - must be between the limits shown in the dialog box
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

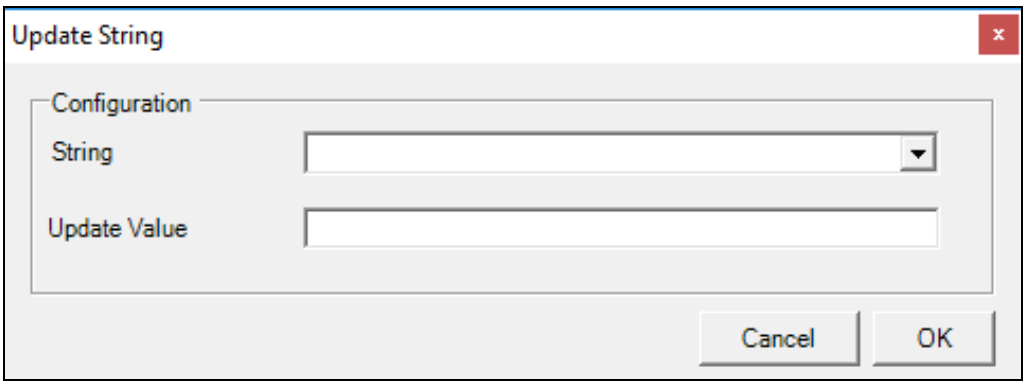
47.1.2 Manage

- **Update Counter**: Update the value of a counter variable:



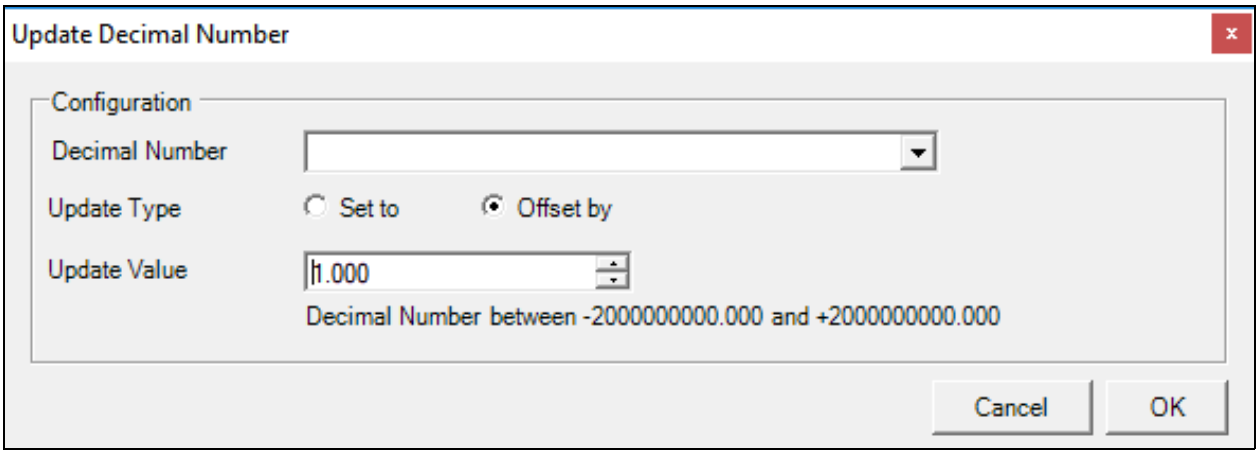
- **Counter**: Select the counter to update from the drop-down list. Counter variables must be declared with a Counter DragScript action before they can be updated
- **Update Type**:
  - **Set to**: If selected, set the counter variable to the value in the Update Value field
  - **Offset by**: If selected, add the value in the Update Value field to the counter. The Update Value field can be negative or positive.
- **Update Value**: A negative or positive integer value to either set the counter variable to or offset the counter variable by
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Update String**: Update the value of a string variable:



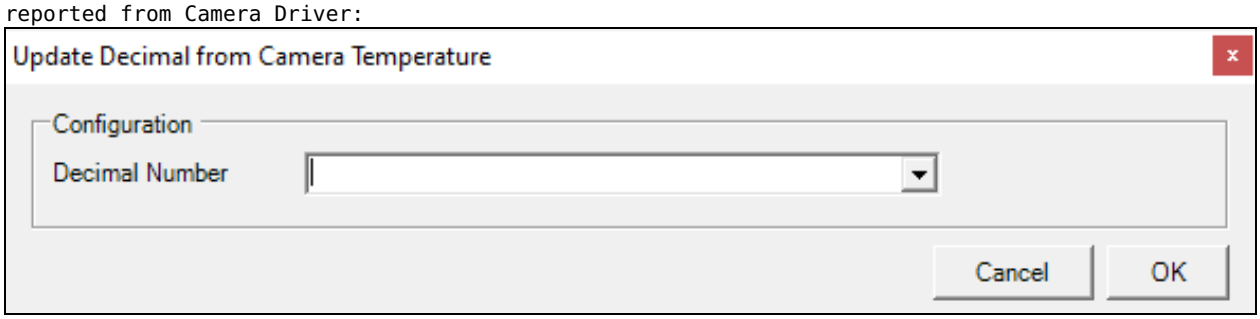
- **String**: Select the string variable to update from the drop-down list
- **Update Value**: Enter the new value for the string variable
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Update Decimal Number**: Update the value of a decimal number



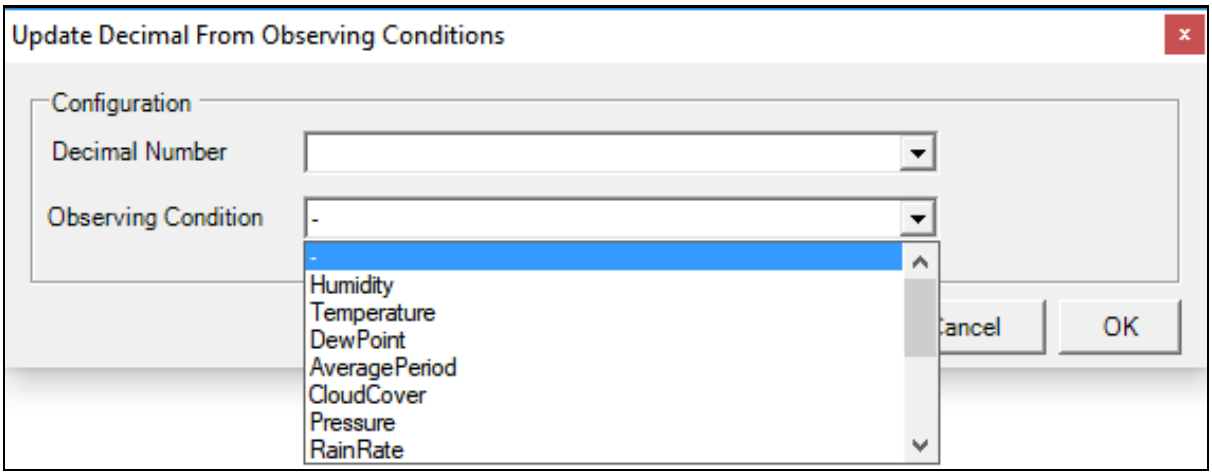
- **Decimal Number**: Select the decimal number variable to update from the drop-down list
- **Update Type**:
  - **Set to**: Set the decimal number value to the number in the Update Value field
  - **Offset by**: Add the +/- number in the Update Value field to the current value of the decimal number
- **Update Value**: Enter the new value for the decimal number variable
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Update Decimal Number from Camera Temperature:** Set the value of a decimal number from the temperature reported from Camera Driver:



- **Decimal Number**: Select the decimal number variable to update from the drop-down list
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

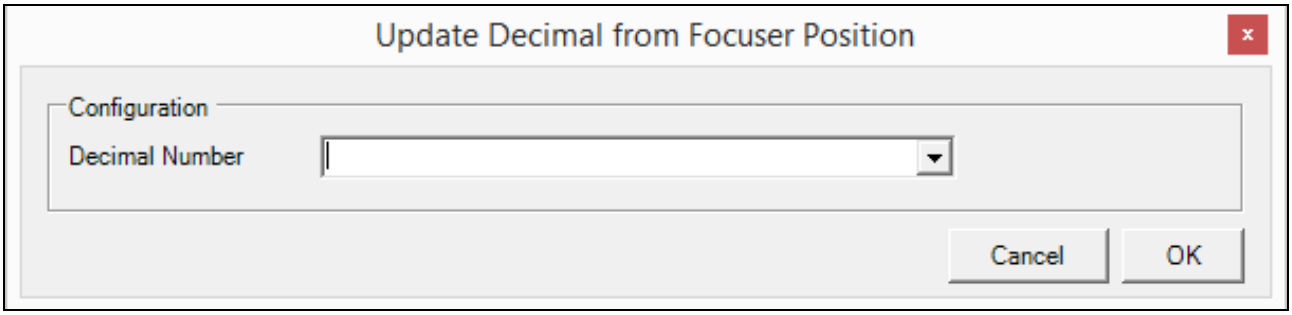
- **Update Decimal Number from Observing Conditions:** Set the value of a decimal number from the observing conditions returned from I/O cards via Viking or from an ASCOM Observing Conditions driver:



- **Decimal Number**: Select the decimal number variable to update from the drop-down list

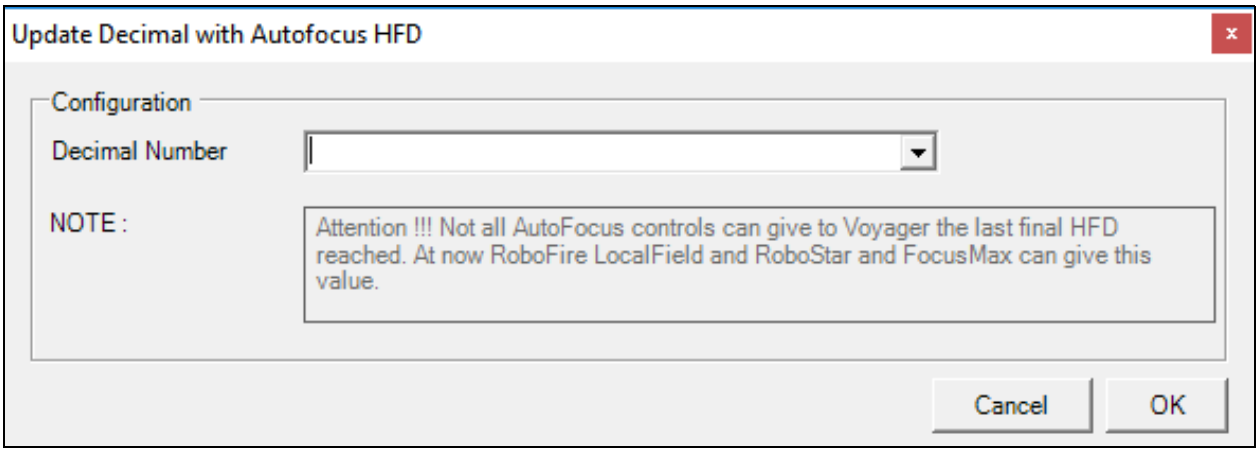
- **Observing Condition**: Select the observing condition whose value should be placed into the decimal number. These values come from Viking, a companion product from Starkeeper.it or from an ASCOM Observing Conditions driver
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Update Decimal Number from Focuser Temperature**: Set the value of a decimal number from the temperature returned by the focuser or auto-focus system



- **Decimal Number**: Select the decimal number variable to update from the drop-down list
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

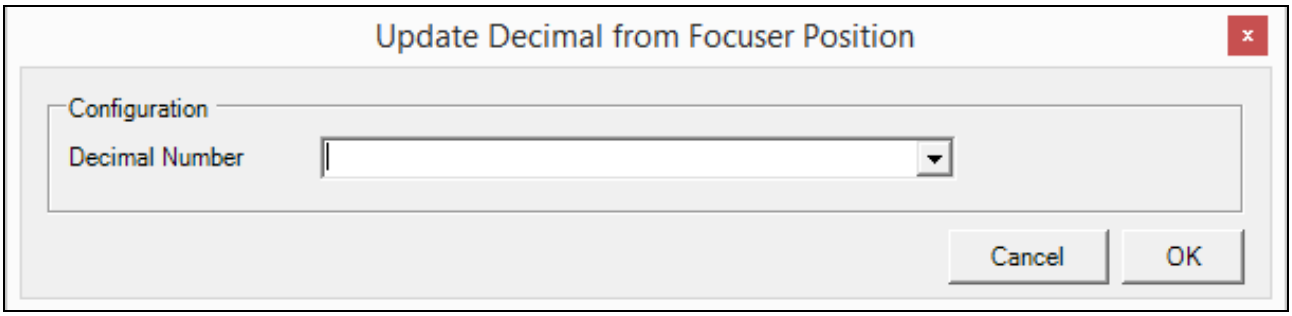
- **Update Decimal Number with Autofocus HFD**: Set the value of a decimal number with the final HFD (Half Flux Diameter) value from the last autofocus operation



- **Decimal Number**: Select the decimal number variable to update from the drop-down list
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

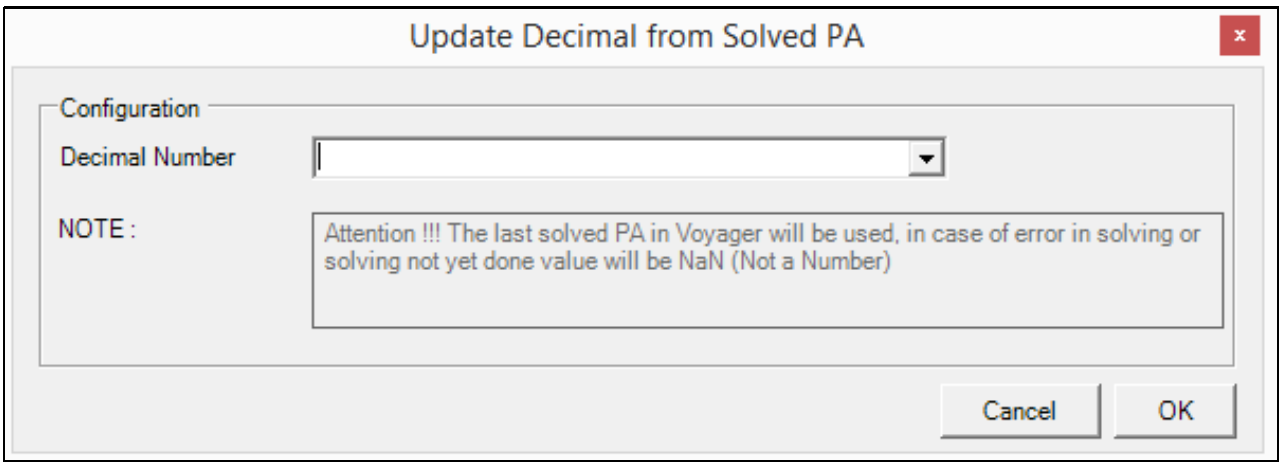
Important Note! At this time only RoboFire LocalField, RoboStar, and FocusMax return the HFD value - if you use a different autofocus routine, the HFD is not available

- **Update Decimal from Focuser Position**: Set the value of a decimal number from the actual position returned by the RoboFire focuser



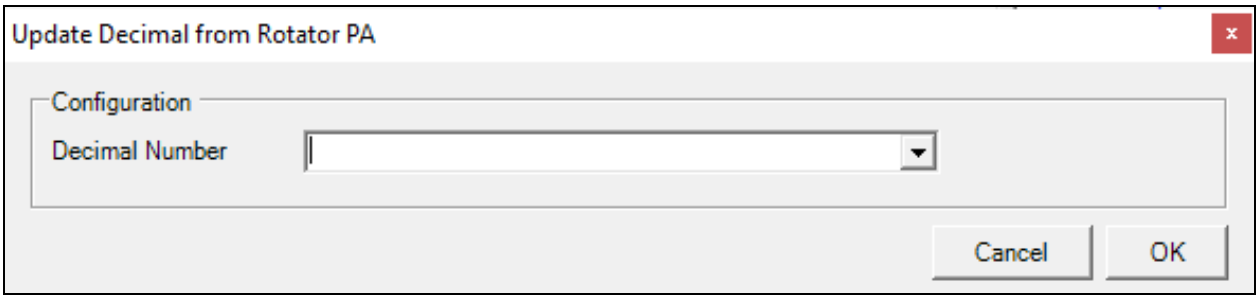
- **Decimal Number**: Select the decimal number variable to update from the drop-down list
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Update Decimal from Solved PA**: Set the value of a decimal number from the last solved PA returned by a Plate or Blind Solving action



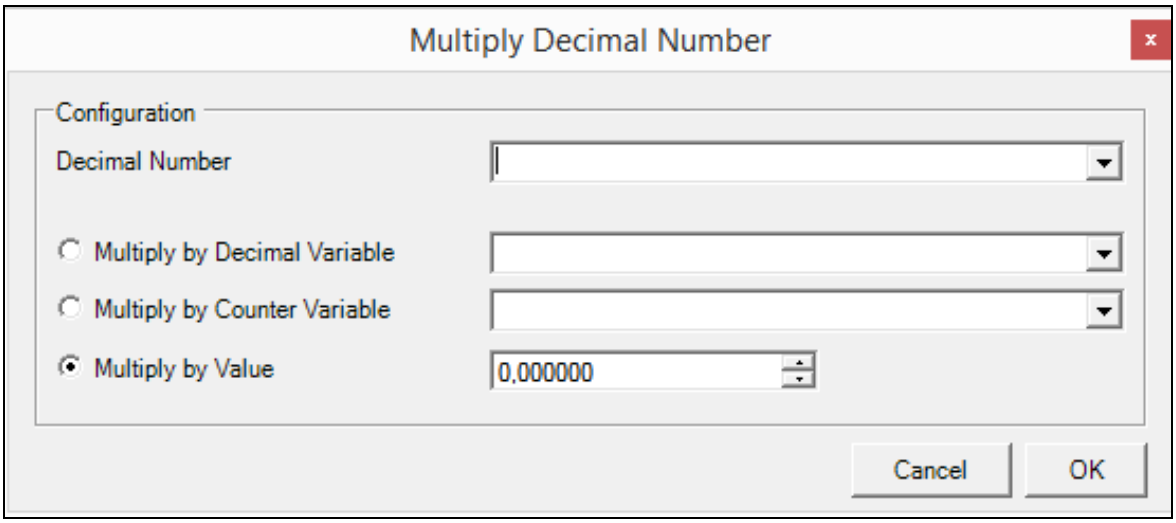
- **Decimal Number**: Select the decimal number variable to update from the drop-down list
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Update Decimal from Rotator PA**: Set the value of a decimal number from the Rotator PA returned by Rotator driver



- **Decimal Number**: Select the decimal number variable to update from the drop-down list
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

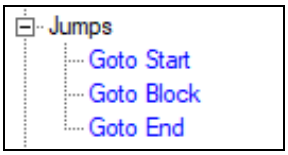
- **Multiply Decimal Number**: Multiply a decimal number variable for the value in another variable of type counter or decimal or by direct value, the result will be stored in replace of actual value



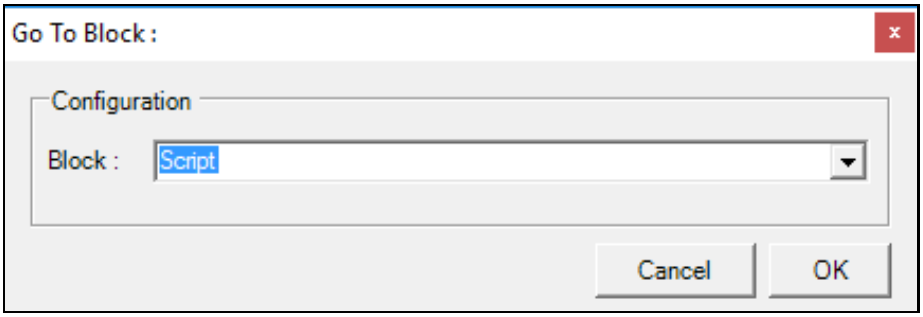
- **Decimal Number:** Select the decimal number variable to multiply and update
- **Multiply by Decimal Variable:** Select the decimal number variable to use for multiply
- **Multiply by Counter Variable:** Select the counter variable to use for multiply
- **Multiply by Value:** Select the direct value to use for multipy
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

47.2 Jumps

Jumps are used to goto a specified block of the DragScript. You can jump to the Start, End or a named Block.



- **Goto Start**: Jump to the Start block of the script
- **Goto Block**: Jump to a named block in the script



- **Block**: Select the named from the drop-down list, or type in the name of a block
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Goto End**: Jump to the End block of the script

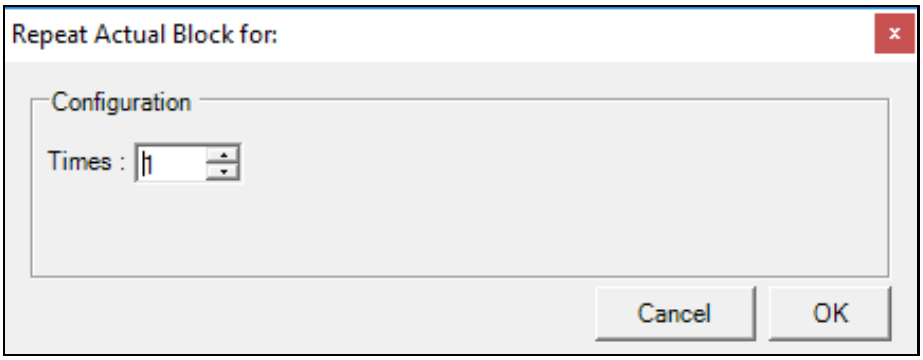
47.3 Repeats

Repeats are used to execute a DragScript block a specified number of times, or until a specific time, or until astronomical night ends.

Repeats must be placed inside a block (note: Script: is a special block that contains the entire script.

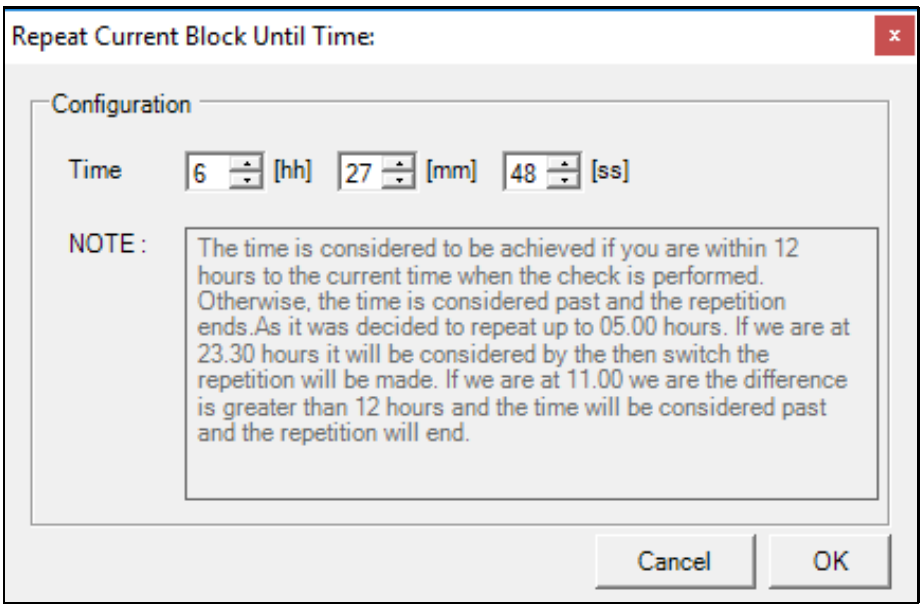
If the result of evaluating a Repeat is to repeat the block, control returns to the block statement that contains the repeat.

- **Repeat Block for n Times**: Repeat the containing block a specified number of times



- **Times**: Number of times to repeat this block
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

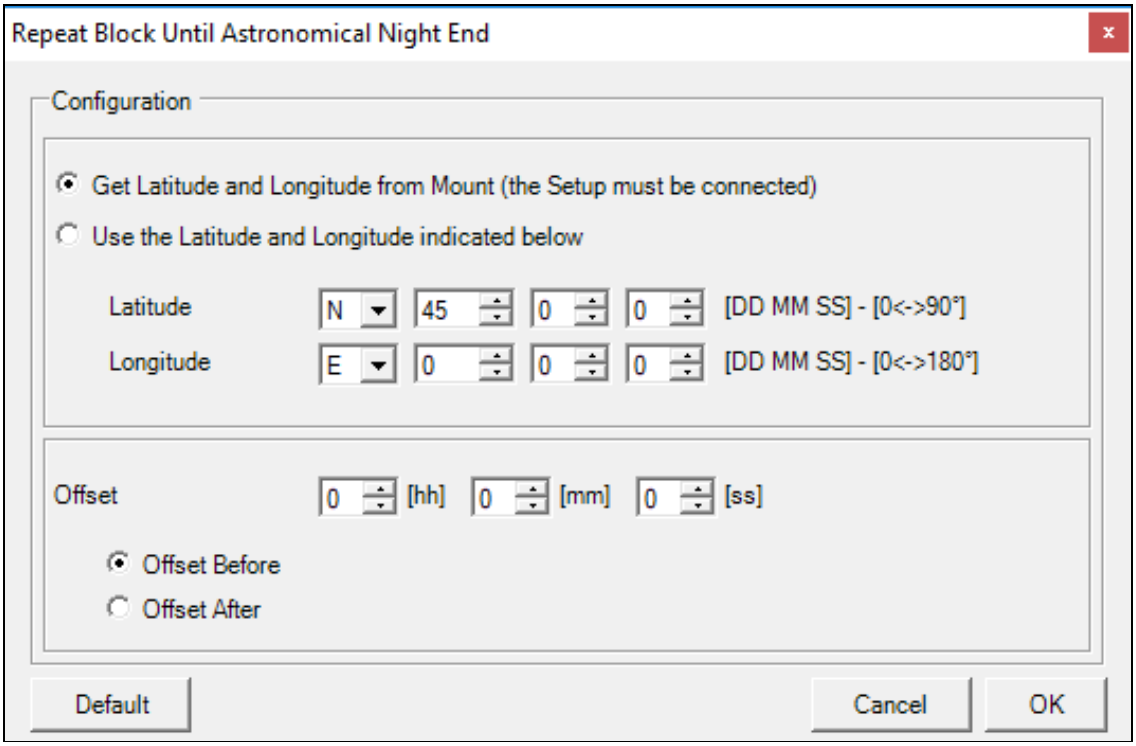
- **Repeat Current Block Until Time**: Repeat the contained block until the specified time:



- **Time**: Repeat the current block until this time
- **OK**: Save changes and close the window

- **Cancel**: Discard changes and close the window

- **Repeat Block Until Astronomical/Nautical/Civil Night End**:



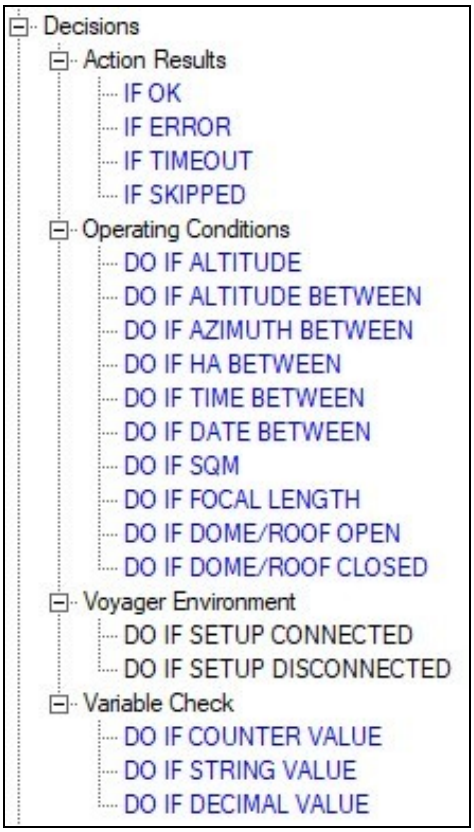
- **Get Latitude and Longitude from Mount**: Retrieve the current latitude and longitude from the connected mount, which must support this command. This location is used, along with the current date, to determine the time that astronomical/nautical/civil night ends
- **Use the Latitude and Longitude indicated below**: Specify your current latitude and longitude in the fields below. This location is used, along with the current date, to determine the time that astronomical/nautical/civil night ends
- **Offset**: Time in HH MM SS
    - **Offset Before**: If selected, repeat the block until this amount of time before astronomical/nautical/civil night ends
    - **Offset After**: If selected, repeat the block this amount of time after astronomical/nautical/civil night ends
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window
    -

Important Note! The time will be considered to have been reached if it is within 12 hours of the current time when the check is performed. E.g., if we set a repeat until 05:00, if it is 23:30 the repeat will be done since 23:30 is more than 12 hours in the future and less than 12 hours in the past, relative to 05:00. If it is 11:00, the repeat will be skipped, since 11:00 is later than 05:00 and more than 12 hours in the past.

47.4 Decisions

Decisions control the flow of your DragScript based on the results of an action (OK, ERROR, TIMEOUT), operating conditions (current time, date or target altitude), or the value of a variable.

Important Note! A Decision element will create a new indent level in your DragScript. Drag new elements and drop them on the Decision element, or copy and paste them to it, to have their execution controlled by the result of the Decision



47.4.1 Action Results:

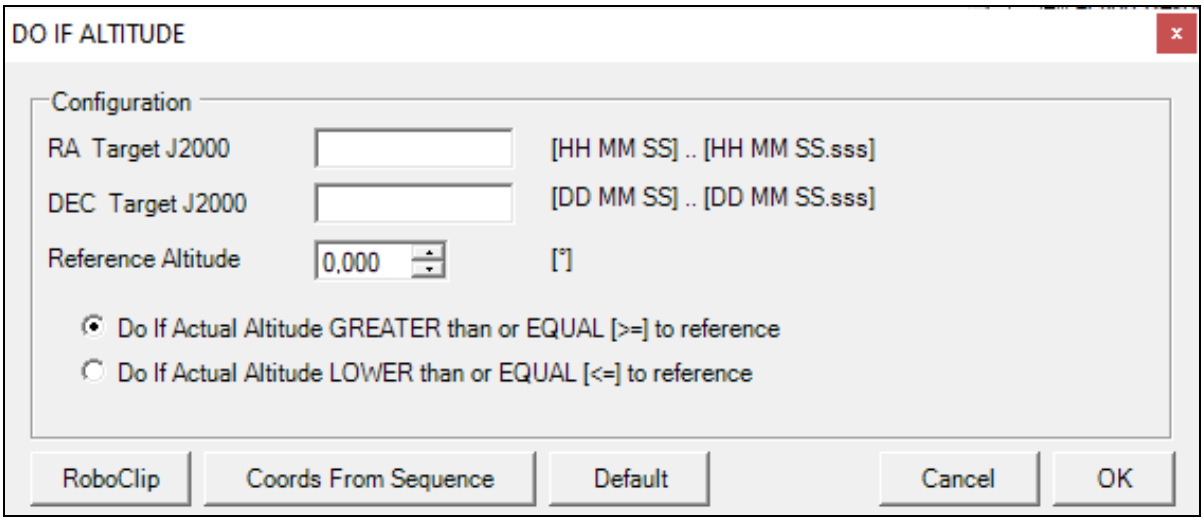
Do the actions at the indent level created by the Decision block based on the results of the action preceding the decision

- ♦ **IF OK**: Do the actions following this statement if the result of the previous action was OK - meaning the action was successful
- ♦ **IF ERROR**: Do the actions following this statement if the result of the previous action was ERROR - meaning the action failed
- ♦ **IF TIMEOUT**: Do the actions following this statement if the result of the previous action was a TIMEOUT - meaning the action reached a specified timeout value without succeeding
- ♦ **IF SKIPPED:** Do the actions following this statement if the skipped status of the previuos action was SKIPPED - meaning the action not generate ERROR or finish OK just is SKIPPED because some constraints isnìt possible to match. At now only the Sequence Action use the SKIPPED status if time wait or time end or one of the constraints in azimuth, hour agle, alitute was thrown

47.4.2 Operating Conditions:

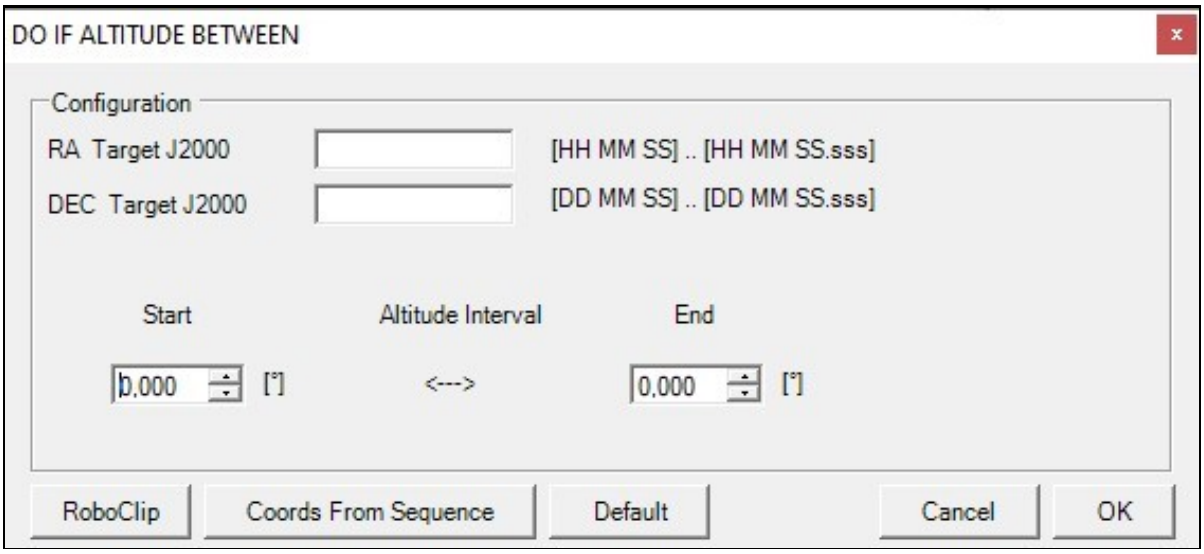
Do the actions at the indent level created by the Decision block based on the time, date or target altitude

- **DO IF ALTITUDE**: Do the actions if a target specified by RA and DEC coordinates has risen above or set below a specified altitude:



- **RA Target J2000**: RA coordinates of the object you want to reach the Reference Altitude in HH MM SS or HH MM SS.sss
- **DEC Target J2000**: DEC coordinates of the object you want to reach the Reference Altitude in DD MM SS or DD MM SS.sss
- **Reference Altitude**: Altitude to reach in degrees
- **Do If Actual Altitude GREATER than or EQUAL (>=) to reference**: Do the actions if the target has reached or risen above the reference altitude
- **Do If Actual Altitude LOWER than or EQUAL (>=) to reference**: Do the actions if the target has reached or set below the reference altitude
- **RoboClip:** load RA and DEC from RoboClip catalog
- **Coords From Sequence:** load RA and DEC from a sequence file
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

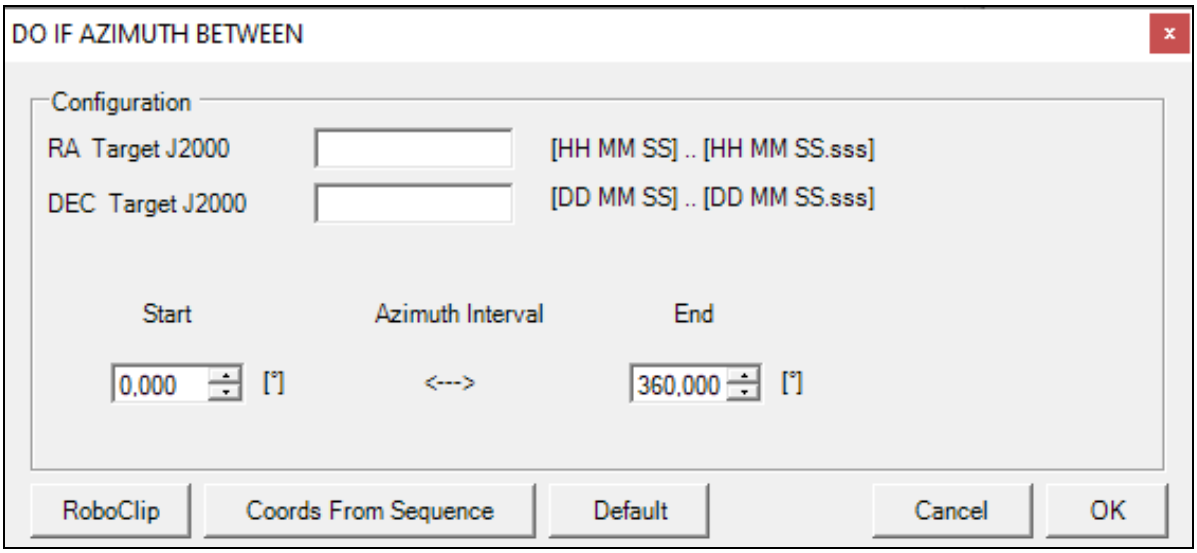
- **DO IF ALTITUDE BETWEEN:** Do the actions if the altitude of a target specified by RA and DEC coordinates is between the **Start** and **End** values



- **RA Target J2000**: RA coordinates of the object you want to reach the Reference Altitude in HH MM SS or HH MM SS.sss
- **DEC Target J2000**: DEC coordinates of the object you want to reach the Reference Altitude in DD MM SS or DD MM SS.sss

- **Start and End:** Do the actions if the specified target's altitude is greater than or equal to the **Start** value and less than or equal to the **End** value in decimal degrees
- **RoboClip:** load RA and DEC from RoboClip catalog
- **Coords From Sequence:** load RA and DEC from a sequence file
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

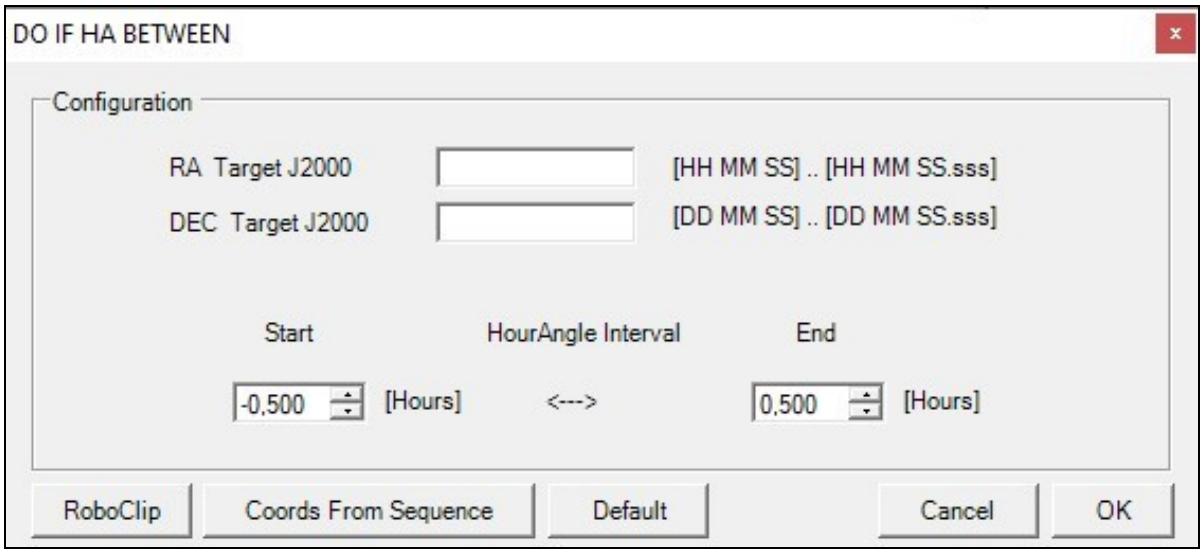
- **DO IF AZIMUTH BETWEEN:** Do the actions if the azimuth of a target specified by RA and DEC coordinates is between the **Start** and **End** values and the Altitude of the Target is above the minimum Altitude for slew set up in Voyager Mount setting (default is 0°)



- **RA Target J2000**: RA coordinates of the object you want to reach the Reference Altitude in HH MM SS or HH MM SS.sss
- **DEC Target J2000**: DEC coordinates of the object you want to reach the Reference Altitude in DD MM SS or DD MM SS.sss
- **Start and End:** Do the actions if the specified target's azimuth is greater than or equal to the **Start** value and less than or equal to the **End** value in decimal degrees. Also the Altitude of the target must be above the minimum for a slew like set tup in Voyager Mount setting (default is 0°)
- **RoboClip:** load RA and DEC from RoboClip catalog
- **Coords From Sequence:** load RA and DEC from a sequence file
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

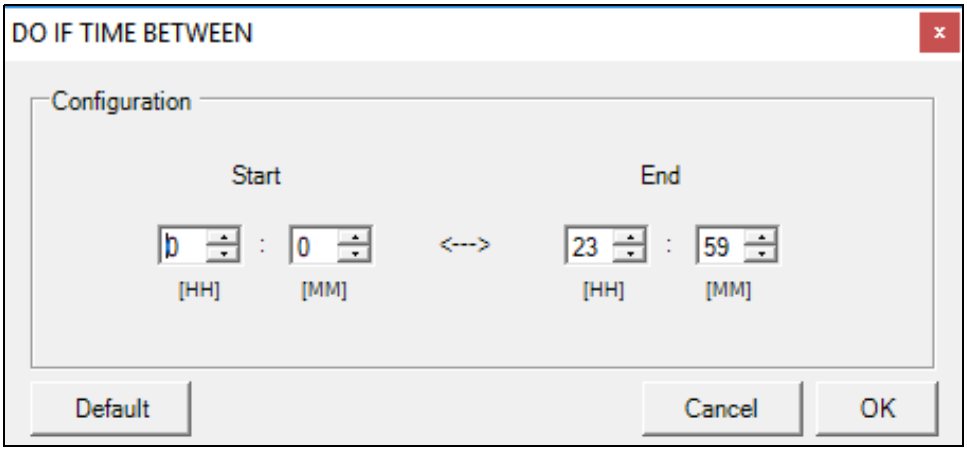
Important Note! Remember that a Target can be in the right azimuth interval but can be upside down wiht negtive altitude. DO IF will be not executed if altitude of target are under the minimum altitude value accepted for a slew in Voyager mount setting

- **DO IF HA BETWEEN:** Do the actions if the hour angle of the target (hours difference from the meridian) is between the specified start and end amounts



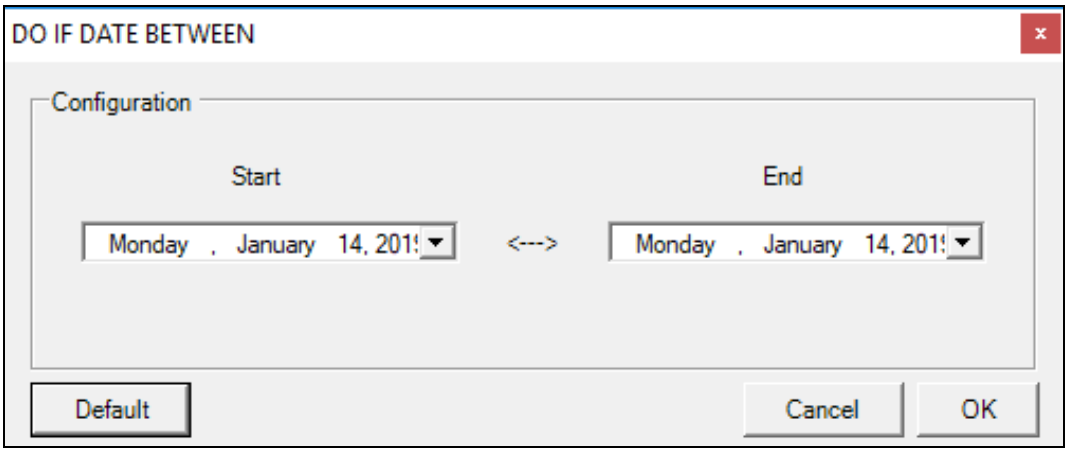
- **RA Target J2000**: RA coordinates of the object whose hour angle we are testing, in HH MM SS or HH MM SS.sss
- **DEC Target J2000**: DEC coordinates of the object whose hour angle we are testing, in DD MM SS or DD MM SS.sss
- **Start and End:** Do the actions if the specified target's HA (hour angle) is greater than or equal to the **Start** value and less than or equal to the **End** value in decimal hours. Note the values can be positive (after the meridian) or negative (before the meridian). The start to end can be both negative, both positive, or the start can be negative and the end can be positive. **In all cases, the value must increase from start to end.**
- **RoboClip:** load RA and DEC from RoboClip catalog
- **Coords From Sequence:** load RA and DEC from a sequence file
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **DO IF TIME BETWEEN**: Do the actions if the time is between the specified start and end times



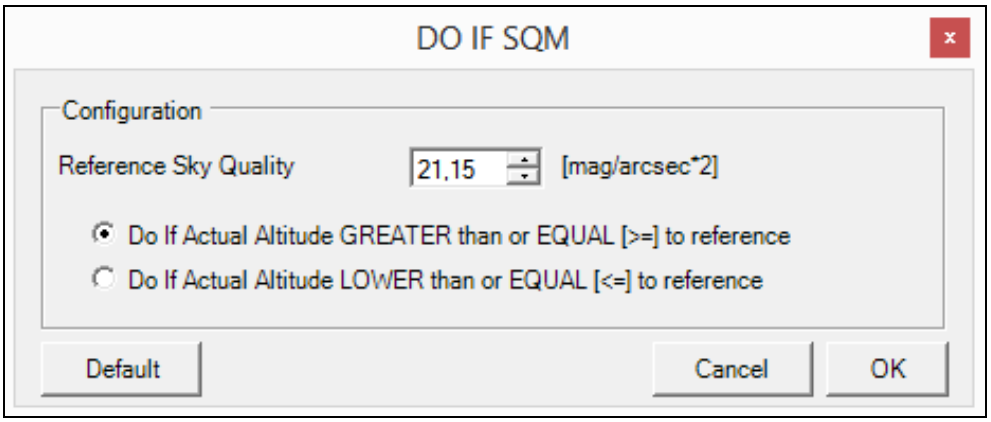
- **Start**: Beginning time of interval within which to do the following actions
- **End**: End time of interval within which to do the following actions
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **DO IF DATE BETWEEN**: Do the actions at the indent level created by the DO statement if the date is between the start and end dates:



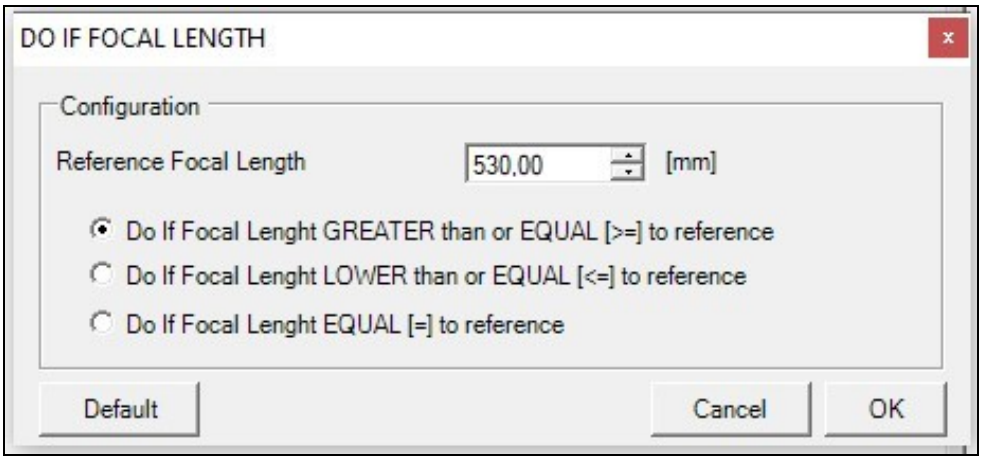
- **Start**: Start date of the interval
- **End**: End date of the interval
- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **DO IF SQM**: Do the actions at the indent level created by the DO statement if the SQM value readed from control or Observing conditions is between the start and end dates:



- **Reference Sky Quality**: reference value of Sky Quality to check
- **Do If Actual value GREATER than or EQUAL [>=] to reference**: execute what is inside DO IF if the actual value >= that the reference value
- **Do If Actual value LOWER than or EQUAL [<=] to reference**: execute what is inside DO IF if the actual value <= that the reference value
- **Default**: use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **DO IF FOCAL LENGTH**: Do the actions at the indent level created by the DO statement if the FOCAL LENGTH readed from actual profile (Setup->Camera) is >=, <= or equal to reference value:



- **Reference Focal Length**: reference value of Telescope Focal Length to check
- **Do If Focal Length GREATER than or EQUAL [>=] to reference**: execute what is inside DO IF if the actual value >= that the reference value
- **Do If Focal Length LOWER than or EQUAL [<=] to reference**: execute what is inside DO IF if the actual value <= that the reference value
- **Do If Focal Length EQUAL [=] to reference**: execute what is inside DO IF if the actual value = that the reference value
- **Default**: use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **DO IF DOME/ROOF OPEN**: Do the actions at the indent level created by the DO statement if the DOME/ROOF is opened
- **DO IF DOME/ROOF CLOSED**: Do the actions at the indent level created by the DO statement if the DOME/ROOF is closed

Important Note! Status of DOME/ROOF will be read from the DOME Control configured in Voyager. This control is not absolutely reliable at 100%. Voyager cannot responding in anycase and any mode on damage derived from use of this conditional blocks. Please instead use the I/O card system with Viking management and physycal sensors to check the real status of your dome/roof.

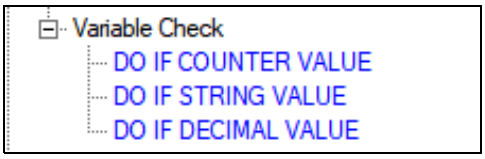
47.4.3 Voyager Environment:

Do the actions at the indent level created by the Decision block based on the Voyager internal status

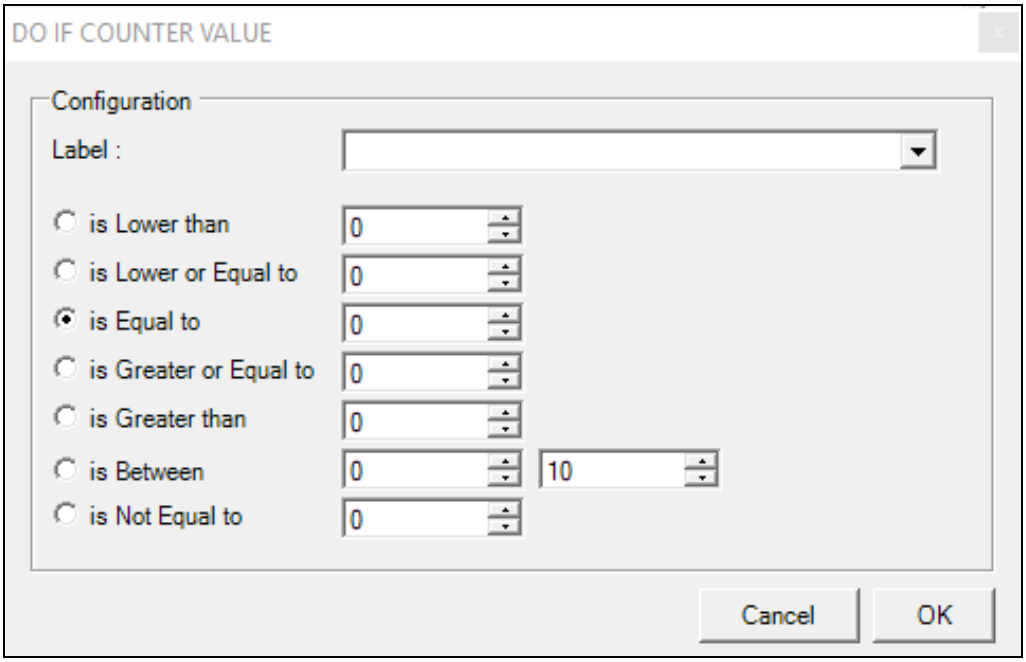
- **DO IF SETUP CONNECTED**: Do the actions if Voyager Setup is connected (from Startup menù or by DragScript connect block)
- **DO IF SETUP DISCONNECTED**: Do the actions if Voyager Setup is not connected (from Startup menù or by DragScript disconnect block)

47.4.4 Variable Check

Do the actions at the indent level created by the DO IF statement based on the value of a variable. Variables must be declared before they can be tested in a DO IF statement

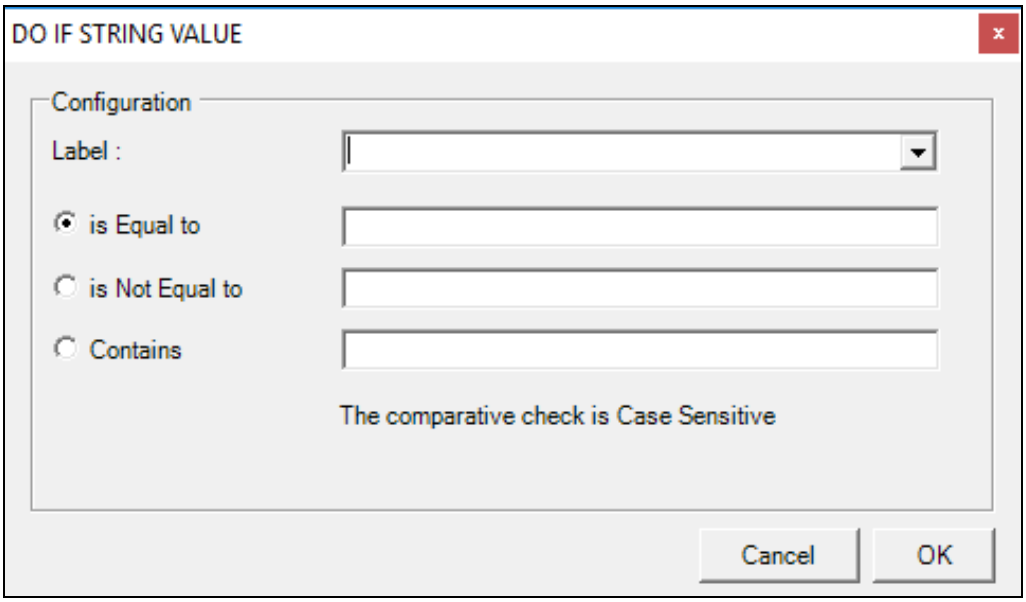


- **DO IF COUNTER VALUE**: Check the value of a counter (integer) variable and do the following actions if the value of the counter meets the specified criteria:



- **Label**: Choose the counter variable to test from the drop-down list
- **is Lower than**: Do the following actions if the selected counter value is less than the number in the counter field
- **is Lower than or Equal to**: Do the following actions if the selected counter value is less than or equal to the number in the counter field
- **is Equal to**: Do the following actions if the selected counter value is equal to the number in the counter field
- **is Greater or Equal to:** Do the following actions if the selected counter value is greater than or equal to the number in the counter field
- **is Greater than:** Do the following actions if the selected counter value is greater than the number in the counter field
- **is Between:** Do the following actions if the selected counter value is between the values in the two counter fields (greater than or equal to the left value AND less than or equal to the right field)
- **is Not Equal** to: Do the following actions if the selected counter value is not equal to the number in the counter field
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

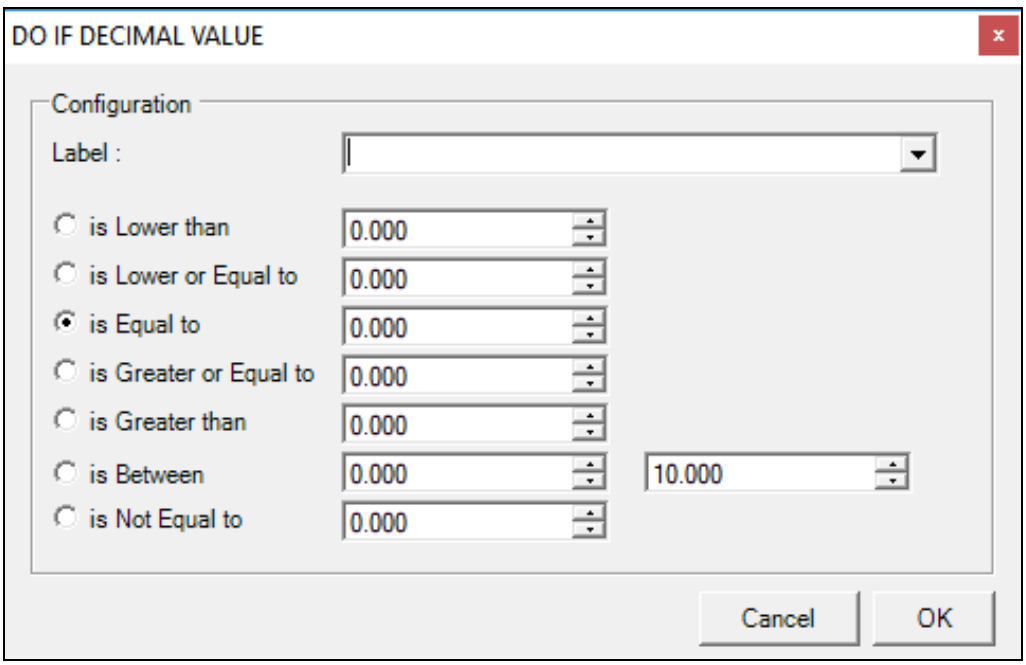
- ♦ **DO IF STRING VALUE**: Do the actions at the indent level created by the DO IF statement if a string variable is equal to, not equal to, or contains a specified string:



- **Label**: Choose the string variable to test from the drop-down list
- **is Equal to**: Do the following actions if the selected string value is equal to the specified string
- **is Not Equal to**: Do the following actions if the selected string value is not equal to the specified string
- **Contains**: Do the following actions if the selected string value contains the specified string
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

Important Note! String comparisons are case sensitive, i.e. TargetName is not equal to targetname

- **DO IF DECIMAL VALUE**: Do the actions at the indent level created by the DO IF statement if the value of the decimal number meets the specified criteria:



- **Label**: Choose the counter variable to test from the drop-down list
- **is Lower than**: Do the following actions if the selected decimal number value is less than the number in the decimal number field

- **is Lower than or Equal to**: Do the following actions if the selected decimal number value is less than or equal to the number in the decimal number field
- **is Equal to**: Do the following actions if the selected decimal number value is equal to the number in the counter field
- **is Greater or Equal to:** Do the following actions if the selected decimal number value is greater than or equal to the number in the decimal number field
- **is Greater than:** Do the following actions if the selected decimal number value is greater than the number in the decimal number field
- **is Between:** Do the following actions if the selected decimal number value is between the values in the two decimal number fields (greater than or equal to the left value AND less than or equal to the right field)
- **is Not Equal** to: Do the following actions if the selected decimal number value is not equal to the number in the decimal number field
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

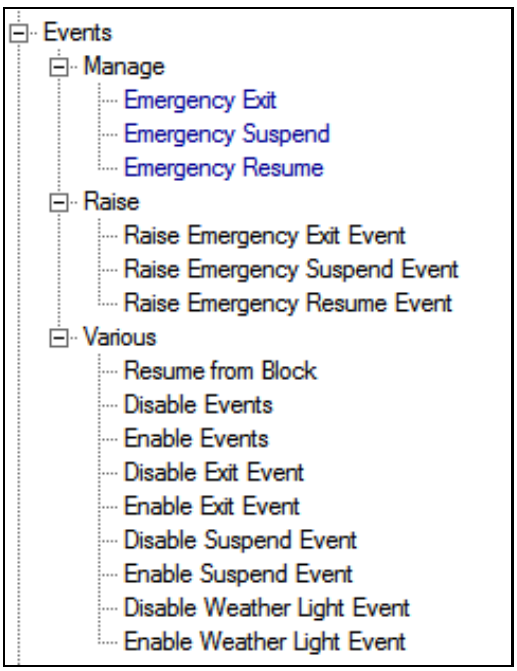
47.5 Events

DragScript execution can be suspended, terminated (exited) and resumed based on the occurrence of Emergency Exit, Emergency Suspend and Emergency Resume events.

The most common use of Events is together with a weather monitoring system, as configured in Weather Setup. You can specify at a detailed level which events should cause DragScript execution to SUSPEND (such as overcast clouds), EXIT (such as rain), or RESUME (such as clouds moving out so it becomes clear again).

In addition to weather events, you can raise Emergency Exit, Emergency Suspend and Emergency Resume events at any point in your DragScript.

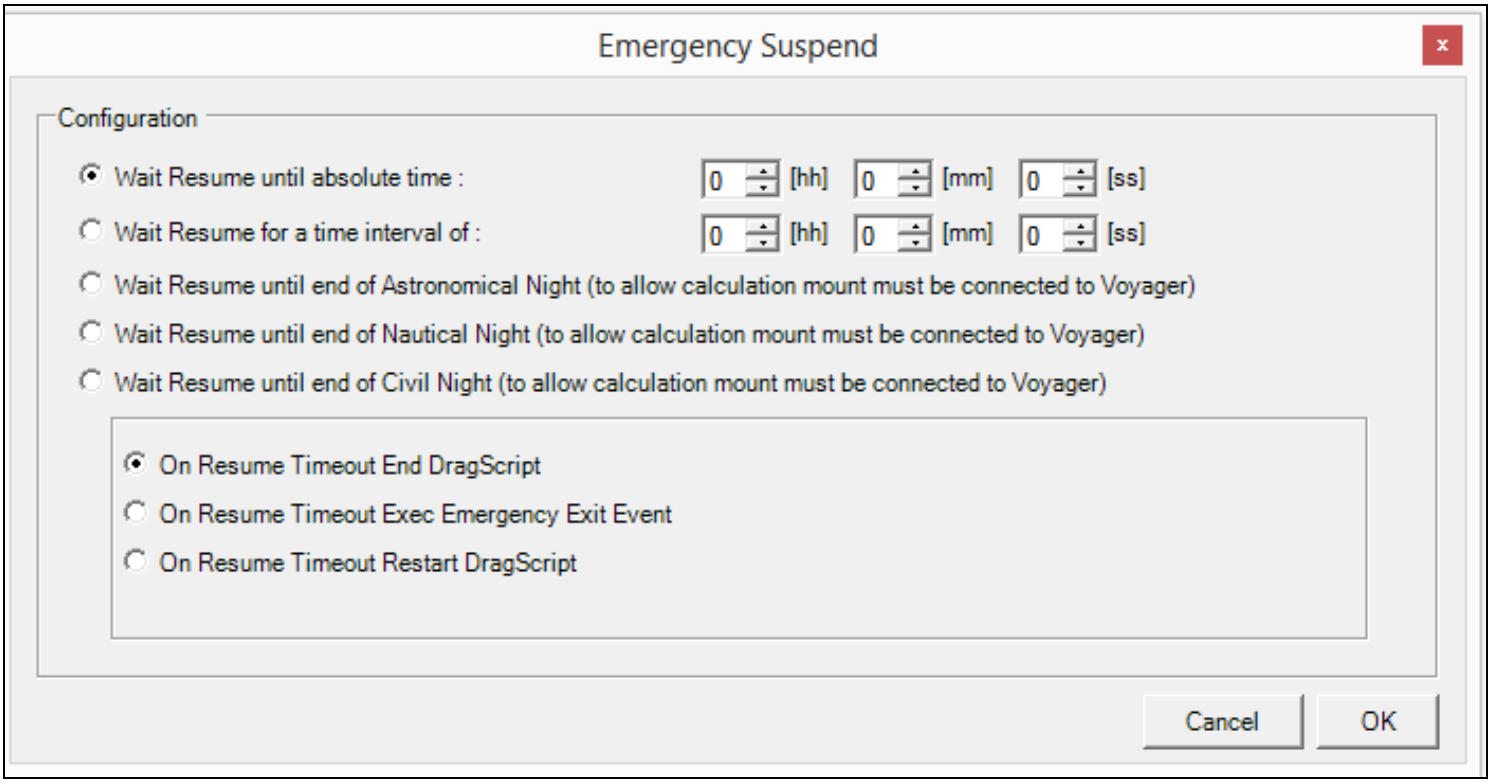
When an Event is raised, control flow goes immediately to the appropriate block (Exit, Suspend or Resume) in the Events block of your DragScript. Create those blocks by dragging elements from the Events: Manage list.



47.5.1 Manage

See the DragScript Examples section to see how these blocks work in a DragScript.

- **Emergency Exit**: Drag this element to the Events block of your DragScript. Then drag the actions you wish to take place when an Emergency Exit event is raised. For example, stop tracking, stop guiding, park your mount, and close the observatory roof
- **Emergency Suspend**: Drag this element to the Events block of your DragScript. Then drag the actions you wish to take place when an Emergency Suspend event is raised. For example, stop tracking and stop guiding



- **Wait Resume until absolute time**: If the time specified in HH MM SS is reached without an Emergency Resume event being raised, perform the action selected from the radio buttons in this dialog window
- **Wait Resume for a time interval of:** If the time period specified in HH MM SS elapses without an Emergency Resume event being raised, perform the action selected from the radio buttons in this dialog window
- **Wait Resume until end of Astronomical Night (to allow calculation mount must be connected to Voyager)**: If the end of Astronomical Night arrives without an Emergency Resume event being raised, perform the action selected from the radio buttons in this dialog window
- **Wait Resume until end of Nautical Night (to allow calculation mount must be connected to Voyager)**: If the end of Nautical Night arrives without an Emergency Resume event being raised, perform the action selected from the radio buttons in this dialog window
- **Wait Resume until end of Civil Night(to allow calculation mount must be connected to Voyager)**: If the end of Civil Night arrives without an Emergency Resume event being raised, perform the action selected from the radio buttons in this dialog window
- **On Resume Timeout End DragScript**: If the time specified above is reached without an Emergency Resume event occurring, end the DragScript
- **On Resume Timeout Exec Emergency Exit Event**: If the time specified above is reached without an Emergency Resume event occurring, raise an Emergency Exit event
- **On Resume Timeout Restart DragScript**: If the time specified above is reached without an Emergency Resume event occurring, Voyager will restart the DragScript form beginneng like a new running
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Emergency Resume**: Execute these actions when an Emergency Resume event is raised. For example, start tracking and start guiding

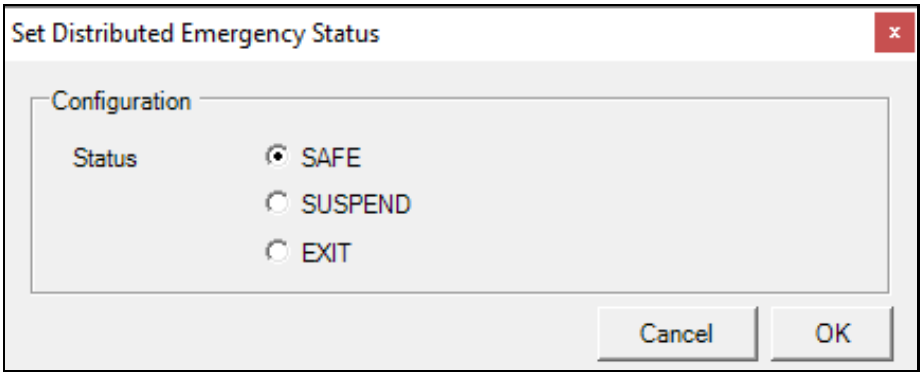
47.5.2 Raise

Raise an Emergency Exit, Suspend or Resume event

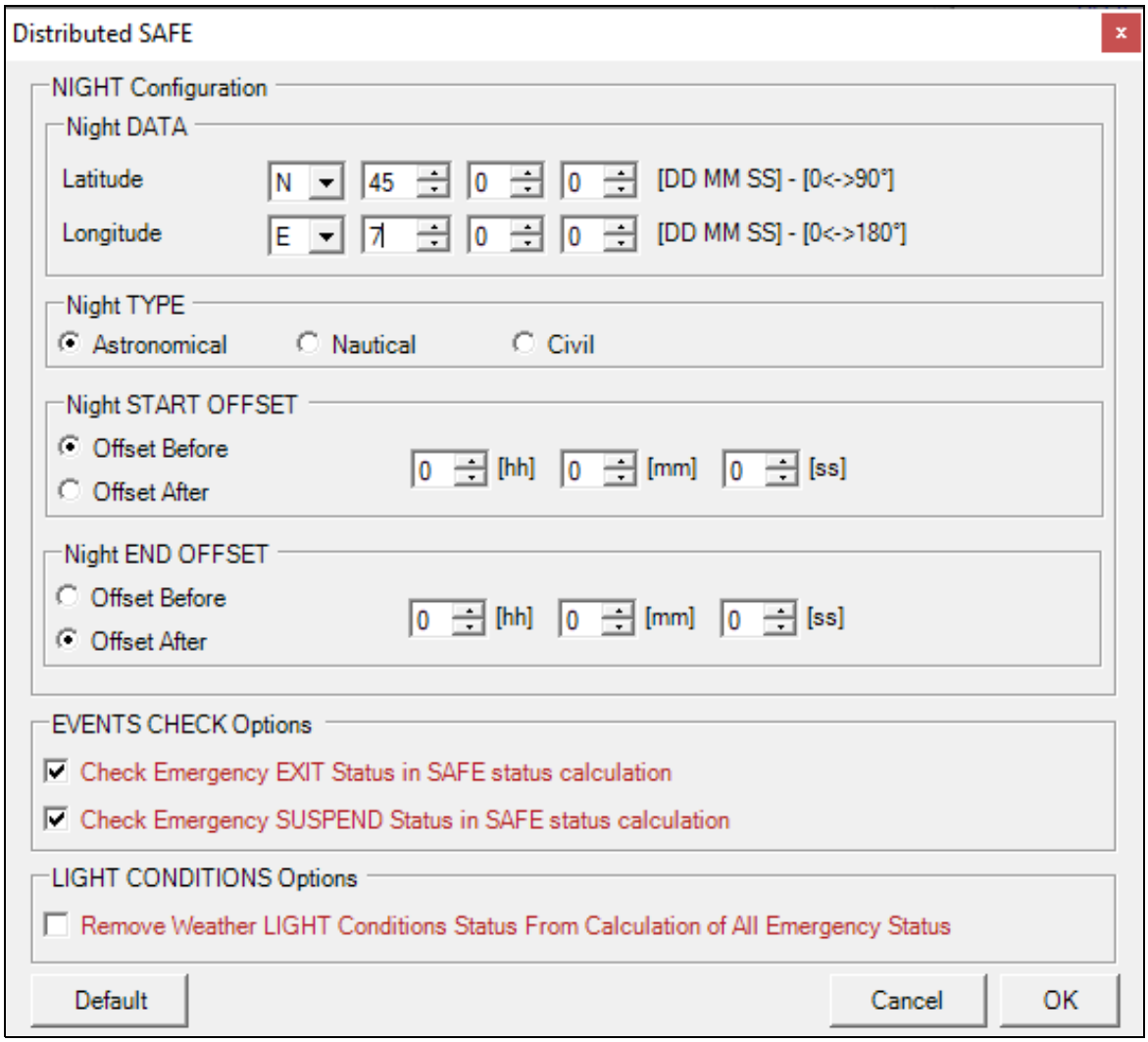
- **Raise Emergency Exit Event**: Raise the Emergency Exit event. Execution of the DragScript will go immediately to the Emergency Exit block in the Events block
- **Raise Emergency Suspend Event**: Raise the Emergency Suspend event. Execution of the DragScript will go immediately to the Emergency Suspend block in the Events block
- **Raise Emergency Resume Event**: Raise the Emergency Resume event. Execution of the DragScript will go immediately to the Emergency Resume block in the Events block

47.5.3 Remote

Block for management of Distributed Distributed Emergency

- **Set Distributed Emergency Status**: Update overriding the internal Distributed Emergency Status for the Voyager Client connected to the selected value
  - 

- **Distributed Safe**: Distributed Safe wait the night like configured and in the night wait to have a Safe condition from the Emergency Event System (in Voyager is Weather, Safety Monitor, Viking I/O). If night is recognized and safe condition is true DragScript will exit from this block with OK result. If timeout is reached waiting DragScript will exit from this block with a TIMEOUT result. In case of error during waiting DragScript will exit with ERROR result. Checking the exit of block user can decide if inform all the client of a SAFE condition using the SET DISTRIBUTED EMERGENCY STATUS or restart the Master DragScript to wait for better conditions (same night or next night is automatically decided from DragScript). This block is usually associated and work only if you using the Distributed Emergency plugin. Right and only place where to use is the Voyager MASTER of plugin where information is processed and emergency events checked.
  - **Important Note!** Distributed Safe Cannot be used inside the Event Manager (Exit, Suspend, Resume)



◊ **NIGHT Configuration:** data necessary to calculate the start and end interval of the actual night

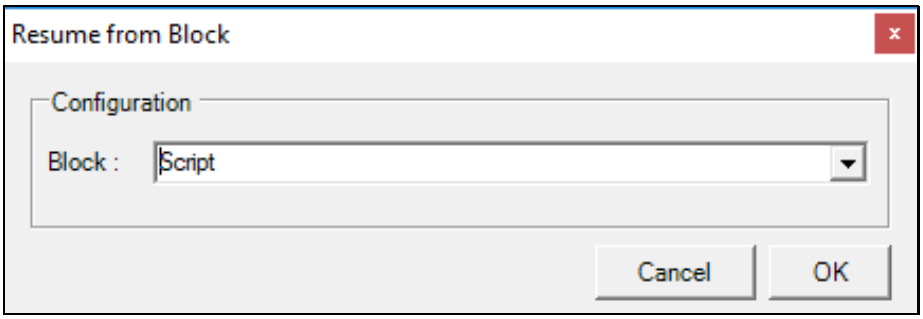
- **Night DATA:** data about location of observatory
  - Latitude: Latitude of the Mount
  - Longitude: Longitude of the Mount
- **Night TYPE:** type of night to calculate. Astronomical, Nautical or Civil
- **Night START OFFSET:** apply an offset to the time start of the night
  - Offset Before: offset before the start in hours, minutes and seconds
  - Offset After: offset after the start in hours, minutes and seconds
- **Night END OFFSET:** apply an offset to the time end of the night
  - Offset Before: offset before the end in hours, minutes and seconds
  - Offset After: offset after the end in hours, minutes and seconds
- **EVENT CHECK options:** with this option you can decide to remove from processing status of SAFE some kind of events that will be ignored (event in any case are disable during the wait safe action)
  - **Check Emergency Exit Status in SAFE status calculation:** if unchecked the condition that throw an Emergency Status will be ignored in calculation of SAFE Staus . ATTENTION !! this is a way really dangerous for your setup .. use only if you want to wait safe in particular condition , particular timing and for particular tasks
  - **Check Emergency SUSPEND Status in SAFE status calculation:** if unchecked the condition that throw an Emergency Status will be ignored in calculation of SAFE Staus . ATTENTION !! this could be a way really dangerous for your setup .. use only if you want to wait safe in particular condition , particular timing and for particular tasks.
- **LIGHT CONDITIONS options:** with this option you can decide to remove from processing status of SAFE the LIGHT Conditions status

- **Remove Weather LIGHT Conditions Status From Calculation of All Emergency Status:** if unchecked the LIGHT conditions from Weather system will be not used to calculate the SAFE Status. Usefull if you want to open the dome with the light approaching the night time and do skyflat. For the Dawn flat you can decide to disable the LIGHT event using dedicated block

- **Default**: Use the default settings
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

47.5.4 Various

- **Resume from Block**: Resume execution starting with the specified block. This can only be placed in the Emergency Resume block in the Events block



- **Block**: Choose the block where execution should resume from the drop-down list
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

- **Disable Events**: Disable event processing. Emergency Exit, Suspend and Resume events will be ignored

- **Enable Events**: Enable event processing. Emergency Exit, Suspend and Resume events will be recognized and handled
- **Disable Exit Event:** Disable event processing. Emergency Exit only event will be ignored
- **Enable Exit Event:** Enable event processing. Emergency Exit event will be recognized and handled
- **Disable Suspend Event:** Disable event processing. Emergency Suspend and Resume only events will be ignored
- **Enable Suspend Event:** Enable event processing. Emergency Suspend and Resume only events will be recognized and handled
- **Disable Weather Light Event:** Disable event processing of Light conditions coming from Weather System. Status of Light will be not used to processing the Emergency Exit and/or Emergency Suspend or Emergency Resume events (Work only if you have a weather system configured in Voyager)
- **Enable Weather Light Event:** Enable event processing of Light conditions coming from Weather System. Status of Light will be used to processing the Emergency Exit and/or Emergency Suspend or Emergency Resume events (Work only if you have a weather system configured in Voyager)

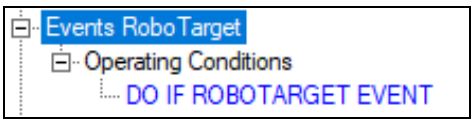
Important Note! Enable and disable Events is a really powerful features !!! Please use with complete understand that if you forget to re-enable the events your setup can be damaged from weather conditions.

Important Note! Enable and disable Light Conditions from emergency status calculation can be useful for do SkyFlat or generally other kind of tasks at dawn and dusk or for daylight operations and testing.

47.6 Events Robotarget

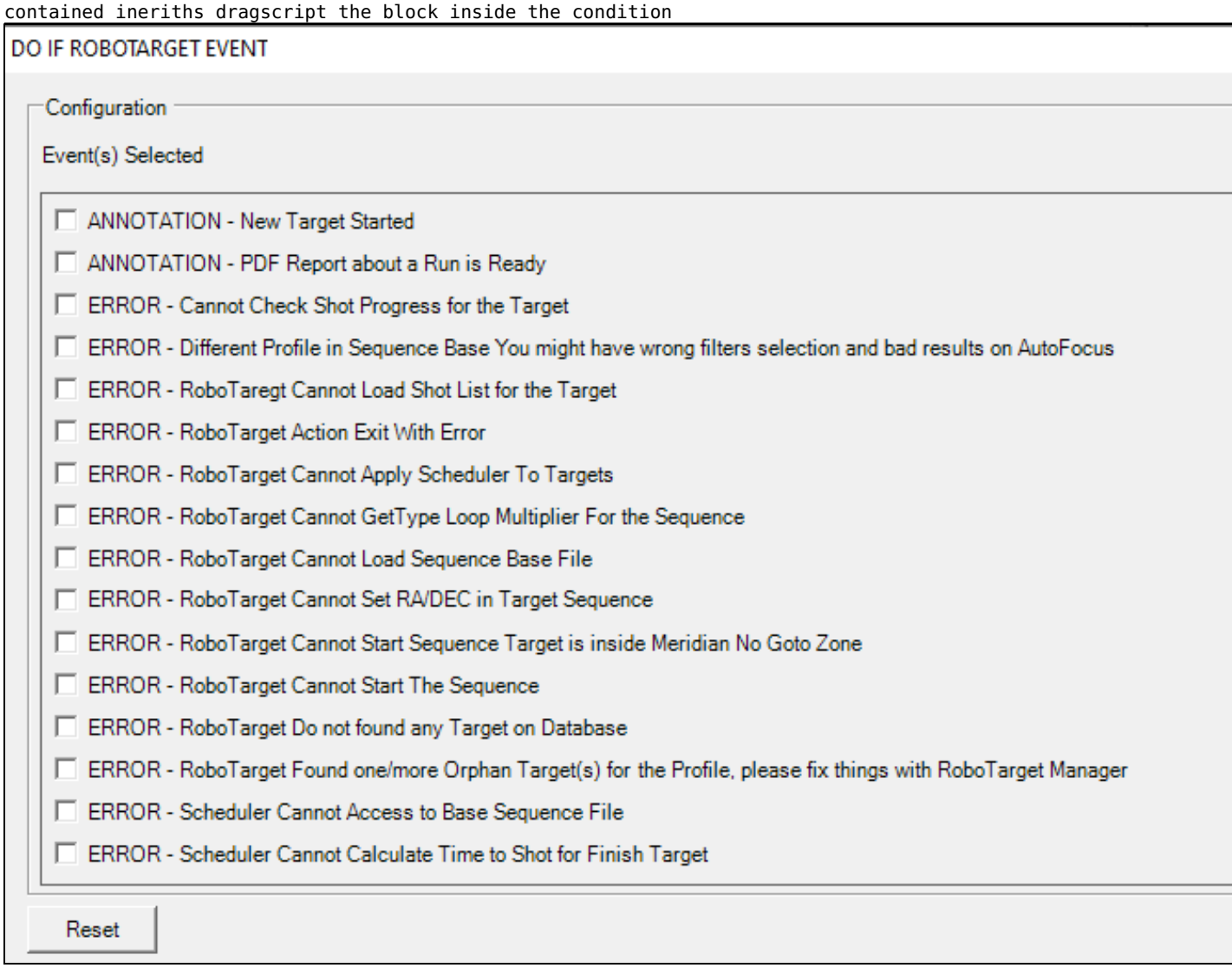
If you are running a Voyager Advanced or Full version you can intercept the thrown events generated by RoboTarget Action during. This event can be annotations or errors. Data about are saved in the environment variables of DragScript and can be used in the signal block of DragScript. What is inside the Events RoboTarget Management will executed in seld contained DragScript ineriths by the actual DragScript eliminating all except what is in the events handle you have created.

To select the event handle and create it you must use the Operating Conditions blocks.



47.6.1 Operating Conditions

There is only one operating conditions block to handle a RoboTarget Event. The DO IF ROBOTARGER EVENT. You can use one or more of this block.

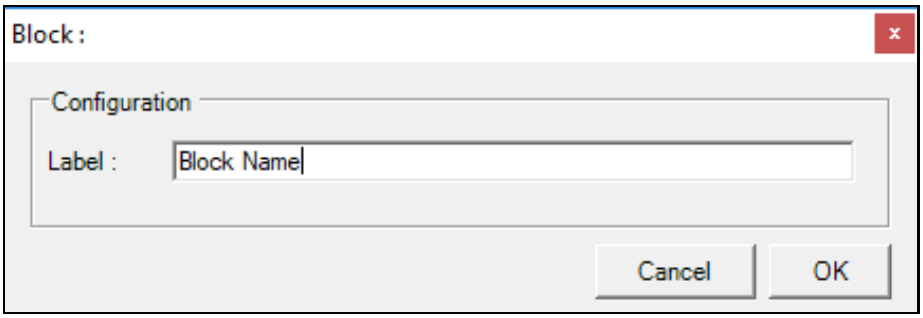
- **DO IF ROBOTARGER EVENT**: Handle one or more events related to RoboTarget Action executing in a self contained ineriths dragscript the block inside the condition
- 

- **Even(s) Selected**: select one or more RoboTarget events to handle

- **Reset**: Uncheck all the events selected and remove from handling
- **Cancel**: exit from configuration without save anything
- **OK**: Save changes and close the window

47.7 Block

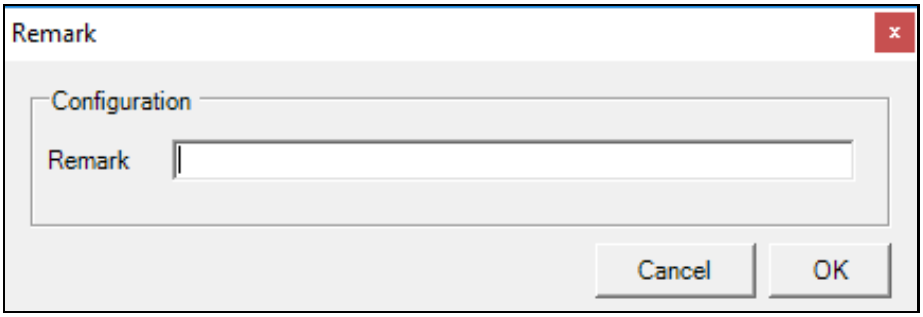
The Block element creates a new block in your DragScript. Drag and Drop it on a DragScript element that creates a new indent level, e.g. Script, DO IF, IF, Emergency Exit, Emergency Suspend, or Emergency Resume.



- **Label**: Give your block a name. This name can be referenced by other script elements such as jumps and resumes
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

47.8 Remark

The Remark element adds a non-executable comment to your script for documentation purposes



- **Remark**: Enter a comment that will appear in your script
- **OK**: Save changes and close the window
- **Cancel**: Discard changes and close the window

47.9 Flow

Flow Control are useful for changin flow of execution during DragScript

- **Exit Block:** exit the current block container and execute the first following useful instruction
  - must be used inside a BLOCK container
  - cannot be used directly under the SCRIPT default block or EVENTS default block

    - if nested inside more than one BLOCK container DragScript Engine will exit from the first BLOCK container parent
- **Restart DragScript:** The Restart DragScript element allow script to be restart from beginning, all the variable and status will be resetted

48 DragScript Examples

49 Sample DragScripts

DragScript can be used to automate your imaging from startup to shutdown.

It can also be used to automate a single exposure, or image sequences of one or more targets.

It offers great flexibility, which is powerful, but can leave you wondering where to start.

We will post some sample DragScripts here, with comments, to help "prime the pump" of ideas on how to leverage this tool.

We have opened a dedicated section in our forum dedicated to Sample Dragscripts:

https://forum.starkeeper.it/t/please-post-here-your-dragscript/1243

We welcome your contributions to expand this library for the community.

49.1 Simple DragScripts

Here are a couple of simple DragScripts to get you started.

49.1.1 Multiple Targets

Multitargeting is very easy with a simple Voyager DragScript. You don't need a huge script, just a few lines, no code to write. Just drag and drop as many Sequence actions as you need from Session node of the DragScript Editor Elements window and drop them on the Script block:

```
1   -   Start: Events At Start are ENABLE
2   -   Script
3   -           Sequence: Start 21:30:00 [hh:mm:ss] - End 01:10:00 [hh:mm:ss] - C:\Users\leonardo\Documents\Voyager\ConfigSequence\M
4   -           Sequence: Start 01:10:00 [hh:mm:ss] - End 03:45:00 [hh:mm:ss] - C:\Users\leonardo\Documents\Voyager\ConfigSequence\L
5   -           Sequence: Start 03:45:00 [hh:mm:ss] - End 05:50:00 [hh:mm:ss] - C:\Users\leonardo\Documents\Voyager\ConfigSequence\M
6   -   End
7   -   Events
```

Double click each Sequence action and set the start and end times or altitudes. Then load the script into Voyager's DragScript tab and run it.

49.1.2 Multiple Targets with Slot Time and Error Management

Now let's add slot time and error management to our Multiple Targets script.

With a couple of additions, our DragScript will retry a Sequence until a time we specify if there are any errors (e.g. Guiding fails) encountered during the running of that Sequence.

1. Drag and drop to add a Block element before each Sequence action. Give each Block a unique name - just double-click the block and type your name into the window that pops up. We use TARGET A, TARGET B and TARGET C.
2. After each Sequence action, we add a test IF OK. This tests the results of the Sequence, and executes the actions indented under that IF OK statement if the Sequence ended with OK.
3. Drag a Goto Block action onto each OK statement. Double-click the Goto Block action and set the target of the Goto to be the block label of the next block.
4. Drag a Repeat Current Block Until Time action onto each Block. Set the time to the latest time at which you want the Sequence to run.

```
1   -   Start: Events At Start are ENABLE
2   -   Script
3   -           Block: TARGET A
4   -                   Sequence: Start 21:30:00 [hh:mm:ss] - End 01:10:00 [hh:mm:ss] - C:\Users\leonardo\Documents\Voyager\ConfigSe
```

```
5   -                           IF OK
6   -                                   Goto Block: TARGET B
7   -                   Repeat Current Block Until Time: 01:10:00
8   -           Block: TARGET B
9   -                   Sequence: Start 01:10:00 [hh:mm:ss] - End 03:45:00 [hh:mm:ss] - C:\Users\leonardo\Documents\Voyager\ConfigSe
10  -                           IF OK
11  -                                   Goto Block: TARGET C
12  -                   Repeat Current Block Until Time: 03:45:00
13  -           Block: TARGET C
14  -                   Sequence: Start 03:45:00 [hh:mm:ss] - End 05:50:00 [hh:mm:ss] - C:\Users\leonardo\Documents\Voyager\ConfigSe
15  -                           IF OK
16  -                                   Goto End
17  -                   Repeat Current Block Until Time: 05:50:00
18  -   End
19  -   Events
```

Error Management is useful if you have trouble with setup or passing clouds and you don't have a weather system, or similar problems. Voyager will restart the sequence for you until the time you asked. Usually the best practice is to set the repeat until time equal to the Sequence finish time.

Other nights just change the target and timing if needed, and use Save As to save the DragScript with a new name.

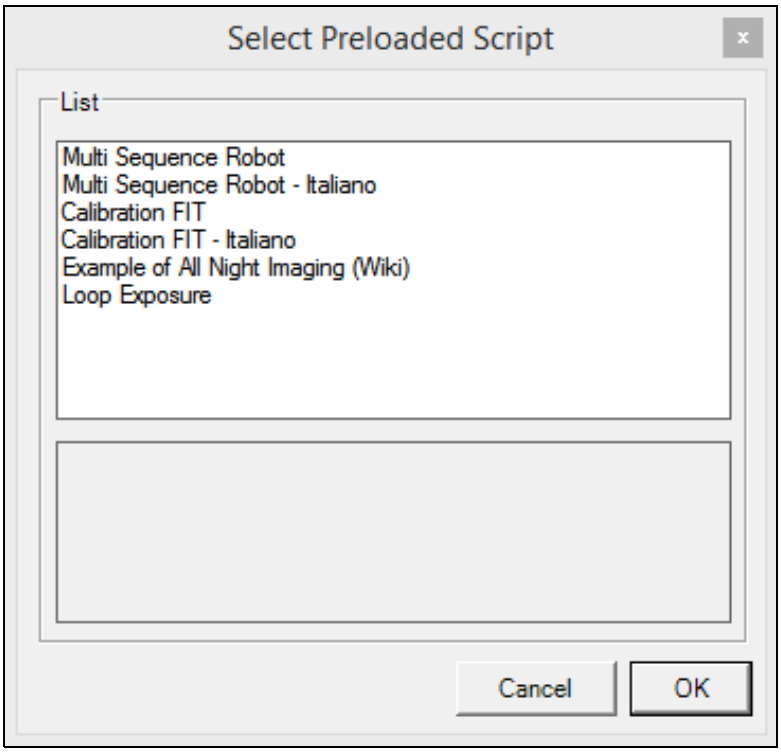
Best practice is to add your opening night and closing night blocks. You can use the precompiled ?Multi Sequence Robot? script built into the editor as a reference.

And remember, with your Voyager license you have a built-in help call with the developer to guide you in creating your first DragScripts.

49.2 Preloaded Scripts

Voyager includes two scripts that can be accessed from the command bar:

Click the icon that looks like three blocks to bring up the Select Preloaded Script menu:

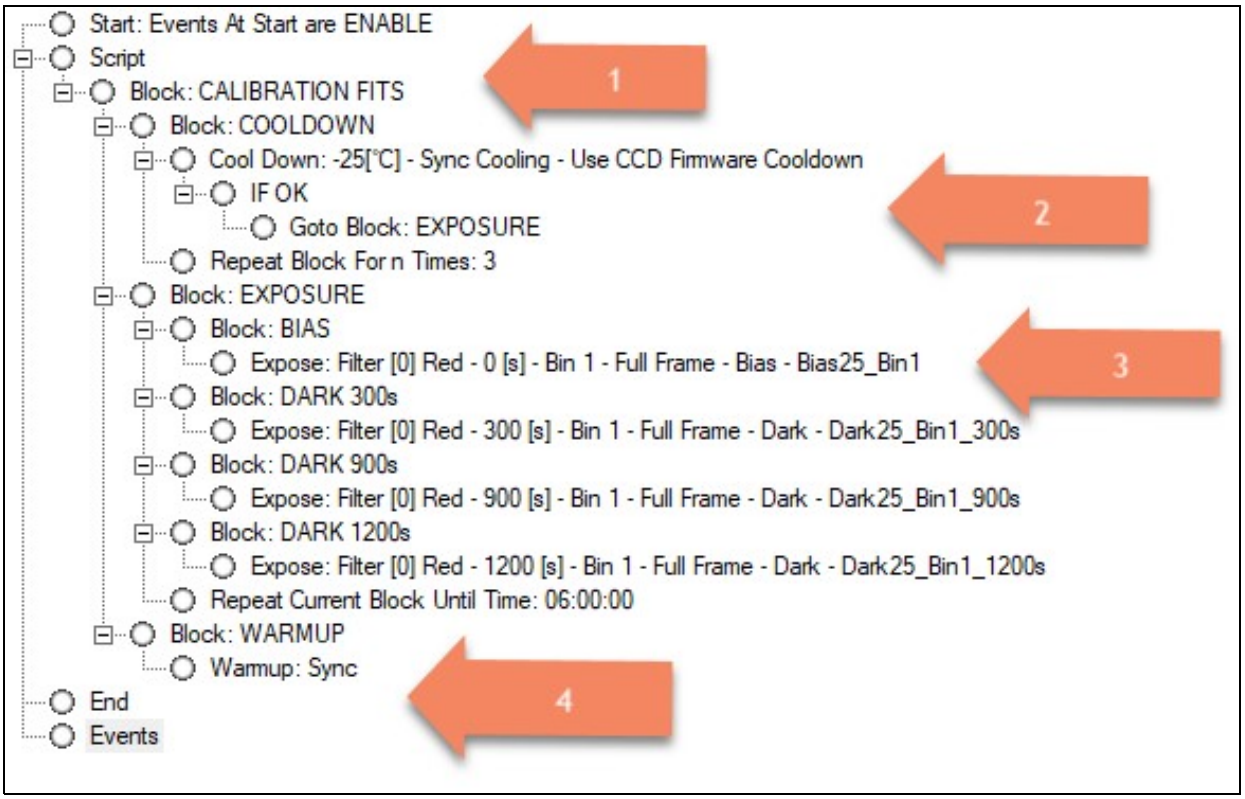


Let's first examine the Calibration FIT script, which is a short script to take calibration frames.

49.2.1 Calibration FIT

The Calibration FIT that comes preloaded with Voyager has Italian block names. You can download one with English block names here: CalibrationFIT.zip

This preloaded DragScript is an example of building a calibration library of bias frames and dark frames with three different exposure lengths, 300, 900 and 1200 seconds:



1. Every script includes a Start, Script, End and Events element. In this script, Events are enabled in the Start element. However, note that the Events element at the last line is empty. This means that even though events are enabled, they are not handled. The All Night Imaging script below includes examples of handling events. The first block inside the Script tag is labeled CALIBRATION FITS. In your example script, the names may be in Italian. You can double click the Block tag in the editor and change them to match the English ones here, or leave them as-is. Block names, like CALIBRATION FITS, can be the target of Goto and Resume statements. Control flows to the block named in those statements.
2. Blocks can be nested, as you see here. The CALIBRATION FITS block contains two inner blocks, labelled COOLDOWN and EXPOSURE. Inside the EXPOSURE block, there are four more blocks labelled BIAS, DARK 300s, DARK 900s, and DARK 1200s. The COOLDOWN block contains a Cool Down statement, which will use the camera's built-in firmware to cool the camera to -25C. It will use Sync cooling, meaning that control will not proceed from this statement until the camera reaches -25C, or an ERROR or TIMEOUT status is raised. If the Cool Down statement completes with an OK status, the Goto Block: EXPOSURE transfers control to that block. Otherwise, control flows to the Repeat Block statement, which tries the cool down again, up to three times total
3. The EXPOSURE bock is where the calibration frames are taken. Each of the four inner blocks contains one Expose statement. The information in each Expose statement tells us which filter was chosen, the exposure length in seconds, the binning level, the frame size, the frame type (Bias or Dark), and the filename The last statement in the EXPOSURE block says to Repeat Current Block Until Time 06:00:00. The line drawn upwards from the Repeat statement ties into the Block: EXPOSURE statement, so you can tell that the EXPOSURE block is the one that will be repeated. Each Expose statement takes a single frame, and the series of four exposures will be repeated until 6AM local time.
4. The last block, WARMUP, completes the script with a warm-up of the camera

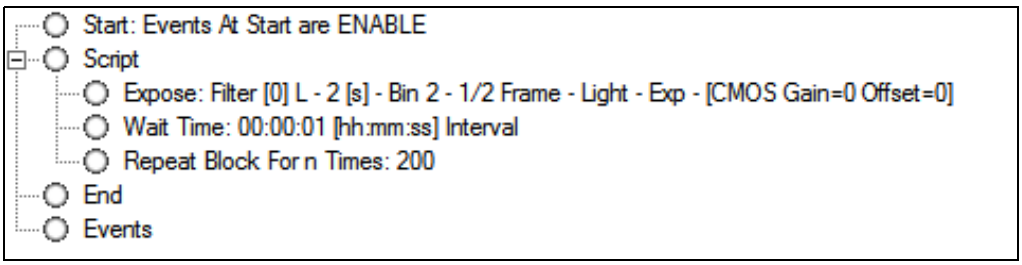
49.2.2 Loop Exposure

The Loop Exposure that comes with Voyager take a series of exposure in a loop with an interval of 1 second between each (plus time to download and save it on disk).

Coming with a default of 2s in bin2 half frame, user can modify this setting and the interval time to his needed.

Number or repeats on loop are 200, always customizable.

Used with a small framing ROI and fast mode can be useful for doing manual focus togheter with the Voyager FIT Viewer service and focuser command widget commands



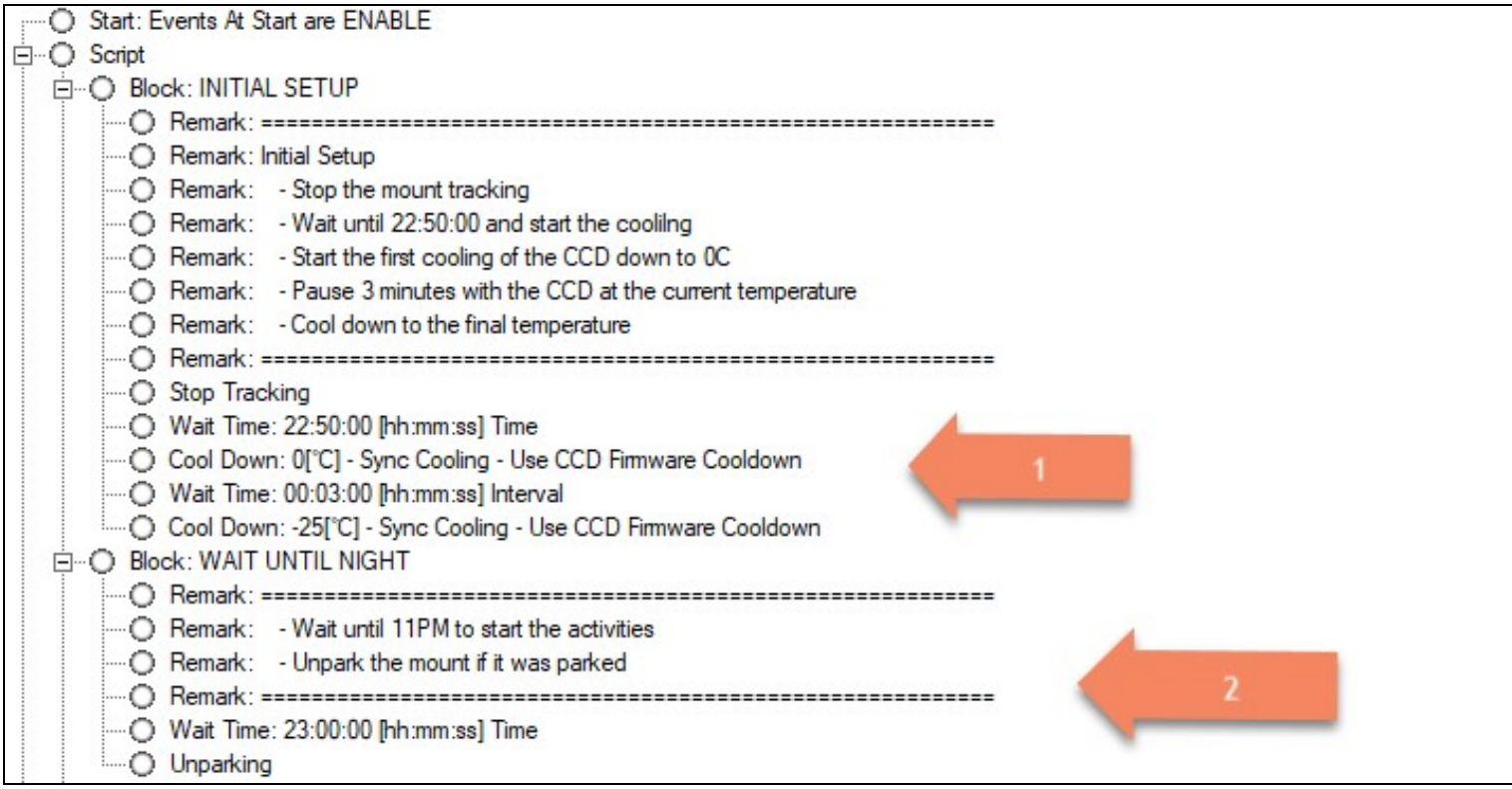
49.2.3 Multi-Sequence Robot

The second pre-loaded script that comes with Voyager is the "Multi-Sequence Robot." This is a shorter, simpler version of the "All Night Imaging" script documented below.

The version that currently ships with Voyager is commented in Italian. You can download a version with English comments here: MultiSequenceRobot.zip

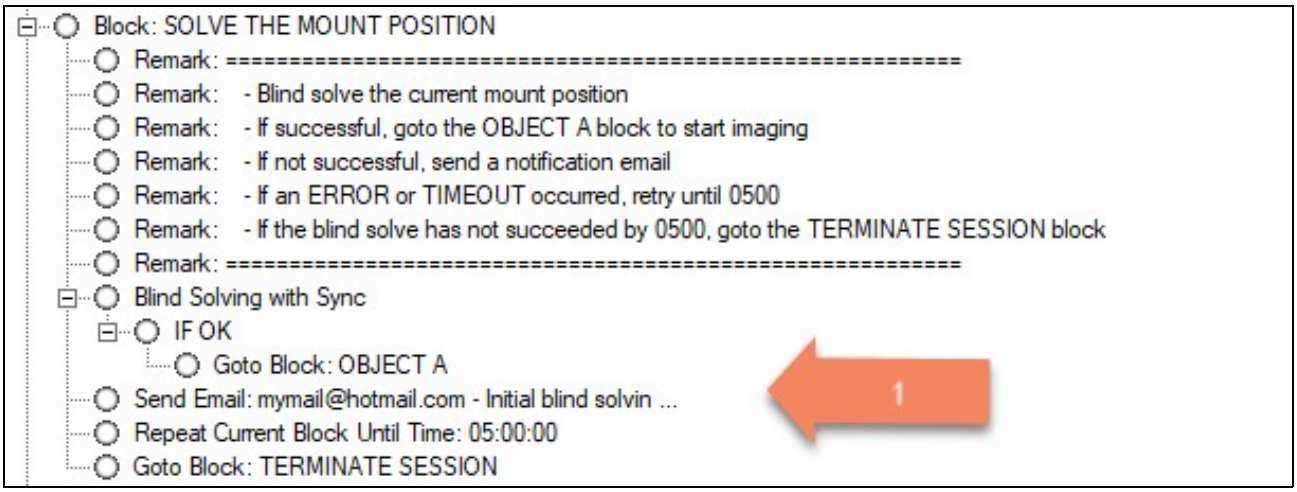
This script demonstrates waiting until astronomical night, blind solving the mount's position, running two sequences, and shutting down.

49.2.3.1 Initial Setup and Wait Until Night



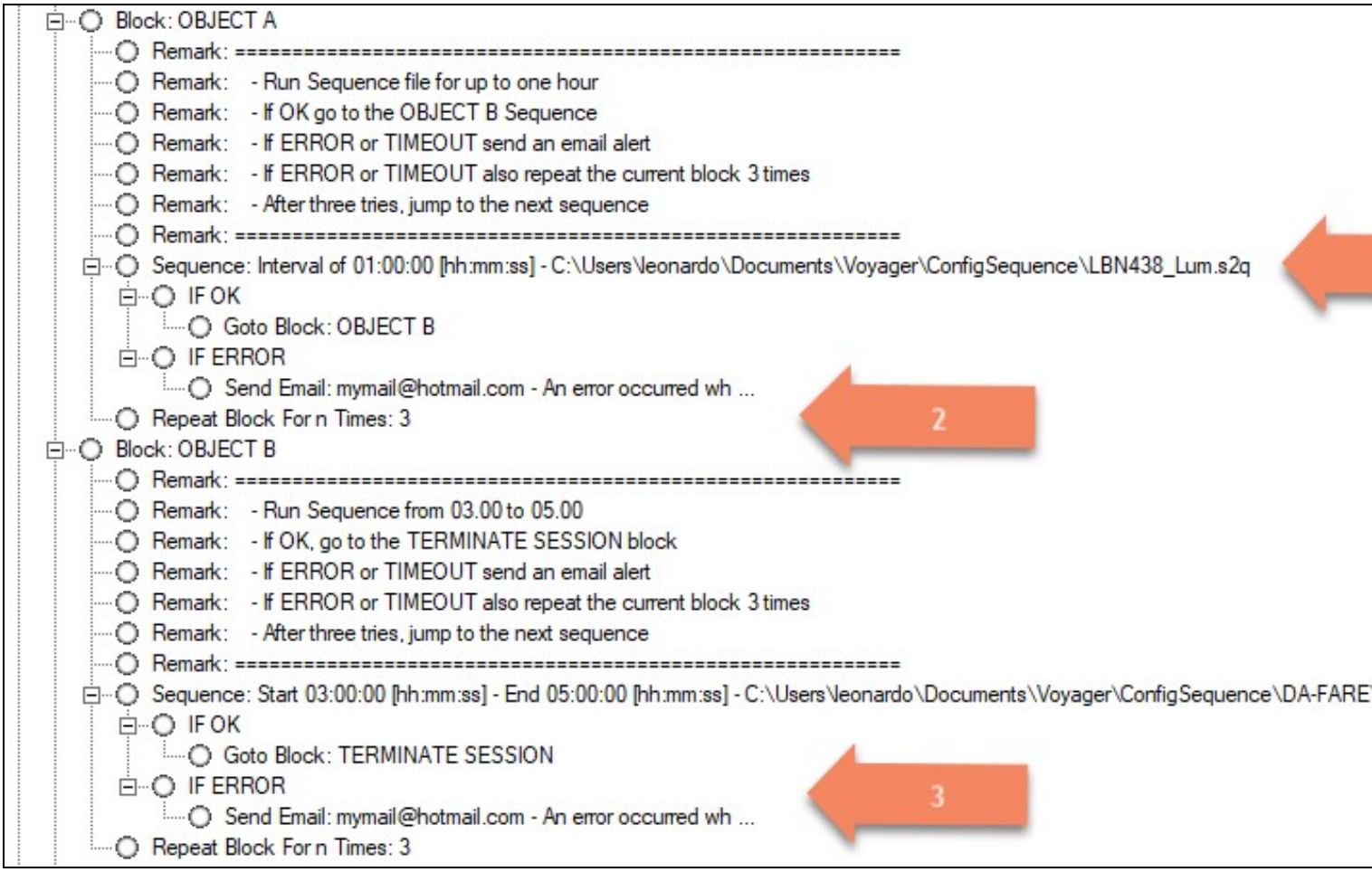
1. Stop the mount from tracking. Wait until 22:50 local time, then start cooling the CCD camera. Do the cooling in two steps - first to 0C, wait 3 minutes, and then continue cooling to -25C. The 3 minute pause is to prevent frost forming from too rapid cooling.
2. Wait until 23:00 local time and unpark the mount

49.2.3.2 Solve the Mount Position



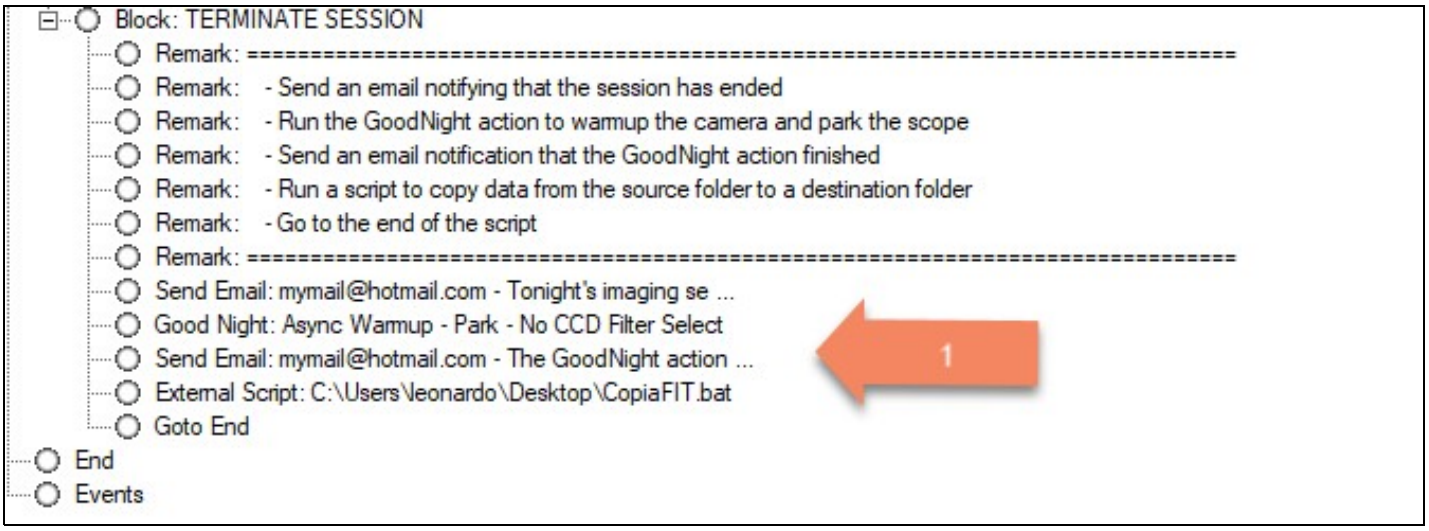
1. Perform a Blind Solve operation with Sync - if the mount has been star-aligned and not moved since that time, this should establish the initial mount position so subsequent goto's work better. If the Blind Solve is successful, jump to the OBJECT A block to begin imaging. If the Blind Solve ends with an ERROR or TIMEOUT, try again. The Repeat Current Block statement will keep trying to blind solve until 0500 local time. This could help if, e.g., it was not dark enough for a good Blind Solve, or the view was temporarily obscured by clouds. If the operation has still not succeeded at 0500, goto the Terminate Session block

49.2.3.3 Run the Imaging Sequences



1. Run the imaging sequence file LBN438_Lum.s2q. The sequence was defined and saved with the OnTheFly Sequence Configuration window. Start running the sequence immediately, and end it after one hour has elapsed. To change the start and end times and other options for running the sequence, double-click the Sequence: command in the DragScript editor and adjust the parameters, which are documented in the DragScript Actions section
2. If the sequence completes successfully, jump to the OBJECT B block to start imaging our second object. If there is an error or timeout, send an email notification and try again, up to three times. Note that since we set a one hour interval for this sequence, it could run up to three hours if the ERROR or TIMEOUT occurs near the end of the one hour interval. Use an absolute end time if you want to make sure the sequence does not run past a given time
3. The OBJECT B block follows very similar logic to OBJECT A, but with absolute start and end times of 03:00 and 05:00 specified. If this block is entered before 03:00, execution will pause until 03:00 is reached. If the block is entered after 05:00, the sequence will not be executed

49.2.3.4 Terminate Session



1. Send an email notification the the imaging session completed. Run the GoodNight action to warmup the camera and park the mount. Finally, run a script to copy the images taken in this session to a remote folder.

That's it! At a minimum, you will need to edit the Send Email actions to use your email address and SMTP server information, and edit the Sequence actions to load the sequences for the images you want to take. It's also likely that you will want to edit the start and stop times throughout the script.

Here's the full script, which you can also download here: Multi-Sequence-Robot-English.zip

- Start: Events At Start are ENABLE
- Script
  - Block: INITIAL SETUP
    - Remark: ==
    - Remark: Initial Setup
    - Remark: - Stop the mount tracking
    - Remark: - Wait until 22:50:00 and start the coolilng
    - Remark: - Start the first cooling of the CCD down to 0C
    - Remark: - Pause 3 minutes with the CCD at the current temperature
    - Remark: - Cool down to the final temperature
    - Remark: ==
    - Stop Tracking
    - Wait Time: 22:50:00 [hh:mm:ss] Time
    - Cool Down: 0[°C] - Sync Cooling - Use CCD Firmware Cooldown
    - Wait Time: 00:03:00 [hh:mm:ss] Interval
    - Cool Down: -25[°C] - Sync Cooling - Use CCD Firmware Cooldown
  - Block: WAIT UNTIL NIGHT
    - Remark: ==
    - Remark: - Wait until 11PM to start the activities
    - Remark: - Unpark the mount if it was parked
    - Remark: ==
    - Wait Time: 23:00:00 [hh:mm:ss] Time
    - Unparking
  - Block: SOLVE THE MOUNT POSITION
    - Remark: ==
    - Remark: - Blind solve the current mount position
    - Remark: - If successful, goto the OBJECT A block to start imaging
    - Remark: - If not successful, send a notification email
    - Remark: - If an ERROR or TIMEOUT occurred, retry until 0500
    - Remark: - If the blind solve has not succeeded by 0500, goto the TERMINATE SESSION block
    - Remark: ==
    - Blind Solving with Sync
      - IF OK
        - Goto Block: OBJECT A
    - Send Email: mymail@hotmail.com - Initial blind solvin ...
    - Repeat Current Block Until Time: 05:00:00
    - Goto Block: TERMINATE SESSION
  - Block: OBJECT A
    - Remark: ==
    - Remark: - Run Sequence file for up to one hour
    - Remark: - If OK go to the OBJECT B Sequence
    - Remark: - If ERROR or TIMEOUT send an email alert
    - Remark: - If ERROR or TIMEOUT also repeat the current block 3 times
    - Remark: - After three tries, jump to the next sequence
    - Remark: ==
    - Sequence: Interval of 01:00:00 [hh:mm:ss] - C:\Users\leonardo\Documents\Voyager\ConfigSequence\LBN438_Lum.s2q
      - IF OK
        - Goto Block: OBJECT B
      - IF ERROR
        - Send Email: mymail@hotmail.com - An error occurred wh ...
    - Repeat Block For n Times: 3
  - Block: OBJECT B
    - Remark: ==
    - Remark: - Run Sequence from 03.00 to 05.00
    - Remark: - If OK, go to the TERMINATE SESSION block
    - Remark: - If ERROR or TIMEOUT send an email alert
    - Remark: - If ERROR or TIMEOUT also repeat the current block 3 times
    - Remark: - After three tries, jump to the next sequence
    - Remark: ==
    - Sequence: Start 03:00:00 [hh:mm:ss] - End 05:00:00 [hh:mm:ss] - C:\Users\leonardo\Documents\Voyager\ConfigSequence\DA-FARE

49.3 All Night Imaging

This DragScript is rather extensive and designed to automate your imaging from startup to shutdown, including running from one to seven image-taking sequences.

Emergency Suspend, Resume and Exit events are handled. It is assumed that a weather monitoring device is attached and Weather Setup has been filled out.

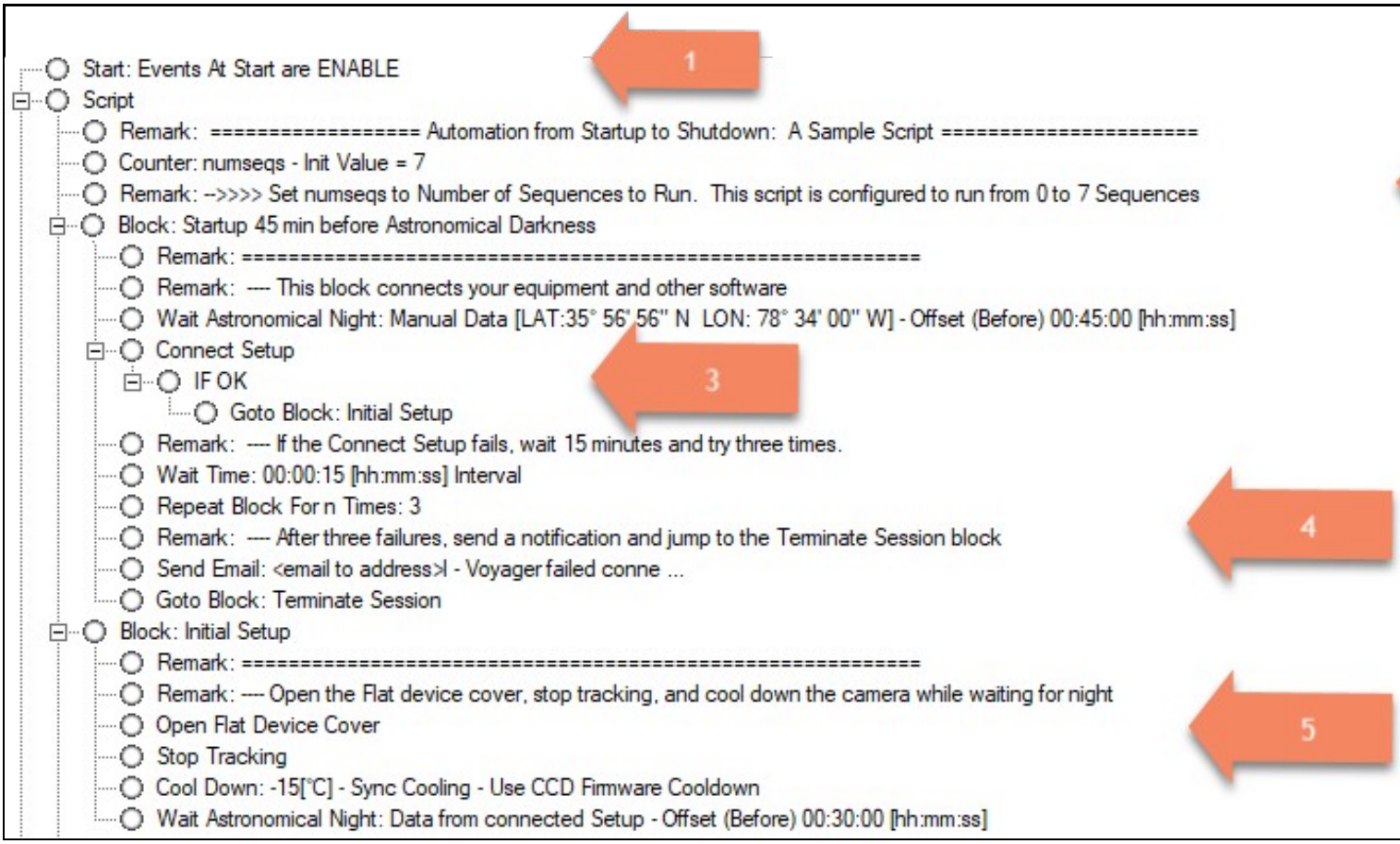
Signals from the weather monitoring device trigger the Emergency Events. The Weather Setup window gives complete control over which weather conditions cause which events.

You could also just build a script using the parts of this script that are relevant to your situation and goals.

You can download the sample script here and edit it to suit your purposes: StartToShutDown.zip

We will look at the script in sections as it is rather long, primarily because we have seven nearly identical sections to run up to seven sequences in a single night

49.3.1 Connect Setup and Cool the Camera



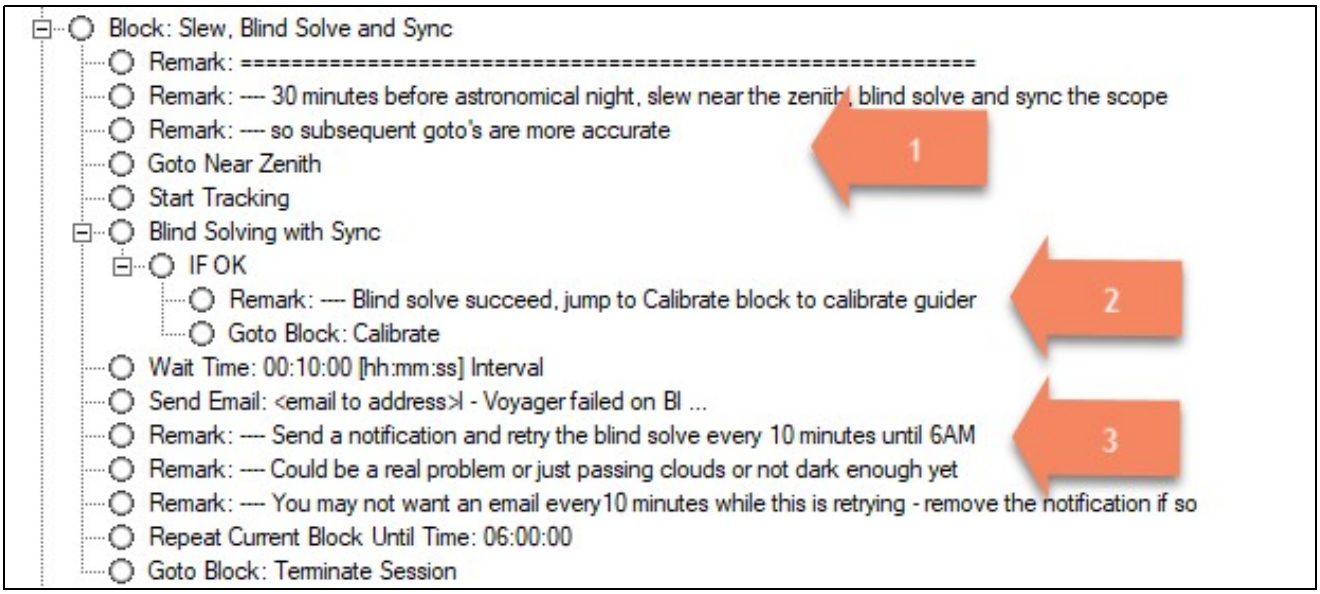
1. At the start of the script we make sure Emergency Events are enabled
2. We use a Counter variable to control how many of the seven sequence blocks defined in this script will execute. Edit the Counter block to the number of sequences you want to run with this DragScript.
3. Wait until 45 minutes before Astronomical Night and then connect the setup. If the connect action was OK, jump to the Initial Setup block. If it failed or timed out, fall through to the Wait Time 00:00:15

action. Wait 15 seconds and then try to connect again.
4. If this fails three times, send an email notification and jump to the Terminate Session block
5. The Initial Setup block has actions to open our Flip Flat device, which covers the scope when it is closed, stop tracking to make sure we don't track into a pier crash, and cool down the camera's sensor to -15C. Then wait until 30 minutes before Astronomical Night to proceed to the next block

Important Note! The Wait for Astronomical Night actions require either your latitude and longitude to be entered or your setup to be connected if you get this information from your mount. Otherwise an error will occur when Voyager tries to calculate the exact time of astronomical night.

Important Note! The Send Email notifications throughout this script must be edited once to include your email address and SMTP server login information. If you download the script, you must do this or notifications will fail

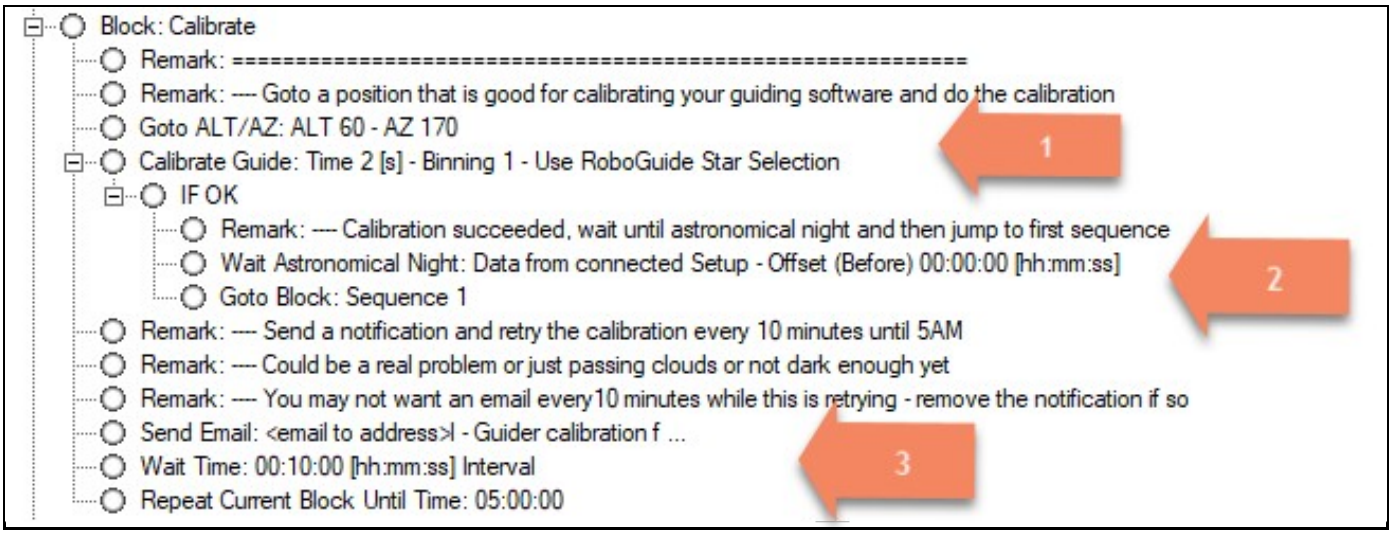
49.3.2 Blind Solve and Sync



1. Slew the mount to position overhead with a Goto Near Zenith action. Start the mount tracking and perform a Blind Solve with Sync action.
2. If OK, jump to the next block where we calibrate the guider. If not, wait 10 minutes and try again.
3. Keep trying all night. This example sends a notification every time this fails, which would be a lot of notifications if it went on for hours, so you may choose a different strategy here such as leaving out the notification or giving up sooner. If we are still trying at 6AM, give up and jump to the Terminate Session block.

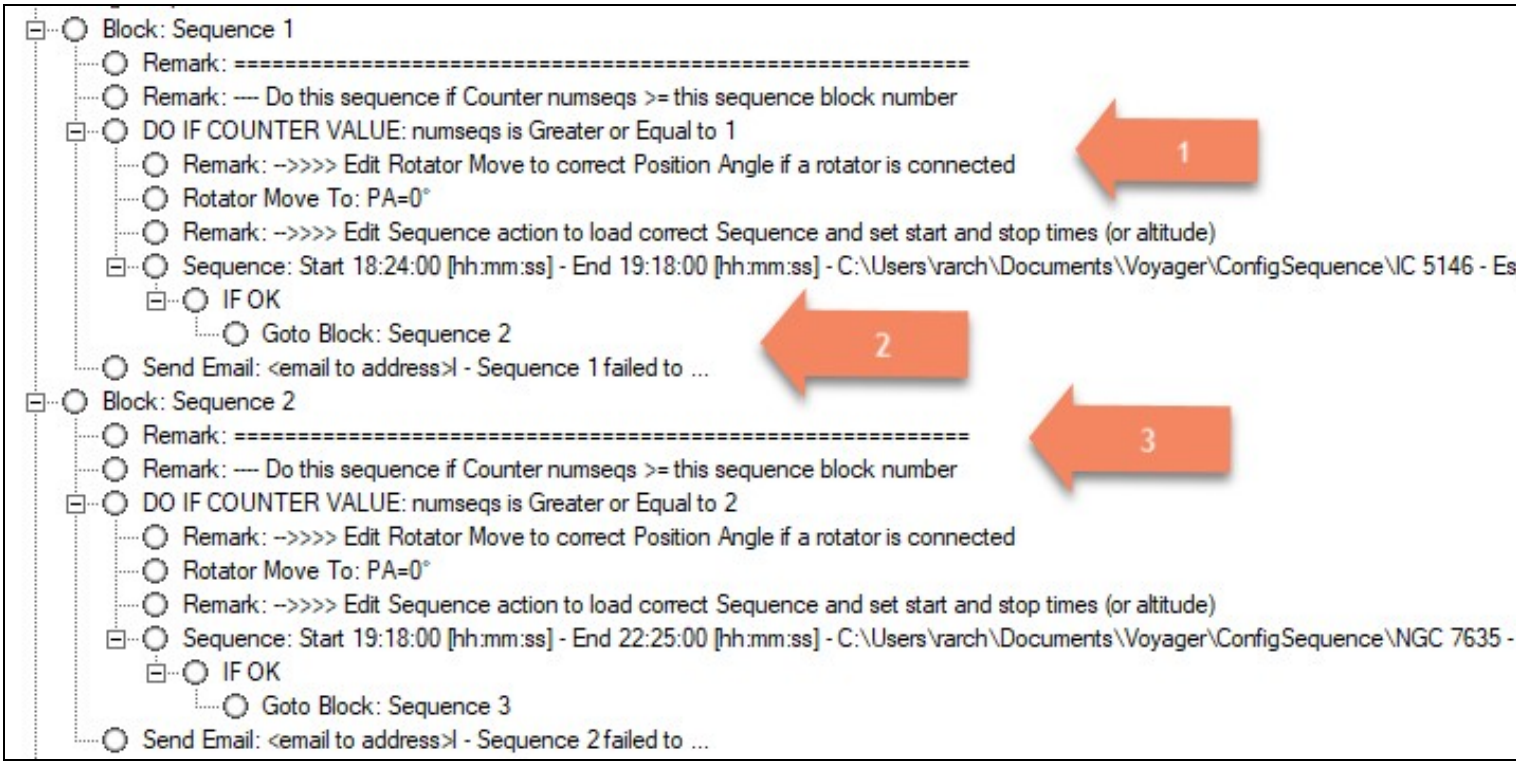
Important Note! The Goto Near Zenith command works if the mount is aligned. If you are travelling and your mount is not yet aligned, you may need to do a manual alignment following your mount's instructions and then do the Goto Near Zenith and Blind Solve and Sync from the OnTheFly workspace

49.3.3 Calibrate Guider



1. Slew the mount to an appropriate position for your guiding software to calibrate the guider. For my latitude, this is East of the meridian and at 60 degrees. Command the guider to do the calibration
2. If the calibration suceeded (IF OK), wait until Astronomical Night and then jump to the block that runs the first sequence, Sequence 1
3. If the calibration failed, wait 10 minutes and try again. Keep trying until 5AM. This example sends a notification every time the calibration fails, which would be a lot of emails if it ran all night. You may choose a different notification strategy, or give up sooner and jump to the Terminate Session block after a shorter time

49.3.4 Run a Sequence

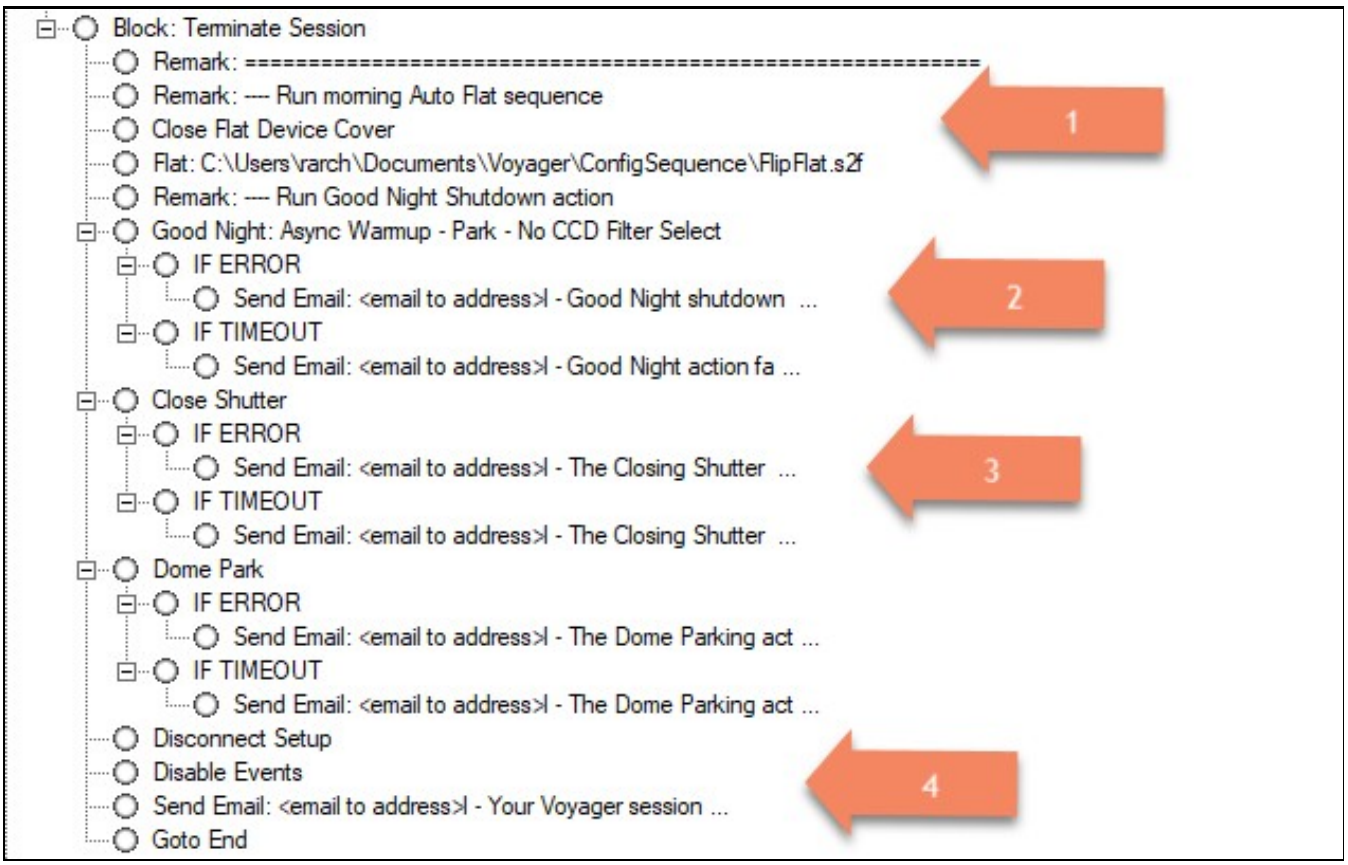


1. Check the counter variable "numseqs" we set at the start of the script, which determines how many of the sequence blocks are run. If numseqs >= the number of this sequence block, proceed. We have a rotator so the first command rotates to the specified position angle for this sequence. This rotation will probably be done inside the sequence at some point in the future. You should edit the Rotator Move To command for

each sequence before running the script
2. Execute the sequence. If the actual time is >= the start time or <= the end time, run the sequence. You should edit the Sequence command to specify the correct sequence file and start and end times before running the script
3. When the sequence finishes, if it returned OK, jump to the next sequence block. Reaching the end time results in an "OK" status. If there was an error or timeout, send a notification and then continue to the next block to try the next sequence

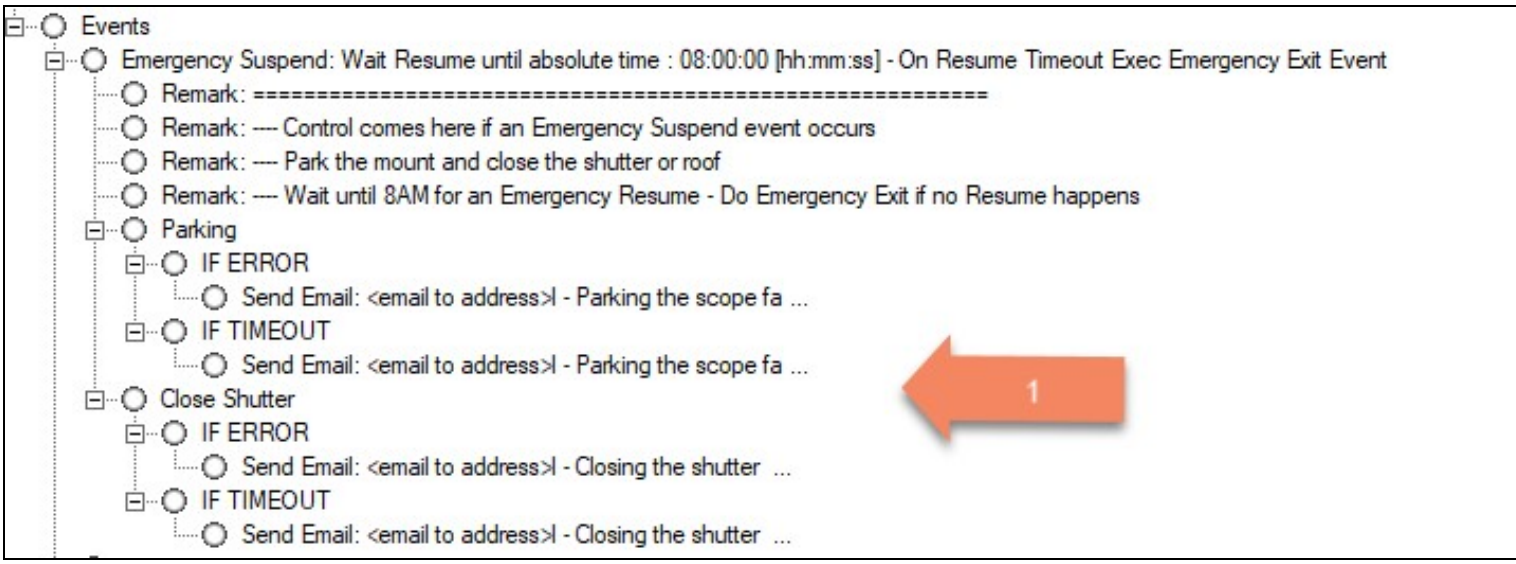
This same series of events and tests is repeated in this script for seven sequence blocks. I chose seven because that's typically the most targets I image in a night. You can adjust the script to have more or less to suit your own requirements.

49.3.5 Terminate Session



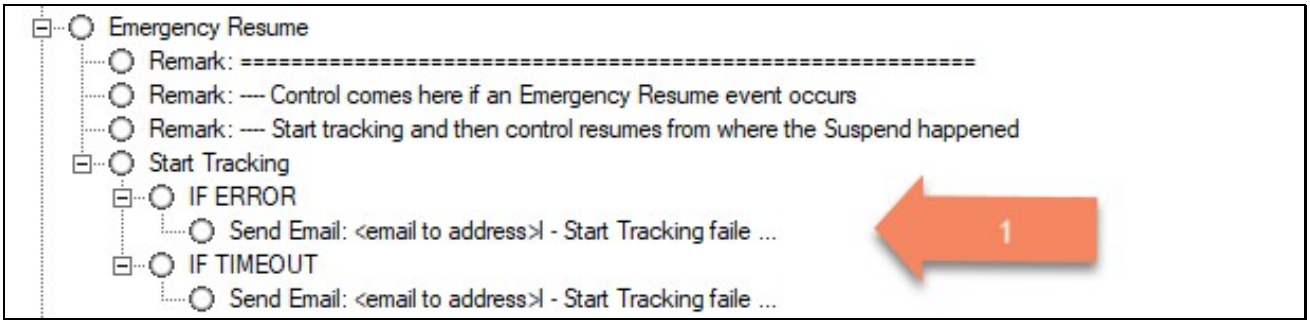
1. Close the flip-flat and run the dawn flat taking sequence
2. Run the Good Night action to park the scope and warm the camera. Send a notification if it fails
3. Close the shutter or roof and park the dome. Send a notification if either one fails
4. Disconnect the equipment, disable events, and send a notification that our session completed successfully. Hooray!

49.3.6 Emergency Suspend



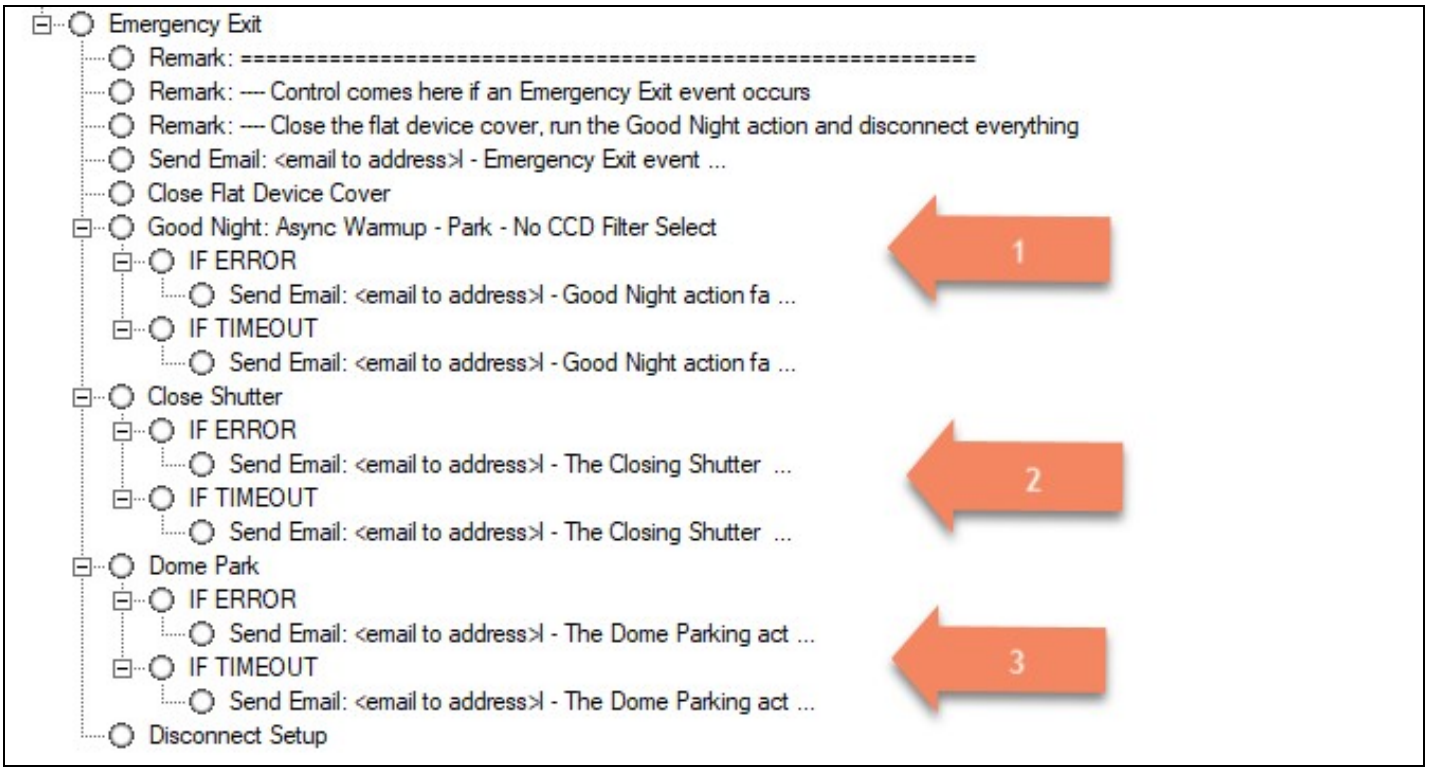
1. Control comes here when an Emergency Suspend event occurs. Park the scope and close the shutter / roof. If either action results in an error or timeout, send a notification. If you don't have an observatory, and a suspend operation is not a threat to your equipment (e.g. light cloudiness), you may decide to just stop tracking here and wait. Note

49.3.7 Emergency Resume



1. Control comes here when an Emergency Resume event occurs. Start tracking again and then the DragScript engine will automatically jump to the spot that was executing when the Emergency Suspend event happened. For example, if a sequence was running, control will return to that sequence. If the end time of that sequence has passed since the Emergency Suspend event, execution of the sequence completes with an OK status and the next action in the DragScript is executed
2.

49.3.8 Emergency Exit



1. Send a notification that we are executing an Emergency Exit event as this could be a serious issue so we want to make sure the notification goes out first. Close the flip-flat to cover the scope and run the Good NIght action to park the scope and warm up the camera
2. Close the shutter or roof. If the close action fails, send a notification
3. Park the dome and send a notification if the parking fails. Disconnect the equipment and software. The script implicitly ends after the last action in an Emergency Exit, you cannot do a jump to some other line of the script

49.3.9 Full Script

For reference, here is the full script, which you can download from: StartToShutdown.zip

- Start: Events At Start are ENABLE
- Script
  - Remark: ================== Automation from Startup to Shutdown: A Sample Script ======================
  - Counter: numseqs - Init Value = 7
  - Remark: -->>>> Set numseqs to Number of Sequences to Run. This script is configured to run from 0 to 7 Sequences
  - Block: Startup 30 min before Astronomical Darkness
    - Remark: ==
    - Remark: ---- This block connects your equipment and other software
    - Wait Astronomical Night: Data from connected Setup - Offset (Before) 00:45:00 [hh:mm:ss]
    - Connect Setup
      - IF OK
        - Goto Block: Initial Setup
    - Remark: ---- If the Connect Setup fails, wait 15 minutes and try three times.
    - Wait Time: 00:00:15 [hh:mm:ss] Interval
    - Repeat Block For n Times: 3
    - Remark: ---- After three failures, send a notification and jump to the Terminate Session block
    - Send Email: <email to address>I - Voyager failed conne ...
    - Goto Block: Terminate Session
  - Block: Initial Setup
    - Remark: ==
    - Remark: ---- Open the Flat device cover, stop tracking, and cool down the camera while waiting for night
    - Open Flat Device Cover
    - Stop Tracking
    - Cool Down: -15[°C] - Sync Cooling - Use CCD Firmware Cooldown
    - Wait Astronomical Night: Data from connected Setup - Offset (Before) 00:30:00 [hh:mm:ss]
  - Block: Slew, Blind Solve and Sync
    - Remark: ==
    - Remark: ---- 30 minutes before astronomical night, slew near the zenith, blind solve and sync the scope
    - Remark: ---- so subsequent goto's are more accurate
    - Goto Near Zenith
    - Start Tracking
    - Blind Solving with Sync
      - IF OK
        - Remark: ---- Blind solve succeed, jump to Calibrate block to calibrate guider
        - Goto Block: Calibrate
    - Wait Time: 00:10:00 [hh:mm:ss] Interval
    - Send Email: <email to address>I - Voyager failed on Bl ...
    - Remark: ---- Send a notification and retry the blind solve every 10 minutes until 6AM
    - Remark: ---- Could be a real problem or just passing clouds or not dark enough yet
    - Remark: ---- You may not want an email every10 minutes while this is retrying - remove the notification if so
    - Repeat Current Block Until Time: 06:00:00
    - Goto Block: Terminate Session
  - Block: Calibrate
    - Remark: ==
    - Remark: ---- Goto a position that is good for calibrating your guiding software and do the calibration
    - Goto ALT/AZ: ALT 60 - AZ 170
    - Calibrate Guide: Time 2 [s] - Binning 1 - Use RoboGuide Star Selection
      - IF OK
        - Remark: ---- Calibration succeeded, wait until astronomical night and then jump to first sequence
        - Wait Astronomical Night: Data from connected Setup - Offset (Before) 00:00:00 [hh:mm:ss]
        - Goto Block: Sequence 1
    - Remark: ---- Send a notification and retry the calibration every 10 minutes until 5AM
    - Remark: ---- Could be a real problem or just passing clouds or not dark enough yet
    - Remark: ---- You may not want an email every10 minutes while this is retrying - remove the notification if so
    - Send Email: <email to address>I - Guider calibration f ...
    - Wait Time: 00:10:00 [hh:mm:ss] Interval
    - Repeat Current Block Until Time: 05:00:00
  - Block: Sequence 1
    - Remark: ==
    - Remark: ---- Do this sequence if Counter numseqs >= this sequence block number

49.4 Perpetual Script H24/7Days

This DragScript is rather extensive and designed to automate your Observatory day after day, you will need only to manage the Sequences to run.

Emergency Suspend, Resume and Exit events are handled. It is assumed that a weather monitoring device is attached and Weather Setup has been filled out.

Signals from the weather monitoring device trigger the Emergency Events. The Weather Setup window gives complete control over which weather conditions cause which events.

You could also just build a script using the parts of this script that are relevant to your situation and goals.

A Wait Safe is called to wait for night and safe conditions, after an atomic operation to prepare observatory to run, events will be enabled and the sequence started.

At finish of night there is also a call to skyflat sna if all work fine a restart from begin of the dragscript will return to wait safe for the next coming night.

A call to VIking for I/O cards are used to check mount/parking/roof status.

Customize the script in the way that match your observatory HW/SW.

You can download the sample script here and edit it to suit your purposes: PerpetualScript.zip

50 Introduction to RoboClip

50.1 What is RoboClip

RoboClip is a facility manager for import, editing, storage, retrieve and sharing of data related to the user targets.

Targets Data are made of RA J2000,DEC J2000,Target Name, Position Angle, Group and Note memo text. All the field are completly editable from users.

You can store inside RoboClip all the targets you want getting coord data and name optionally from Internet, connected planetarium or from Sesame online research tool (governative online database structures) or just simpy editing it by hand.

This data will be stored in a database placed in the Documents/Voyager/Data folder and will not be affected by new Voyager installations or upgrade.

So you can create your personal catalog of interest targets to shot during your activities directly in Voyager without passing for a planetarium and/or without having one.

Form release 2.2.6 of Voyager and 1.0.12 of Web Dashboard is now possible to create modify and use a powerful mosaic tool.

A video about RoboClip:

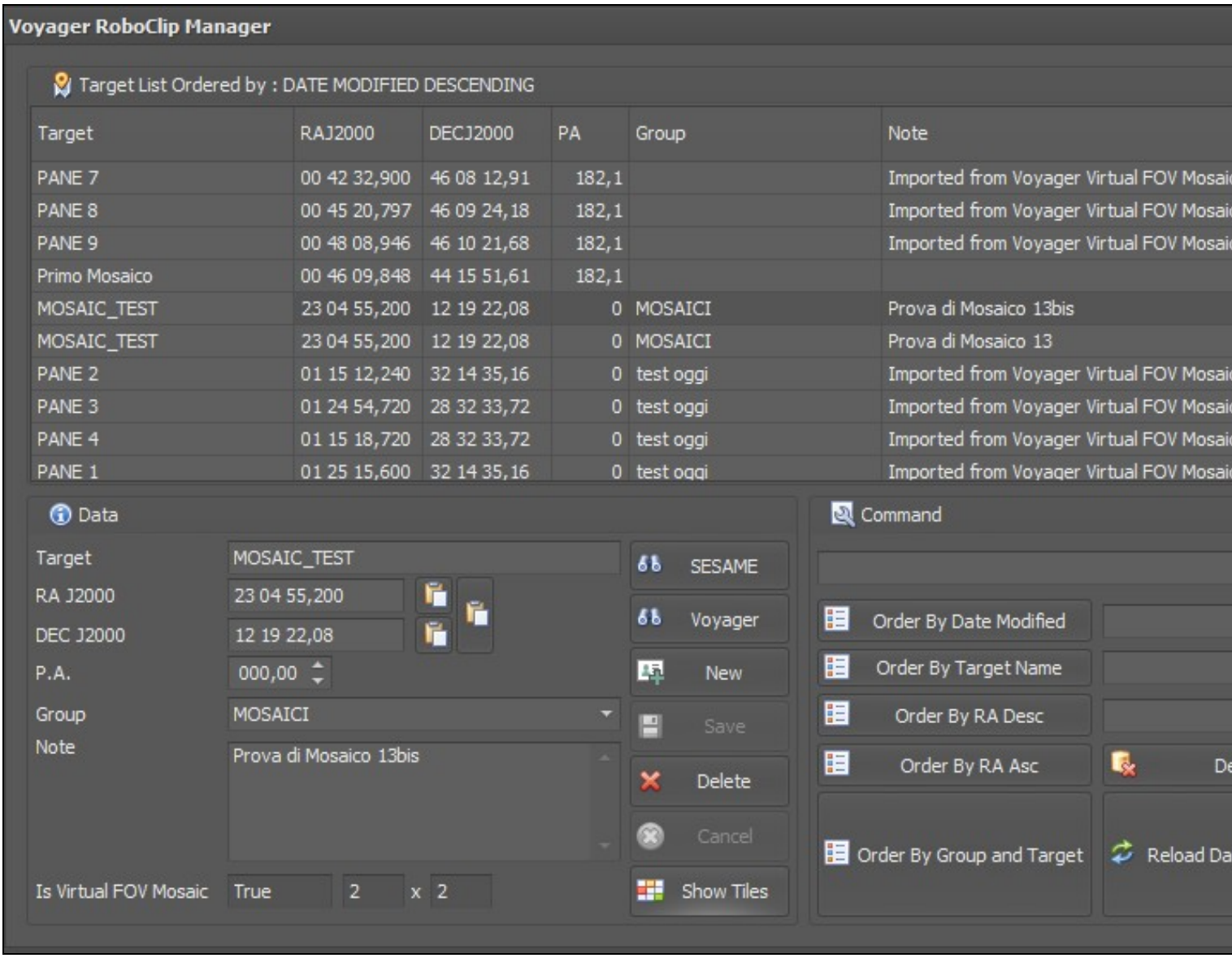
https://vimeo.com/381202609

50.2 How to use RoboClip

You can use RoboClip from whatever place in Voyager modules and applications you will found a button with caption "RoboClip".

Clicking on this button you will open the same windows manager with the same format and the same information shared from the central database also if you are connected in Application Server (RoboTarget or DashBoard environments). You can use in all Voyager Section of Voyager having needed to input a coords, in Sequence editor, in DragScript blocks.

Also data can be imported from Website like [https://telescopius.com/] (CSV or clipboard object list or panels mosaic) or from external Application like Cartes du Ciel , TheSkyX, Astroplanner with a massive import of targets just in a simple click.



50.3 Why use RoboClip

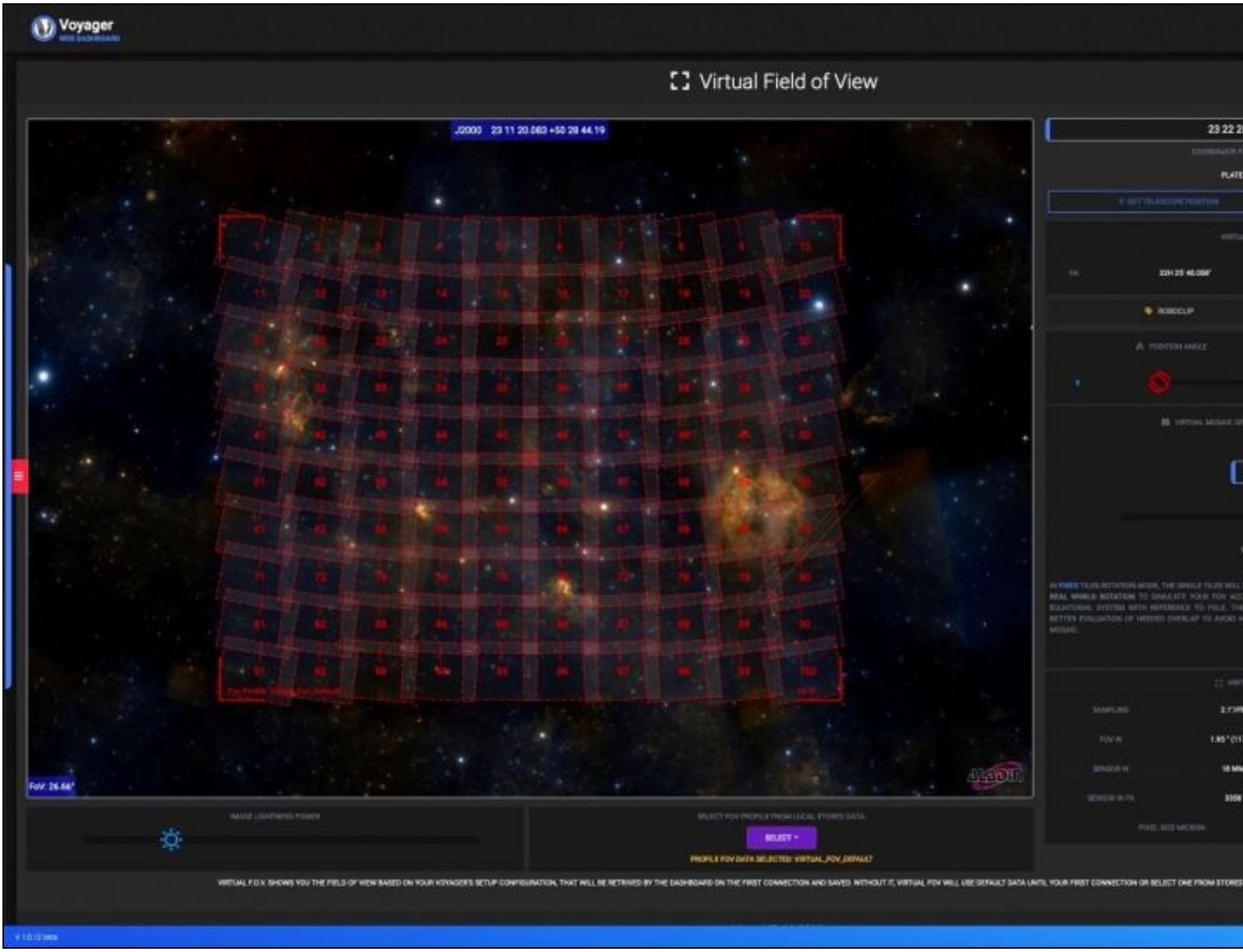
Because you can share data across Voyager world , fast and in safety. You can create personalized targets pointing to optimize framing.

You can put a text note to remember useful info about the target. You can cross platform creating your own targets catalog.

50.4 Integration with Virtual FOV Mosaic (Web Dashboard)

Starting from version 2.2.6 of Voyager , RoboClip can be integrated with the mosaic realized with the Virtual FOV using the Web Dashboard, you can create a mosaic in Virtual FOV and save the mosaic for using in sequence/dragscript or to modify in a second time

Example of mosaic realized with Virtual FOV using the Web Dashboard:



[[Category:All]]

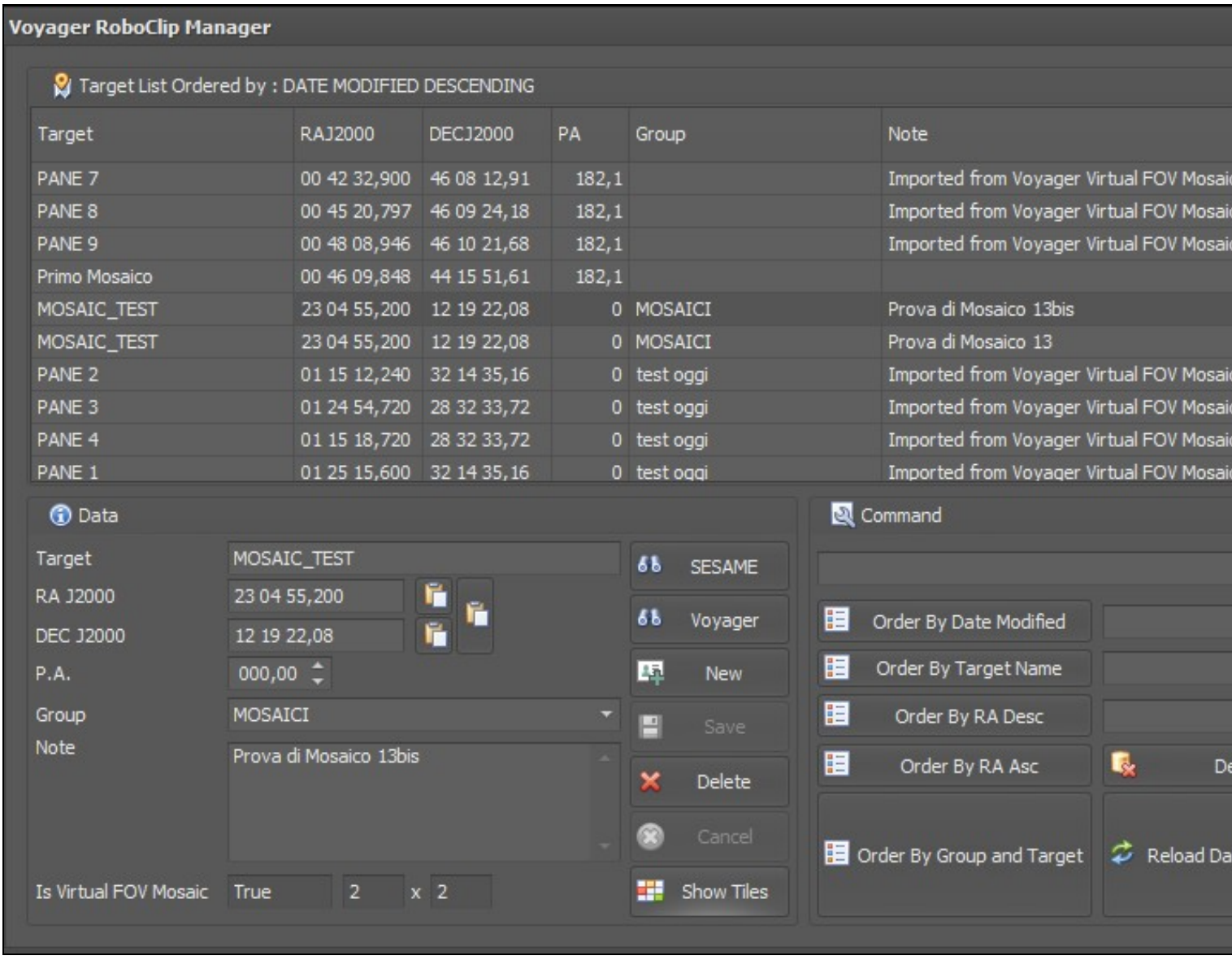
51 Manager Window

51.1 Where to access to RoboClip

You can access to RoboClip manager window from:

- Voyager Main Window Icon on top
- Voyager Main Menù , page Tools and Editors
- OntheFly section with RoboClip button
- Sequence Editor with RoboClip button
- Research and Survey Edito with RoboClip button
- DragScript Editor in blocks allowed to choose coordinates RA and DEC with RoboClip button
- RoboTarget manager with RoboClip button

The manager window will be the same for each access point used:



Windows manager are organized in 3 different parts:

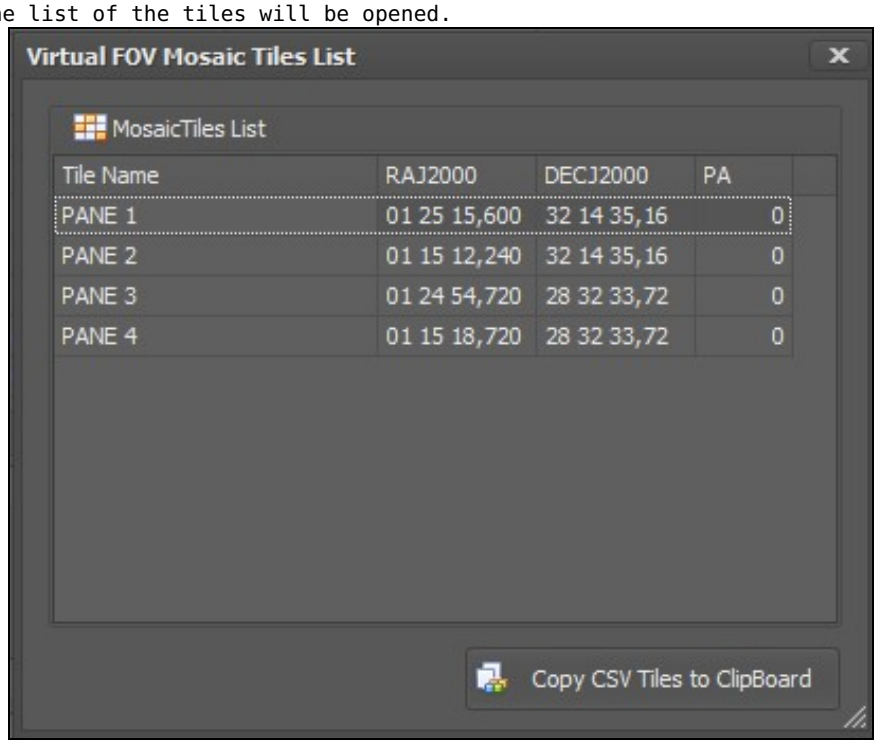
1. Target List
2. Data
3. Command

51.2 Target List

This area show the list of all targets saved in RoboClip Database, default order is last created or importe on top. Actual order is reported on the area caption

51.3 Data

This area allow user to add new target and delete or modify the one selected

- **Target** : name to assign to target
- **RA J2000**: coordinate of RA in J2000 in text format HH MM SS.SSS
- **DEC J2000**: coordiante of DEC in J2000 in text format DD MM SS.SS
- **P.A.** : position angle to apply to FOV targeting (degree format 0-360°)
- **Group** : text of group to assign to target, targets with the same text in group can be fitlered togheter
- **Note** : free memo text note user like
- **Is Virtual FOV Mosaic** : True if the Target ia mosaic reaiza with Virtual FOV, if true also will be reported the dimension in columns and rows
- **Sesame** : search using http://cds.u-strasbg.fr/cgi-bin/Sesame
- **Voyager** : search using planetarium configured in Voyager (planetarium must be connected in Voyager to obtain data)
- **New** : prepare data area to add new target
- **Save** : save the data area (new or modify target)
- **Delete** : delete the selected target
- **Cancel** : resume the data in database and remove field modified and not saved
- **Show Tiles** : if the Target is a mosaic realized with Virtual FOV , pressing this button a new window with the list of the tiles will be opened.
    - 

    - **Tile Name** : name of the tile
    - **RAJ2000** : RA coord of the center of the Tile

- **DECJ2000** : DEC coord of the center of the Tile
- **PA** : Position Angle of the Tile
- **Copy CSV Tiles to ClipBoard** : copy the list of the tiles in CSV format to ClipBoard, can be imported in RoboClip using dedicated import

The 3 button near the RA and DEC field allow to paste data inside this fields, you can copy single RA or DEC from web or another application or in another place of Voyager where a copy button is ready to use and paste in the RA and DEC field of the Data area. Also you can copy RA and DEC togheter like in https://telescopius.com/ website and paste in just one click

51.4 Command

List of commands available in RoboClip Command Area:

- **Import** : you can import data from CSV file format or Clipboard data in one click, also a massive import of Targets. Possible source at current version of RoboClip are:
  - Voyager Research and Survey CSV file log.csv
  - Telescopius.com Deep Sky Object / Observing List CSV file
  - Telescopius.com Single/Mosaic CSV Panels from Clipboard
  - TheSkyX Mosaic Grid from Clipboard
  - Cartes du Ciel Mosaic File Format
  - Astroplanner to Voyager Allan's Format CSV file example.csv
  - Voyager Virtual FOV Mosaic CSV from Clipboard
- **Filter♦Target** : filter data by target name (or part of target name) written in text field
- **Filter Group**: filter data by Group name (or part of Group name) written in text field
- **Filter Note** : filter data by Note text (or part of Note text) written in text field
- **Order by Date Modified** : order data in target list by Data modified descendent
- **Order by Target Name**: order data by target name
- **Order by RA Desc**: order data by RA descendent
- **Order by RA Asc**: order data by RA ascendent
- **Order by Group and Target** : order data by group name and target name
- **Delete ALL** : **remove all targets from database**
- **Reload Data / Reset Filters** : remove data filters and reload all data from database
- **Use Selected Target** : send back to the original call point the RA/DEC and target name info selected in the target list (same thing happen if user double click on a row in the target list

[[Category:All]]

52 Quick Start

52.1 Quick Start Video

There is a video covering the material in this tutorial on the Voyager Astro Imaging YouTube channel:

52.2 Quick Start

In this tutorial we will walk through the steps to:

1. Setup a minimal Voyager Profile (configure your equipment) using ASCOM simulators
2. Select a target to image
3. Define a sequence to take a series of exposures
4. Run the sequence to take the exposures

We will use the ASCOM simulators so everyone can do this tutorial. You can substitute your actual equipment, but you will find it helpful to create a simulator profile that matches your real equipment, so we recommend doing that first.

Many Voyager actions depend on having a connected profile. With a simulator profile that matches your gear, you can create and test sequences and scripts without connecting to your actual equipment.

After completing this exercise with the simulator profile, you can create a profile based on your real equipment and the image-taking sequence you create here should work with your real gear.

52.3 Prerequisites

You should have the following software installed before starting this tutorial:

- Voyager: Follow the Installation instructions. You can do this tutorial with the Demo, Trial or Basic versions of Voyager.
- ASCOM: ASCOM Platform 6.x https://ascom-standards.org
    - The ASCOM platform comes with the simulators needed for this Quick Start exercise

52.4 Configure a Simulator Profile

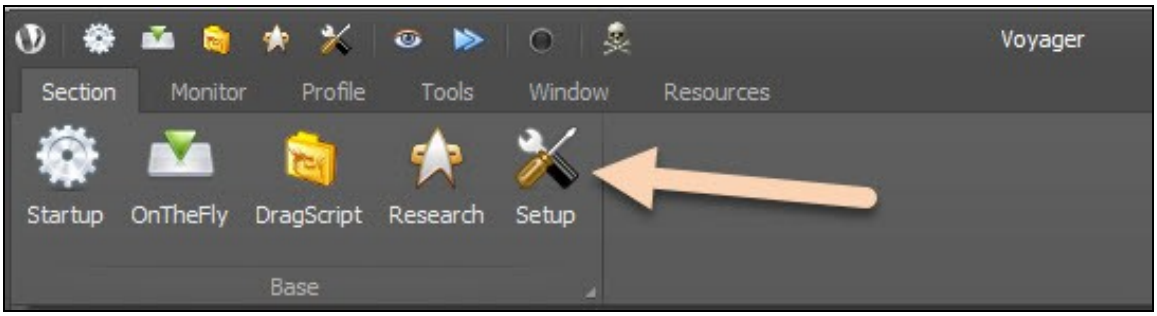
Voyager uses profiles to store a description of your equipment and various settings that you use while imaging. You can create as many profiles as you like.

Profile definitions are stored on disk, in a location of your choosing or by default in the Voyager\Profile directory - see the Installation page for more details on folders, and the Profile section to read more about profiles.

Profiles can contain information many things, but for this Quick Start, we will create a minimal configuration containing a Camera and a Mount.

Let's get started! Run Voyager if it is not already running.

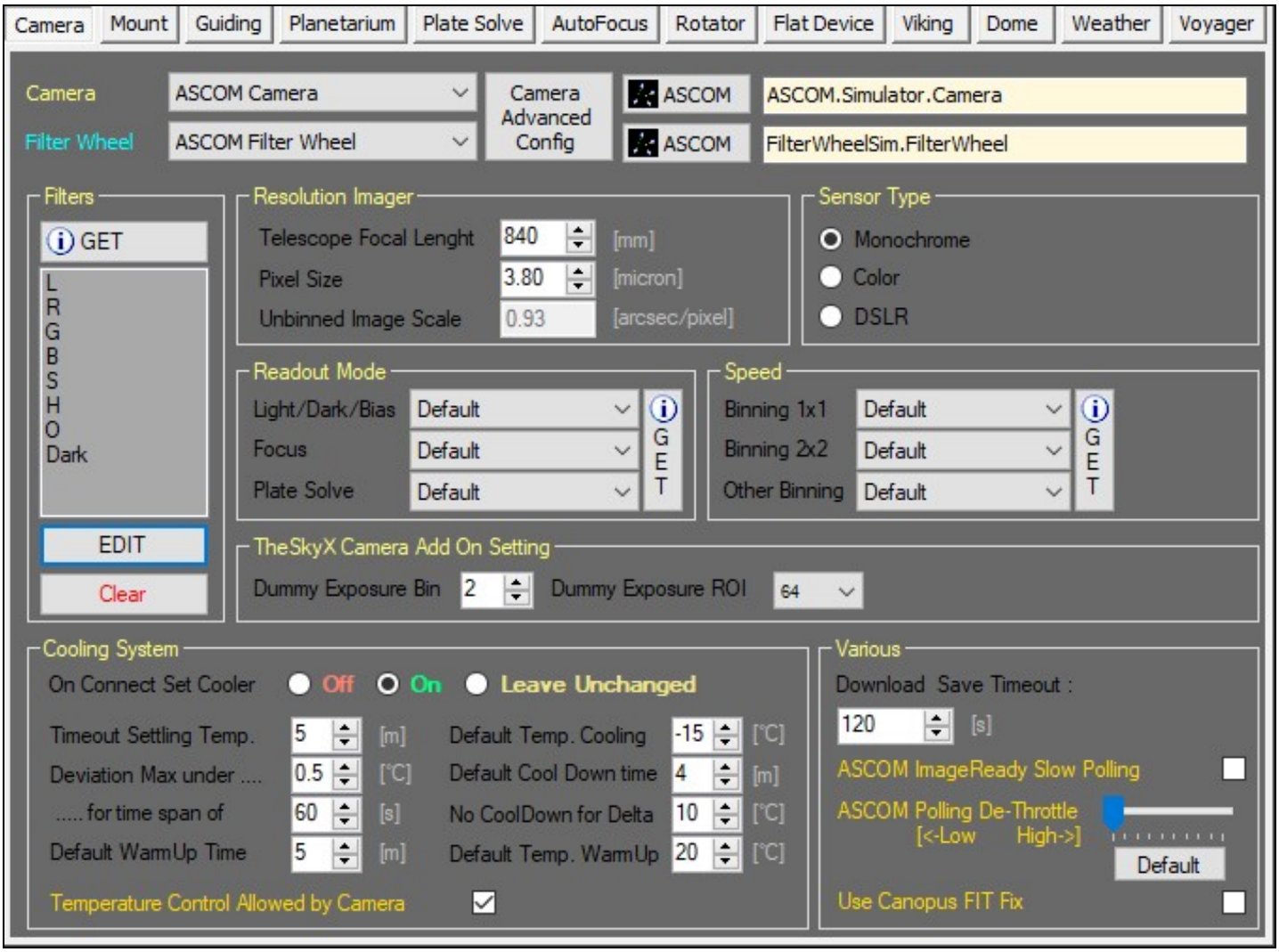
- Click the Section menu item and then the Setup icon:

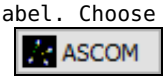


Important Note! Changes to the open profile are saved automatically, so if you have already begun entering information into setup that you don't want to lose, be sure to create a new profile before making changes. Open the Profile menu and click New (or Clone) to create a new profile, and click Save to save it to a new filename

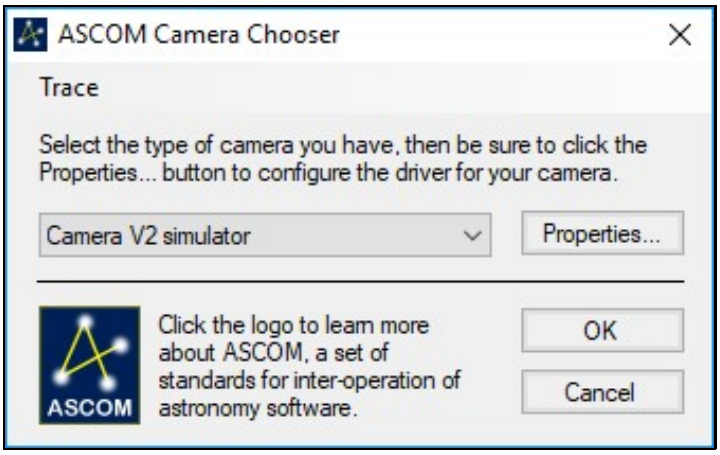
52.4.1 Camera Setup

- Click the Camera button to bring up the Camera setup form. Here is what the dialog will look like when we are finished:

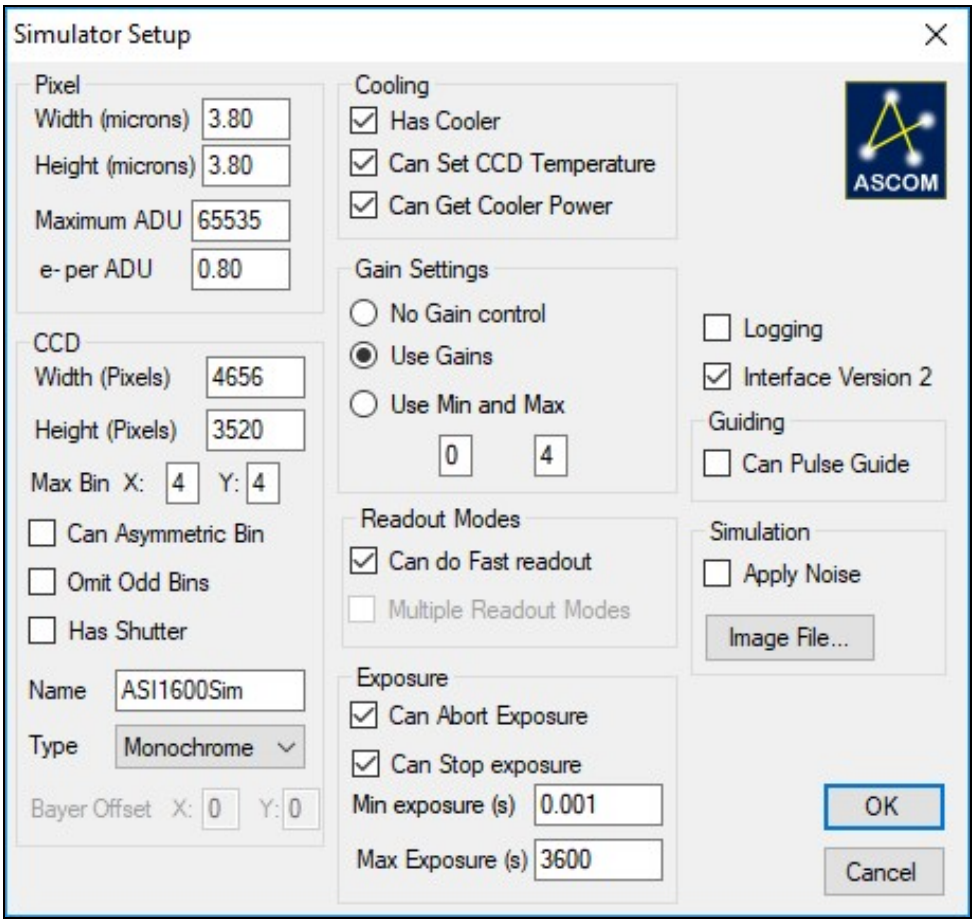


- Click the drop-down list next to the Camera label. Choose ASCOM Camera from the list.
- Click the top button of the two ASCOM buttons 

to bring up the ASCOM Camera Chooser window:



- Select Camera V2 simulator from the drop-down list and then click the Properties button to bring up the Simulator Setup window. Fill out the fields as shown to simulate a ZWO ASI1600MM Cool camera:



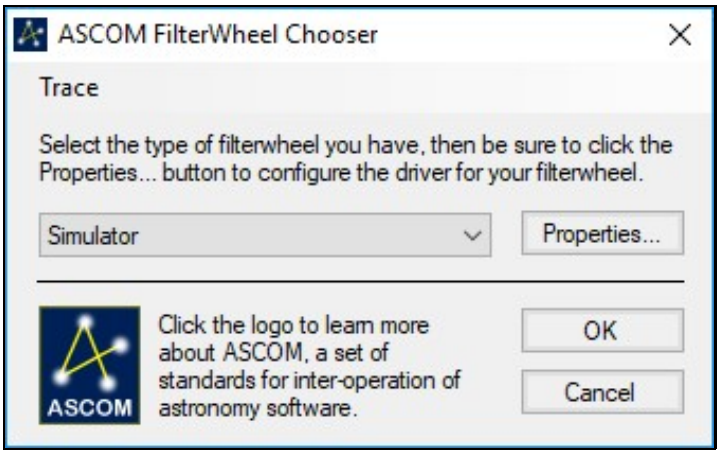
- ♦ Click OK to save your Camera Simulator settings
  ♦ Click OK on the ASCOM Camera Chooser to save your camera choice

Important Note! When creating a simulator to match your equipment, the key Camera V2 simulator fields are the Pixel Width and Height, CCD Width and Height, Max Bin, Cooling, and Gain Settings. This should be enough to let you create a sequence with the simulator profile that will work with your real equipment profile

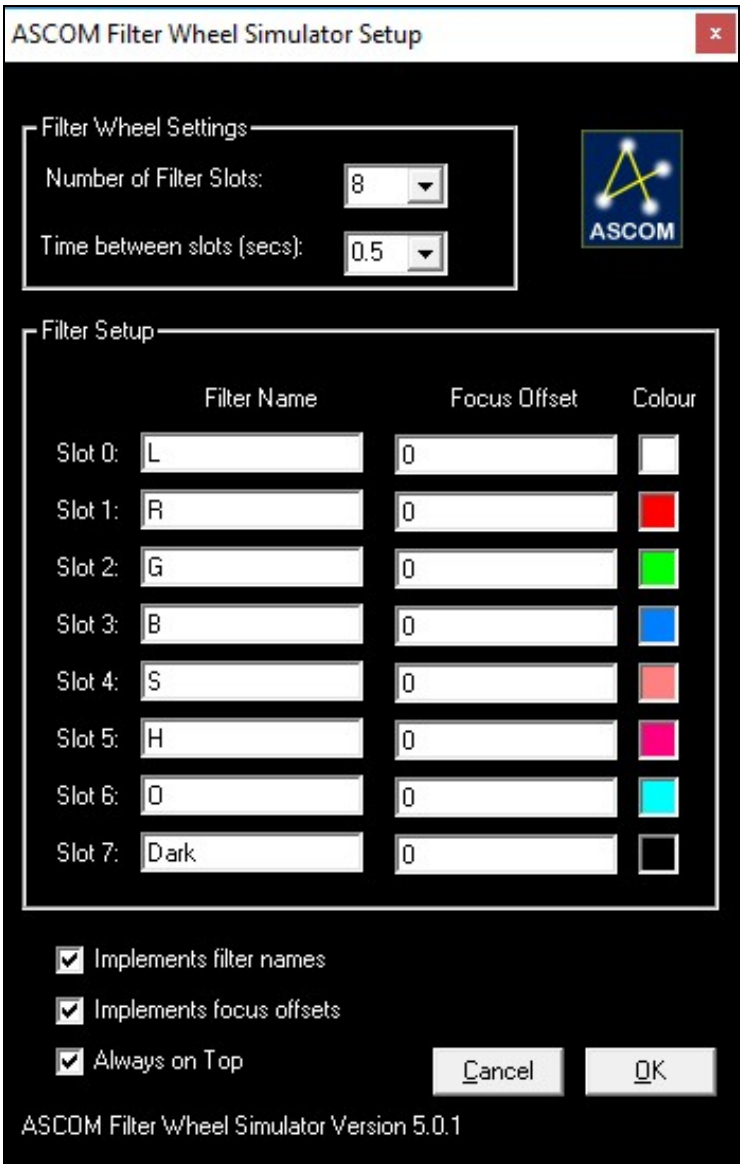
52.4.2 Filter Wheel Setup

- Next we will set up an ASCOM Filter Wheel simulator
  - Select ASCOM Filter Wheel from the drop-down list next to the Filter Wheel label
  - Click the lower of the two ASCOM buttons 

to bring up the ASCOM Filter Wheel chooser:



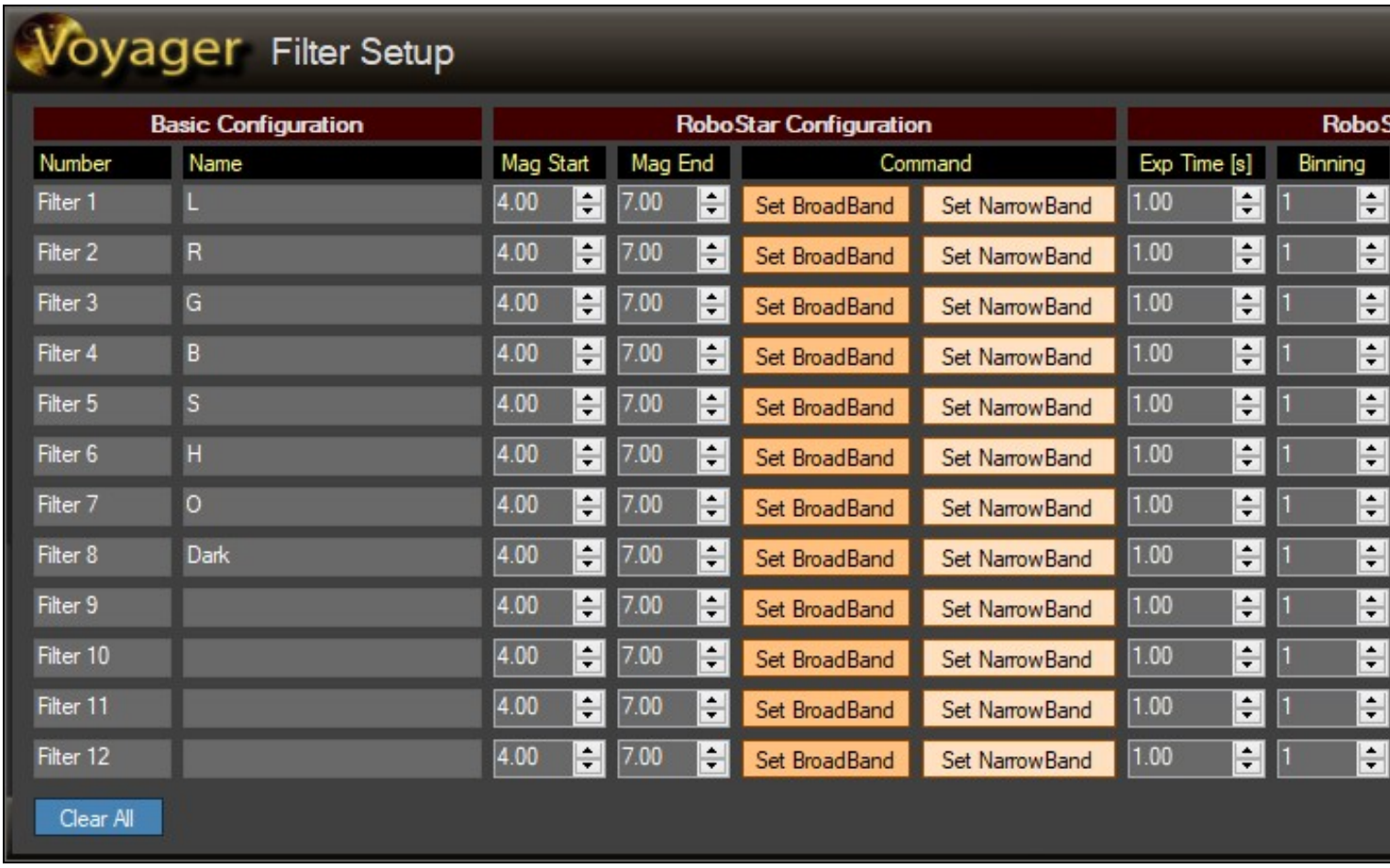
-
  - Choose Simulator from the drop-down list
  - Click the Properties button to bring up the Filter Wheel Simulator configuration dialog and enter settings to match these:



- ♦ Click OK to save your Filter Wheel Simulator setup and close the window
- ♦ Click OK on the ASCOM Filter Wheel Chooser to save your choice and close the window

Now we need to populate the Filters section of the Camera setup dialog.

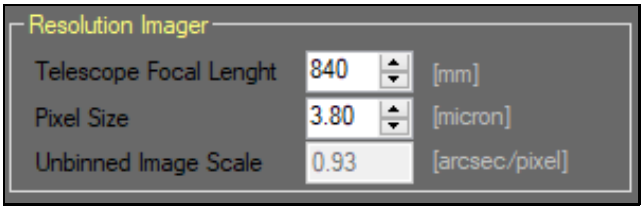
- Try clicking the Get button. For some filter wheels (or camera software such as Maxim DL or TheSkyX), your filter selections will automatically populate the Filters panel of the Camera setup workspace. As of this writing, the ASCOM Filter Wheel Simulator does not support this command
- If your filter names were not automatically read, enter them manually in the Filter Setup dialog.
  - ♦ Click the EDIT button in the Filters panel
  - ♦ Enter the filter names in the Basic Configuration column labeled Name and click OK:



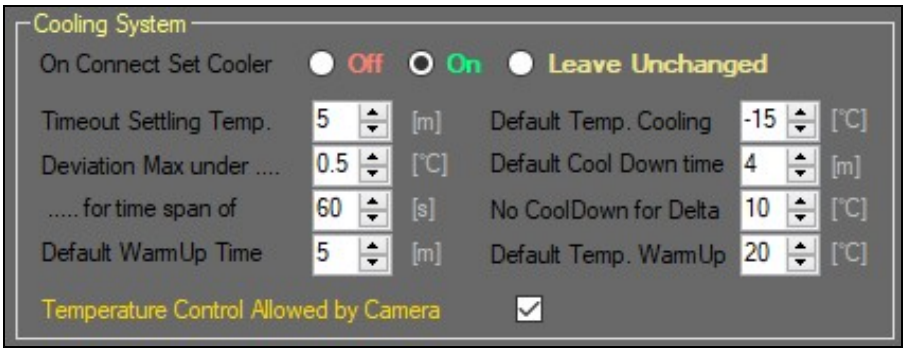
- For more information on this dialog, read the Filter Setup section of Camera Setup

52.4.3 Other Camera Setup

- Enter the focal length and pixel size of the simulated telescope in the Resolution Imager panel



- Here we used the values for an Esprit 120 refractor (840 mm focal length) and ASI1600MM Cool camera (3.8 micron pixels). This is one of the fields that should match your actual gear when you create a simulator profile to use when building sequences and scripts without connecting to your gear
- For Sensor Type, choose Monochrome
- Under Cooling System, choose these values:



- The Readout Mode, Speed, TheSkyX Camera add On Setting and Various panels don't matter for this tutorial

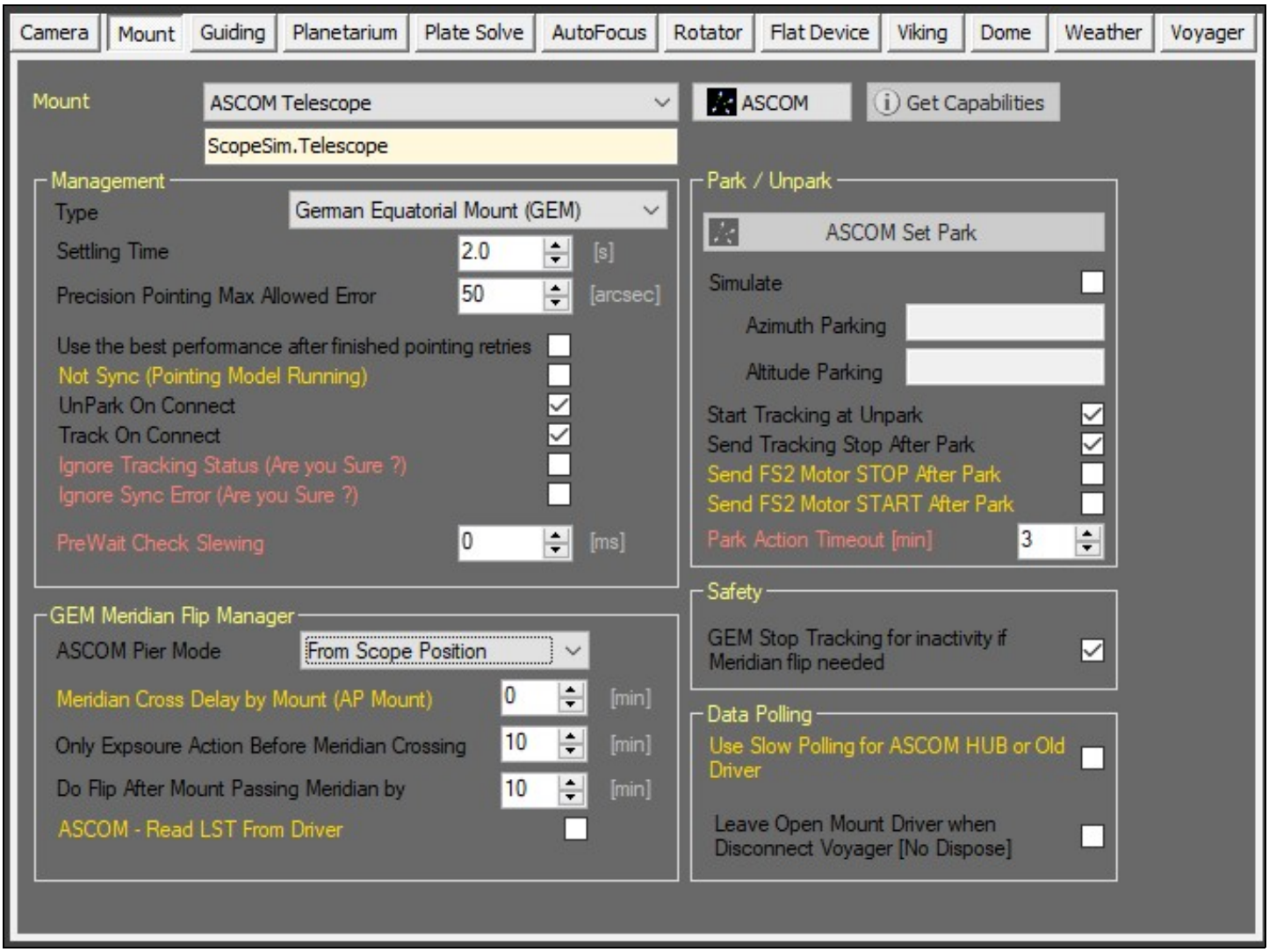
Congratulations, you have finished setting up your camera!

Important Note! Profile information is saved automatically as it is entered. The last open profile is automatically opened the next time you run Voyager

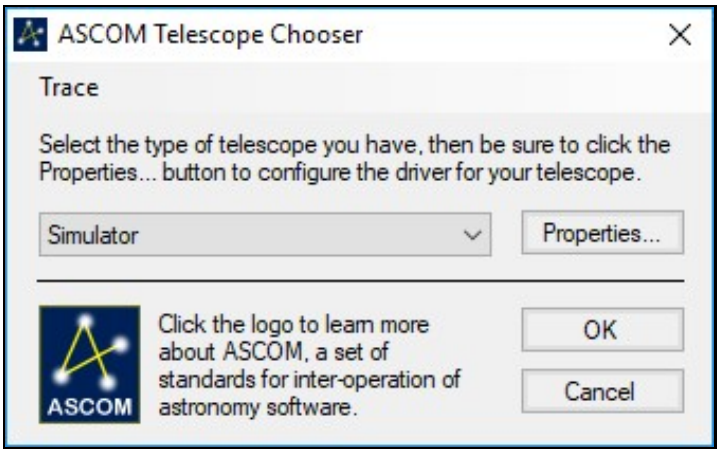
Now let's setup a simulated mount.

52.4.4 Mount Setup

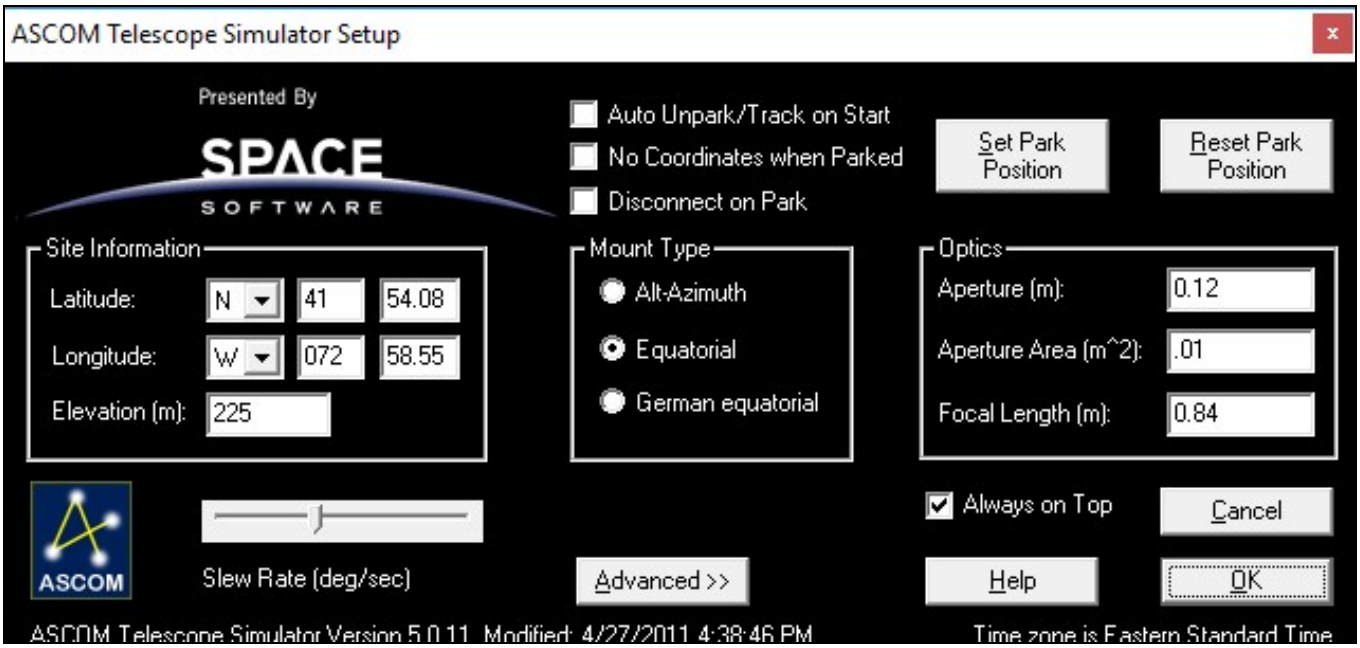
- While in the Setup workspace, click the Mount button to open the Mount setup window. It will look like this when we are done:



- Select ASCOM Telescope from the drop-down list next to the Mount label
- Click the ASCOM button to bring up the ASCOM Telescope Chooser



- Select Simulator from the drop-down list and click the Properties button to bring up the ASCOM Telescope Simulator Setup:



- Fill out the values as shown. You can use your own Latitude, Longitude and Elevation, but if you do, you may get different results later in this tutorial
- Click OK to save your settings
- Click OK in the ASCOM Telescope Chooser to save your mount (telescope) choice
- In the Management panel, change the Settling Time to 2 seconds to speed up the simulated gotos
- Check the other settings against the Mount setup window above - we used defaults for everything else, so you shouldn't have to change any other values

Congratulations, you have setup your simulated mount!

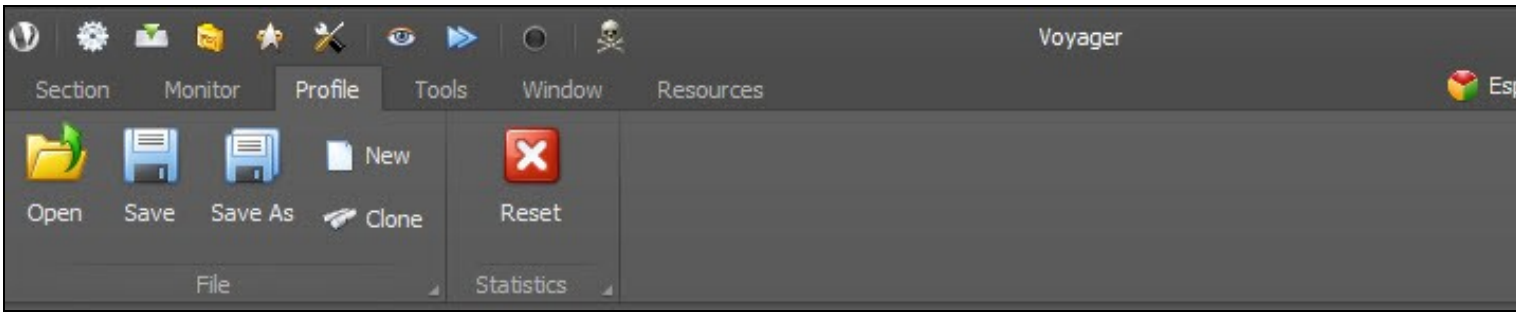
You can certainly experiment with setting up more simulated gear in this profile, but nothing else is required for this tutorial.

52.4.5 Save the Profile

By default, the settings you just entered will be saved in a profile on disk with the filename Default.v2y.

Let's save our profile under a new name so we can load it later and modify it to match our own equipment.

- Click the Profile menu:



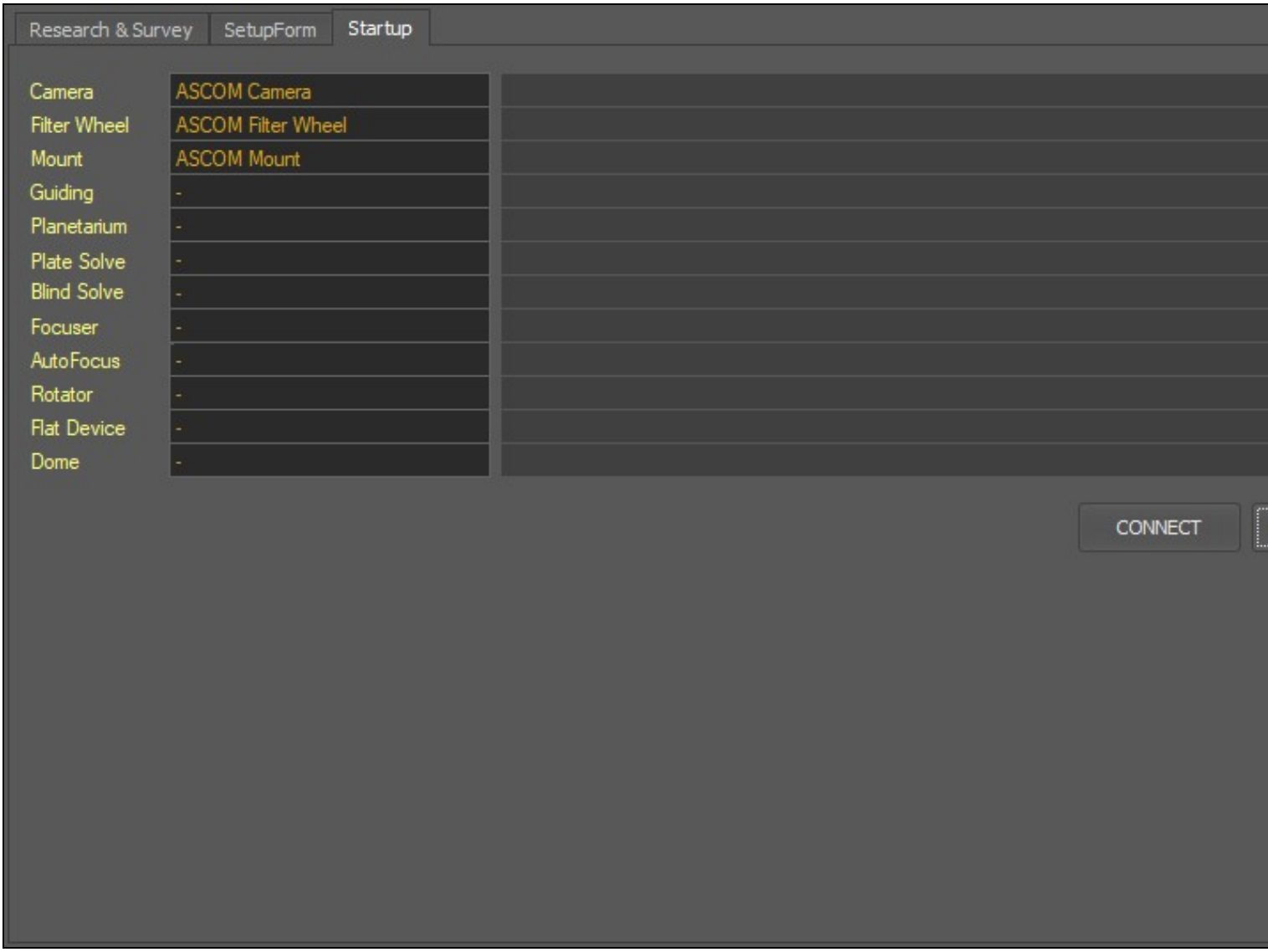
- Click Save As
- Enter Quickstart Tutorial as the file name
- Click OK to save the profile to disk

Now let's connect to our profile so we can choose a target and create an imaging sequence.

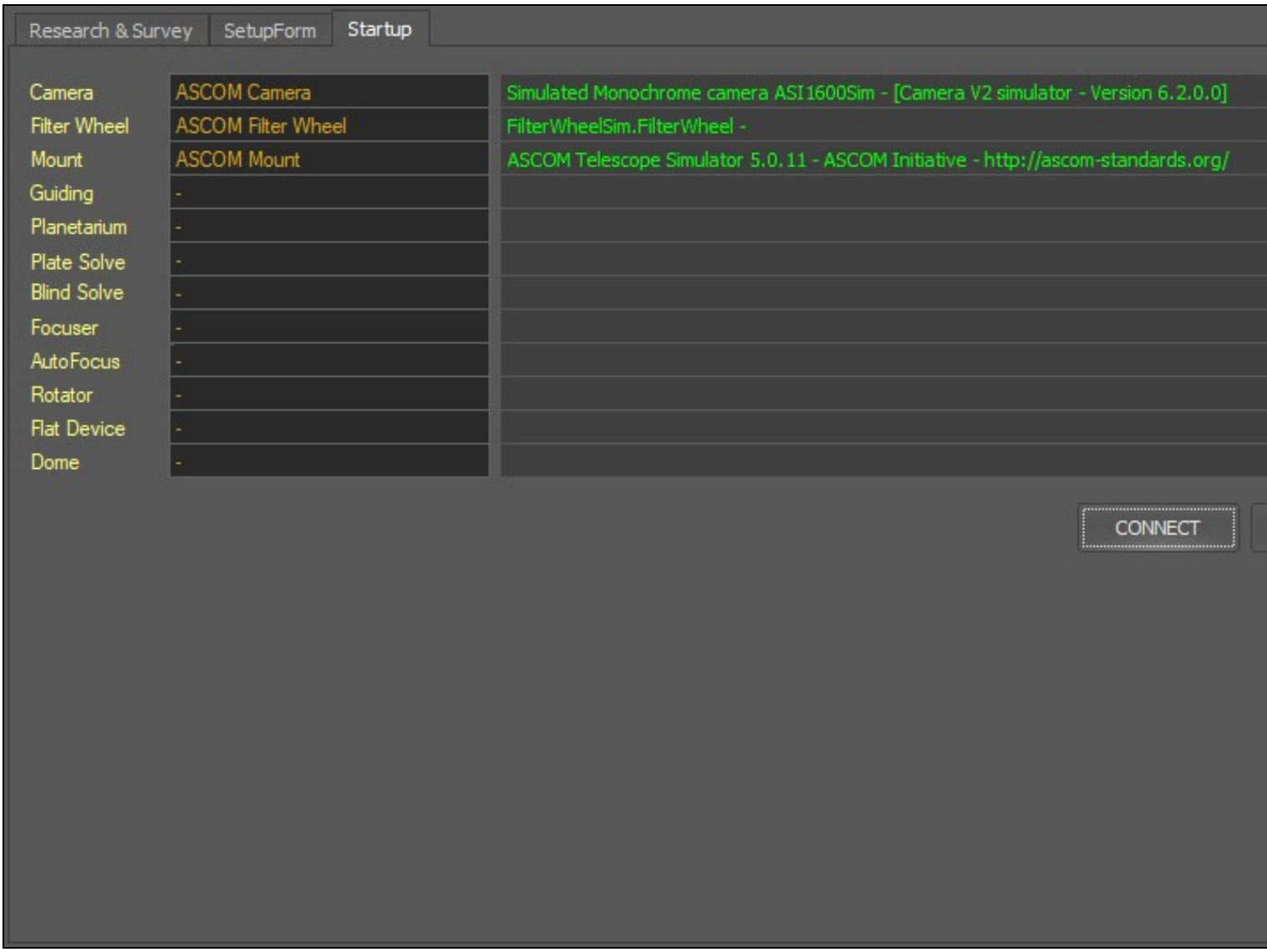
52.5 Connect to the Simulator Profile

Since we just finished defining a profile, we don't have to load it - it is already the active profile.

- Click the Section menu item and then the Startup icon:

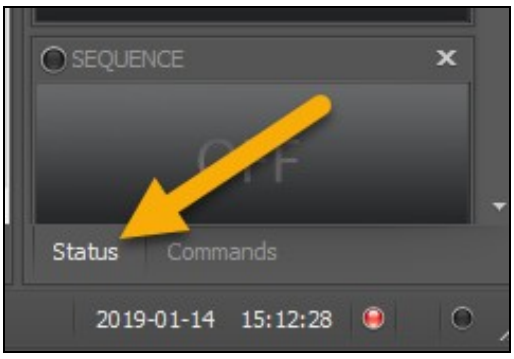


- Our profile, with three things defined, is shown in this window
- Click the CONNECT button and Voyager connects to our profile:

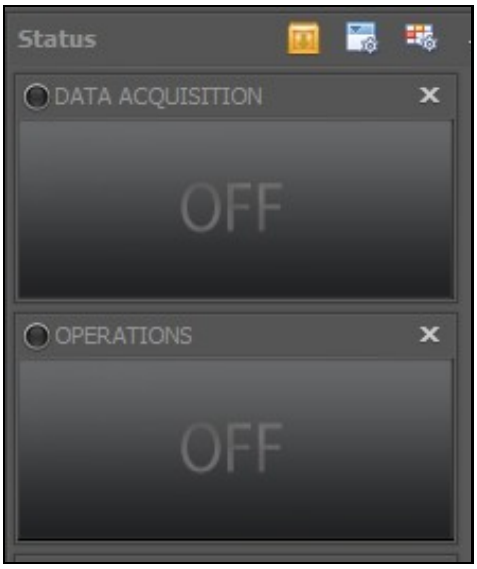


That's it! We are now connected to our profile.

Look on the right of the Voyager main window. Make sure the Status window is selected - click the Status tab at the bottom of the right column:



Before you connected, it was a stack of gray boxes that looked like this:



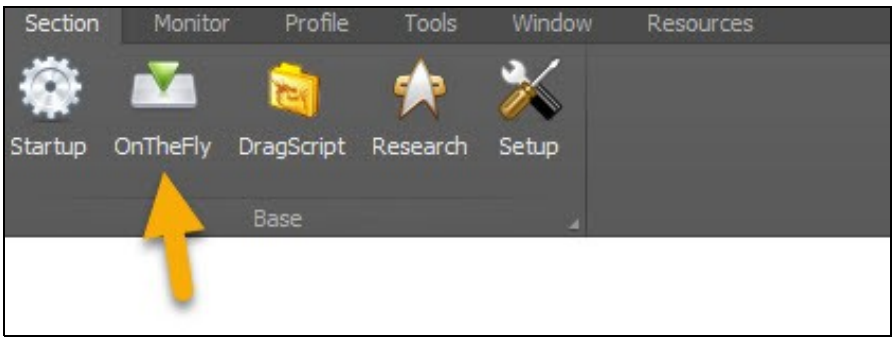
After connecting to your profile, Status widgets display information about the connected devices:

Read more about the Status window in this section.

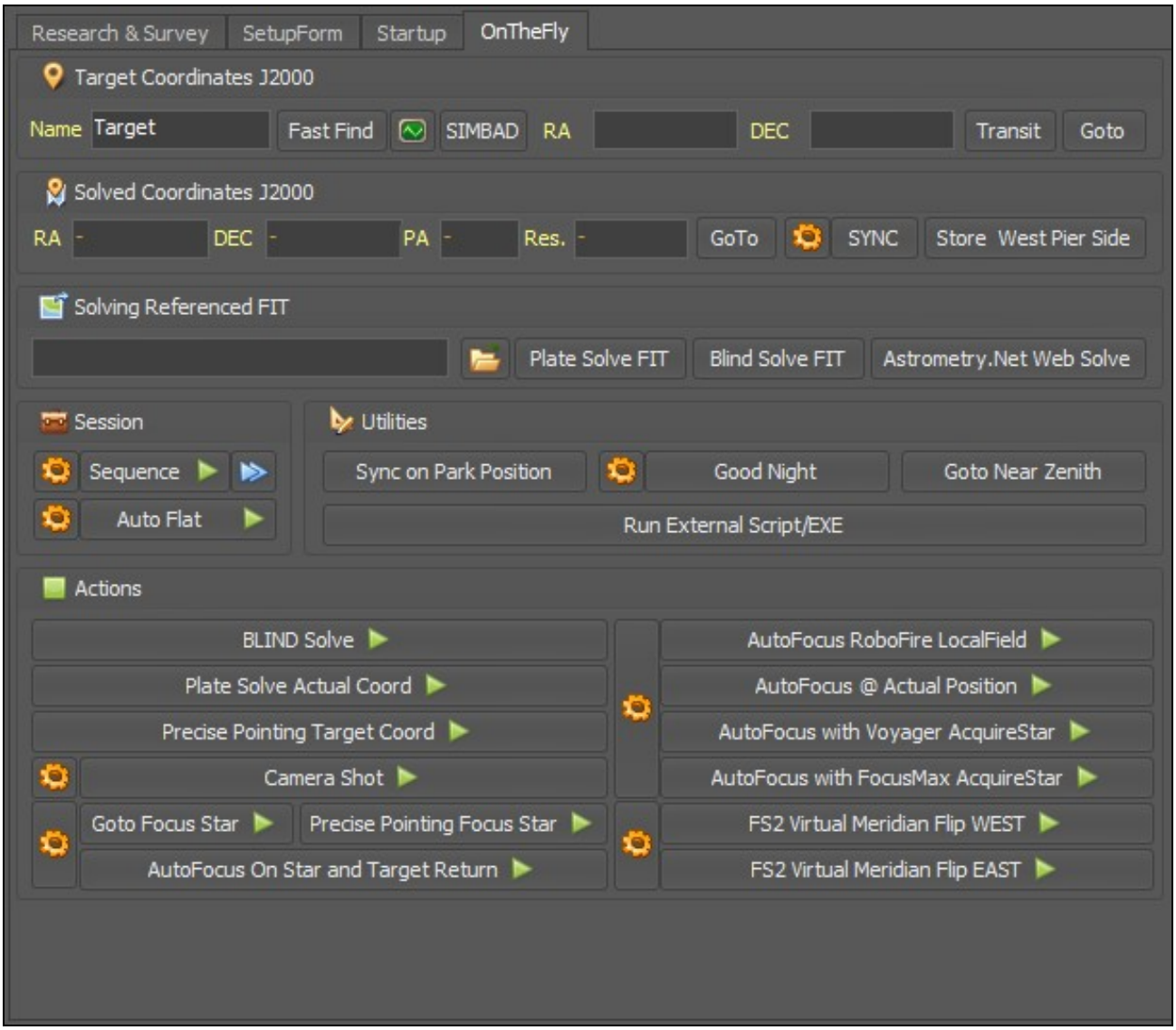
Now let's select a target to image!

52.6 Select a Target to Image

Click the Section menu item and then OnTheFly to enter Voyager's OnTheFly workspace:



The workspace looks like this:



Since we will be instructing the mount to slew to our target, it is important that Voyager knows exactly where the mount is pointing.

If your mount is on a permanent pier, or if you know that the coordinates it reports are accurate, it is not

absolutely necessary to do a SYNC operation before slewing to your target.

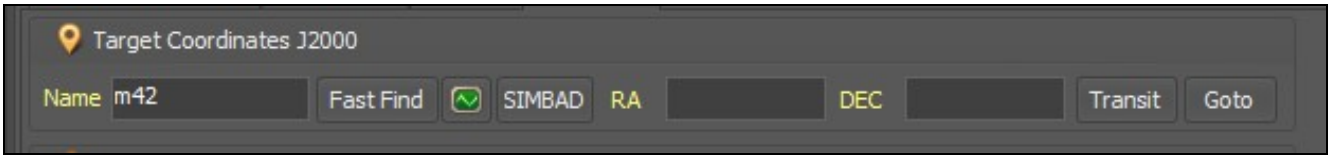
However, in many cases it is helpful to do a "blind solve and sync" or simply "blind sync" operation at the start of the night to be sure your mount knows where it is pointing.

Since we are using simulators in this Quick Start, plate solving is not functional so the following two steps won't work.

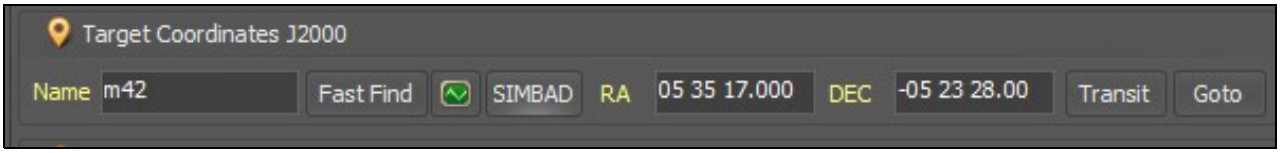
1. If you are using your real equipment and you are under the stars, you can do a blind sync by clicking the Plate Solve Actual Coord button in the Actions panel, and then the SYNC button in the Solved Coordinates J2000 panel.
2. If the plate solve fails, usually because your mount's actual position is too far from its reported position, click the BLIND Solve button in the Actions panel and then the SYNC button in the Solved Coordinates J2000 panel.

Now let's continue our Quick Start by picking a target to shoot!

- Pick a target that is in the sky tonight. As this is written, M42 is up, so I'll type M42 in the field next to Name in the Target Coordinates J2000 box:



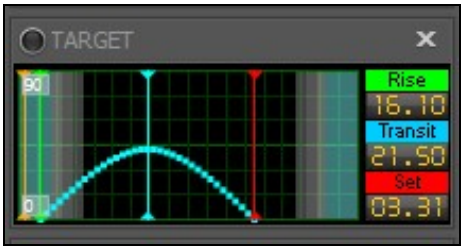
- If you have an Internet connection, click the SIMBAD button and Voyager will lookup M42 using the SIMBAD online service.
- Click OK in the popup window showing the results of the SIMBAD search, and Voyager will populate the RA and DEC fields with M42's coordinates



If you don't have an Internet connection, just type the RA and DEC coordinates shown in this screenshot into the RA and DEC fields.

If we had configured a Planetarium in our Profile, such as the excellent and free Cartes du Ciel https://sourceforge.net/projects/skychart/ , or TheSkyX, we could do a Fast Find and Voyager would lookup the coordinates from our connected Planetarium program.

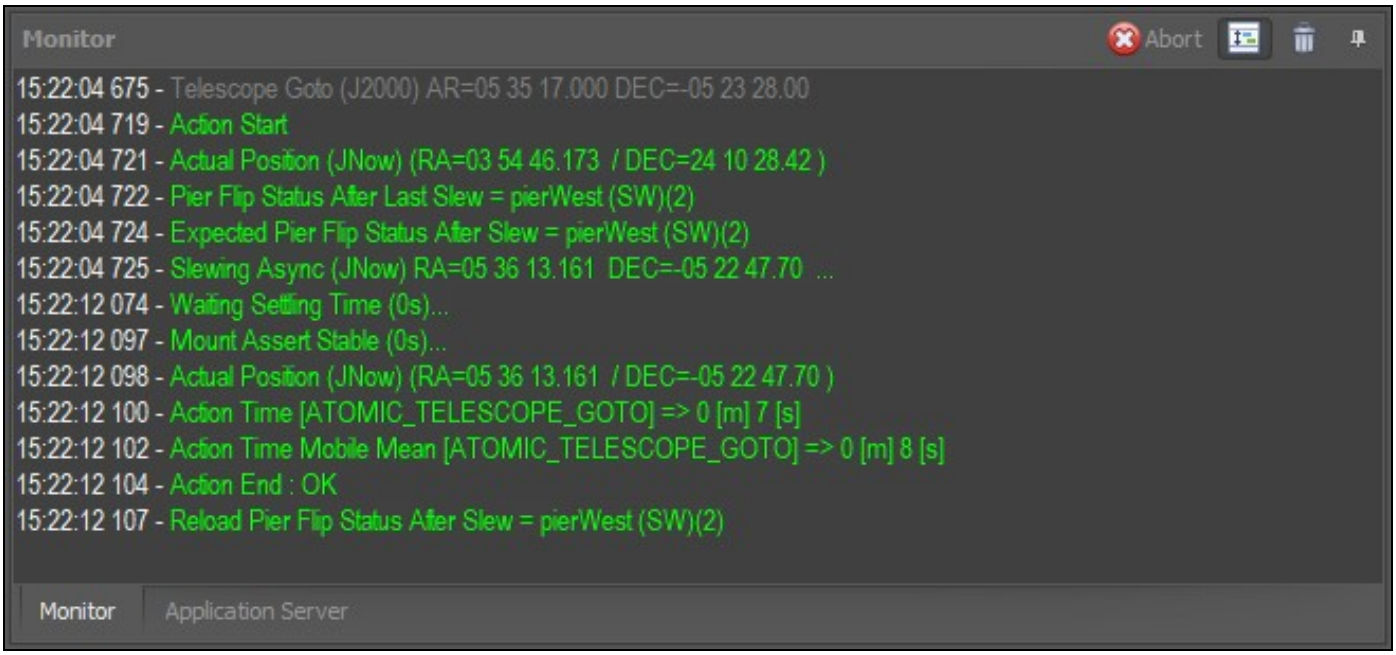
As soon as the RA and DEC fields are populated, the Target widget lights up with information about M42's rise, transit and setting times today:



Read more about this in the Target Widget section.

- Click the Goto button 

and the OK button in the popup asking us to confirm the action, and our simulated mount will slew to M42's coordinates.
- Watch the Monitor window at the bottom of the Voyager window for a scrolling log of the actions Voyager is taking:

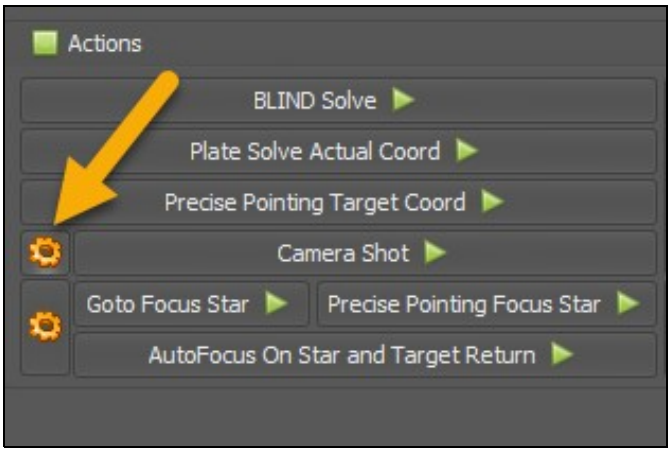


Whenever Voyager is executing an action or DragScript, useful information about the current run will show up in the Monitor window and the Status window. The information is also saved to a Log file in the Log folder.

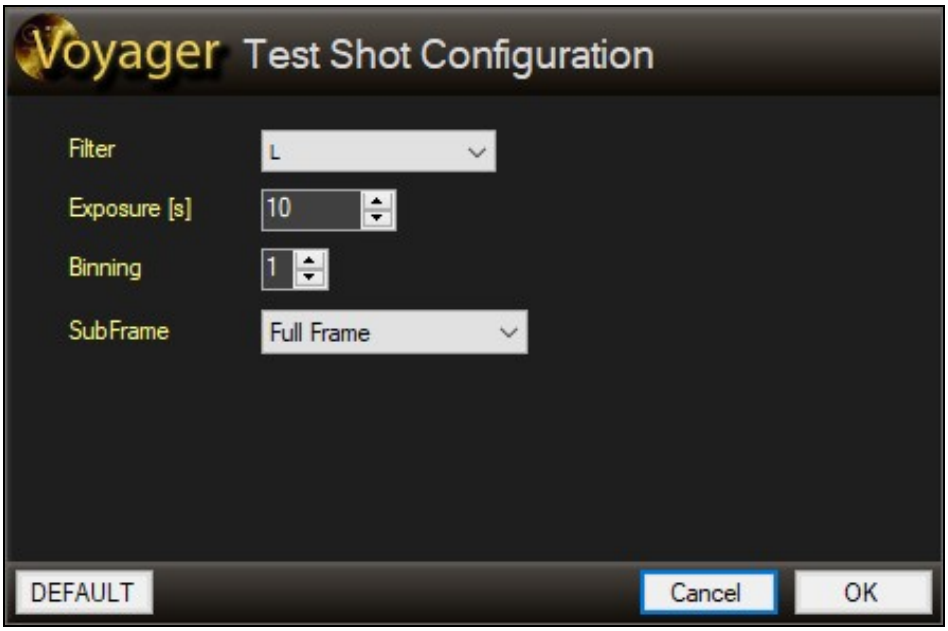
Now that we have pointed the scope at M42, we can take a quick simulated picture.

Important Note! In this tutorial, we have kept things simple and not configured plate solving, so we are using an unverified Goto command which relies on the mount's model of the sky to point the scope at the requested coordinates. With plate solving, Voyager can perform a precision pointing operation. Precision pointing issues a goto command to the mount, then takes a picture, plate solves it to determine where the scope is actually pointing, and then moves the mount again to correct the error

- Click the gear icon  next to the Camera Shot button in the Actions panel:

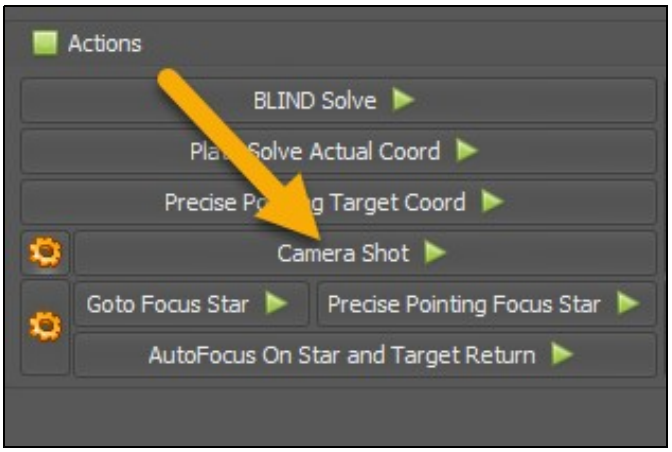


This will bring up the Test Shot dialog window:

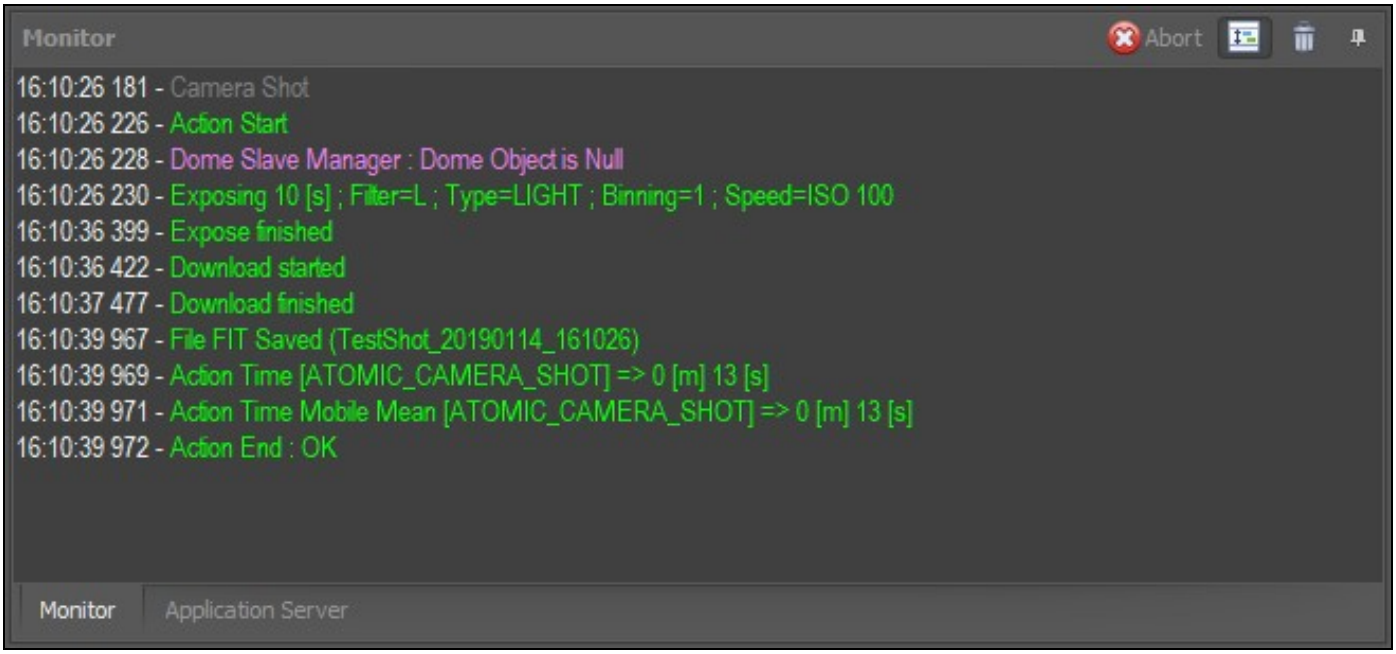


You can use any settings you like, but these are fine. This will take a 10 second simulated exposure with binning level 1x1, full frame, and using the L filter.

- Click the OK button accept your settings and close the window
- Now click the Camera Shot button to take the exposure:



Watch the Monitor window to see the progress of the Camera Shot action:



Congratulations, you've taken your first (simulated) exposure with Voyager! Now let's define a Sequence, which lets us take a bunch of images with a single command.

52.7 Define a Sequence

A Sequence is the Voyager's main way to take a series of images of a single target. Depending on the target's availability in your night sky, a single sequence could run for many hours.

You can run multiple sequences with a DragScript, Voyager's drag and drop scripting language. A DragScript can automate an entire night's imaging, from startup to shutdown including taking flats and calibration frames.

For now, we will define a single sequence and use it to take five images each of M42 through four filters, L, R, G and B.

- Click the gear icon next to the Sequence button to bring up the Sequence Configuration dialog window

The Sequence Configuration window will have the target name and coordinates filled out already since we entered them in the Target Coordinates panel earlier in this tutorial

- Click the gray box with a 1 in it in the Slot column:

It will turn green and the fields in that row are activated

- Select Light in the Type drop-down list
- Select L in the Filter drop-down list
- Type an L in the Suffix field - this will include the filter label, L, in the saved image filename. You can put any static text in this field to include it in the filename. Filenames will automatically include the target name, image type, exposure length, binning level, camera temperature, a timestamp, and a sequence number
- Enter 10 in the Exposure field. You can enter any length (in seconds) in this box. We choose ten seconds to make the tutorial run go faster, but if you are using your actual equipment and taking real images, use whatever exposure length works for your gear
- Leave the Bin field at 1. This will take the exposure with binning level 1x1.

- Enter 5 in the Repeat field. This tells Voyager to take five exposures of M42 with the L filter

Your filled out Slot 1 should look like this:

Now repeat this process for the R, G and B filters.

Note: As of Voyager 2.1.1f, there are Copy and Paste buttons for each Sequence Element line. For this example, you can click Copy on the R (second) line and then Paste on the third and fourth lines to copy the element values. Then change the Filter and Suffix on the third line to G, and on the fourth line to B.

Your finished Sequence Elements panel should look like this:

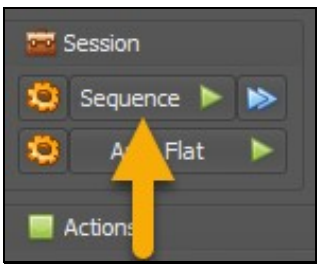
Below the Sequence Elements you will see a bar like this:

It shows the order in which images will be shot with your choice of color filters. In this case, it tells us we will cycle through the L, R, G and B filters five times, as the default sequence mode is "Cyclic Round."

- Click OK to save your settings and close the Sequence Configuration window. There are many more configuration options available for a sequence, but especially since we are running with simulators, let's just run this and see what happens.

52.8 Run the Sequence

- Click the Sequence button with the green triangle to run the sequence.



- Unless you have changed your setup options to start a sequence without confirmation, you will get a pop up window asking if you really want to run the sequence. Click OK

The sequence should start running immediately. You can watch its progress in the Monitor window. Messages will scroll by telling you what Voyager is currently doing, along with interesting status information.

Messages in the Monitor window are color coded, as explained in the Monitor Window section.

Additionally, the Sequence widget in the Status window displays information about the currently running sequence

The green bar tells you what fraction of the sequence has completed. The red bar shows the same thing for the current exposure. The time values tell you when the sequence began, how much time is left, and what the estimated time of completion will be.

Congratulations, you:

1. Defined an equipment profile
2. Selected a target and searched for its coordinates
3. Slewed to the target
4. Took a test exosure
5. Defined a sequence and ran it to capture 20 images using four different filters

52.9 Next Steps

We used a very basic equipment profile and sequence in this tutorial.

Try creating a basic equipment profile using your actual equipment. Clone this profile or use the Profile Save As... menu to save a new profile so you don't write over your simulator profile.

Then try repeating the steps of selecting a target, slewing to it, taking an exposure, and running a sequence. If your mount's goto is not accurate, you may move it to the desired target with your hand controller or setup up Plate Solving and use Precise Pointing to get your target right in the middle of your field of view.

Click through the tabs of the Sequence Configuration window to try more of the options available for a sequence. For more information on what these options do, read the Sequence Configuration section.

53 Extending Voyager

This page contains examples of extending Voyager with its built-in tools such as DragScript.

53.1 HitecAstro Mount Hub Pro Management

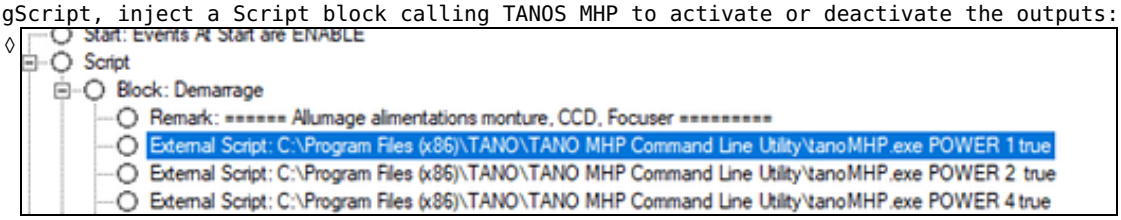
Thanks to Nicolas Kizilian for this contribution and write-up (https://forum.voyagerastro.com/t/hitecastro-mount-hub-pro-management-with-scripts/681)

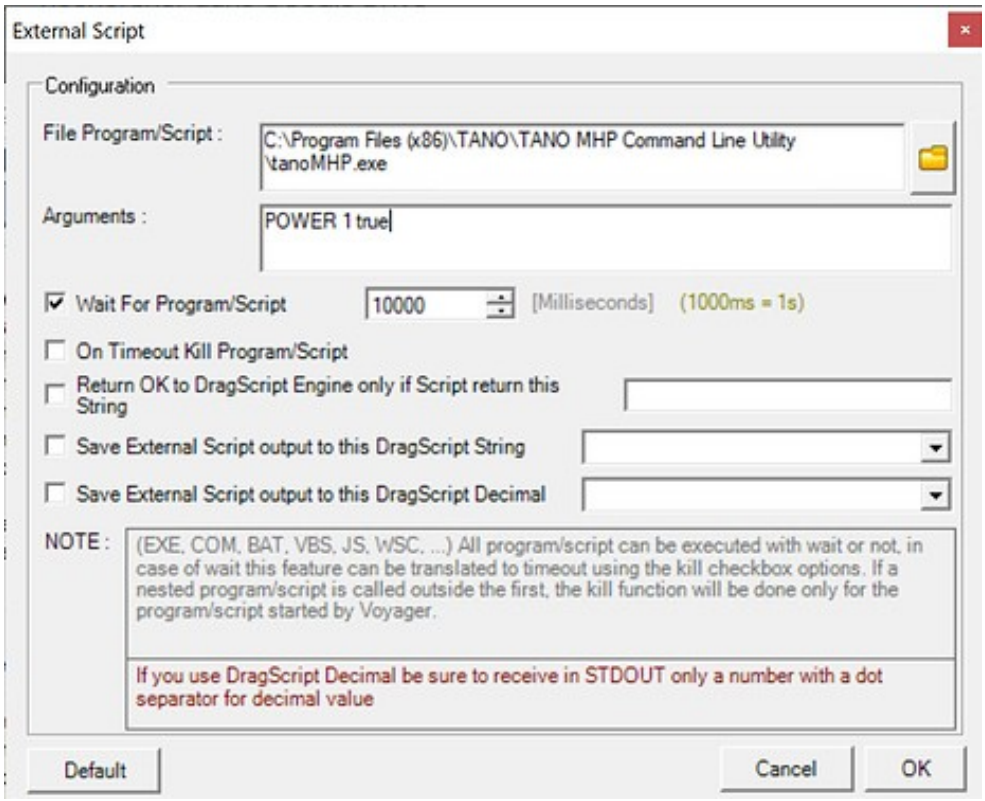
Editor: While this is an example of how to support a specific piece of hardware, the technique used - calling external programs from a DragScript - can be used for many other things.

For my setup I?m using an HitecAstro MountHubPro (MHP) for managing my power outputs and dew heaters.

Although it isn?t supported (yet?) by Viking, you can automate it with DragScript.

- First you?ll need a tool developed by Darren Jehan from CN called TANOS MHP. This tool lets you activate/deactivate any output, manage the dew heaters output and the focuser controller on your MHP with simple command lines. You can download this tool from my GDrive here
- Install TANOS MHP The usage of TANOS is pretty simple
  - 

- - In DragScript, inject a Script block calling TANOS MHP to activate or deactivate the outputs:
    - 



Very easy isn?t it ?

Another idea would be to get the data from your weather sensors and activate/deactivate/manage your dew heaters depending on the temperature and the dew point automatically.

I hope that?ll help ! Nicolas

54 Viking

Voyager's companion product, Viking, provides I/O status and control for domotics (control devices used for home automation) and your observatory's I/O devices.

Actual release version is 1.0.27

Viking can be used standalone from its GUI and also integrated with Voyager to check the status and set the values of:

- Relay Cards: read status and set on/off Digital (on/off)
- Analog Input status
- Digital Input status
- PWM (Pulse-Width-Modulation) device: read status and set value
- DAC (Digital to Analog Conversion) device: read status and set value

Viking contains an application server for both local and LAN-based programmatic control

54.1 List of Supported I/O Cards and Automation Protocols

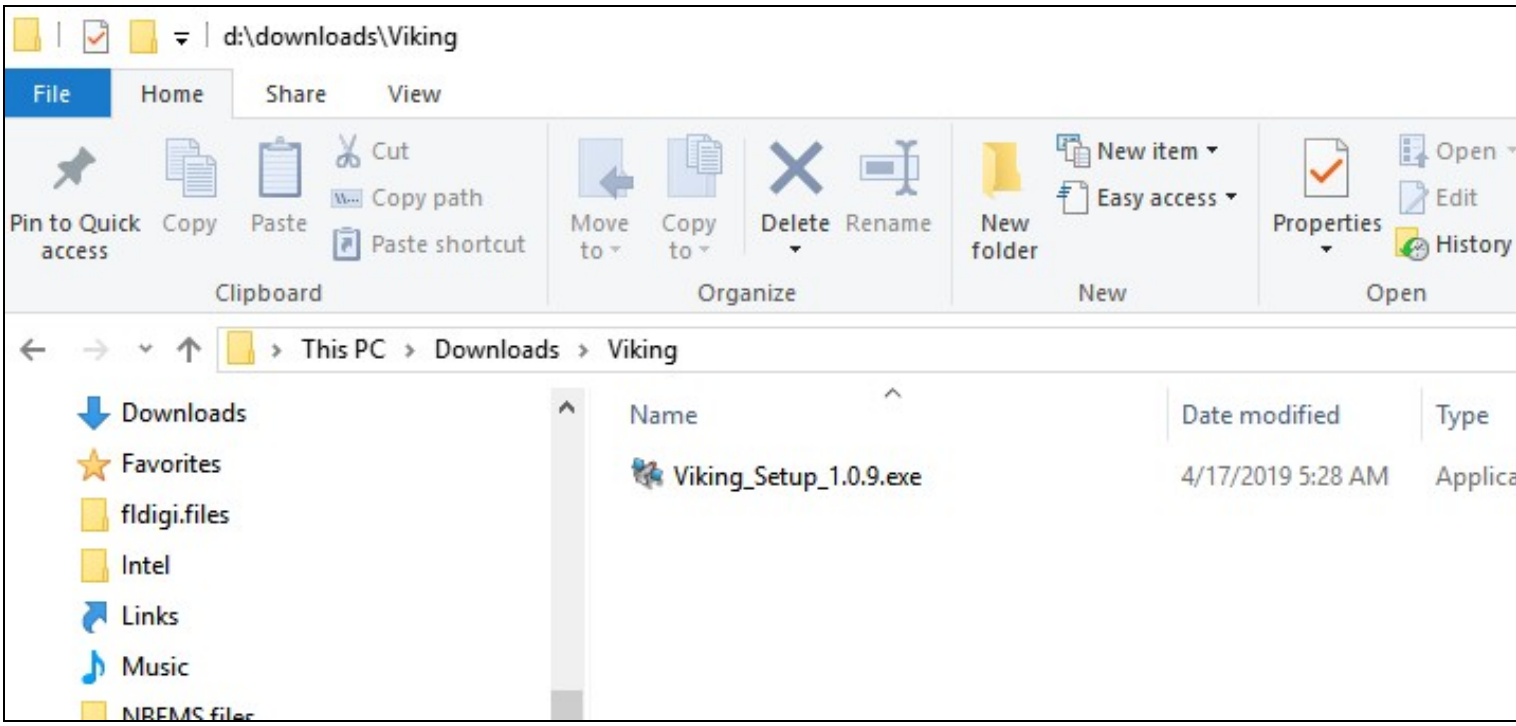
This is actually list of I/O cards and automation protocols (more are coming or may be requested at license purchase):

- ARDUINO - Box Relay Ethernet 8 Relay
- DENKOVI - DAEnetIP3 Ethernet 12 Relay I/O Module
- DENKOVI - Internet/Ethernet Relay Board 12 Channel with DAEnetIP4 - I/O, SNMP, Web
- DENKOVI - SmartDEN-IP16R IoT Internet / Ethernet 16 Relay Module - DIN Rail BOX
- DENKOVI - SmartDEN-IPMAXI - DIN Rail BOX
- Digital Loggers - Web Power Switch Pro (Using REST API with firmware >= 1.8.0.20)
- Digital Loggers - Web Power Switch Pro (Using HTML API)
- Digital Loggers - Web Power Switch 7 (Using HTML API)
- DragonFly ASCOM from Lunatico
- DragonFly COM from Lunatico
- FireFly ASCOM from Lunatico
- FireFly COM in EXP Port from Lunatico
- GCE - IPX-800 V2 - 8 relay board internet controller
- GCE - IPX-800 V3 - 8 relay board internet controller
- GCE - IPX-800 V3 + (1) X-880 - 16 relay board internet controller
- KMTronic - LAN Ethernet IP 4 channels UDP Relay board
- KMTronic - LAN Ethernet IP 8 channels UDP Relay board
- KMTronic - LAN Ethernet IP 8 channels WEB Relay board
- MyHome - Open Protocol for Electric Networks (BTicino)
- PegasusAstro - Pocket PowerBox [OLD ASCOM]
- PegasusAstro - Ultimate PowerBox [OLD ASCOM]
- PegasusAstro - Umtilate PowerBox 2 [OLD ASCOM]
- PegasusAstro - USB Control HUB [OLD ASCOM]
- PegasusAstro - Ultimate PowerBox 2 - Unity ASCOM
- PegasusAstro - Ultimate PowerBox 2 - Unity REST/API
- PrimaLuceLab - Eagle 2/3
- PrimaLuceLab - Eagle 4
- Robot Electronics - ETH8020
- Robot Electronics - ETH008
- ScopeDome ASCOM Switch [Using Driver >= 5.5.5.19]
- Simulator
- TecnoSky - TecnoShelter I/O Card

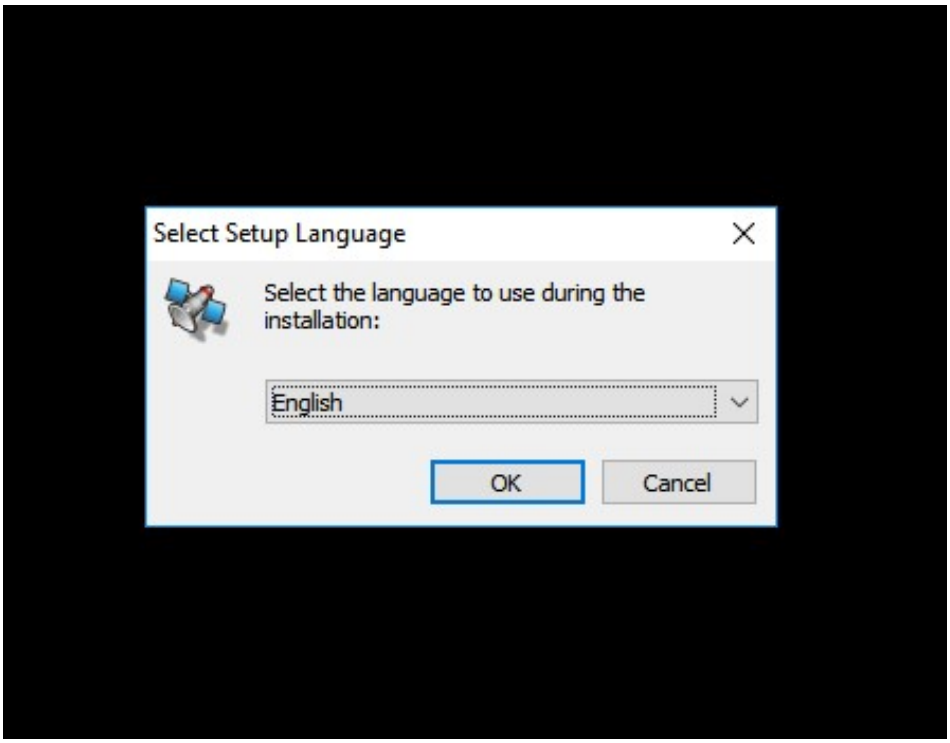
- Velleman P8055
- Velleman VM140
- West Mountain Radio - RIGRunner 4005i

54.2 Installation

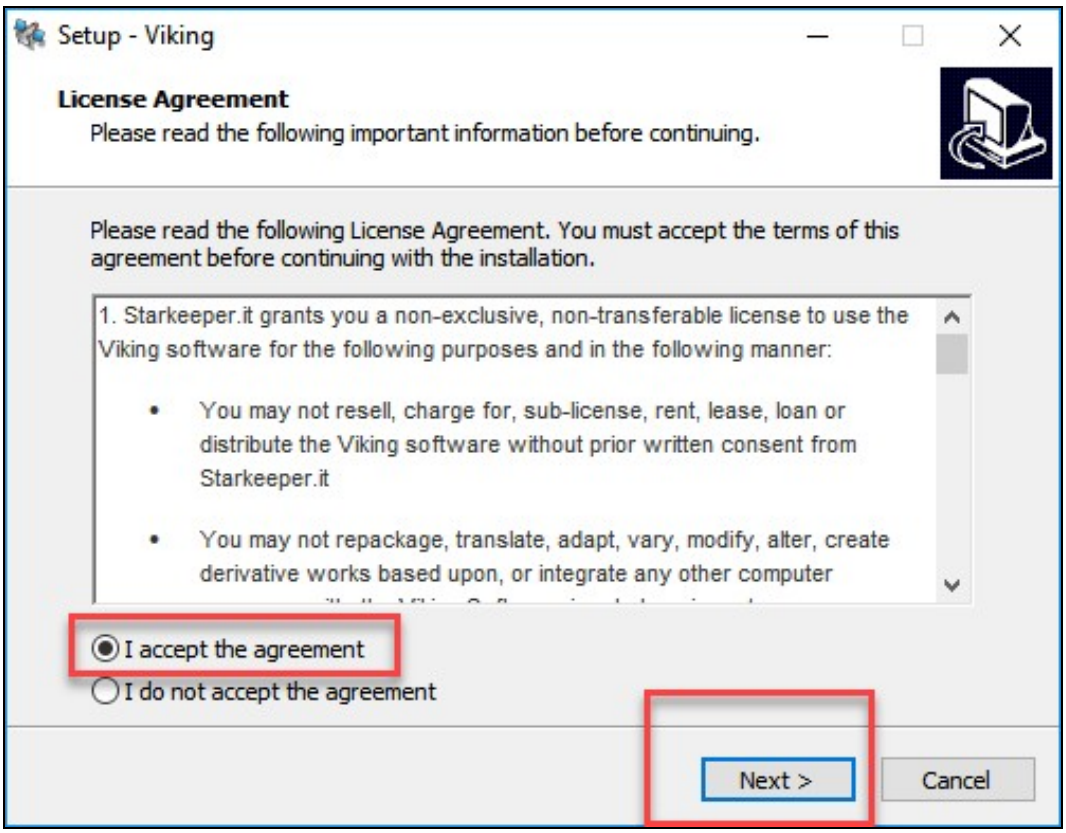
Download the free trial version of Viking, then locate the downloaded Viking_Setup_X.Y.Z.exe file and double-click to start installation:



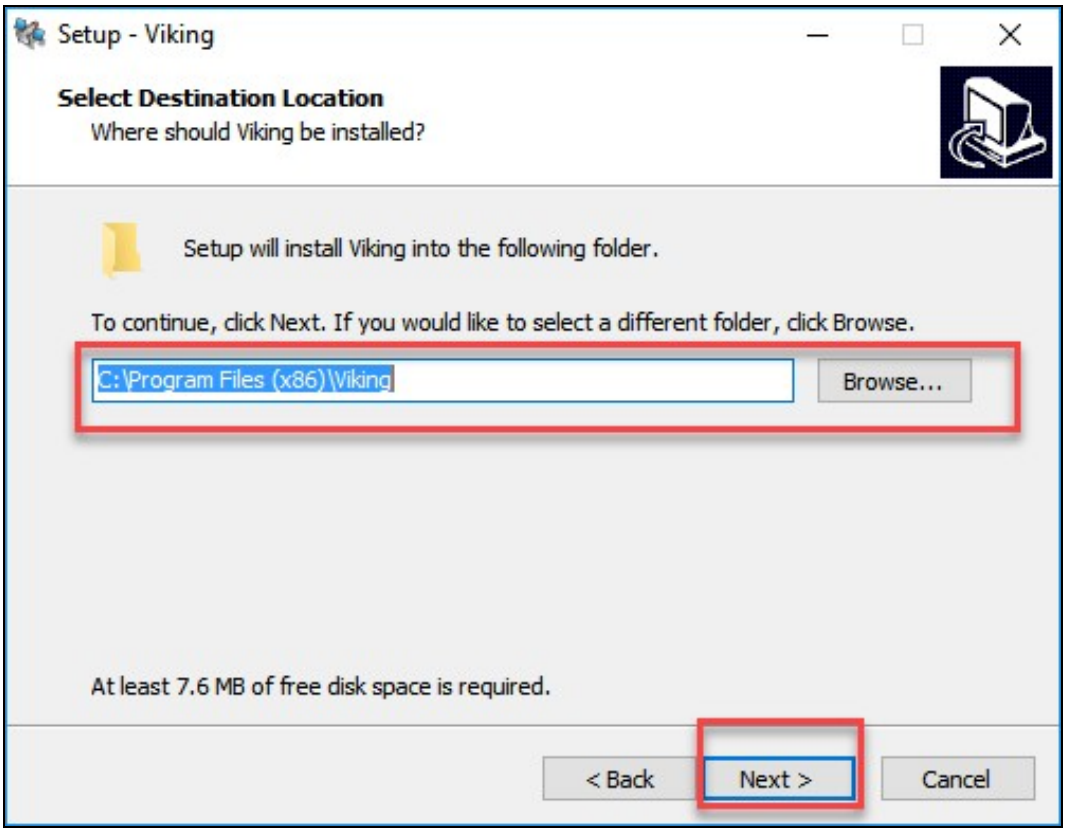
If you get a Windows User Account Control warning message asking if you want to install this application from an unknown publisher, click Yes to continue.



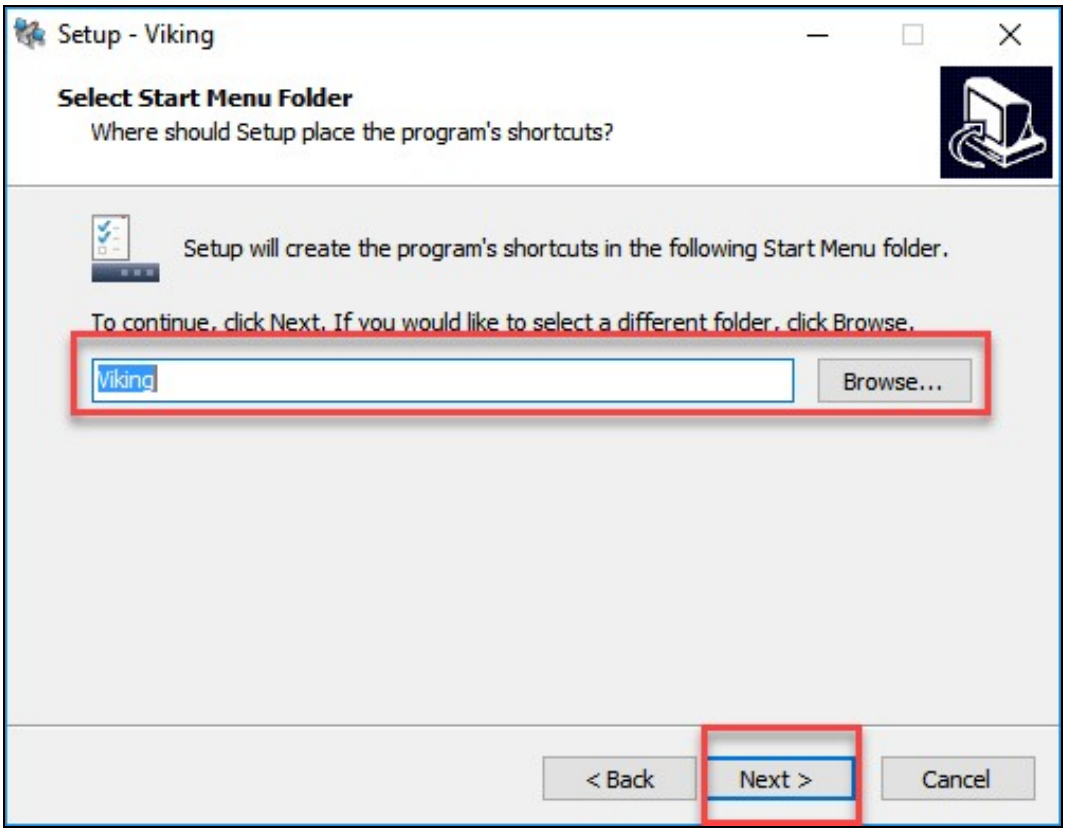
Select the language for installation and click OK



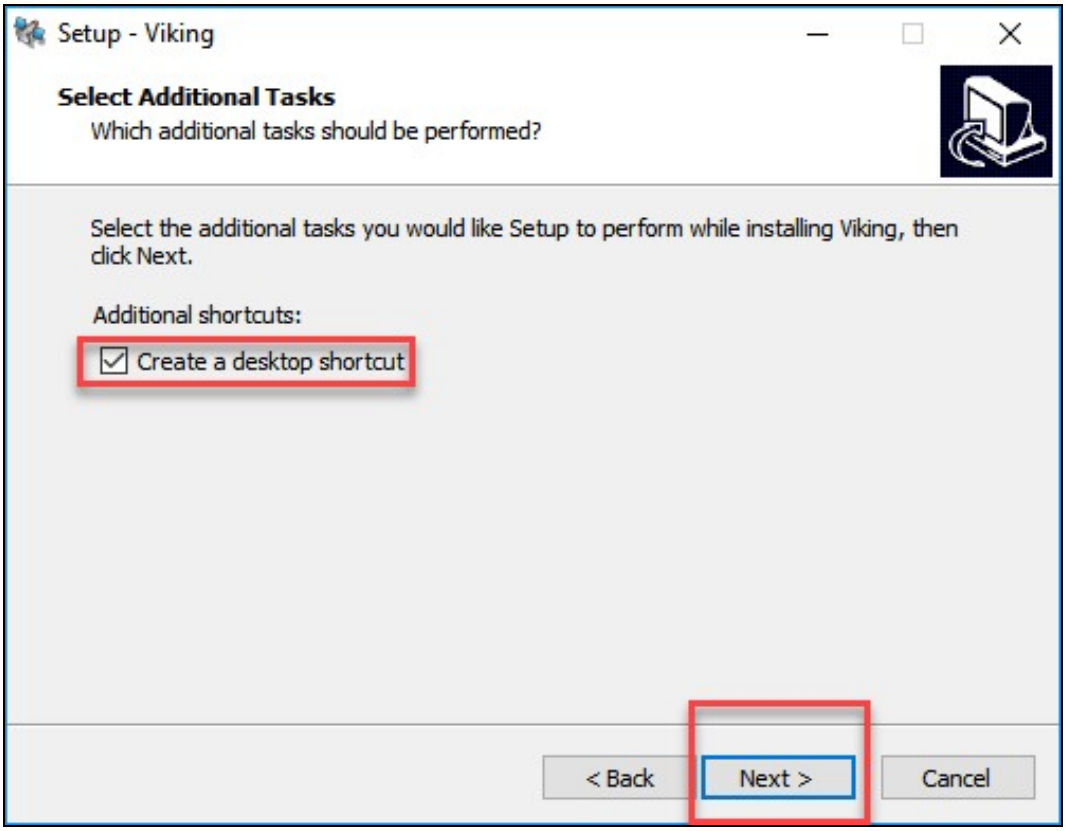
Click the radio button to Accept the agreement and click Next to continue



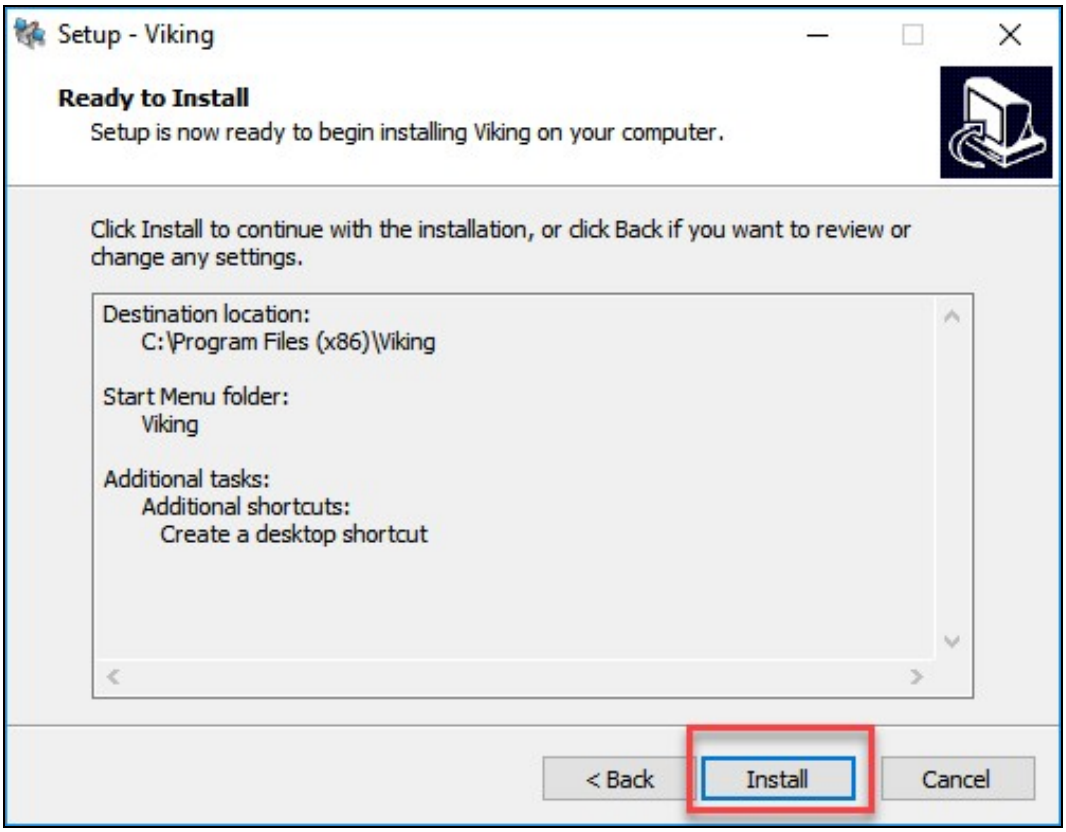
Choose your installation directory or just accept the default and click Next to continue



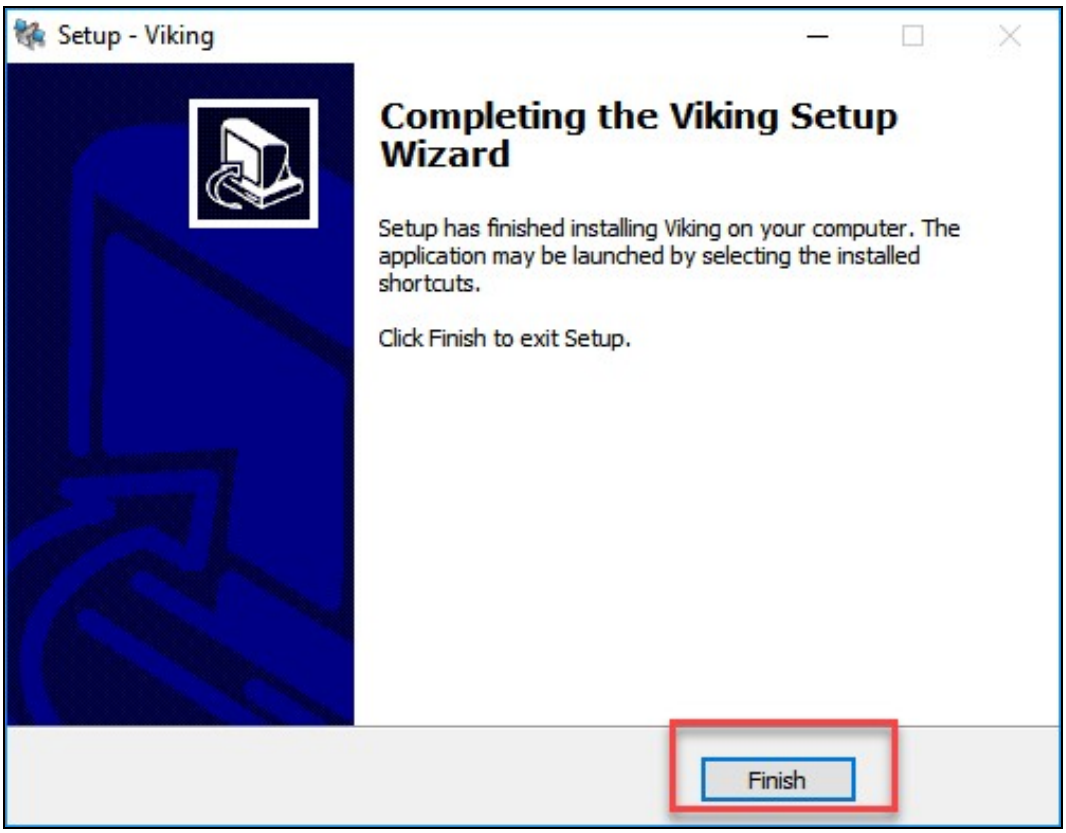
Select your Start Menu folder or accept the default and click Next to continue



Check the box to create a desktop shortcut (recommended) and click Next to continue



Confirm your settings and click Install to perform the installation, or Back to make changes

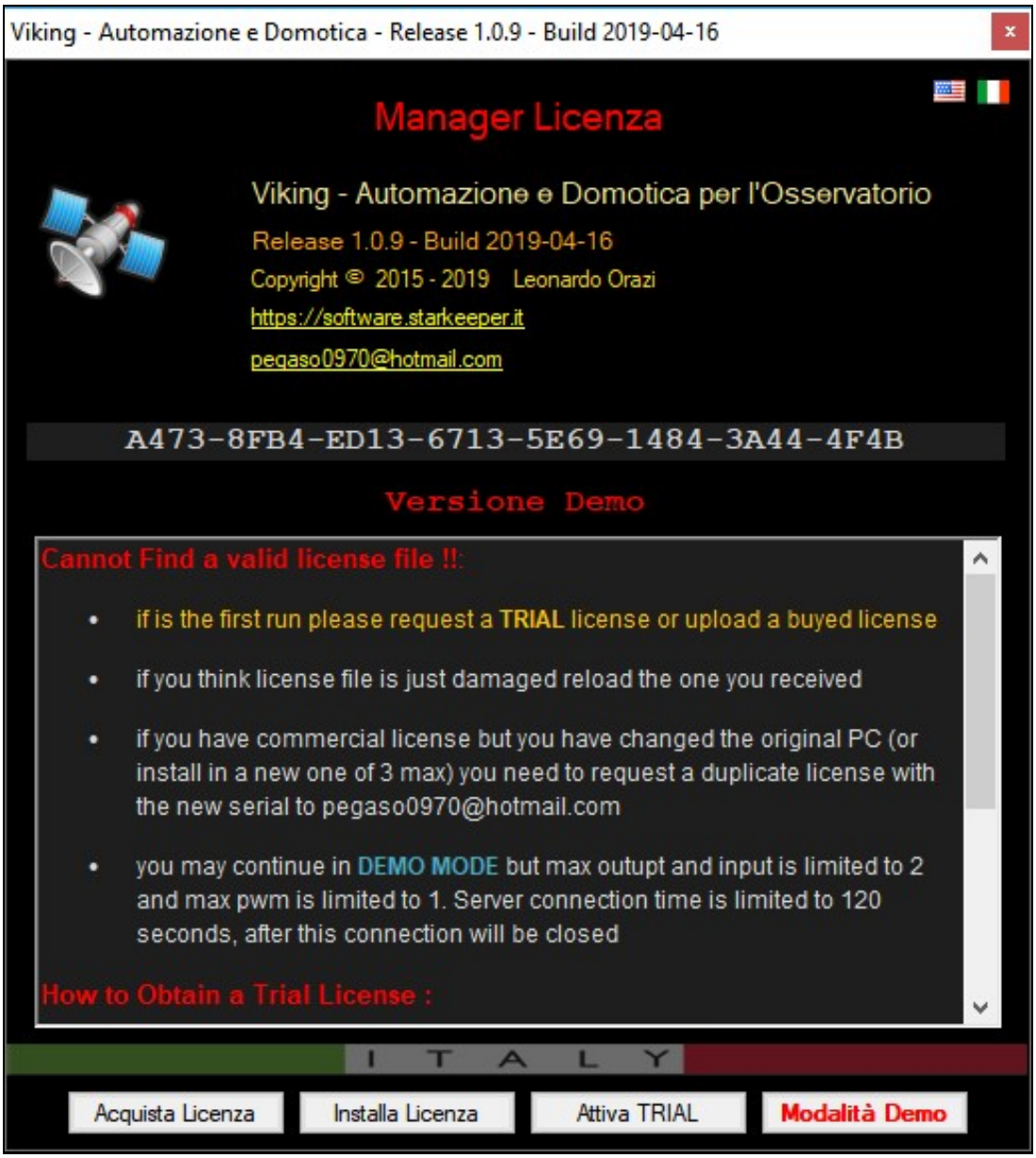


Click Finish to exit Setup

54.3 Licensing

Double click the desktop Viking icon, or type Viking in the Windows menu to find and start the application.

Viking will start in Demo mode and show the License Manager splash screen



In Demo Mode, the number of I/O devices is limited and the application server is not available.

You can use Demo Mode indefinitely to learn the Viking software and work with the included Simulator.

54.3.1 Trial License

When you are ready to start your 45 day free trial, click the Attiva TRIAL button (Activate Trial). If you are connected to the Internet, your trial license will be automatically activated.

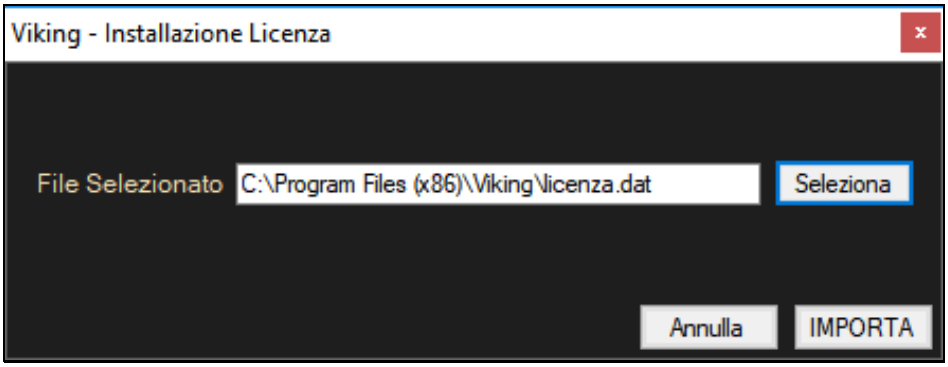
If you are not connected to the Internet, follow the instructions under "How to Obtain a Trial License" in the splash screen. You will have to copy and paste the serial number - in the example above it is the set of eight four-digit blocks of letters and numbers - into an email and send it to the email address shown in the message. You will receive a license file within 24-48 hours by email.

54.3.2 Commercial License

Click the Acquista Licenza button (Buy License) to obtain a commercial license. You will have to copy and paste the serial number - in the example above it is the set of eight four-digit blocks of letters and numbers - into the order form when you buy the license. You will receive a license file within 24-48 hours by email.

54.3.3 Installing Your License

Click the Installa Licenza (Install License) button to install your license file.



Click the Seleziona (Select) button to browse to the license file attached to the email you received.

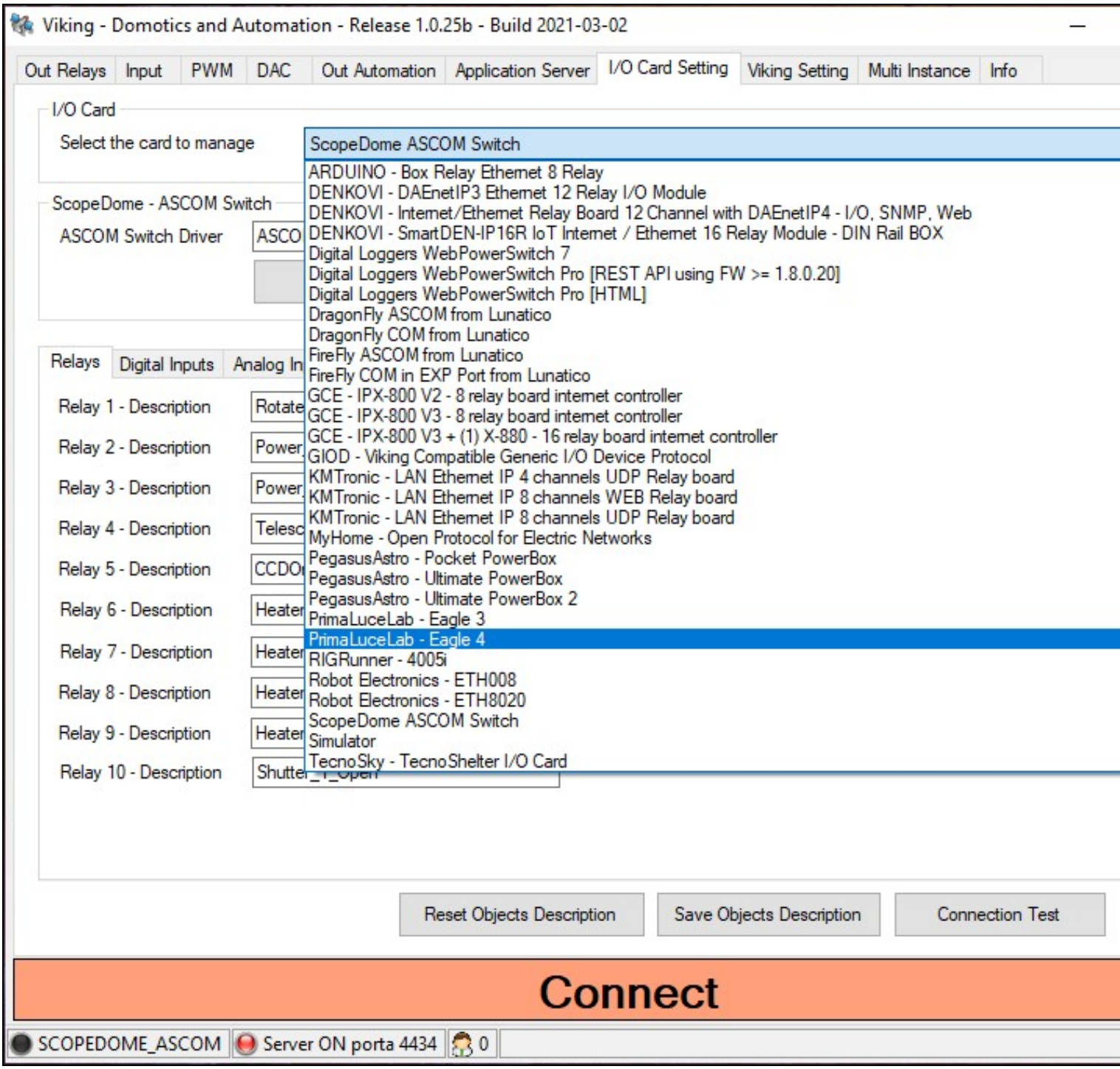
Click IMPORTA (Import) to import the license file and activate it. Click Annulla (Cancel) to cancel the operation and exit the window.

You can now start Viking and use it with your newly installed license.

54.4 Setup

You can setup your I/O controller card on the I/O Card Setting tab of the Viking GUI.

One instance of Viking can control one I/O card.

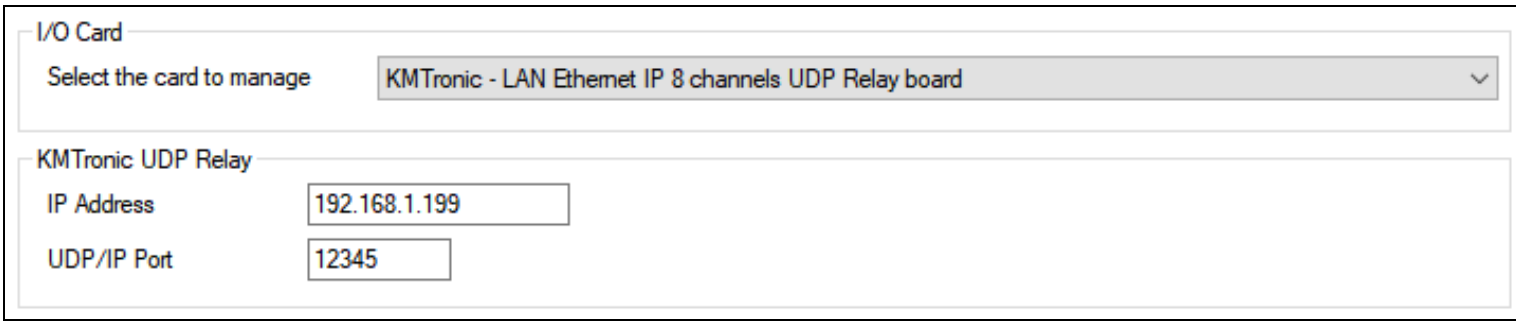


- **I/O Card**: Choose your I/O card from the drop-down list of supported devices.

Depending on the I/O card you select, different fields will be displayed directly below the I/O card selection drop-down.

These fields tell Viking how to address the I/O card. Fill them out as appropriate for your card.

In this example, the KMTronic UDP Relay card is selected, and it requires an IP Address and UDP/IP Port number.

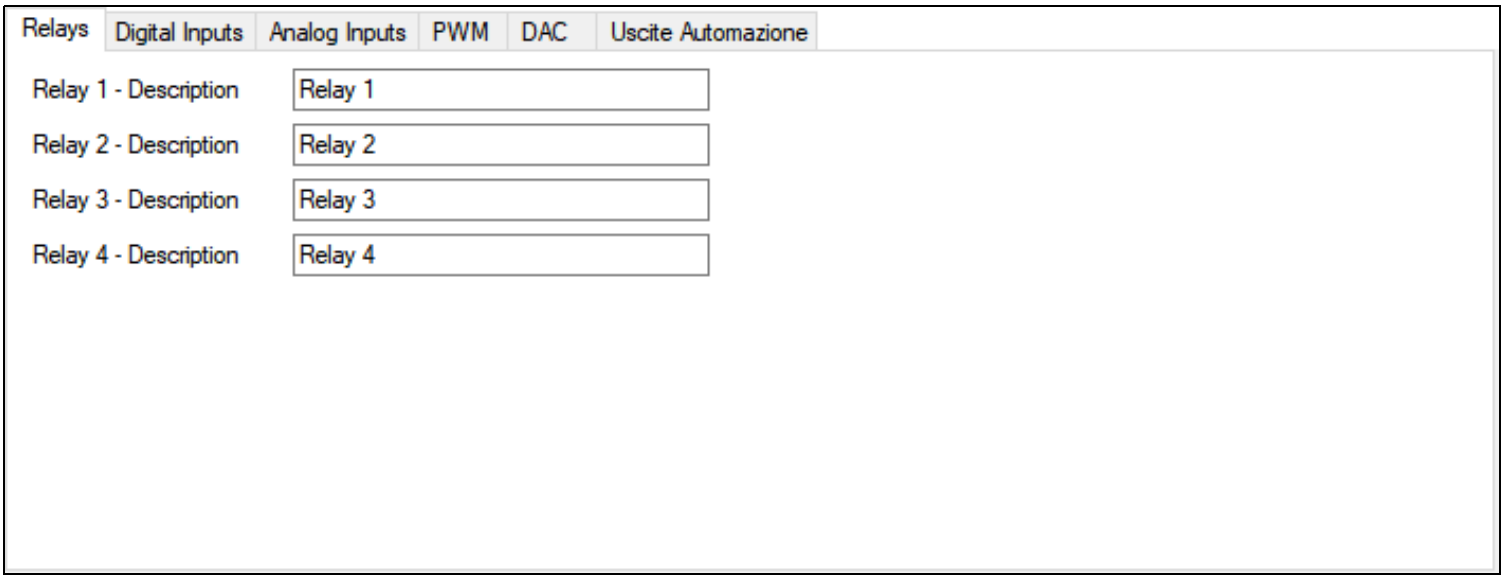


Most cards use an IP address and port number, but some have ASCOM drivers or other means of connecting.

Depending on the capabilities of the card you select, one or more of the tabs in the lower half of the screen will have relevant settings for the selected card.

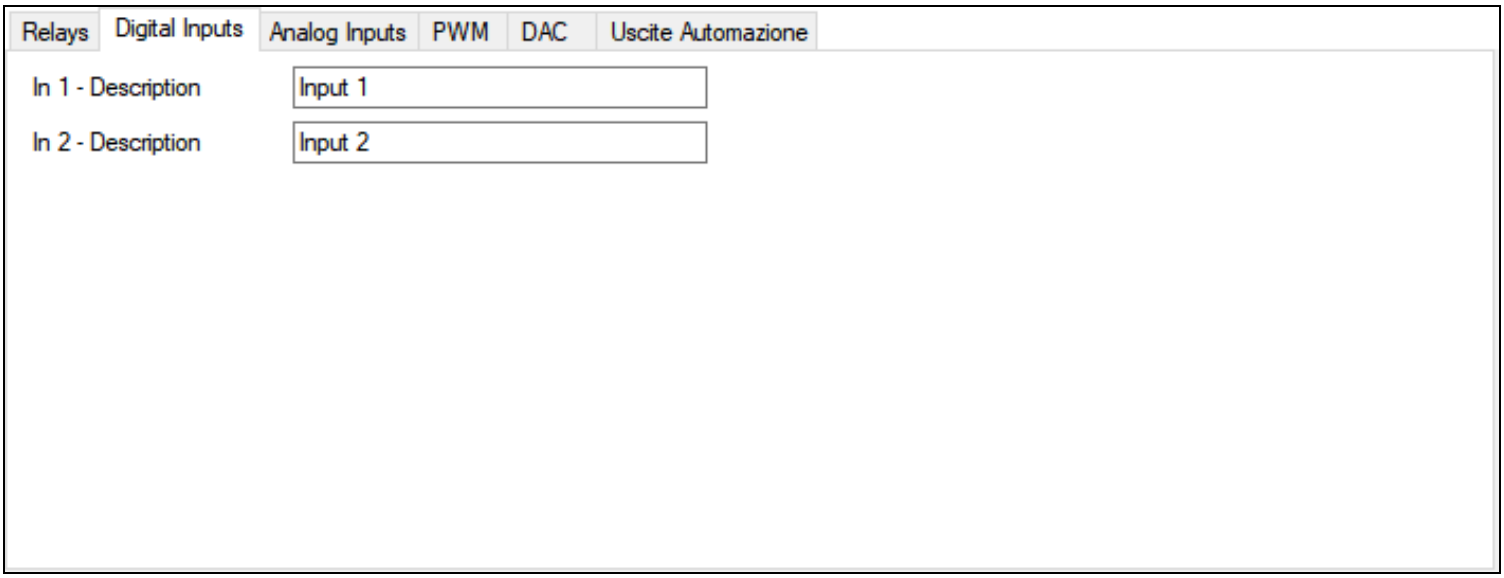
54.4.1 Relays Setup Tab

The number of relays shown on this tab should match the number on the I/O card selected from the drop-down on this tab.



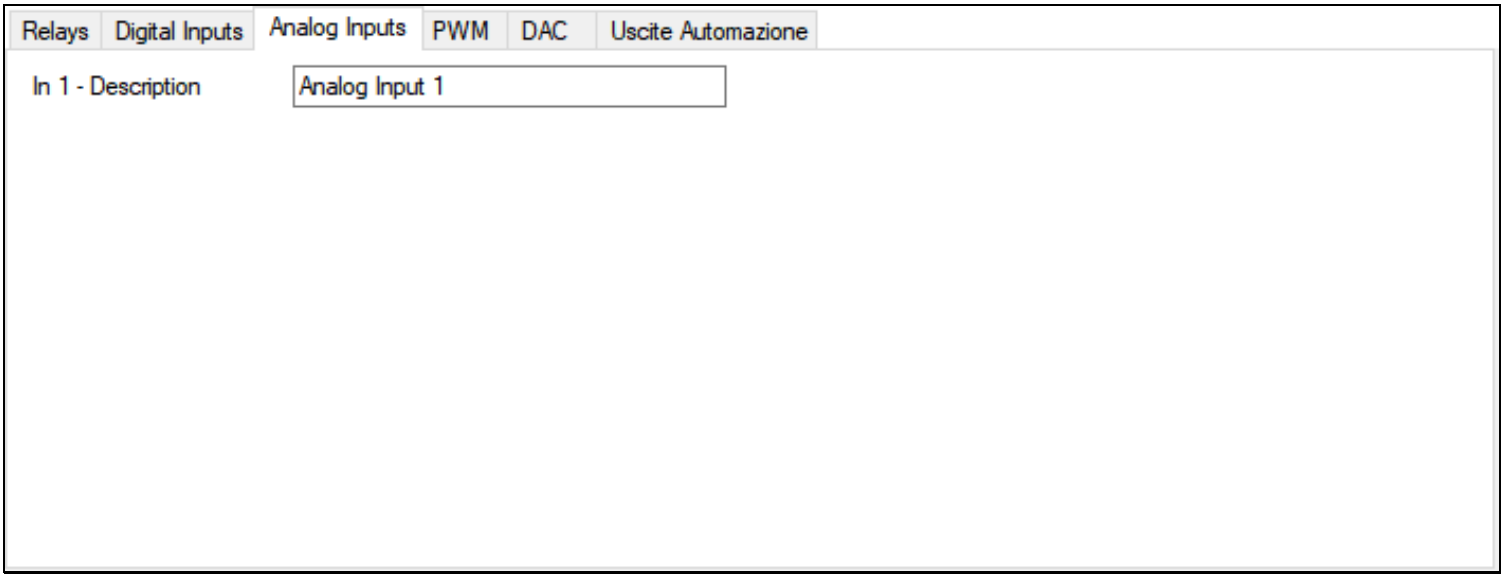
- **Relay X - Description**: Provide a meaningful name for the relay. The name you provide here will appear on Viking's Relay control tab

54.4.2 Digital Inputs Setup Tab



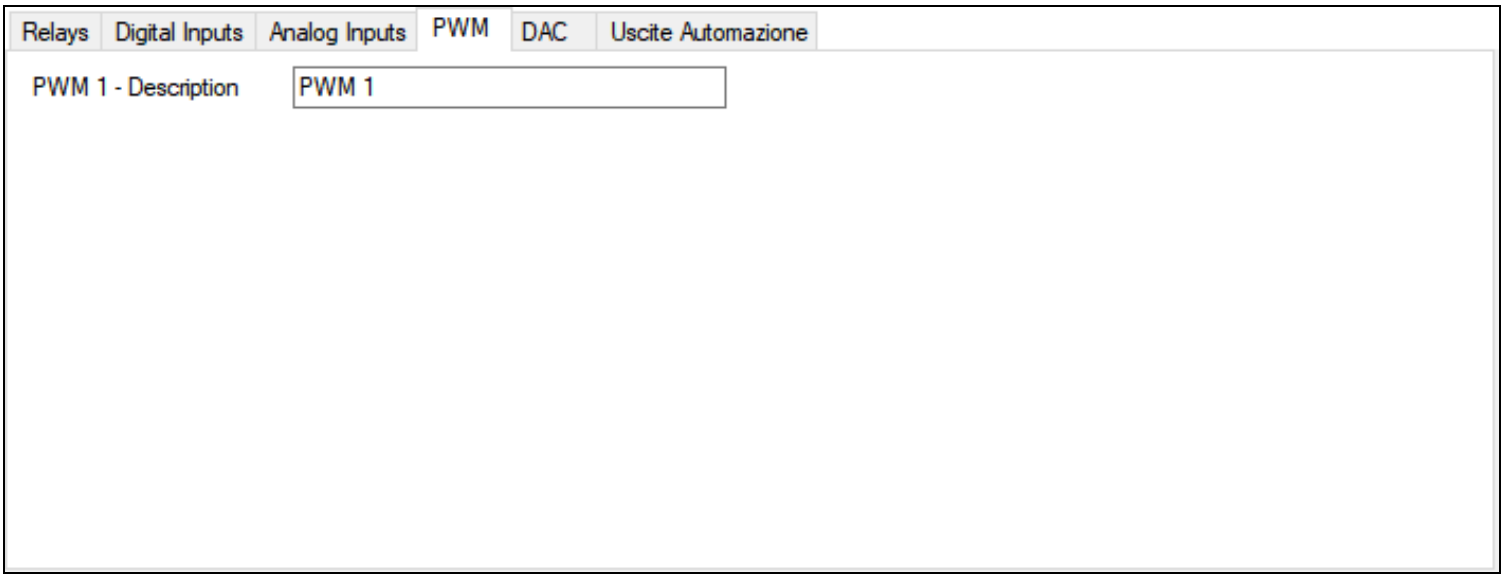
- **In X - Description**: Provide a meaningful name for the digital input. The name you provide here will appear on Viking's Input control tab

54.4.3 Analog Inputs Setup Tab



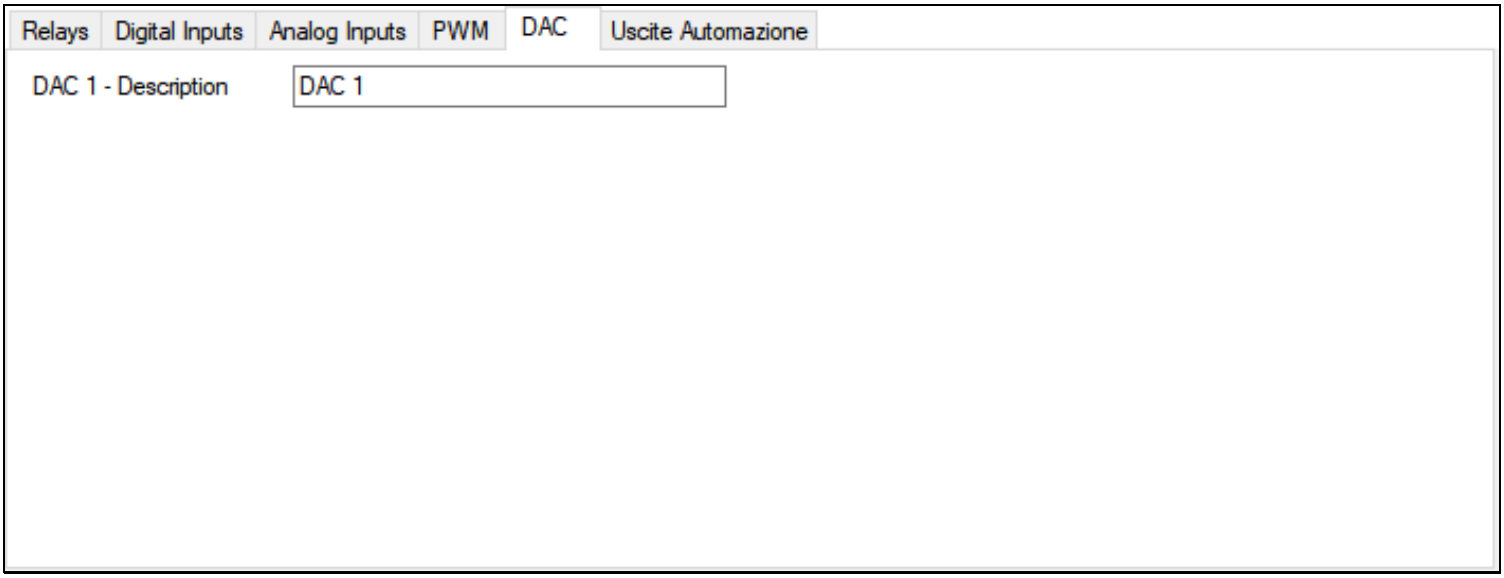
- **In X - Description**: Provide a meaningful name for the analog input. The name you provide here will appear on Viking's Input control tab

54.4.4 PWM Setup Tab



- **PWM X - Description**: Provide a meaningful name for the PWM device. The name you provide here will appear on Viking's PWM control tab

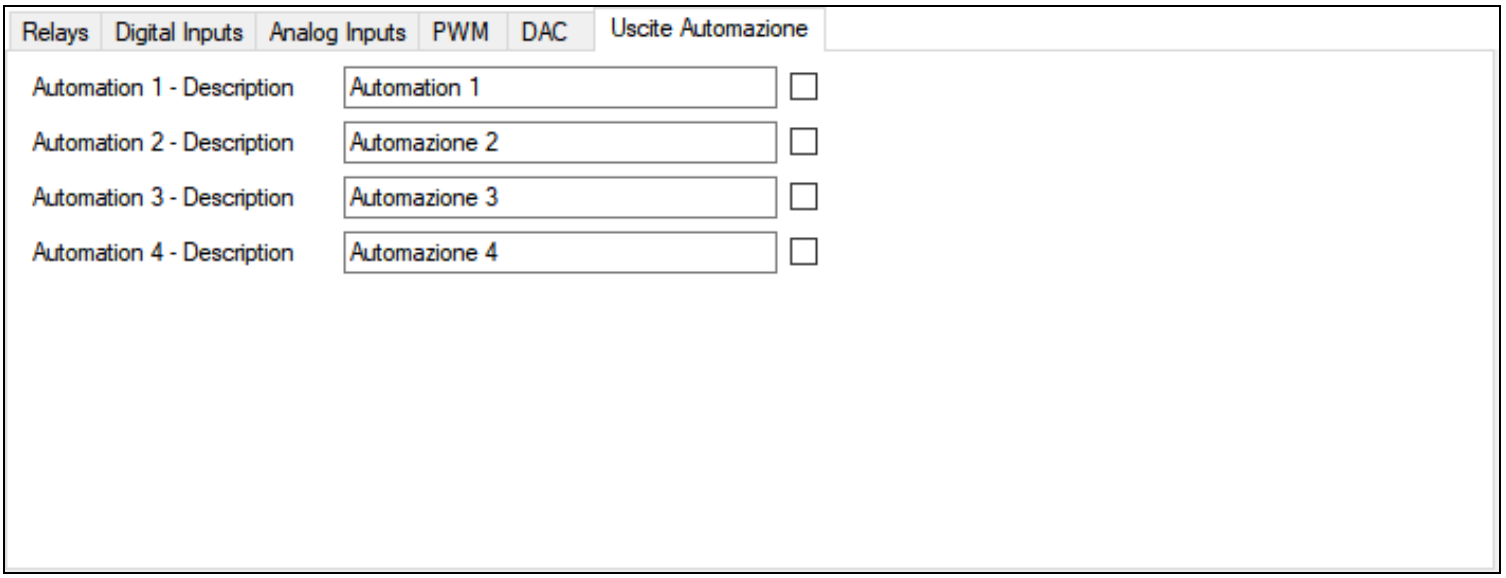
54.4.5 DAC Setup Tab



- **DAC X - Description**: Provide a meaningful name for the DAC device. The name you provide here will appear on Viking's DAC control tab

54.4.6 Uscite Automazione Setup Tab

Note: "Automations" are unique to the MyHome automation device. You can use Voyager's DragScript to automate reading and setting any I/O device controlled by Viking.



- **Automation X - Description**: Provide a meaningful name for the Automation device. The name you provide here will appear on Viking's Out Automation control tab

54.5 Additional Info for some I/O Cards:

Below is specific information for some I/O Cards regarding their use:

Important Note! Read carefully below if you have connection and use problems and you are using one of the cards listed below

- **Digital Logger:**
  - In order to use this cards its necessary to use firmware version 1.8.0.20 or newest, activate the flag for REST API for admin and not admin user, choose also legacy clear login allow flag (or Allow legacy plaintext login methods) using web setup. Viking use REST API to communicate with this Card.
- **DragonFly e FireFly from Lunatico (COM and ASCOM):**
  - Use Viking (Or Voyager if you manage Vikign from Voyager) to connect first time the hardware, in this way the user environment is the one correct to be used with Viking. Other you will not be able to connect the board
  - If you have used another program (not VIking and Voyager) you must kill the DragonFly /FireFly application or better restart the PC to use with Voyager

54.6 Descriptions and Connection Test

After naming your I/O card's individual controls, you can save the descriptions to a file, reset the descriptions to the default, and test your connection.

The buttons below the descriptions provide these functions:

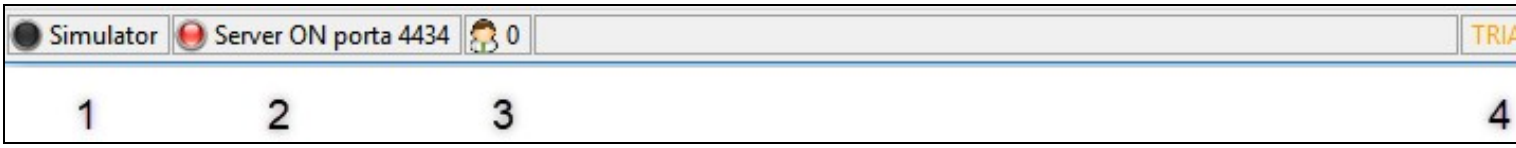
- **Reset Objects Description:** Sets the descriptions back to the default values, e.g. Relay 1, Relay 2, etc. Be sure this is what you want so you don't accidentally lose all your meaningful names
- **Save Objects Description:** Saves the descriptions (meaningful names)
- **Connection Test:** After selecting your I/O card and configuring its address, click Connection Test to make sure Viking can communicate with your I/O card

54.7 Connecting and Status

At the bottom of the Viking GUI you will always find the Connect button and some additional status information.

- **Connect:** Click to connect to your I/O card. After successfully connecting, the button reads Disconnect. Click to disconnect from your I/O card

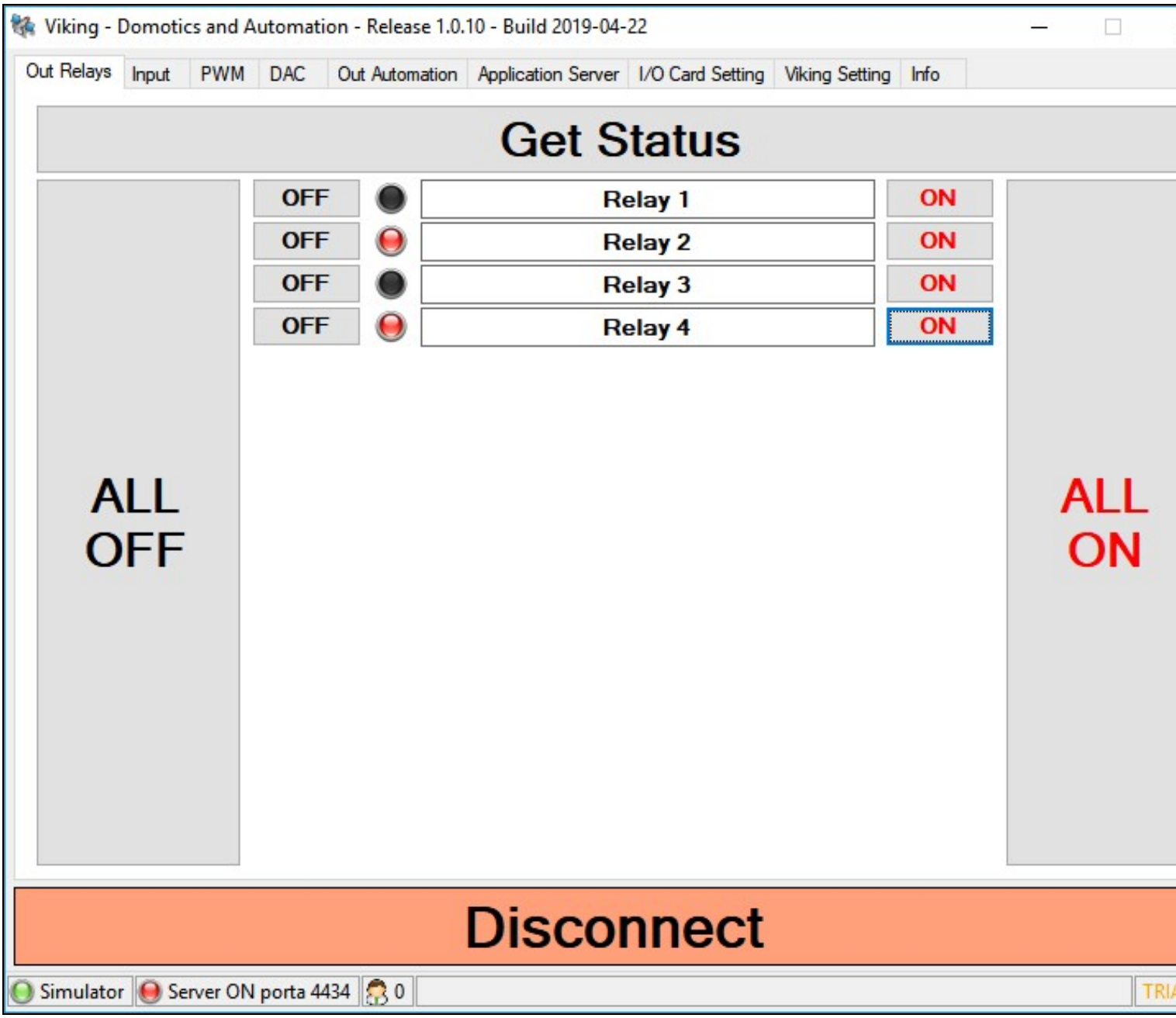
Connection status information appears at the bottom of the Viking window:



1. The type of I/O control card selected. The LED is black if not connected, green if connected
2. Viking's Application Server port number. In this example, the application server is on port 4434
3. Number of clients connected to Viking's application server
4. License type

54.8 Relay Devices

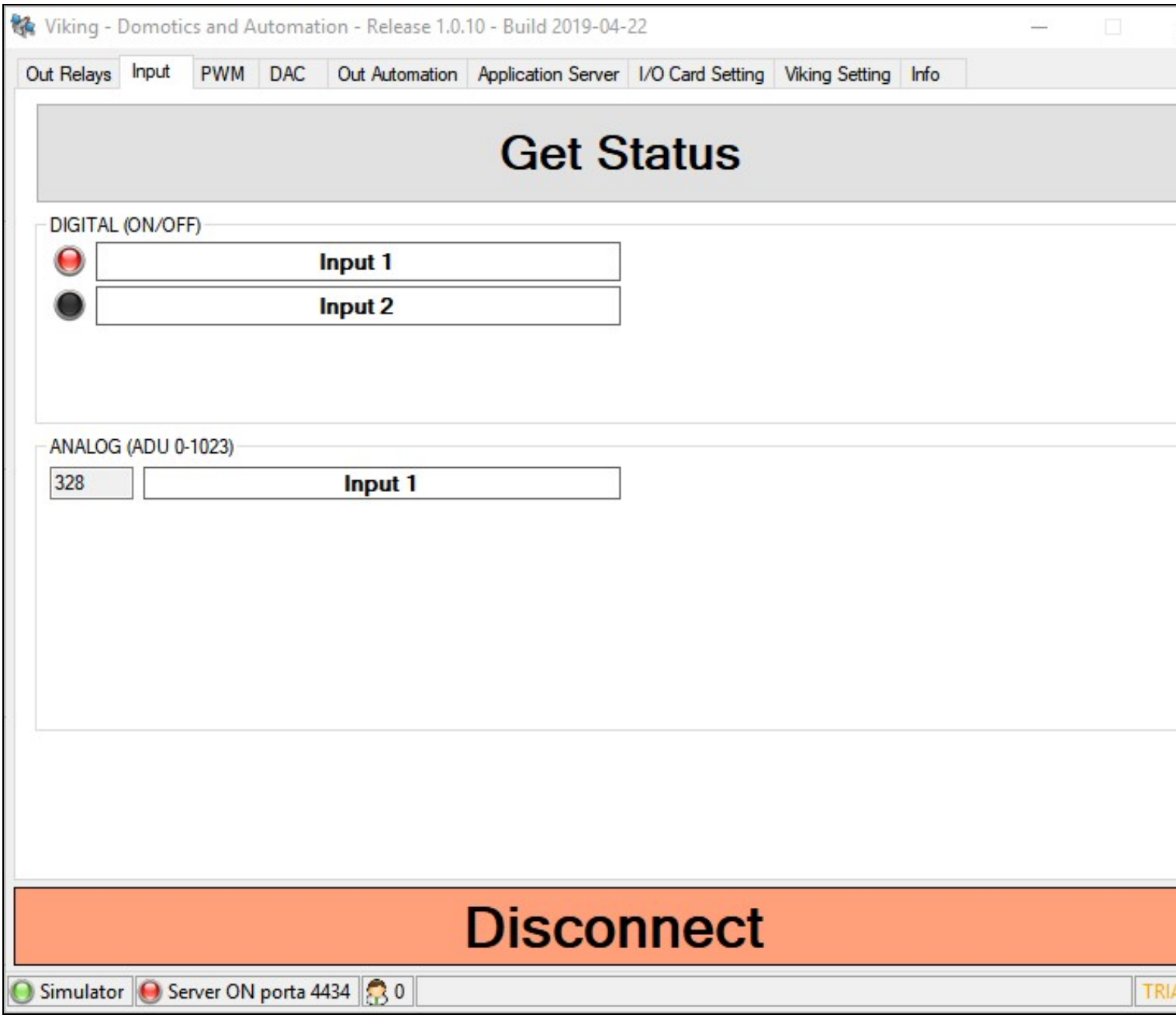
The Out Relays panel shows the current status of connected Relay devices and provides buttons to set individual or all relays on or off.



- **Get Status**: Click to refresh relay status
- **ALL OFF**: Click and then click OK on the confirmation popup window to set all relays to the OFF position
- **ALL ON**: Click and then click OK on the confirmation popup window to set all relays to the ON position
- **OFF**: Click the OFF button to the left of the relay description to turn an individual relay OFF
- **ON:** Click the ON button to the left of the relay description to turn an individual relay ON
- **LED's**: The LED's to the left of the descriptions are black if the device is OFF, and red if it is ON

54.9 Input Devices

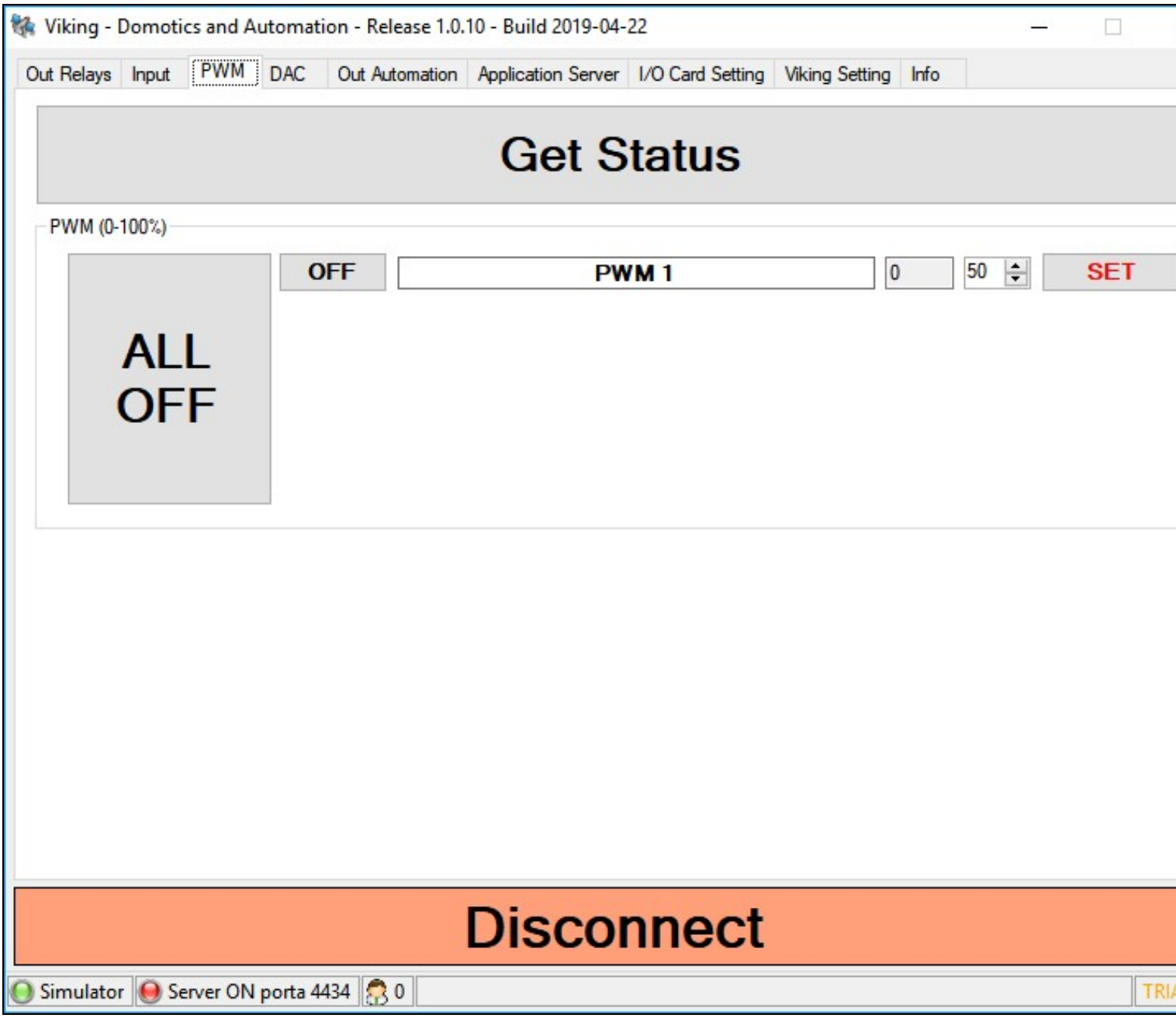
The Input panel shows the current status of connected digital and analog input devices



- **Get Status**: Click to refresh device status
- **LED's**: The LED's to the left of the descriptions are black if the device is OFF, and red if it is ON
- **Analog:** The value of the Analog input is displayed in the box to the left of the description

54.10 Pulse Width Modulation (PWM) Devices

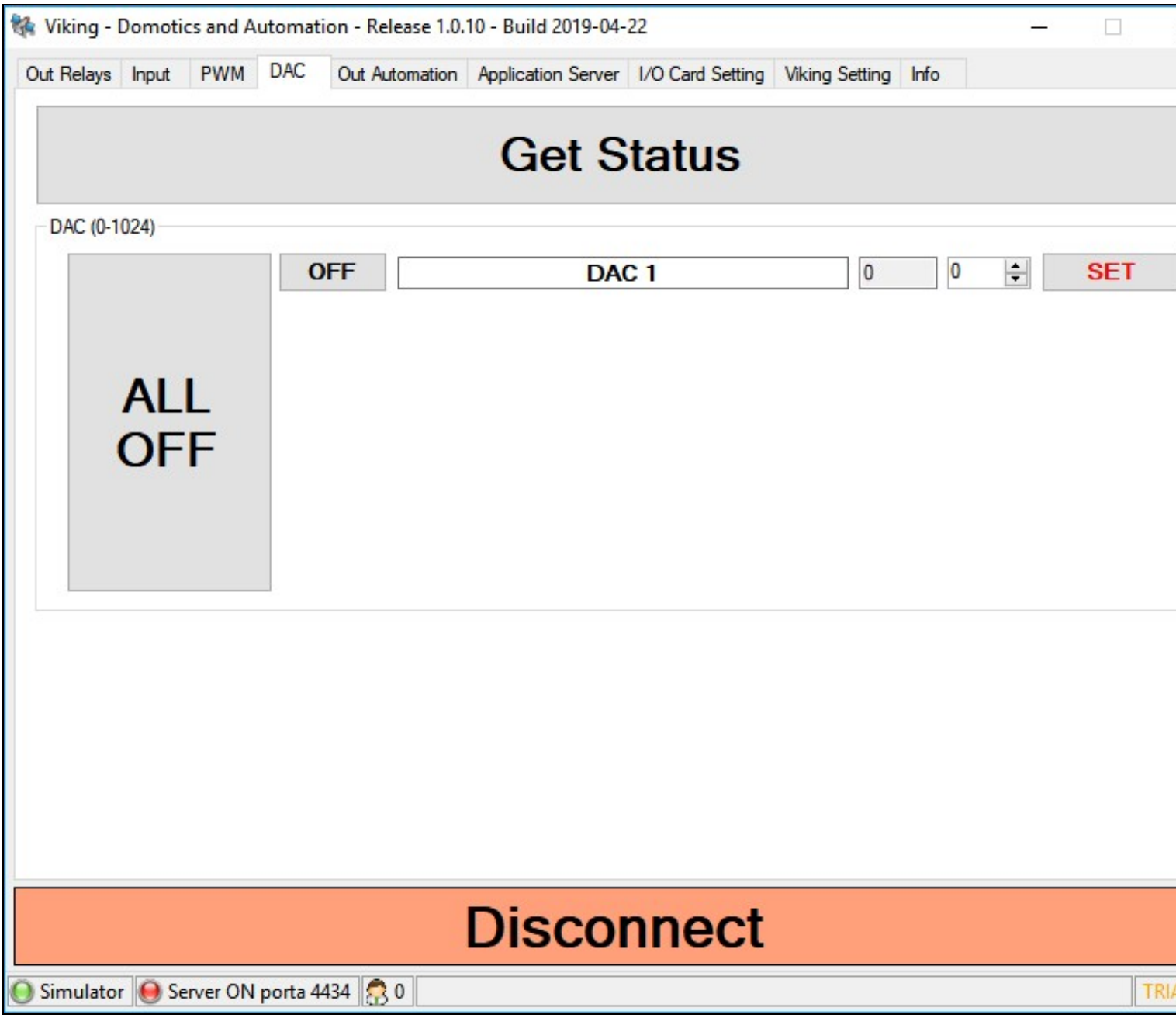
The PWM panel shows the current status of connected PWM devices and provides buttons to set individual or all PWM devices to a specified value or off.



- **Get Status**: Click to refresh PWM device status
- **ALL OFF**: Click and then click OK on the confirmation popup window to set all PWM devices OFF
- **OFF**: Click the OFF button to the left of the relay description to turn an individual PWM device OFF
- **SET:** Sets the PWM device to the value specified by the counter field
- **Value**: The field to the right of the PWM description label shows the current value of the PWM device

54.11 Digital to Analog Conversion (DAC) Devices

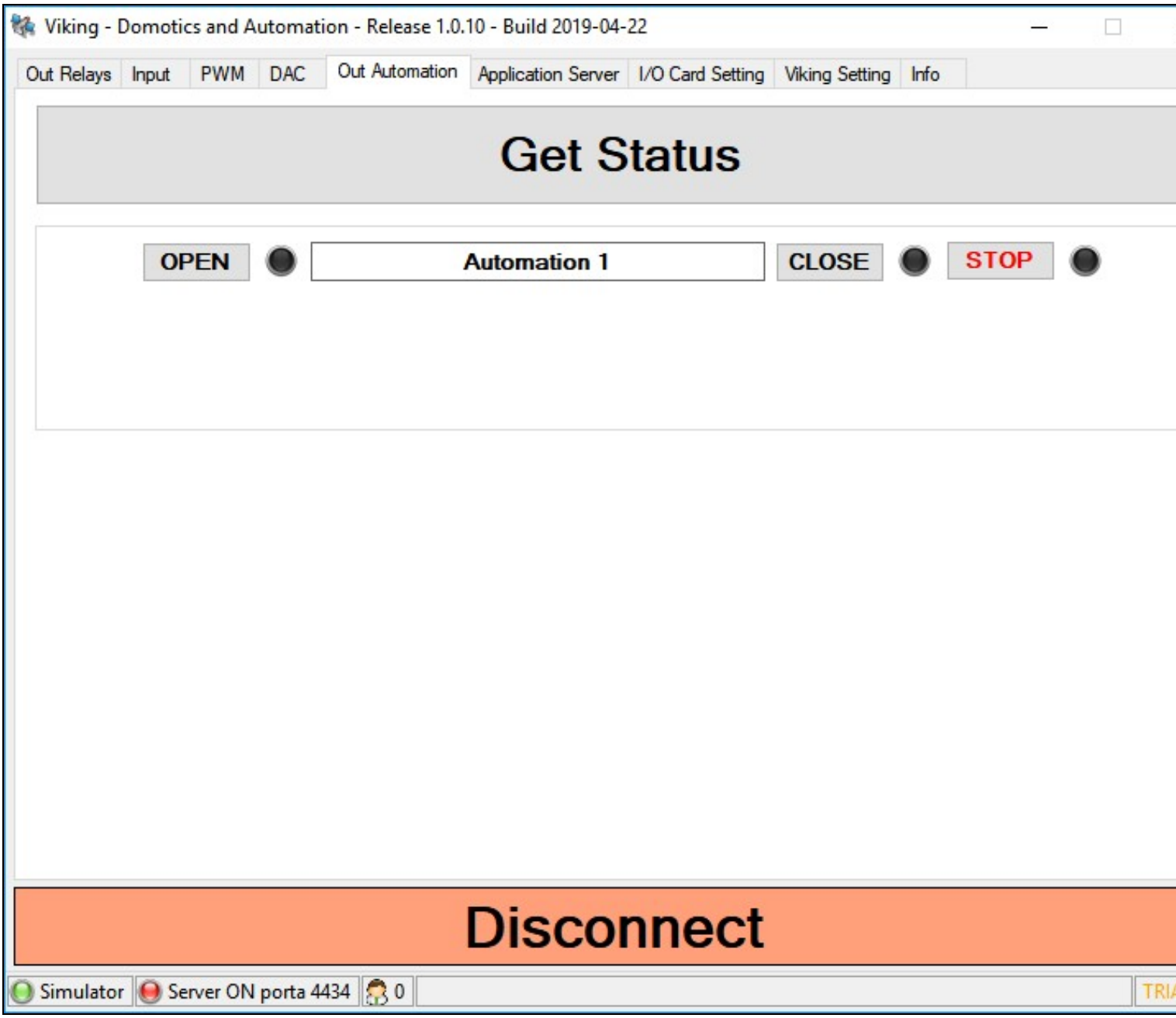
The DAC panel shows the current status of connected DAC devices and provides buttons to set individual or all DAC devices to a specified value or off.



- **Get Status**: Click to refresh DAC device status
- **ALL OFF**: Click and then click OK on the confirmation popup window to set all DAC devices OFF
- **OFF**: Click the OFF button to the left of the relay description to turn an individual DAC device OFF
- **SET:** Sets the DAC device to the value specified by the counter field
- **Value**: The field to the right of the DAC description label shows the current value of the DAC device

54.12 Home Automation Devices

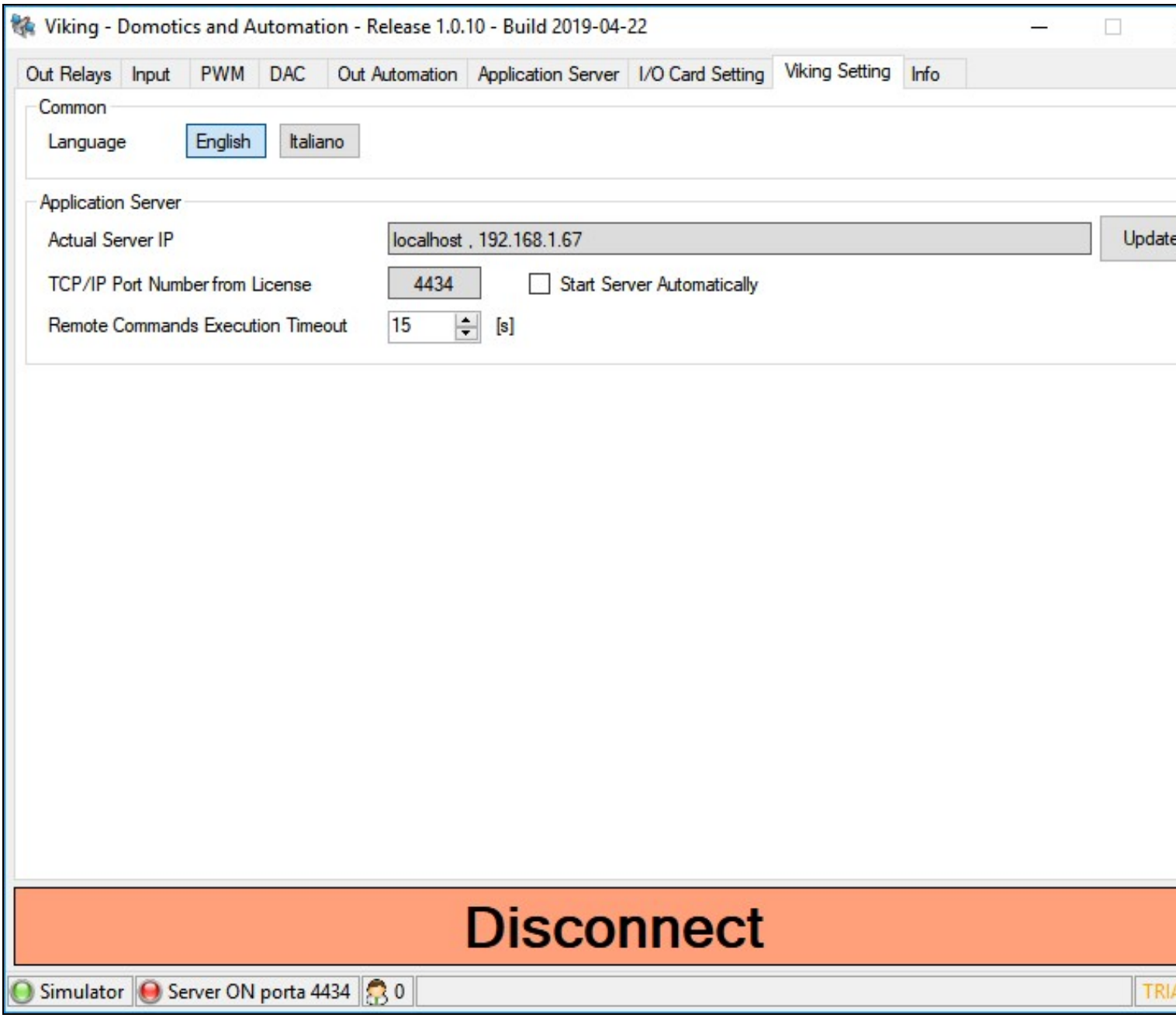
The Out Automation panel shows the current status of connected Bticino MyHome devices and provides buttons to Open, Close or Stop a MyHome automation



- **Get Status**: Click to refresh device status
- **OPEN:** Open the MyHome automation
- **CLOSE**: Close the MyHome automation
- **Stop:** Stop the MyHome automation
- **LED**: The LED's to the right of the button are black until the button is clicked, then red to indicate the MyHome automation status for that button is active

54.13 Viking Settings: Common and Application Server

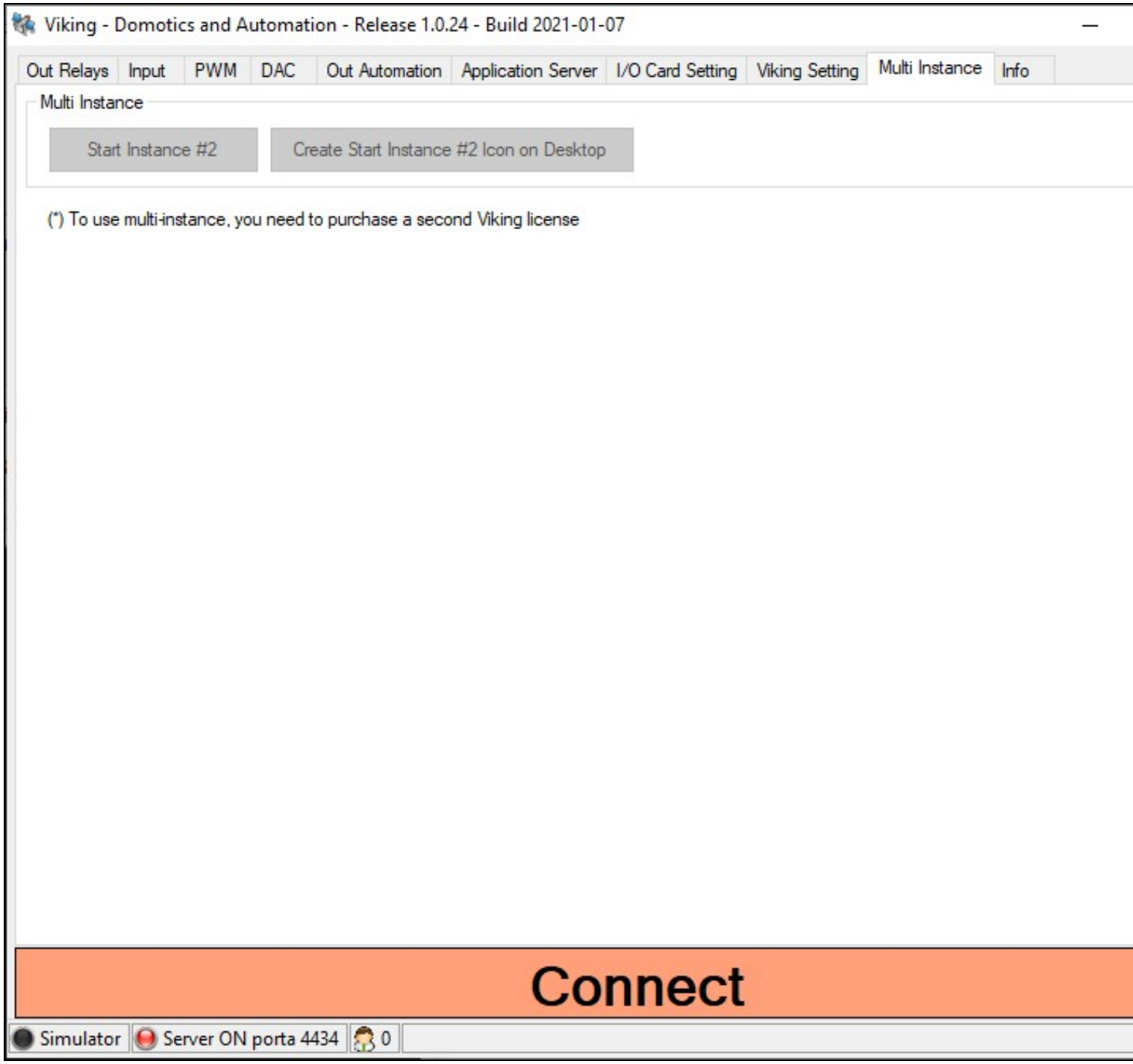
The Viking Setting tab is where configuration information about Viking itself (not the I/O cards) is stored.



- **Common:**
  - **Language:** Choose the interface language, English or Italian
- **Application Server:** Settings for the application server contained in Viking
  - **Actual Server IP:** IP address for the Viking program's application server. This is the IP address of the machine where this instance of Viking is running
    - **Update:** Click this button to read the IP address of the machine if it has changed since the last setting
  - **TCP/IP Port Number from License:** Port number of Viking's application server. This is read from your Viking license file.
  - **Start Server Automatically**: If checked, Viking's application server will start when Viking starts
  - **Remote Commands Execution Timeout:** How long to wait in seconds before considering a remote command to have timed out
    -

54.14 Multi Instance

Starting from release 1.0.24 Viking allow multi instance running correctly in on PC. This tab allow you to start the 2nd instance or create a shortcut icon on the Desktop to start the 2nd instance.



- **Start Instance #2:** click the button to open a second instance of Viking
- **Create Start Instance #2 Icon on Desktop:** create a shortcut icon on the Desktop to start the 2nd instance

Important Note! To activate the Multi Instance you must purchase a second license of Viking for the same serial. You will receive a dedicated license file to unlock the features.

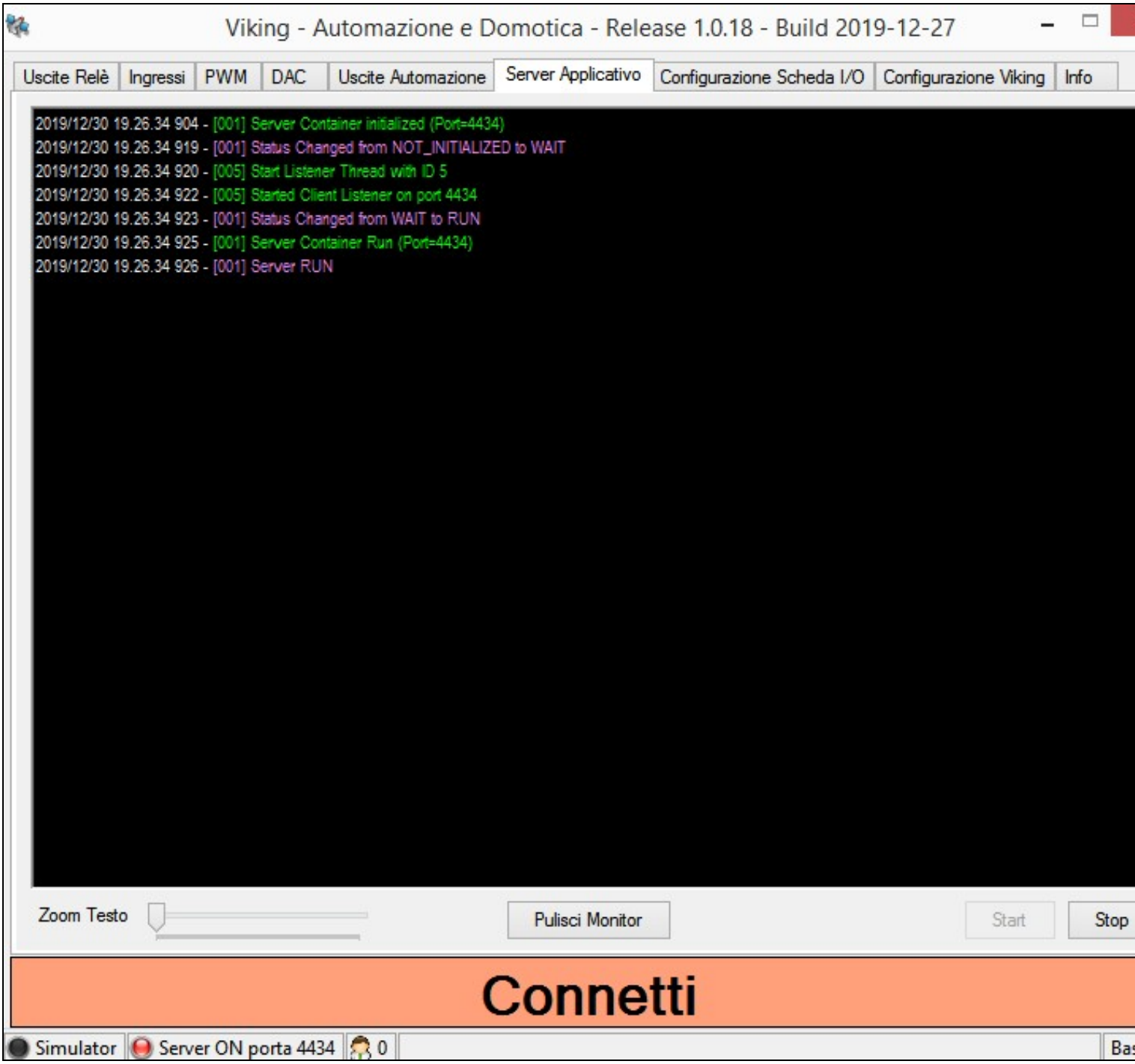
Important Note! You can run a max of 2 instances of Viking in one PC

Important Note! With 2 instances running you can manage 2 different I/O cards. Voyager, starting from version 2.2.16j, have a second Viking client ready to be configured and used.

Important Note! If your tab for multi instance is disabled this means: you dont have license enabled for multi instance, you are in demo mode, your instance is the #2

54.15 Application Server Monitor Window

The Application Server tab contains a running log of timestamped application server commands and responses:



- **Text Zoom:** Move the slider to change the font size for the text in the monitor window
- **Clear Monitor:** remove all text in the monitor log of application server
- **Start:** start the application server
- **Stop:** stop the application server

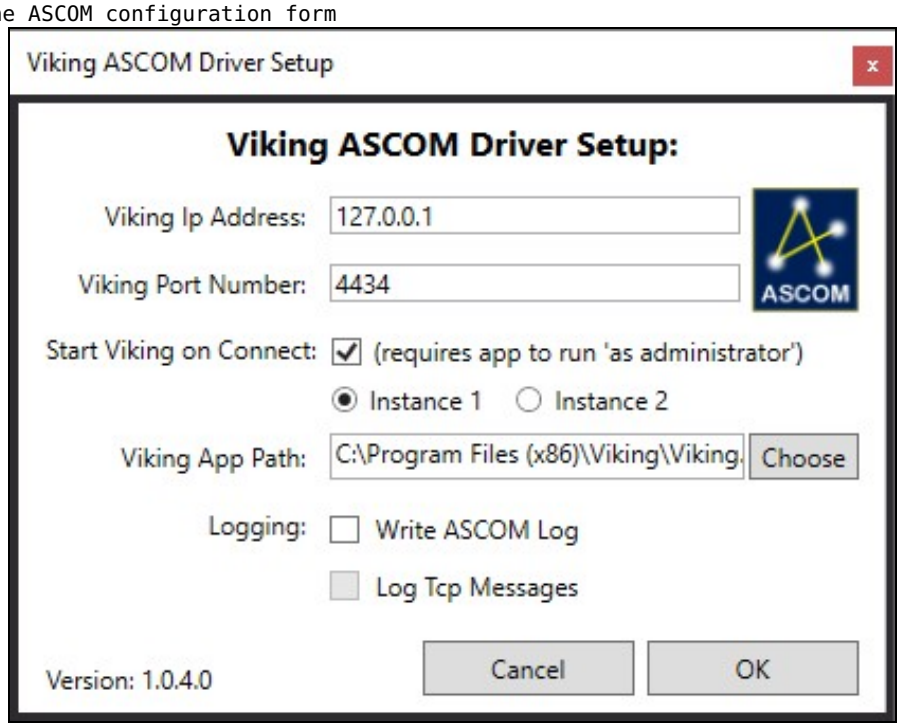
54.16 Viking ASCOM Switch driver for 3rd part Automation Software Integration

We have developed [Thanks to Michael Poelzl] an ASCOM Switch Driver for VIking that allow other automation software, that support ASCOM Switch Client, to use Viking for interface to all the I/O cards managed by Viking. Starting from Viking 1.0.26 we support the ASCOM interaction with this driver. You can download it on our website at download section https://software.starkeeper.it

Prerequisites are:

- Viking 1.0.26 ore newer Installed and configured
- ASCOM Platform 6.4 or newer installed
- Microsoft Dot.Net Framework 4.6 installed

How to install

- check the prerequisites above
- download the Viking ASCOM Switch Driver Installer from our website
- start the installation
- follow instructions at video during installation
- Open your Automation Software (SGP,NINA...)
- Select in the ASCOM Switch section of your software the driver choosing the "ASCOM Switch Driver for Starkeeper Viking Application"
- Open the ASCOM configuration form
    - 

    - **Viking IP Address:** insert the IP of the PC where Viking is installed. Insert 127.0.0.1 if your Viking is installed on the same PC of your automation software.
    - **Viking Port Number:** default port is 4434 for istance 1, 4435 for instance 2
    - **Start VIking on Connect:** allow ASCOM driver to start Viking Application at connection if not already start. To work with this feature Viking must start like admin (use compatibility tab of Viking link icon to enable the admini mode)
        - **Instance 1 or 2:** choose the istance you wan to start
    - **Viking App Path:** select the path were Viking is installed (usually c:\Program Files (x86)\Viking...
    - **Logging:** enable the logging on file of the driver activities
        - **Write ASCOM Log:** writing in ASCOM log default folder the ASCOM activities
        - **Log TCP Messages:** add to log also the protocol messages exchanged between Viking and the ASCOM driver

- Connect and test it, your automation software will retrieve all the configuration data from Viking and will show what is provided by the I/O card configured in Viking
- Follow the instructions of your automation software on how use the Switch facilities

[[Category:All]]

55 Application Server API

Voyager contains an Application Server based on TCP/IP connection for remote management based on JSON and JSON RPC protocol. It was originally written to support the SC Observatory project in which Voyager controls an array of telescopes.

Commands usable depends on which kind of license are used.

Download: PDF Version of Voyager Application Server Protocol documentation

56 Array

Voyager Custom Array is a special version of Voyager born to manage array of telescopes over a single mount. its possible to manage from 2 nodes to 4 nodes. Logic used for managed the array node is the MASTER/SLAVE tecnology where a MASTER organize the job and task of each nodes connected (SLAVE) using communications trough the LAN with a TCP/IP packets. Voyager using internal Application Server to allow communications between MASTER and SLAVE.

All the operations in the array are centralized synchronized parallelized and optimized .. isn't a simple dithering sync but something born just to do array job , result of years of development and real test on the field.

Most important features of Custom Array in Voyager:

- Master - Slave Technology with Application Server Communication System
- Single PC multi instances or separate PCs
- Works in Local, LAN/WAN or mixed Mode
- Guide calibration, Guide execution and Dithering are Syncronized
- Advanced Dithering System managed by Single Node, Multiple Node or Full Nodes
- Centralized and Syncronized AutoFocus with RoboFocus on single star and LocalField on multiple Stars
- Single Mount
- Centralized Dashboard Management on Master
- Centralized Sequence Editor on Master
- Integrable in DragScript
- All the Base License feature are included, also in Slave Version.

Array of 4 RH300 - Image courtesy Mike Selby - https://www.masterdarks.com/sc-observatory/

Important Note! Array support is a custom feature and is not included in the Base Voyager license. A special license called Custom array is needed please refer to Voyager WebSite for more info and purchase license.

Important Note! Array's support starting from 2.2.8h version of Voyager

Important Note! If you want to use multi instance on the same PC and need to use a same brand / object for the two nodes (for example 2 focuser of the same type and brand) please be sure driver of your hardware can handle more than one instance of this objects. Otherwise you will need to use 2 or more PC instead of 2 or more instance. In case of use of big camera sensor (more than 80 MB of FIT image, please also considering to use a multi PC system).

56.1 Communications between Nodes of Array

The logic behind Array setup is to have 1 MASTER Array Setup and one or more SLAVE Array Setup(s).MASTER and SLAVEs communicate using TCP/IP protocol with the Voyager Application Server included in Voyager. Possible way to implements the array are (all needed Voyager Custom Array license):

- 1 PC for each node with Voyager installed (communications using LAN with a LAN Switch and Ethernet cable or wi-fi connection)
- 1 PC and 1 instance for each node (if controls used in Voyager for setup allow multiple instance and PC have enough resource to manage it)
- mixed mode where you can have 1 PC for node or 1 PC with more instance (example MASTER and 1 SLAVE in one PC in multi instance and 2 PC with Voyager single instance for the other nodes)

In any case Voyager Application must be enabled for each Voyager node and firewall in each PC must be enabled to allow Voyager Application Server communications over TCP/IP ports 5950,5951,5952,5953. Usually when install Voyager and activate Application Server request about opening firewall will be showed automatically, just say OK and allow (needed only 1 time).

For your info Node is every members of the Array.

56.2 LAN / WI-FI Settings

If you decide to work in LAN please be sure your PCs are on the same subnet of LAN and have a different IP and are connected togheter if necessary with a LAN switch and ethernet cable in case of physical LAN.

You can check raw LAN communication between PCs using the ping command from windows command line.

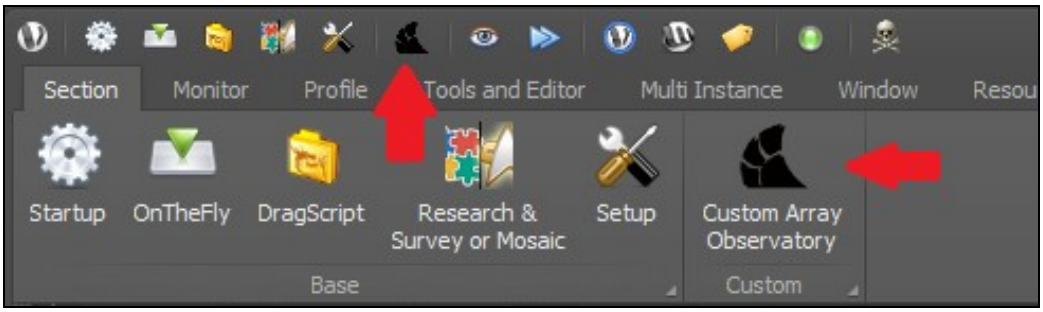
If PCs aren't on the same LAN or firewall is not opened you cannot obtain array (or some nodes) to work.

Important Note! If you use DHCP in your network be sure to do reservation for your IPs of the nodes to aboid connection problem due to the change of IP at next session.

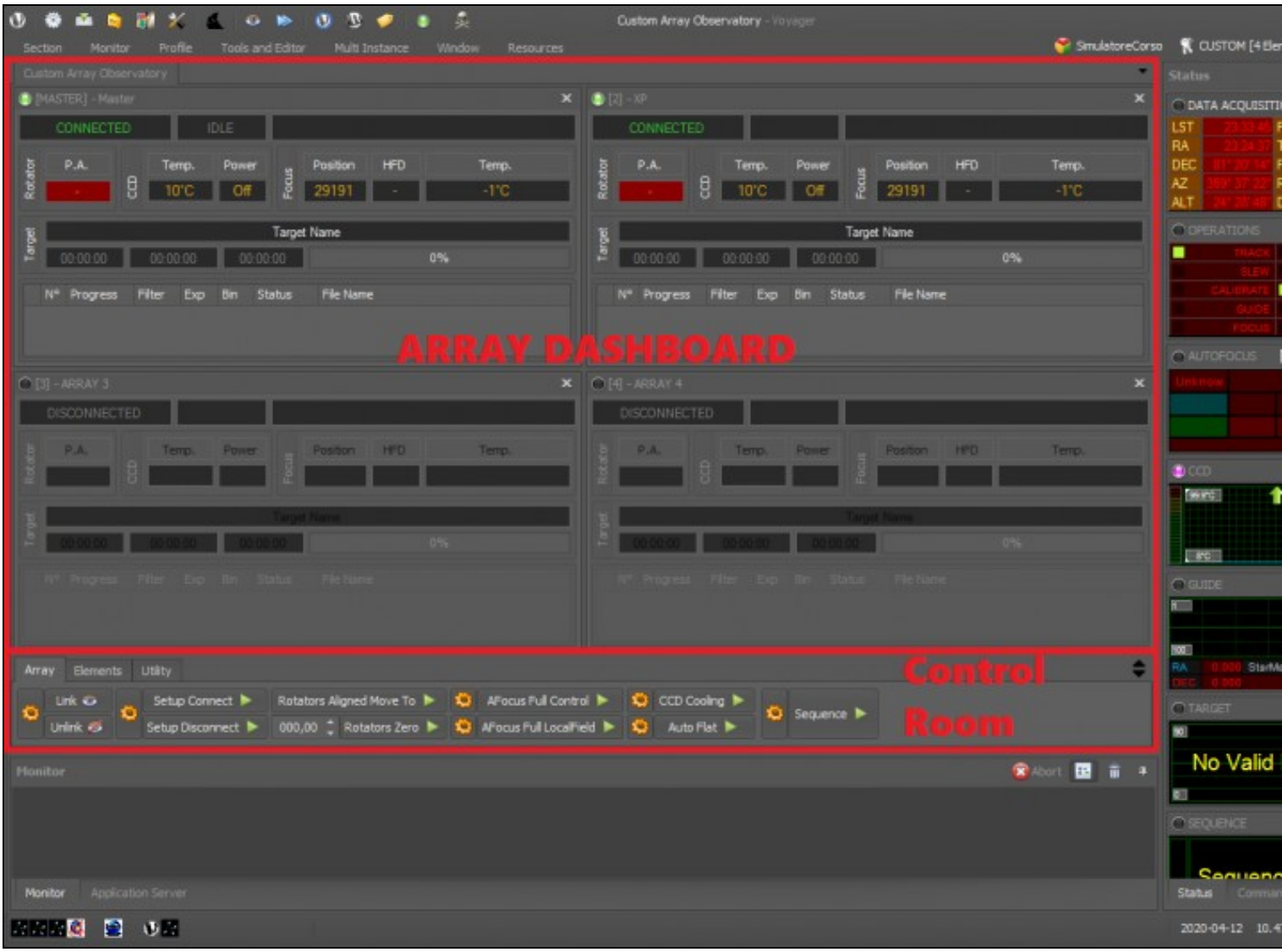
Important Note! Minimum versione of Voyager to run Custom Array Observatory versione is 2.2.8h

56.3 Custom Array Observatory Section

Voyager reserve a new section for the Custom Array, this section called "Custom Array Observatory Section" will be visible in the MASTER of the array and cannot be opened from the SLAVE. You will found an icon dedicated to this section in the main window short menu and main menù:

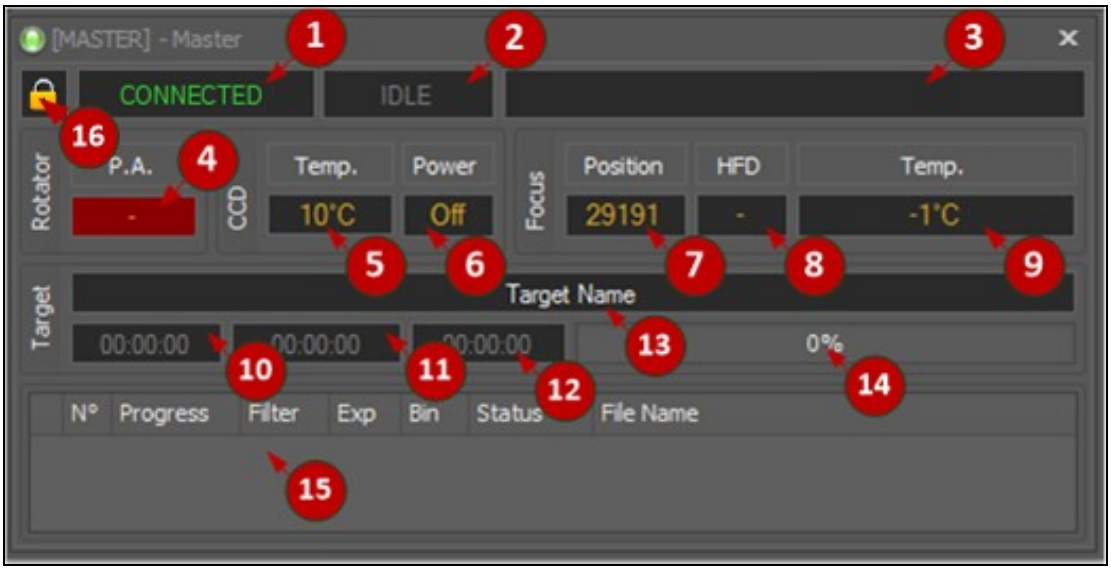


The Custom Array Section Form in divided in 2 parts, upper the dahsboard dedicated to all the Array elements with data and status and lower the control room with all the command to setup the Array and control it:



56.4 Array Dashboard

The Array Dashboard contains one info panel for each array node present in the array included the MASTER, its possible to rearrange position of the panel but not to remove or modify size that is only automatic, the size will be resized with the main windows and the number of panels is locked to the number of array elements allow by license.



The title of the panel report the status of the node connection with a coloured led (green is connected) , the name of the node and if this is a MASTER node or a SLAVE node. Panel cannot be close also if the X command is visible on the windows caption.

All the data in the Panel are referred to the single Node rappresented. Explanation of the fields:

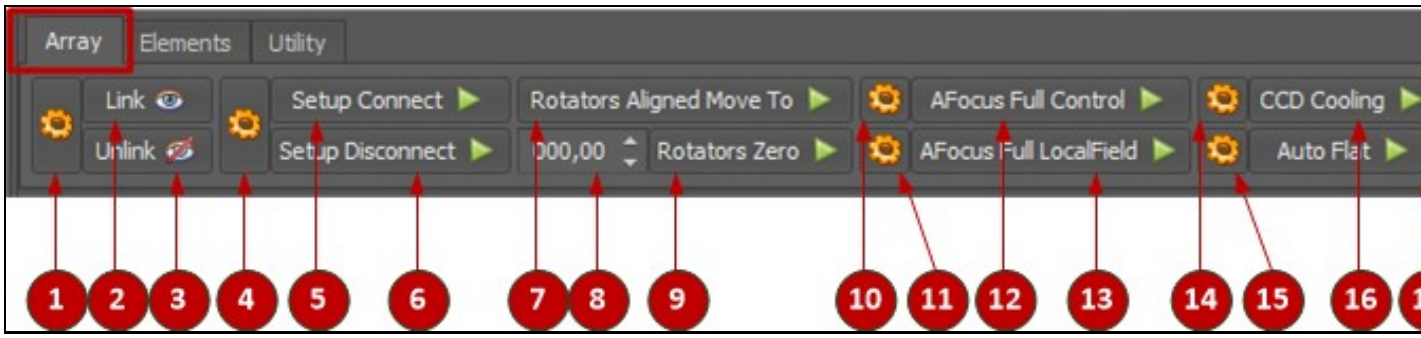
1. **Connection Status:** report the link connection status of the Node related to the Array, connected if the node array is communicating the the MASTER (linked)
2. **Operative Status:** report if the node are running some action or are in IDLE
3. **Details on Action Running on the Node:** report the description of the action running on the node
4. **P.A of the Rotator**: report PA of the Rotator on the node if is present
5. **Temperature of CCD**: report the temperature of CCD on the node if available
6. **Power Status of CCD Peltier**: report the power of CCD peltier on the node if available
7. **Focuser Position in Step:** report the position of the focuser in step of the node
8. **HFD of last focus done:** reporte the last HFD value obtained on autofocus action in the node
9. **Temperature reported from the Focuser system:** report the temperature readed by the focuser system in the node if available
10. **Time start of the Sequence:** report the time when the sequence running was started
11. **TIme to finish of the Sequence:** report (if available) the time when the running sequence will be finished
12. **TIme elapsed of the Sequence:** report the time elapsed by the running sequence
13. **Target name of th Sequence:** report the target name of the running Sequence
14. **Elapsed % of actual Shot in Sequence:** report graphycally and by number the % of elapsed shot
15. **Table with list of all Shot in Sequence and data:** this table show all the list order of the shot will be done or are done or is running, data row represent in order the progressive number, the elapsed % of shot, the filter used,the exposure lenght in s., the bin used, the status of shot, the file name used or that will be used to store the FIT file
16. **Authentication Status:** report if the connection with the related Node is protected under username/password credentials. When is protected a yellow lock icon will be showed.

56.5 Control Room

The Control Room allow you to control the Array setting and operation in overall mode or for a single node at time without need to jump to the related Voyager instance.

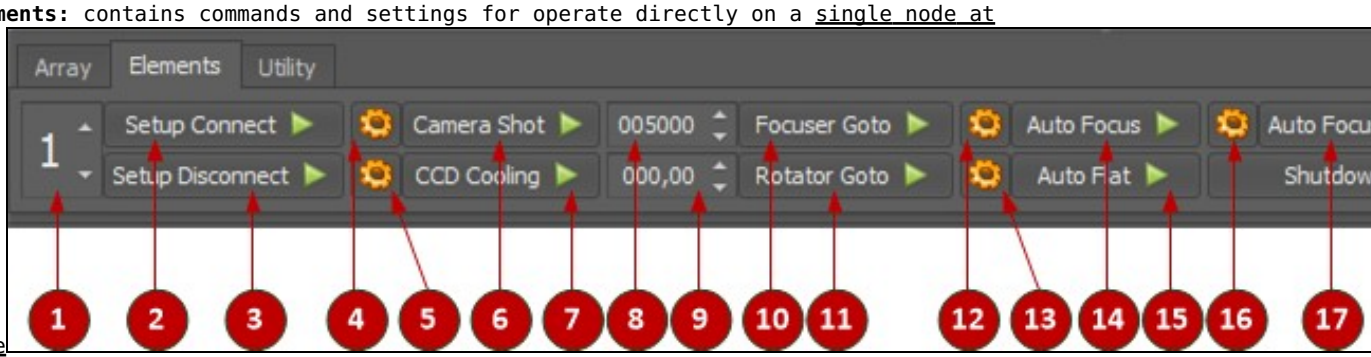
It is dived in 3 tabs:

- **Array:** contains configuration of Array, link command and generally all the commands and configurations relative at actions executed by all the nodes in the array at same time



- **1 - Array Setting** - Configuring the Array
- **2 - Link** - Connect all the node available in the array togheter
- **3 - Unlink** - Disconnect all the node available in the array
- **4 - Setup Connect and Disconnect setting** - Define setting for execute Setup connection and disconnect
- **5 - Setup Connect** - Execute parallelized action to connect setup on all the nodes in the Array (equivalent to startup section connect in a base license)
- **6 - Setup Disconnect** - Execute parallelized action to disconnect setup on all the nodes in the Array (equivalent to startup section disconnect in a base license)
- **7 - Rotators Aligned Move To** - Execute parallelized action to align rotators on all the nodes in the Array at requested PA (movement will be done according set in Array settings)
- **8 - PA Value** - Value of PA to use for Rotators
- **9 - Rotators Zero** - Execute parallelized action to align rotators on all the nodes in the Array at PA of 0° (movement will be done according set in Array settings)
- **10 - AFocus Full Control Settings** - Settings of the AFocus Full Control Action
- **11 - AFocus Full LocalField Settings** - Settings of the AFocus Full LocalField Action
- **12 - AFocus Full Control** - Execute Parallelized action to AutoFocus all the nodes in the Array using RoboStar (Single star autofocus)
- **13 - AFocus Full LocalField** - Execute Parallelized action to AutoFocus all the nodes in the Array using Localfield (All stars on the field)
- **14 - CCD Cooling Settings** - Settings of the CCD Cooling Action
- **15 - AutoFlat Settings** - Settings of the AutoFlat Action
- **16 - CCD Cooling** - Execute Parallelized action for Cooling operations in all the CCD in the Array
- **17 - AutoFlat** - Execute Parallelized action to take Flat for all the nodes in the Array (so many limitation are included in this action please refer to dedicate paragraph)
- **18 - Sequence Settings** - Setting of the Sequence Action
- **19 - Sequence** - Execute Parallelized Sequence Action in all the nodes of the Array (Master run sequence, Slave execute sequence command from Master)
- **20 - Double black arrow** - Close or Open in toggle the Control Room Window

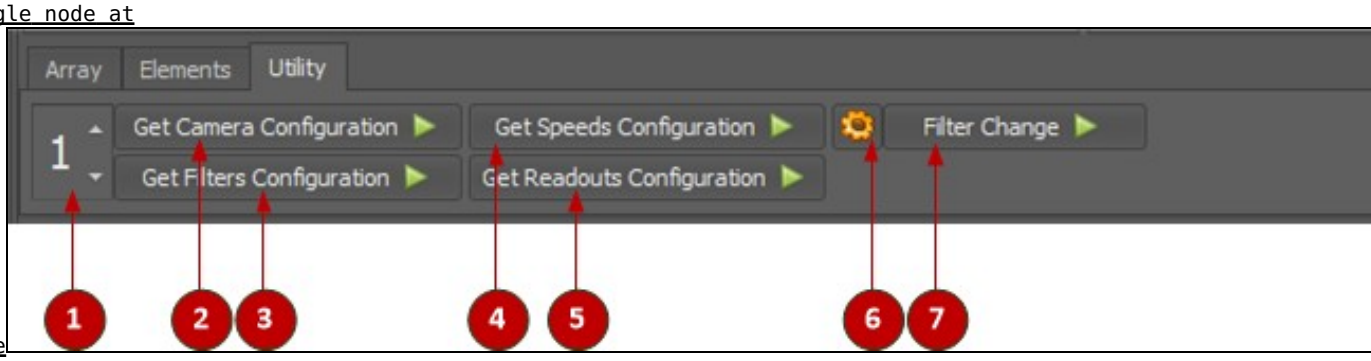
- **Elements:** contains commands and settings for operate directly on a single node at time



- **1 - Array Node Index** - select the index node where to apply to settings and action in the this tab
- **2 - Setup Connect** - connect the setup in the selected array node
- **3 - Setup Disconnect** - disconnect the setup in the selected array node
- **4 - Camera Shot Settings** - settings of the Camera Shot action
- **5 - CCD Cooling Settings** - settings of the CCD Cooling action
- **6 - Camera Shot** - running a shot action in the selected array node
- **7 - CCD Cooling** - cooling operations on the CCD in the selected array node

- **8 - Focuser Position for Focuser Goto** - position of focuser in step to use for Focuser Goto
- **9 - PA for Rotator Goto** - PA position in degree to use for Rotator Goto
- **10 - Focuser Goto** - move the focuser to the selected position in the selected array node
- **11 - Rotator Goto** - move the rotato to the selected PA in the selected array node
- **12 - AutoFocus Settings** - settings of the Aufocus action
- **13 - AutoFlat Settings** - settings of the AutoFlat action
- **14 - AutoFocus** - execute autofocus action in the selected array node (RoboStar single star)
- **15 - AutoFlat** - execute autoflat action in the selected array node
- **16 - AutoFocus LocalField Settings** - settings of the autofocus localfield
- **17 - AutoFocus LocalField** - execute autofocus action in the selected array node (LocalField all stars)
- **18 - ShutDown PC** - execute a shutdown of the PC in the selected array node (you will lost connection to this array node)
- **19 - Double black arrow** - Close or Open in toggle the Control Room Window

- **Utility:** contains commands dedicate to configuration array setting retrieving or special operations on a single node at time



- **1 - Array Node Index** - select the index node where to apply to settings and action in the this tab
- **2 - Get Camera Configuration** - retrieve the information about Camera (If is Color Camera or not, CMOS Gain and Offset capabilities)
- **3 - Get Filter Configuration** - retrieve the filters configuration in the selected array node, this data are necessary and will be store in the array settings
- **4 - Get Speed Configuration** - retrieve the speed of CCD control in the selected array node, this data are necessary and will be store in the array settings
- **5 - Get Readout Configuration** - retrieve the readut of CCD control in the selected array node, this data are necessary and will be store in the array settings
- **6 - Filter Change Settings** - setting for filter change action
- **7 - Filter Change** - change the filter in the selected array node
- **8 - Double black arrow** - Close or Open in toggle the Control Room Window

56.6 Setup Custom Array - Step by step List

To configure an Array this is the operations to do in order, take your time:

- install Voyager in each PC will be run the array
- copy and paste the serial number of each node obtained after installation and send to support to receive the right license
- install the license to transform the Voyager installations to Voyager Custom Array version
- configuring each node one at time like if you running a normal Voyager with all setup (mount, pate solving, autofocus....etc), goal is to align the camera rotation (or if you have a motorized rotators obtaing a PA reading for do the zero offset of rotators) and to get filters offset to use in the array autofocus (autofocus in Voyager array will be done with a default filters and a focuser steps offset will be applied during sequence shot according filters difference)
- For each node
  - (goal is to align camera rotation) plate solve you actual position and get camera PA. If you doesn't have rotator just choose a PA reference get it and use in all nodes, if you have rotator you will use the PA readed to obtain and set a zero offset in the array setup
  - usign autofocus calculate filters offset
    - select one of the filter like reference and put 0 in the offset value

        - ◊ do a series of autofocus with the choosed filter in previous point and obtaing an average of focus steps
        - ◊ do a series of autofocus with each other filters , obtain an average of focus step, subtract to the reference filter, this value must be inserted in the offset field of the filter
        - ◊ example A : you have choosed L filter like reference filter in Master, after 5 autofocus you found the average steps is 12930, doing autofocus for 5 times with R filter you have found average is 12945, subtracting 12945- 12930 you have 15 steps .. this is the offset to put in the offset field
        - ◊ example B : you have choosed L filter like reference filter in Master, after 5 autofocus you found the average steps is 12930, doing autofocus for 5 times with G filter you have found average is 12920, subtracting 12920 - 12930 you have -10 steps .. this is the offset to put in the offset field
- configuring setup that wil be used (in the node) in each single array Node (MASTER and SLAVEs)
- Activate Voyager Application Server in each node and alow firewall rule to be added to the OS
- prepare list of IP of array node and ports for the next steps
- running voyager in the SLAVEs without connecting setup
- configuring the array setting in the MASTER
- test the connection in Array setting form
- Link the array from the control room
- Connect all setup of array nodes from the control room
- retrieve for each node (MASTER and SLAVE) the setting data using the utility in the control room:
    - ♦ Get Camera Configuration (each node)
    - ♦ Get Filters Configurations (each node)
    - ♦ Get Speeds (each node)
    - ♦ Get Readout Modes (each node)
- running some operations for the array if work correctly (shot, filter change, autofocus)
- setting the filter offset for all array nodes if you need, remember that the Custom Array always do autofocus on Sequence usign Default Filter and working with offset
- congratulations your array are ready to work

56.7 Setup Custom Array - Single Array Node Setup

To configure an Array, you must first configure the individual array elements.

See the Setup section for information on setting up a single node (which will be a component of the array).

After you have align the camera PA (or offset rotators PA) and have get the filters offset you must create a profile for the final array setup configuration (see notes about in step by step list)

In **MASTER** setup **all kind of controls** you have and need.

In **SLAVE** only this kind of controls are **configurable** (if you need):

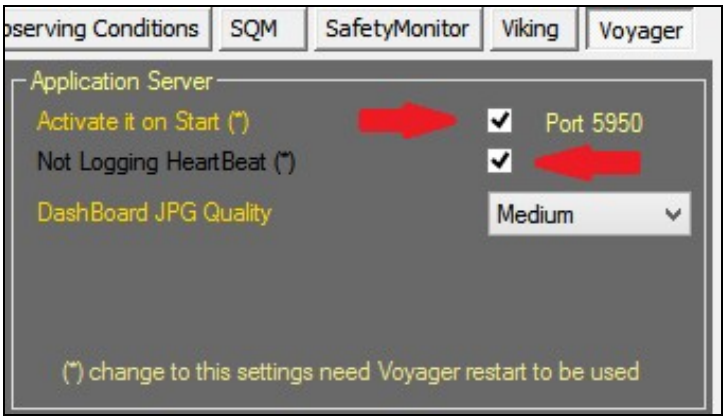
- Camera
- Mount (Only "Array Virtual Mount")
- Rotator
- Flat Device

In **SLAVE** absolutely **not Configure** controls for:

- Guiding
- Planetarium
- Plate Solving
- Blind Solving
- Dome
- Weather
- Observing Conditions
- SQM

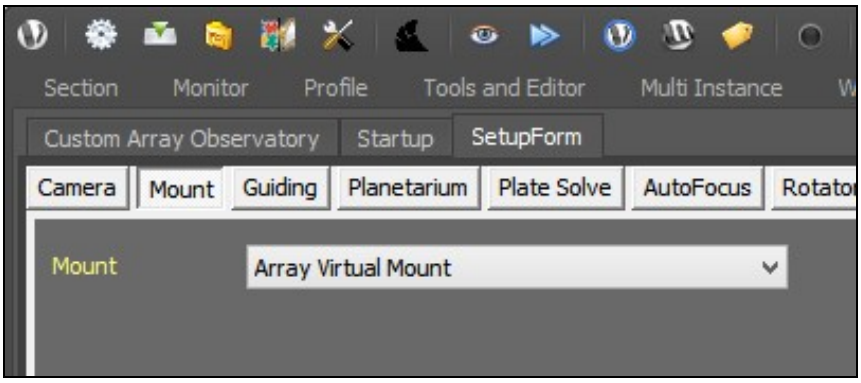
- SafetyMonitor
- Viking

Activate the Application Server in Voyager SetupForm



When your individual array elements are setup, in all the SLAVE arrays you have to set the mount choice to "Array Virtual Mount".

Note: All the mount options and configurations will disappear, the MASTER Array will fully control the Mount.



Important Note! SLAVEs control mount selection must be "Array Virtual Mount" . WiIthout this kind of control selected array will not work properly

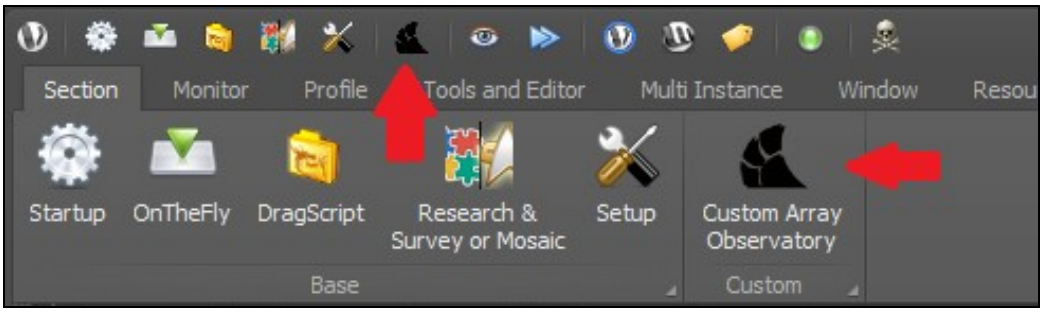
Important Note! Please not configure in SLAVE this kind of controls (leave empty): Planetarium, Plate Solve and Blind Solve, Dome, Weather, Observing Conditions, SQM, Safetymonitor, Viking

Important Note! Custom Array Control version of Voyager have some restrictions in term of AutoFocus control. You must use the RoboFire Autofocus Control with ASCOM driver selection. Other kind of autofocus cause array to not work properly

56.8 Setup Custom Array - Array Setup

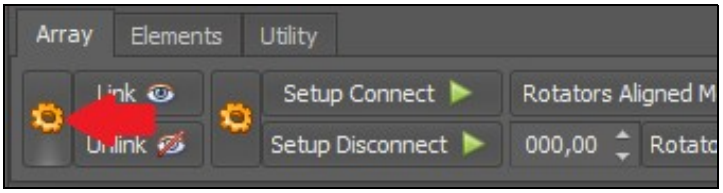
Next step is to configure the Array:

Click the Section menu and choose the Custom Array Observatory icon:

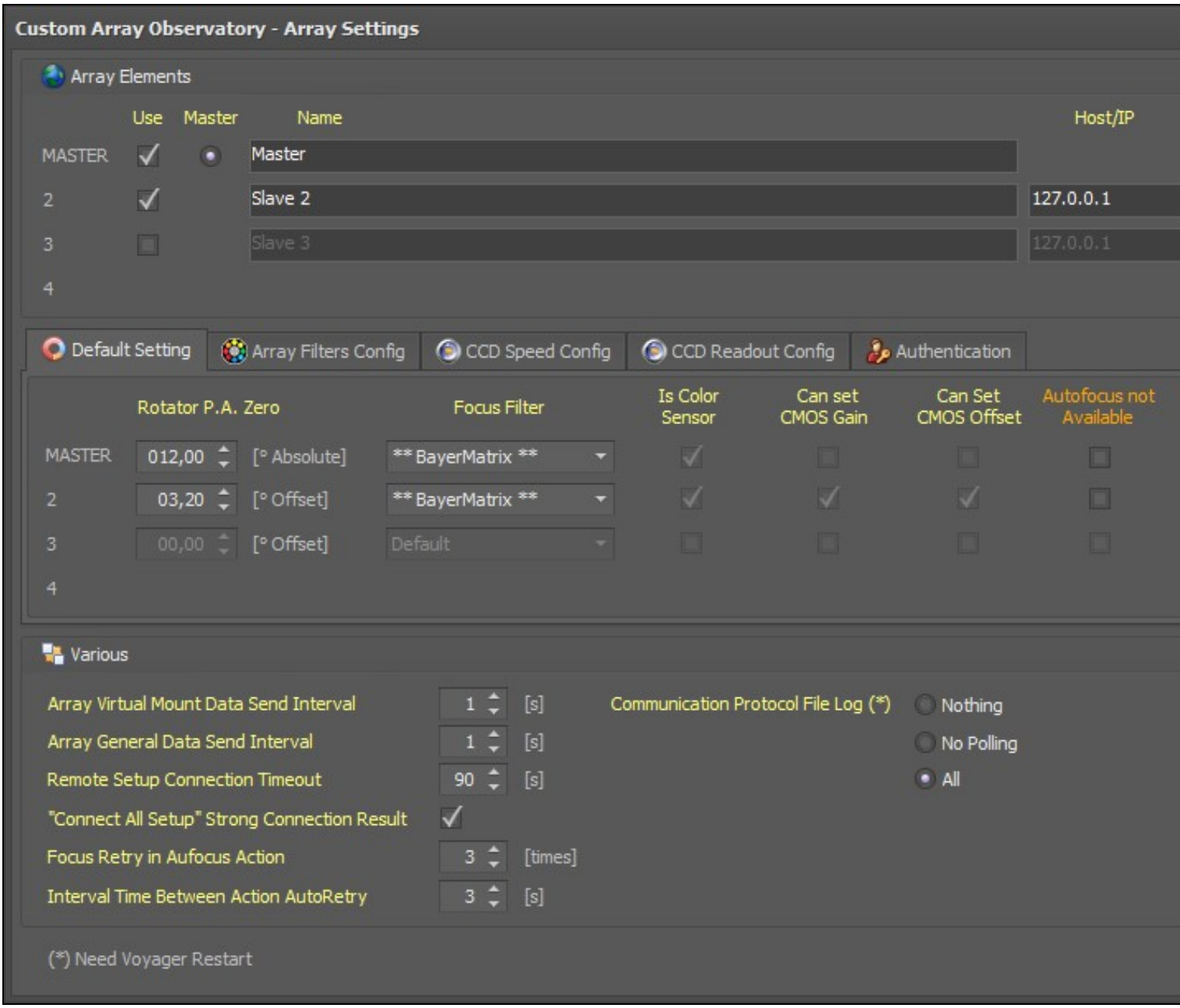


The Custom Array Observatory main window will be opened.

In the Control Room select the Array tab and click on the array setup icon .



the configuration windows of Array will be opened at center screen:



Important Note! The configuration window have all settings field enabled only if you are not linked to the Array, so if you want to reconfigure the Array, please unlink it

- **Array Elements** box contains settings for communications and link of the array nodes, according your license only the node allowed will be editable
  - first element to configure is always the **MASTER**, you can have only one MASTER in your array so you will found a **radio option Master** already selected.
  - check the flag **Use** for each node will compose the array , if this flag is unchecked the array will not be considered in any operations can be useful if you want to temporarly remove a node of the array cause failure or manteinance or simple you dont want to use in some kind of job
  - edit the **Name** of each Node, using a text short that can help you to easily recognize the setup also on the log
  - fill the **Host / IP** and **Port** fields, edit the Name of PC or IP address that hosting the Voyager instance for the selected node. MASTER doesn't need IP or host because the PC is the same PC where the configuration and all operations will be managed. You can retrieve IP and port of the PC using the OS utilities or starting Voyager in the node and opening the Application Server monitor, at beginning of the log text you will fund the list of IP address and port (do not use

localhost). Generally fort he port each first instance of voyager have port 5950 assigned, 5951 for the 2nd instance, 5952 for the 3rd instance and 5953 for the 4th instance

- press **Reset** if you want to bring back the value to the default
- press **Default Port** if you want to fille the Port field with default port used by Application Server in Voygaer (5950)
- press **Test** if you want to try connection to the host/ip and port you have setup for the Node, a message about test result will be reported at screen

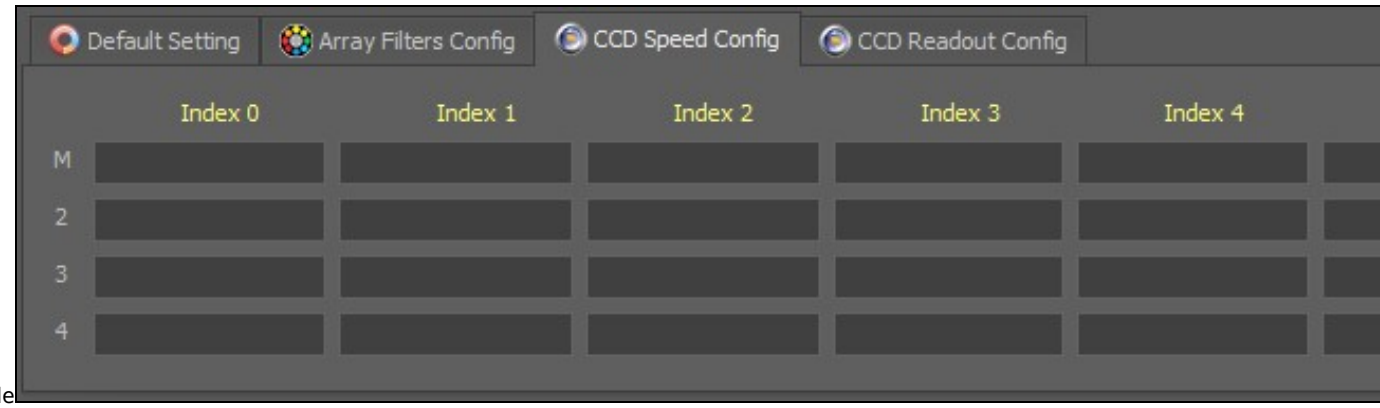
- **Default Setting** tab contains field necessary for generic and sequence actions
  - **Rotator P.A. Zero** contains data to manage the zero PA value of all the rotators in the array (if you use it). In an Array to obtain the same PA not necessary to single PA in node will be the same. With this offset you will be able to pointing all the rotator with a correct angle value to have finally all the same PA. Do this operations to fill the data the first time you configure the Array:
    - set MASTER rotator to zero PA
    - solve an image and get the PA from monitor log
    - if you are able to offset the zero in your driver use it otherwise put the PA solved like zero value in **MASTER PA field**
    - for each node put the rotator to zero PA and solve image, get the PA solved, offset by **MASTER PA field** and put the difference in the **NODE PA field**
  - **Focus Filter** contains the default fitler used for focus in each array nodes. Voyager Array use at now final offset to adjust focus from default filter to the final asked during the sequence or autofocus command in the Control Room
  - **Is Color Sensor** is a flag retrived automaticall during the Get Camera Configuration explained in the Step by step list to configure Array, If set mean the camera is a color camera
  - **Can Set CMOS Gain** is a flag retrived automaticall during the Get Camera Configuration explained in the Step by step list to configure Array, If set mean the camera is a CMOS camera and Voyager can set the gain
  - **Can Set CMOS Offset** is a flag retrived automaticall during the Get Camera Configuration explained in the Step by step list to configure Array, If set mean the camera is a CMOS camera and Voyager can set the offset
  - **Autofocus Not Available** this is a manual flag if setup in the node not allow use of Autofocus or if you want to exclude the node from autofocus tasks
  - **Cooling Not Available** this is manual flag that remove the options for the node to activate and manage the cooling or if the camera in the node doesn't have peltier capability
- **Array Filters Config** tab contains field necessary for configure Filter list in each node and the focus offset by filter always for each node

  - **Important Note!** Max 8 filters can be managed by Voyager Custom Array
  - **Filter Label** cannot be edited, value must be retrieved directly from the Control Room using tab Utility , selecting the node and press command *Get Filter Configuration*. This operation mus be done when you have finished to configure all the remain settings of the Array. Please refer to Array Single Node Utility Operations instructions
  - **Offset Numeric Spin** contains number of step (negative or positive) to apply to the filter to leave the focus correct. Must be inserted after the filter list will be populated like for the previous point. To obtain filter offset do this operations FOR EACH NODE including MASTER the first time you configure the Array:
    - select one of the filter like reference and put 0 in the offset value
    - do a series of autofocus with the choosed filter in previous point and obtaing an average

of focus steps

- ◊ do a series of autofocus with each other filters , obtain an average of focus step, subtract to the reference filter, this value must be inserted in the offset field of the filter
- ◊ example_A : you have choosed L filter like reference filter in Master, after 5 autofocus you found the average steps is 12930, doing autofocus for 5 times with R filter you have found average is 12945, subtracting 12945- 12930 you have 15 steps .. this is the offset to put in the offset field
- ◊ example_B : you have choosed L filter like reference filter in Master, after 5 autofocus you found the average steps is 12930, doing autofocus for 5 times with G filter you have found average is 12920, subtracting 12920 - 12930 you have -10 steps .. this is the offset to put in the offset field

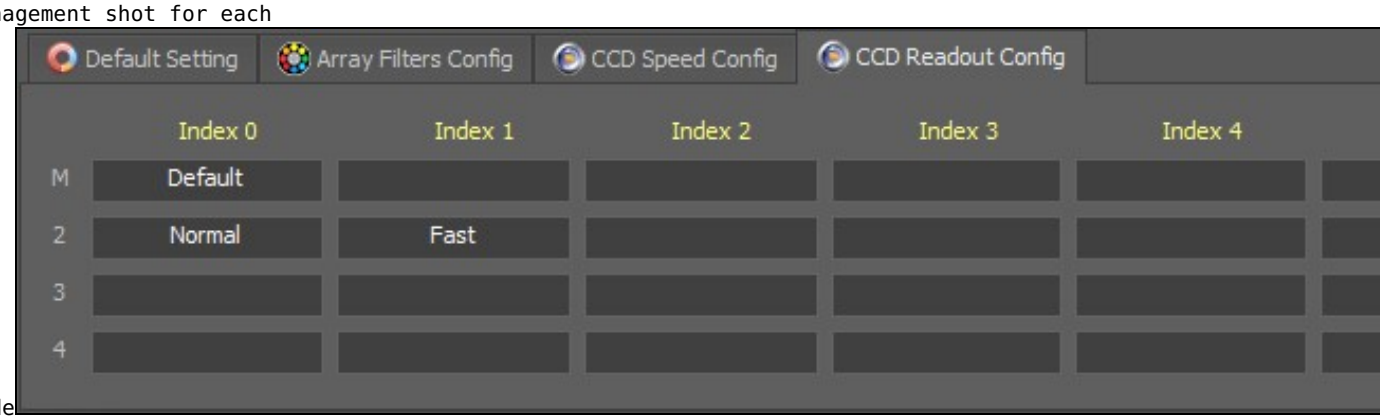
- **CCD Speed Config** tab contains the various speed usable (if present and supported) in the CCD management shot for each



node

- ♦ **Important Note!** Max 8 speed index can be managed by Voyager Custom Array
- ♦ **Index Label** cannot be edited, value must be retrieved directly from the Control Room using tab Utility , selecting the node and press command *Get Speed Configuration*. This operation mus be done when you have finished to configure all the remain settings of the Array. Please refer to Array Single Node Utility Operations instructions

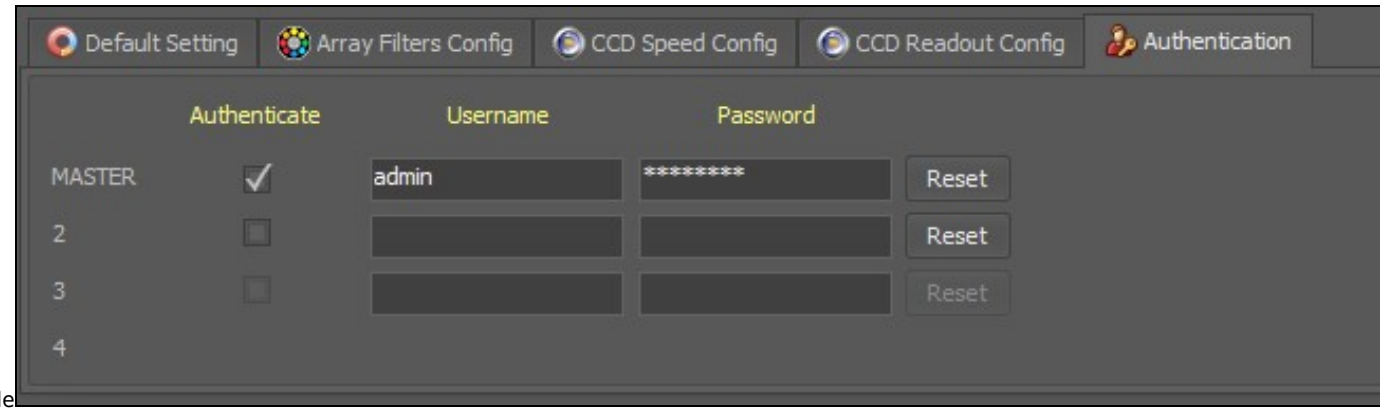
- **CCD Readout Config** tab contains the various Readout Mode usable (if present and supported) in the CCD management shot for each



node

- ♦ **Important Note!** Max 8 Readout Mode index can be managed by Voyager Custom Array
- ♦ **Index Label** cannot be edited, value must be retrieved directly from the Control Room using tab Utility , selecting the node and press command *Get Readout Configuration*. This operation mus be done when you have finished to configure all the remain settings of the Array. Please refer to Array Single Node Utility Operations instructions

- **Authentication** tab contains the credentials for authentication on each nodes if needed, this depends on how is configured the application server in each

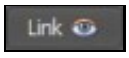


node

- **Authenticate:** check it if the node need authentication (equal the application server in the node have the authentication method set up to username/password)
- **Username:** username to use for authentication, is case sensitive
- **Password:** password to use for authentication, is case sensitive
- **Reset:** to reset data to empty fields

- **Various** Panel contains the setting dedicated the general aspect of Array
  - **Array Virtual Mount Data Send Interval:** time interval in seconds between each mount data send from MASTER to each SLAVE
  - **Array General Data Send Interval:** time interval in seconds between each detailed data send from each SLAVE to MASTER
  - **Remote Setup Connection Timeout**: timeout in seconds before abort setup connection action
  - **"Connect All Setup" Strong Connection Result:** check this flag if you want that the connection setup action report OK (not ERROR) only if all the nodes in the array are able to connect all setup, useful if control trough dragscript the connect and want be sure all the node are usable
  - **Focus Retry in Autofocus Action:** number of autofocus retry in case of failure during autofocus all array actions
  - **Interval Time Between Action AutoRetry:** interval time in seconds between an action repeat due to a failure
  - **Communication Protofo File Log(*):** customize the log level info inside the array communications log file (**nothing** = no messages logged, **No Polling** = messages polling between node will be not reported, **All** = all the messages will be logged). If you use **All** file log can be really big, check the filesystem space regularly

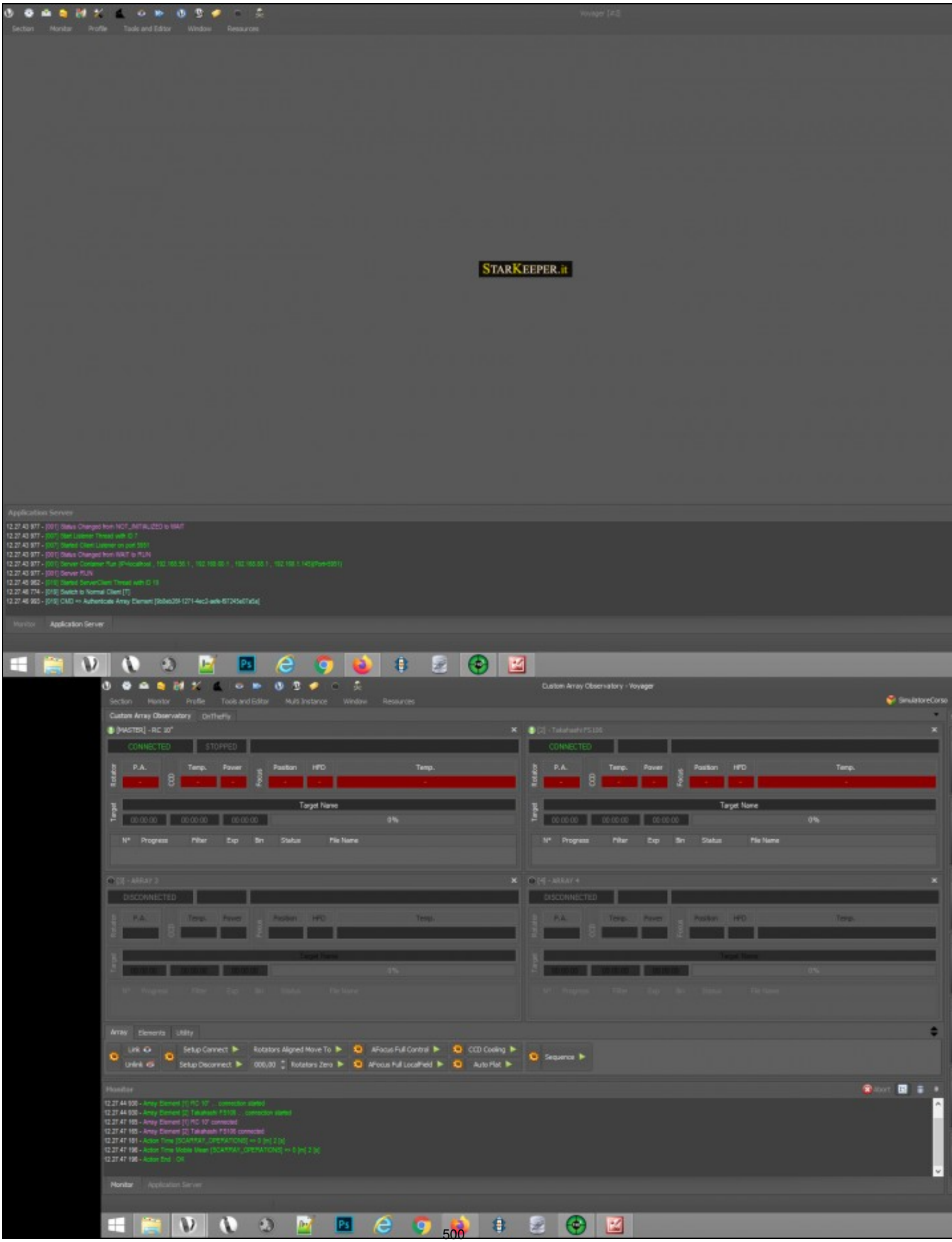
56.9 Array Link and Connection

To establish the link between all your array setups just press the Link button 

available into the Array control box.

NOTE: This operation will not connect your setup, but only link the Voyager instances.

The screen is an example of Link between a MASTER and one SLAVE over the same PC using a second istance of Voyager (image onf 2 monitor):


STARKEEPER.it
Application Server
Monitor
Application Server
Custom Array Observatory - Voyager
Section
Monitor
Profile
Tools and Editor
Multi Instance
Window
Resources
SimulatoreCorso
Custom Array Observatory
OnTheFly
[MASTER] - RC 10"
CONNECTED
STOPPED
P.A.
Temp.
Power
Position
HFD
Target Name
N°
Progress
Filter
Exp
Bin
Status
File Name
DISCONNECTED
Array
Elements
Utility
Link
Unlink
Setup Connect
Setup Disconnect
Rotators Aligned Move To
Rotators Zero
AFocus Full Control
AFocus Full LocalField
CCD Cooling
Auto Plat
Sequence
Monitor
Application Server

To make fully functional the array you must connect all setup using dedicated action in the Array Operations

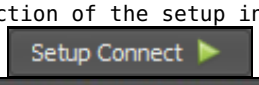
56.10 Array Operations

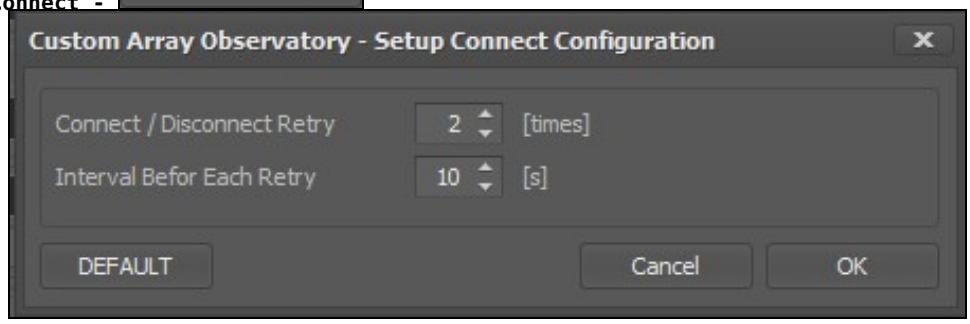
Array operations work on all nodes of the array, can be operte only from the MASTER using the commands in the Array tab of the Control Room

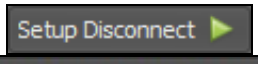
For Array Setup (first icon on the left of the Array Operations) please referer to dedicated instructions here.

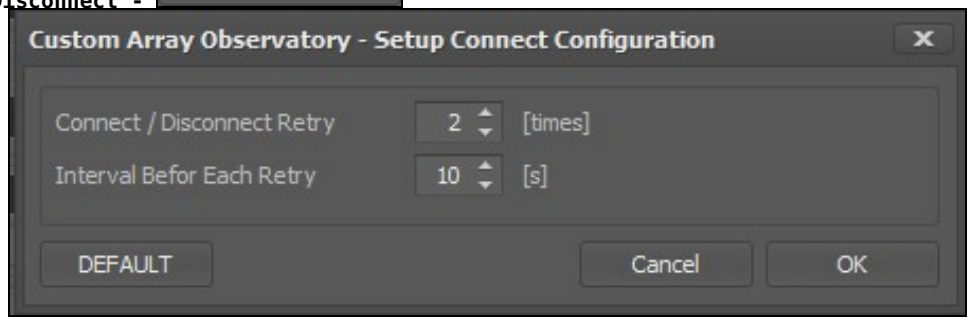
- **Link** - 

- Connect all the nodes available in the array togheter. Result of the Connection will be reported in the Array Dashboard in the Connection Status Field. Link mean connection of the MASTER to the Application Server of the SLAVE. Communications will be established and array are ready to accept all the commands. Link to the array doesn't mean to start the setup in each node, for this exists a dedicate command. Possible value result is CONNECTED - CONNECTION ERROR , during Connection a CONNECTING status will be reported
- **Unlink** - 

- Disconnect all the node available in the array. Result of the Connection will be reported in the Array Dashboard in the Connection Status Field. Unlink mean disconnection of the MASTER to the Application Server of the SLAVE. Communication will be close and array element are not reachable from the MASTER. Operations within SLAVE will be not allowed and an error will be throw. Unlink doesn't mean a disconnection of the setup in the SLAVE that will continue to have the same previous status
- **Setup Connect** - 

  - 

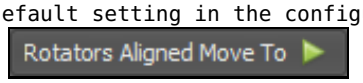
  - The setup of all nodes will be connected at same time (parallelized) with more retry in case of failure before report error for the node
  - **Connect / Disconnect Retry** - retry in case of failure in connect remote setup before report general error to the user
  - **Interval Before Each Retry** - interval in seconds before retry setup connect in one node that have failed
  - **DEFAULT** - restore default setting in the configuration fields
- **Setup Disconnect** - 

  - 

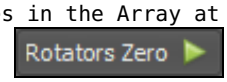
  - The setup of all nodes will be disconnected at same time (parallelized) with more retry in case of failure before report error for the node
  - **Connect / Disconnect Retry** - retry in case of failure in disconnect remote setup before report general error to the user
  - **Interval Before Each Retry** - interval in seconds before retry setup disconnect in one node that

have failed

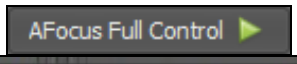
- ♦ **DEFAULT** - restore default setting in the configuration fields

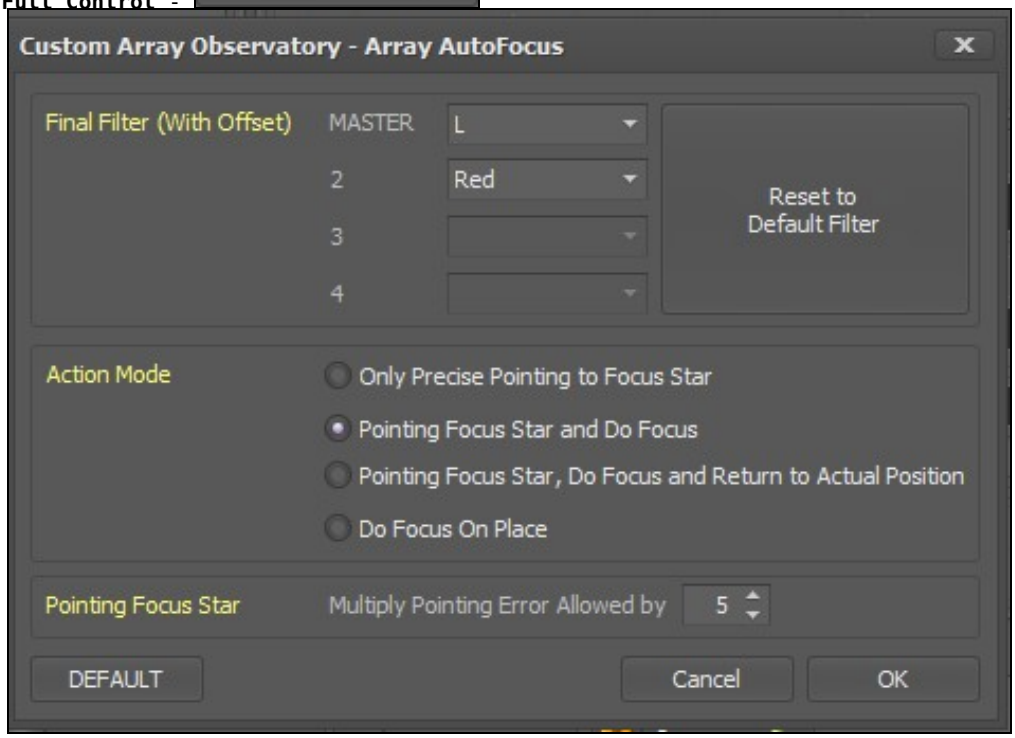
- **Rotators Aligned Move To** - 

- Execute parallelized action to align rotators on all the nodes in the Array at requested PA (movement will be done according offset in Array settings)

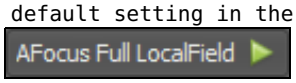
- ♦ **Rotators Zero** - 

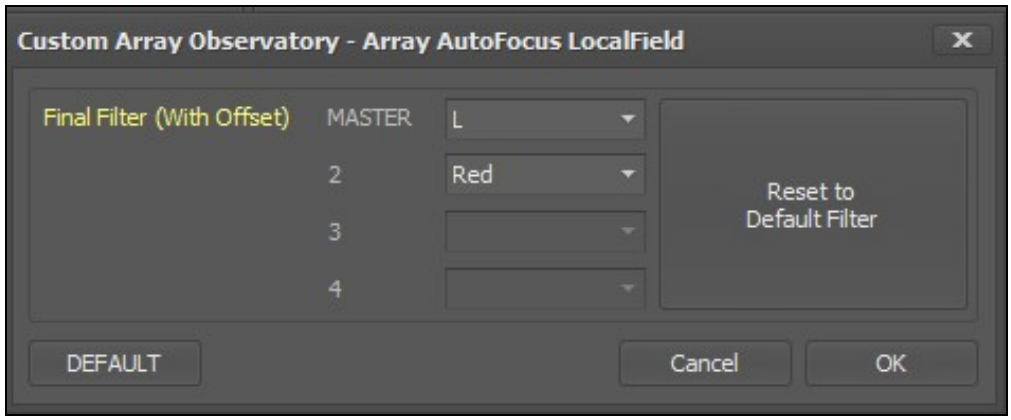
- Execute parallelized action to align rotators on all the nodes in the Array at PA of 0° (movement will be done according offset in Array settings)

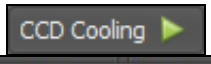
- **AFocus Full Control** - 

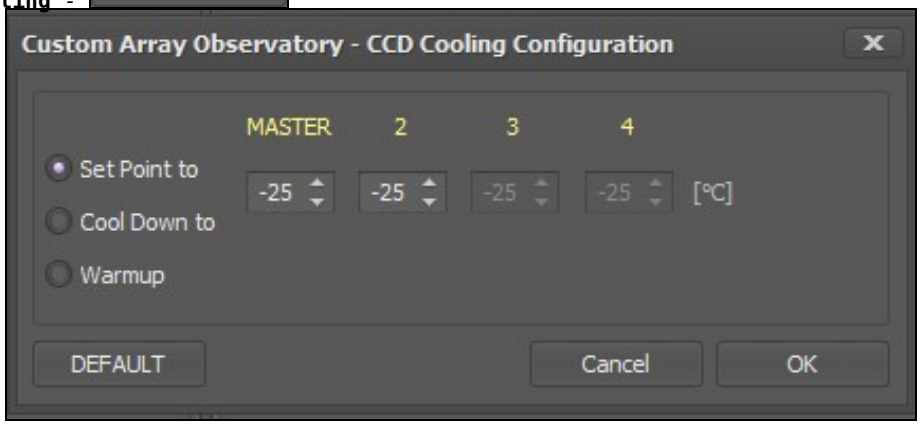
- ♦ 

- ♦ Execute Parallelized action to AutoFocus all the nodes in the Array using RoboStar (Single star autofocus). Solving and pointing will be done only in the MASTER
- ♦ **Final Filter (With Offset)** : focus in Custom Array are always done with default filter selected in the Array Setup , after focus finished the filter we be changed to the one asked in this setting and offset set in Array Setup will be apply according difference between default filter and final filter. Its possible to choose different filter for different node
- ♦ **Reset to Default Filter** : all the node will use the default filter configured in Array Setup
- ♦ **Action Mode**: define exactly the various step will be done during the Autofocus Action
  - ◊ **Only Precise Pointing to Focus Star**: just pointing a right star for autofocus and exit
  - ◊ **Pointing Focus Star and Do Focus**: pointing a right star for autofocus and do autofocus and exit
  - ◊ **Pointing Focus Star, Do Focus and Return to Actual Position**: pointing a right star for autofocus, do autofocus , go back in a precise way to previous position and exit
  - ◊ **Do Focus On Place**: try to do autofocus on the actual place without pointing any stars, you must be lucky to found a right star for focus, probably the action will fail
- ♦ **Point Focus Star Multiply Pointing Error Allowed by**: define the amount of error (multiply by times the original in the MASTER setting) to precise pointing the focus star (use a high value to fstening the operation). Focus on all start will start when the pointing procedure on MASTER will be terminated
- ♦ **DEFAULT** - restore default setting in the configuration fields

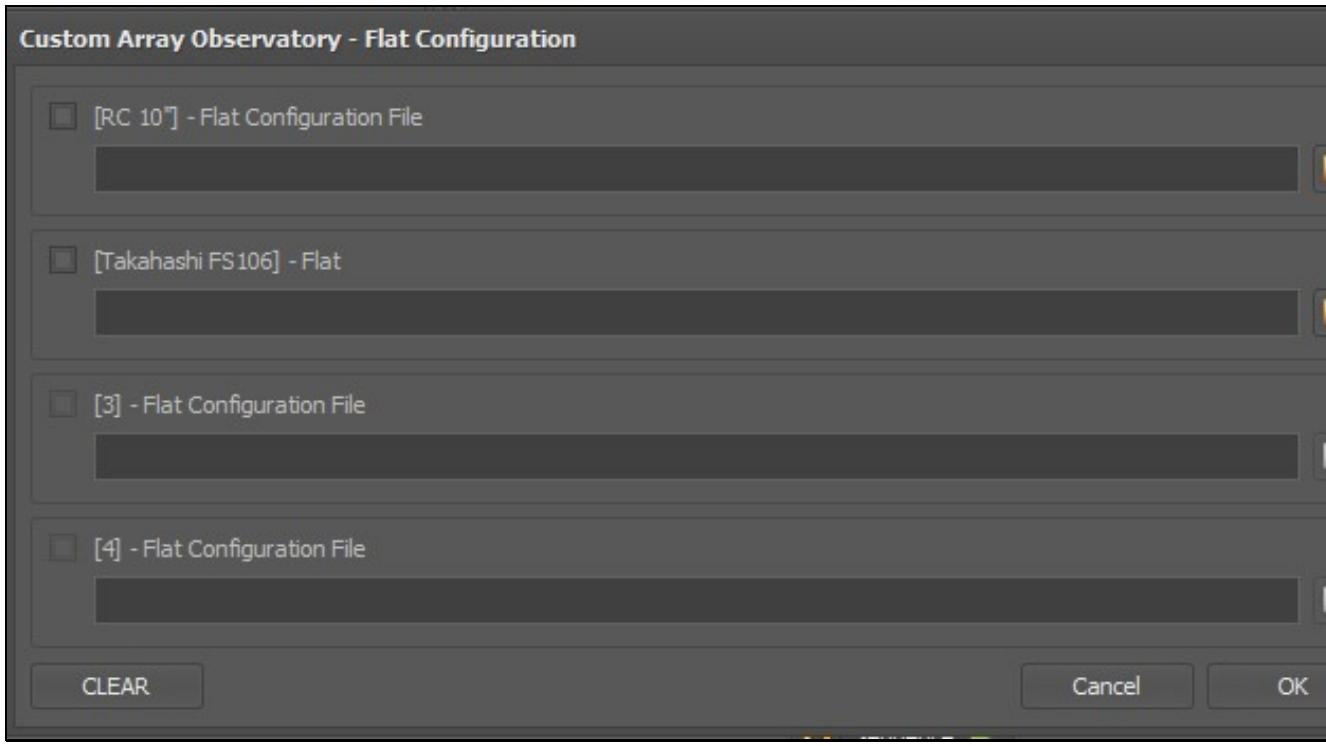
- **AFocus Full LocalField** - 

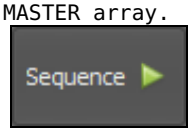
- 

  - Execute Parallelized action to AutoFocus all the nodes in the Array using Localfield (All stars on the field). Mount will not be moved and the focus will be done in the actual position
  - **Final Filter (With Offset)** : focus in Custom Array are always done with default filter selected in the Array Setup , after focus finished the filter we be changed to the one asked in this setting and offset set in Array Setup will be apply according difference between default filter and final filter. Its possible to choose different filter for different node
  - **Reset to Default Filter** : all the node will use the default filter configured in Array Setup
  - **DEFAULT** - restore default setting in the configuration fields
- **CCD Cooling** - 

  - 

  - Execute Parallelized action for Cooling operations in all the CCD in the Array
  - **Set Point to** : using internal firmware of each CCD in each node to reach pelterier requested temperature in °C
  - **Cool Down to** : using Voyager ramp cooling down of each CCD in each node to reach pelteer requested temperature in °C
  - **Warmup** : reach ambient temperature of each CCD in each node with a ramp
  - **DEFAULT** - restore default setting in the configuration fields
- **AutoFlat** - 

- 

  - Execute Parallelized action to take Flat for all the nodes in the Array (so many limitation are included in this action please refer to dedicate paragraph)
  - **Flat Configuration File for node MASTER** - select configuration file for autoflat action to run in MASTER node
  - **Flat Configuration File for node 2** - select configuration file for autoflat action to run in node 2
  - **Flat Configuration File for node 3** - select configuration file for autoflat action to run in node 3
  - **Flat Configuration File for node 4** - select configuration file for autoflat action to run in node 4
  - **CLEAR** - remove all configuration file from setting
  - **Important Note!** Some kind of autoflat actually are not supported, flat on the sky can be done only on the master. Flat with the panel can be done only with fixed panel and command management in MASTER array.
- **Sequence** - 

- Execute Parallelized Sequence Action in all the nodes of the Array (Master run sequence, Slave execute sequence command from Master). Please refer to Array Sequences instructions.

56.11 Array Single Node Operations

56.12 Array Single Node Utility Operations

56.13 Array Sequences

56.14 Array DragScript Integration

56.15 FAQ

- **Can i focus the slave nodes of the array without have Array connected ?**
  - Answer is yes, but due to fact that the mount is connected only to the master you must cloning the Voyager profile on the slave an changing mount control from Array Virtual Mount to a real mount (you must switch mount connection to the slave PC in case of using another PC and not secondary instance of Voyager) or ASCOM simulator. In this case you can use LocalField to for

autofocus beacuse for RoboStar you must enable also the Plate Solving control. Generally you are working in a complex environment best way is to use Array facilities from the Master.

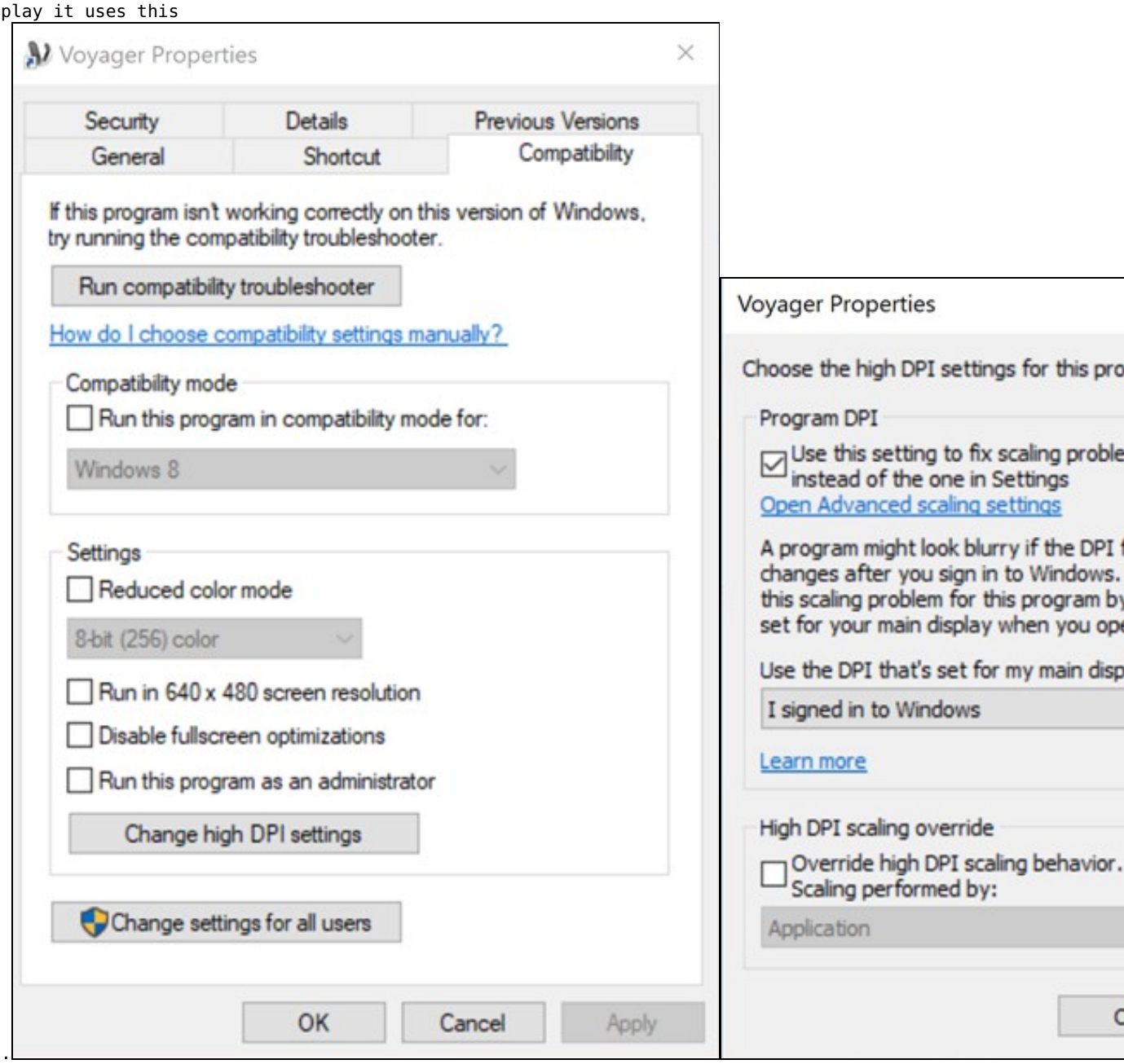
57 FAQ

Post your questions in the Voyager Forum at https://forum.starkeeper.it We monitor that forum and will add the answers here if appropriate.

57.1 4K Monitor Resolution from Local or Remote Desktop

I have some font size problem on 4K monitor resolution, font is scaled to small and cannot show correctly Voyager Windows?

- There is a compatibility tab in the windows properties for the Voyager application. On this tab is a button labelled ?Change high DPI settings?. I then checked the box for ?Use this setting to fix scaling problems for this program instead of the one in settings? and for ?Use the DPI that?s set for my main display when:? I selected ?I signed into Windows?. I think that means if I sign in locally on the observatory PC with a 1920x1080 monitor it uses this DPI and if I sign in remotely with my laptop and 4K display it uses this DPI.



57.2 Artificial Intelligence (AI) in Voyager

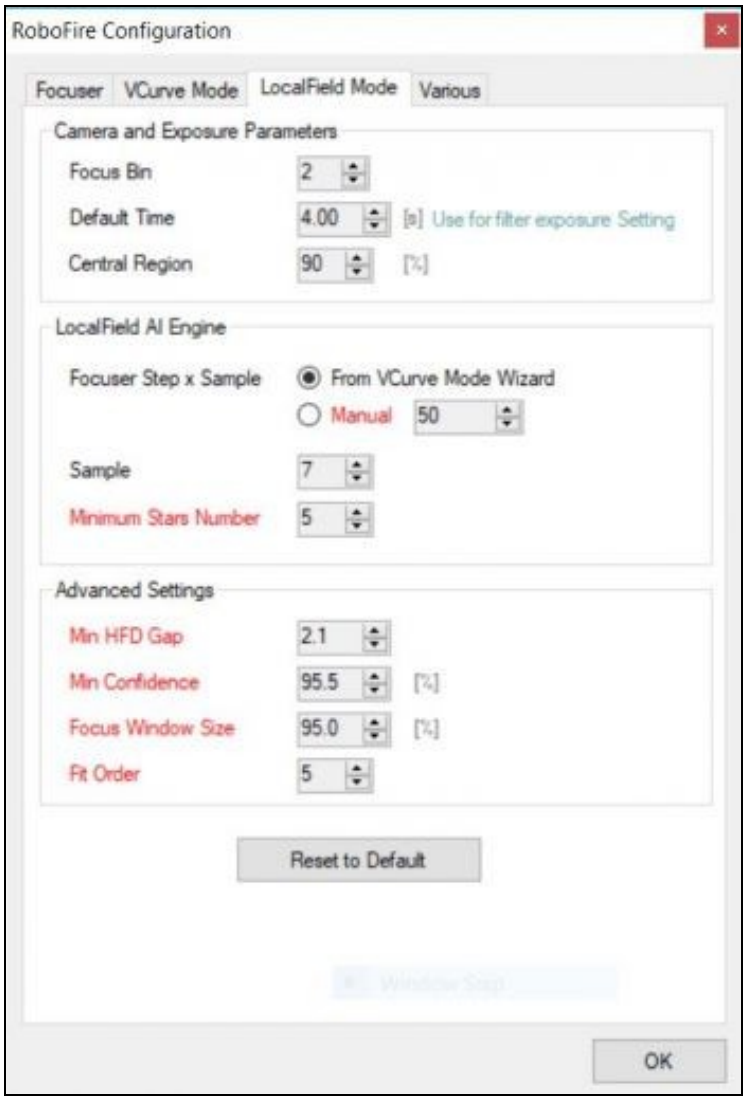
- **What is the benefit to users of the AI automata inside of Voyager?**
  - Voyager uses AI technology to improve focus, star recognition , equation calculation for VCurve, statistical calculations, and decisions for how to handle exceptions generated by the watchdog timers. Watchdogs are timers that oversee all requests to external hardware and software and recover from soft errors. The bottom line is that the advanced AI technology inside of Voyager contributes significantly to Voyager's exceptional reliability.

57.3 AstroPhysics Mounts and APCC

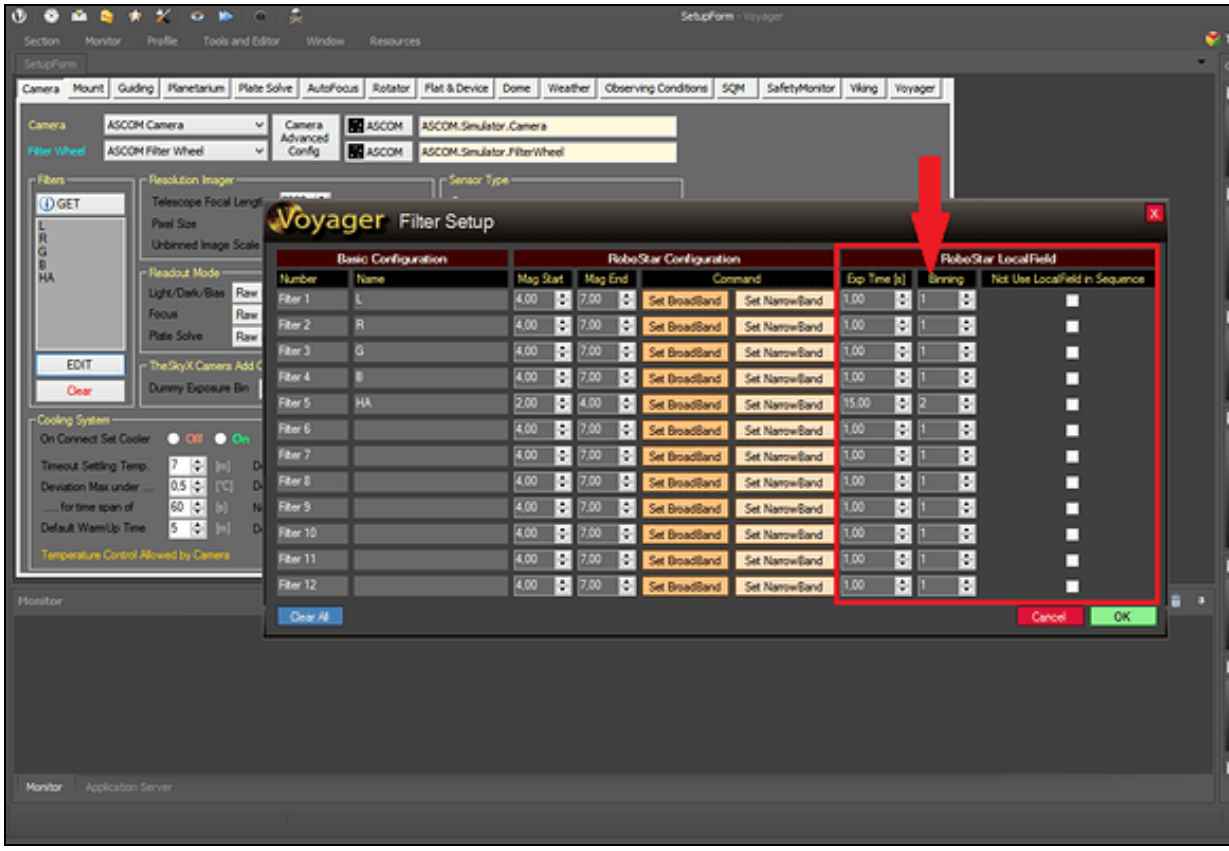
- **What is the best way to connect to APCC from Voyager?**
  - Short answer courtesy of Voyager user Bill Long: *I run Voyager in admin mode. I just open APCC first in admin mode, connect the ASCOM driver to APCC, then connect via Voyager. Works fine.*
- **I tried this but still having problems connecting to APCC from Voyager**
  - In setup for APCC, in the lower-left corner, you?ll need to uncheck the two boxes in the AP V2 Driver section labeled ?auto connect? and ?auto config?. This will allow Voyager to start the driver first without APCC interfering with other startup functions.

57.4 AutoFocus

- **LocalField autofocus fails with an out-of-memory error [For version older than 2.2.1b]**
  - **This problem was solved in Voyager version 2.2.1c and newer**
  - Try using a smaller ROI or binning 2x2 instead of 1x1. The image is managed in memory using a Microsoft memory object that does not do garbage collection, so depending on what other programs are running and possibly using this memory, you may run out if your camera creates large images with each shot. NOTE: Be sure to set the binning for LocalField autofocus in the correct spot for your camera:
    - If your camera does **not** have filters, use the Focus Bin setting - it's in Setup -> AutoFocus -> Robofire Configuration -> LocalField Mode:

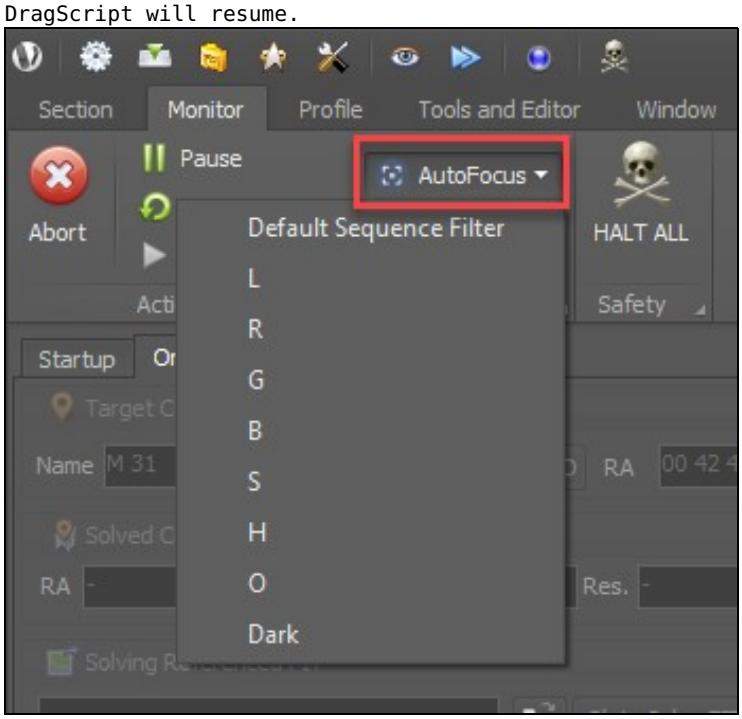


◊ If your camera does have filters, its in the per-filter settings dialog, which is in Setup -> Camera, then click the EDIT button in the Filters panel:

◊ 

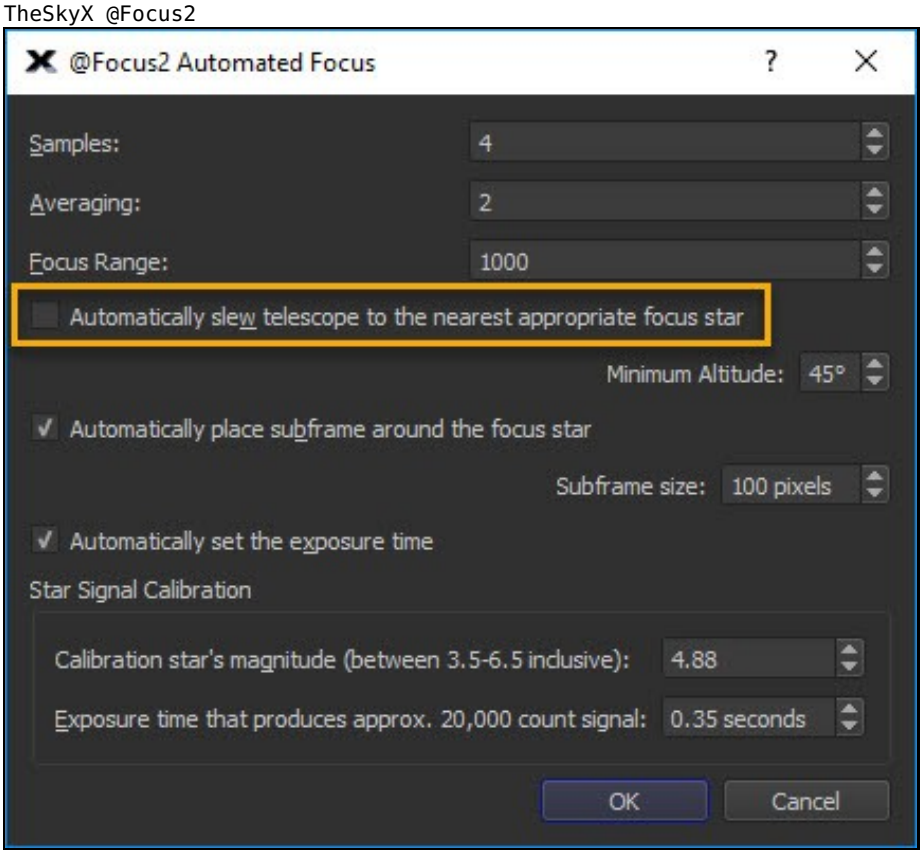
- ♦ **How do I request an autofocus while a sequence or DragScript is running?**

  ◊ Click the Monitor tab, then click AutoFocus. Choose the filter for autofocus. The current exposure will finish, then an autofocus will be performed, and then the sequence or DragScript will resume.

◊ 

- **TheSkyX @Focus2 slews to a Focus Star but doesn't return to my target.**

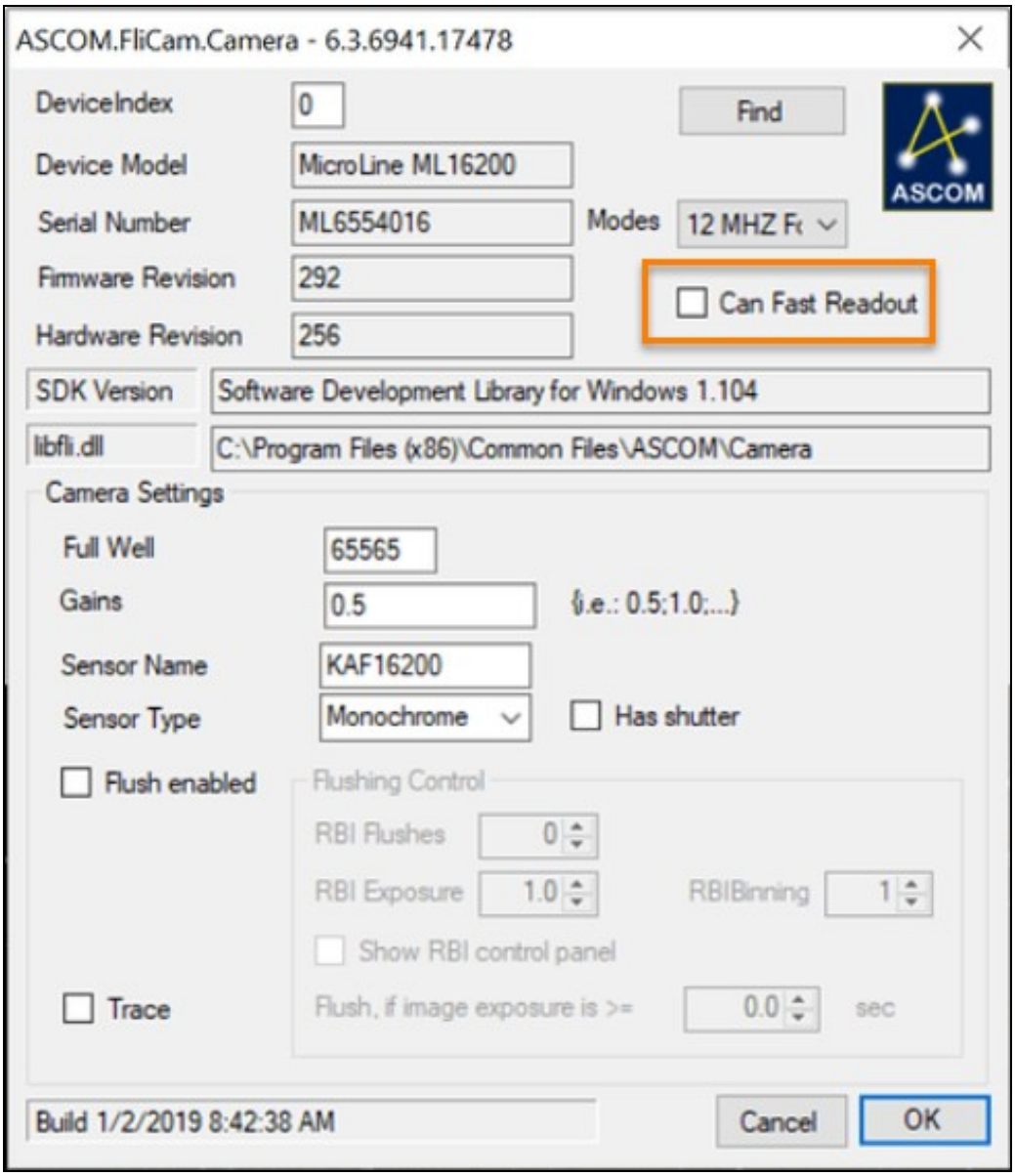
  ♦ Choose Voyager RoboStar in your Sequence setup, Focus tab. Voyager will choose a focus star, call TheSkyX @Focus2 which does the autofocus, and then Voyager will slew back to your target

- Be sure to uncheck "Automatically slew telescope to the nearest appropriate focus star" in TheSkyX @Focus2
- 

- **Does Voyager implement Temperature Compensation (move the focuser a predetermined amount based on ambient temperature)?**
  - No, Voyager does not implement temperature compensation. Even the author of FocusMax says that temperature compensation gives inconsistent results and he decided not to use it. We want your images to have sharp focus. Voyager's goal is reliable imaging automation and unfortunately temperature compensation is unreliable. If you still want to use temperature compensation, you can find some focuser drivers that implement it for you in the driver software.

57.5 Cameras

- **Can Voyager use my FLI Camera?**
  - You can connect to an FLI camera using TheSkyX, Maxim DL, or the ASCOM driver written by Hartmut Bornemann in the Yahoo! FLI Imaging Systems group at:https://groups.yahoo.com/neo/groups/FLI_Imaging_Systems/files/Hartmut%20Bornemann/
  - There is a checkbox in his driver labelled ?Can Fast Readout." This must be unchecked. If it is checked, Voyager will not be able to consistently change the readout mode. (thanks to Bill Long for the tip)



- **Can Voyager use my SBIG camera?**
  - You can connect to your SBIG camera using TheSkyX or Maxim DL. There is no native support in Voyager for SBIG cameras as of Voyager 2.1.4. We need access to a camera to test a native driver. This may happen in the future but we don't have any firm as of this writing (June 2019)

- **Downloads from my camera are hanging**
  - Check your USB cable lengths. The maximum length specified for USB3 is 3 meters - longer than that and you may have problems.
  - For ASI cameras, try reducing the download speed in the ASCOM driver

- **Can Voyager support Gain and Offset for my ZWO ASI CMOS camera?**
  - As of Voyager 2.1.6b, an ASI Camera native driver is available as a choice in Camera setup. Use this driver and you can set Gain and Offset individually for each Sequence Element.
  - You **cannot** set Gain or Offset using the ASI ASCOM driver, you must use the ASI Camera native driver.
- **Does Voyager add GAIN and OFFSET keywords to my image file FITS headers?**
  - As of Voyager 2.1.6b, if you use the ASI Camera native driver, the GAIN and OFFSET keywords will be set in the image file FITS headers.

57.6 Cooling

- **Why did Voyager put "NoCooling" in the file name saved by my Sequence?**
- This happens when the Sequence's ?Cooling? checkbox on the Cooling tab is unchecked. This means you have cooling on in your camera but Voyager's Sequence is not managing it. You may have started cooling from the Voyager command box or from the camera control, extrernal to Voyager. It is thus possible that the camera has been cooled, but it will say NoCooling because Voyager is not managing the temperature. If there?s an error in cooling you might see the text "UNK" in your file name.

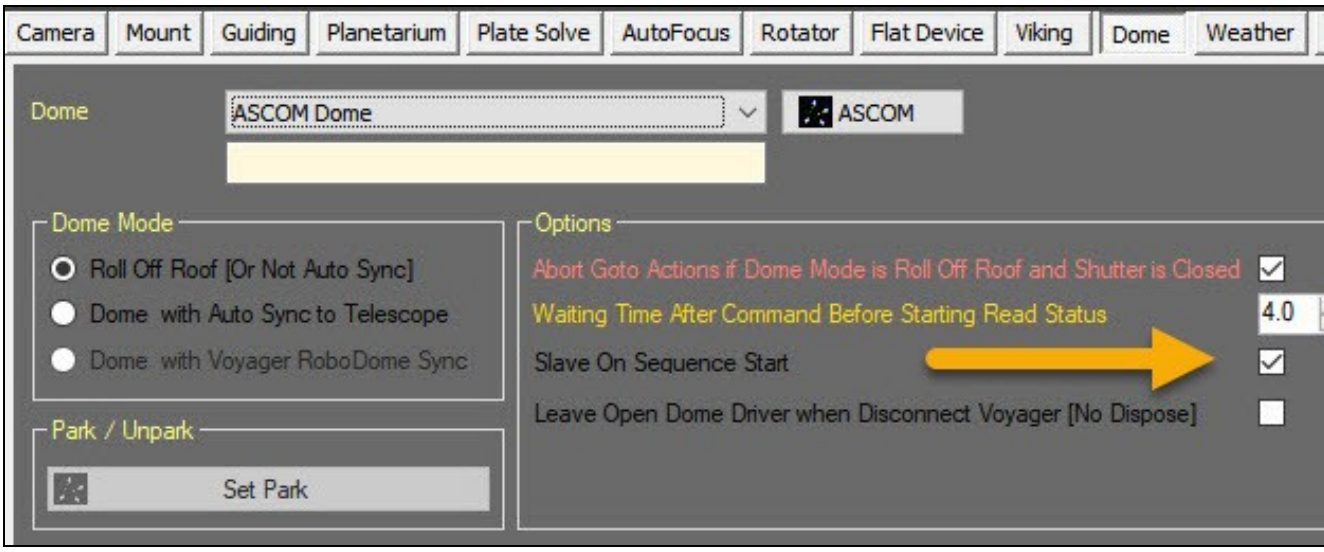
57.7 Connection / Startup

- **I get a red error message when I click Connect in the Startup workspace - Voyager can't connect to third party software such as TheSkyX, Maxim DL, PHD2, etc.**
  - Ensure Voyager is running as administrator. Start Voyager before all other programs. Let Voyager start the other programs it needs. They will inherit the proper mode from Windows when Voyager starts them.
  - If you still have an error, check your antivirus software to make sure it is not preventing Voyager from communicating with other programs.
  - If the inter-program communication is via TCP/IP ports, check that Voyager and the third party program are allowed to access ports in the Windows firewall, or any other firewall you may be running
- **I get a red error message when I click Connect in the Startup workspace - Voyager can't connect to my hardware**
  - Ensure Voyager is running as administrator. Check that your hardware is powered up and configured properly in Voyager and any driver software used to connect to it.
  - Ensure the COM port has not changed - sometimes Windows assigns a different COM port and your hardware driver will not be able to connect to your gear.
  - For camera connection problems, try applying the Slow Polling flag in Camera Setup. Some camera drivers can't handle requests spaced too closely together
  - For mount connection problems, try applying the Slow Polling flag in Mount Setup. Some mount drivers can't handle requests spaced too closely together
- **Voyager closes after trying to connect to other software or hardware**
  - Voyager will only close if a driver had a critical failure at the Windows kernel level that cannot be handled. Please activate the ASCOM log and report to the driver developers.
- **Voyager has problems connecting to my ASCOM device**
  - See above suggestions
  - Make sure the version of ASCOM you have installed is the correct one for your driver
  - If your driver accepts only one connection (a serial error when you try to connect from Voyager would indicate this) you can connect only one app. If you want connect more than one app you must use an ASCOM hub.

Voyager implements standard ASCOM.

57.8 Dome

- **I have the HiTec Roll-Off-Roof controller. I am getting "The requested operation is not permitted at this time" errors. What should I do?**
  - These errors have been seen when using the ASCOM driver as standard. Try the ASCOM Dome ConnectionLess Interface, which seems to eliminate these errors
- **Voyager started taking images before the dome had finished rotating**
  - Voyager will slave to the dome when starting a sequence only if you check the box **Slave on Sequence Start** in Setup -> Dome:



- If you don't do a specific command to slave the dome in Voyager, you'll see the message "Slave is unlock from user" in the monitor window
- This is because some drivers don't report slave status to Voyager
- If you create a DragScript to manage all night imaging remember to put a slave on block in the script if you do other mount operations before starting a sequence.
- Also remember to slave off and park the dome at the end of the script

- **I use VIking to control my Dome (or Roll-Off Roof). How do I connect it to Voyager's Dome controls?**
  - Voyager's Dome controls are only for ASCOM drivers. To use Viking from Voyager, build a DragScript and use the Viking actions to read and write to Viking's relays, switches and controls.
  - This video explains how to do this: https://vimeo.com/331171731
- **How do I make sure Voyager doesn't move my scope if I have a Roll Off Roof and the roof is closed?**
  - Go to SetupForm/Dome and you will see a tick box: ?Abort GoTo actions if Dome mode is Roll off Roof and the Shutter is closed? A tick there will stop any clash between scope and roof. (Courtesy of Graham on our forum)
- **How can I get slaving to work with my MaxDome ASCOM driver?**
  - Use Voyager RoboSync to slave the dome.

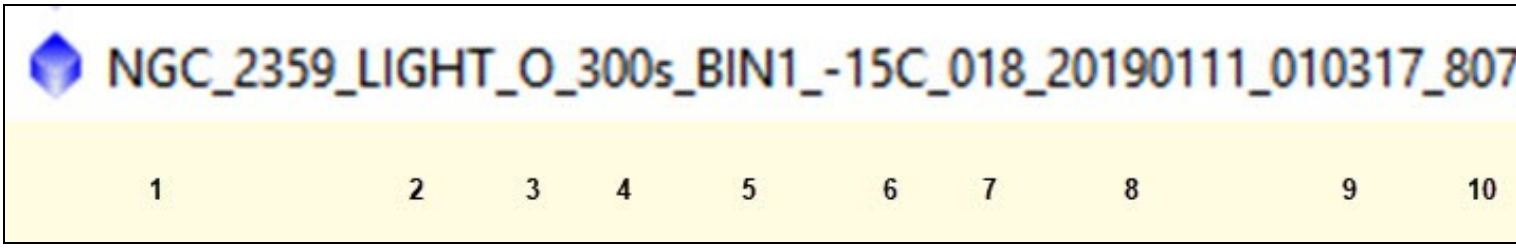
57.9 DSLR Support

- **Can I use my DSLR camera (Canon, Nikon) with Voyager?**
  - Voyager supports camera connection via ASCOM drivers, Maxim DL, or TheSkyX
  - We strongly recommend using Maxim DL or TheSkyX with DSLR's as their camera support has been widely used
  - There is an open source ASCOM.DSLR driver that may work for you. It can connect via the Canon or Nikon SDK's, or for Canon cameras, it can also connect via O'telescope's Backyard EOS.
  - We cannot help you if this doesn't work, but if you want to try using the ASCOM.DSLR driver, we wrote a Wiki page on how to set it up

57.10 Editing a DragScript

- **I can't get Drag and Drop to work in the DragScript Editor (perhaps with a remote desktop connection such as VNC, TeamViewer, etc)**
  - You can only drop DragScript elements where the mouse pointer shape changes to an arrow with a little rectangle attached when you hover over the desired drop location.
  - On Windows 10, the mouse pointer will not change shape if there is no mouse connected to the remote PC. To enable the mouse pointer shape changing with no mouse connected:
    - Right click the Windows button on the remote PC's desktop (not on your local PC)
    - Click Settings
    - Type "Mouse Keys" in the search box and select "Turn Mouse Keys On or Off"

◊ Turn Mouse Keys on



1. Target name
2. Type of exposure: Light, Dark, or Bias
3. Suffix: whatever you type in the "Suffix" field. Filter names are used here.
4. Exposure length
5. Binning level
6. Sensor temperature
7. Sequence number: a sequential number generated automatically when Voyager takes a new image
8. Date: YYYYMMDD
9. Time: HHMMSS
10. MS: millisecond portion of the time the image was taken
11. Position Angle
12. Position relative to Meridian: E = East or W = West
13. File type: FIT for a FITS file

57.11 Filenames

- **Can I use my own filenames for images taken with Voyager?**
  - **Sequences**: You can add something to the image filenames created by a sequence by typing it into the Suffix field - in this example, the filter name is used

  - **Other:** With the Camera -> Expose action in a DragScript, you can specify the filename however you like
- **What do the fields mean in the default image filenames saved by Sequences?**

57.12 Filters

- **How can I have Voyager use Filter Offsets (automatically change focus position when switching filters with a filter wheel)?**
  - Set this up in the ASCOM driver for your filter wheel, or in TheSkyX or Maxim DL if you use them for your Camera control

57.13 Flats

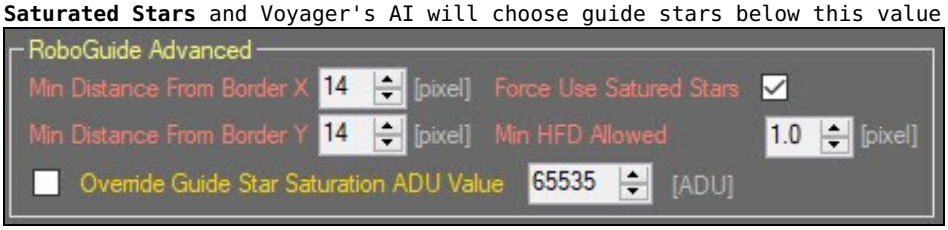
- **How can I take flats without the variable exposure feature of Auto Flats?**

- There are at least two ways to do this. Use the Camera -> Expose option in a DragScript. You can enter your desired exposure length and choose Flat as your exposure type. Or, enter your desired exposure length in Auto Flats for the minimum, maximum, and initial exposure times. Set the desired ADU to your mid-range (usually 32767) and 100% as your error tolerance.

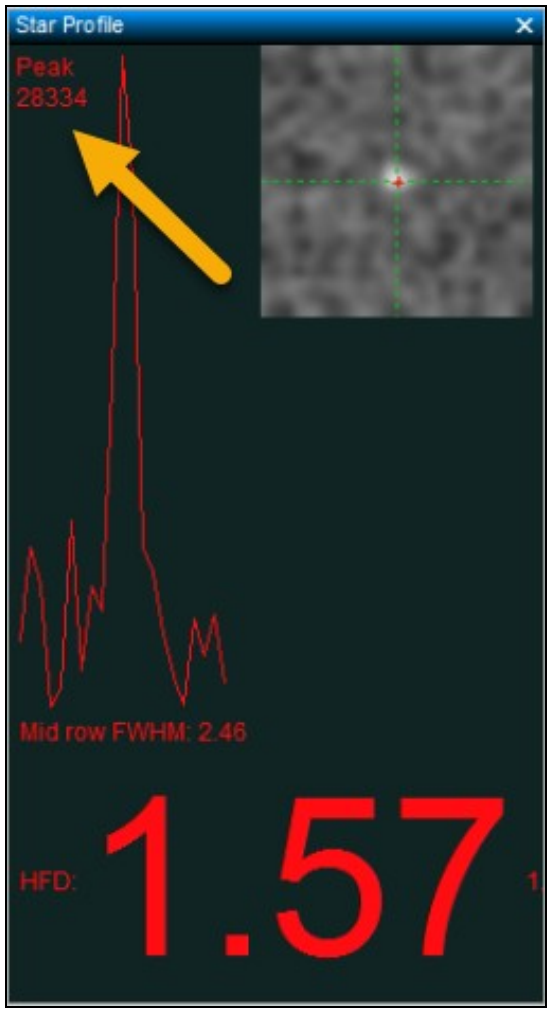
- **My Auto Flats never finish, they keep looping trying to find the proper exposure time but it is always outside the allowed error tolerance**
  - Try using a larger ROI - with a camera with a large number of pixels, the mean ADU of the default small ROI can change quite a bit. Also, look at the deviation in percent reported in the Monitor window. Increase your allowed error tolerance if necessary. You can also change the ROI to "no" and Voyager will determine exposure length based on the entire image, but this takes a little longer.

57.14 Guiding

- **What's the difference between RoboGuide and Native Guide controls?**
  - If you use RoboGuide, Voyager will choose a guide star using the parameters you set in RoboGuide Advanced
  - 

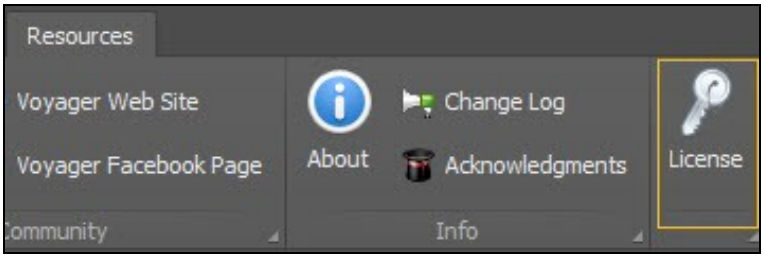
  - If you use Native Guide Control, Voyager will let your guiding software (PHD2, Maxim DL, TheSkyX) choose the guide star
- **Why does RoboGuide choose saturated guide stars?**
  - This happens if you check **Force Use Saturated Stars** in the RoboGuide Advanced section of Guiding setup. This can be useful at long focal lengths where only a few guide stars are available. Sometimes a saturated star is the best choice for guiding.
  - If you use a CMOS camera, check with a viewer to see what ADU value returned for a saturated star. Put this value in the **Override Guide Star Saturation ADU Value** box and uncheck **Force Use Saturated Stars** and Voyager's AI will choose guide stars below this value
  - 

  - You can read the ADU value of a guide star inside of PHD2 if you use that for guiding

- 

57.15 Licensing

- **What's the difference between "Demo" and "Trial" modes?**
  - The Voyager download installs in Demo mode. This is a perpetual, full functionality version of Voyager that times out after 60 minutes. Trial mode is full functionality with no session time limit, but limited to 45 days from the time you start the trial (which can be a later date than installation).
- **How do I get a license for my second or third PC's?**
  - Install the download on your second or third PC. Copy the serial number, which is unique to that PC, and email it to Leo or use the form at https://voyagerastro.com/contact-us/
- **Can I install the Free Trial download on multiple computers?**
  - Yes. It will install in "Demo" mode which is full functionality with a 60 minute session timeout. You can start the 45 day free trial at any time by clicking the Activate Trial button on the startup splash screen.
- **Do I need to install Voyager to get a serial number before buying a license?**
  - Yes. Each installation of Voyager has a unique serial number that is generated when you install it. Find your serial number by running Voyager, clicking the Resource menu, then the License option



- Copy the serial number from the License window and enter it in the Serial Number field of the license purchase form

57.16 Meridian Flips

- **How do I set up Voyager to manage meridian flips?**
  - Determine how far past the meridian your scope can slew without a pier crash. Let's say this is 30 minutes. Choose a value less than this, default is 10 minutes, and put that number in the "Do Flip after Mount Passing Meridian By" field in Mount Setup. If you want Voyager to finish the current exposure before doing the flip, allow enough time for your longest exposures to complete. E.g. if your longest exposure is 10 minutes in this example, Voyager would do the meridian flip no later than 20 minutes past the meridian, which would be OK with a 30 minute max for your equipment.
  - We don't recommend using zero (0) for the Do Flip after Mount Passing Meridian By" number, because this requires precise synchronization of the time settings in your PC and mount and the lat/long position of your site, and you must choose the "**ASCOM - Read LST from Driver**" in Mount Setup
  - Make sure your mount driver does not also do an automatic meridian flip when it is just tracking past the meridian
  - Choose Manage from Meridian Flip Mode in the Meridian Flip tab of the Sequence definition.
  - Run your sequences. When your scope crosses the meridian plus the number of minutes you specified in "Do Flip after Mount Passing Meridian By" minutes, Voyager will wait until the current exposure finishes, then perform the meridian flip before starting the next one.
  - For a more thorough explanation, read the GEM Meridian Flip Manager section of mount setup, the Meridian Flip tab of the Sequence documentation, and the Meridian Flip Status LED explanation in the Status Window section
- **Why does Voyager start another exposure when the Orange status indicator is flashing indicating a meridian flip is needed?**
  - The orange status indicator means the meridian has been crossed. The meridian flip won't happen until the "Do Flip after Mount Passing Meridian By" minutes have passed and the exposure underway *at that time* has finished.
- **My time zone is a partial hour different from UTC (like Australian Central Time which is UTC+9:30) and my meridian flips are happening 30 minutes late (or early).**
  - This has been fixed in Voyager 2.1.7m and later, please upgrade

57.17 Mosaics

- **Does Voyager have a Framing and Mosaic Manager?**
  - Not as of June 2019, although one is being worked on: https://forum.voyagerastro.com/t/framing-mosaic-maker-manager/419

- **How can I make a Mosaic with Voyager without a Framing and Mosaic Manager?**
  - A mosaic is just a set of adjacent images. There are many free and paid tools that will let you plan a Mosaic, including the one that will be integrated with Voyager:
    - http://www.skycrumbles.net/mosaic-maker/
  - Just run the tool to plan your mosaic and then copy and paste the coordinates for each panel into a Sequence in Voyager. You can use a Research & Survey sequence to shoot multiple targets with a single sequence.

57.18 PHD2

- **I am new to PHD2, how should I get started?**

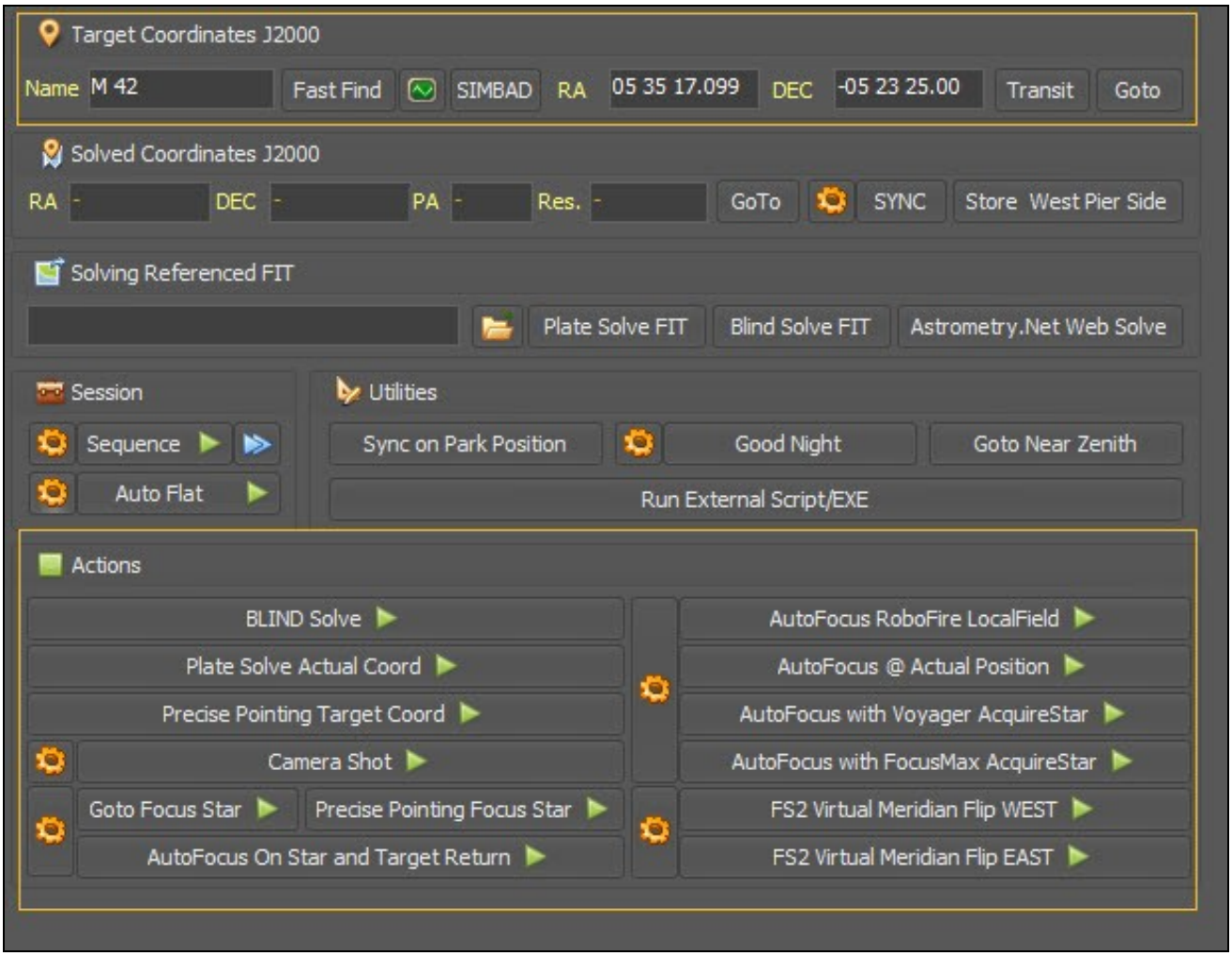
- There are many online tutorials on using PHD2 so we won?t try to recreate them here, but here?s one approach when setting up a new system with PHD2. Create an equipment profile for the connected gear. Start with the PHD2 defaults, then click the Brain icon and make sure your camera?s Pixel Size (on the Camera tab) and Focal Length (on the Guiding tab) are correct. Start taking guide images with PHD2. Hold Shift and click the Guide button to start a calibration run. If you haven?t already created a dark library, you will be prompted to do it. Follow the instructions and PHD2 will create a dark library. Once you have a successful calibration, PHD2 should start guiding automatically. Go to the Tools menu and select the Guiding Assistant. Follow the instructions to run it. It says to let it run at least 2 minutes, until the RMS values settle down. On the PHD2 Yahoo! group, they usually advise to run it for 15 to 20 minutes. However long you run it, when you stop it, it will give you suggestions to improve your guiding algorithm parameters. Accept them. Nine times out of ten, you will have ?good enough? guiding at this point to take images.

57.19 Plate Solving

- **What happens during a sequence if, after autofocus, plate solving on return to target fails, e.g. due to clouds?**
  - Voyager will try focusing three times with three different stars if you use RoboStar, or on the same field if you use LocalField. If plate solving to position to the focus star fails, Voyager will try blind solving if a blind solver is configured. Otherwise, the focus is aborted and an emergency fast goto is done back to the target.
  - If you use guiding and it failed due to clouds, Voyager will try to calibrate the guider three times and for each calibration re-try, it will try to acquire a guide star three times. (note - Voyager does not use stored calibration values)
  - If all guide calibration tries fail, the sequence is aborted with an Error status and the actions set in the "On Error" tab are taken.
  - If you don't use guiding, the sequence will continue with the normal goto used to position to the target - meaning goto without plate solving, not precision pointing.
  - Autofocus will be tried again when scheduled, and also plate solving will be tried three times to goto the focus star.
  - After three failed tries to goto a focus star, plate solving to find the focus star is disabled until the first good autofocus. All failure counters are reset if autofocus is successful.
  - Voyager's goal is to not stop any time - just not use guiding if it is not available due to clouds.
  - If you have a cloud sensor, you can manage the actions taken on cloudiness using DragScript Emergency Suspend, Resume and Exit events

57.20 Session

- **What is the relationship between the Target Coordinates in the OnTheFly workspace and the Sequence defined on that page?**
  - The target coordinates in the OnTheFly panel are used by by the Actions - the things outlined in yellow below. The Actions are simple things like autofocus or precision pointing (slew, plate solve, correct). If you previously defined coordinates with the Target Coordinates search box, the Solved Coordinates plate solve box, or the Solving Referenced FIT box, you will be asked if you want to use those coordinates when you create a new sequence. But if you create a sequence first, without coordinates, then go back to OnTheFly, new coordinates entered, searched or solved do not change the sequence coordinates. The assumption is that you might want to do something "On The Fly" with different coordinates, and you don't want to change your sequence coordinates.



57.21 Slewing and Meridian Flips

- **Why does Voyager sometimes stop my mount from slewing when both Voyager and an external program are connected and I initiate a slew from the external program (e.g., Cartes du Ciel)**
  - Voyager has a safety system to stop your mount if it will pass the meridian and Voyager is not doing anything at that time. There's a flag in the Mount Setup tab, under Safety, that controls this behavior. Please read that section of the Wiki for more information

- **Note on TheSkyX Conversion Between J2000 and JNow**
  - As of Voyager 2.1.2b, Voyager will double check Conversion between J2000> JNow and JNow> J2000 in case there is a glitch in the telescope data received from TheSkyX. Calculation will automatically switch from conversion by TSX to conversion by ASCOM / Voyager internals if needed

57.22 Starting Third Party Programs

- I am unable to start a third party program from Voyager (e.g. PHD2, Cartes du Ciel, TheSkyX)
  - Make sure the checkbox allowing Voyager to start the third party program is checked in Setup (e.g. "Try Start Exe On Connect")
  - Make sure exceptions are added to any firewall / antivirus / antimalware software you are running to allow Voyager and the third party program to connect
  - If Voyager is successfully starting the third party program but you are getting an error, you may need to increase the delay time in Setup on the Voyager tab, under the External PROCESS Starting box. Try a larger number and see if that gives the third party program enough time to start so Voyager can connect.

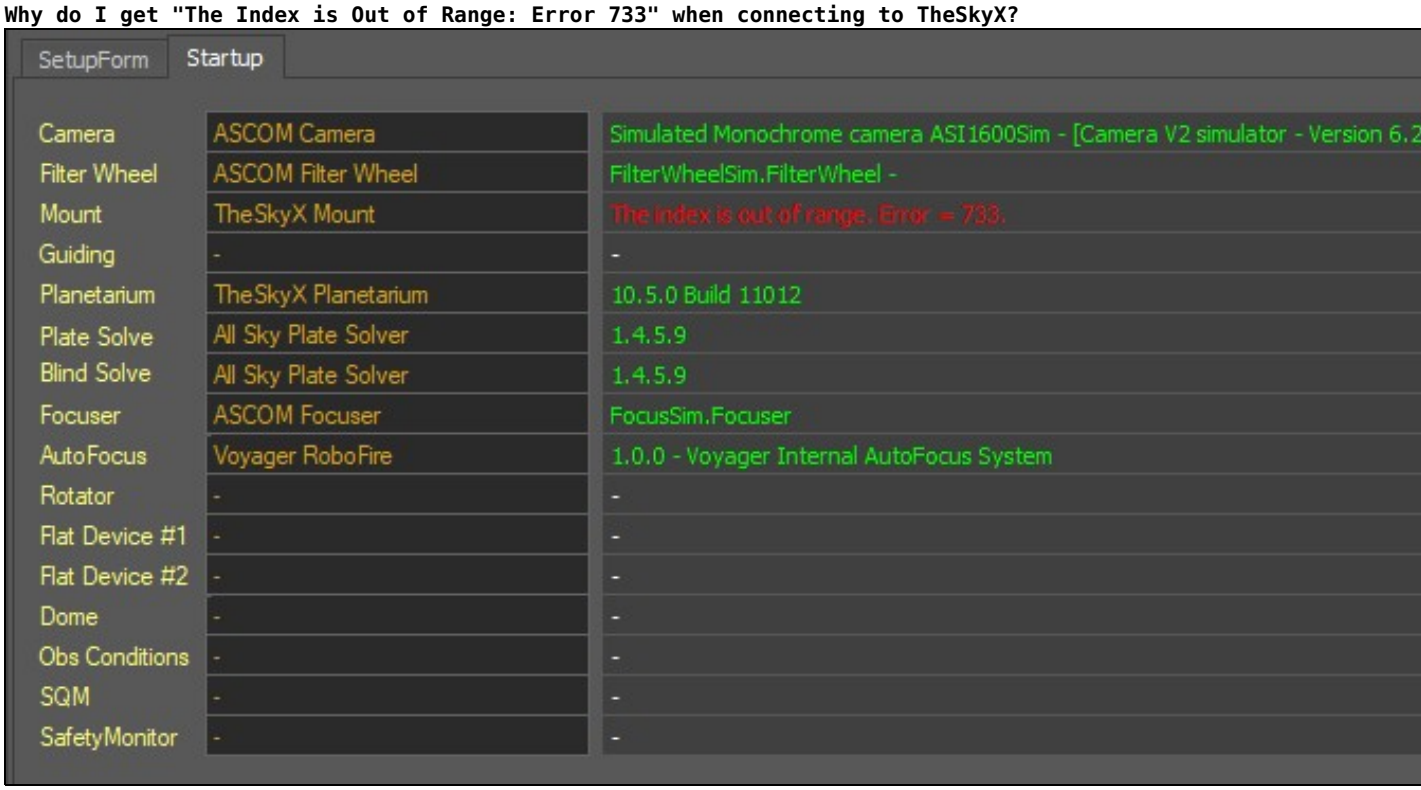
57.23 Startup Problems

- **When I try to start Voyager, the startup splash screen is stuck on the message "Sound Preload"**
- This is rare but it can happen if Voyager was closed abruptly at the OS level, corrupting information about the layout and position of controls and windows in Voyager.
    - Navigate to these folders in File Explorer - substitute your OS Login username for <username>.
        - C:\Users\<username>\AppData\Local\Leonardo_Orazi
        - C:\Users\<username>\AppData\Roaming\Leonardo_Orazi
        - Look in the Leonardo_Orazi folders and you should find one or more directories with names like "VOyager2.exe.xxxxxxxxxxxxxxxxxxxxxxxxx" or similar name where the long string of "x's" are other characters. You may only find the Leonardo_Orazi folder in one of these parent directories.
        - Remove all the directories inside the Leonardo_Orazi folders and restart Voyager.
        - If you are not comfortable doing this please allow us to help you with a Teamviewer session - email or use the support link on top page at https://software.starkeeper.it/

57.24 FITViewer Startup Problems

- **When I try to start FITViewer, and exception error of NET Framework is showed and application not start"**
- This is rare but it can happen if FITVIewer was closed abruptly at the OS level, corrupting information about the layout and position of controls and windows in FITVIewer.
    - Navigate to these folders in File Explorer - substitute your OS Login username for <username>.
        - C:\Users\<username>\AppData\Local\VoyagerFITViewer
        - C:\Users\<username>\AppData\Roaming\VoyagerFITViewer
        - Remove all the directories inside the VoyagerFITViewer folders and restart Voyager.
        - If you are not comfortable doing this please allow us to help you with a Teamviewer session - email or use the support link on top page at https://software.starkeeper.it/

57.25 TheSkyX and Voyager

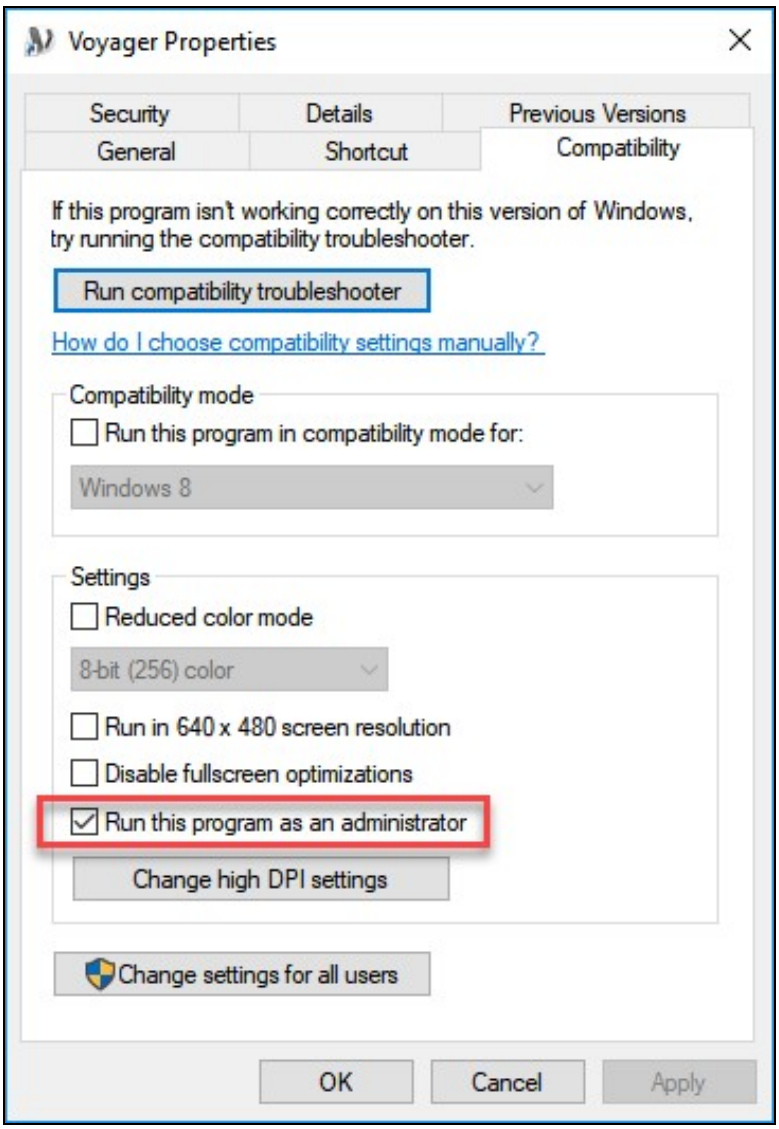
- **Why do I get "The Index is Out of Range: Error 733" when connecting to TheSkyX?**
- 

    - Voyager and TheSkyX cannot communicate. The most likely problem is that TheSkyX and Voyager are running in different modes (administrator or user). Let Voyager start TheSkyX - it will do so

when you click Connect in Voyager and TheSkyX will inherit the correct mode. Or, if you start TheSkyX manually, make sure it is running in the same mode as Voyager. We recommend and only support administrator mode because connection problems can happen with some software and drivers if Voyager runs in User mode.

- This sequence should work:

1) Check that Voyager will run as Administrator. (Right click the Voyager icon or Voyager2.exe file, click Properties, click Compatibility tab, make sure Run this program as an Administrator box is checked, click OK)



2) Check that TheSkyX can connect to a mount. In TheSkyX (not Voyager), click Connect to Telescope. We want to make sure that independently of Voyager, TheSkyX can connect to the telescope. It could be a Simulator, we just want it to be able to connect successfully.

3) Close programs and reboot your PC so we are sure there are no TheSkyX processes running

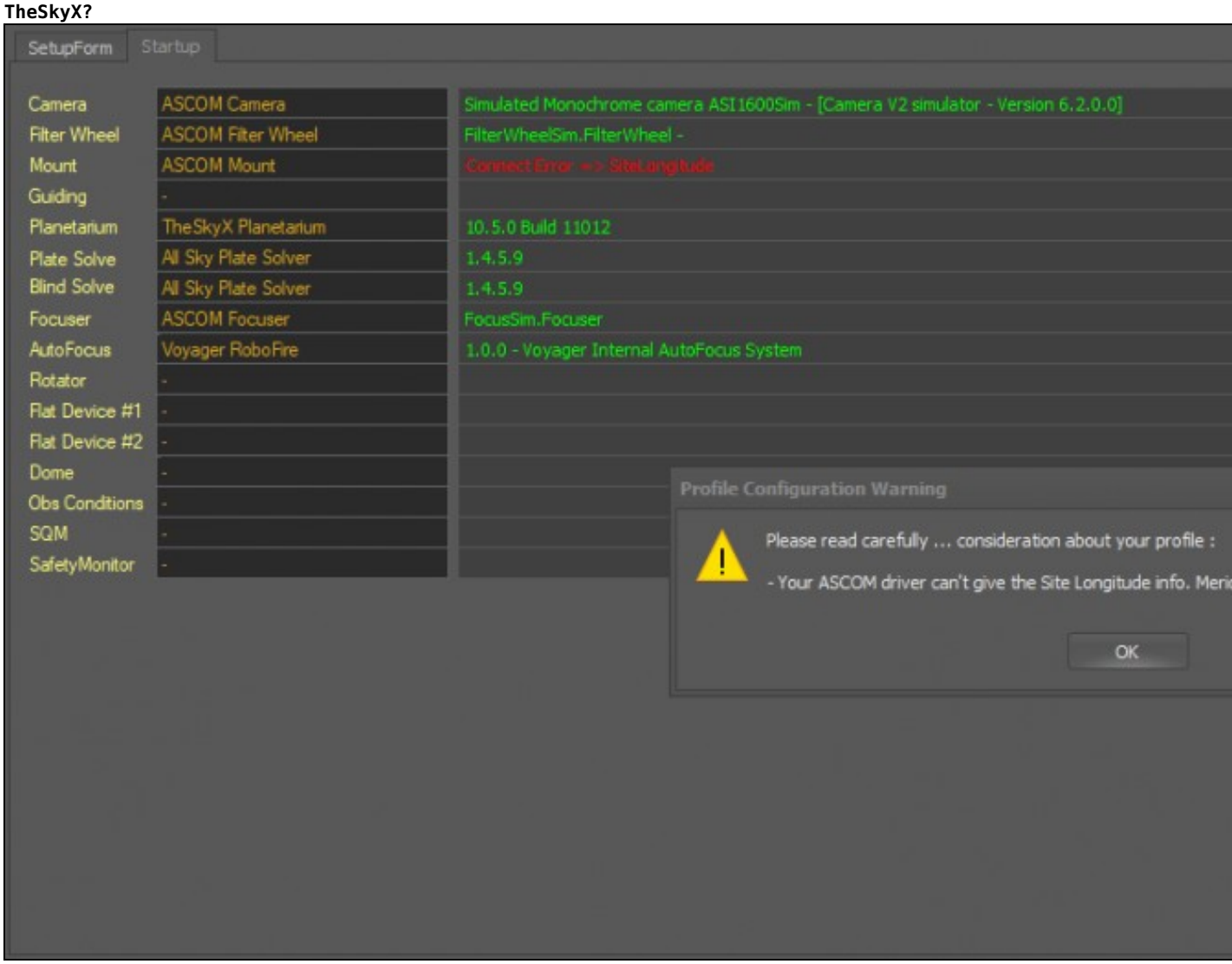
4) Start Voyager

5) In Voyager Setup -> Mount tab, choose TheSkyX from the Mount drop-down (we want to try connecting natively to TheSkyX, not via ASCOM)

6) In Voyager Startup, click Connect

If there are errors connecting to TheSkyX and the mount, it might be a firewall or antivirus preventing the programs from talking. But let's see if this basic sequence works.

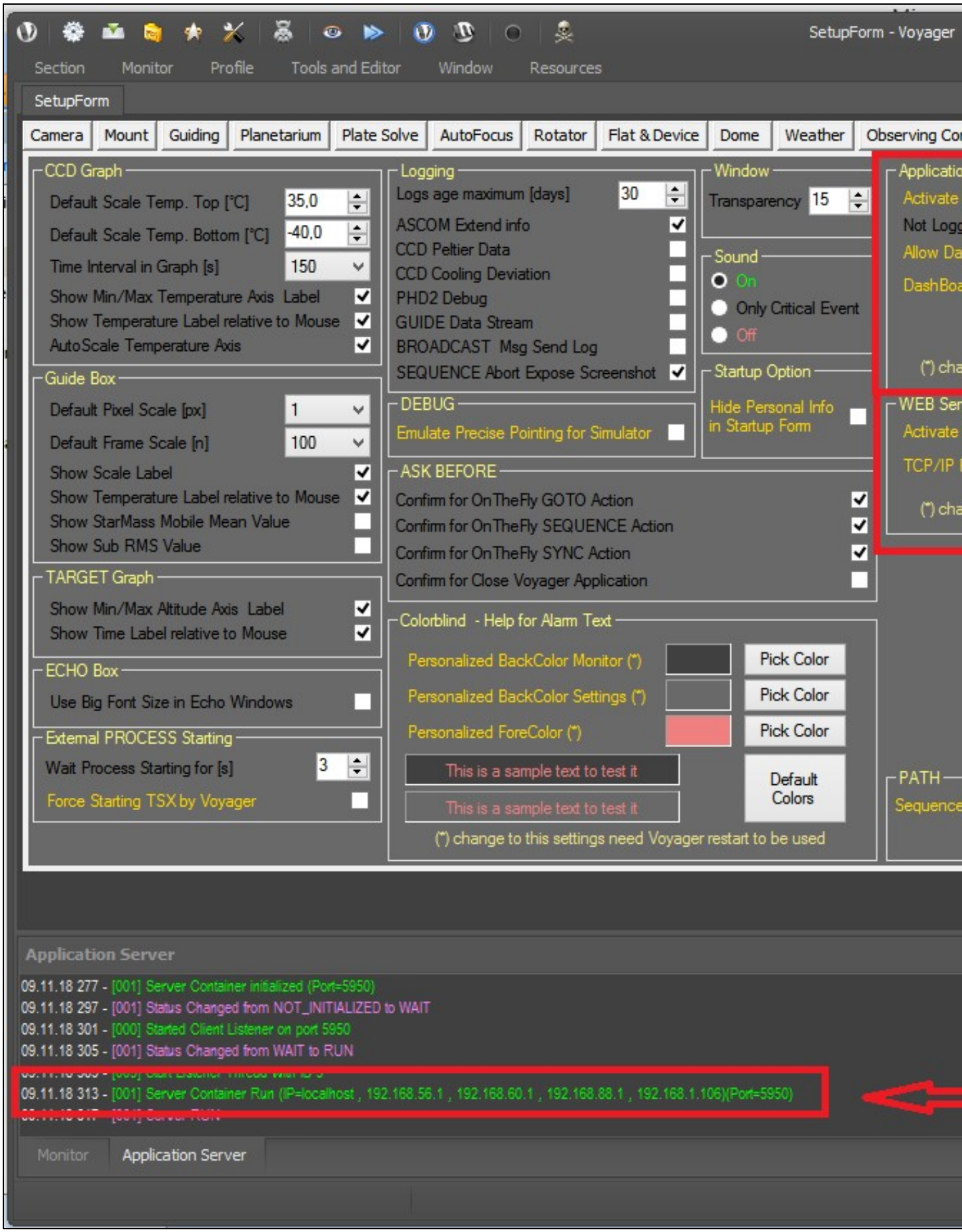
- **Why do I get a Connect Error -> SiteLongitude and "Your ASCoM driver can't give the Site Longitude info. Meridian Flip can't be managed from Voyager !!" error when connecting to Paramount's ASCOM driver for TheSkyX?**
-



  - This is a symptom of the same problem as the previous one - Voyager and TheSkyX can't communicate.
  - The most likely problem is that TheSkyX and Voyager are running in different modes (administrator or user). Let Voyager start TheSkyX - it will do so when you click Connect in Voyager and TheSkyX will inherit the correct mode. Or, if you start TheSkyX manually, make sure it is running in the same mode as Voyager. We recommend and only support administrator mode because connection problems can happen with some software and drivers if Voyager runs in User mode.
  - To run a program as administrator, right click the .exe file and select Properties. From the Compatibility tab of the Properties dialog, check the Run as Administrator box.
  - It is also possible that your firewall or anti-virus software is preventing Voyager from connecting. Check your firewall and anti-virus and make sure it is not blocking this connection.

57.26 Setting up Application Server and Internal Web Server

- **How can I set up the Application server and Internal Web Server in Voyager ?**

- 

- Box Application Server
  - ♦ flag on "Activate it on start"

- flag on "Not logging heartbeat"
- flag on "Allow dashboard service"
- select the image quality for dashboard (more quality mean more bigger data to transfer on the internet/network) default is medium

- Box Web Server
  - flag on "Activate it on start"
  - use default 80 port if you don't have another web server or service using port 80, change port to 8080 or similar free port if this is not true
- Close Voyager
- Restart Voyager
- Say yes on private and public network flag when Operating System asks for your firewall allowance (don't say no or close it or web server and application server cannot work) and you must do it manually from control panel
- to know at which IP address your PC could answer you need to check in the Application server monitor, you?ll found a list of IP address if application server is turned on, see the attached image.f you have switch on also the Web Server please contact one of this IP with the browser: http://localhost (if you are on the same pc) http://localhost:pppp/ (if you are on the same pc and use different port than 80) http://xxx.xxx.xxx.xxx (if you are on the network) http://xxx.xxx.xxx.xxx:pppp (if you are on the network and use different port than 80) Which IP dependes on your networking, someone can be only local, someone can be closed by your firewall/router, someone can change if you are on local olnly or in DHCP environment. If your pc have a hostname use it, better solution: http://hostname (if you are on the same pc) http://hostname:pppp/ (if you are on the same pc and use different port than 80)

57.27 Copy Voyager Data between different PC

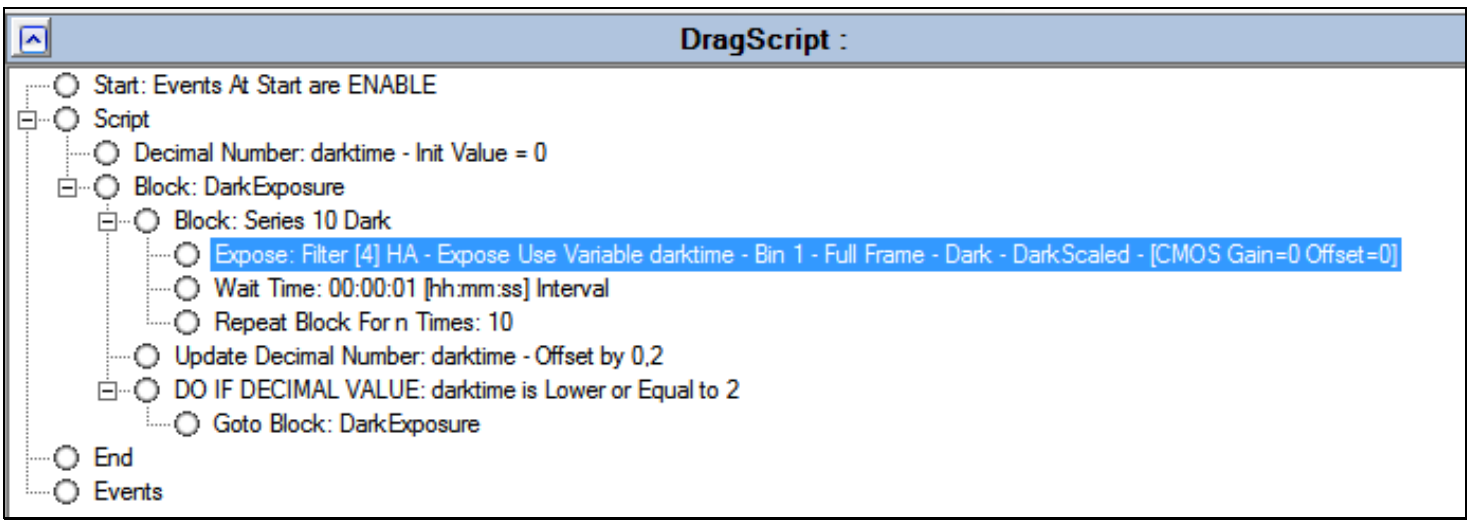
- **How can I move voyager data between two different PC ?**

Its possible to move data information about Voyager (profiles, sequences,autofocus setting, FIT Data) between two PC without lost any data. Just copy the folder "Voyager" that you can found in "Documents" folder of your PC. Paste it in a USB pen drive or in LAN shared folder. In the new PC install Voyager (if not was done), open at least 1 time, close it, copy the "Voyager" folder in USB inside the "Documents" folder of the new PC. Open Voyager in new PC. Thats all.

57.28 Using DragScript to create Parametric Dark (or DarkFlat)

- **How can I realize automatically Dark with different time also for DarkFlat ?**

Its possible to use the DragScript and the exposure block in conjunction with the decimal variables feature in Voyager to create a simple DragScript that create parametric Dark (in terms of exposure time) really fast. Look at this script:



This DragScript take a series of 10 dark starting from 0 to 2 seconds with increment between dark of 0.2 second.

10 dark at 0s

10 dark at 0.2s

10 dark at 0.4s

10 dark at 0.6s

?

?

10 dark at 1.8s

10 dark at 2s

Editing the repeat times and the initial value of *darktime* variable and the DO IF control value you are able to create your own parametric dark ?

58 ASCOM.DSLR

58.1 ASCOM for DSLR Cameras

Voyager supports DSLR cameras via TheSkyX and Maxim DL.

Voyager also supports ASCOM drivers, and there is an open source ASCOM driver for DSLR cameras on Github: https://github.com/vtorkalo/ASCOM.DSLR

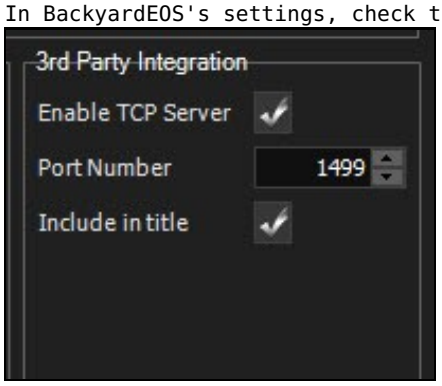
This open source ASCOM DSLR driver supports some Canon and Nikon cameras natively using an SDK, and also supports Canon cameras via O'Telescope's BackyardEOS commercial product.

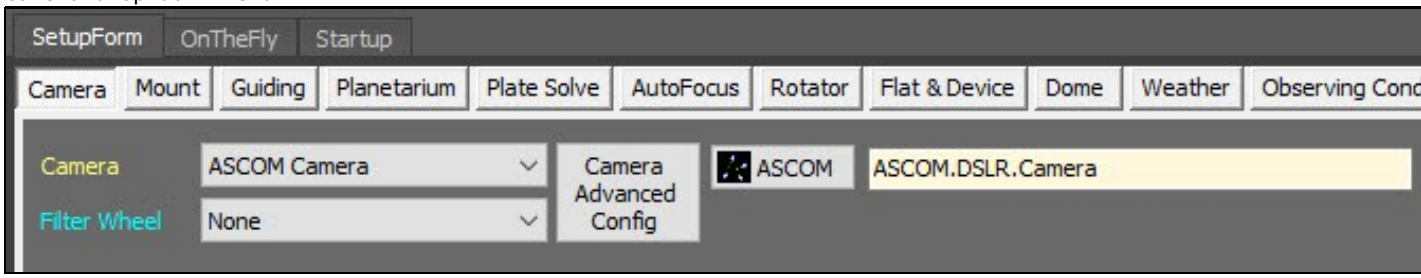
We tried using the driver to connect using the native SDK, but were not successful.

However, we were successful using Voyager talking to the ASCOM.DSLR driver talking to BackyardEOS. Here's how we set it up.

58.2 Setting up a Canon DSLR using the Open Source ASCOM Driver and BackyardEOS

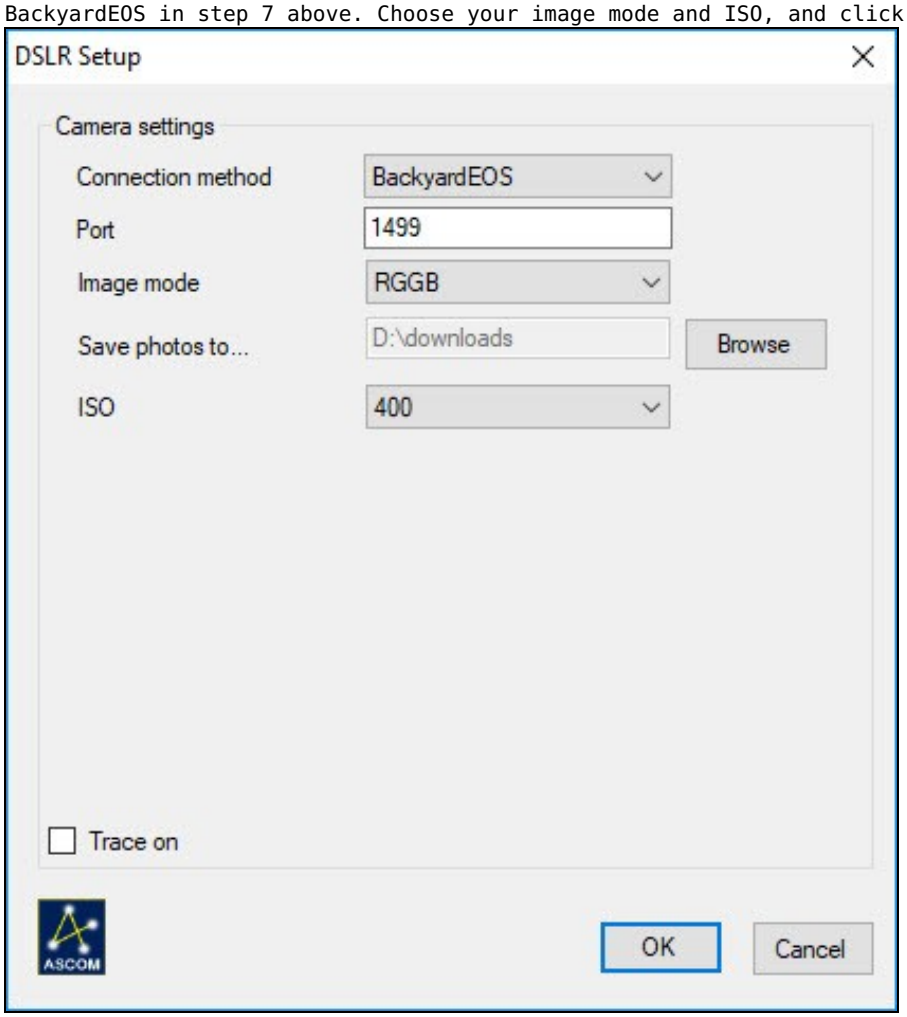
We didn't write the open source ASCOM driver and it has not been updated in a while. The following is for your information only - we can't answer support questions about it and you must use at your own risk.

1. You must have the ASCOM platform 6.x or greater installed: https://ascom-standards.org
2. repository is here https://github.com/FearL0rd/ASCOM.DSLR
3. Get the ASCOM.DSLR driver and install it. Go to Github: https://github.com/FearL0rd/ASCOM.DSLR/blob/master/DSLR.Camera%20Setup.exe and click the Clone or download button, then Download ZIP
4. download file and execute
5. If you are using BackyardEOS, you will have to purchase the premium edition which as of this writing is $50. Following the instructions that come with that program, install and configure your camera and get it working with BackyardEOS before proceeding.
6. In BackyardEOS's settings, check the box to Enable TCP Server, write down the port number, click Save.
7. 

8. Exit and restart BackyardEOS. Your Windows firewall will ask if it's OK to let BackyardEOS through - allow it.
9. Start Voyager. In the Setup workspace, click the Camera button and then choose ASCOM Camera from the Camera drop-down menu:
10. 

11. Select ASCOM Camera Driver for DSLR in the ASCOM Camera Chooser menu, then click Properties:

12. 

13. Select BackyardEOS as the connection method. Use the port number you wrote down when you enabled it in BackyardEOS in step 7 above. Choose your image mode and ISO, and click OK
14. 

15. Click OK in the ASCOM Chooser

You should be able to take pictures with Voyager using your Canon DSLR camera, connected via BackyardEOS and the open source ASCOM driver.