WARNING!

BEFORE MAKING ANY CHANGES TO YOUR SETUP PLEASE MAKE SURE THAT YOUR DRIVE WHEEL IS OFF THE GROUND TO PREVENT A RUN AWAY SITUATION!

The Fine Print HA! I can see you squinting
No warranties are expressed or implied, you are testing a Beta product and accept all responsibility. Precautions have been taken in the design to detect and prevent faults, but that does not mean every failure mode has been discovered yet.

Now on to the fun stuff...
Firstly, thank you for being a Beta Tester of my throttle interface.

The purpose of this device is to be installed between your throttle and the controller. It wil allow you to set the start / end voltage of your throttle and also adjust the curve and ramp rate of the throttle voltage. This allows for much smoother starts and better overall throttle control, especially on higher powered setups. I would appreciate your feedback and an open discussion on the www.endless-sphere.com forum in this thread http://endless-sphere.com/forums/viewtopic.php?f=2&t=32599

The throttle interface comes to you mostly assembled, you will need to add your own throttle connectors. I have left these open to the end users since many people use different styles of connectors. You will need to install a single conneciton for your throttle input and at least one connector which will go to your controllers throttle input. There is an optional second controller output which may be used for monitoring and possibly connecting to a second controller. I have not tested this yet so please use caution if you want to try this. I / you need to verify that connecting two controllers throttle inputs to the interface does not cause any harm to the controllers.

You will also need to insulate the controller from any shorts since it is an exposed PCB. I personally used a piece of cardboard cut to shape and held on with masking tape while testing.

Safety Features:

If you connect the throttle interface to your controller, but do not have a throttle connected, it will output 0.00V and will latch to this voltage. That means even if you connect a throttle to the controller and try to move it, it will still be stuck at 0.00V because it has detected a fault. You may clear this fault in one of two ways. Pressing the red button on the interface to reset it, or cycling the power to the interface. If you choose to cycle power to the interface, you may have to wait for the capacitors to discharge in the controller before it will work properly again.

If the ground wire on the throttle becomes disconnected, the interface output will latch to 0.00V because the throttles signal wire goes higher than the allowed input. This voltage is around 17% higher than the maximum voltage read on the throttle input. If the hall throttle input range is 0.86V – 2.73V (typical of 4.25V supply voltage from the throttle connector of the controller) when hooked to the interface, any voltage over 3.20V on the input will trigger a fault causing the output to latch to 0.00V. This is used to detect a fault condition of the ground wire being disconnected from the throttle interface from the throttle. If the positive wire from from the throttle were to short to the throttle signal wire, it too will cause an over voltage condition causing the output to latch to 0.00V. To protect any wiring from the controller to the throttle interface, it would be wise to enable the "Bar Protect" feature which provides the same kinds of fault detection.

Output range of the interface is from 0.00V to 0.5V less than the supply voltage to the interface. For Xie Chang controllers this limits the maximum output to 3.75V with a supply of 4.25V.

In summary, the following conditions trigger a fault on the throttle interface which require a reset:

- Ground wire from the throttle to the interface.
- Positive wire contacting the the signal wire.
- No throttle connected to the input.
- any voltage on the input line exceeding 17% of the maximum throttle voltage.

SETTING UP YOUR INTERFACE

Setup Steps:
The following steps will be performed with the 4 25 turn adjustment potentiometers labled MinV, Delay, Buffer and MaxV. They do not have stops at their ends and you can continue to turn them. They only way to know when you have reached the maximum or minimum setting is to feel/listen for a very faint click or measure the voltage on the middle pin. It should be between 0 and 4.3V.

Potentiometer Settings
MinV – Sets the minimum output voltage – Clockwise increases voltage
Delay – Sets the acceleration rate – Clockwise increases acceleration rate
Buffer – Sets the amount of throttle filtering – Clockwise increases buffering
MaxV – Sets the maximum output voltage – Clockwise increases voltage

Step 1 - Setup your bike so the powered wheel is off the ground, then without the throttle interface installed, record your maximum unloaded speed if you haev a Cycle analyst or other speedometer. Once you have this information, power down your bike (unplug the battery) and install the throttle interface. VeLNL = 60.2 mph

Step 2 - Adjust the MinV potentiometer
MinV: It is set on the bike with the powered wheel off the ground. It is adjusted with the bike in high power mode if you have a 3 speed switch until the rear wheel just barely turns with no throttle input, then you back it off the setting to make the voltage low enough to prevent the wheel from moving at all when not on the throttle.

Step 3 – Adjust the MaxV potentiometer
MaxV: Sets the maximum voltage the interface will output. It sets a scaling factor for the throttle input. It is adjusted on the bike with powered wheel off the ground. Before setting this you should check your maximum unloaded wheel speed for best results. Once you know what that is, you pin the throttle wide open and adjust the voltage to give you maximum wheel speed and then turn it just slightly higher to account for any variations.

Notes about adjusting the Delay and Buffer settings. These two settings Delay and Buffer are interlinked to each other and effect the throttle response curve to allow you to tune the throttle for your bikes unique characteristics. This is not a one size fits all setup and being able to tune these settings is important so you may taylor the curve to your own bike and riding style. A high powered motor in a 20" tire being fed 6-15kW rides nothing like a more common smaller motor in a 26" wheel fed 4kW, but both can be compensated for with this through trial and error tuning. Yes, you will need to do trial and error adjustments to get it just right for your setup, but all you need is a small flat head screwdriver, no hammers allowed!

Step 4 – Adjust the Delay setting
Delay: Well, the label is kind of incorrect for this one because I changed things, it is more appropriately called the throttle acceleration setting. This sets how fast the throttle will adjust based on how quickly you turn the throttle to it's next position. Very slowly twisting the throttle = very slow throttle ramp rate and can be set to allow you to walk next to a 10KW bike with 20" tires and

manipulate the throttle. Quickly twisting the throttle = fast throttle ramp rate and or optional catapult mode depending on how powerful your setup is (just like without the interface). This setting is one of the most important to get right, you must find the right zone. Too low and it feels laggy, too high and the throttle is too touchy. Once you feel you are close to the correct area, start making changes in 1/4 turn increments.

Step 5 – Adjusting the Buffer setting

Buffer: This setting adjust the amount of throttle filtering through averaging. It is settable from 1 to 32. At the setting of 1 there is no averaging occurring on the throttle and it is 1:1. At max setting of 32 the throttle is averaged over 32 samples. This allows you to choose a setting that matches your bike, riding style and terrain. At higher setting it will filter out throttle jitter created by riding on rough terrain to help you maintain speed even with the throttle position changing rapidly. The setting you choose will vary greatly on your motor/wheel setup. My 9C 2808 in a 26" tire at 4KW does not need a lot of filtering compared to my Greyborg Cromotor in a 20" tire which requires filter setting around the middle to eliminate any throttle surges in normal riding. When setup properly you can wiggle the throttle and your speed will not change unless you actually hold the new position.

For EB3XX controllers the starting point for MinV is around 1.40 volts and the MaxV is around 3.40 volts.
For EB2XX controllers should be similar.

On the controller settings this will correspond to the following potentiometer voltages when measured on the middle pin.

MinV = 1.85V
MaxV = 2.64V

For my 20" tire 6kW 100V Greyborg Cromotor I have the following potentiometer voltages set for Buffer and Delay.

Delay = 0.65V
Buffer = 1.43V

Hopefully these will give you some ball park figures to start with for your own bike.

Anyone who has experimented with throttle ramp rates has learned that they create a lag. This is why I provide both of these parameters. It allows you almost eliminate lag with proper settings and by relearning throttle control movements, you can go completely off power for a few seconds to coast, then bring the throttle quickly back and very close to it's original position and the power will come on smoothly alloing you to continue along without that surge/jerk you normally get from a stock controller.

Regards,

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