

SPM SOFTWARE

Alltrax Tool-Kit

The SPM software provides the user easy access to many settings including throttles, throttle type, curves, and performance characteristics. This SOFTWARE communications "Tool-Kit" is used between Windows-XP® (SP2 or newer) through Win-7®, 32 or 64 bit computers for Alltrax SPM-SPB motor controllers.



Document based on Software Rev P1.4.4 or newer.

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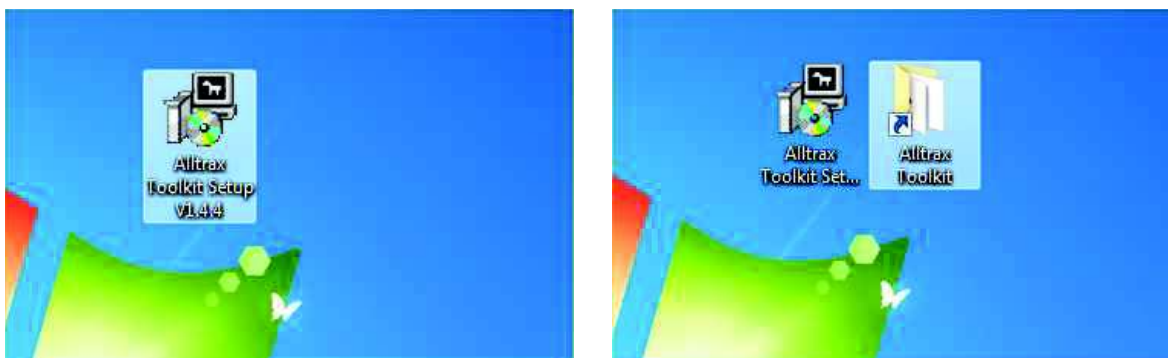
Document: Doc113-002-A_Op-Man Alltrax Tool-Kit, Version A, EC release EC-063011

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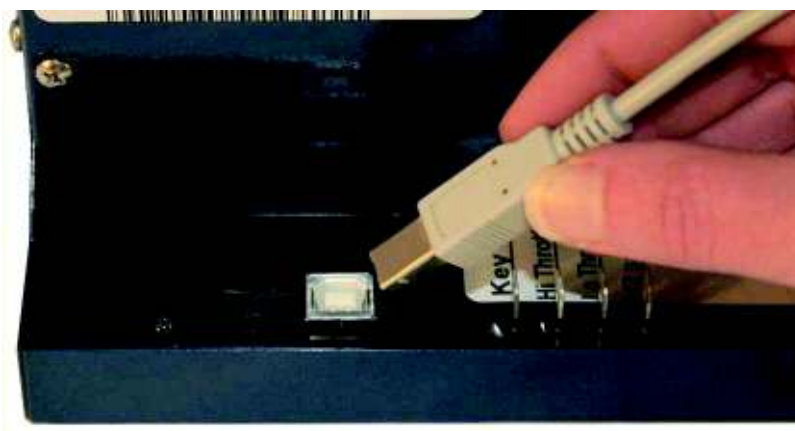
TABLE OF CONTENETS AT THE END OF THIS MANUAL

Before starting, it is recommended that you install this software only on Windows®-XP or NEWER machines. It is HIGHLY recommended to use Windows update to ensure your drivers and software frameworks are current.

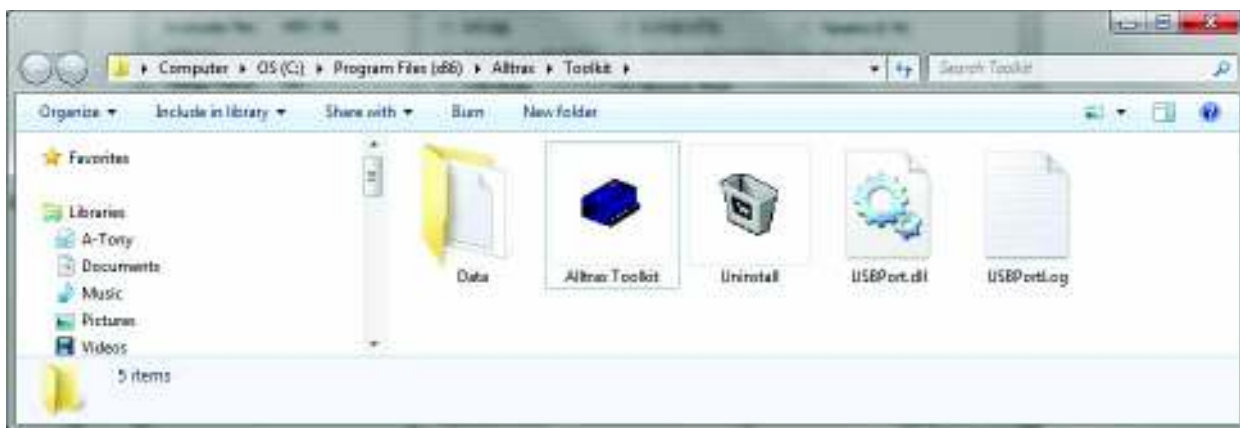
1. Install the software onto your desktop, double click the ICON and Tool-Kit will install onto your computer (Win-7® shown below). The Tool-Kit may automatically install "Dot.Net Framework" if needed.
2. A folder will be created for the Tool-Kit software folders with a shortcut on your desk top.



3. Connect the USB cable to the computers USB port and to the controllers USB port (SPM controllers are USB 1.1 or USB 2.0 compatible).



4. Click on the Alltrax Toolkit folder and open Alltrax Tool-Kit ICON



1. Alltrax Toolkit – Navigating The Main Screen:

Tool-Kit provides the user-basic settings to configure the controller for various vehicles, throttle types, and allows for adjusting how the controller performs.

CONTROLLER INFO
When connected to the USB – displays unit information

Alltrax Tool-Kit Software Version

TABS:
SETTINGS TAB: throttle type, detect levels, safety
THROTTLE TAB: adjustment and reaction
MONITOR: Record real time events

SETTING FUNCTION:
Instructs controller to load memory (set) or load and save files

Status Window

Settings and changes occur "real time" – changes are programmed automatically.

2. Software Screens – Throttle Settings:

1. Throttle Settings buttons:

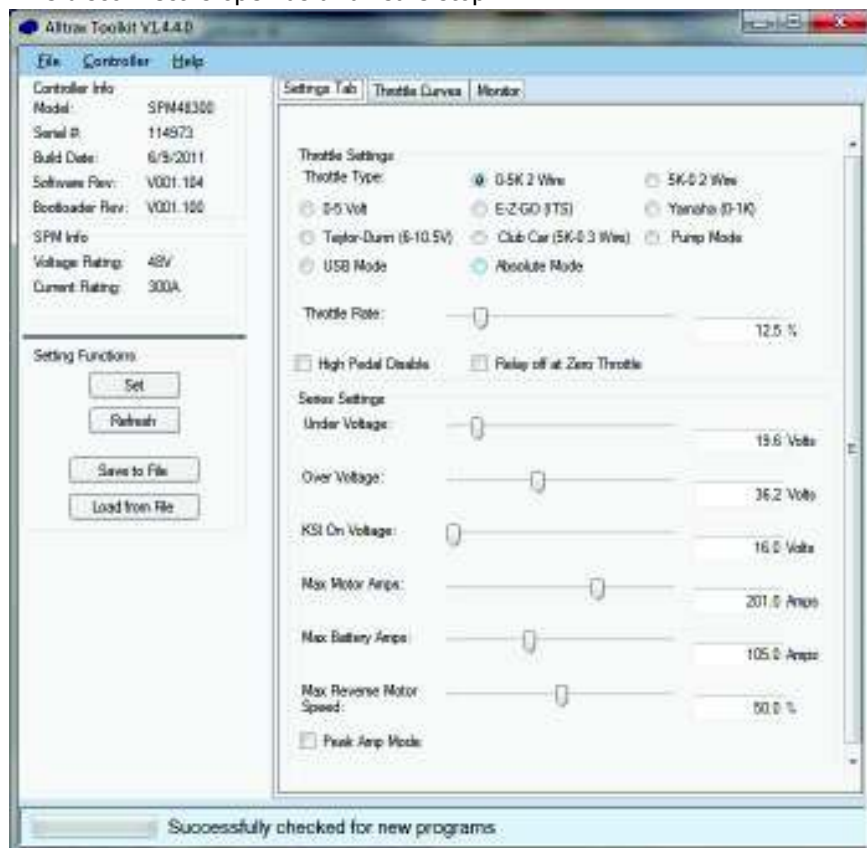
- The proper throttle type selected based on your vehicle and throttle output. (The Absolute and USB throttles will be explained in future released versions of the Tool-Kit manual).
- Pump Mode throttle is basically a on/off switch input that; when selected will ramp up to 100% output to control hydraulic or pressure pumps in a constant current to 100%. This prevents high current surges or shearing shaft loaded keyways. (Used in industrial applications)

2. Throttle rate – changes the rate of response of the OUTPUT voltage and current based on throttle INPUT. (e.g. How quickly the output ramps up compared to the input throttle change).

- A setting of 10-12% is "normal" for most applications requiring smooth operation. 20-30% for most racing applications. The setting does not increase power, however, it changes how fast the output ramps up.
- A very fast setting can cause excess power dumped into the motor for the first few seconds without any real gain in traction or increase in take off speed. This results in wasted power and hard on the motor and motor brushes. If adding 10% did not increase performance, then set it back to the previous level.

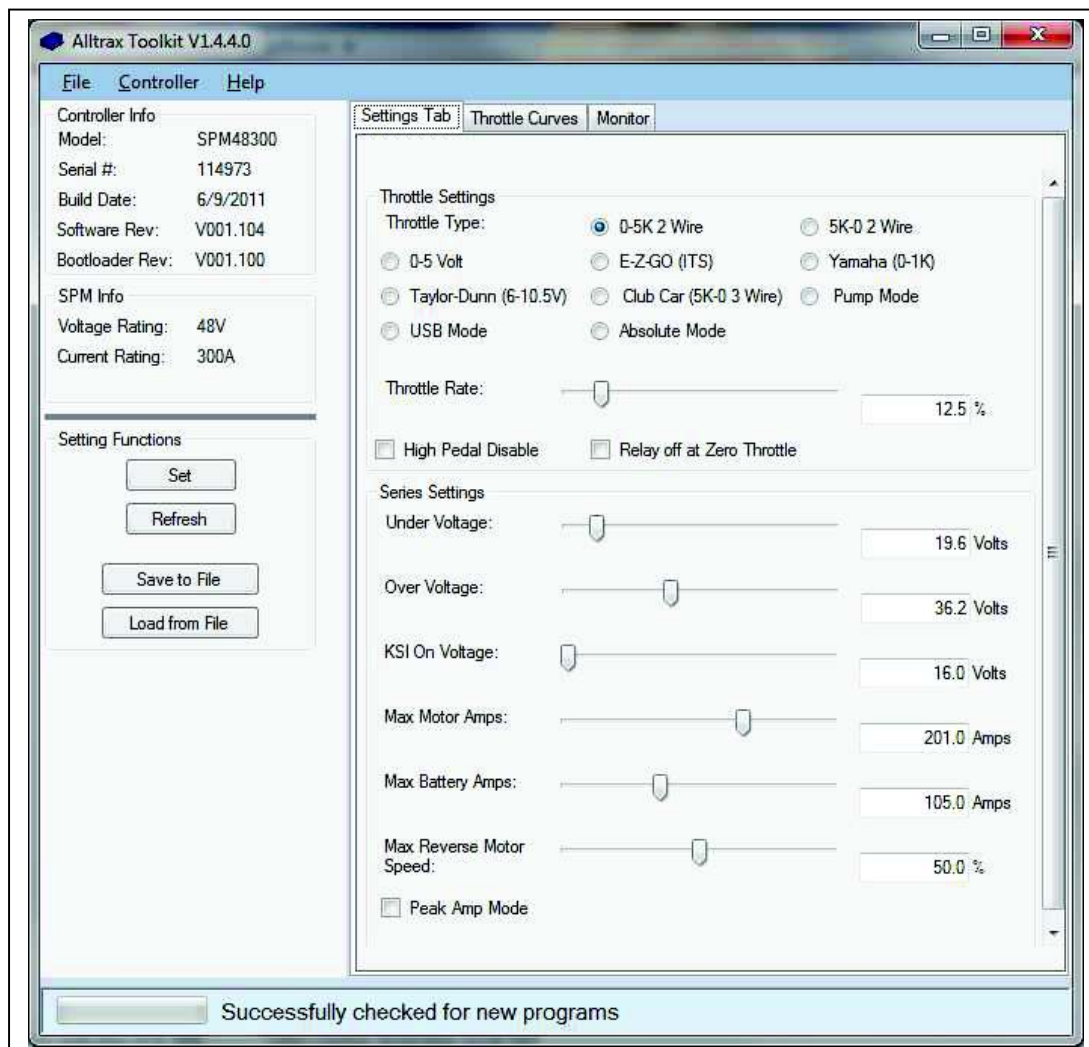
3. HPD is the High Pedal Disable that when the controller is powered up with throttle input, the SPM will not energize the motor until the throttle is reset. This provides protection that a vehicle will not take off when key is turned on with some throttle input. If the throttle is At 100% when power is applied, the controller will expect the throttle to be reduced, then increased to apply power to the motor.

4. RELAY OFF AT ZERO THROTTLE is a safety feature that when throttle is at Zero Position, the SPM will disengage the main DC solenoid. Should a short circuit in the motor, or controller, or throttle is at Zero, the main DC disconnect is open as a fail safe stop.



3. Software Screens – Series Settings:

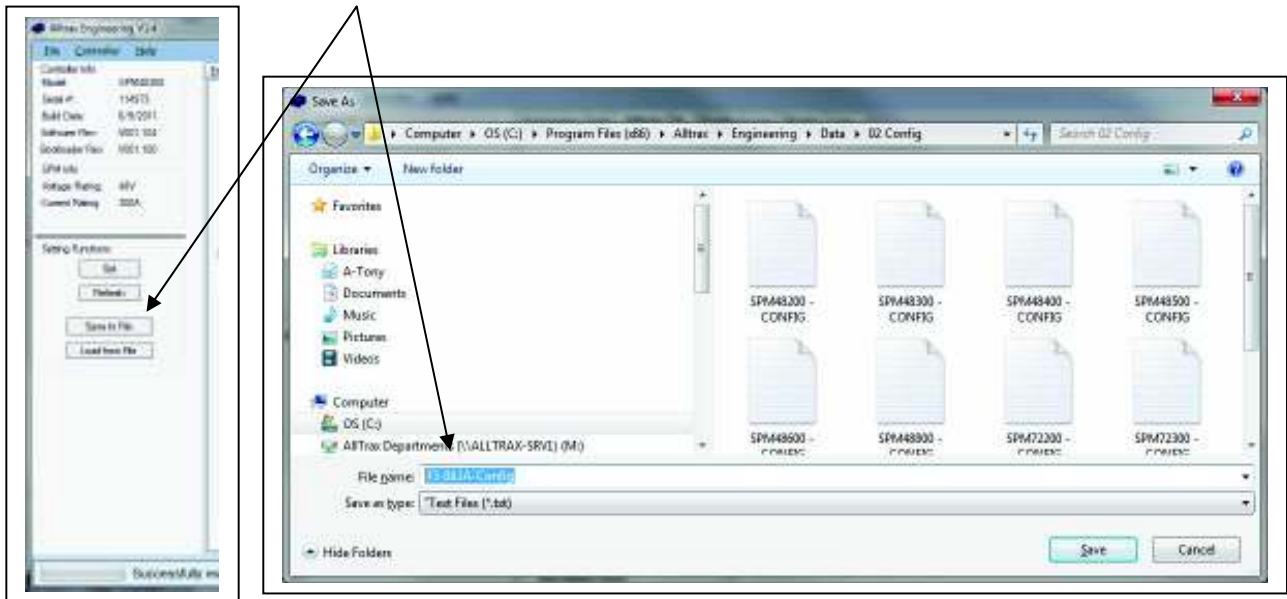
1. Under Voltage: The point the controller will not consume power below the battery low voltage set point. This is set to the battery manufacturer's recommendation.
2. Over Voltage: Used mainly with regen type vehicles, prevents overcharge during hard regen with full batteries.
3. KSI ON-Voltage: Sets the turn on point where the power stage will be off below this voltage and on above this setting.
 - a. **NOTE: The KSI must always be set BELOW the UNDER VOLTAGE voltage.** Otherwise if KSI is set above the under voltage – the SPM will shutdown before low voltage limiting can occur.
4. MAX Motor Amps limits the maximum amount of current which affects torque. This value can be higher than max battery amps when the battery is the limiting factor.
5. MAX Battery Amps AMPS limits the maximum battery current drawn from the battery pack under any driving conditions.
6. Max Reverse Motor Speed reduces reverse speed in relation to forward speed. This prevents dangerous speeds in reverse.
7. Peak Amp Mode. Adds 15% peak current to the motor if the temperature is below 55°C (131°F) lasting up to 2 seconds peak current used in performance applications.



4. Loading and Saving Configuration Files:

Once a configuration is programmed on the SETTINGS tab, these settings can be saved to the hard drive for future use. In this example the SETTINGS are saved:

1. Press the SAVE TO FILE button
2. Provide a file name with CONFIG at the file end – please keep in the SAME directory.

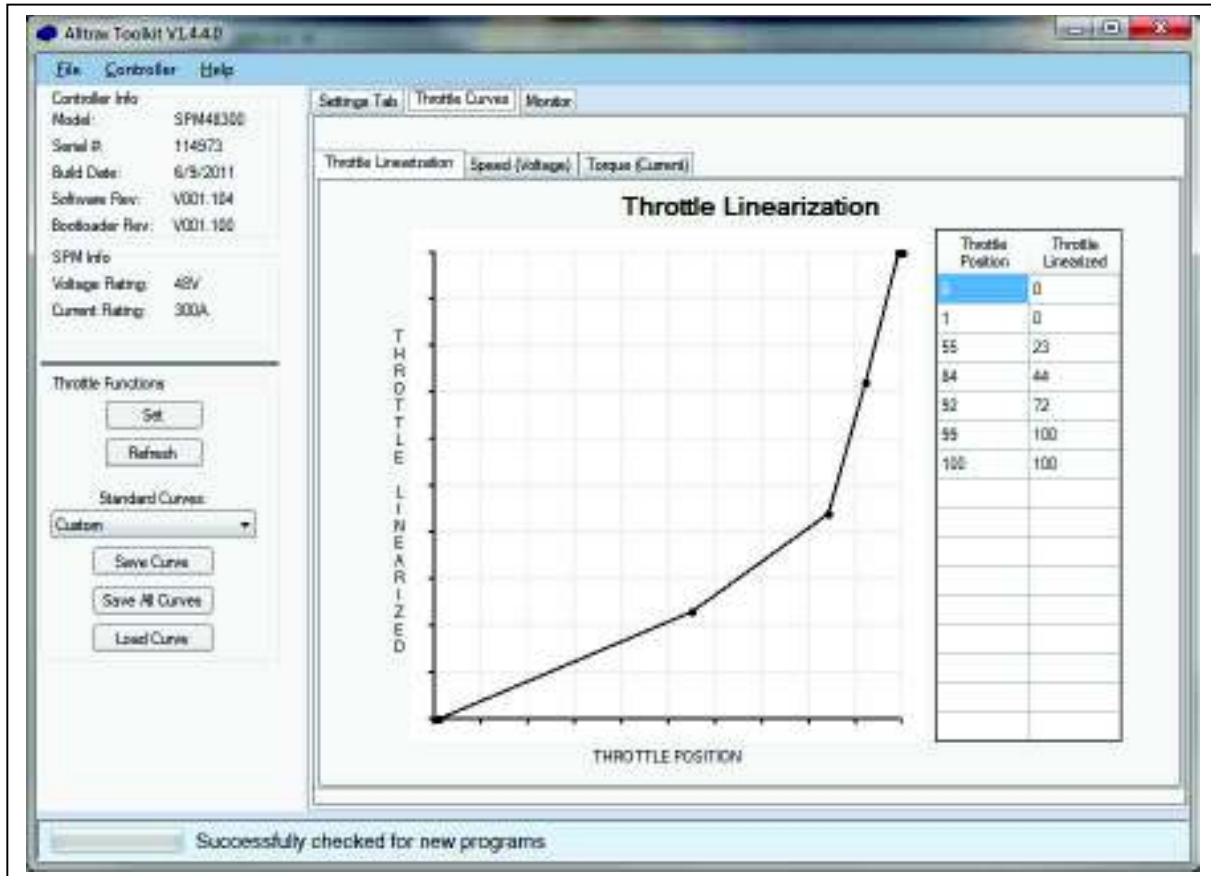


If using a new unit, you can reload this FILE by pushing the LOAD FROM FILE button and select the file. The new configuration settings be saved to a file and re-loaded into other units.

5. Throttle Curves:

1. Throttle Curves:

1. Throttle Linearization - smoothes out throttle curve issues
2. Speed (Voltage) - Affects the voltage curve of the output
3. Torque (Current) - Affects the current curve of the output



A brief discussion what these controls really do:

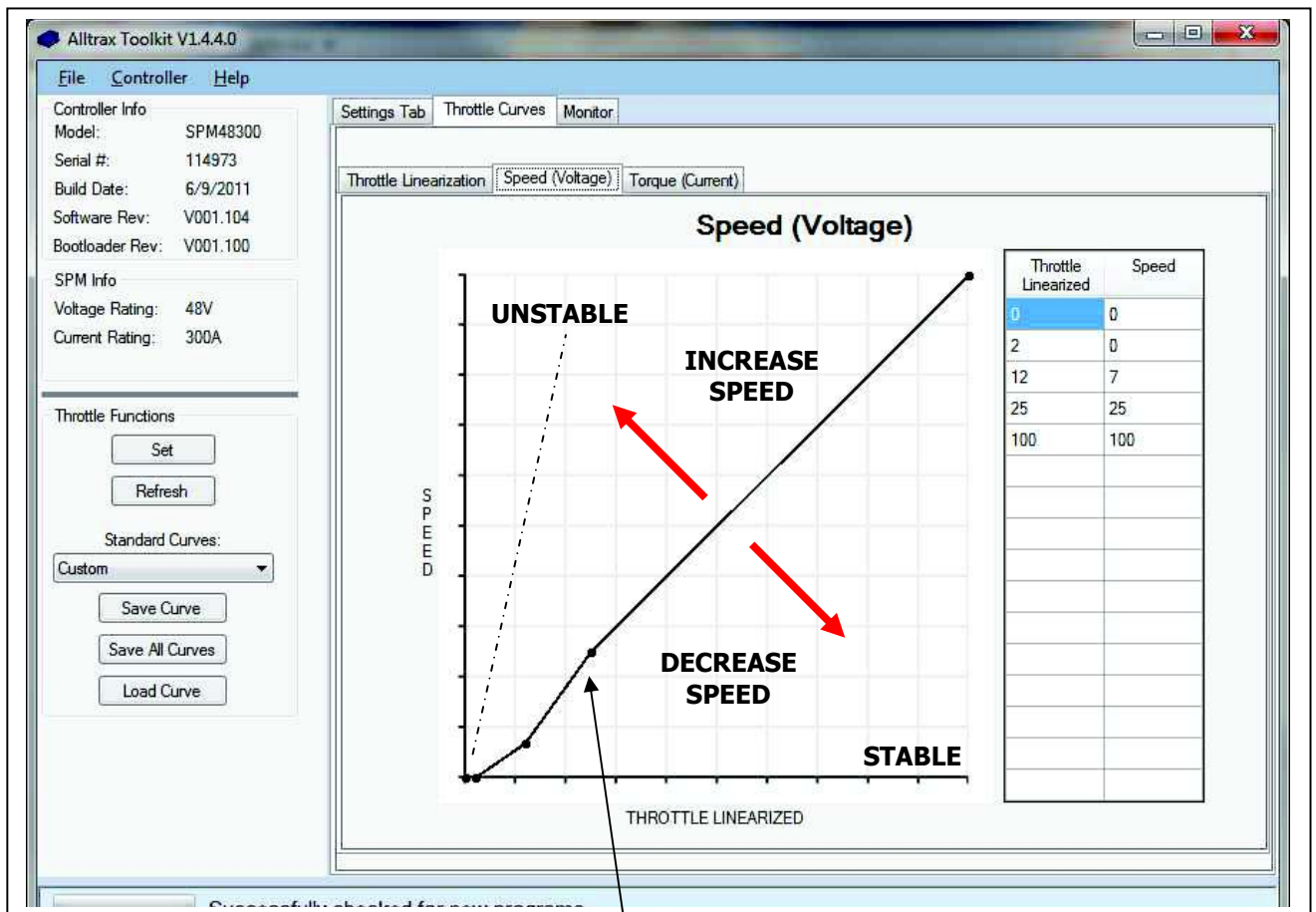
1. **Throttle linearization** is a curve that eliminates non linear throttles. Twist grips, pivot mounted potentiometers, etc can affect the power curve. They may start off soft and ramp faster as the throttle is increased.
2. The curve above eliminates twist grip throttle non linearity. The bottom curve (X) is the percentage of throttle position plotted to Y Throttle linearized. In this example shown above (Default Curve):
 - o In effect – the curve reduces “smooth out the low end” by slowly ramping in the low end, then progressively increasing at the end of the throttle. . This eliminates “surging” caused by touchy twist grip throttles.
 - o If this curve was the opposite as shown, ramping up the throttle quicker” would result in very fast response based on very little throttle input, sometimes preferred by motorcycle racing events. However, can be very unstable on cruising speed.
 - o **If in doubt – leave this curve alone.**

2. Speed Curves:

1. Speed (Voltage) curve effectively plots percentage of throttle on the bottom and the voltage applied to the motor at left. This curve provides a little dead band at zero throttle with return to 45 degree linear throttle map at about the 25% point as shown below. This removed any issues with "creeping" when the throttle did not really return to zero.
2. If you wish to reduce the amount of voltage (Y) based on throttle position (X), move the curve down towards the bottom right side.
3. If you wish the motor voltage and speed to increase more rapidly, move the curve towards the upper left corner.

Warning:

Adjusting this curve without really knowing how it works can create unexpected and undesirable effects. This factory curve has been proven for most all applications..



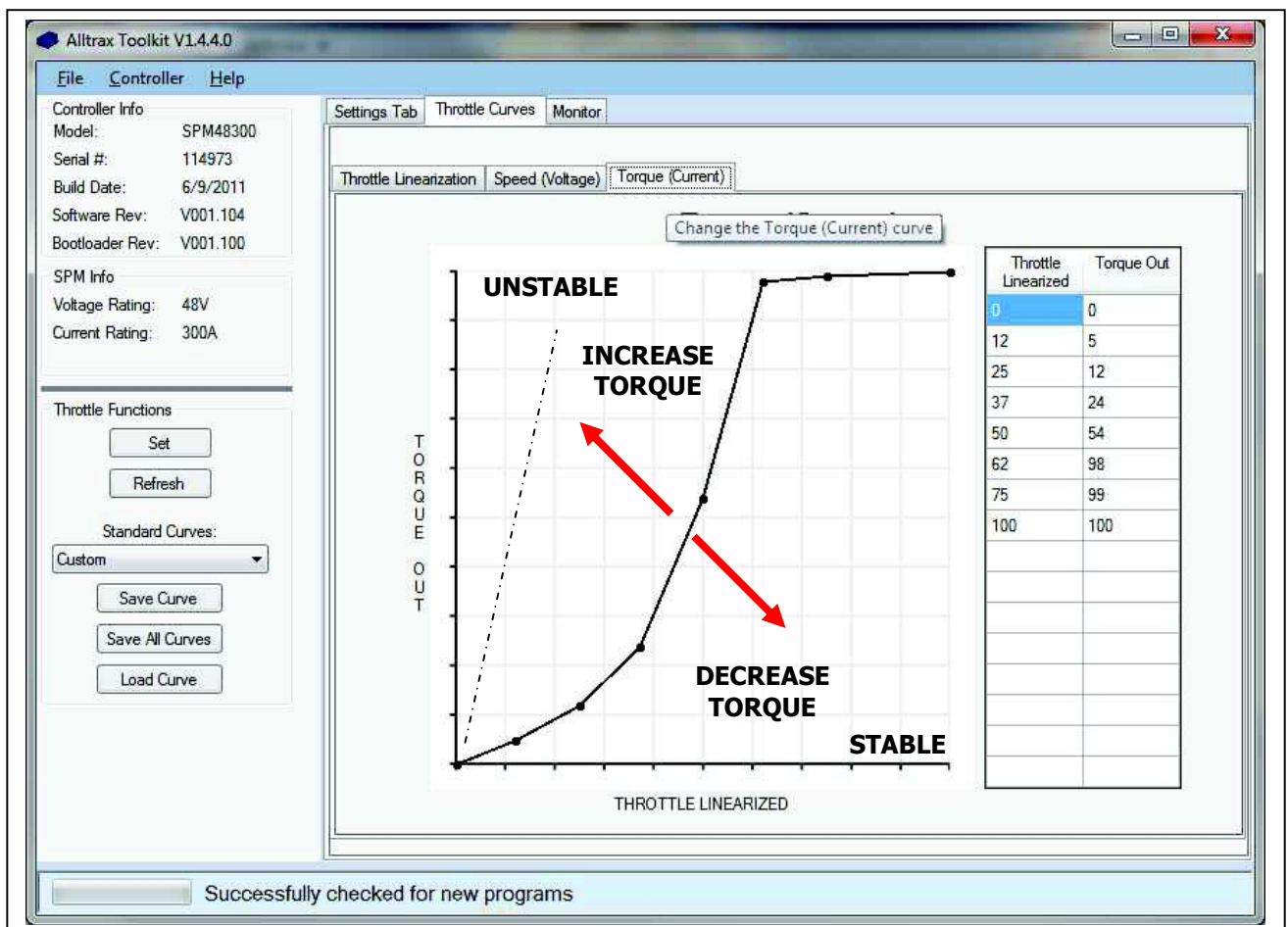
25% mark the curve goes linear from here.

3. Torque Curves :

1. Torque is the "throttle linearization curve" from the throttle linearization curve represents the "X-axis" shown below /applied to/ TORQUE OUT represents the Y-axis is how much output torque is applied to the motor (in motor amps).
2. The curve below is typical for most motor applications where the low end of the throttle curve is nice and smooth and rises quickly after the 50% throttle position. This provides a torque buildup similar to what people expect in acceleration and control.
3. This map can be tailored to the vehicle application for best overall performance.
 - o Moving the curve down & right corner "reduces torque" compared to throttle position (like scooters or small vehicles wanting smooth operation)
 - o Moving the curve Up & left corner "increase torque" compared to throttle position, much faster acceleration (like racing)

Warning:

Adjusting this curve without really knowing how it works can create unexpected and undesirable effects. This factory curve has been proven for most all applications..



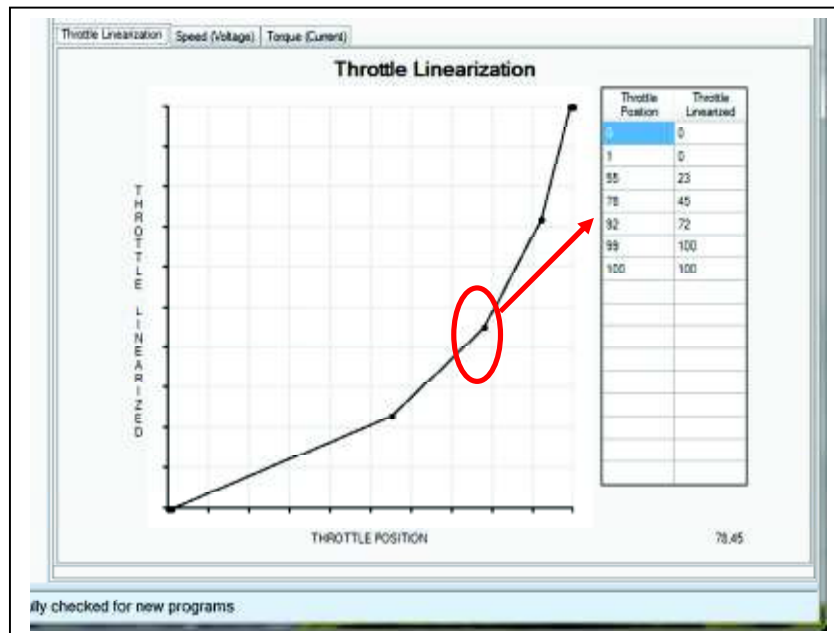
4. Modifying Curves:

This section describes how to modify the curve, save to a file, or load from a file. In some cases, a call to Alltrax Tech support may solve your issues with a file emailed to you. This file can be uploaded into the controller and programs the controller. This section applies to Throttle, Speed, and Torque in general, all three curves are changed using the same tools.

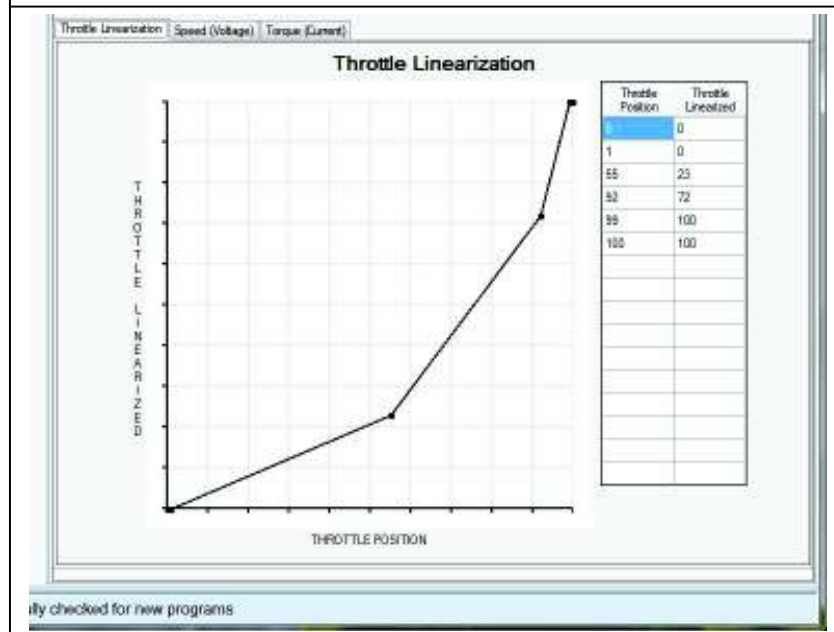
1. Deleting Points on the curve examples:

The curves shown can be modified to add or delete points in the curve. Double click a blank point and the point is deleted.

BEFORE:
(Click on 78)

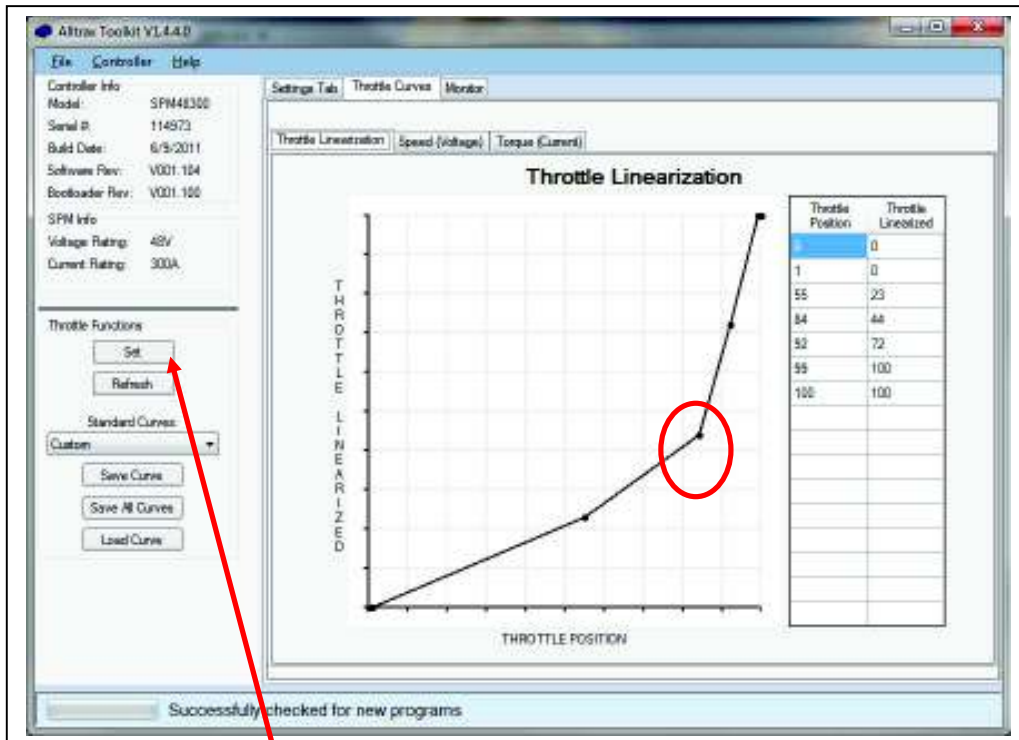


AFTER:
78 is removed.

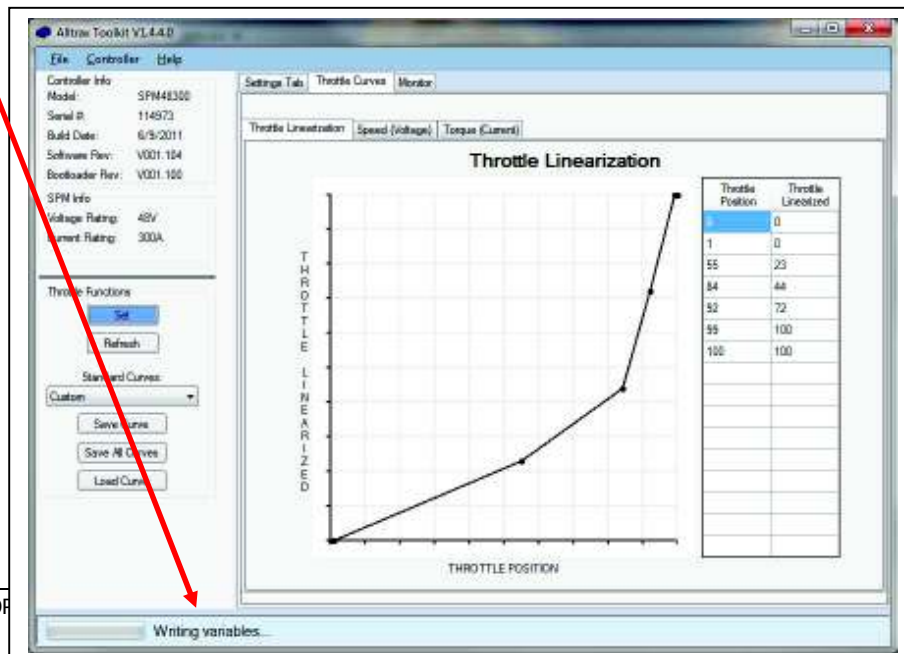


5. Adding Points to the Curve:

To add points in the curve. Double click a point on the line you wish to add a point, then drag to a new position as shown in the example below, I added one point at 84% throttle position which now equals = 44% Throttle linearized.



2. Once complete, press the SET button:
3. The Status Window will show the progress

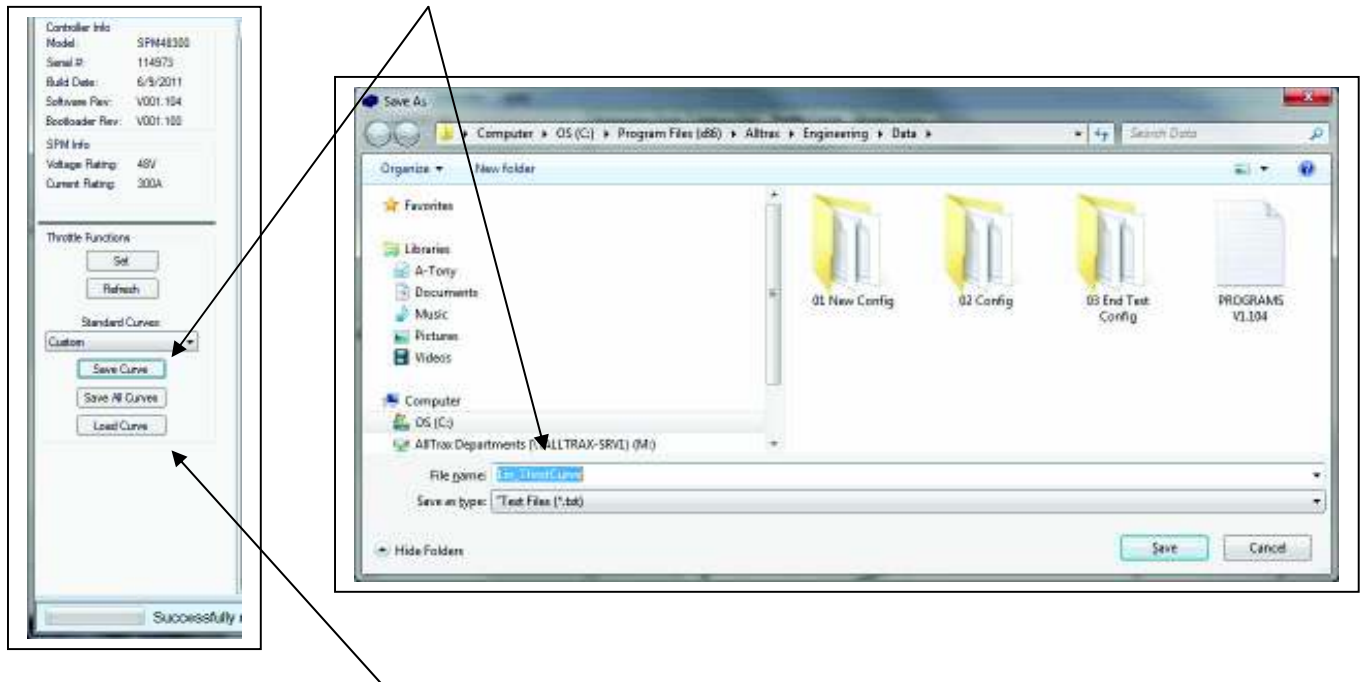


6. Saving a Curve:

Once a CURVE is created, this can be **saved as a file** onto the hard drive for future use.

In this example the curve is saved:

- a. Press the SAVE CURVE button
 - a. Provide a file name – please keep in the SAME default directory the tool-box uses.

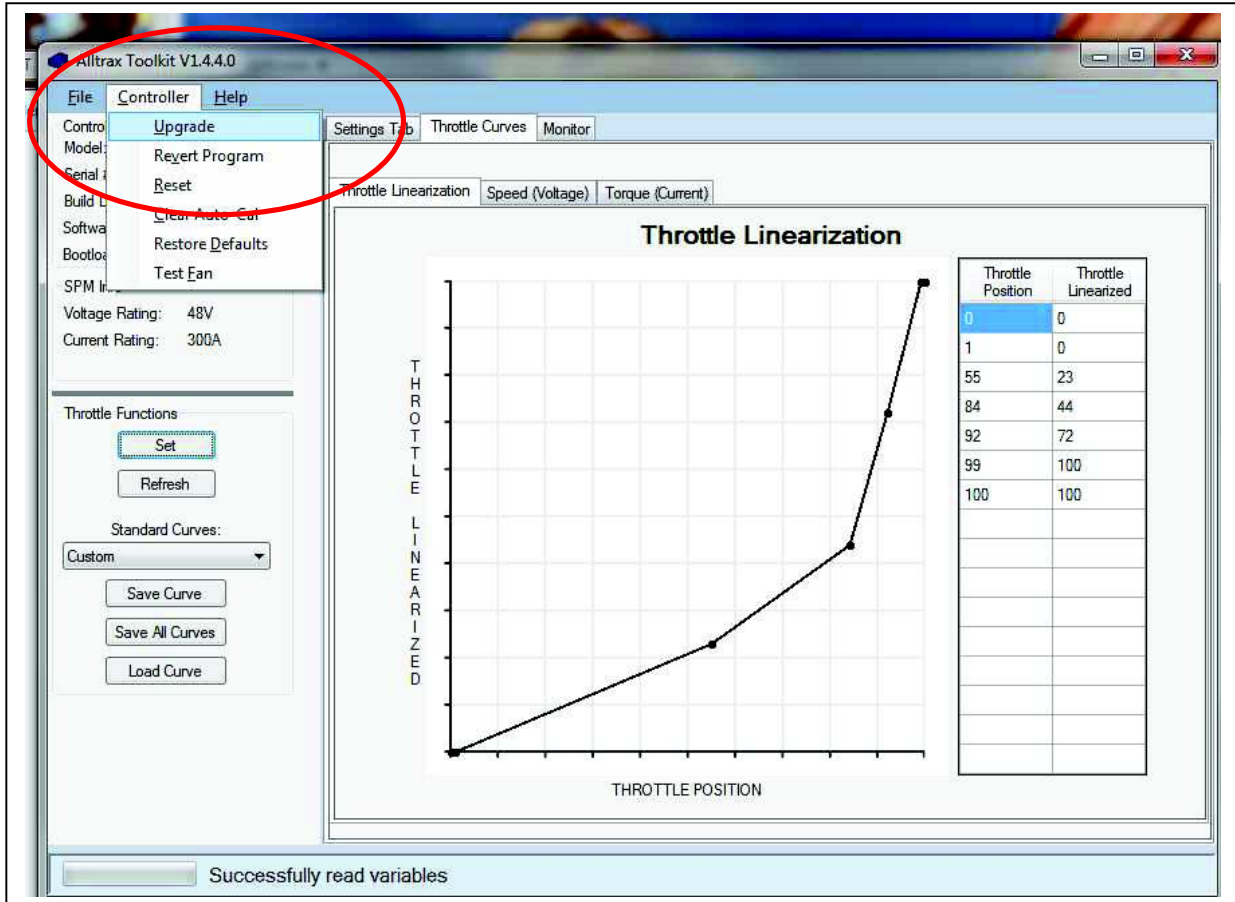


A new unit can be used and by loading these files into the unit, you can duplicate configurations, curves, and settings in a few simple steps.

- Reload this CURVE by pushing the LOAD CURVE button, select the file and press SET. The new curve you made earlier will be loaded into other units.

6. UPGRADE a Controller:

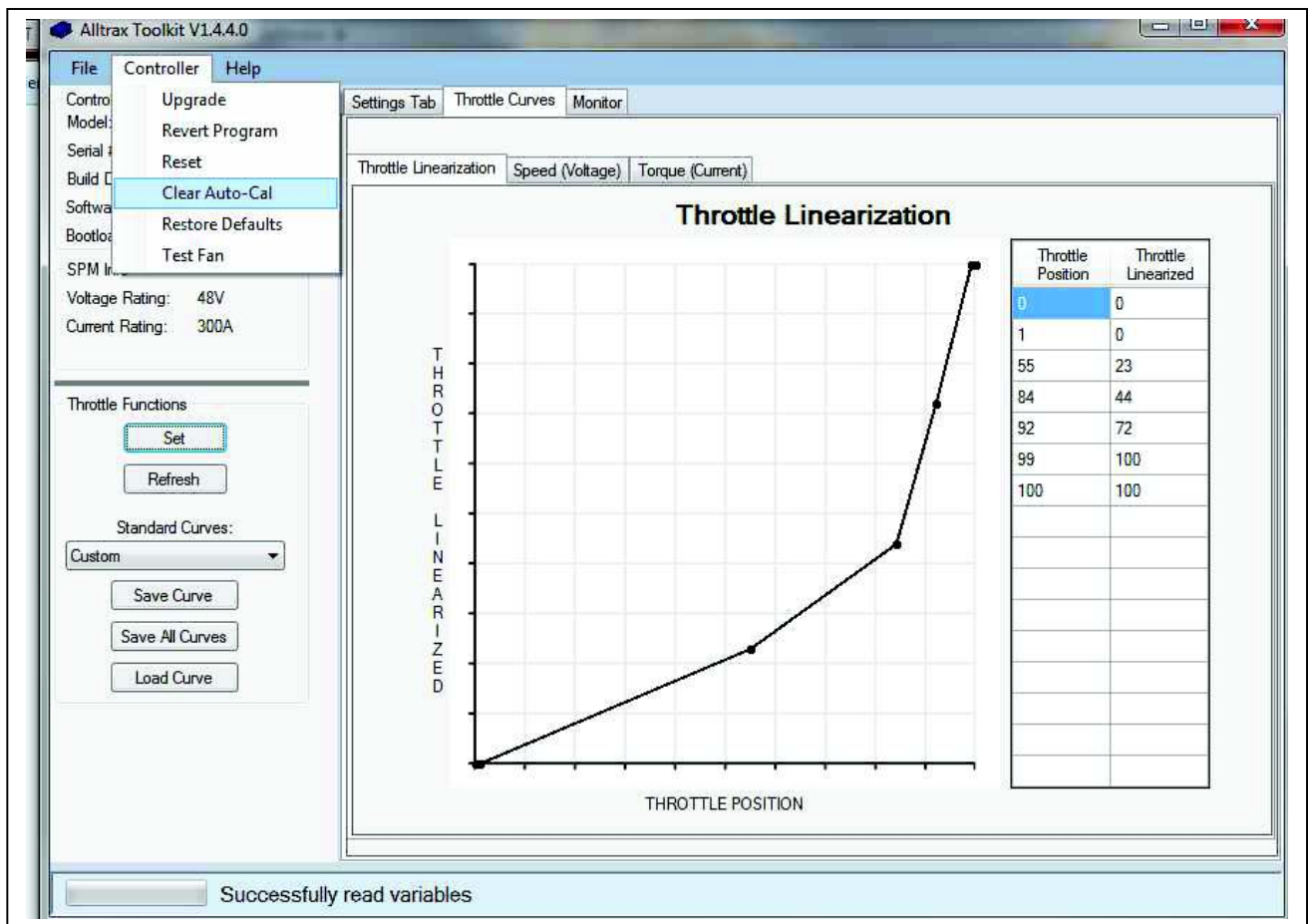
As new Alltrax Tool Kit Software versions are developed, or possibly older units installed in the field may require upgrading, the Controller [**Upgrade Function**] is used. This will program the latest software into the flash memory using a pre-loaded boot-loader. This is the first field upgradeable controller in the market using USB 2.0 protocol.



1. Throttle Auto Calibrate Feature:

The SPM controller uses a “seek and store” method to determine throttle position. This provides excellent throttle control by eliminating the mechanical variations found in most all throttle assemblies. For instance, out of 10 throttles, several may not have the same resistance outputs. This feature reads the throttle as zero and when 100% sets these limits in memory as 0-100%. Other competitive controllers may “jump” just off zero caused throttle zero, or never achieve 100% throttle because of mechanical linkage wear and tear. The values are saved until either they are cleared or power to the controller is disconnected from B+ and USB.

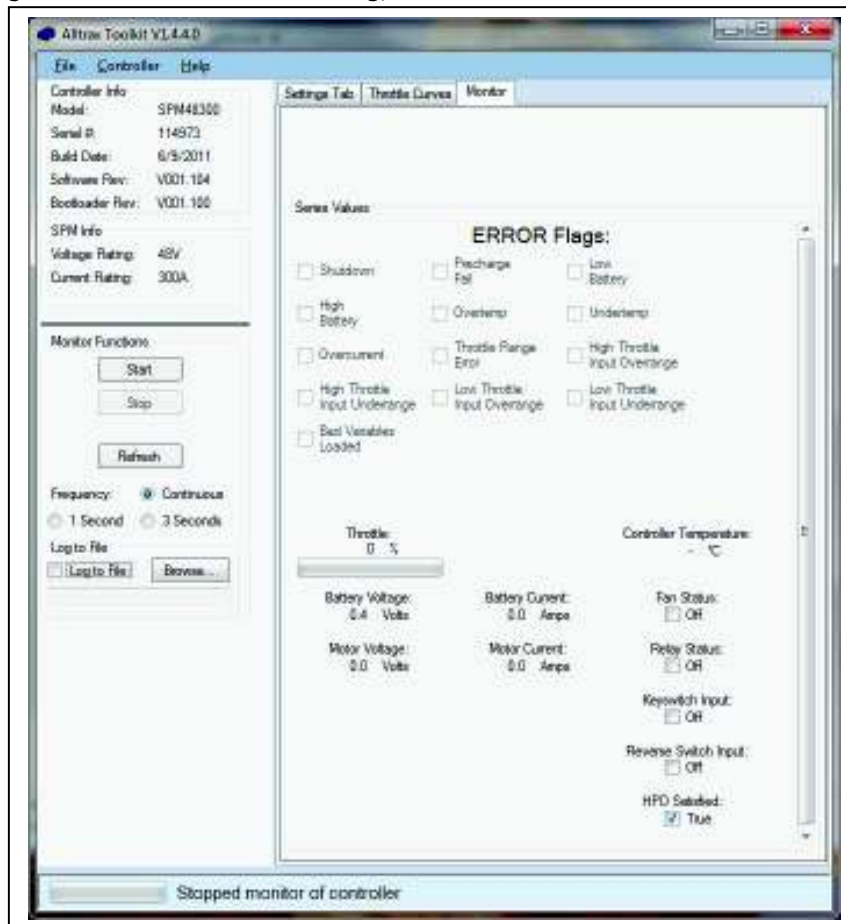
When a new throttle is used, or installing a new controller into a unit, it is best to CLEAR the throttle calibration.



7. Monitoring Data:

The SPM controller has real time data outputs with alarms and error flags to observe the operation and performance of the vehicle. This data can be saved to the hard drive and plotted in spread sheet formats for charts or other data programs.

1. While the controller is not connected to the vehicle, the main DC power supply is off and only the USB powered microprocessor is active. The data shown below will be shown when connected and installed into a vehicle.
2. Check the LOG TO FILE and provide a file name for the data to be appended
3. Select the FREQUENCY of the data snapshots.
4. 1 second for general logging, continuous for short bursts of detailed data.
5. Press START to begin logging
6. Press STOP when finished
7. Error flags can be useful troubleshooting, contact Alltrax for the secret decoder ring.



To disconnect from the controller, use the FILE then EXIT menu, disconnect the USB cable from the controller and the SPM is now ready to install into the vehicle.

END Manual

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