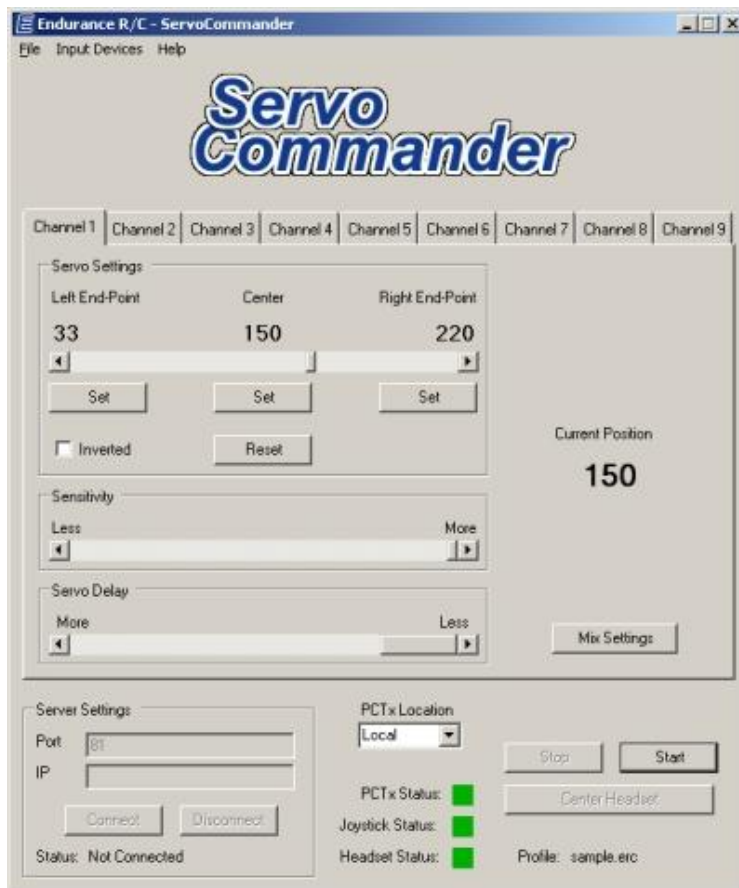


# Servo Commander

## v1.2.1 Instructions

Endurance R/C  
[www.endurance-rc.com](http://www.endurance-rc.com)



*ServoCommander Screen Shot*

The Endurance R/C ServoCommander software was designed to allow DirectInput devices and the eMagin z800 head tracker to communicate with standard R/C transmitters via the Endurance R/C PCTx and Endurance R/C servo controllers. By using the software, a user has the ability to map joystick axes, buttons, sliders, and dials to r/c servos and electronic motor controllers. Anything that can be attached to an R/C receiver can be configured and controlled with the ServoCommander software. ServoCommander allows for a user to configure individual user for different situations or models. The software supports all windows joysticks and input devices including game pads, joysticks, and racing wheels as well as a keyboard and mouse. You can even built your own joysticks with the Analog Reader and use it to control your model or robot. The software even supports the ability to send input device data to a remote PC running the supplied PCTx Server software.

The server software is open source and can be downloaded from the software development section: <http://www.endurance-rc.com/software.html>

The eMagin Z800 headset with built in head tracking can be used as an input device. Usage of the AeroPix head tracker is also possible when using the pass through functionality of the head tracker.

**Important Note about the Z800 headset:**

This software is not compatible with eMagin Z800 firmware version 63e or earlier. You can check your firmware version in the eMagin control panel software. If you have this version an update chip can be obtained from eMagin's web store for \$25.00usd.

**Requirements:**

PCTx or Endurance R/C 25 Servo Controller

Input Device – Such as a Joystick, Game pad, Analog Reader, keyboard or mouse

PC running Windows XP or Vista

Remote - 2 PC's and internet connection for web interface

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## **Output Device Setup**

ServoCommander was designed to work with the Endurance R/C PCTx and 25 Servo Controller only. Devices from other manufacturers are not compatible with the software.

## **PCTx**

1. Plug the PCTx interface into an open powered USB port and then into your transmitter's trainer port. Windows will recognize the device and automatically install the correct drivers.
2. Windows will display a message indicating the PCTx was installed correctly. If a problem occurs with the install unplug the PCTx and re-insert.
3. If you are unsure if the PCTx was correctly installed you can open the device manager to check. From the windows desktop or start menu click on My Computer and choose Properties. Go to the hardware tab and press the Device Manager button. Expand the "Human Interface Devices" section. When you plug in the PCTx a "HID-compliant device" and a "USB Human Interface Device" will appear.
4. During the operation of ServoCommander a green box will indicate that a PCTx is present on the system.

## **R/C Transmitter**

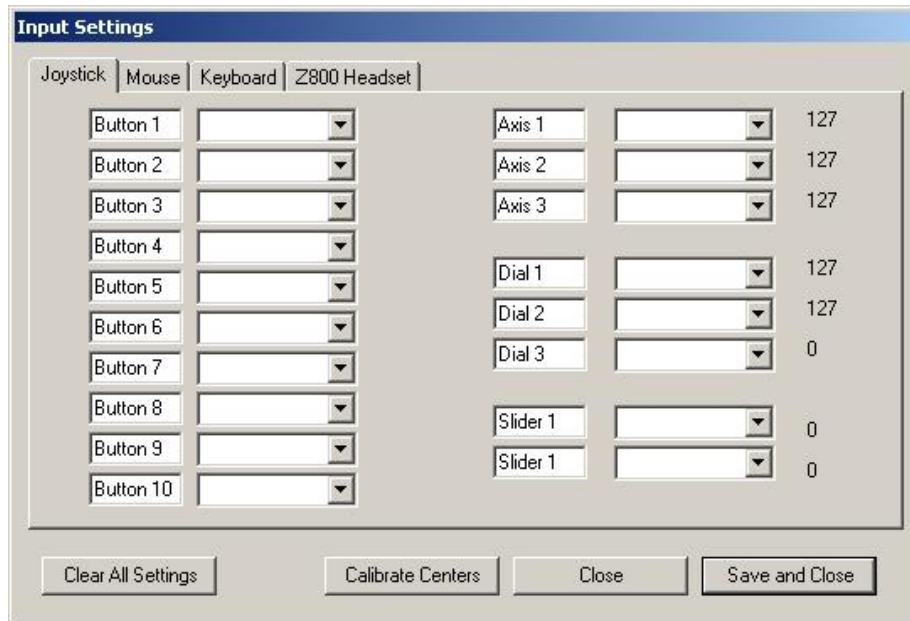
1. Make sure the trainer switch on the transmitter is switched to the OFF position. If your radio was purchased from Endurance R/C a toggle switch has been installed in the transmitter which allows for on/off trainer action. If you did not purchase your radio system from Endurance R/C the switch must be held down, replaced, or removed in order to achieve hands off trainer functions.
2. Extend the transmitter antenna, power on the transmitter, and then power on the model or robot. Slowly move the control sticks to verify all functions are working correctly.
3. If your radio requires and special setup to enable trainer input do this now.
4. Plug the PCTx into the transmitter's trainer port.

## 25 Servo Controller

1. Plug the 25 Servo Controller to an open powered USB port. Windows will recognize the device and automatically install the correct drivers.
2. Windows will display a message indicating the controller was installed correctly. If a problem occurs with the install unplug the controller and re-insert.
3. If you are unsure if the controller was correctly installed you can open the device manager to check. From the windows desktop or start menu click on My Computer and choose Properties. Go to the hardware tab and press the Device Manager button. Expand the "Human Interface Devices" section. When you plug in the PCTx a "HID-compliant device" and a "USB Human Interface Device" will appear.
4. An external power source is required for powering the 25 Servo Controller. Standard servos usually require a power source of 5v-6v DC. Some servos will run on 9v and above as well. The 25 Servo Controller was designed to work with any servo and subsequent power source. Power for the controller and servos are isolated. Please consult the servo manufacturer instructions for selection the proper power source for your servo.
5. Connect the power source to the green terminal next to the USB connector. Insert the positive line into the side of the connector marked with the '+' symbol, next to the status indicator.
6. During the operation of ServoCommander a green box will indicate that a controller is present on the system.

## Input Device Setup

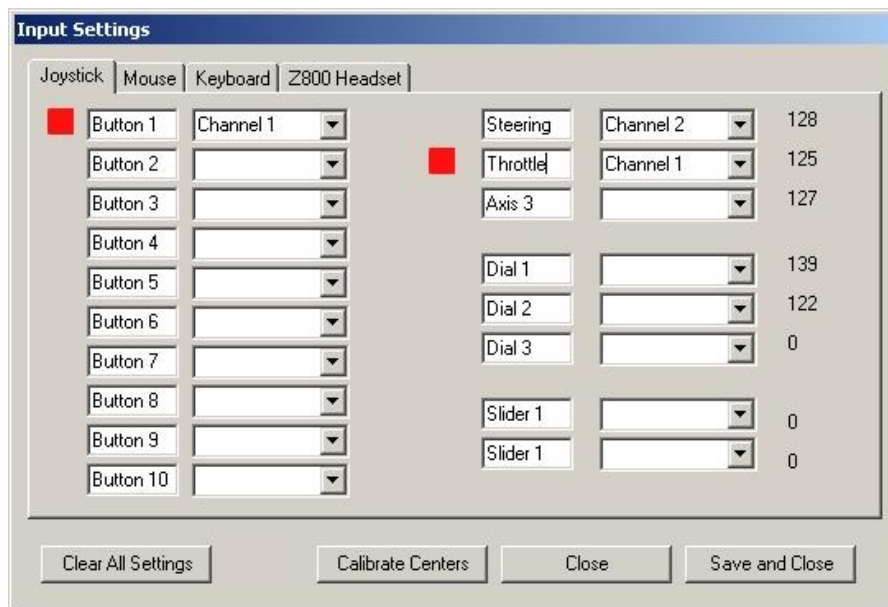
Go to Input Devices->Settings. The Input Settings will be displayed. The following is an image of the Joystick setup dialog. Each tab will display settings for the appropriate device.



*Joystick setup screen*

## Joystick/Analog Reader

1. Click on the Joystick tab to reveal the joystick setup.
2. Move the joystick or press any available buttons to see how the software responds to the movement. Button presses will display a green box next to the appropriate button. Axes, sliders, and dials will display a value from 0-255.
3. Once you have located the function you wish to map select the correct output channel from the corresponding list. The channels chosen here will take on the settings applied for the corresponding channel settings on the main screen.
4. Repeat until all channels are set. Red boxes next to each channel will indicate a duplicate setting which will prevent the settings from being saved. Remove any duplicates by selecting a free channel or press the Clear All Settings button to reset all settings.



*Duplicate channel assignments*

5. If you wish to give custom names to each Joystick functions you can do this now by editing the text in the box next to the channel pull down menus. These names will be saved/loaded in the profile data.
6. Once the joystick is setup click Save and Close.

## Keyboard

You can assign up to 5 channels to keys on the keyboard.

1. Click on the Keyboard tab to reveal the keyboard setup.
2. Press any available key. The last key press will display a unique code corresponding to that key.
3. Press the “Set to Last” button next to one of the 5 available slots to map the key.
4. Set the channel drop down menu to map the key to an output channel.
5. Give the key a name in the text box to the left of the channel menu if you wish.

## **Mouse**

ServoCommander can also take advantage of mouse buttons and mouse position on the screen.

1. Click on the Mouse tab to reveal the mouse setup.
2. Clicking on the left and right mouse buttons will be displayed here as well as the mouse coordinates.
3. Assign these functions by selecting an available channel.

## eMagin Z800

Note: The following is not required if you choose to not use the z800 headset

1. Insert the z800 3DVisor Software Utility CD and install the eMagin support software. Plug the headset into an open USB port and test the headset motion sensor using the utility before moving forward.
2. Connect the desired video source to the composite video input on the AV Tool video converter. The composite to VGA converter is required to convert the video signal into the VGA signal that the z800 accepts.
3. Connect the VGA output of the AV Tool converter to the input VGA on the eMagin control box (this is the VGA port directly next to the microphone input.)
4. Connect the composite video output from your camera source to the composite input on the AV Tool converter.
5. Test the video feed on the headset before moving forward.

**Note:** The AV Tool converter needs to be setup to output a signal that the video goggles can display. If the goggles do not display an image make sure the led on the eMagin control box is green and the AV Tool converter is on. If you still only see a black image perform the following steps.

1. Press the menu button on the AV Tool
2. Go to Output Setup
3. Then Set to SGA
4. Also make sure that the input is set to C-Video

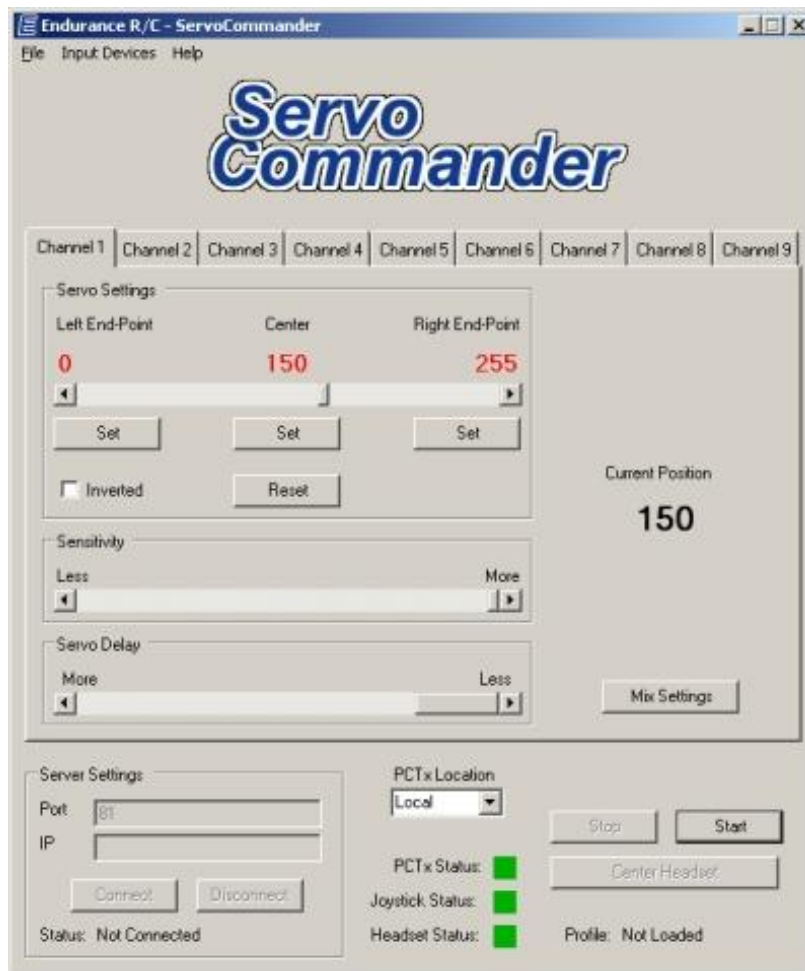
## Centering the Headset

Due to the nature of the head tracking sensors, drift in the center points will occur over time. In order to reset the system press the center button on the main screen. This will return the camera to the center position that you set during ServoCommander setup. When you release the buttons the center point of the headset will also be reset to its current position; look forward in a natural position while holding down the center button.

If you are using a joystick, the headset can also be centered by button presses. Under the Input device settings choose the desired button, press and hold. Wherever the green box appears, select "Center HMD" from the drop down menu to map the center function to the particular button.

## ServoCommander Setup

1. Place the ServoCommander CD in your PC and follow the setup instructions.
2. Double click the ServoCommander shortcut. If any errors occur while starting run setup again and be sure to install all supporting files and restart your computer.
3. Make sure all devices are powered on and connected before starting the software. Each device will appear with green boxes next to the name if the device is present. Red boxes will indicate the device is unavailable to the ServoCommander software. If the device is connected to the PC after the ServoCommander software has been started the application must be re-started in order to recognize the device.



*ServoCommander on startup*

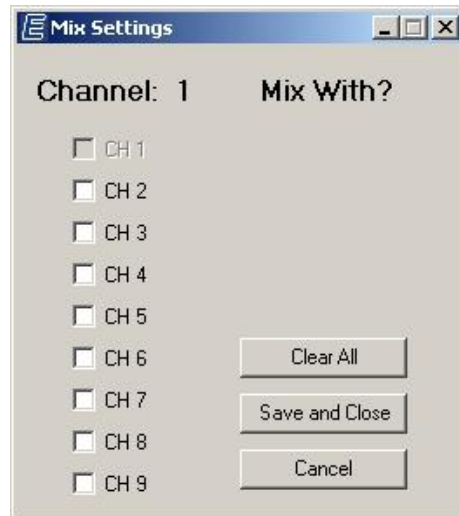
## End and Mid points

End-point and center point values that have not been set will appear in red. The mid points and end points for each channel must be set before communication to the transmitter or 25 Servo Controller will begin. Assigning these values is important in preventing a servo from moving past its maximum travel positions and in turn damaging the servo or the model as well as preventing an electronic speed control and motor from spinning faster than needed. The values can be set by pressing the set button corresponding to left, right, and middle positions. The text will change and appear black when set. All 9 channels must be set in order to start the communication with the model.

**Note:** To save setup time in the future you can save and load profiles by going to File -> Save. Saved settings can also be loaded from the File menu.

## Mixing and Multiple Channel Output

The ServoCommander software also allows the setting of multiple servo/ESC outputs for the same line of control. Servos/ESC's can also be set for rotation direction and delay independently to provide mixing features most commonly used in R/C planes and helicopters. Multiple channels can be set by clicking the Mix Settings button under each channel tab. The current channel will show up as disabled. Checking any of the 8 boxes will set the same line of control to the selected channel.



*Mix Settings*

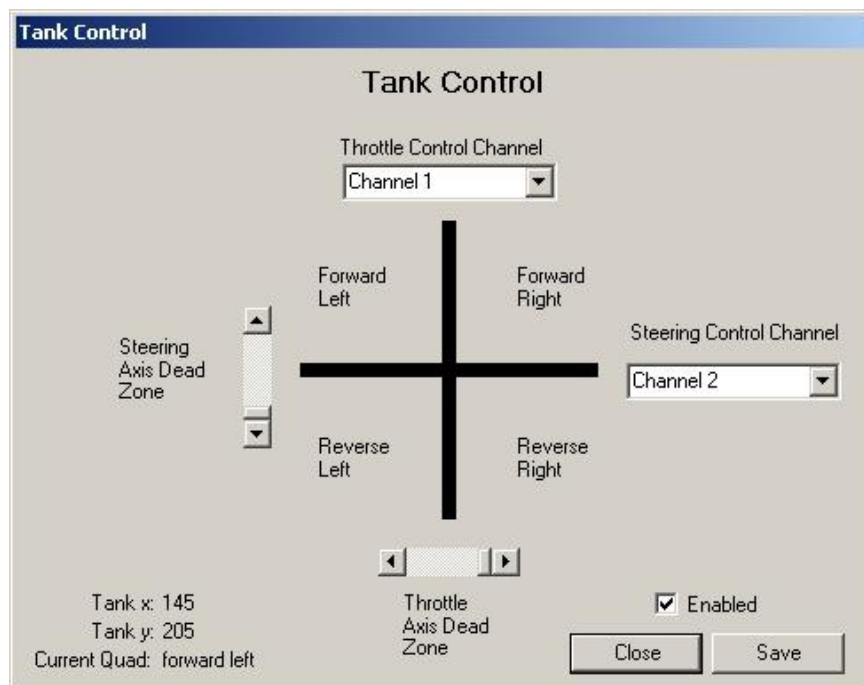
A mixed channel will retain the settings found in its tab on the main screen. Inverting, delay, and mid/end points will still be applied to that channel only. Using these settings the user can select the proper movement that is required for the particular use.

For example, to set aileron channels for an airplane, channels 1 and 2 should be mixed together. The channel that is mixed with the other does not matter just as long as the opposite settings are applied to each channel. If channel 1 was mixed with channel 2, channel 2's movement should be set as inverted while channel 1 is set to normal thus creating opposite servo movement for each wing.

## Tank Control

The Tank Control feature allows for one to setup a joystick to operate a robot or tank naturally. To setup Tank Control have a previously setup joystick or input device

1. Identify an axis control to be assigned to the throttle and steering controls. A joystick axis or mouse will work fine for this. Something like a button without a full range of control will not work correctly.
2. Open the Tank Control dialog from the Edit menu.
3. Assign the throttle and steering channels like in the screen shot below.



*ServoCommander Tank Control Settings*

4. Move the dead zone sliders if desired. The dead zone will create an area where joystick movement is disabled which allows the user greater control of the tank or robot.
5. Enable the Tank Control settings by checking the Enabled checkbox and saving the settings.
6. The dialog can be left open to view tank setting data while running or closed.

## **Profiles**

User profiles can be saved and loaded from the File menu. All user settings will be saved in this file to allow for quick loading in the future.

Multiple profiles complete with different model setting data and input device data can be saved and imported in seconds.

The file saved will include an .erc extension however the file is plain text and can be edited outside of ServoCommander with a text editor if desired.

## **Sensitivity**

Channel sensitivity should not be confused with channel delay. While channel delay will slow down the actual movement of the servo, the sensitivity setting will allow a joystick axis for example to be moved in a much further direction to achieve the same movement. Again, move the slider bar on the corresponding channel to set the sensitivity.

## **Inverting**

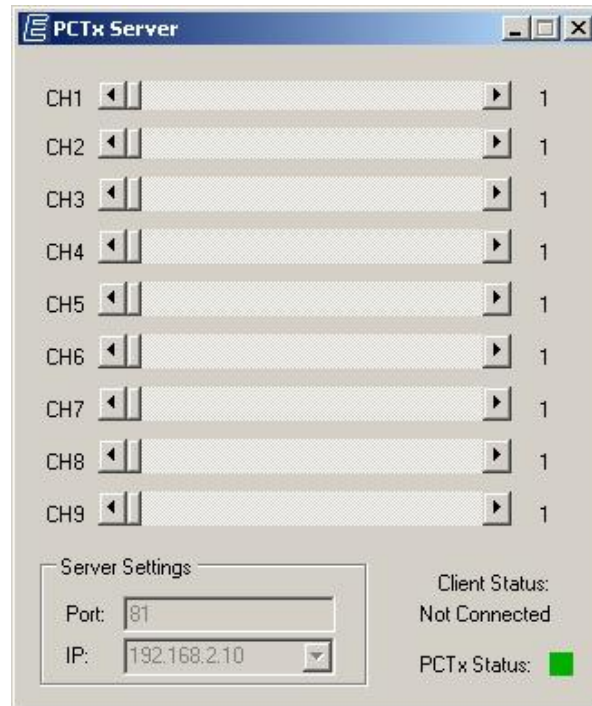
If the servo needs to be reversed you can set its direction by checking the “Invert” option on the corresponding channel tab. If the channel is set to a joystick or mouse button you will notice the servo change from one end-point to the other immediately after inverting. Axes, dials, sliders, mouse positions will reverse direction from the center point value. Inverting options can be set while ServoCommander is sending data to the transmitter or servo controller for on-the-fly adjustments.

## **Delay**

A delay effect can be set for each channel by moving the delay slider on each channel. This will allow servo motion to be slowed down or ESC throttle action to be delayed for such items as landing gear. Move the slider bar on the corresponding channel to set the delay.

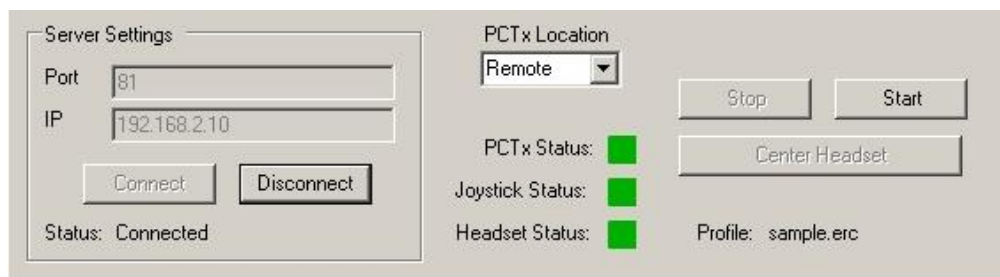
## Web Setup

1. The ServoCommander software allows data to be sent to a remote PC running the PCTx server software. A PCTx or 25 Servo Controller must be connected to the remote PC.



*PCTx server*

2. After the server has been started, start ServoCommander and load a saved profile or enter new end and mid point settings. For the PCTx location select "Remote" from the location combo box. Under the IP setting, enter the IP displayed on the server application and click connect. Click the start button to start sending data to the server.



## **Web Connection Errors**

If any error messages display or ServoCommander fails to connect to the server your remote PC may be behind a firewall. In this case disable the firewall on port 81 and repeat. If errors persist you be behind a router and need to enable port forwarding. See your router's instructions for details on how to enable port forwarding.

## **Running ServoCommander**

Once values are set or loaded click select the PCTx location and click Start. All mid and end point settings will be locked in while started. If a value is not set the software will not be allowed to start operation and an error message will display. Press stop to return to setup mode to adjust these values if necessary.