

Using the Sublight Settings Software (Early Access)

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1. Introduction

Sublight Settings is a software application used to configure Sublight Dynamics joysticks. It is currently available only for Windows computers, and currently used only with Sublight's Early Access 6DOF joysticks. (An early program version exists for use with Sublight's 2019 Test Units.) The program can configure a variety of settings, such as axis sensitivities and deadzones, axis order, and vibration motor options.

The most recent version of the program can be downloaded from the Resources tab of the Sublight Dynamics website, <https://sublightdynamics.com>.

1.1 Quick Start

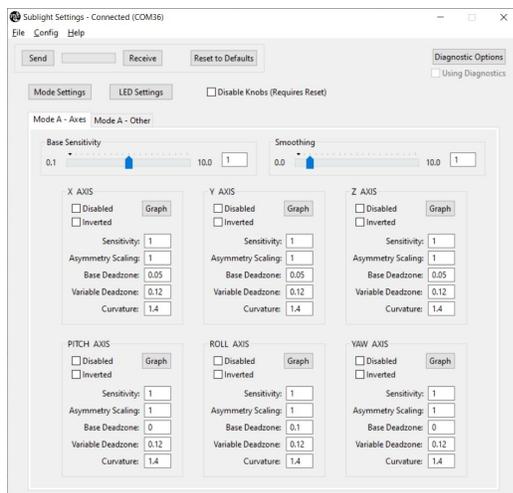
The most commonly-used setting is likely base sensitivity, which simultaneously changes how sensitive all axes are. (Explained in Section 9.1) Initially, users might also want to try vibration motors settings (Section 12). The vibration feedback motor can help beginners learn how much force is required to reach maximum signal output.

2. How the Settings are Stored

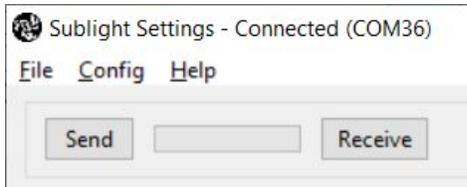
All settings for Sublight joysticks are stored and used locally, on the joystick itself. This means that the joystick's current settings configuration will remain if the joystick is disconnected from a computer or moved to a different computer, and will be used regardless of whether the Sublight Settings program is currently open.

3. How to Send and Receive Settings

Once opened, the main Sublight Settings program window will look similar to:



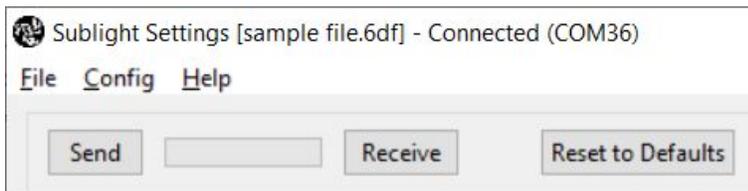
To send or receive settings, the Sublight joystick should be plugged in. Sublight Settings should automatically connect whenever the joystick is plugged in, and should show “Connected” in the main window title.



Once the joystick is connected, the Send and Receive buttons at the top of the main window will be enabled. Clicking “Send” will send the currently-open settings to the joystick. The three mode LEDs at the top of the joystick’s handle will briefly light up until the joystick has received all settings. New settings on the joystick are used immediately, and the joystick doesn’t need to be reset when the settings are changed. Clicking “Receive” will retrieve the joystick’s current settings, overwriting the settings configuration currently open in Sublight Settings.

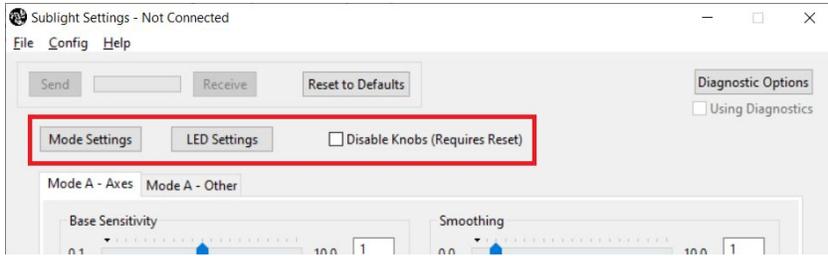
4. Saving Settings Files

Different settings configurations can be saved to the computer as .6df files. When Sublight Settings is started, it will automatically reopen the last file used. The currently-open file will be shown in the window title. To reset the displayed settings to the default settings that shipped with the joystick, use the “Reset to Defaults” button.

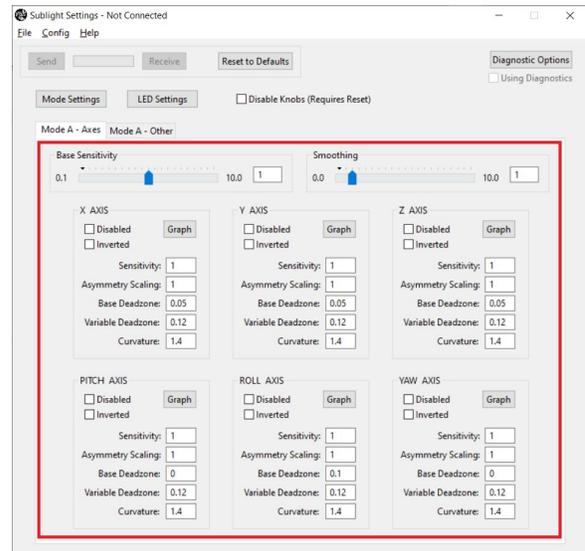


5. Settings Overview

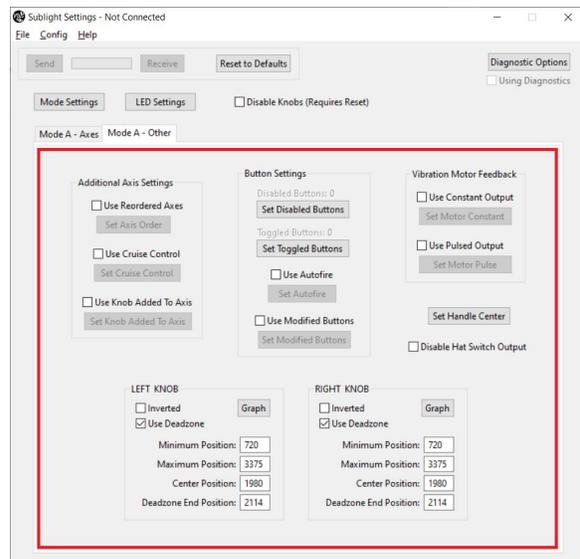
In general, all settings controls in the program have mouse-over tooltips, which provide information about how the setting works. For settings that are changed through dialog boxes, clicking the “Set/Close” button will set the new values, while clicking the “X” will close the dialog box without changing the applying the new settings. There are three main categories of Sublight joystick settings. The first is all-modes settings, which can’t change between modes. This is a small number of settings, whose controls are located above the tabbed area of the main settings window.



The second category is axis-tab settings, which set the shape of axis curves, and can be changed between modes.

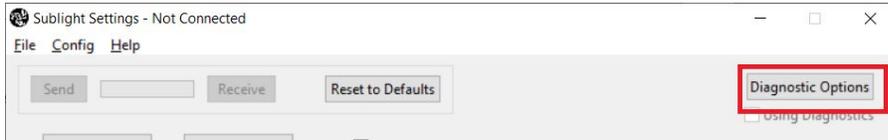


And the third category is other-tab settings, which are miscellaneous remaining settings, such as knob and motor settings, that can be changed between modes.

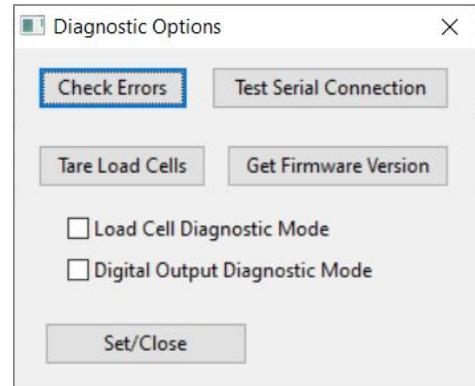


6. Diagnostic Options

A few additional options are located in the diagnostics dialog box, which can be reached by clicking the “Diagnostic Options” button in the upper-right corner.



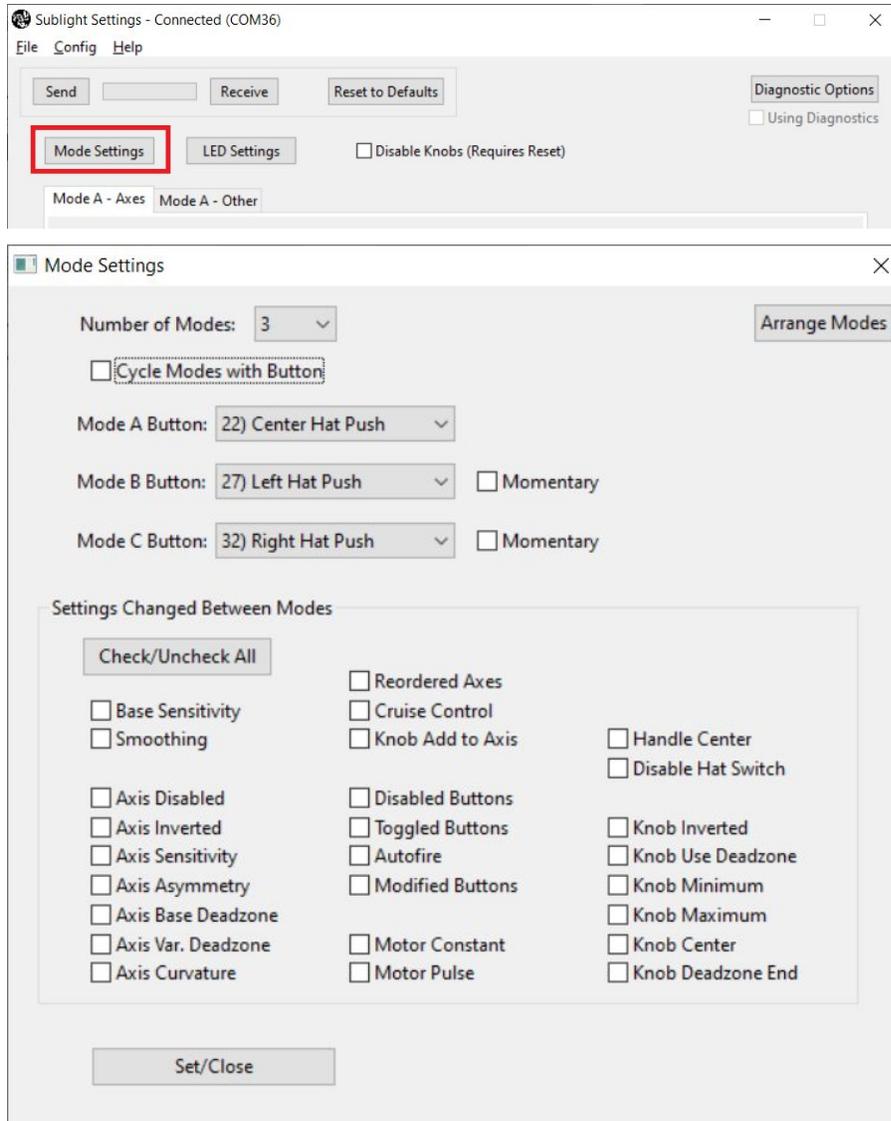
These settings are mainly intended for diagnosing any problems with the joystick. The Check Errors button will retrieve codes for any errors that the joystick has detected (such as broken connections between PCBs). The Load Cell Diagnostic Mode will cause the joystick to output raw force sensor signals to the eight analog axis outputs, one for each load cell, allowing for testing that all sensors are receiving proper signals. The Digital Output Diagnostic Mode causes the joystick to set its LED and motor outputs based on its knobs. Hopefully, none of these will be necessary. If any problems do occur, you can email us at support@sublightdynamics.com.



The diagnostics dialog box can also be used to tare the load cells (which also occurs whenever the joystick is powered on), which recalibrates all axes to zero, or to check the joystick’s firmware version.

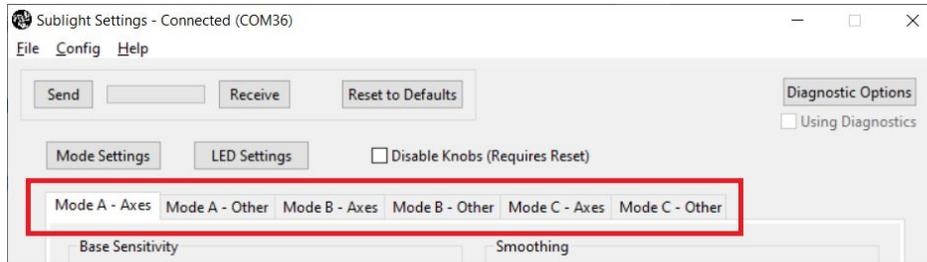
7. Settings Modes

In addition to changing settings by sending them from Sublight Settings, the joystick can also store separate sets of settings as mode profiles, which can be quickly switched by using joystick buttons, while the joystick is in use. The joystick can have up to three modes, and the currently-selected mode is indicated by the LEDs at the top of the joystick’s handle. Settings related to controlling the modes are set using the “Mode Settings” button in Sublight Settings, which opens the mode settings dialog box.



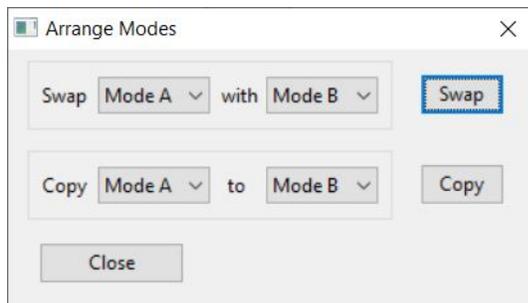
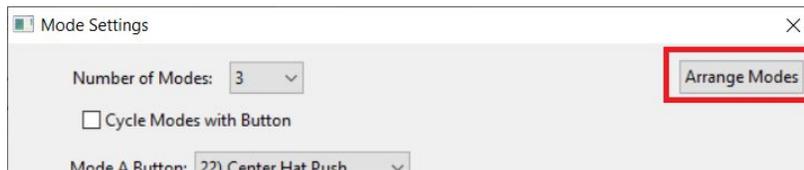
There are three different ways of switching between joystick modes. The first is to use a single cycle-modes button (selected with the “Cycle Modes with Button” checkbox). The second is to specify individual buttons which select each mode. And the third is to use momentary mode buttons, which will only stay in the selected mode for as long as the button is pressed.

Changing the number of modes will add additional tabs to the main Sublight Settings window, allowing individual settings to be changed between modes. By default, only one mode is used.



In order to change a setting between modes, that setting should be checked in the “Settings Changed Between Modes” section of the mode settings dialog box. Otherwise, the setting’s controls will be locked in the Modes B and C tabs, and the settings values in those modes will always be set equal to Mode A.

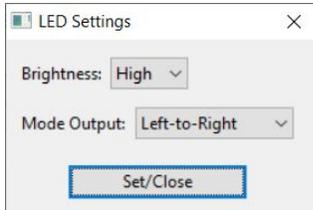
In order to switch two modes, or to copy one mode’s settings to another, the “Arrange Modes” button can be used, which opens a small arrange modes dialog box.



8. All-Modes Settings

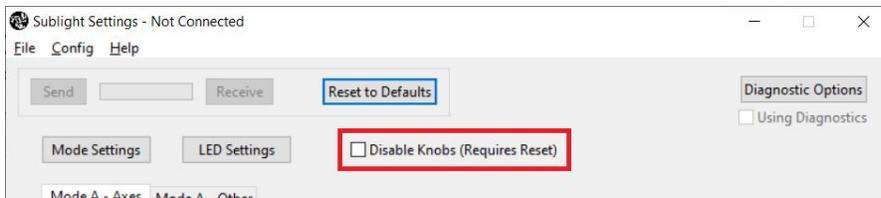
All-modes settings are the settings above the tabbed area of the main window that cannot be changed between different modes. These include the LED settings and the disable knobs setting.

8.1. LED Settings



The LED Settings button opens a dialog box with two settings that affect the mode LEDs at the top of the joystick's handle. The first setting is brightness, which can be changed from low to high. The second is mode output, which determines which LEDs are used, or whether to turn off the LEDs entirely. The "Left-to-Right" and "Symmetrical" options differ in how they display the current mode when the current number of modes is 1 or 2 (but act the same for 3 modes). The "Sym. with Cruise" option is the same as the "Symmetrical" option except that it uses the middle LED to indicate whether the joystick currently has cruise control mode activated. (An other-tab setting that is disabled by default)

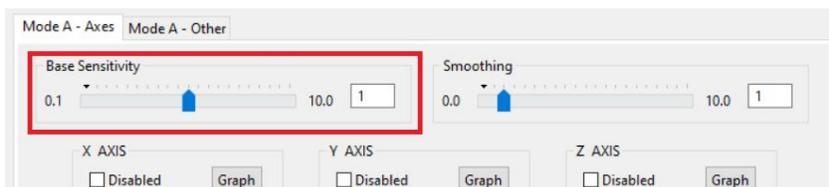
8.2. Disable Knobs



The disable knobs setting disables the joystick's knob axis output (or 7th and 8th axes, if using reordered axes), reducing its total output to six axes. This can be useful for simple games (like Descent with DXX Rebirth) which are incompatible with more than six axes of input. In order to disable the knob axes' output, the joystick must be restarted after sending this setting.

9. Axis Tab Settings

9.1. Base Sensitivity



The base sensitivity setting determines a sensitivity scaling factor that is applied to all axes. Higher values of base sensitivity make the stick more sensitive to input, requiring less input force in order to reach maximum output.

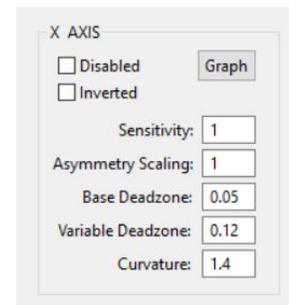
9.2. Smoothing

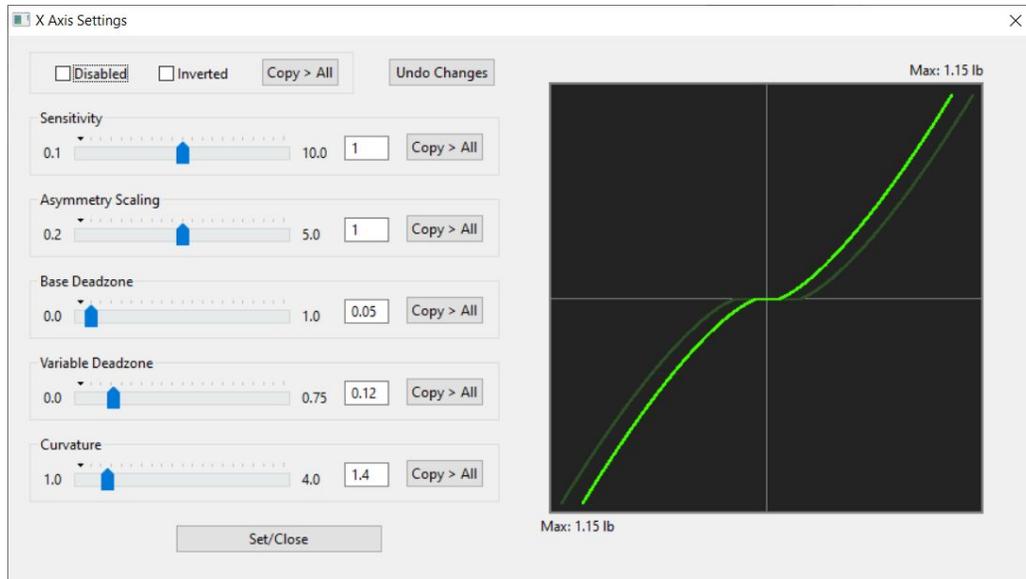


The smoothing setting is a gradual averaging that's applied to all axes. A value of 0 represents no smoothing. Higher values produce a more smooth axis output, but also cause a more delayed response.

9.3. Axis-Specific Settings

For each axis, additional settings can be changed that are unique to the axis. This can be done either through the text boxes in the main window, or by clicking the Graph button for the axis, opening the Graph dialog box, which gives more options and displays the input/output curve of the axis. The units of the force display on the graphs can be changed using the Config/Units option in the title bar of the main window.





9.3.1. Disabled

This checkbox setting disables an axis by setting its output to 0. An example use for this could be to make a mode where only some (or no) axes are outputting signals.

9.3.2. Inverted

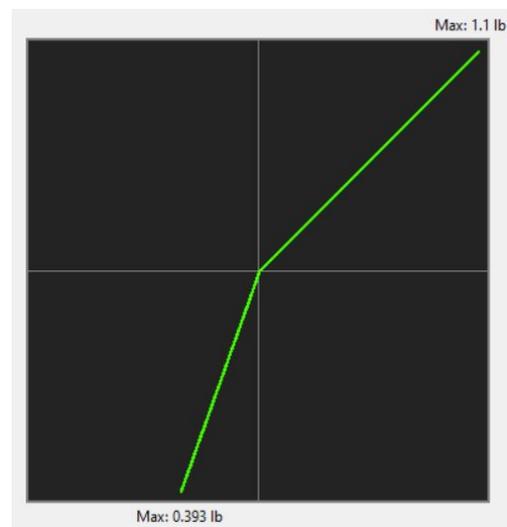
This checkbox inverts the direction of the output for an axis.

9.3.3. Sensitivity

The axis sensitivity setting determines an axis-specific sensitivity scaling factor that's applied to each axis, on top of the base sensitivity factor. A base sensitivity value of 2 and an axis sensitivity value of 3 will produce a combined axis sensitivity value of 6.

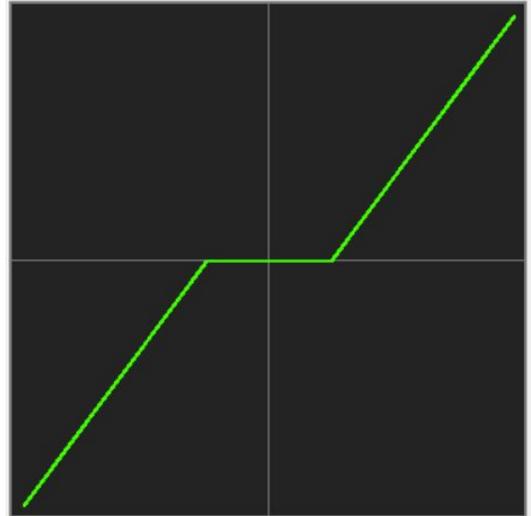
9.3.4. Asymmetry Scaling

The asymmetry scaling setting is a sensitivity scaling factor that is applied only to the negative side of an axis. (The left, back, down, pitch back, roll CCW, and yaw CCW directions) This can be used to, for example, make the downward direction of the Z axis less sensitive than the upward direction. A value of 1 scales both sides equally.



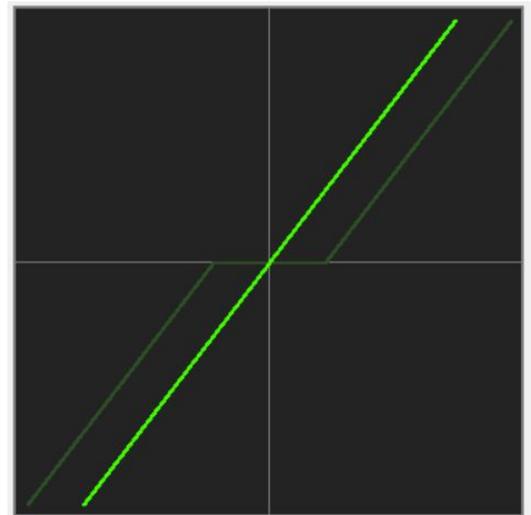
9.3.5. Base Deadzone

The base deadzone setting adds a simple deadzone to the axis, shifting its input-output curve away from the center point of the curve. A value of 0 applies no deadzone. Large deadzones can be useful when preventing accidental input is more important than precise small inputs.



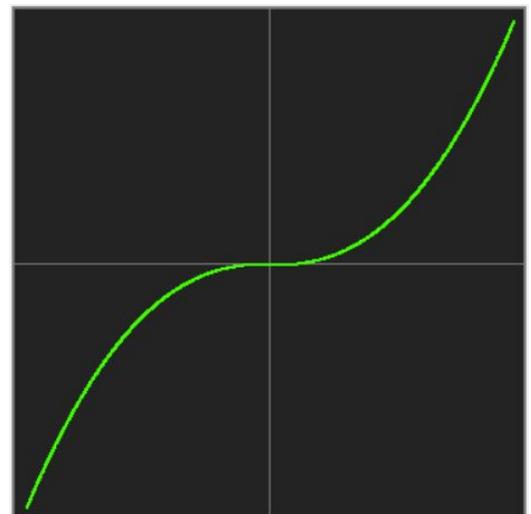
9.3.6. Variable Deadzone

The variable deadzone setting adds a deadzone which starts at 0 and scales up based on the size of the highest current axis value. The value represents the highest deadzone that will be applied, which occurs when any axis is at its highest output. This setting is generally subtle, but can be useful to prevent accidental output on one axis when applying a large input in another, making it easier to limit output to only a single axis. In the axis graph display, the curve with full variable deadzone applied is shown as a darker green curve, behind the regular bright-green axis curve.



9.3.7. Curvature

The curvature setting changes the shape of the input-output curve smoothly between a linear curve and an exponential curve. A value of 1 produces a linear output. This can be used to get more precise small outputs without changing the total input range of the axis.

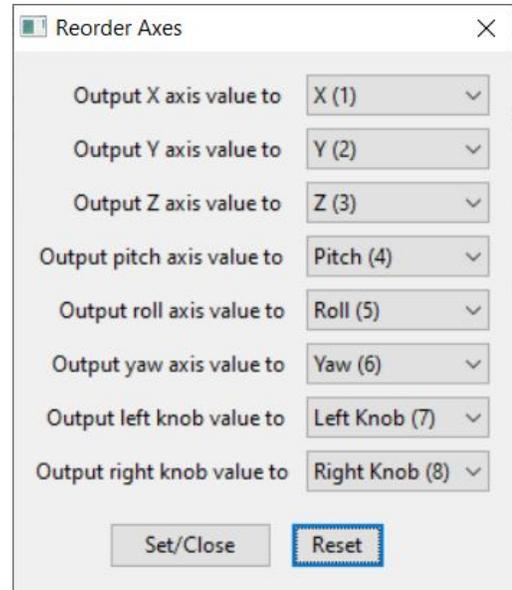


10. Addition Axis Settings

The remaining settings are located in the “Other” tab for each mode profile.

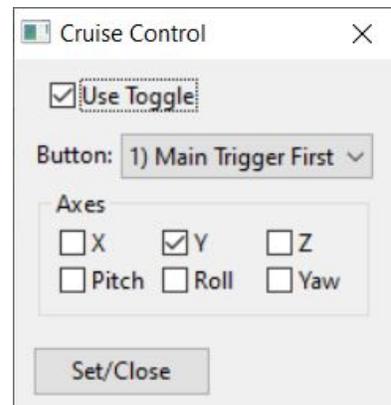
10.1. Reorder Axes

When this setting is enabled, clicking the Set Axis Order button will open a dialog box that allows for changing the order that the joystick outputs its axes. This can be useful for software that doesn't allow for selecting axes to use and that expects joystick axis output in an order that's different from the default. (For example, software that aims using the X/Y values, rather than the pitch/yaw values)



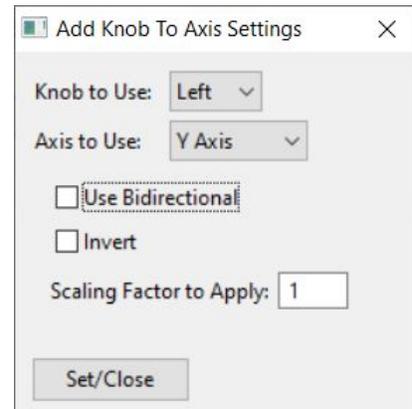
10.2. Cruise Control

When this setting is enabled, clicking the Set Cruise Control button opens a dialog box with cruise control settings. “Cruise control” means that the output for one or more axes can be temporarily locked at its current value by pressing a selected joystick button. This button can be used to toggle cruise control on/off, or as a momentary option (held down), depending on the “Use Toggle” checkbox. This setting can be useful when traveling in a single direction for long periods of time, where it might be tiresome and unnecessary to apply a constant force to the joystick.



10.3. Add Knob To Axis

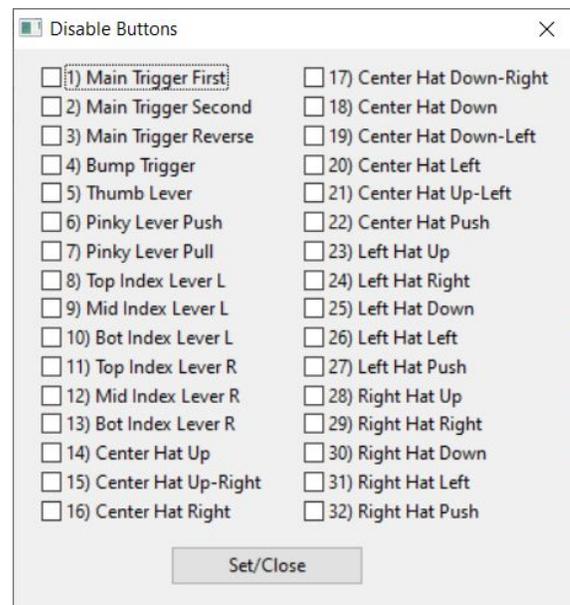
When this setting is enabled, clicking the Set Knob Added to Axis button opens a dialog box with knob-related settings. This setting will add the value of a selected knob to the value of a selected axis. This can be useful in situations similar to cruise control, where a constant output is usually needed, but also in situations where temporary deviations from this constant default speed, whether up or down, are needed. By default, this will add the knob value only in a single direction, across the entire range of the knob's motion. The "Use Bidirectional" checkbox adds the knob value relative to the knob's center position, allowing for both forward and reverse bias. The "Invert" checkbox changes the direction of the knob value added, and the "Scaling Factor" value multiplies the knob value before adding it to the chosen axis. Using this option does not disable the original knob axis. Both axes will be affected by the same knob.



11. Button Settings

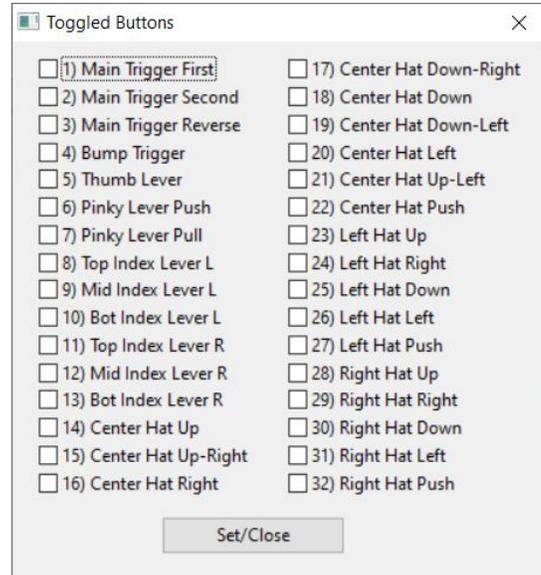
11.1. Disabled Buttons

The disabled buttons setting allows for selecting which joystick buttons will not give output. This could be useful where buttons might be used for other purposes, such as for mode selections or cruise control, and aren't needed for typical button output.



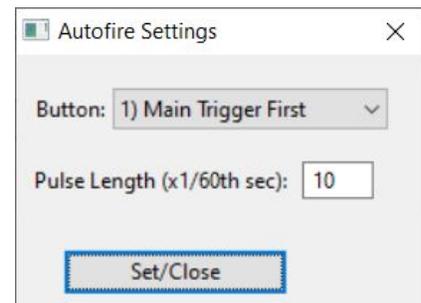
11.2. Toggled Buttons

The toggled buttons setting allows selected joystick buttons to be used in a toggle mode, switching their output on or off when pressed, rather than being on when held down. This allows buttons to be used as toggle switches, where holding down a button might be inconvenient.



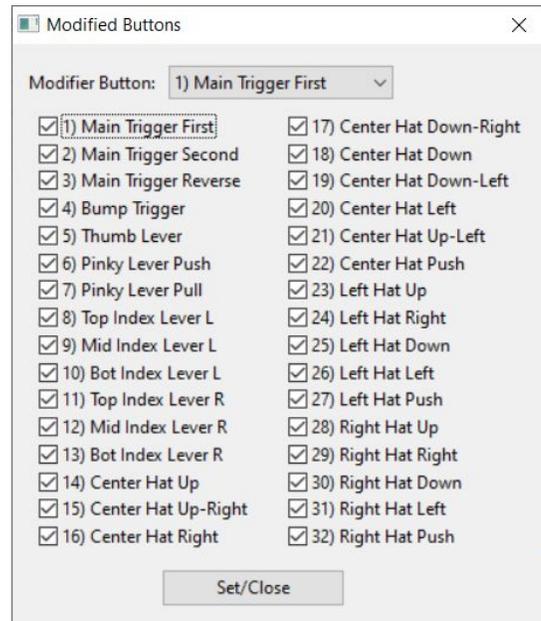
11.3. Autofire

When this setting is enabled, clicking the Set Autofire button opens the autofire dialog box. Autofire allows a single button's output to rapidly auto-click when held down, at a selected pulse length. If the pulse length is set to 60, the button will switch on once per second, when held down.



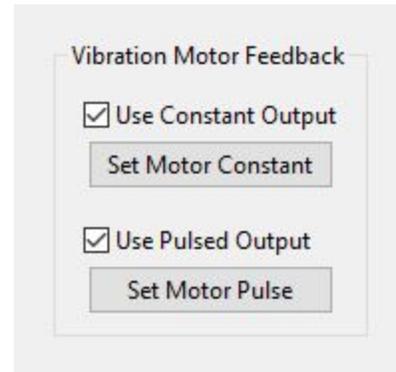
11.4. Modified Buttons

The modified buttons settings allows for using a shifted range of additional button outputs. Normally, the joystick's 32 buttons will output to the first 32 button outputs. When Use Modified Buttons is enabled, a single button can be selected which, when held down, will change a set of selected buttons to instead output in the higher 33-64 button range. This can be used to give two separate functions to a single button. (For example, by having the index levers output as buttons 8-13 normally, but output as buttons 40-45 when the thumb lever is held down)



12. Vibration Motor Settings

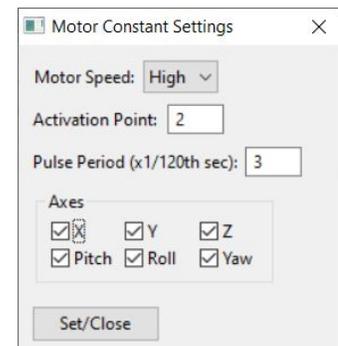
The vibration motor in the joystick's handle can provide pulsed or constant feedback, based on axis values. It is off by default. Beginners can check both these boxes to get vibration feedback for training. The default settings activate a "tap-like" pulse when any axis hits full output, and activate a constant vibration when any axis hits twice the force required for maximum output. This helps users learn the amount of force needed to operate the joystick with their preferred settings and reduces unnecessary fatigue caused by over-input.



Both the feel and activation points can be customized for each. Activation points are measured as a factor of the maximum input needed to produce maximum axis output. (So, 1.0 means activating when the axis reaches max output. Values can be larger than 1.0, to activate at higher forces.) Vibration motor output can be enabled either as a constant motor output, as a brief pulse, or as both together (using two different activation points).

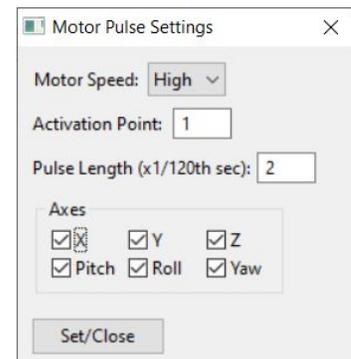
12.1. Motor Constant

The motor constant settings cause the motor to produce a constant output when the set activation point is surpassed on any of the selected axes. The base motor speed can be changed to high or low, and speed can also be changed by setting a pulse period (very rapidly toggling the motor on and off). High pulse periods might provide too little power to produce any noticeable motor output. A pulse period of 0 doesn't pulse the motor at all.



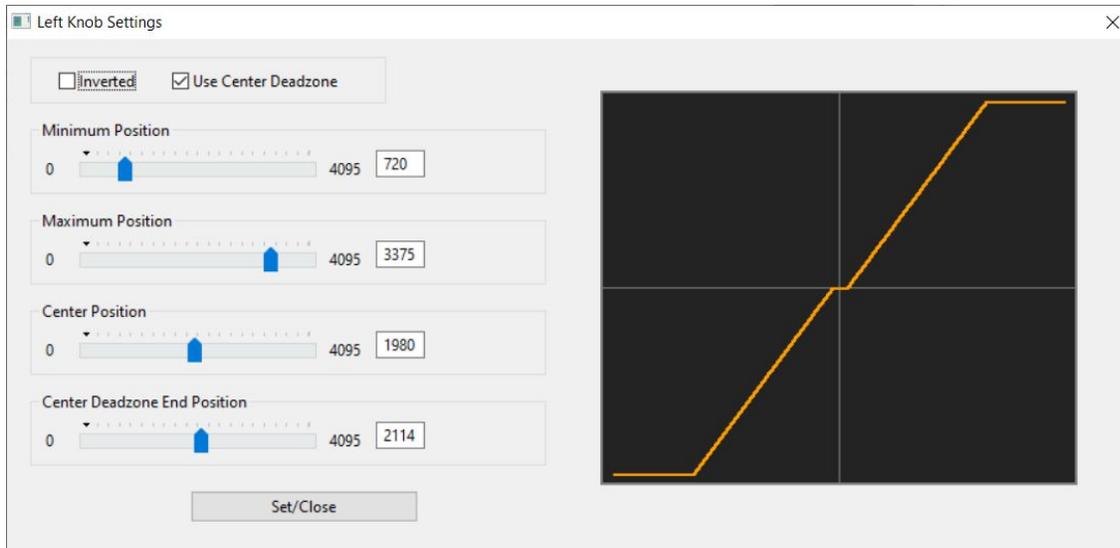
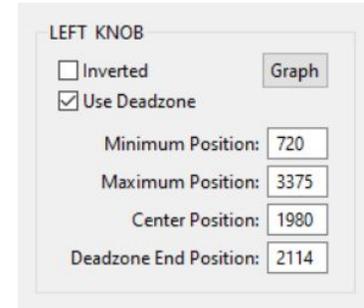
12.2. Motor Pulse

The motor pulse (or tap) setting causes the motor to produce only a single pulse of output when the set activation point is surpassed on any of the selected axes. The base motor speed can be changed to high or low, and the pulse length can be set in 1/120ths of a second.



13. Knob-Specific Settings

The knob axis settings, like the 6DOF axis settings, can be changed either using text boxes in the main window or by clicking the Graph button, opening a Graph dialog box, which gives more options and displays the input/output curve of the knob.



13.1. Inverted

This checkbox setting inverts the output of the knob.

13.2. Minimum / Maximum

These settings change the positions at which the knob produces its minimum and maximum outputs. The knob sensors don't mechanically reach the full range of their outputs, so these values are typically around 700 and 3400, respectively, but can be changed in order to narrow or shift the range of values used.

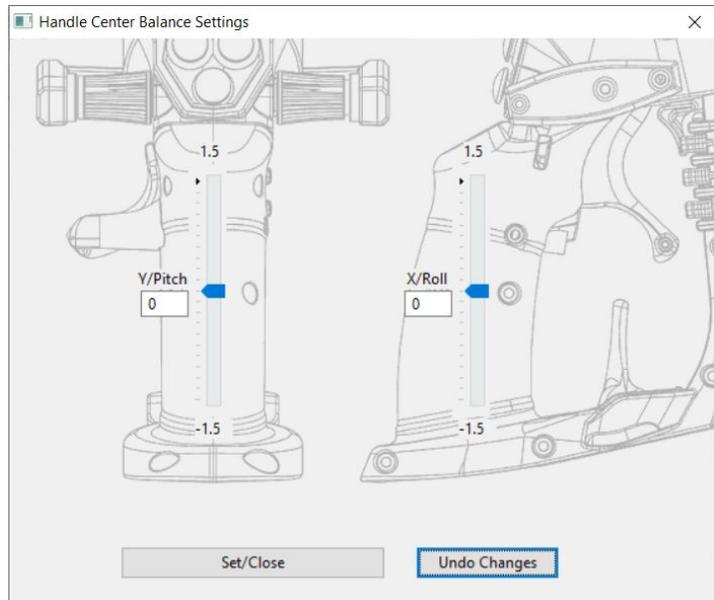
13.3. Center / Deadzone

The center position of a knob can be changed, scaling the sides of the knob output curve accordingly. This can be useful if, for example, the knob's mechanical detente isn't exactly centered, or to scale the upper and lower halves of the knob curve differently.

When the Use Deadzone checkbox is checked, a deadzone at the center of the knob's output is used. It's size and position can be changed using the deadzone start (center) and deadzone end values.

14. Handle Center Balance

The Set Handle Center button opens a dialog box that allows for changing the calculated balance point of the joystick's handle for the pitch/Y and roll/X axes. This changes the point on the handle at which pressing in forward/backward produces Y axis output without pitch output, and the point at which pressing left/right produces X axis output without roll output. This exact position can vary slightly based on natural grip position or hand size, and can be changed if pushing in only the X or Y directions produces unintentional roll or pitch output.



15. Disable Hat Switch Output

The Disable Hat Switch Output setting can prevent the joystick's 8-way hat switch from outputting to software as a hat switch. (But doesn't prevent the hat switch from outputting as button outputs 14-22.)

