Opticstar PL-131 / AG-131 COOLAIR

	Microsoft Windows (64-bit & 32-bit) 7/8/10/11

OPTICSTAR

CAUTION

1. Please read and follow the installation instructions on the following pages for a trouble-free installation!
2. Do not drop your camera as this can result in serious damage.
3. Only use the supplied power supply unit if your camera comes with one.
4. Do not point the camera to a bright light source like the Sun without the appropriate filters as this will damage the sensor.
5. Disconnect the camera from the computer when not in use.
6. Treat the camera glass window with the same care as you would of a photographic lens.

Manufacturer's Warranty

This product has a 12 month back to base warranty. For after sales support, please contact Opticstar at: info@opticstar.com

---

Introduction

The PL-131 series of video cameras include the PL-131C COOLAIR (colour model) and the PL-131M COOLAIR (monochrome model). The PL-131 is the successor to the popular PL-130 but includes a number of significant enhancements such as:

- Twice the speed and the frame rate.
- Higher light sensitivity.
- Improved dynamic range and image quality.
- Region of Interest (ROI) in hardware. User definable.

The PL-131 achieves frame rates of up to 22 frames per second (FPS) at full resolution: 1280x1024 pixels, or up to 80 FPS at 640x480 pixels or up to 220 FPS at 320x240 pixels.

The PL-131 is suitable for imaging the planets, the Moon and the Sun. The camera is also suitable for microscopy when fitted with an appropriate attachment.

> Please note that for solar photography, the camera should be used only with an appropriate solar telescope and/or solar filters.

Software Support

The maximum frame rates are possible in conjunction with the **etAMACAP** and **Opticstar View** software applications that are included on the bundled CD. Alternatively, if the emphasis is to process individual frames rather than a video stream, then the PL-131 can be used with the following software applications:

- **Nebulosity** for image processing (Nebulosity Lite included on the CD).
- **PHD Guiding** for auto-guiding (included on the CD).
- **AstroArt** for advanced image capture, image processing and auto-guiding.
- **MaxIm DL** for advanced image capture, image processing and auto-guiding.

Package Contents

This Setup Guide includes instructions for the Opticstar PL-131 and Opticstar AG-131. The AG-131 includes the PL-131 camera plus the Shoestring GPUSB interface for telescope control. Prior to the installation, please ensure that the following items are included in the box.

Opticstar PL-131 contents:
- Opticstar PL-131 video camera.
- CS to 1.25" telescope adapter.
- USB cable.
- Software CD.

Additionally, the AG-131 includes the following items:
- Shoestring GPUSB interface box for telescope control via the Guide Port (ST4).
- Coiled cable to connect the GPUSB to the Guide port on the telescope mount.

Camera Installation

The minimum computer system requirements are the following:
- Windows (32-bit or 64-bit) 7/8/10/11 with the latest update.
- USB 2.0 port for the camera.

> ⚠️ The camera does not incorporate any optics and therefore it cannot reach focus by itself. A C/CS mounted lens must be used with the camera or it must be attached to a telescope with the nosepiece adapter that is included with the camera. To attach it to a microscope, please use an appropriate attachment.

There are several pieces of software to install in order to add support for the PL-131 camera to Windows. It is not necessary to install all the supplied software but the Windows drivers and Windows DirectShow support (steps 1 & 2) should be installed as a minimum. The remaining software may be installed as needed depending on the user's specific application.

1. Windows DirectShow software for the PL-131.
2. Windows software drivers for the PL-131.
3. EtAMCAP application software for camera control and video capture.
4. Opticstar View application software with more advanced functions and usability.
5. Nebulosity Lite for single shot image capture and processing.
6. PHD Guiding for telescope auto-guiding.
7. Plug-in for AstroArt support (you must already have AstroArt to use this).
8. Plug-in for MaxIm DL support (you must already have MaxIm DL to use this).

> ⚠️ Anti-virus software may attempt to block the software installation. In such cases the anti-virus software should be temporarily disabled. Otherwise, when prompted, add the installation files to the trusted list.

> ⚠️ The installation of the software should be carried out by a user with *Windows administrator permissions.* Otherwise, the installation may fail.

> ⚠️ Please ensure that the camera is **not** connected to the computer yet.
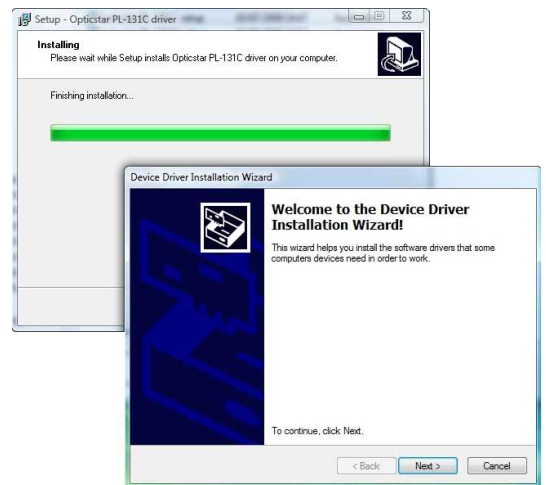
Installing Software for Windows DirectShow

The first step is to install software that makes the PL-131 compatible with Microsoft's Windows DirectShow model. Such compliance allows the PL-131 to be used with **etAMCAP**.

1. Navigate to the **DirectShow** folder on the CD and open the appropriate program for your camera. There are two options:
   - **PL-131C-setup.exe** for the colour camera.
   - **PL-131M-setup.exe** for the monochrome camera.

2. A message will appear "**Welcome to the Device Driver Installation Wizard**". Click on the **Next** button to continue.

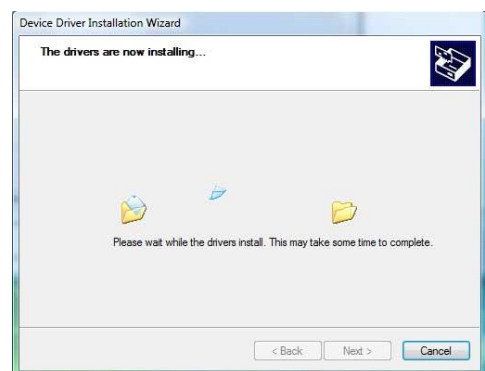Step 1: Open the appropriate installation program.   Step 2: Click **Next** to start software installation.

3. Windows may display a warning message such as **Windows can't verify the publisher of this driver software**. Select "**Install this driver anyway**" to continue.

4. The next message will confirm that "**The drivers are now installing…**".

Step 3: Ignore the Windows warning.   Step 4: Installation in progress.

5. Windows should confirm that the "**Drivers were successfully installed on your computer**". Click **Finish** to continue.

6. Finally, if Windows asks to restart the computer, select "Yes".

Step 6: Drivers installed successfully.


Step 7: Restart the computer.

 DirectShow support can be removed from the Windows Control Panel independently of the camera's Windows software drivers. Click the **Programs and Features** or **Apps & Features**, and remove the entry headed **"PL-131…"**.

Installing the PL-131 Driver Software (32-bit or 64-bit)

Please follow the instructions below in order to install the Windows drivers for the camera.

1. Insert the CD in the drive.

2. Connect the camera to a USB 2.0 port on your computer.

3. A window will appear with the heading **Found New Hardware**, giving three options. Select "**Locate and Install Driver Software**". Windows will search for the camera drivers.

Step3: Install driver software.
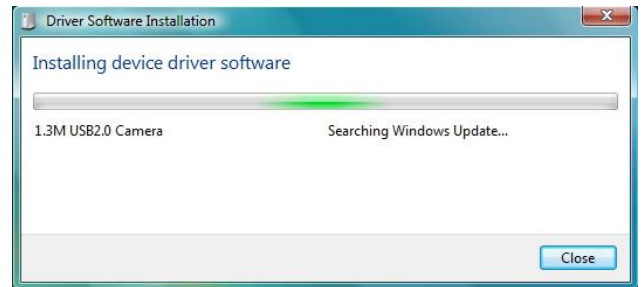
Step 3: Searching for driver software.

4. Windows will ask for the CD that came with camera (insert the CD if not present).

5. The drivers should now be installed and you can proceed on page 11. Otherwise, if Windows fails to find the drivers, it will display that **Windows failed to find the driver software** and prompt for action. Select, **Browse my computer for driver software**.
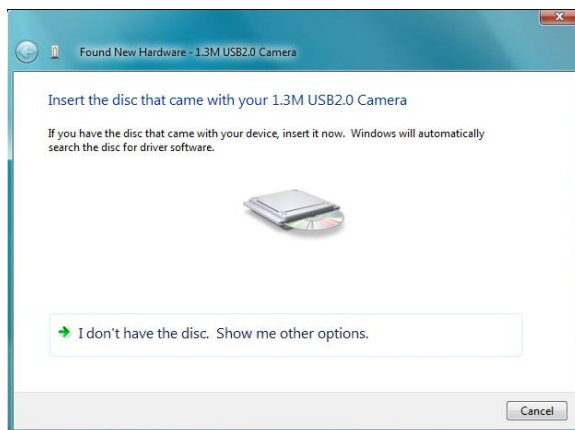
Step 5: Windows failed to find driver software.
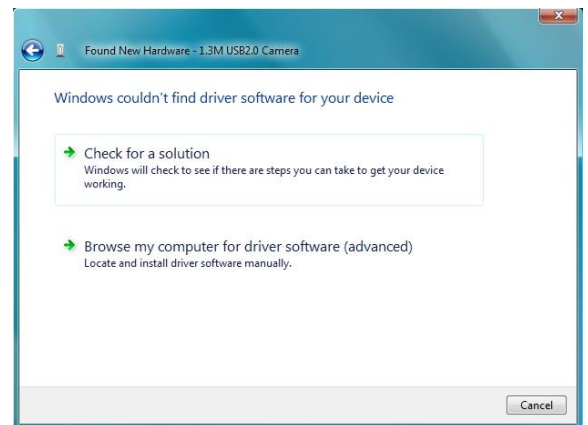
Step 5: Browse computer for drivers.

6. The drivers are located in the **Drivers\PL-131C** (colour camera) and **Drivers\PL-131M** (monochrome camera) folders on the CD. Each folder contains a **32-bit** and a **64-bit** sub-folder. Direct Windows to the appropriate folder. Windows will now install the driver software.
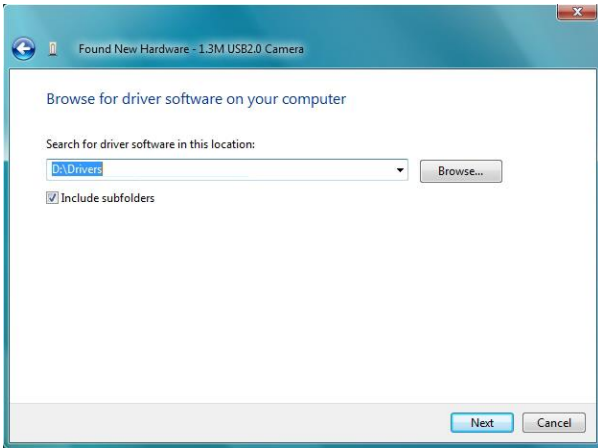
7. Sometimes, Windows will fail to identify the drivers. If this is the case, a message box will appear saying that "**Windows was unable to install your 1.3M USB2.0 Camera**".

Step 6: Direct Windows to the **Drivers** folder.   Step 7: Unable to install the camera.

8. In this case, the driver software should be installed manually. Click on the **Start** button on the Windows desktop and from **Settings > Control Panel**, select **Device Manager**. The camera should appear in the list with an explanation mark next to it, indicating that the drivers have not been installed yet.

9. Right-click on the camera description and from the pop-up menu select **Update Driver Software**.
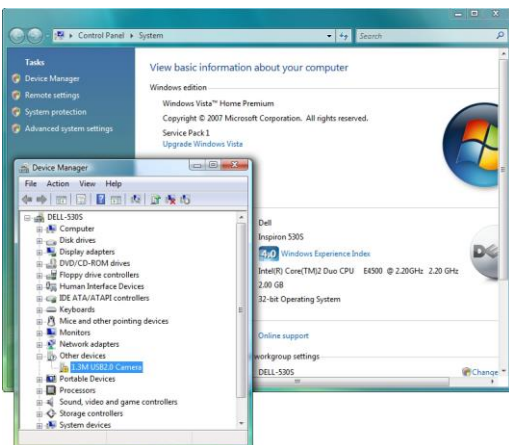
Step 8: Open **Device Manager** to locate the camera.   Step 9: Update the driver software.
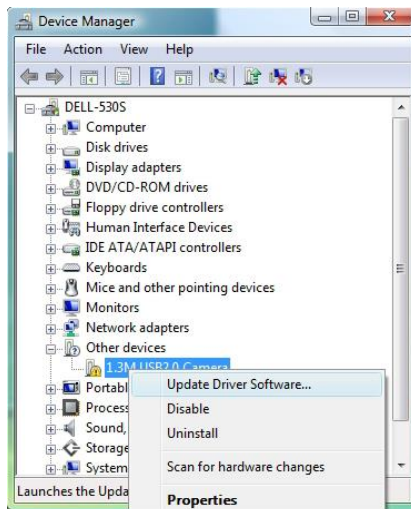
10. Windows will ask "**How do you want to search for driver software?**". Select "**Browse my computer for driver software**" to continue.

11. On the next dialog box select "**Let me pick from a list of device drivers on my computer**".
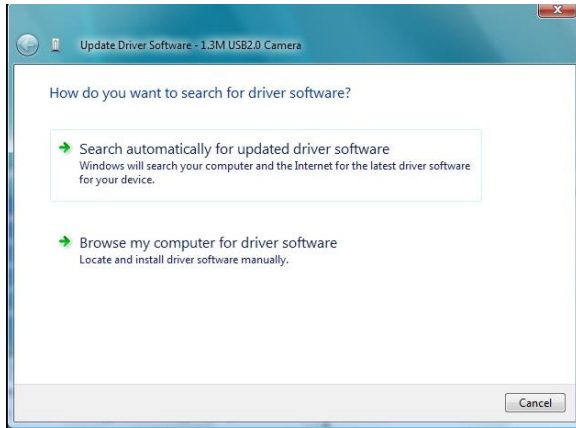
Step 10: Browse for driver software.	Step 11: Pick from a list of device drivers.
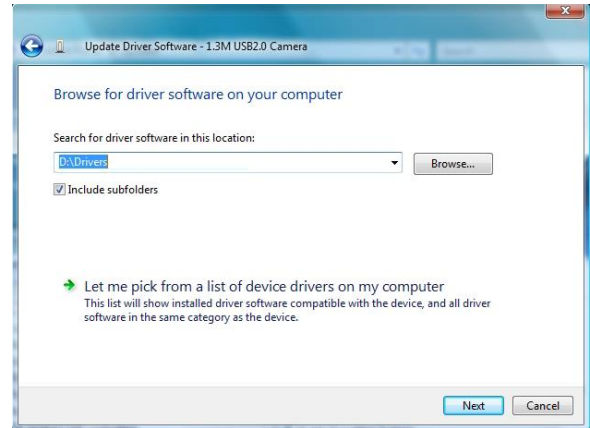
12. Windows will ask to **Select your device's type from the list below**. Select "**Imaging devices**" and click on the **Next** button.

13. On the next message box Windows will display: **Select the device driver you want to install this hardware**. Click the **Have disk** button.
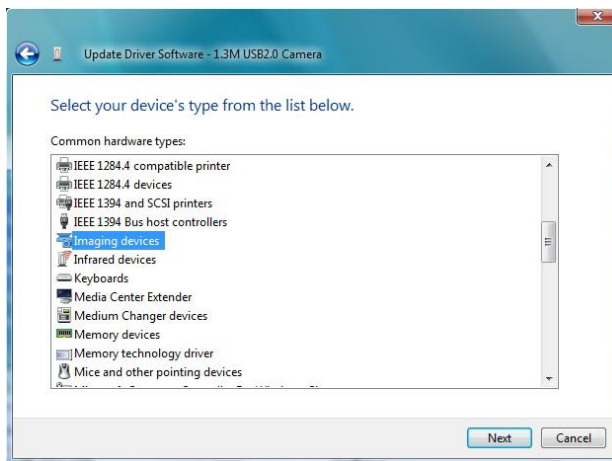
Step 12: Select device type.	Step 13: Have a disk.

14. The next message box with the title **Install from disk** will appear. Navigate to the **Drivers** folder on the CD and click the **OK** button.

15. The camera will be identified as "**PL-131 HighSpeed**". Click the **Next** button to continue.
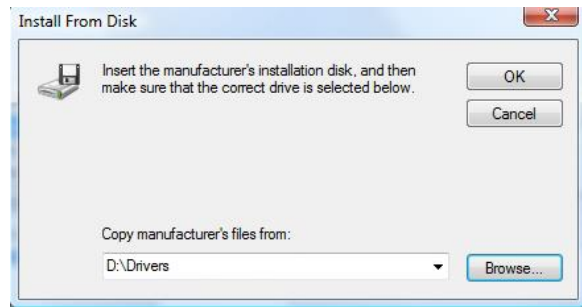
Step 14: **Drivers** folder on the CD.

16. Windows may issue an **Update Driver Warning**. Click the **Yes** button to continue the installation.
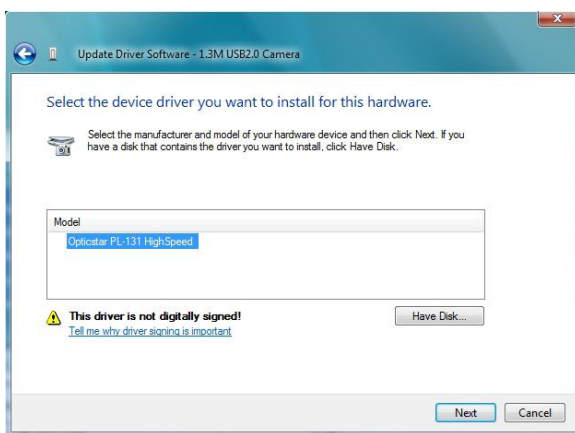
Step 16: Continue the installation.

Step 15: Select the camera from the list.

17. The following warning message may be displayed: **Windows can't verify the publisher of this driver software**. Ignore the message and select **"Install this driver software anyway"**.

18. Finally, Windows will confirm the end of the installation with the following message: **Windows has successfully updated your driver software**.
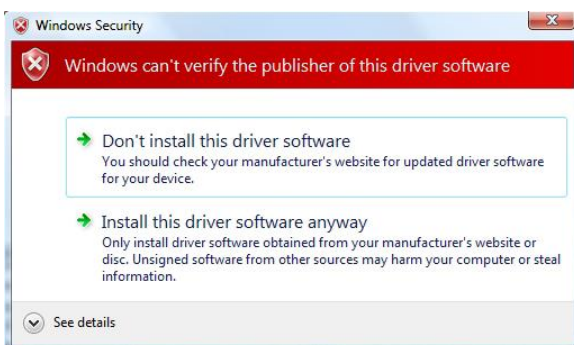
Step 17: Select the camera from the list.
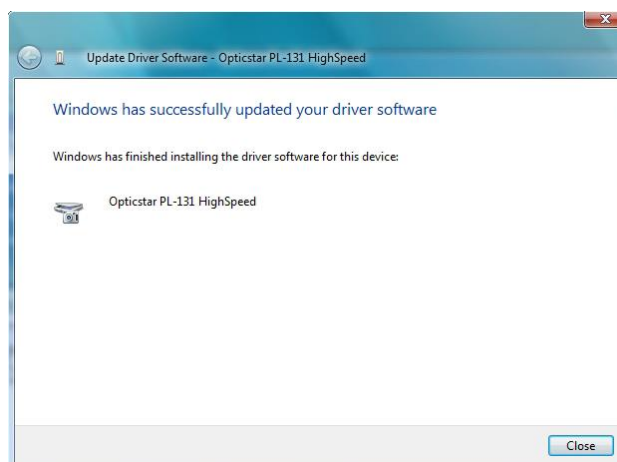
Step 18: Finished driver installation.

Installing etAMCAP

You can test that the camera has been installed successfully by running the **etAMCAP** program.

The **etAMCAP.EXE** can be found on the accompanying CD inside the **etAMCAP** folder. Copy this to your computer's desktop by dragging it from the CD folder.

Double-click the **etAMCAP** icon on the Windows desktop to run the program.

The camera will be identified as **PL-131C** for the colour model or **PL-131M** for the monochrome model. Select the camera from the **Devices** menu. **EtMAMCAP** can be used as a general-purpose program to capture video in AVI format.
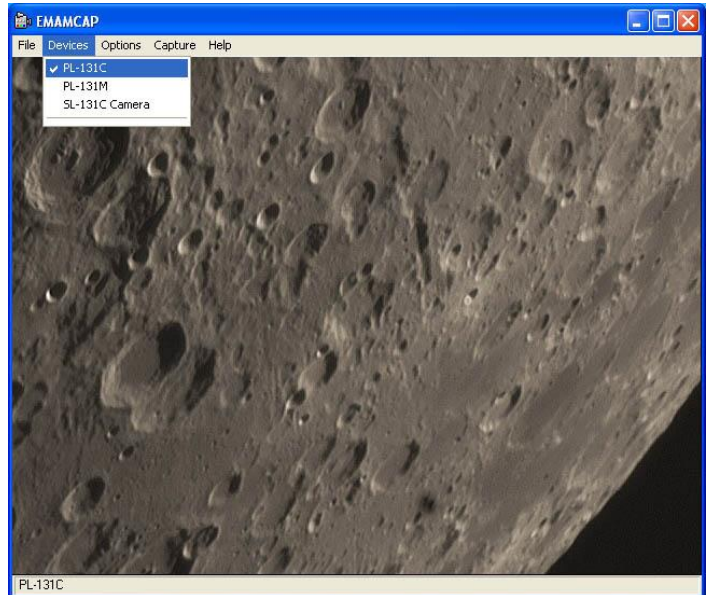
> ⚠️ **EtAMCAP** can be used to capture video in AVI format. It cannot capture single frames. In order to capture single frames as well as video please use **Opticstar View**.

Video Capture with etAMCAP

ROI (region of interest) modes increase the rate at which the camera sends the data to the computer while preserving the full image quality of the selected region.

The camera mode can be selected from the menu by selecting **Options > Video Capture Pin**.

The maximum frame rate that the camera operates at depends on the mode selected.
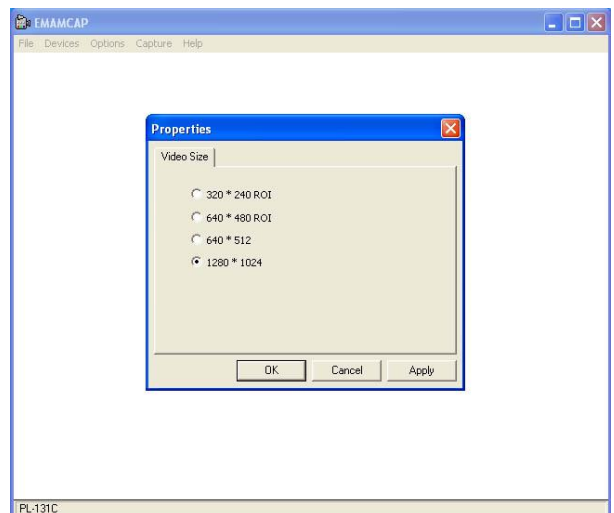
Selecting the camera mode and resolution.

Mode	Frame Rate (max)
1280 x 1024	22 frames per second
640 x 512	70 frames per second
640 x 480 ROI	80 frames per second
320 x 240 ROI	220 frames per second

Exposure Time

The exposure time can be set by selecting **Options > Video Capture Filter** under the **Exposure** tab. The camera can operate using automatic exposure or manual exposure. When using automatic exposure, the only exposure related parameter that the user can control is **Target**. The target slider gives a delta value, up or down, to the automatic exposure used by the camera. Effectively, the user can affect the automatic exposure time by setting the **Target** value. The target value can be set between 50 and 200. The default value is 100 which leaves the default exposure time unchanged.

A **Target** value above 100 will increase the exposure time. A value below 100 will decrease it. The **Gain** value cannot be set by the user when the camera operates in automatic exposure mode.

Manual Exposure Time

The exposure time can also be set manually by un-ticking the **Auto Exposure** option. When the camera operates in manual exposure mode, the **Target** value cannot be set since it has no meaningful purpose in this context. The **Gain** value however can be set between 1 and 40. High **Gain** values increase the camera's light sensitivity.
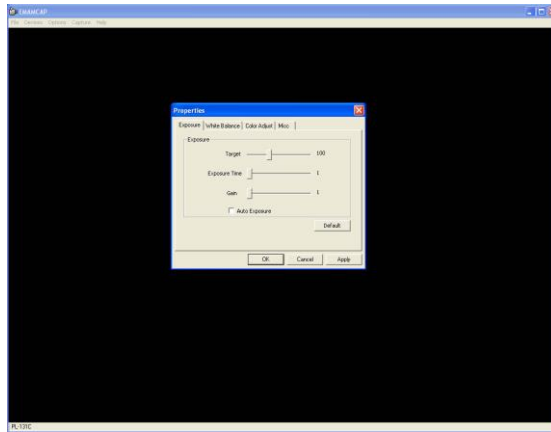
Timing Units and Exposure Time

The region of interest (ROI) modes, increase the frame rate dramatically. At 1280x1024 the frame rate is 22 frames per second (FPS). When in 640x480 ROI mode the maximum frame rate increases to 80FPS. An increase of 3.6 times (80 / 22 = 3.6). The exposure time per frame decreases accordingly. Therefore, in 640x480 ROI the maximum exposure time of the camera is 3.6 times less. Effectively, it is a trade-off between speed and exposure time (and hence sensitivity). Similarly, at 320x240 ROI the frame rate increases to 220 FPS. Therefore, because the frame rate increases by ten times, the exposure time per frame is reduced by 10 times (220 / 22 = 10).

The exposure control slide bar always displays the exposure time units between 0 and 3000. These units relate to the camera's internal clock rather than actual milliseconds. The range of 3000 units specifies different a exposure time depending on the camera mode. When the camera runs in high-speed mode (the default mode), the maximum frame rates and the exposure times are outlined in the table below.

Mode	Frame Rate (FPS)	Exposure Time (max)	Timing Units
1280 x 1024	22	500ms	3000
640 x 480 ROI	80	138ms	3000
320 x 240 ROI	220	50ms	3000

The camera can also operate in standard speed at half the frame rate but double the maximum exposure time. In software applications such as Nebulosity, PHD Guiding, AstroArt and MaxIm DL the camera operates at standard speed.

> ⚠️ When the camera is set to operate at standard speed (by **Nebulosity**, **PHD Guiding**, **AstroArt** and **MaxIm DL**) it will remain at standard speed until the user restarts Windows. Even **etEMACAP** and **View** will operate at standard speed until Windows is restarted.

Region of Interest

When the camera operates in ROI modes, the user can specify the region of data that will be downloaded to the computer by selecting **Options > Video Capture Filter** under the **Misc** tab.

The four arrow keys in the **ROI** group can be used to scroll over the sensor's active imaging area. The selected area is always in full resolution but the camera operates at a higher frame rate.
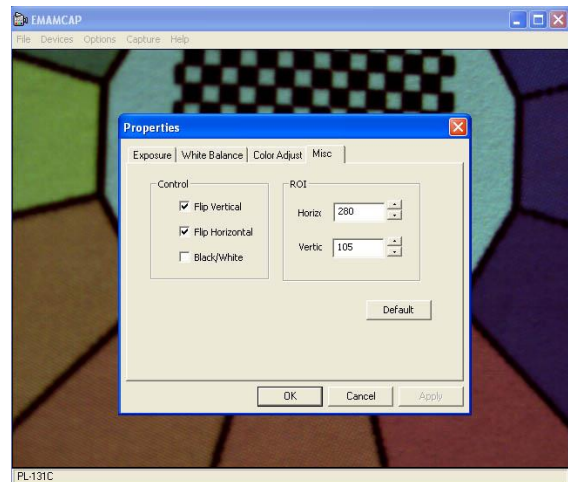
Colour Synthesis for the PL-131C (colour model)

Colour synthesis is the process of creating a colour image from raw data. Scientific colour cameras use a Bayer matrix on the CMOS/CCD sensor. A Bayer matrix is a series of micro-filters that are placed on top of the sensor's cells (pixels) in order to give it the colour information.

Dedicated astronomy cameras do not incorporate an infra-red blocking filter (IR filter) and therefore images tend to have a red bias. By capturing light in the IR region, the camera can capture data that normally would not be visible to the human eye. The PL-131C does not incorporate an IR filter for this reason.

On the PL-131C, colour synthesis can be adjusted manually or automatically. Under the **White Balance** tab, there are three slide bars that can be used to adjust the relative strength each colour channel: Red, Green and Blue (RGB). It is also possible to let the camera perform the colour balancing by clicking on the **One Push WB** button.
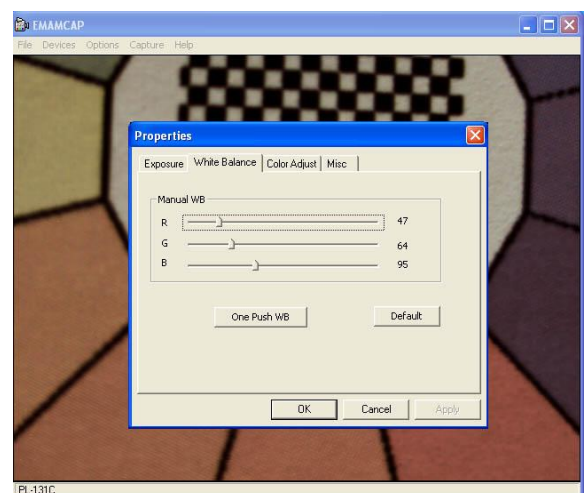
If the user adjusts any of the RGB slide bars, the camera will enter manual white balance mode. To revert back to automatic white balance, the **One Push WB** button must be pressed.

Gamma, Contrast and Saturation (colour model)

Other image properties such as the gamma, contrast and saturation of the image can be adjusted by selecting **Options > Video Capture Filter** under the **Colour Adjust** tab.

These values can be set manually by using the appropriate slide bars or automatically by ticking the **Colour Enhancement Enable** option.
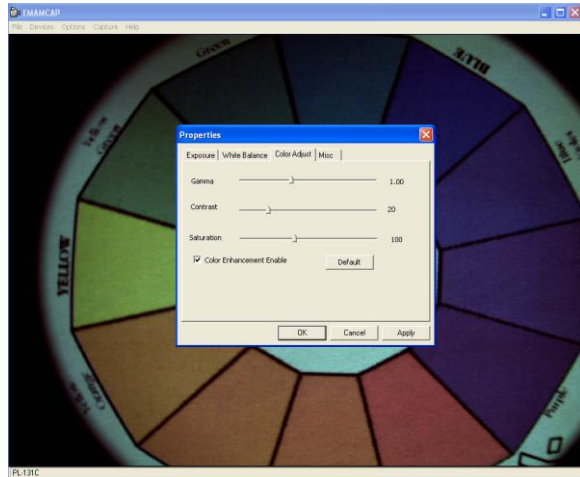
Video Capture

The camera can capture video and store it to disk as an AVI file. The folder and location of the file can be selected from the **File > Set Capture File** menu. In order to start video capture, select **Capture > Start Capture**. Timing during capture can be selected from **Capture > Set Frame Rate** and **Capture > Set Time Limit**.

Post Processing

There is some freely available third-party software that may be of interest to some users. Please note that Opticstar cannot guarantee the suitability the software.

- Deep Sky Stacker. (http://deepskystacker.free.fr).
- RegiStax. (http://www.astronomie.be/registax/)

These programs can be used to post-process video files captured in **EtAMCAP** and **View**. They can stack, align and enhance multiple AVI frames into a single high quality "master" image.

Installing Opticstar View
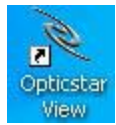
Opticstar View is a more advanced software application that can be used to control the camera, capture single frames or video, perform image processing and image measurements.

View can be used for a wide range of applications outside astronomy including microscopy.
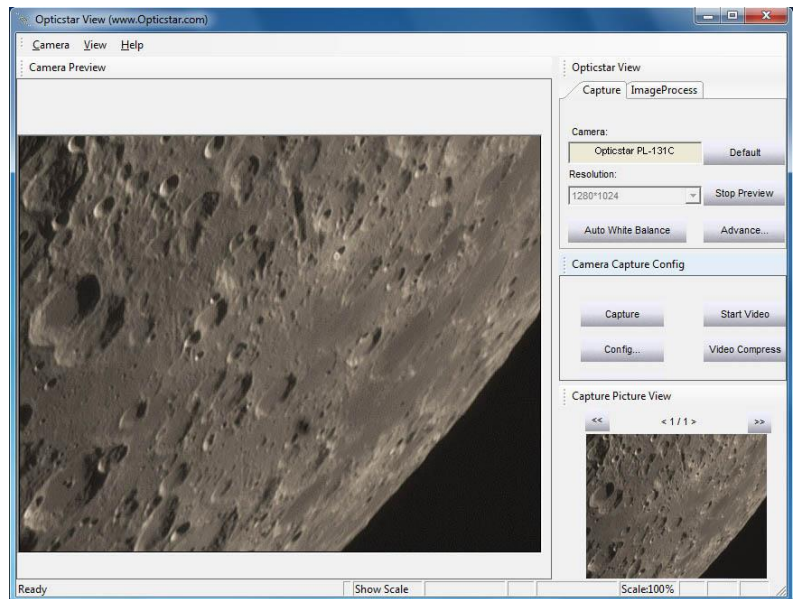
1. To install **View**, navigate to the **View** folder on the CD and open the **View_setup.exe** file.

2. Windows will display "**Welcome to the Opticstar View Setup Wizard**". Click the **Next** button to continue.
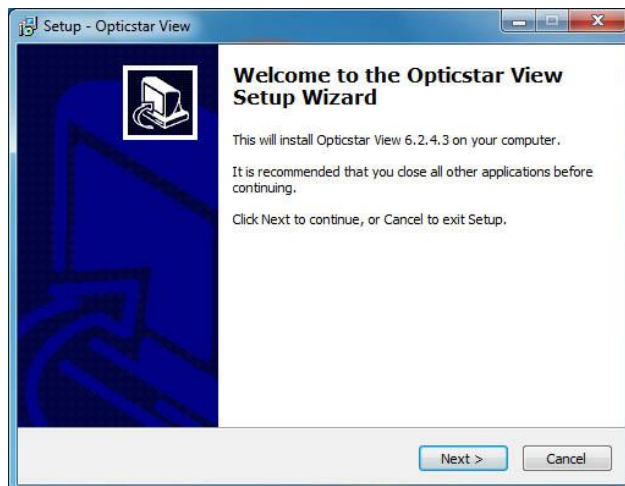
Installing Opticstar View.
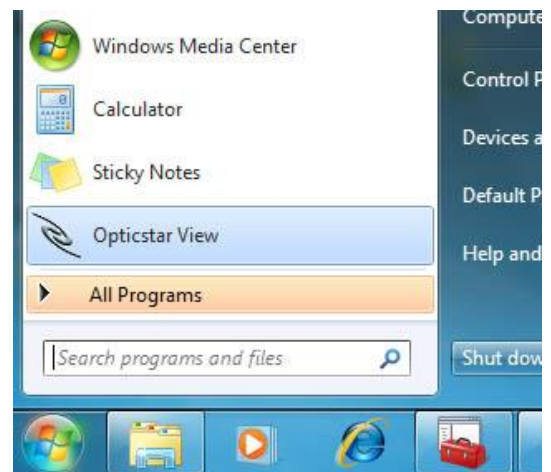
Running Opticstar View.

After the installation has finished, **View** can be run by clicking on the Windows **Start** button and selecting **Opticstar View** from the programs list.

Camera Control

Run **View** with the camera connected to the computer. On the right-hand side panel of the application, under the **Capture** tab, the camera will be identified as "**Opticstar PL-131C**" or "**Opticstar PL-131M**".

By default, the camera will be running as soon as **View** opens. In order to change the image resolution, the preview must be stopped by clicking the **Stop Preview** button. This button toggles between **Start Preview** and **Stop Preview** modes.

The **Default** button resets the camera settings to the default values.
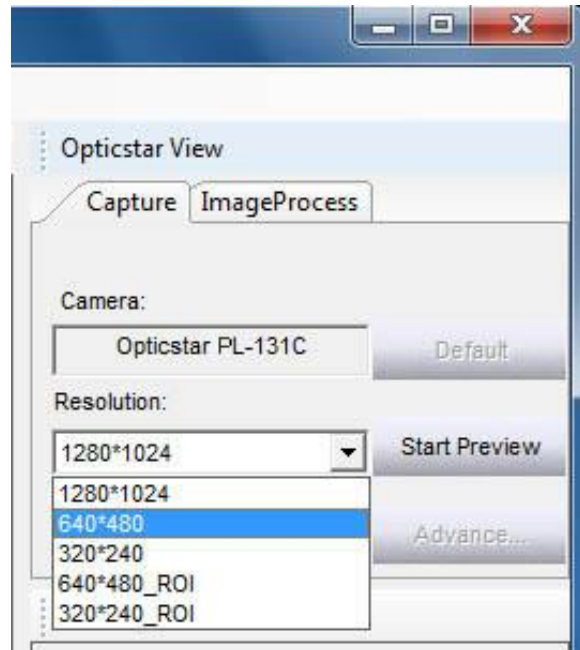
Frame Rate

When lower resolution modes are combined with manual exposure times, they can increase the frame rate (frames per second) at which the camera operates.

Resolution	Frame Rate (max)
1280 x 1024	22 frames per second
640 x 512	70 frames per second
640 x 480 ROI	80 frames per second
320 x 240 ROI	220 frames per second

Camera Configuration

The exposure time as well all other camera parameters can be configured by clicking the **Advanced** button. This button is situated below the **Start Preview / Stop Preview** button.

A window will appear with three tabs:
- Color Adjust
- Explosure
- Other

The options under each tab are outlined in the following sections.

Colour Adjustment Tab

The first three slider bars labelled: **R Gain**, **G Gain** and **B Gain**, can be used to manually adjust the red, green and blue colour reproduction of the camera. Alternatively, the camera can automatically set these values by pressing the **White Balance** button. Automatic values may not be appropriate in certain circumstances depending on t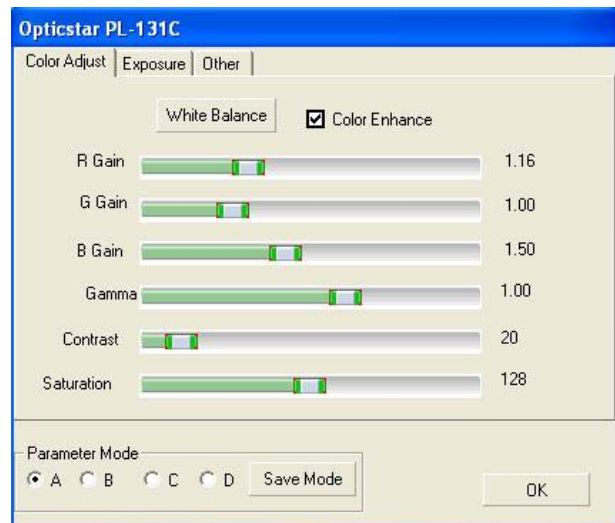he light conditions, luminosity of the target, etc. Other values that are user selectable include **Gamma** and **Contrast**.

User defined settings can be stored for future use. There are four sets of parameters that can be stored for future use. They are labelled **A**, **B**, **C** and **D**. Simply select one of them and click the **Save** button.

Exposure Tab

When auto-exposure is used, the user cannot specify the exposure time. However, it is still possible to add a "bias" by increasing or decreasing the **Target** value. Likewise, the **Gain** value is not user definable in auto-exposure mode.

To set the exposure time manually, simply un-tick the **Auto Exposure** option. In this mode, the time can be set in milliseconds and the **Gain** value can be set manually. The **Target** value cannot be set in manual exposure mode.
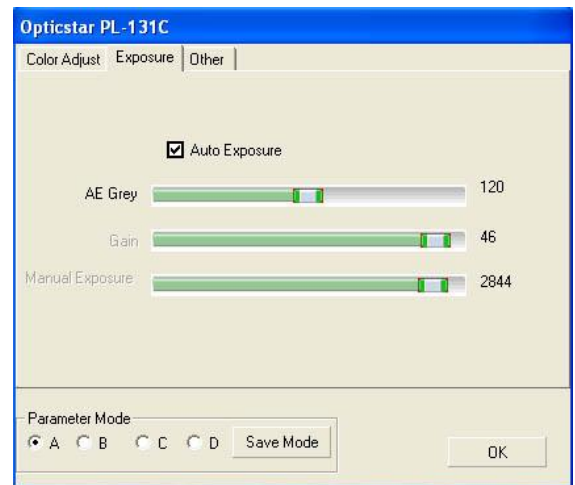
Other Tab

All other configuration settings are situated under the **Other** tab. The camera's frame speed can be set to **Normal** (better image quality) or **High** (higher frame rate).

The way that the camera reads the pixel data from the sensor can be set by selecting the **Sub Resolution** option. This has effect only in binning modes. **Bin Pixels** combines the pixel data but **Pick Pixels** skips some of the data on the sensor.

The orientation of the captured images can be inverted or reflected by the **H Flip** and **V Flip** options. The **Mono** option produces monochrome images rather than colour.
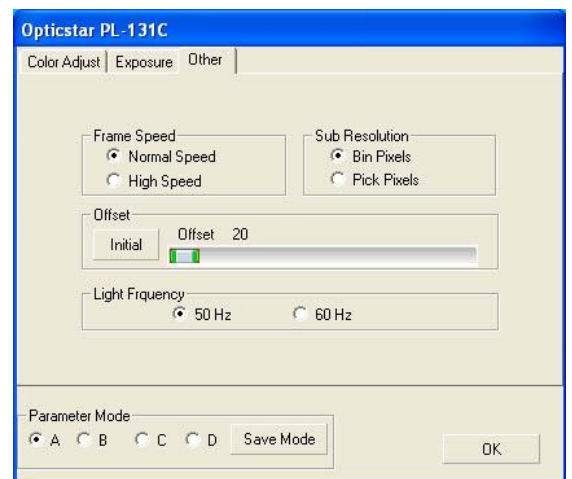
Image Capture

There is a second group of user controls on the right-hand side panel, headed **Camera Capture Config**. The **Capture** button can be used to capture a single frame or a series of frames in **BMP** format. The location of the captured files and the number of frames can be specified by clicking the **Config** button.

By adjusting these options, it is possible to specify how many frames to capture and a time lapse between the frames. The captured frames are also displayed as thumbnails on the bottom right hand side corner.

Video can be captured in AVI format by clicking the **Start Video** button. This button toggles between **Start Video** and **Stop Video**. Once the **Start Video** button has been pressed, the camera will capture and store the data on the hard disk until **Stop Video** is clicked by the user.

The location of the stored file(s) can be specified by clicking the **Config** button. By default, video data is stored uncompressed in order to preserve high image quality. Optionally, it is possible to compress the AVI files by clicking the **Video Compress** button.
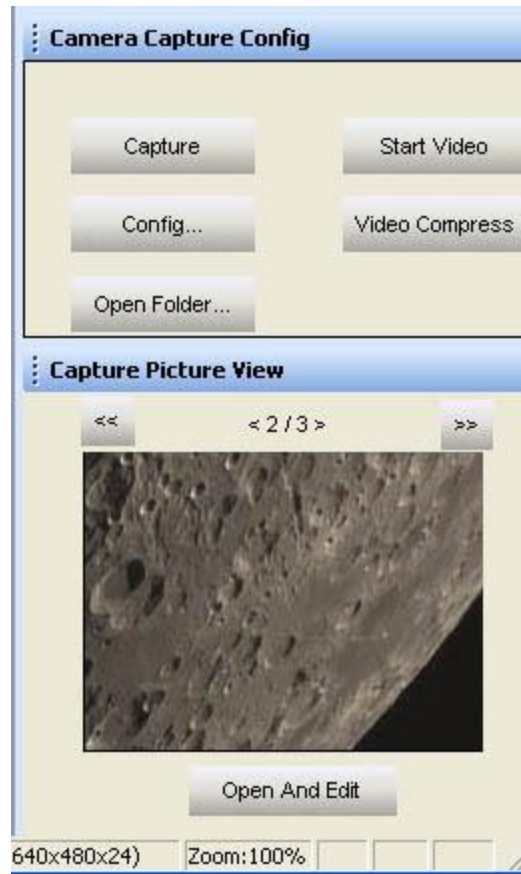
Captured images can be processed in **View** by clicking the **Open And Edit** button underneath the captured image.

The image to be processed should be present in the folder in which the image was stored. This folder can be specified by pressing the **Config** button.

Image Processing`

View can be used to perform measurements on the captured image(s). It is also possible to apply various filters and perform image processing operations.
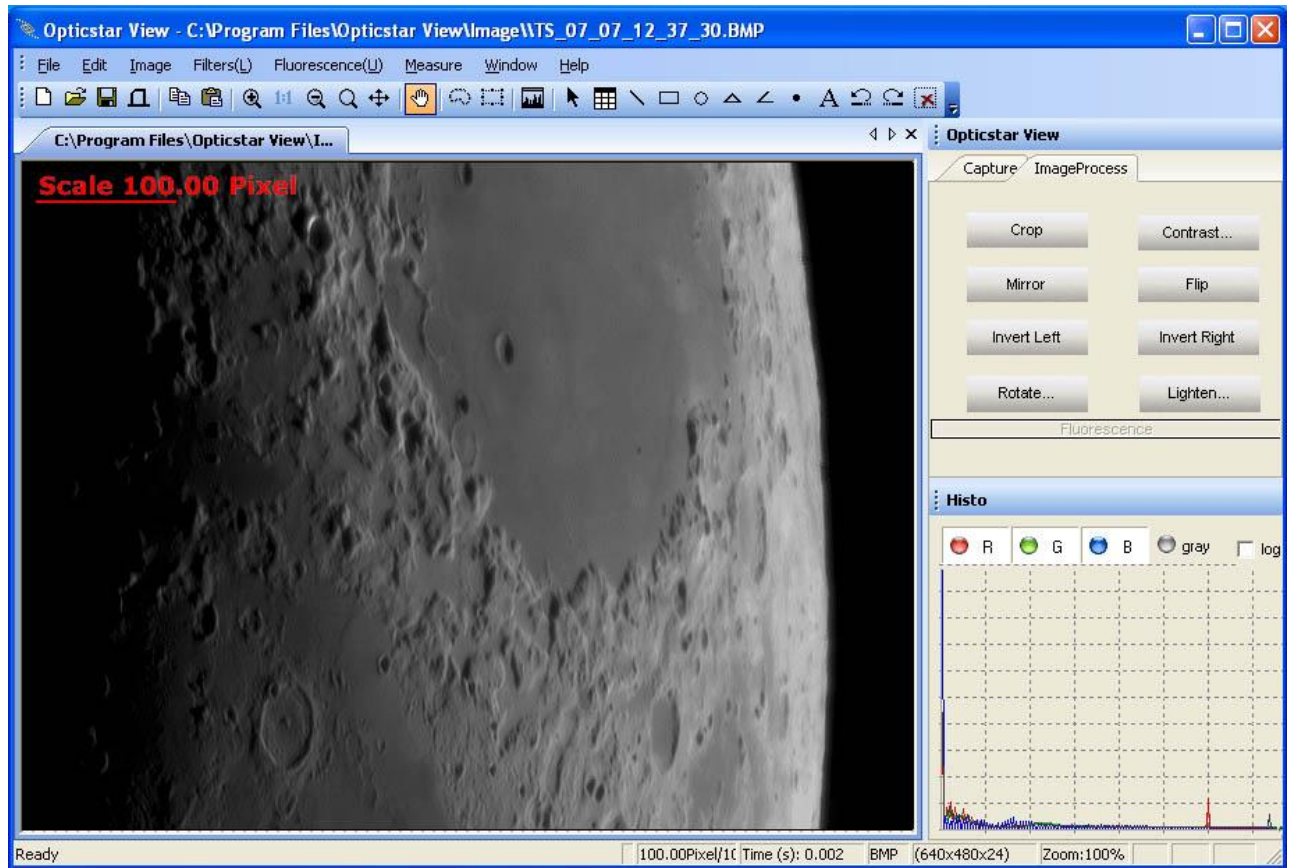
A brief outline of **View**'s image processing functions is listed below:

- Basic operations including Crop, Mirror, Flip, Invert, Rotate, Bright, etc.
- Copy and paste user defined regions.
- Distances can be measured between user defined points, circles, etc.
- Angles can be calculated by defining three points on the image.
- Operations can be performed on any user defined region.
- Colour operations can be performed on individual R, G, B channels.
- Data combine of two images.
- Data calibration.
- Image-zoom as a per cent of the original image.
- Linear filters to soften, sharpen, emboss, blur and Gaussian.
- Non-linear filters for median, erode, dilate, contour, edge and jitter.
- Transform filters for pinch, punch, twirl and cylinder.
- Fluorescence filters for gamma, colorize, mix and combine.

Installing Nebulosity

To install **Nebulosity**, navigate to the **Nebulosity** folder on the CD and run the **setup.exe** file. E.g.: **D:\Nebulosity\setup.exe**. Please follow the on-screen instructions. During installation tick the appropriate option in order to add an icon to the Windows Desktop.

The version of Nebulosity that is bundled with the PL-131 camera has some of its advanced features disabled. In order to enable all the features, a full licence of Nebulosity must be purchased. However, the bundled version of Nebulosity Lite supports lapse photography, 1x1, 2x2 and 4x4 binning modes, StarView real-time video preview mode, frame stacking, support for all popular file formats and more.
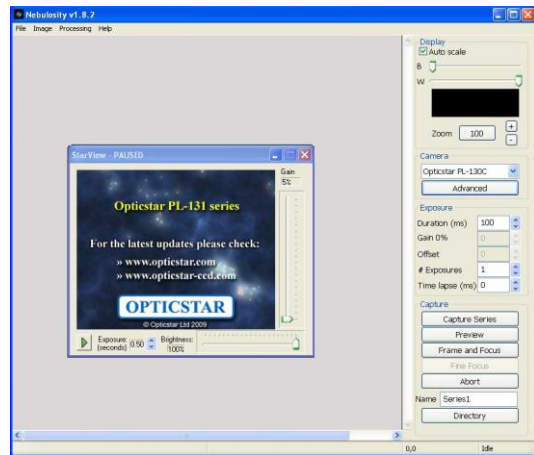
Registering Nebulosity Lite

Please use the *Serial Number* shown, to register Nebulosity Lite. The Nebulosity user manual is included as a PDF document inside the **Nebulosity** folder on the CD e.g.: **D:\Nebulosity\NebulosityManual.pdf**.

05130

Opticstar PL-131 Plug-in for Nebulosity

The PL-131 plug-in for Nebulosity can be found on the supplied CD. Navigate to the **\Plugins\Nebulosity** folder on the CD e.g.: **D:\Plugins\Nebulosity\PL131C** for the colour camera or **D:\Plugins\Nebulosity\PL131M** for the monochrome mode. Copy all the files into the folder in which Nebulosity has been installed on the hard disk e.g.: **C:\Program Files\Nebulosity**. The files that should be copied are: **OSPL130RT.dll** and **OSPL131CRT.dll** for the colour model or **OSPL130RT.dll** and **OSPL131MRT.dll** for the monochrome model.

Selecting the Camera

Run Nebulosity and select the camera model from the drop-down menu on the right-hand panel. Select it as **Opticstar PL-130C** (it is compatible with PL-131C) or **Opticstar PL-130M** (PL-131M compatible). Once the camera has been selected, set the exposure duration to 1 second as a starting point.

The exposure time should not be set to more than 10 seconds even though Nebulosity allows the user to enter much longer exposure times. The camera cannot support longer exposure times and hence they are reduced automatically to 10 seconds. Exposure times above 1 second do not increase the light sensitivity significantly.

Binning Modes

The camera pixel resolution is 1280x1024. There is support for 4 binning imaging modes: 1x1, 2x2 and 4x4. The StarView mode is useful for focusing and previewing. It is very well suited for locating targets quickly. The camera's built-in Gain function should be set on the StarView window (not on the main Nebulosity panel).
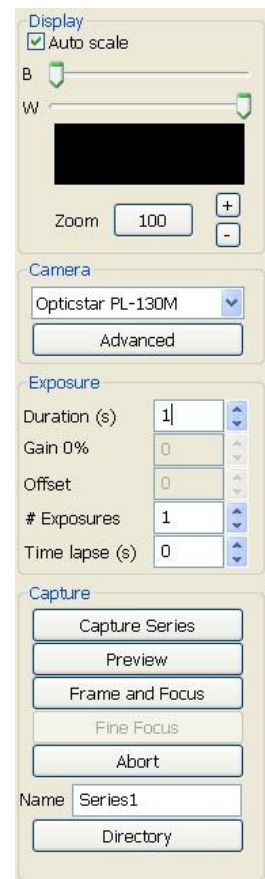
Opticstar PL-131 Plug-in for AstroArt

Plug-in Version 1.0

In order to add long exposure native support to AstroArt v3/v4 for the PL-131 camera you will need to copy **D_PL131C.DLL** and **OSPL131CRT.DLL** for the colour camera. For the monochrome camera the files to copy are **D_PL131M.DLL** and **OSPL131MRT.DLL**.

Copy the files from the folder on the CD e.g. **D:\Plugins\AstroArt\PL131C** (colour model) or **D:\Plugins\AstroArt\PL131M** (monochrome model) into the folder where AstroArt has been installed on the hard disk. For example: **C:\Program Files\Astroart**.

After copying the files, run AstroArt and select the **PL131C** plug-in for the colour camera or the **PL131M** plug-in for the monochrome camera from the list.

Binning and ROI Modes

Within AstroArt the following camera binning/resolution modes are supported.
- 1x1 binning, 1280x1024 pixels.
- 2x2 binning, 640x480 pixels.
- 4x4 binning, 320x240 pixels
- ROI 640x480 pixels. This is the top left-hand corner of the whole image.
- ROI 320x240 pixels. This is the top left-hand corner of the whole image.

Selecting regions is only possible on the top three binning modes. The ROI (region of interest) modes do not support user selectable regions but they provide the fastest frame rates.

Gain and StarView

The camera supports hardware Gain. The Gain setting can be set on the StarView window by the vertical slide bar. By default, the Gain setting is at 50%. This setting is used by the StarView window as well as by AstroArt when it captures images.

Opticstar PL-131 Plug-in for MaxIm DL

Plug-in Version 1.0

In order to add long exposure native support to MaxIm DL for the PL-131 camera you will need to copy the plug-in files **CCDPlugOSPL131C.DLL** and **OSPL131CRT.DLL** files for the colour camera. For the monochrome model the files are **CCDPlugOSPL131M.DLL** and **OSPL131MRT.DLL**. Copy the files into the folder where MaxIm DL has been installed on the hard disk. For example: **C:\Program Files\Diffraction Limited\MaxIm DL V5**.

The plug-in files are located on the CD e.g. **D:\Plugins\MaxImDL\PL131C** for the colour camera or inside **D:\Plugins\MaxImDL\PL131M** for the monochrome model.

After copying the files, run MaxIm DL and select the **Opt PL131C** plug-in for the colour camera or the **Opt PL131M** plug-in for the monochrome camera from the list.
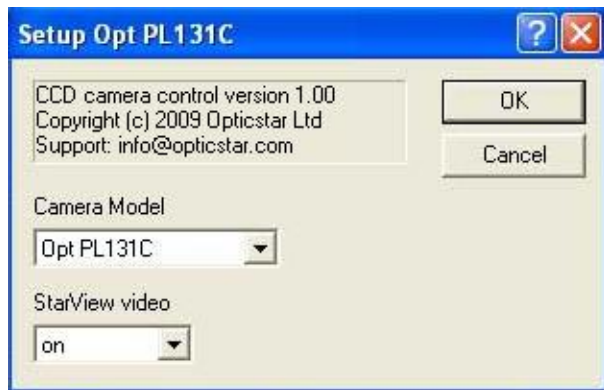
Binning and ROI Modes

Within MaxIm DL the following camera binning/resolution modes are supported.
- 1x1 binning, 1280x1024 pixels.
- 2x2 binning , 640x480 pixels.
- 4x4 binning, 320x240 pixels

The hardware ROI (Region of Interest) modes are not supported in MaxIm DL.

Gain and StarView

The camera supports hardware Gain. The Gain setting can be set on the StarView window by the vertical slide bar. By default, the Gain setting is at 50%. This setting is used by the StarView window as well as by MaxIm DL when it captures images.

Telescope Control and Auto-Guiding with the AG-131

The AG-131 includes the Shoestring GPUSB interface box that connects the computer to the telescope mount for telescope control and auto-guiding. The following sections describe how to install the GPUSB and the appropriate software. Before proceeding, please ensure that PL-131 camera has been installed and tested successfully as explained in the previous sections.

System Requirements

The following should already be installed:
Opticstar PL-131 video camera.

- *Optionally*: third party software such as AstroArt or MaxIm DL.

Additionally, the following items are needed:

- A telescope mount with a guide port (ST4 port).
- The ASCOM software platform for telescope control.
- PHD Guiding or other software (e.g., AstroArt, MaxIm DL) for auto-guiding.

ASCOM Software

You will need the *ASCOM software platform* to be able to auto-guide. Although it is not always necessary it is recommended that the ASCOM software platform is installed before proceeding. The *ASCOM platform* is freely available and can be downloaded at **http://ascom-standards.org.** Please visit the ASCOM website for more information. At the time of writing version 5 is available to download.

PHD Guiding

PHD Guiding supports the PL-131 natively (selectable as PL-130). The program can be installed by running the **Setup_PHDGuiding.exe** file inside the **PHD_Guiding** folder on the CD e.g.: **D:\PHD_Guiding\ Setup_PHDGuiding.exe**. Once the program has been installed, you must copy the Opticstar PL-131 plug-in that will enable PHD Guiding to use the PL-131 camera in native mode and achieve better image data for guiding.

Installing the PL-131 Plug-in for PHD Guiding

The camera plug-in used for PHD Guiding is the same one that is used for Nebulosity. Simply copy all the files on the supplied CD from the **\Plugins\Nebulosity** folder e.g.: **D:\Plugins\Nebulosity\PL131C** (colour) or **D:\Plugins\Nebulosity\PL131M** (monochrome) to the folder where PHD Guiding has been installed on the hard disk e.g.: **C:\Program Files\PHDGuiding**.

Selecting the Camera in PHD Guiding

Select the PL-131 camera (selectable as PL-130) by clicking on the camera icon, on the bottom left-hand corner of the PHD Guiding panel. please select "**Opticstar PL-130C**" or "**Opticstar PL-130M**". Longer exposure times increase the camera's light sensitivity.
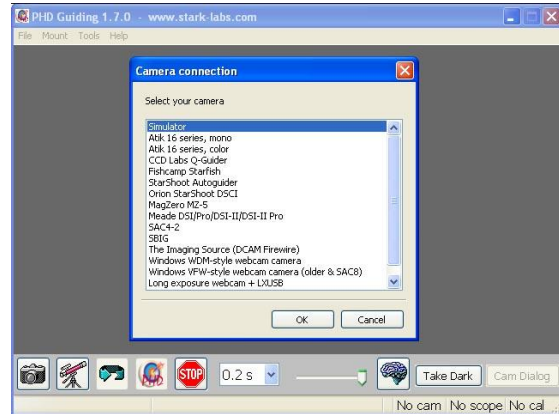
Shoestring GPUSB

Plug the Shoestring device into a USB port. The red LED on the GPUSB should light immediately. A "**Found New Hardware**" balloon will pop up on your monitor. Wait a few moments and the text in the balloon should change to say "**Your new hardware is installed and ready to use**".

Once you have completed the initial installation, you may want to verify that the GPUSB is working properly before you begin to use it with your auto-guide software. To do this, you can copy and install **GPUSBCheck_1p1p0_setup.exe** from the **Shoestring\GPUSB** folder on the supplied CD, e.g.: **D:\Shoestring\GPUSB\ GPUSBCheck_1p1p0_setup.exe**.

This simple software allows you to turn the LED on and off, change the colour of the LED from red to green, and to control the directional movement of your scope mount.

It is intended to allow you to verify that everything is working properly. Should you have trouble getting your third-party auto-guide software to work; using **GPUSBCheck** will also allow you to troubleshoot your setup.

In other words, if everything works with **GPUSBCheck**, then your problem most likely is with your third-party software.
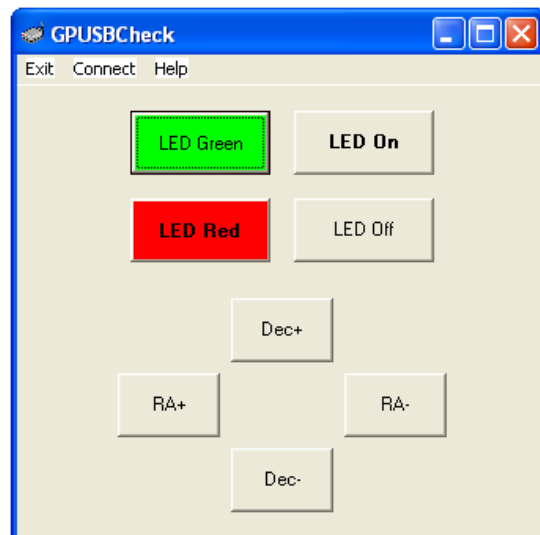
Assembling your Auto-Guiding Hardware

Once the PL-131 camera is operational and all software have been successfully installed you will be ready to set up your telescope. Please make all the physical connections required with reference to the illustrations later in this document.

If you are using two USB cameras at the same time it is advisable that the two cameras are attached to different USB controllers. Almost all PCs have two internal USB controllers and four USB ports. Every controller is allocated its own bandwidth to be shared by its two USB ports.

Attaching two cameras to the same USB controller will affect performance and speed depending on the amount of data that needs to be transferred to the PC.

M51: 23.03.2006. by Ulrich Gurschen - 3 minutes exposure without and with Guidemaster guiding

Once you have ensured that your software and hardware is operational you should be able to auto-guide your mount and telescope.

Please make certain that all your USB devices are properly plugged in. Stretched cables can lead to momentary loss of communication than can crash a camera, controller or any other USB device connected to your PC.
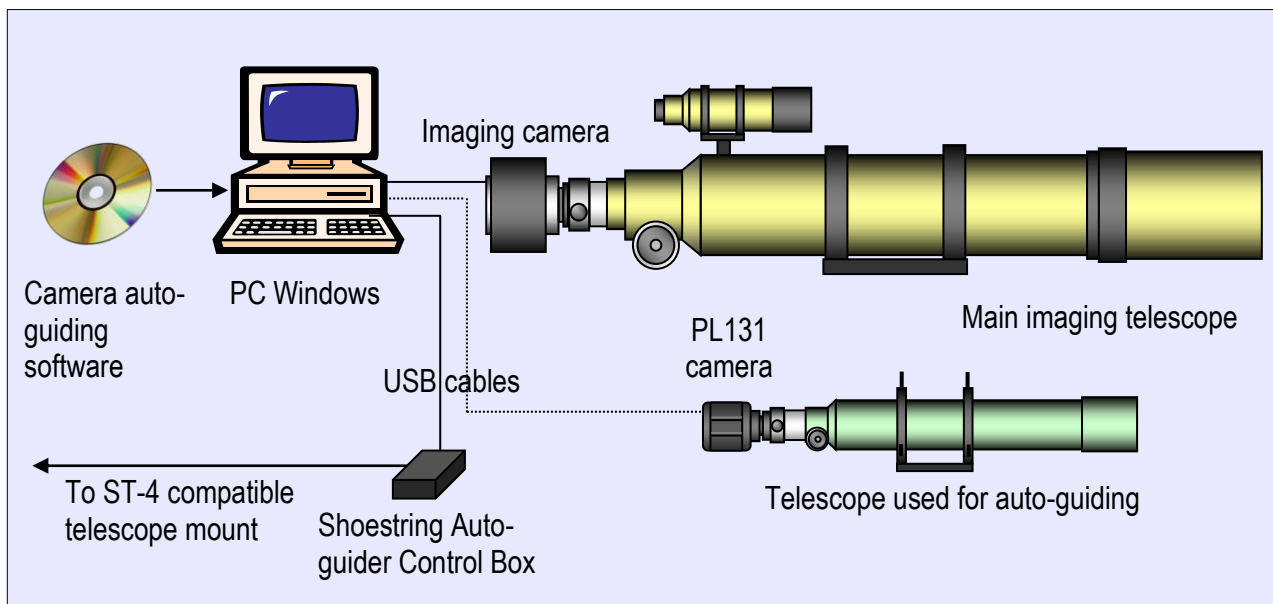
Auto-Guiding

There are a number of ways you can guide a telescope but there are mainly two ways of doing so. The most versatile method is to use two scopes mounted on the same mount, one for imaging and the second for guiding. Alternatively, you could use a single scope to perform this function. While this method is easier it will limit your choice of locating a suitable guide star.

Imaging and Auto-guiding With Two Scopes

In general, to be able to auto-guide with the Opticstar AG-131 Auto-guiding Kit you will require the following:

1. An imaging camera, i.e., Opticstar DS-616C XL+.
2. An imaging scope, i.e. A&M 80mm f7.5 Super APO.
3. A secondary scope for auto-guiding, i.e., 70mm f13 achromat
4. An ST-4 compatible mount, i.e., Sky-Watcher EQ6 or HEQ5.
5. *ASCOM software platform v5* or later (freely available)
6. PC with USB2.0 ports running Windows 7/8/10/11.
7. The Shoestring auto-guide controller and cables, i.e., Shoestring GPUSB kit.
8. Auto-guiding software, i.e., PHD Guiding, AstroArt, MaxIm DL.
9. Opticstar PL-131 camera and software drivers.

The Opticstar AG-131 auto-guiding kit contains items 7, 8 and 9 in the above list. You will therefore also need to provide your own imaging camera, imaging telescope, secondary telescope for auto-guiding, PC running Windows 7/8/10/11 and ST-4 compatible telescope mount.

Please note that the secondary scope that is used for auto-guiding would further increase your choices for locating a suitable guide star if it was held in brackets, like a huge finder scope. This would allow you to easily locate a suitable guide-star even under very difficult conditions.

Imaging and Auto-guiding With a Single Scope

An alternative setup will involve a single telescope for imaging and auto-guiding purposes instead of two different telescopes. As such you will require the following items to be able to image and auto-guide.

1. An imaging camera, i.e., DS-616C XL+.
2. An imaging scope, i.e. A&M 80mm f7.5 Super APO.
3. An off-axis guider
4. An ST-4 compatible mount, i.e., Sky-Watcher EQ6 or HEQ5.
5. *ASCOM software platform v5* or later (freely available)
6. PC with USB2.0 ports running Windows 7/8/10/11.
7. The Shoestring auto-guide controller and cables, i.e., Shoestring GPUSB kit.
8. Auto-guiding software, i.e., PHD Guiding, AstroArt, MaxIm DL.
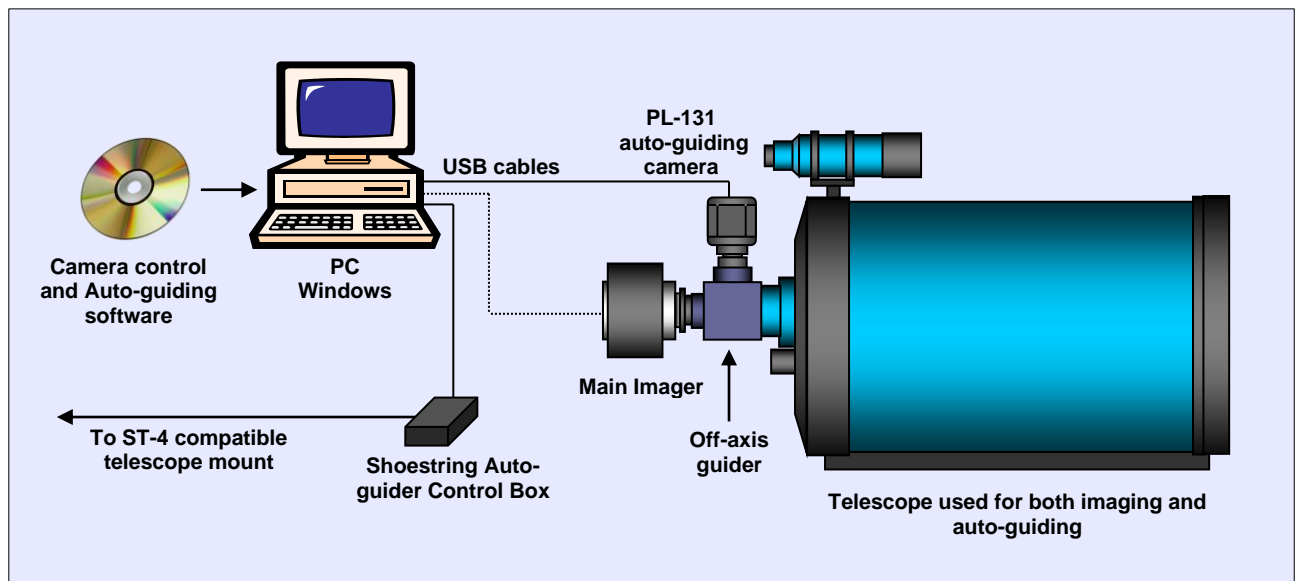9. Opticstar PL-131 camera and drivers.

The Opticstar AG-131 auto-guiding kit contains items 7, 8 and 9 in the above list. You will therefore also need to provide your own imaging camera, telescope, off-axis guider, PC running Windows 7/8/10/11 and ST-4 compatible telescope mount.

An off-axis guider provides an easy and affordable way to auto-guide with a single scope. It minimises possible tube flexure but has the disadvantage of having a limited field of view. Also, the amount of light that hits the prism/mirror is relatively small making less bright stars more difficult to see and track.

Troubleshooting

If you experience difficulty in installing the camera software and drivers this may be due to a number of reasons related to your computer, operating system and other devices already connected to it. The following sections outline the most common problems and suggest ways in which you should be able to solve them. Please also refer to the documents in the **Articles** folder on the CD.

USB Requirements

Please ensure that your computer runs Windows 7/8/10/11 or later, has the latest updates from Microsoft (inc. Direct X) and also has USB 2.0 ports. The PL-131 camera will not work with USB1.1. If your computer has USB1.1 ports you will need to obtain a PCI USB2.0 type card if you have a desktop, or an Express USB2.0 card if you have a laptop. The ExpressCard will need to be fully supported by your computer, in some entry level laptops full ExpressCard support in not fully implemented.

If you have a desktop, try both the USB ports on the front and back of your PC if the camera is not recognised on a particular USB port. USB ports attached directly to the motherboard are more efficient. Please note that PCMCIA USB2.0 cards typically do not provide the full USB2.0 bandwidth and will not work with the PL-131 camera.

Express Card

To resolve such issues an ExpressCard (with USB2.0 ports) should be used instead of a PCMCIA/CardBus card due to the ExpressCard's superior speed of 2.5Gbit/s (480 Mbit/s through USB 2.0) per slot, for comparison PCMCIA/CardBus devices connected to a computer would share a total 1.06 Gbit/s bandwidth. Express type cards use a 34mm slot where PCMCIA/CardBus cards use 54mm slots. An ExpressCard should be connected directly to the computer and not via a PCMCIA/CardBus card.

Re-Installing the Software Drivers

If the camera cannot be identified by Windows, then it is possible that the software drivers have not been installed correctly or they have been corrupted. In such cases, it is best to uninstall the camera. This can be done from the **Device Manager** in Windows.

Click on the **Start** button on the Windows desktop and from **Settings > Control Panel**, select **Device Manager**. The camera should appear in the list under **Imaging devices**.

1. Right-click on the **Opticstar PL-131** entry.

2. On the pop-up menu and select **Uninstall**.

3. If Windows asks to restart the computer, click yes and continue. When the computer restarts, please re-install the software as normal.

To re-install the drivers please follow the instructions in the **Installing the PL-131 Driver Software** section on page 7 of this guide.
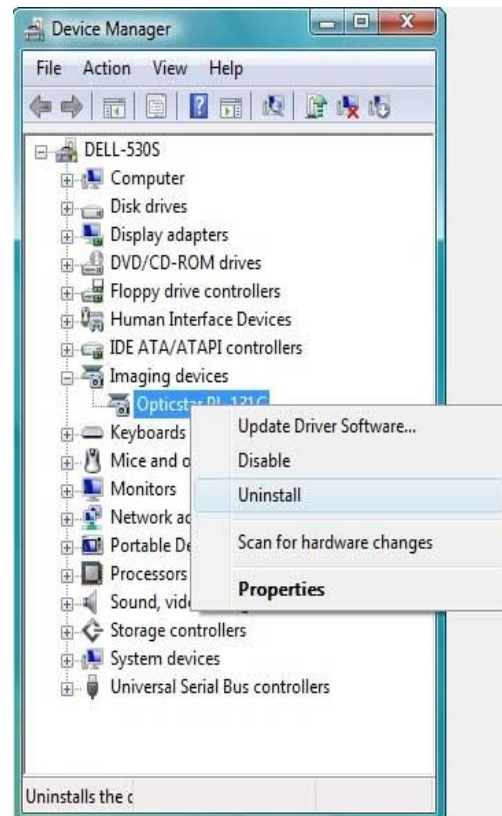
Support

For support regarding the PL-131 or AG-131 please email Opticstar at: **info@opticstar.com**.

Other Software

There is some freely available third-party software that may be of interest to some users. Please note that Opticstar cannot guarantee the suitability the software.

- Deep Sky Stacker. (http://deepskystacker.free.fr).
- RegiStax. (http://www.astronomie.be/registax/)

These programs can be used to post-process video files captured in **EtAMCAP** and **View**. They can stack, align and enhance multiple AVI frames into a single high quality "master" image.

Microscope Attachments

In order to use the camera with a microscope, one or more attachments must be used. The attachments shown from left to right are: C/CS to 23mm (x0.5), C/CS to 23mm (x1), C/CS to 30mm and C/CS to 30.5mm. These attachments are not bundled with the camera.

Camera Specification

Specification	PL-131 COOLAIR
Image sensor	1/2" CMOS
Sensitivity	1.8v/Lux-sec at 550nm
Sensor	Micron MT9M001C
Pixel size	5.2μm x 5.2μm
Max. Resolution	1280 x 1024 pixels
Speed	22fps at 1280x1024 80fps at 640x480 220fps at 320x240
Data Readout	Raw at 8-bit per pixel RGB colour 24-bit
Gain	In hardware
Region of Interest (ROI)	640x480 user definable, 320x240 user definable
Binning modes	Hardware: 1x1, 2x2 Software/Hardware: 4x4
Auto-Exposure	Automatic/Manual
Image Output	USB 2.0, 480 Mb/s
Power Supply	USB 2.0
Lens Mount	C/CS Mount
Mounting Tube	23.2mm
Lens Mount	C/CS Mount
Mounting to telescope	C/CS to 1.25" (included)
Mounting to lens	C to T-thread (M42 x 0.75)
Mounting to microscope	C to 23mm, C to 30mm, C to 30.5mm
USB Cable	1.8 meter long
Weight	250g
Operation temperature	0°C to 60°C
Computer requirements	Windows (32-bit or 64-bit) 7/8/10/11 USB 2.0 or later
Software support	Microsoft DirectShow, MSB AstroArt, Diffraction Limited MaxIm DL, Stark Labs Nebulosity Stark Labs PHD Guiding

OPTICSTAR