"ROS Helios"

Windows™ PC Control Software GUI

INSTALLATION AND OPERATION MANUAL

REVISION NUMBER: _____

SHIP DATE: _____

21-30030   REV E

1 DISCLAIMER

1.1 Limitation of Remedies

Customer assumes all risk and liability for results obtained in any installation, operation, or use of the software product. In no event shall Vendor, its Agents, or Employees be liable to the original Customer or Third Party for any consequential or incidental damages or expenses of any nature arising directly out of or in connection with the use of the Vendor-supplied software products, even if Vendor has been advised of the possibility of such damages or expenses.

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TEL: (001) 858-565-8500

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E-mail: support@rosys.com

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3   INTRODUCTION

This publication describes how to install and run the "HELIOS" (ROSHELIOS.EXE) GUI.

This program allows the user to manipulate any of the ROS supported devices that use the RS-485 serial communications protocol.

Supported devices include:

- PT-10 and PT-25 Pan and Tilts
- R-10 and R-25 Rotators
- Navigator, Inspector, Inspector HD, and CE-X Cameras
- MV-LED

The RS-485 protocol enables more than one device to be connected on the same physical wire. The device protocol can support up to 32 nodes simultaneously.   Each node represents a single microprocessor that manages the device's communications. The camera and light devices have only one node. The pan and tilt devices have two nodes, as each axis is interfaced individually.

The majority of users will have a single system (such as one pan and tilt, one camera, and one or two lights).

Devices have all been factory pre-installed with certain default Node ID's. Typically pan and tilts are configured as nodes A and B (A = Pan Axis, B= Tilt Axis), cameras as node C, and lights as nodes D and/or E.

Unless the user has made any modifications to these default values, the PC software GUI should be able to auto-detect the nodes attached to the system after it is installed.

4   INSTALLATION GUIDE

4.1   Hardware Installation

First, install the hardware. Start by attaching cables to the device(s) to be used. Make sure they are firmly seated and pushed in all the way, such that the connectors are flush. If applicable, the rubber loop should be utilized to keep the connector mated.

Next, connect the other end of the ROS cable to the power adaptor, and plug this into the wall power. If you are using a light in your system, you should see the light has turned on.

Now locate the RS-485 9-pin "D" subminiature adaptor and connect this to your RS-232 adaptor. If you are using a COM port (RS-232 serial port on your PC), plug the RS-232 end of the converter to the PC. It is generally a good idea to use a small screwdriver to screw the converter tight with the PC connector to prevent accidental unseating of the connector.

If you are using a USB port, connect the adaptor according to the instructions specified by the manufacturer of the USB converter device. Note that you will need to set the delay time in the settings of the virtual COM port so that communications operate properly. You may need to disable the character echo mode on the ROS devices if you are using a USB converter. This will be explained in more detail later in this document.

If you have a joystick that you are planning on using to control a Pan and Tilt or Rotator, make sure it is installed and functional as well before running the software. If you are using a Camera or Light, the joystick buttons can also be programmed to control certain device settings.   If the joystick is not connected until after the program has been executed, you can disable and then re-enable the joystick to trigger it. This is explained in more detail in the "How to use the Pan and Tilt Window" section.

After all the above steps have been completed, insert the CD-ROM into the computer.

4.2 Software Installation

After all the hardware devices have been properly connected to the PC, insert the CD-ROM.

The CD-ROM will automatically open a browser with links to all ROS product manuals and software installers. If it does not start for some reason you can open the html file "Main_Page.htm" on the root of the CD-ROM.
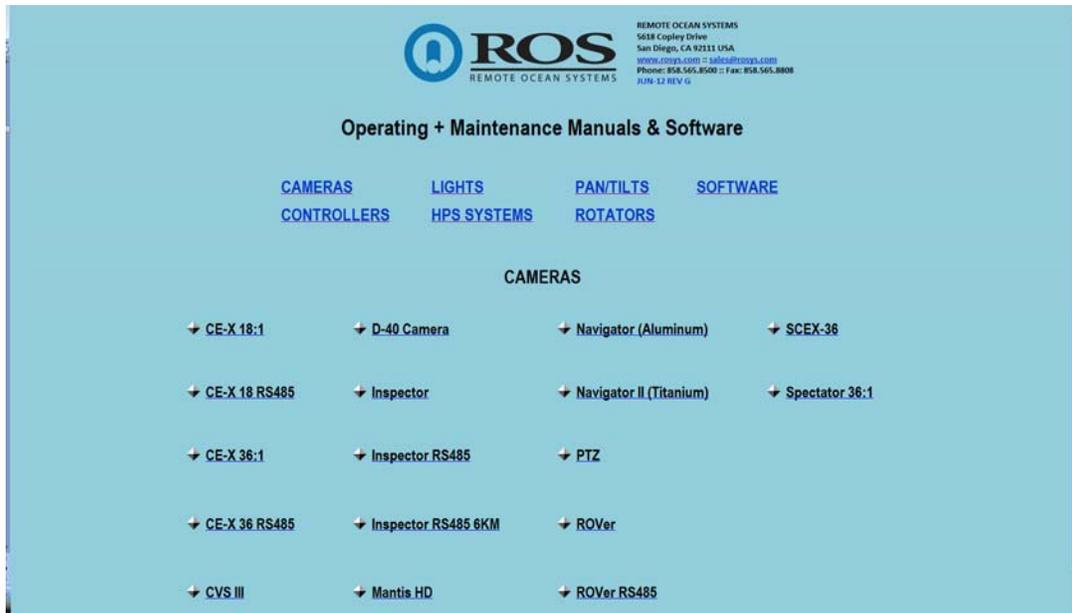
The browser defaults to the "Camera" page. Click on the "Software" link to view the software options.

First, you will want to install the MSVC 2010 Redistributables. Choose either (x86) for 32-bit systems or (x64) for 64-bit systems.   This installs the necessary dlls to interface with programs developed in Microsoft Visual C++. Most computers already have the dlls installed. Follow the installer instructions to install these files.

Microsoft Visual C++ 2010 x86 Redistributable Setup

Welcome to Microsoft Visual C++ 2010 x86 Redistributable Setup
Please, accept the license terms to continue.

MICROSOFT SOFTWARE LICENSE TERMS

MICROSOFT VISUAL C++ 2010 RUNTIME LIBRARIES WITH SERVICE PACK 1

These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above,

☑ I have read and accept the license terms.

☐ Yes, send information about my setup experiences to Microsoft Corporation.

For more information, read the Data Collection Policy.

Install   Cancel

Next, install Helios. To install Helios, click on "Helios Software GUI" link. This button executes the Setup Installer program.

If the Setup program does not start for some reason, double-click on the installer program ("ROS_HELIOS_V1.0.X_Installer.exe"). Click "Next" to continue.

After the initial startup screen, there is a License Agreement screen where you will need to select the button "I accept the agreement" and click "Next" to continue.

Next the program will display an Information screen with text to remind the user to install the hardware (if not already done so).
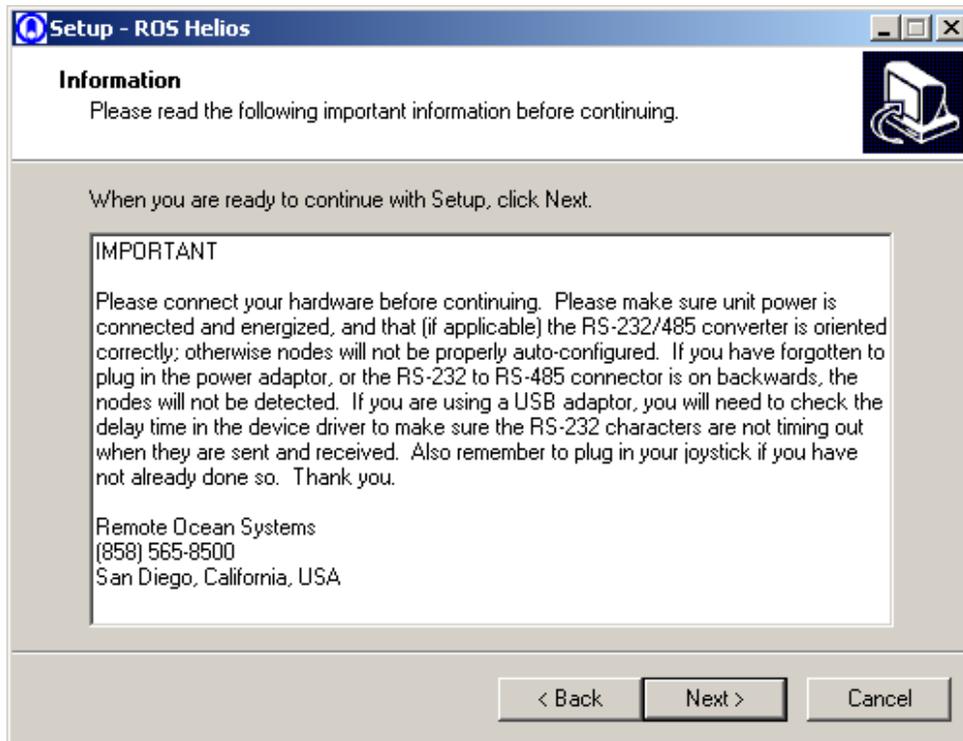
Next you will see the Select Destination Location screen to choose the target installation folder on your hard drive where the files will be copied to (i.e. C:\Program Files\ROSHELIOS). Click Next to continue. If you so desire, you can modify the default to select an alternate path.
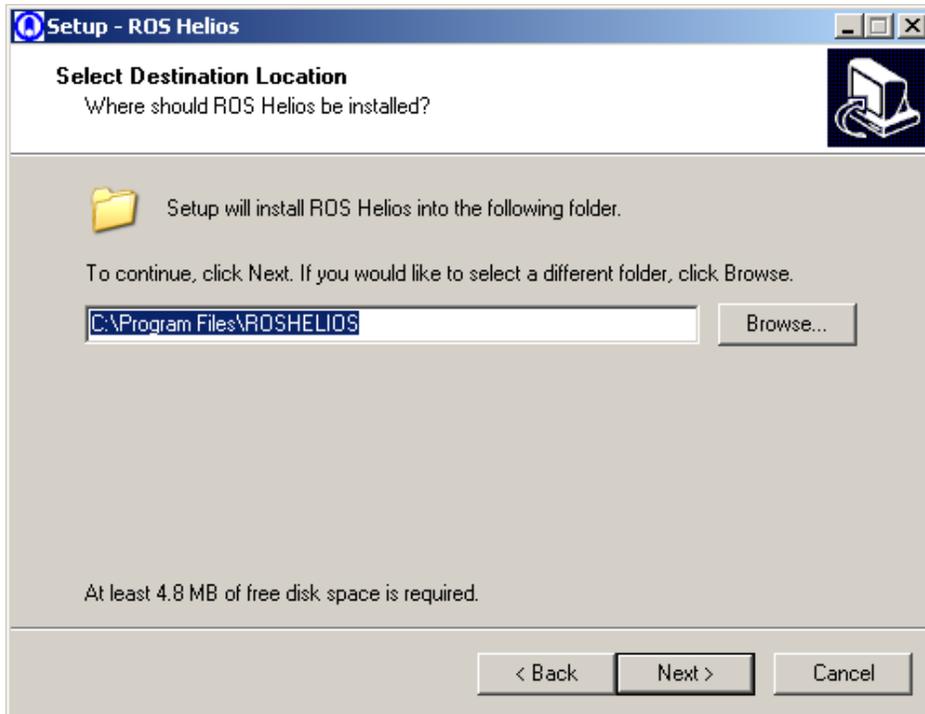
Next the user will see the Start Menu Folder screen. Click Next to continue.
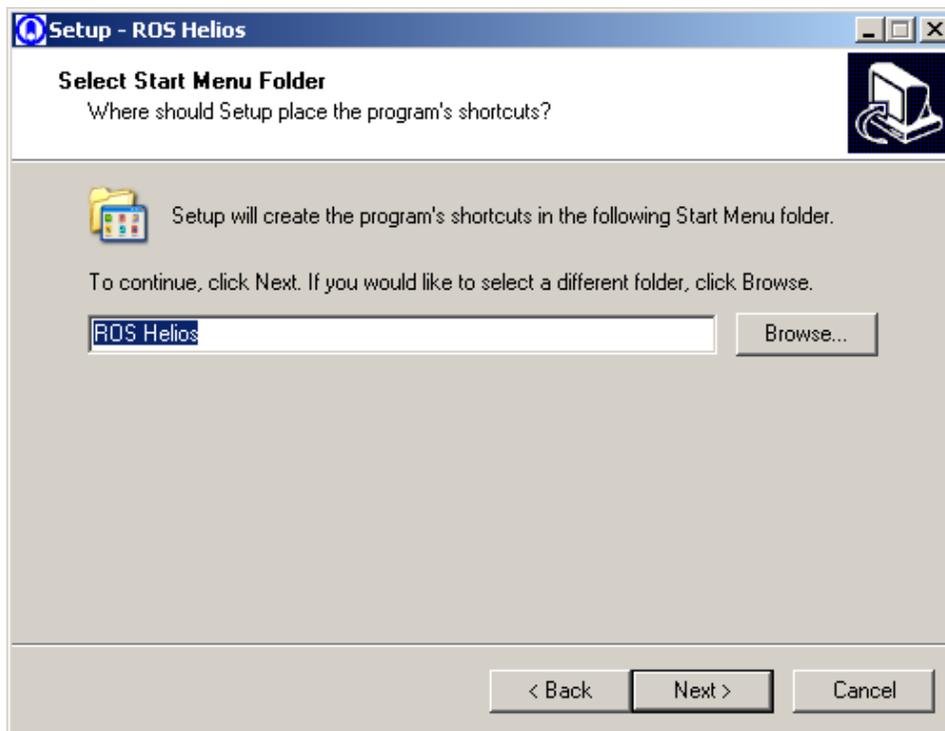
Leave checked to create icon shortcuts for your desktop and start menu folder.
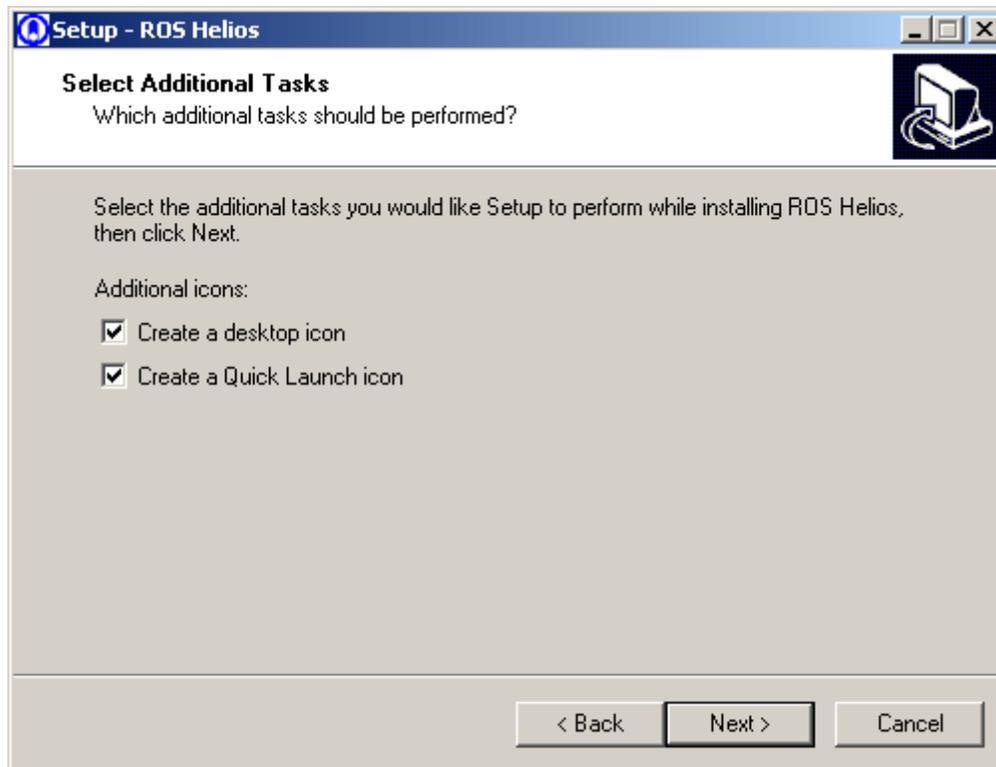
Click Next to start copying files, and Finish when complete.

Setup - ROS Helios

Completing the ROS Helios Setup Wizard

Setup has finished installing ROS Helios on your computer. The application may be launched by selecting the installed icons.

Click Finish to exit Setup.

☑ Launch ROS Helios

Finish
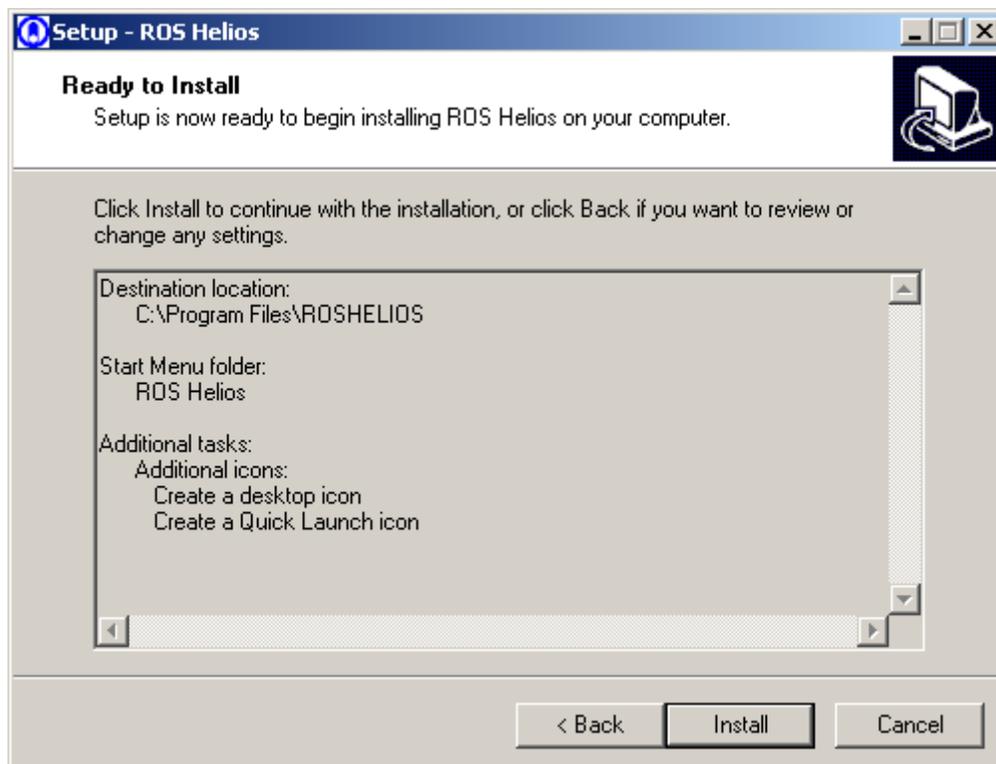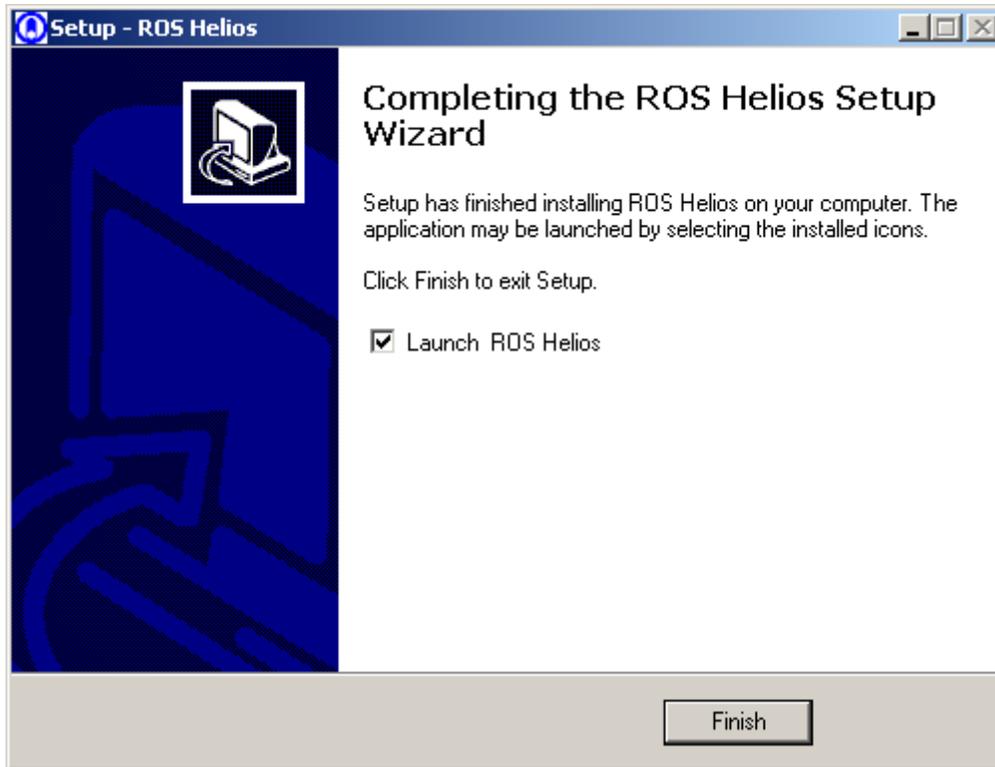
The installer program will open and execute the ROSHELIOS.EXE application GUI window. By default, the program will immediately attempt to automatically detect the attached nodes on your system.

At this point, the nodes will either be detected successfully, in which case you will get a series of sub-windows representing each type of node (pan and tilt or rotator, camera, or light). If you also have a joystick attached to the system, you will be able to move the pan and tilt with the joystick. If the devices are working, you can skip the next section on troubleshooting communication problems.
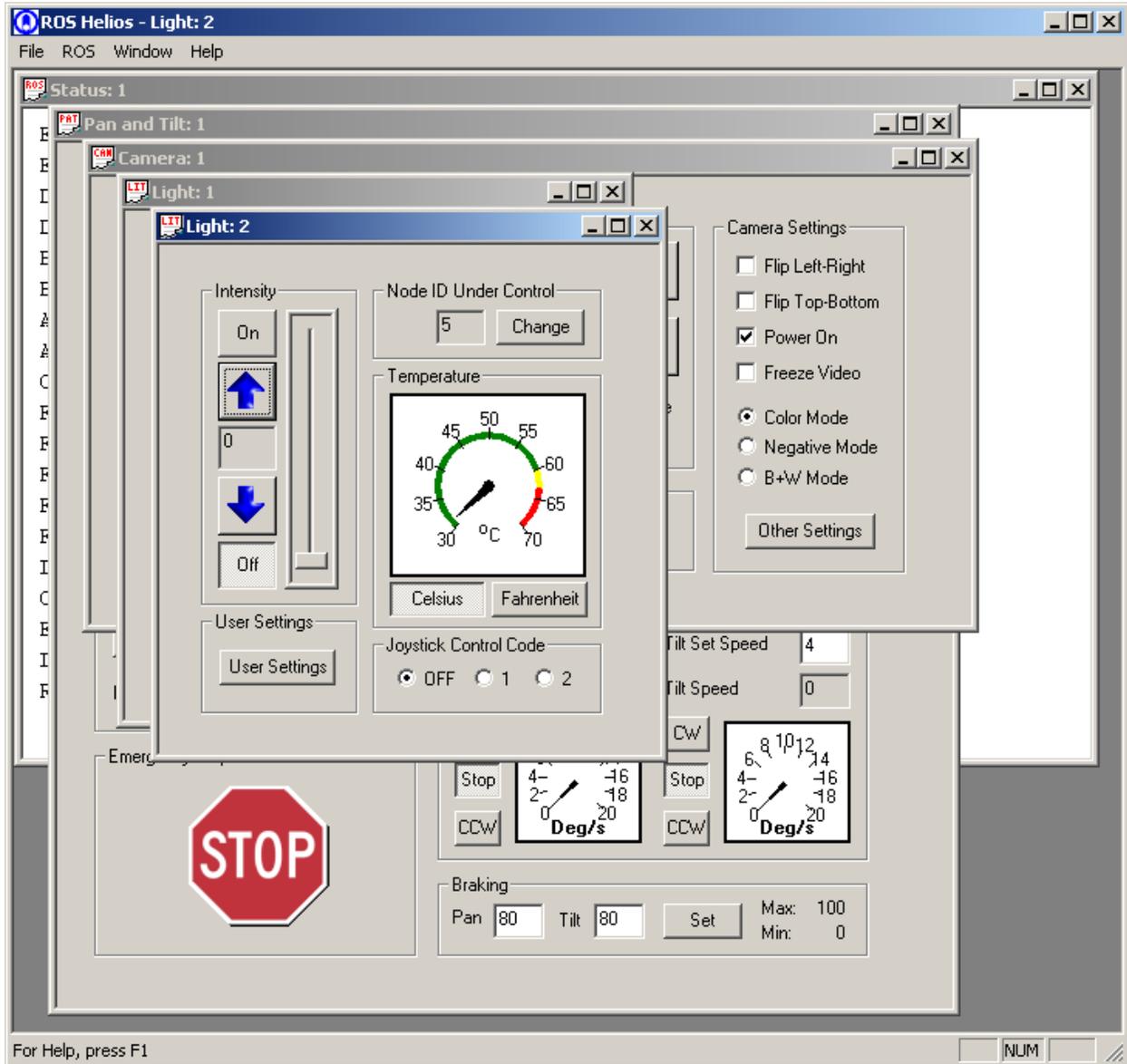
If the device is not responding, there may be a communication problem, reported as shown in the following snapshot (see next section).

```
ROS Helios – Status: 1                                    _ □ ×
File  ROS  Window  Help

Status: 1                                                 _ □ ×

    No nodes detected.  Check your connection and COM port.
    COM4 port closed.
    Looking for attached devices ...
    COM4 port opened.
    COM3 port closed.
    Looking for attached devices ...
    COM3 port opened.
    COM2 port closed.
    Looking for attached devices ...
    COM2 port opened.
    COM1 port closed.
    Looking for attached devices ...
    COM1 port opened.
    Attempting to auto-detect nodes.  This may take a minute.
    ROS 485 System Messages




For Help, press F1                              NUM
```

4.3 RS-485 Troubleshooting

If you cannot recognize any devices during the auto-detect, there is a communication problem. If the devices are working as expected please move on to the next section.

Otherwise, there are typically seven categories of communication problems:

1. Power is not supplied to the device(s), or damaged or improper power supply.
2. Cable is not attached properly to device(s).
3. Cable is not attached properly to power or PC.
4. Faulty or damaged cable.
5. Incorrect RS-485 converter connection to computer.
6. USB converter problems.
7. Damaged device(s).

The following process can be used to narrowing down the problem so that devices can be controlled successfully.

1. First, check the power adaptor (wall jack). Is it the correct rated voltage and amperage? Check the power cable. Is it seated fully? Sometimes these cables can come loose, or are damaged.

2. Next check the device connections. Are they fully seated onto the device connectors? Try pulling them off and pushing them on again if unsure.

3. Is the cable connected properly to the power and the PC? Check the ROS power adaptor cable connection to make sure it is seated properly. The PC communicates via RS-232 whereas the ROS devices communicate via RS-485. There are benefits to 485, but it is necessary to ensure the adaptor is connected properly. It is very easy to connect backwards, and if the connector screws are not tightened, the adaptor can become loose. If it is loose the communication will have unpredictable behavior. Make sure it is screwed tightly against the serial (COM) port on the computer. Make sure there is sufficient space behind the computer so that the cable is not bent or bound up. The combination of the cable and the adaptor can end up jutting out of the back of the PC for some distance so be careful not to knock it with anything.

4. It is possible that the ROS cable itself could be damaged. Inspect the cable for cut marks.

5. If you do not use the ROS-recommended RS-485 to RS-232 converter you will need to follow your manufacturer's instructions on how to connect it. You may need special device drivers depending on which model it is.

6. If you are using an RS-485 or RS-232 to USB connector, you will need to have already installed the device drivers for it. The way these devices work is that they create a "virtual" COM port device driver within Windows. This uses kernel-level calls to communicate via the USB hub, and convert the signals to RS-232 protocol, simulating the COM port. However, most converter manufacturers have a number of specialized advanced settings that change the way that the converter hardware responds. The typical default settings in these devices employ some sort of delay time, in milliseconds. For most hardware, such as modems or printers, these delays may be acceptable. However, for our devices, it can create garbage on the line with half-duplex RS-485. What happens is that our devices receive the signal and respond with an echoed character notifying the PC that we successfully received the character. However, if there is a delay, it is possible that the next character sent out the line will "collide" with the echoed character. This will cause an electrical signal phase error, which will disrupt the information contained in both the transmitted and received characters, and confuse both the hardware device microprocessor on the equipment-end, and the PC software on the GUI-end. To avoid these problems, first attempt to set the delay time to the lowest value provided to you in the advanced settings (1 ms

for example). Then try again to run the Helios program (you should find the icon on your desktop with the ROS logo). It should now auto-detect the nodes. If it does not, there is a more serious error and it may not be possible to use that particular USB-232 converter. An easy alternative is to purchase a RS-485 PCI slot adaptor card which allows the user to communicate via a standard serial port even if the computer does not have one. Even if the auto-detect is successful, it may not be possible to operate devices predictably with the USB adaptor, due to this timing problem. In that case it will be necessary to disable character echo. The next section will detail this procedure.

7.   If the system is still not running, it is possible that devices may have been inadvertently damaged. This can happen if an over-voltage or over-current spike enters the power or signal leads, if both pan and tilt axes have inadvertently been set to the same Node ID, and a few other possible failure modes. Since this is an atypical case, please contact our offices immediately for further information.

5   USER GUIDE

5.1   Overview

Once nodes have been successfully detected, examine the window(s) that correspond to the device(s) attached to the PC.

Depending on the device configuration, the program will display one or more of the following types of "child" windows:

5.1.1   Status & Control Windows

5.1.1.1   Status Window

The status window provides feedback messages if there are communication problems. It also notes if the COM port has been opened or closed, and displays active RS-485 commands as they are sent out by the software to our devices.

5.1.1.2   Pan and Tilt (or Rotator)

The pan and tilt window is designed to control a pan and tilt device (or rotator). There are gauges that display the current orientation, if feedback is enabled. There are buttons to actuate the device clockwise (CW) or counterclockwise (CCW) at various speeds. There is a virtual joystick available to control the P&T unit in case you do not have a joystick attached to your PC already. There is also an emergency STOP button.

The following snapshot is an example of the Pan and Tilt window. The subsequent snapshot is an example of the same window in Rotator mode.

ROS Helios - [Pan and Tilt: 1]

File   ROS   Window   Help

Virtual Joystick

VJ Throttle

Node ID's Under Control

Pan [1]   [Change]   Tilt [2]   [Change]

Goto Position

[Pan Goto -->] [180]   [Tilt Goto -->] [180]

Pan Axis [0]   Tilt Position [0]

Joystick Control

☑ Disable Virtual JS

☐ Tilt Axis Only

☐ Pan Axis Only

[1] %

Settings

[Pan Factory]   [Tilt Factory]

☑ Feedback On   [User Settings]

[Speed Profile]   [Position Limits]

Actuate

Pan Set Speed [4]   Tilt Set Speed [4]

Pan Speed [0]   Tilt Speed [0]

[CW]   [CW]

[Stop]   [Stop]

[CCW]   [CCW]

Emergency Stop

STOP

Goto Preset

[Positions]

[START]

[STOP]

Braking

Pan [50]   Tilt [50]   [Set]   Max: 100   Min: 0

For Help, press F1

NUM

5.1.1.3 Camera

The camera window is designed to control a camera. There are zoom, focus, and exposure buttons. The joystick also has certain functionality programmed into it if one is attached. The buttons can be customized by the user in the ROS Menu User Preferences dialog screen.
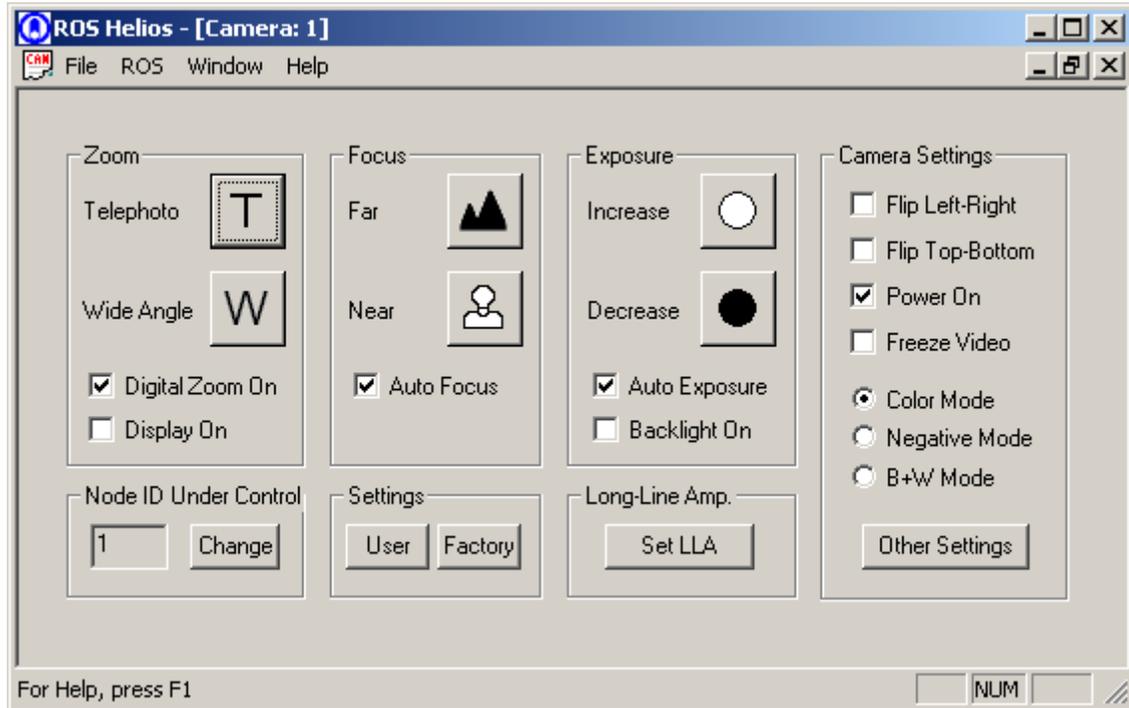
5.1.1.4 Inspector HD Camera

The Inspector HD camera window is designed to control a high-definition video camera. There are zoom, focus, and exposure buttons. The operation is very similar to the standard camera window.
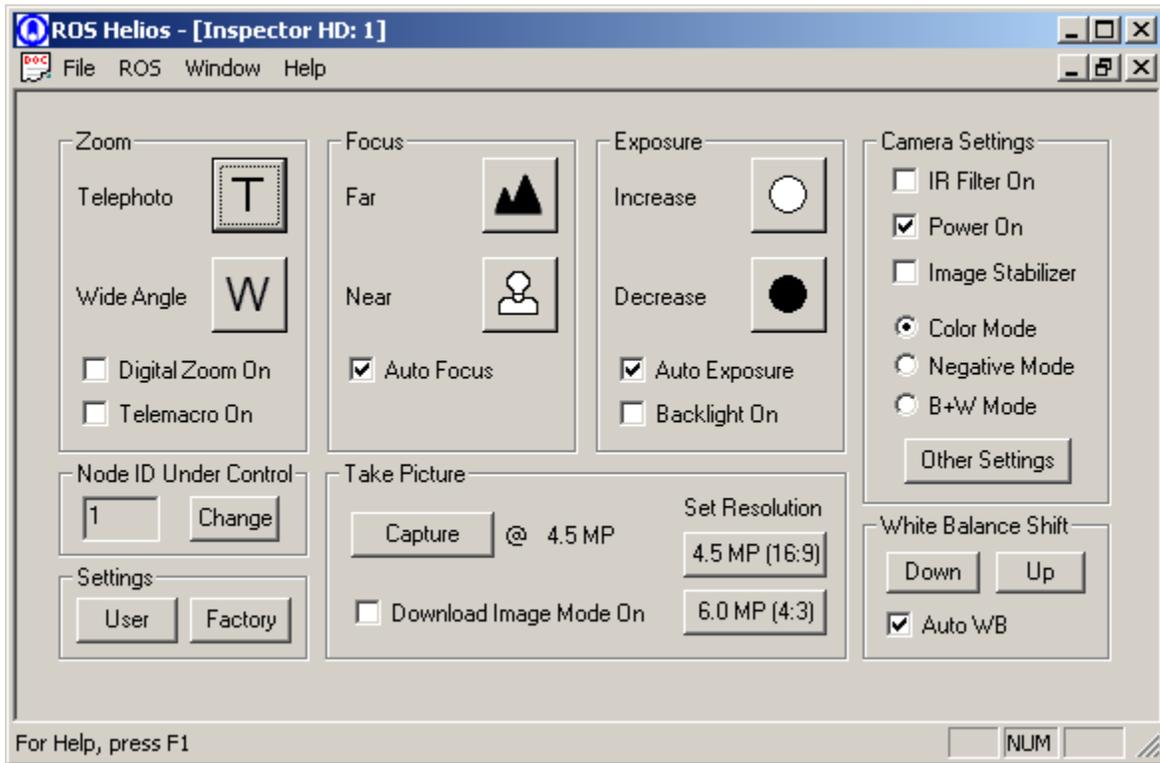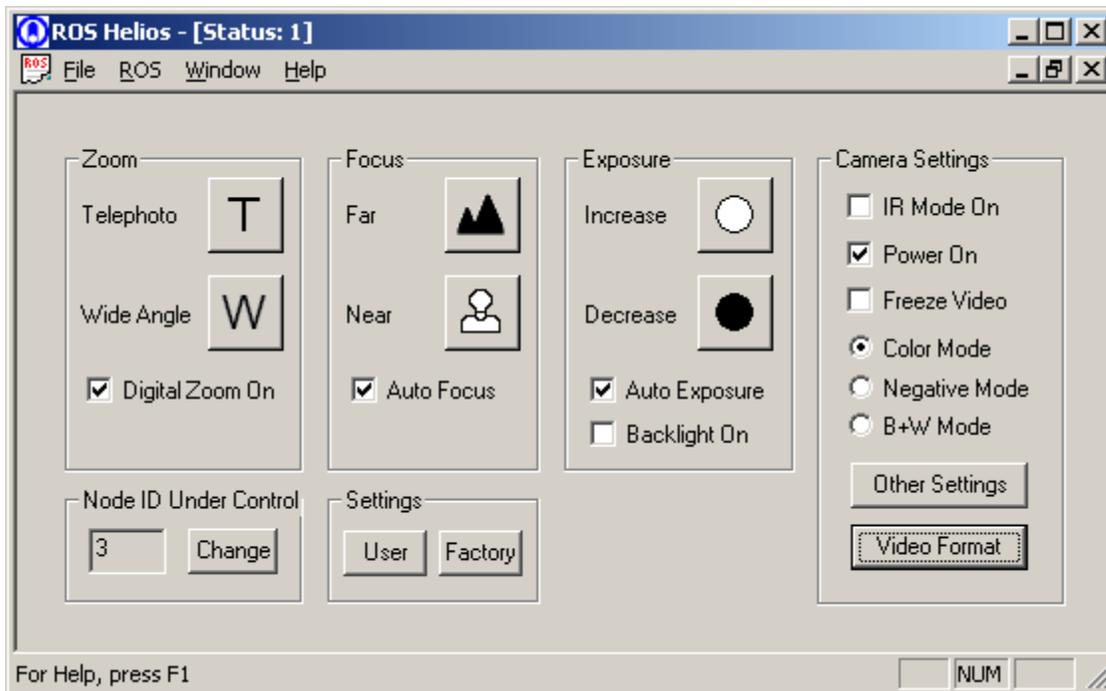

5.1.1.5 HD Camera

The HD (high-definition) camera window is designed to control a high-definition video camera. There are zoom, focus, and exposure buttons. The operation is very similar to the standard camera window.

ROS Helios - [Status: 1]

File ROS Window Help

Zoom

Telephoto [T]

Wide Angle [W]

☑ Digital Zoom On

Focus

Far [▲▲]

Near [👤]

☑ Auto Focus

Exposure

Increase [○]

Decrease [●]

☑ Auto Exposure
☐ Backlight On

Camera Settings

☐ IR Mode On
☑ Power On
☐ Freeze Video
◉ Color Mode
○ Negative Mode
○ B+W Mode

[Other Settings]

[Video Format]

Node ID Under Control

[3] [Change]

Settings

[User] [Factory]

For Help, press F1

NUM

5.1.1.6 Light

The light window is designed to control a light. There are buttons to increase or decrease the intensity of the light, as well as a temperature gauge to display the unit's temperature.
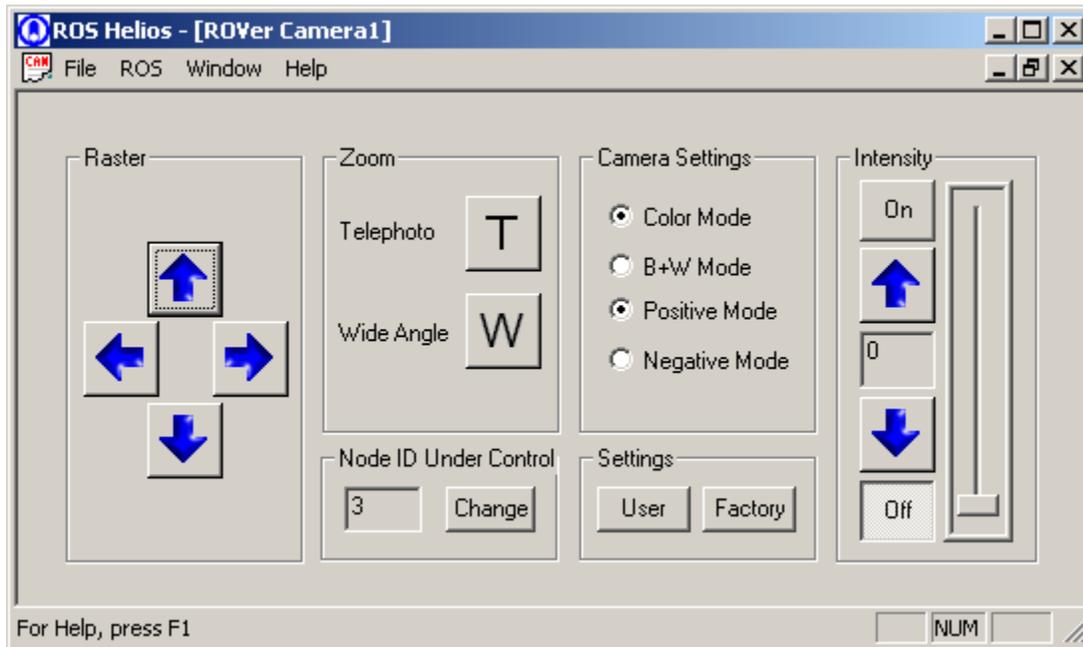

21-30030 REV E
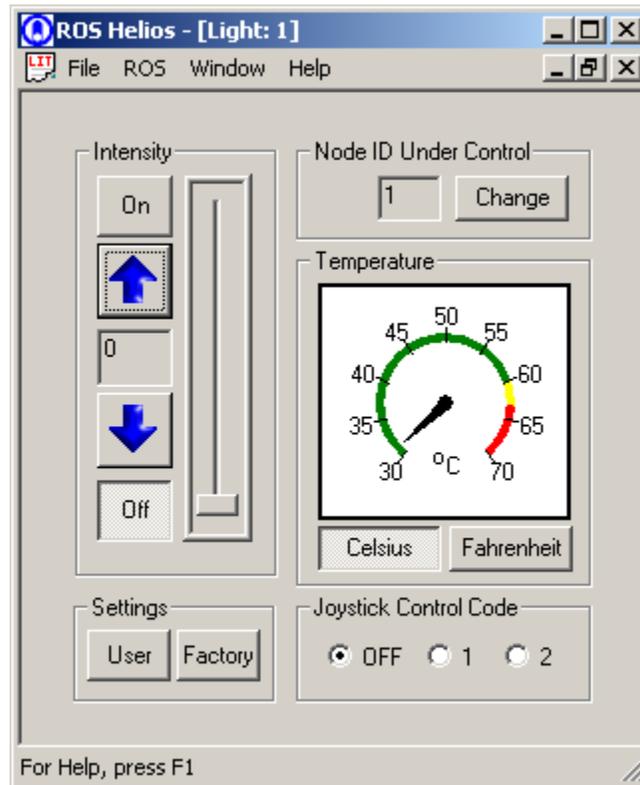
5.1.1.7 ROVer

The camera window is designed to control a ROVer camera. There are zoom and raster buttons move to vary your viewing area. There are also controls to vary the LED light array.

5.1.2 Menus

5.1.2.1 File Menu

The File menu allows the user to close whatever child window is currently selected (the title bar will appear darker on the current window), and to exit the program.


If there are no child windows open, the File menu appears as such:

The user can have one "system" (tracked by the status window) on one single COM port open at once in the application. Each system can have up to 32 nodes on it, and as many child windows there are nodes, except for the pan and tilt window which is, in actuality, two nodes per window (unless using a rotator). Most Helios users employ 5 nodes or less.
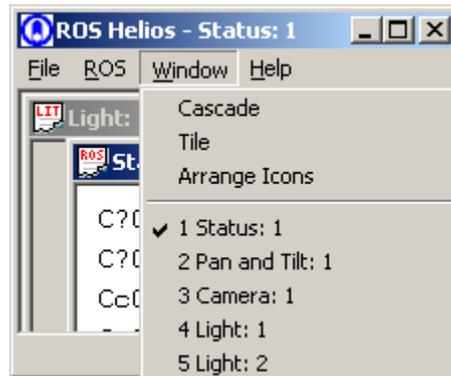
5.1.2.2 ROS Menu

The ROS menu allows the user to run the "Autodetect Nodes" feature or open up the user preferences.
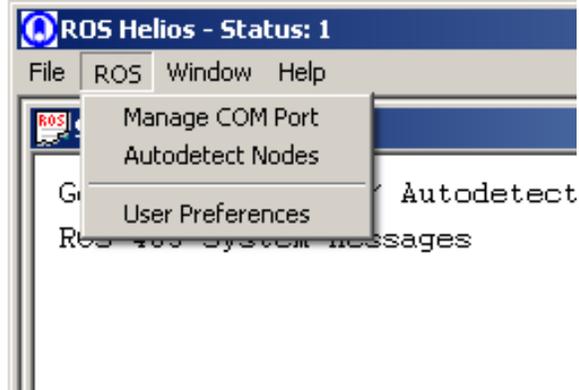
5.1.2.3 Window Menu

The Window menu allows the user to organize the child windows in various ways.

5.1.3 Dialog Boxes

5.1.3.1 <u>User Preferences</u>

The first tab of the user preferences dialog box allows the user to specify the desired mode that the program employs at startup. By default, the startup is set to "None".

For the Autodetection startup sequence, the program will open each available COM port and search for the attached nodes. The control windows for each detected device will then open.

Once, your system has been detected, it is a good idea to select the "Load Saved Configuration" in the Startup Behavior section. This will retain the COM port of your system and use it the next time the application is opened.

It is also possible within this menu to set the timeout for the character reads on the character echo. This is useful in debugging problematic USB converter chains.
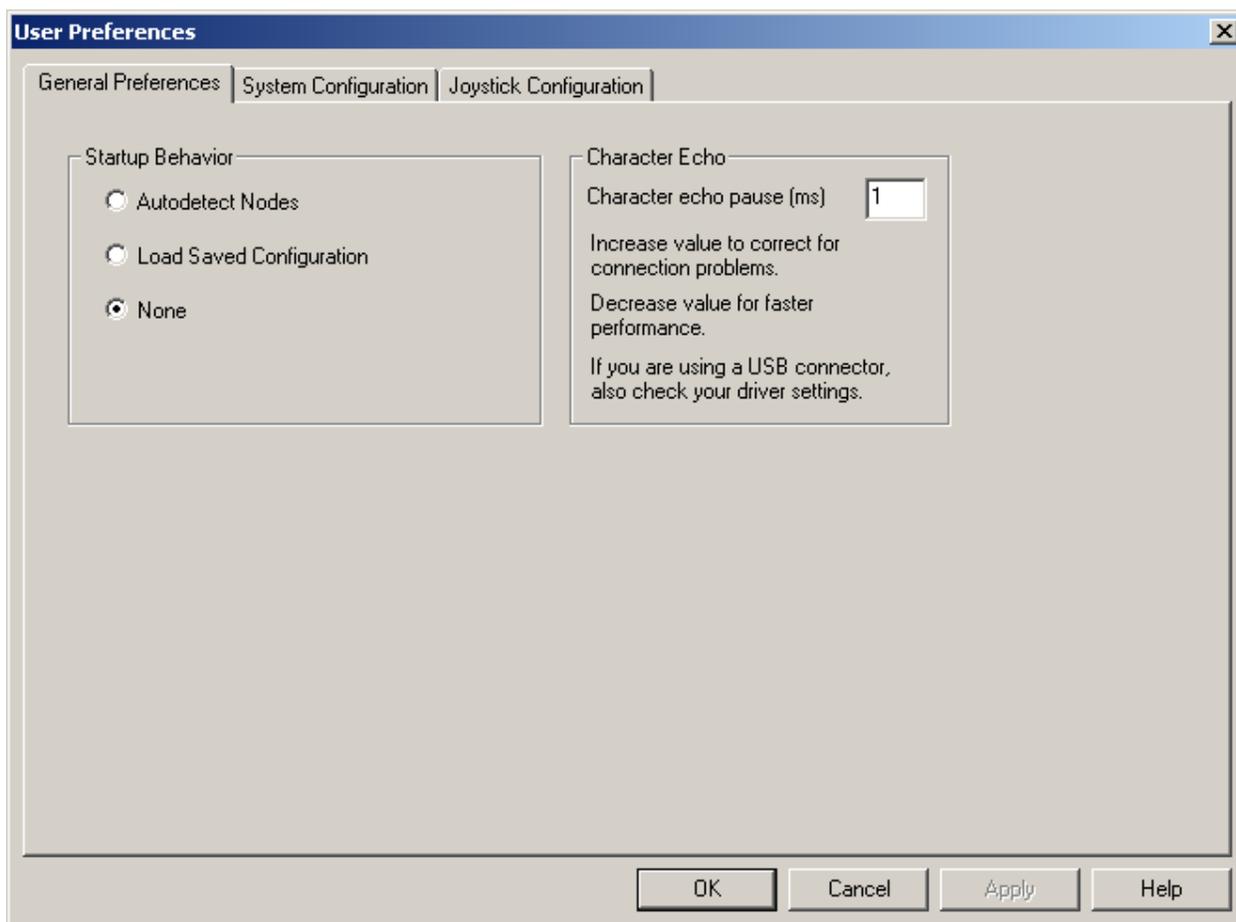
The second tab on this user preferences screen is shown below. This displays what nodes are currently known to be attached to the system.

User Preferences

General Preferences | System Configuration | Joystick Configuration

Device Types
0 = Not Connected
1 = Pan Axis
2 = Tilt Axis
3 = Camera
4 = Light
5 = HD Camera
6 = N/A
7 = ROVer
8 = High Speed Pan

Select COM Port
COM4

Current System Configuration

Node 1:	0	Node 9:	0	Node 17:	0	Node 25:	0
Node 2:	0	Node 10:	0	Node 18:	0	Node 26:	0
Node 3:	0	Node 11:	0	Node 19:	0	Node 27:	0
Node 4:	0	Node 12:	0	Node 20:	0	Node 28:	0
Node 5:	0	Node 13:	0	Node 21:	0	Node 29:	0
Node 6:	0	Node 14:	0	Node 22:	0	Node 30:	0
Node 7:	0	Node 15:	0	Node 23:	0	Node 31:	0
Node 8:	0	Node 16:	0	Node 24:	0	Node 32:	0

OK | Cancel | Apply | Help

The third tab is the joystick settings. Here it can be specified which buttons the joystick employs for each type of command in the camera and light windows. The user can also specify which joystick(s) are attached to the system, and select between them (if there are more than one).
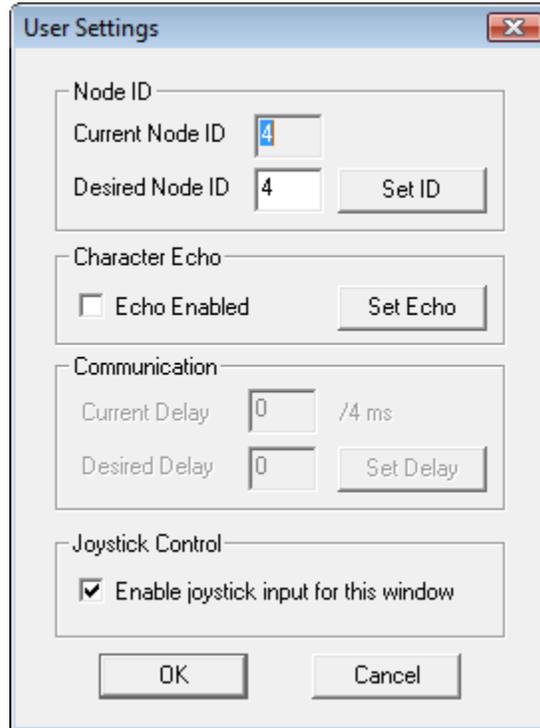
5.1.3.2 User Settings

On each of the control windows there is a button for User Settings. This can be utilized to change the current Node ID stored on a device's firmware to a desired node ID. Note that if two devices are set to be the same value that neither may respond, and one device will have to be temporarily disconnected from the communication bus while the other one is set to a different node ID. This can be particularly problematic for the axes of a single pan and tilt, and so the software attempts to prevent the user from assigning the same node to the tilt axis as the pan axis, if it detects the device type of the node is such. This is not a foolproof system, however, so the user simply needs to be careful about what node is assigned to what device, and to ensure that this setup is kept consistent. To change the desired Node ID (this will actually write the value to the device firmware), type the ID value (1-32) into the "Desired Node ID" edit box, and then click "Set ID."

The Character Echo option is useful when there are some communication problems (such as with USB converters) that cause delays. If the user is fairly sure that the devices are connected correctly, but communication is still not working, and a USB converter is employed, try disabling the "Echo Enabled" option by unselecting the checkbox and clicking on "Set Echo."

The Communication Delay setting is not available for all RS-495 products. The main use of the communication delay is to better interface with communication devices that have inherent switching delays such as a multiplexer. If you add a delay to one of the RS485 units, the unit will wait the delay

length before responding. This allows for switching in the devices between the computer and your RS-485 units.

The Joystick Control option is useful for multiple windows. If you happen to have more than one pan and tilt, camera, or light on the same COM port, the joystick commands will be sent to all of them simultaneously. This could lead to some confusion in controlling a system. In that instance, simply go to the window(s) for which it is desired to disable joystick input for, and uncheck the "Enable joystick input for this window" checkbox. When finished, click OK to remember this setting.
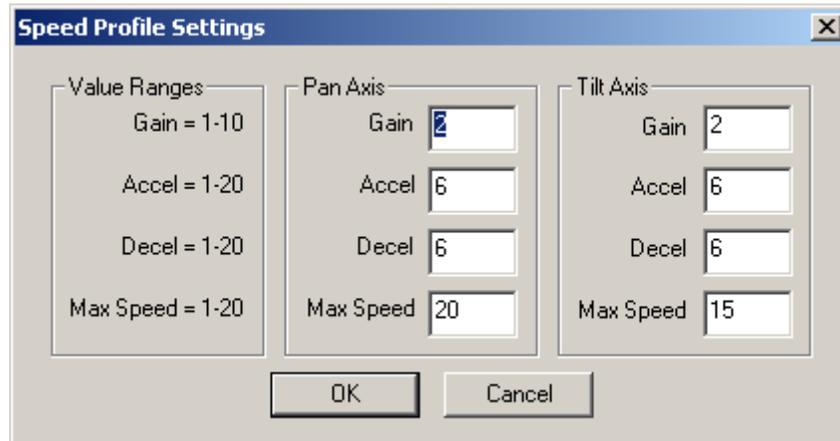

5.1.3.3 Change Node ID

The user will also notice a button labeled "Change" in the "Node ID Under Control" group box. Similarly to the User Settings dialog, this dialog allows the user to change the ID that the window points to (i.e. which device node is currently "under control" of this window). This does not actually change the ID of the device firmware, but instead changes the ID that the window points to when it attempts to communicate with that device.
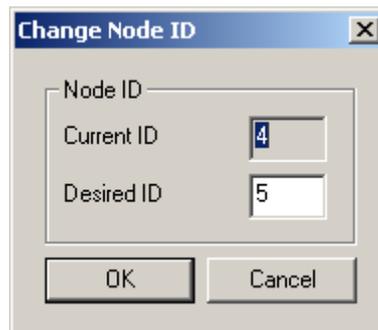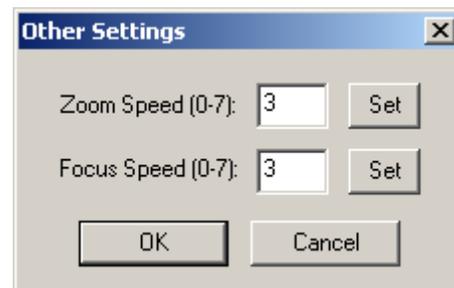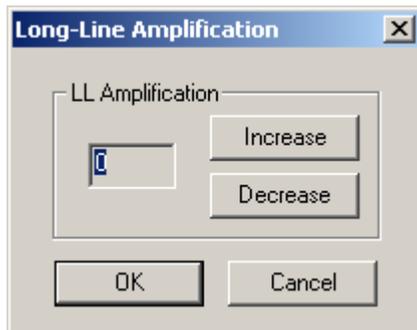
5.1.3.4 Speed Profile Settings

The "Speed Profile Settings" dialog is accessible from the Pan and Tilt window and provides the user the ability to adjust the speed parameters in the pan and tilt Goto position routine. When the user selects a degree value to rotate the pan or tilt axis to and presses Goto, the program ramps up the speed based on the difference between the current and the desired position. After the device begins to approach the desired location, it adjusts the speed and ramps down based on these values.

Speed Profile Settings		
Value Ranges	Pan Axis	Tilt Axis
Gain = 1-10	Gain 2	Gain 2
Accel = 1-20	Accel 6	Accel 6
Decel = 1-20	Decel 6	Decel 6
Max Speed = 1-20	Max Speed 20	Max Speed 15

OK   Cancel

5.1.3.5 Long-Line Amplification (LLA) and Other Settings

The "Set LLA" button on the camera control window pulls up this dialog, which allows the user to control the strength of the signal. This is necessary over long transmission distances. One can increase or decrease this value from 0-99. The "Other Settings" dialog controls Zoom and Focus speed.

Long-Line Amplification

LL Amplification

0   Increase

Decrease

OK   Cancel

Other Settings

Zoom Speed (0-7): 3   Set

Focus Speed (0-7): 3   Set

OK   Cancel

5.1.3.6 Limit Settings

The "Position Limits" button on the pan and tilt window opens up the "Limit Settings" dialog box, which allows the user to adjust the limits to which the pan and tilt can turn. These are set by the user. This is extremely important to set when operating a device with a heavy or bulky payload that may be damaged if the motor turns too far.
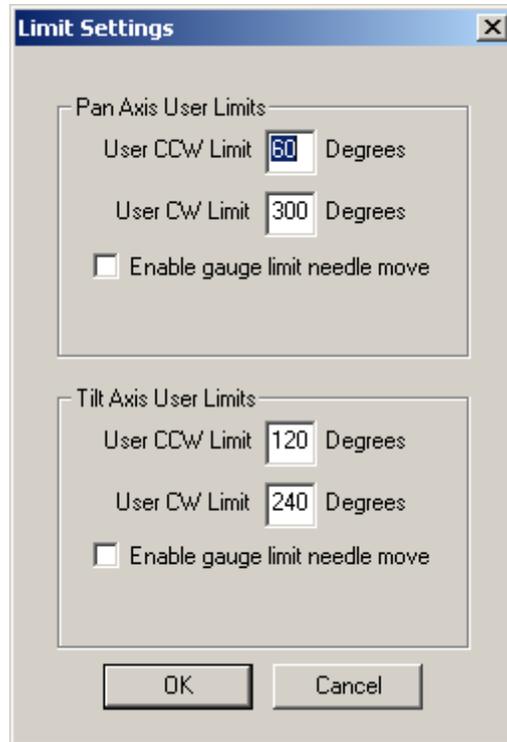
5.1.4 Factory Settings Windows

The factory settings windows are made available to the user in case one would like to query the current device firmware to determine revision and related parameters. This is intended for debugging purposes, in case there is some question as to which device version is being utilized. Factory settings are read-only for the customer.

See the RS-485 Protocol Document for more details on what values are available.

5.1.4.1 Factory Settings: Pan and Tilt

Factory Settings

Node ID
A

FW Rev.
3.00

Device Type
- ○ R/PT-10 88:1
- ○ R/PT-25 160:1
- ○ Camera
- ○ Light
- ○ R/PT-10 50:1

Dash Number
- ○ -01   ○ -05   ○ -09
- ○ -02   ○ -06
- ○ -03   ○ -07
- ○ -04   ○ -08

Serial Number
4 Digits:
0

Positioner
- ○ Feedback Off   ○ Feedback On

CCW Limit: 10   Import Curr Pos
CW Limit: 989   Import Curr Pos
User CCW: 15   15   90
User CW: 975   345   270

Baud Rate
- ○ 9600
- ○ 19200
- ○ 57600

Calibrate
This calibration feature is applicable for PT-10's and R-10's with firmware verion 9.0 or greater.

START CALIBRATION   ABORT CALIBRATION

STEP CW   STEP CCW   ACCEPT

GET FDBK

Bits Feedback
0

SET   Cancel

5.1.4.2 Factory Settings: Camera

5.1.4.3 Factory Settings: Light

Factory Settings

Node ID
D

FW Rev.
1.03

Device Type
- ○ R/PT-10 88:1
- ○ R/PT-25 160:1
- ○ Camera
- ● Light
- ○ R/PT-10 50:1

Dash Number
- ● -01   ○ -05   ○ -09
- ○ -02   ○ -06
- ○ -03   ○ -07
- ○ -04   ○ -08

Serial Number
4 Digits:
0

Baud Rate
- ● 9600
- ○ 19200
- ○ 57600

Light

Model
- ○ MV-LED II
- ● Lightning

Dimming Control
- ○ [A] 0-5 VDC
- ○ [B] 0-10 VDC
- ○ [C] RS-485
- ○ [D] Phase Control
- ● [E] None (Full On)

Input Power
- ● [1] 24VDC   ○ [2] 120VAC

SET   Cancel

5.2 How to use the Control Windows

5.2.1 Using the Pan and Tilt Window

The Pan and Tilt Window allows one to manipulate and specify operating parameters for Pan and Tilt (or a Rotator) device. Each section of the window is organized into a box with a label on it (such as Virtual Joystick). The sections described in detail below.
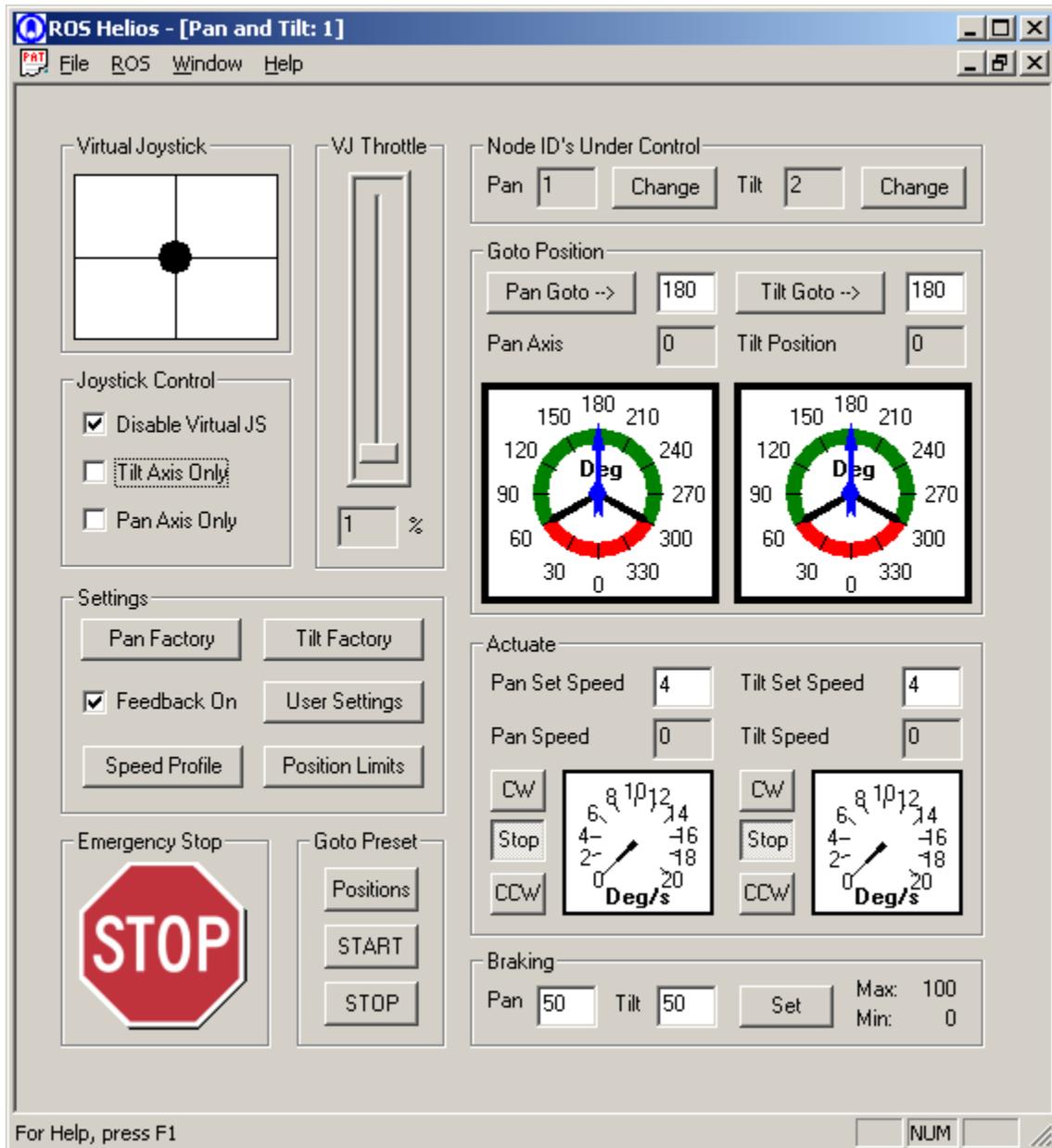
5.2.1.1 Real Joystick

The Joystick, if attached, can be used to control the rotation speed of the Pan and Tilt axes. The software allows up to two joysticks attached to Windows at any given time. Use the ROS Menu, and User Preferences, and the Joystick tab to check which joystick is currently selected. One should be able to move the joystick and see an immediate response from the Pan and Tilt unit if everything is working properly. If not, make sure the joystick is enabled in the Joystick Control section, and if it is still not working, reference the RS-485 Troubleshooting section of this manual.

5.2.1.1.1 Using the Joystick for Speed Control

Moving the Joystick in the X plane (pushing left and right) controls the Pan axis. Left pans CCW (counter-clockwise, or rotate to the left) and Right pans CW (clockwise, or rotate to the right) in the sense that if one is looking down on top of the Pan axis with the unit mounted payload-side-up (not upside down), a clockwise rotation will appear to turn the device to your right (if you are standing behind the pan and tilt).

Moving the Joystick in the Y plane (pushing straight forward and back with the stick) controls the Tilt axis. By default, pulling back on the stick pulls the Tilt axis upwards (CCW) and pushing away from you pulls the Tilt axis downwards (CW) with the unit mounted payload-side-up.

If the unit is mounted upside down (for example on the underbody of an ROV), you can reverse the joystick direction in the User Preferences Joystick tab, in which case the CCW and CW behaviors are swapped.

As the "real" joystick is moved, you will notice the "virtual" joystick moving in sync. If you do not have a joystick or wish to not use it for some reason, you can utilize the Virtual Joystick as if it were a real joystick (see below).

5.2.1.1.2 Joystick Buttons

Each model of Joystick may have a different set of button arrangements, which is why Helios has a Joystick tab on the User Preferences screen to customize their behaviors. You can change these settings to suit particular needs. The Joystick buttons can control many Camera and Light settings, but are not used by the Pan and Tilt unit.

5.2.1.1.3 Joystick Throttle

Some joysticks have a throttle control, which varies the maximum speed that the joystick can actuate the Pan and Tilt. This maximum speed varies from the actual maximum value that can be set in the Speed Profile, to a very low value that enables the user to have finer control over the motion.

5.2.1.2 Virtual Joystick

5.2.1.2.1 Using the VJ for Speed Control

If a joystick is not attached when the program starts, the "Virtual Joystick" is available by default. If a joystick is attached, it may be disabled for Pan and Tilt control in favor of the virtual joystick by un-checking the checkbox called "Disable Virtual Joystick" in the "Joystick Control" section. At this point the operator can grab the black circle at the center of the crosshairs using the mouse cursor, click down on the right mouse button, and move the mouse. This will move the circle in the white square area and simulate a joystick motion. The joystick works exactly like a real joystick would work, as if one were looking straight down at the center of the stick from above.

5.2.1.2.2 VJ Throttle

The VJ Throttle works just like a real joystick throttle control. If the VJ is disabled, the VJ throttle displays the state of the real joystick's throttle control. If the VJ is enabled, the VJ throttle slider can be moved and will adjust the maximum speed that can be attained on the Pan and Tilt axes by pushing the VJ to its extents.

5.2.1.2.3 Joystick Control

This section provides for the ability to enable or disable the virtual joystick and also the ability to "Fix" either the Pan or the Tilt axis in the case that it is necessary to move only one axis and it is necessary to ensure that the other axis is stationary.

5.2.1.3 Node IDs Under Control

These refer to the device node ID that is being controlled by the window.

5.2.1.3.1 Pan Change

This allows the user to change the ID of the Pan axis that the window points to. This will NOT change the ID of the actual device firmware.

5.2.1.3.2 Tilt Change

This allows you to change the ID of the Tilt axis that the window points to. This will NOT change the ID of the actual device firmware. This option is not available if in Rotator mode.

5.2.1.4 Goto Position

5.2.1.4.1 Position Feedback

The Goto Position section is available if position feedback is available. If it is available, the user will be able to quickly see where the current position is via the virtual instrument gauge readout for the Pan and Tilt axes. These gauges display values from 0-360 degrees.

Notice that not all of the full range of the gauge is available. The green colored section is the OK range, and the red colored section is past the user-specified limits. By default the user limits are set to the hardware limits at the factory. These values can then be customized by the user to prevent damage to the unit or to other hardware in close vicinity to the unit by having the payload collide during part of its rotation path. The PT-10 and 25 can produce enough torque to permanently damage hardware if driven past appropriate limits.

The speed of rotation is controlled according to the Speed Profile settings, and will ramp up and ramp down depending on how far away the current position is from the desired position.

5.2.1.4.2 Pan Goto

The "Pan Goto" button will cause the device to slew until it reaches the degree specified in the edit box to the right of the Pan Goto button.

5.2.1.4.3 Tilt Goto

The "Tilt Goto" button will cause the device to tilt until it reaches the degree specified in the edit box to the right of the Tilt Goto button.

5.2.1.5 Actuate

5.2.1.5.1 Speed Feedback

An alternate method to control the rotation of the Pan and Tilt axes is to manually adjust the speed (or "slew" rate). The current speed of the device axes are displayed in degrees / second on the gauges in this section.

5.2.1.5.2 Pan Set Speed

Type the desire speed here and then press the CW or CCW buttons to begin an actuation. The device will ramp up and down, noticeable in larger speed values, to prevent stalling or inducing jolting vibrations to the load.

5.2.1.5.3 Tilt Set Speed

Type the desire speed here and then press the CW or CCW buttons to begin an actuation. The device will ramp up and down, noticeable in larger speed values, to prevent stalling or inducing jolting vibrations to the load.

5.2.1.5.4 CW, Stop, and CCW Buttons

Pressing the CW button will start the axis rotating clockwise at the speed indicated in the Pan Set Speed edit box. Pressing the CCW button will start the axis (with a speed-up ramp) rotating counter-clockwise. Pressing Stop will cause that axis to stop (with a speed-down ramp).

5.2.1.6 Braking

5.2.1.6.1 Pan & Tilt Set

Setting a value from 0 (no braking) to 100 (max braking) in the Pan and Tilt edit boxes, and then pressing the "Set" button will set the braking value to use next time the brake is applied. Note that the brake will not be applied until the rotation stops on the axis. The brake is not active unless the speed is zero.

5.2.1.7 Settings

5.2.1.7.1 Feedback On

If feedback is available (i.e. feedback potentiometer is present in the device) and the checkbox is enabled, the user will be able to see the position and speed feedback of the Pan and Tilt axes. If the Feedback On checkbox is checked off, this information will not be reported.

5.2.1.7.2 User

This dialog allows you to specify the device ID, character echo, and enable the joystick.

5.2.1.7.3 Factory

This dialog allows you view the factory settings in your RS=485 unit.

5.2.1.7.4 Speed Profile

This dialog allows the user to set various speed values used in the P control effort for Goto Position. These values are: Gain, Acceleration, Deceleration, and Max Speed. Max Speed also limits the values one can slew. Note that the device can stall if sudden speed changes are requested, which is why speed ramping up and down is necessary to reach higher speeds.

5.2.1.7.5 Position Limits

This dialog allows one to set the user-defined position limits (red area of position feedback gauges) for both the Pan and Tilt axes. The Joystick, Goto Position, and Actuate functions are all pre-programmed to stop before reaching these limits. These values can be specified by the user to prevent collisions between the payload and walls, other system components, or vehicle parts.

5.2.1.7.6 Switch to Rotator Mode

This button switches the display to Rotator mode (disabled Tilt, and re-labels Pan to Rotator).

5.2.1.8 Emergency Stop

5.2.1.8.1 STOP Button

Stops motion on both axes. This can be useful if something goes wrong or if the user did not set enough of a limit to prevent a collision. Note that the motion will not ramp down but freeze immediately.

5.2.2 Using the Camera Window

The Camera Window allows one to manipulate and specify operating parameters for a Camera device. Each section is described below.
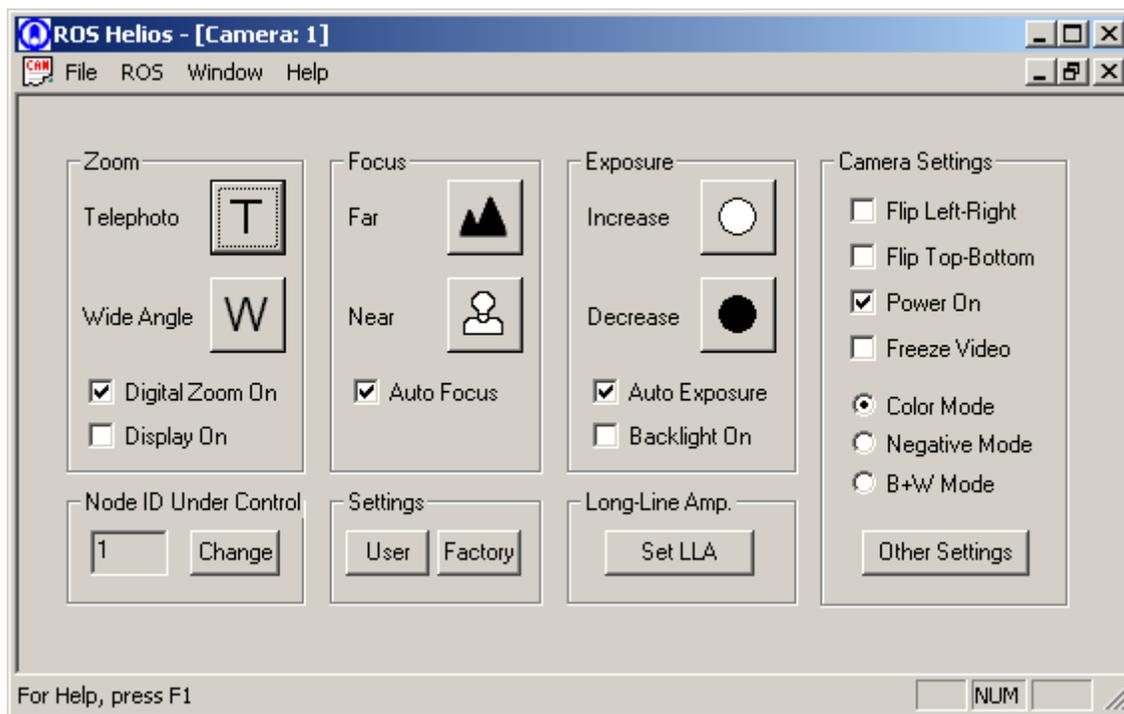
5.2.2.1 Zoom

5.2.2.1.1 Telephoto
Holding down this button will actuate the camera's zoom in towards telephoto mode. Alternatively, one can hold down buttons 1 and 3 on the Joystick.

5.2.2.1.2 Wide Angle
Holding down this button will actuate the camera's zoom out towards wide angle mode. Alternatively, one can hold down button 3 on the Joystick.

5.2.2.1.3 Digital Zoom On
If this checkbox is checked on, the digital zoom feature is employed in addition to the optical zoom.

5.2.2.1.4 Display On
If this checkbox is checked on, there will be an onscreen display. This can be useful when zooming to see how close one is to the wide / telephoto limits.

5.2.2.2 <u>Focus</u>

5.2.2.2.1 Far

Holding down this button will focus the camera out towards infinity. Alternatively, one can hold down button 4 on the Joystick.

5.2.2.2.2 Near

Holding down this button will focus the camera in towards zero. Alternatively, one can hold down buttons 1 and 4 on the Joystick.

5.2.2.2.3 Auto Focus

If this checkbox is checked on, the built-in auto-focus algorithm is used in the camera to set the focus level. The algorithm looks for straight lines in the image and attempts to make them sharp. If edges are present that are not sharp for some reason, manual focus may be utilized. Alternatively, one can hold down buttons 4 and 5 on the Joystick.

5.2.2.3 <u>Exposure</u>

5.2.2.3.1 Increase

Pressing this button increases the exposure (i.e. more light, or a smaller "F-stop" value) setting. Alternatively, one can hold down button 6 on the Joystick.

5.2.2.3.2 Decrease

Pressing this button decreases the exposure (i.e. less light, or a larger "F-stop" value) setting. Alternatively, one can hold down button 5 on the Joystick.

5.2.2.3.3 Auto Exposure

Checking this checkbox on turns on the auto-exposure feature. Alternatively, one can hold down buttons 5 and 6 on the Joystick.

5.2.2.3.4 Backlight On

Backlight enhances the natural exposure for low-light conditions.

5.2.2.4 <u>Node ID Under Control</u>

This refers to the device node ID that is being controlled by the window.

5.2.2.4.1 Change Button

This allows one to change the ID that the window points to. This will NOT change the ID of the actual device firmware.

5.2.2.5 Settings

5.2.2.5.1 User

This dialog allows you to specify the device ID, character echo, and enable the joystick.

5.2.2.5.2 Factory

This dialog allows you view the factory settings in your RS=485 unit.

5.2.2.6 Long-Line Amplifier (LLA)

5.2.2.6.1 Set LLA Button
Pulls up the LLA dialog box which allows one to specify the amount of video amplification.

5.2.2.7 Camera Settings

5.2.2.7.1 Flip Left-Right
Reverses the image left-right.

5.2.2.7.2 Flip Top-Bottom
Reverses the image top-bottom.

5.2.2.7.3 Power On
Turns on or off the power to the camera.
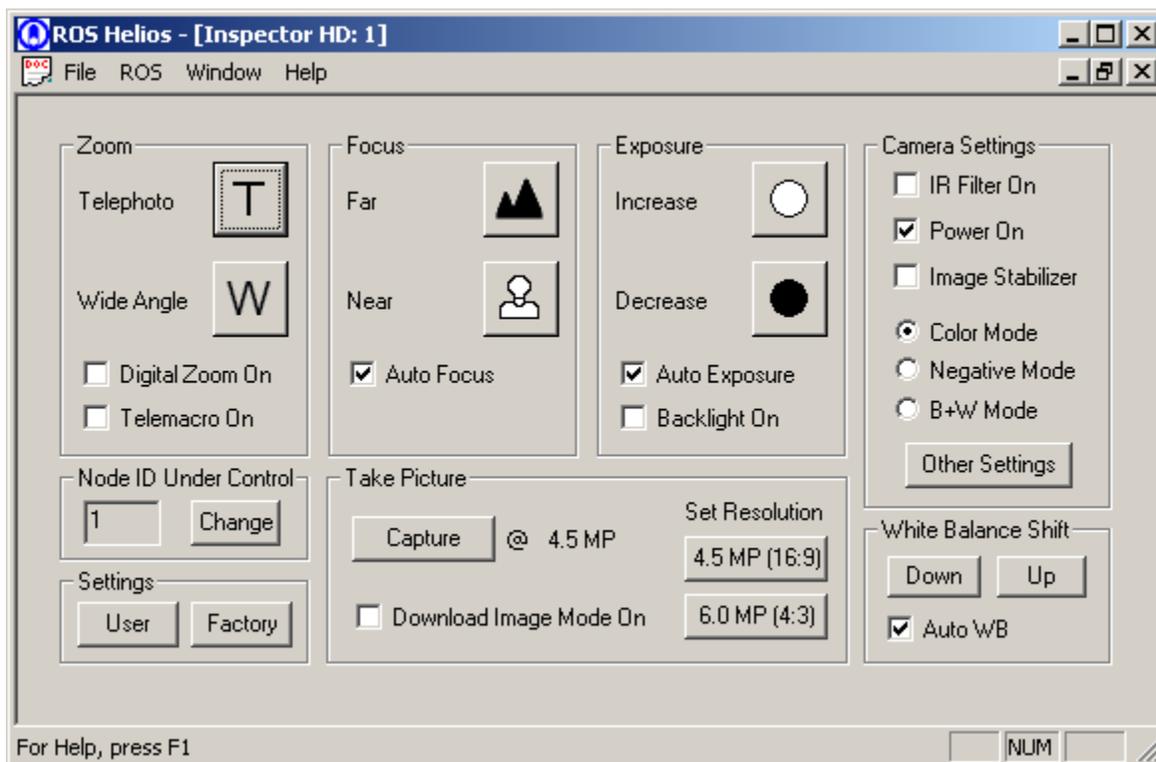
5.2.2.7.4 Freeze Video
Freezes the video so a snapshot or still shot can be recorded.

5.2.2.7.5 Color Mode / Negative Mode / B&W
Toddles between color, black and white, or negative modes.

5.2.3 Using the Inspector HD Camera Window

The Inspector HD Camera Window allows one to manipulate and specify operating parameters for a Camera device. Each section is described below.

5.2.3.1 Zoom

5.2.3.1.1 Telephoto
Holding down this button will actuate the camera's zoom in towards telephoto mode. Alternatively, one can hold down buttons 1 and 3 on the Joystick.

5.2.3.1.2 Wide Angle
Holding down this button will actuate the camera's zoom out towards wide angle mode. Alternatively, one can hold down button 3 on the Joystick.

5.2.3.1.3 Digital Zoom On
If this checkbox is checked on, the digital zoom feature is employed in addition to the optical zoom.

5.2.3.1.4 Telemacro On
If this checkbox is checked on, the HD camera moves the zoom to the tele end of the zoom range.

5.2.3.2 Focus

5.2.3.2.1 Far
Holding down this button will focus the camera out towards infinity. Alternatively, one can hold down button 4 on the Joystick.

5.2.3.2.2 Near
Holding down this button will focus the camera in towards zero. Alternatively, one can hold down buttons 1 and 4 on the Joystick.

5.2.3.2.3 Auto Focus
If this box is checked, the built-in auto-focus algorithm is used in the camera to set the focus level. The algorithm looks for straight lines in the image and attempts to make them sharp. If edges are present that are not sharp for some reason, manual focus may be utilized. Alternatively, one can hold down buttons 4 and 5 on the Joystick.

5.2.3.3 Exposure

5.2.3.3.1 Increase
Pressing this button increases the exposure (i.e. more light, or a smaller "F-stop" value) setting. Alternatively, one can hold down button 6 on the Joystick.

5.2.3.3.2 Decrease
Pressing this button decreases the exposure (i.e. less light, or a larger "F-stop" value) setting. Alternatively, one can hold down button 5 on the Joystick.

5.2.3.3.3 Auto Exposure
Checking this box turns on the auto-exposure feature. Alternatively, one can hold down buttons 5 and 6 on the Joystick.

5.2.3.3.4 Backlight On
Backlight enhances the natural exposure for low-light conditions.

5.2.3.4 Node ID Under Control

This refers to the device node ID that is being controlled by the window.

5.2.3.4.1 Change Button

This allows one to change the ID that the window points to. This will NOT change the ID of the actual device firmware.

5.2.3.5 Settings

5.2.3.5.1 User

This dialog allows you to specify the device ID, character echo, and enable the joystick.

5.2.3.5.2 Factory

This dialog allows you view the factory settings in your RS=485 unit.

5.2.3.6 Take Picture

5.2.3.6.1 Capture
Take pictures in 4.5 MP or 6.0 MP mode.

5.2.3.6.2 Download Image Mode On
Enable the image transfer mode so that the captured images can be copied via a USB cable to your PC.

5.2.3.6.3 4.5 MP Mode
Enable 4.5 megapixel resolution mode using 16 X 9 aspect ratio.

5.2.3.6.4 6.0 MP Mode
Enable 6.0 megapixel resolution mode using 4 X 3 aspect ratio.

5.2.3.7 Camera Settings

5.2.3.7.1 Night Shot On
Enable the low-light mode.

5.2.3.7.2 Power On
Enable or disable the power to the HD camera.

5.2.3.7.3 Stabilizer On
Enable or disable the image stabilizer feature which is used in image capturing.

5.2.3.7.4 Color Mode / Negative Mode / B&W
Toggle between color, black and white, or negative modes.

5.2.3.8 Other Settings

5.2.3.8.1 Set Zoom Speed
Set the speed of the zoom action (0-7) where 0 is slow and 7 is fast.

5.2.3.8.2 HD Component Video Mode
Switch the video to HD component mode (suitable for HD monitors).

5.2.3.8.3 Composite Video Mode
Switch the video to composite mode (suitable for normal monitors).

5.2.3.9 <u>White Balance Shift</u>

5.2.3.9.1 Down
Decrease white balance.
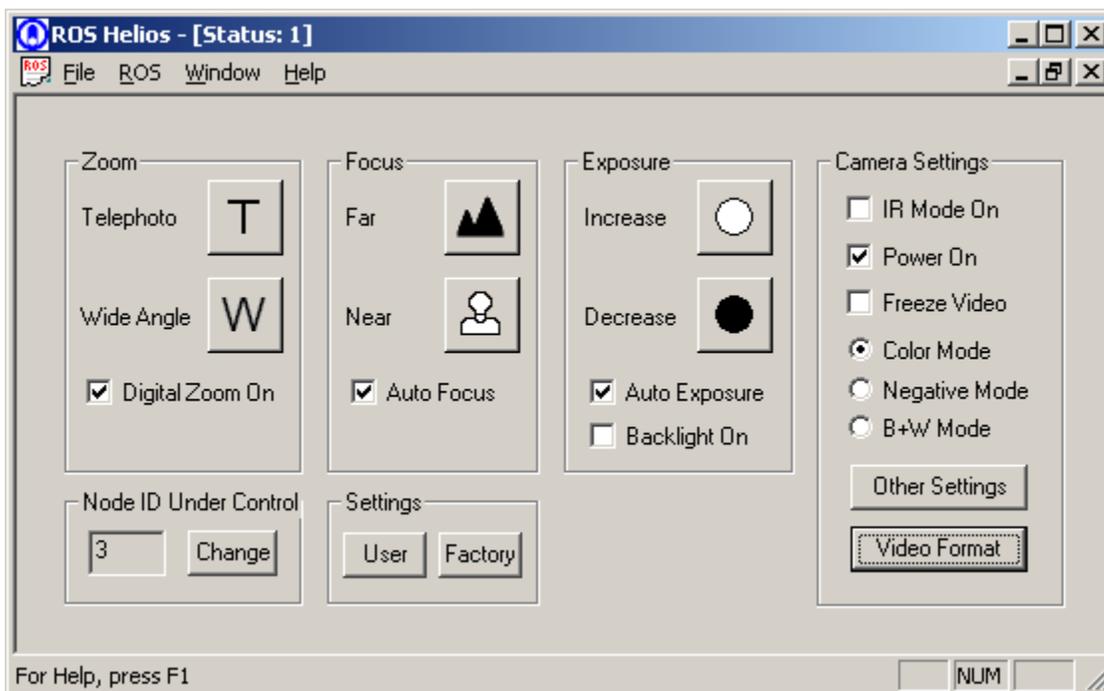

5.2.3.9.2 Up
Increase white balance.

5.2.3.9.3 Auto
Use the default level for automatic white balance.

5.2.4 Using the HD Camera Window

The HD Camera Window allows one to manipulate and specify operating parameters for a HD Camera device. Each section is described below.

5.2.4.1 Zoom

5.2.4.1.1 Telephoto
Holding down this button will actuate the camera's zoom in towards telephoto mode. Alternatively, one can hold down buttons 1 and 3 on the Joystick.

5.2.4.1.2 Wide Angle
Holding down this button will actuate the camera's zoom out towards wide angle mode. Alternatively, one can hold down button 3 on the Joystick.

5.2.4.1.3 Digital Zoom On
If this checkbox is checked on, the digital zoom feature is employed in addition to the optical zoom.

5.2.4.2 Focus

5.2.4.2.1 Far
Holding down this button will focus the camera out towards infinity. Alternatively, one can hold down button 4 on the Joystick.

5.2.4.2.2 Near
Holding down this button will focus the camera in towards zero. Alternatively, one can hold down buttons 1 and 4 on the Joystick.

5.2.4.2.3 Auto Focus
If this checkbox is checked on, the built-in auto-focus algorithm is used in the camera to set the focus level. The algorithm looks for straight lines in the image and attempts to make them sharp. If edges are present that are not sharp for some reason, manual focus may be utilized. Alternatively, one can hold down buttons 4 and 5 on the Joystick.

5.2.4.3 <u>Exposure</u>

5.2.4.3.1 Increase
Pressing this button increases the exposure (i.e. more light, or a smaller "F-stop" value) setting. Alternatively, one can hold down button 6 on the Joystick.

5.2.4.3.2 Decrease
Pressing this button decreases the exposure (i.e. less light, or a larger "F-stop" value) setting. Alternatively, one can hold down button 5 on the Joystick.

5.2.4.3.3 Auto Exposure
Checking this checkbox on turns on the auto-exposure feature. Alternatively, one can hold down buttons 5 and 6 on the Joystick.

5.2.4.3.4 Backlight On
Backlight enhances the natural exposure for low-light conditions.

5.2.4.4 <u>Node ID Under Control</u>

This refers to the device node ID that is being controlled by the window.

5.2.4.4.1 Change Button
This allows one to change the ID that the window points to. This will NOT change the ID of the actual device firmware.

5.2.4.5 <u>Settings</u>

5.2.4.5.1 User

This dialog allows you to specify the device ID, character echo, and enable the joystick.

5.2.4.5.2 Factory

This dialog allows you view the factory settings in your RS=485 unit.

5.2.4.6 Camera Settings

5.2.4.6.1 IR Mode On
Enables/disables the IR mode to the camera.

5.2.4.6.2 Power On
Enables/disables the power to the camera.

5.2.4.6.3 Freeze Video
Freezes the video so a snapshot or still shot can be recorded.
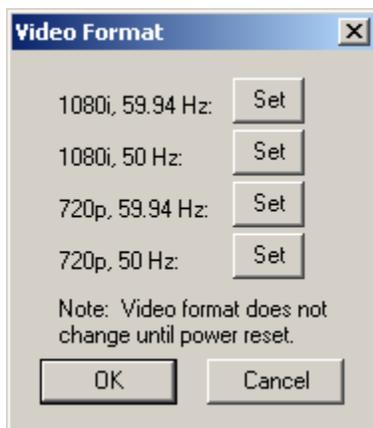
5.2.4.6.4 Color Mode / Negative Mode / B&W
Toggles between color, black and white, and negative modes.

5.2.4.6.5 Other Settings
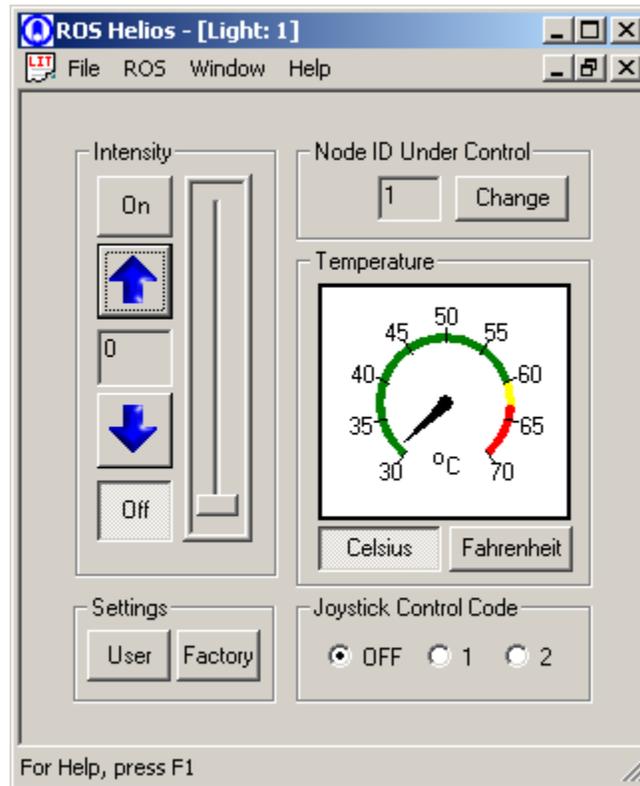Allows the user to set focus and zoom speeds.

5.2.4.6.6 Video Format

The Video Format dialog allows the user to switch video format. Video format does not change until camera power is cycled.

5.2.5 Using the Light Window

The Light Window allows one to manipulate and specify operating parameters for an RS485 Light device. Each section is described below.

5.2.5.1 Intensity

5.2.5.1.1 On / Off Buttons
Turns light on or off.

5.2.5.1.2 Up Arrow / Down Arrow Buttons
Increases or decreases intensity (from 0 for off to 100 for on).

5.2.5.1.3 Slider Bar
Increases or decreases intensity (from 0 for off to 100 for on).

5.2.5.2 Node ID Under Control

This refers to the device node ID that is being controlled by the window.

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5.2.5.2.1 Change Button

This allows one to change the ID that the window points to. This will NOT change the ID of the actual device firmware.

5.2.5.3 Temperature

5.2.5.3.1 Gauge

The virtual gauge displays the current calculated temperature of the light housing. If the temperature enters the yellow range the power will start to auto-cycle to lower the heat. If the temperature enters the red range the power will shut off until the temperature drops below the safe range.

5.2.5.3.2 Celsius / Fahrenheit

These buttons switch between temperature units.

5.2.5.4 Settings

5.2.5.4.1 User

This dialog allows you to specify the device ID, character echo, and enable the joystick.

5.2.5.4.2 Factory

This dialog allows you view the factory settings in your RS=485 unit.

5.2.5.5 Joystick Control Code

5.2.5.5.1 Not used / 1 / 2

Disables the joystick, or enables the joystick light commands #1, or #2 defined in the ROS Menu / User Preferences / Joystick tab.

5.2.6 Using the ROVer Window

The ROVer Window allows one to manipulate and specify operating parameters for a ROVer device. Each section is described below.
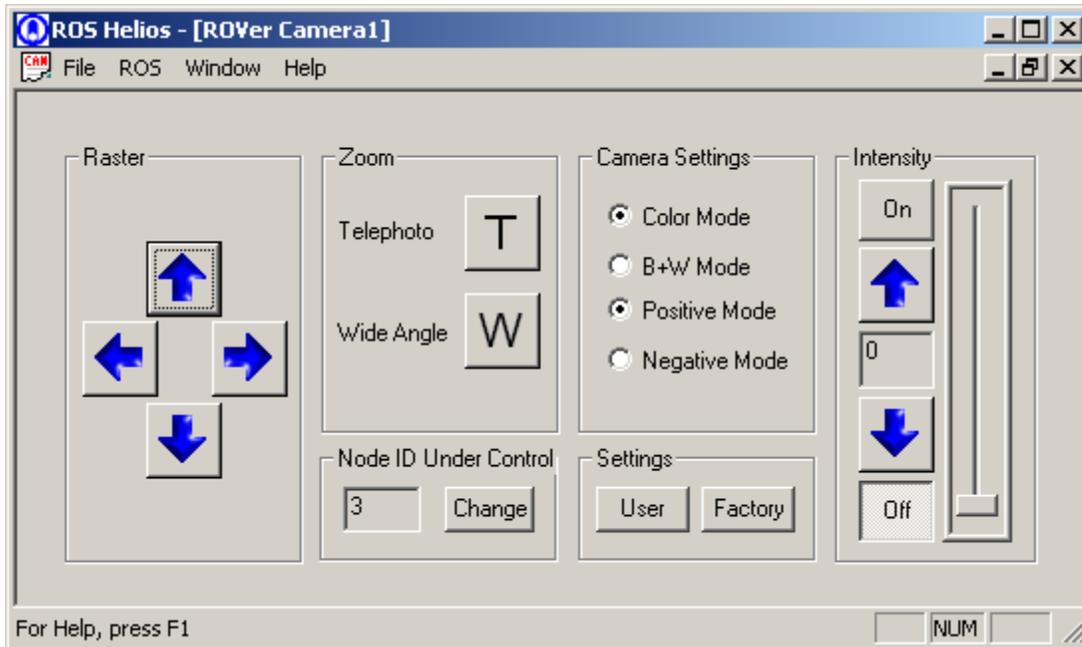
5.2.6.1 Raster

When zoomed in beyond full wide angle, the user can actuate the raster controls to shift the viewing area.

5.2.6.2 Zoom

5.2.6.2.1 Telephoto

Holding down this button will actuate the camera's zoom in towards telephoto mode. Alternatively, one can hold down buttons 1 and 3 on the Joystick.

5.2.6.2.2 Wide Angle

Holding down this button will actuate the camera's zoom out towards wide angle mode. Alternatively, one can hold down button 3 on the Joystick.

5.2.6.3 Camera Settings

Allows the user to switch between color/black-and-white modes and between positive/negative video modes.

5.2.6.4 Node ID Under Control

This refers to the device node ID that is being controlled by the window.

5.2.6.5 Settings

5.2.6.5.1 User

This dialog allows you to specify the device ID, character echo, and enable the joystick.

5.2.6.5.2 Factory

This dialog allows you view the factory settings in your RS-485 unit.

5.2.6.6 Intensity

5.2.6.6.1 On / Off Buttons
Turns light on or off.

5.2.6.6.2 Up Arrow / Down Arrow Buttons
Increases or decreases intensity (from 0 for off to 100 for on).

5.2.6.6.3 Slider Bar
Increases or decreases intensity (from 0 for off to 100 for on).