

## Using the StellaCam™ PC Control

### INTRODUCTION:

The StellaCam PC Control feature allows you to control your camera from a computer using any standard serial interface. The camera control is handled by a microprocessor in the StellaCam control box which "pushes buttons" for you when it receives serial commands from a computer. While the camera itself does not have a serial interface, with the PC Control feature you can use the available command protocol in any software written to control the camera or use one of the two supplied programs.

Two programs are supplied which can be used on any personal computer running Windows (95/98/Me/NT/2000/XP). A serial or USB port is required.

### AVAILABLE PROGRAMS:

#### **SCButtons**

This small program simply has the on-screen equivalent of the 5 red buttons on the camera control box. You can also control the power to the camera using this program.



Simply click and hold buttons using your mouse just as you would press the buttons on the control box. Examples:

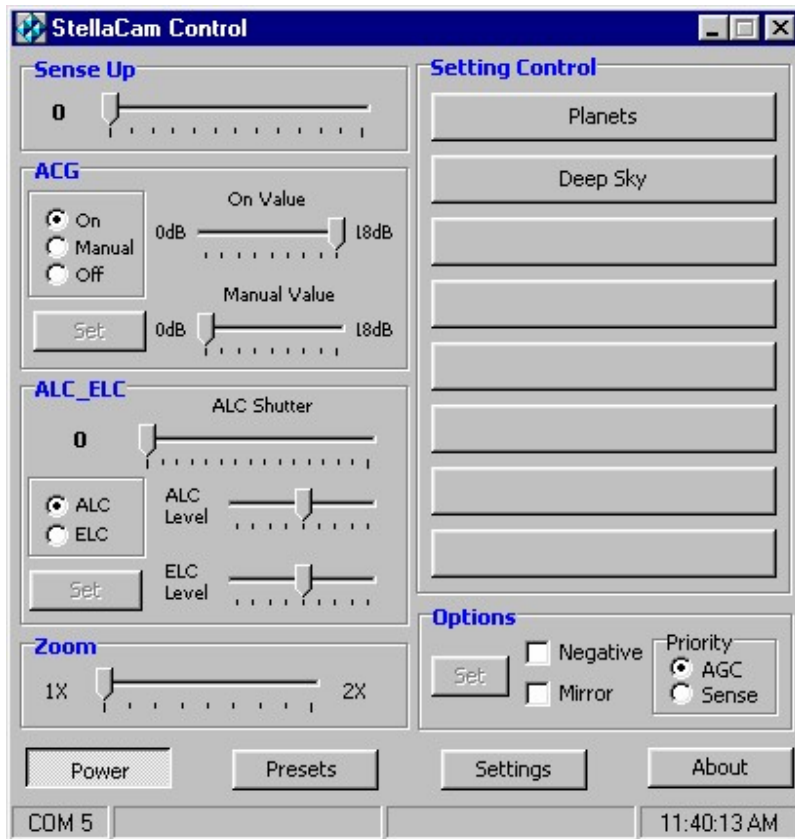
1. To enter the Menu, click and hold the Menu/Enter button for 1 second.
2. To scroll through the menu, click and hold the Up or Down button

The program can be located anywhere on the screen and it will reappear in this position whenever it is started. To set the COM port or to choose whether the program is to stay on top of all windows on the screen, right click anywhere on the program window except on a button. A small menu will appear. Exiting the program saves the selected settings.

See the "Software Control" section for information on how other Windows programs can send messages to SCButtons for remotely controlling the camera.

#### **SCControl**

For complete PC control of the camera you can use the SCControl program. It has controls for every function of the camera except entering Titles. The program consists of a main window where you will control the camera and a settings screen where you can select various program options. You can also define up to 6 buttons to set some or all of the camera parameters with a single mouse click. The main window of the program looks like this:



When any of the controls are operated SCControl constructs and sends the set of commands needed to change the camera parameter desired. Some of the controls operate directly in that as soon as you release the mouse button the parameter is changed. For example, slide the **Sense Up** button to the value desired and when you release the mouse button you will see the camera's on screen menu appear and the "buttons pushed" to change the Sense Up value. Other parameters such as **ALC\_ELC** have several parts to the setting. You can change any or all of the parts and then click the flashing **Set** button to change the parameters all at once.

Note that the camera does not have a serial interface itself and cannot change parameters or, more importantly, report back its state through the serial interface. SCControl is keeping track of what state the camera is in. **It assumes that it is starting from a "Preset" set of values and that the camera is operating (i.e. not in menu mode).**

**Warning:**

*If you were to manually change a setting using the buttons on the control box this will cause SCControl to loose track of the state of the camera and SCControl will no longer work correctly. This is true if you leave the camera in menu mode since SCControl also assumes the camera is operating when it starts a menu operation. There are interlocks and other measures built into the software to make it difficult to get out of sync but it is possible to get out of sync. It is, therefore, up to the user to operate the program in a "safe" way. Keep in mind that the SCControl program and the serial interface board in the control box are simply pressing buttons for you. The speed it can do this is fixed by the camera electronics. Be patient when commands are being executed, as the speed of operation cannot be much faster than if you were pushing the buttons yourself.*

There are 4 buttons along the bottom of the window. The **Power** button controls power to the camera and when power is off no on-screen controls will operate. Further, if power is turned off

all settings that SCControl is keeping track of for you are lost and the program is therefore completely out of sync with the camera. In this case, or whenever you wish to re-synchronize, use the Presets button to reset the camera and SCControl and bring everything to a known, synchronized state.

The **Settings** button brings up the settings screen and the **About** button displays program information including the version number,

This is the Settings screen:



All of the parameters on the setting screen are saved in a configuration file in the same folder where the program is installed.

Com Port: Note that the Com Port can be any value up to COM 12. This is to allow use of USB to serial adapters

Start Up Button: Any one of the eight **Settings Control** buttons can be automatically run on program start up. Enable the feature with the check box and choose the button desired. Save the settings and restart the program

Stay on Top: Keeps the main window on top of all other windows on the screen.

LED Flash: The LED on the camera control box will flash to off whenever the box cannot accept a command because it is busy. This provides a good visual feedback of system operation. Use this check box to disable the LED flashing

Auto Preset on Startup or Shutdown: Recall that it is possible for the program and the camera to be out of sync. It is strongly recommended that you enable Auto Preset on start up so the SCControl program can force the camera to a known state. If you wish for a specific set of parameters to set into the camera when the program starts, simply program one of the **Settings Control** buttons for the set of parameters you want and have this button automatically run at startup. Start Up and Shut Down check boxes force the Preset button on the main screen to be pressed automatically for you.

**Warning:**

*SCControl will NOT work if the camera is not in a preset state when the program starts running. You should force this condition through the control box, use the manual **Presets** button on the main screen, or use the automatic method through the **Auto Preset** program setting.*

Disable Button Box: You should now understand that doing anything to get the SCControl program and the camera out of sync is a bad thing. The easiest way to do this is to press a button on the control box. By default, SCControl disables the buttons in the control box so you don't inadvertently push any of them. You can override this behavior if you wish but it is highly recommended that you leave the buttons disabled. Every parameter you can set with the control box can be set through the SCControl program (except Titles). Note that the SCControl program will re-enable the buttons and restore control box operation when it exits.

Any of the parameters can be changed during program operation but left in their previously saved state for the next time the program is run. If any setting is changed you will be asked if you wish to save the settings to the configuration file or not.

### **Using the Settings Control Buttons**

A powerful feature of the SCControl program is **Settings Control**. With the eight buttons you can capture or define all of the camera settings of interest and by clicking one of these buttons set any and all the camera parameters you wish. Two of these buttons are predefined for you: **Planets** and **Deep Sky**. The camera settings for these buttons are consistent with recommended settings in the camera user's guide. The other six buttons can be set up in any way you desire.

Right clicking on any of the programmable buttons will pop up a small menu. The menu choices are:

Set: Choosing Set from the menu will cause all of the current settings of the camera to be stored in the button's "program". The button Edit screen will then be presented to allow you to name the button. The name selected will appear on the button as its caption.

Edit: If a button is already defined you may edit any of its parameters by choosing this menu option.

Clear: You will be asked if you are sure you want to return the button to the undefined state. If you answer Yes the button is cleared including its caption.

When the program exits all button definitions are saved to the configuration file.

## SOFTWARE CONTROL:

There are multiple ways to write programs to control the camera using the PC Control feature:

1. Directly control the microprocessor in the camera control box by sending serial commands to it from a PC or other device capable of simple 3 wire (Rx, TX, Gnd) serial communications. The "[StellaCam Control Command Protocol](#)" document defines the entire communications scheme. Given the need to allow time for command completion, a simple software based "flow control" capability is provided and can be optionally used.
2. Use the SCButtons program and broadcast Windows registered messages to it from any operating Windows program using two Windows API calls as follows.

Define these constants:

```
REGMSGVAL = "AVA_SC_MSG"  
W_PARAM = 1234  
M_ = 77  
U_ = 85  
D_ = 68  
L_ = 76  
R_ = 82  
E_ = 69  
OFF_ = 0
```

Note that the constants define the ASCII code for the M, U, D, L, R, and E characters and correspond to which button you wish to "push" programmatically, i.e. M = Menu, E = Enter, U = Up, etc.

Define a global variable to hold the registered message handle (e.g. MsgVal) and one time in your program (during start-up, typically) call:

```
MsgVal = RegisterWindowMessage (REGMSGVAL);
```

Then to "push a button" issue the sequence of commands:

```
SendNotifyMessage (HWND_BROADCAST, MsgVal, W_PARAM, <button code>);  
  
SomeDelayProcedure (delaytime)  
  
SendNotifyMessage (HWND_BROADCAST, MsgVal, W_PARAM, OFF_);
```

Where delaytime is a time adequate to cause the camera menu action to occur such as 1 second for the Menu key or 200ms for another key. Leaving a button "pushed" (i.e. not sending the second message releasing the button) will cause the menu to scroll just as if you held a physical button down on the control box.

The SCButtons program must be running as it accepts the messages and control the camera.

3. Contact Adirondack Video Astronomy about purchasing an optional ActiveX object containing high level commands for most control functions. All serial communication is encapsulated within the object such that, for example, setting the Port property to the Com port number and setting the PortState property to TRUE opens the Com port. An example of the high level of control is the RunScript method that allows the programmer to pass a string defining the series of button pushes. e.g. object.RunScript('MULE')

causes the camera to be reset to the Preset settings. Another available method is the PushButton method where a call to it will push the specified button for the required time, release it, and return control to the calling process. Overall, the object automatically handles timing of commands and utilizes the flow control capability of the command protocol to execute the button push or "script". Events (callbacks) are available to notify the controlling program of when a script has begun to run and when it is finished, when a button has been cycled and has completed operation, when the communications link is opened/closed, and a general notification of the internal flow control from the microprocessor in the control box.

The object can be directly used in a Visual Basic, Visual C/C++, Delphi, or other development environment supporting ActiveX. In addition, the control is scriptable and can be used with any compatible script language or host.

4. Contact Adirondack Video Astronomy about contracted custom software development specific to your application.