



BETA SOFTWARE RELEASE NOTES

June 26, 2008

Castle is pleased to announce the BETA release of new firmware for our Phoenix controllers. The new code brings several exciting new features to the controllers for helicopter and control line applications. We have also made some improvements to one of the core functions of any brushless controller – motor startup. This document briefly describes the new functions and changes. Please use this and the built –in help buttons on the Castle Link interface to help you choose the best settings for your application.

Please test this software THOROUGHLY and get acclimated to the new features prior to putting your choppers in the air.

We do not expect that you will encounter any surprises, but this is an initial BETA release. Let us know if you find any behaviors in the software that should not happen. Remember, operate the controllers with safety as your top priority. Castle will not be responsible for damage to your gear. That being said, we sincerely appreciate your willingness to help us out with this project!

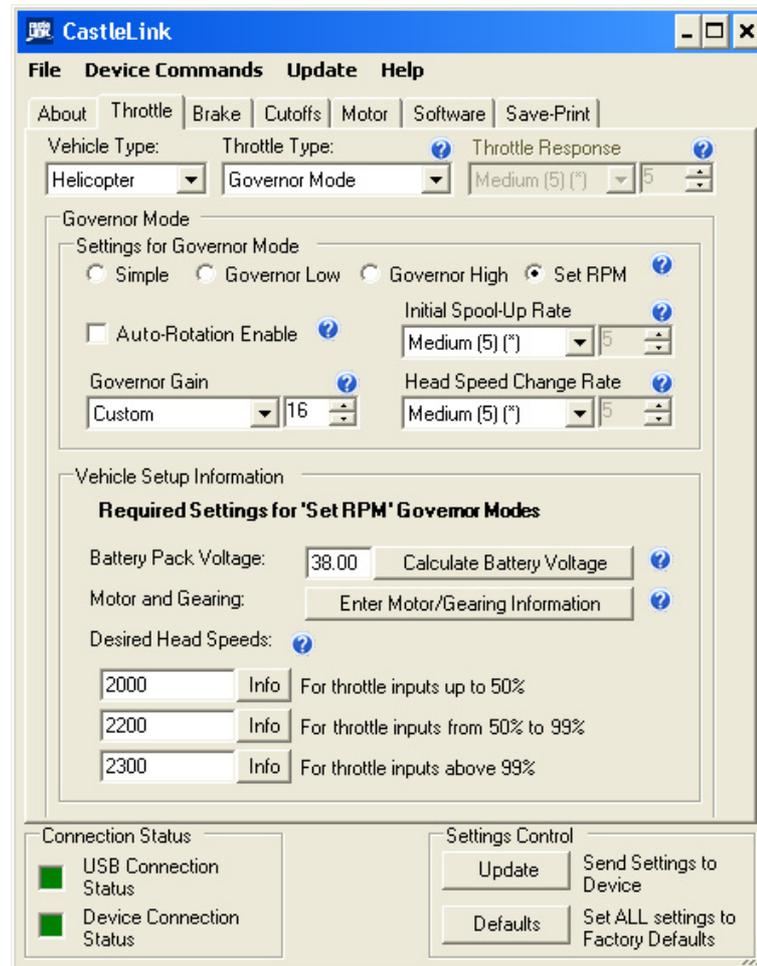
Please note that the motor drive portions of this update will be ported to the THUNDERBIRD line in the very near future.

Here are the new features!



Phoenix, Phoenix ICE, Phoenix HV, Phoenix SHV Compact

Helicopter Function Expansion -- Additional modes added



New Throttle Settings Page

1. **Simple Governor Mode** – select this mode and the Phoenix controller will maintain head speed at an RPM corresponding to your RADIO throttle percentage. This mode should be very similar to the mode offered by Kontronik.

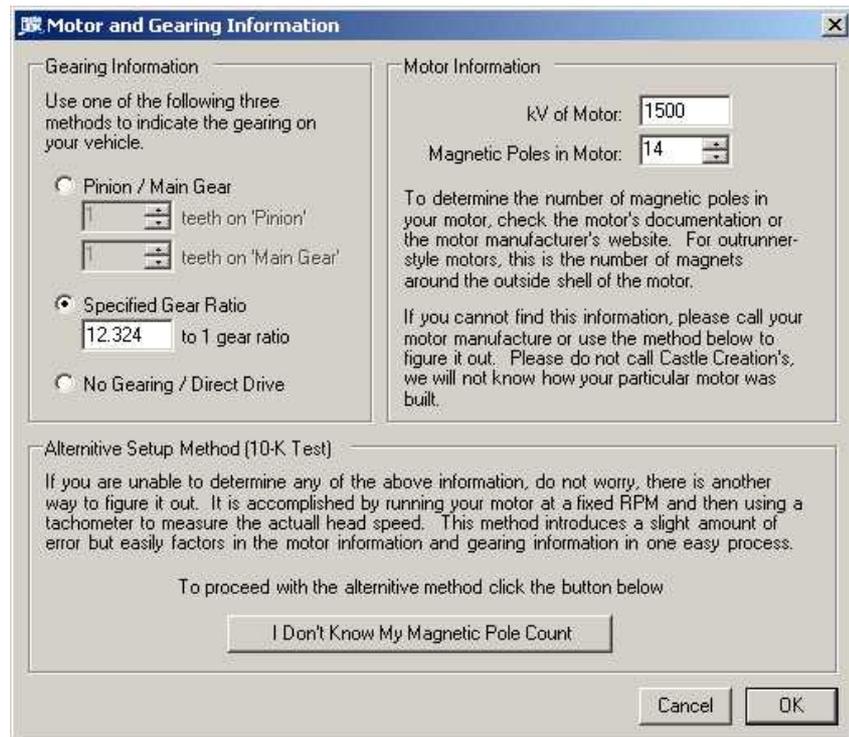
Advance throttle to the desired head speed and allow head speed to stabilize for 1.5 seconds. The controller will lock at that speed and the LED will flash rapidly indicating that governor is operating and locked.

Once locked, changes to the throttle input will change the head speed accordingly. The controller will increase throttle in response to higher throttle commands based on a new setting, 'Head Speed Change Rate'. The default values for these settings should work well for most users.

2. **SET RPM** – select this mode and enter the desired head speeds that you wish the controller to maintain. Once the motor poles, KV, spur gear tooth count, main gear tooth count, and nominal battery volts are entered via Castle Link, the controller will maintain the numerically entered head speed. The controller can be preset for three distinct head speeds; these are commanded by your TX/RX in flight by a throttle command in the specified range for each speed.

If you don't know your motor's pole count, please contact the motor manufacturer. We don't know the count!

If you don't want to do that, or don't speak Chinese, there is a new throttle diagnostic mode called the **20K Test** that will spin your motor to 20,000 ELECTRICAL RPM. Tach the resulting head speed, reconnect the controller to the Link software, set the controller to the SET RPM throttle mode, and enter the head speed that resulted from the 20K test. The software can then calculate your number of magnetic poles.



DO NOT ATTEMPT TO FLY YOUR HELI IN THIS DIAGNOSTIC MODE! Perform this test with the blades removed and observe all possible safety precautions. The controller will follow the usual Castle arming requirements but it will only run the motor at 20,000 electrical RPM or zero rpm based on your throttle input. The motor will spin to 20,000 electrical rpm. The actual motor shaft RPM will be 20,000 times 2 divided by the number of poles in your motor. The resulting head speed will be the motor shaft RPM divided by the gearing on your heli. The actual head speed that results may be rather slow. This is OK, just take a good tach reading of this speed.

3. **Improved Gain Performance** -- gain algorithms have been modified to perform better across the wide range of applications that the controllers see in service. Setting values now range from 1-32. We suggest starting with the default setting. If your tail wags slowly, your gain is likely too low. Rapid wagging is a sign that your gain is set too high.
4. **Head Speed Change Rate** – This is a new setting. Users may set the rate at which the controller responds to throttle changes during flight. This setting controls the throttle advancement AFTER the initial spool up is complete. This setting is a compliment to the Initial Spool Up Rate. Head Speed Change Rate controls the rate of change AFTER the head has reached the governed head speed.
5. **Initial Spool Up Rate** – This setting controls the rate of throttle advance on the initial spool up of the heli. It is also triggered whenever the throttle is decreased below 1.0 ms. Once the headspeed reaches the target head speed for governed modes, Head Speed Change Rate controls the rate of change allowed when the throttle is advanced from the transmitter.
6. **Autorate Enabled** -- This version of firmware adds a new feature for helicopter pilots called 'Auto Rotate Mode'. This mode adds a small window above zero throttle (1.0ms to 1.1ms) in which the motor is no longer being powered, but an increase in throttle, such as bailing out of an autorotation, will use the 'Head Speed Change Rate' to get back to the governed speed instead of the 'Initial Spool-Up Rate'. This will allow a gentle initial spool-up AND a very fast recovery from an autorotation maneuver. Any throttle below 1.0ms will be treated as total throttle-off, and all throttle increases from this zero throttle position will use the 'Initial Spool-Up Rate'.

UNCHECKED - - Auto-Rotate mode is disabled, and throttle below 1.1ms will be treated as full-off.

CHECKED -- Auto-Rotate mode is enabled, turning on the window just above zero throttle for auto-rotations.

NON-HELI SPECIFIC CHANGES TO PHOENIX FIRMWARE

1. **Control Line Stunt Mode**
New throttle mode allows for use of a governed motor RPM with the ability to command a motor brake at the low/off range.
2. **Motor Start Software Refinements**

Improved startup for some outrunner motors. The code is more flexible to adapt to a motor's operational abilities. This should offer better starts when users attempt to VERY slowly start the motor.

3. Audible Error Codes

If controller experiences an error condition in use, it will beep a code that will allow user to identify and correct for the error condition. The LED on the controller will also flash these codes. Examples, overcurrent, low voltage cutoff, prop strike etc. This should make troubleshooting in-flight shut downs MUCH easier for users and for our Tech Support Department.

If you hear your controller beeping an error code, count them!

1 flash/beep	Start Failure (The motor was jammed or locked)
2 flashes/beeps	Low Voltage Cutoff (Your batteries are likely discharged. Check that batteries are fully charged and that your Phoenix detects the proper number of cells at power-up)
3 flashes/beeps	Over Current (Current draw exceeded the safe capacity of the controller)
4 flashes/beeps	Prop Strike Detected. The controller sensed that the motor stopped spinning freely. Check for proper operation of motor.
5 flashes/beeps	Poor Radio Signal (Signal from your receiver is corrupt or non-existent, check transmitter and receiver)

Note that this beeping often sounds a bit hoarse. It may be more of a croak than a beep.

4. Powered Controller Reminder Beep

Phoenix controllers will beep after 20 seconds of no throttle activity to warn pilots that the system is still powered up.

5. Brake PWM is now INAUDIBLE

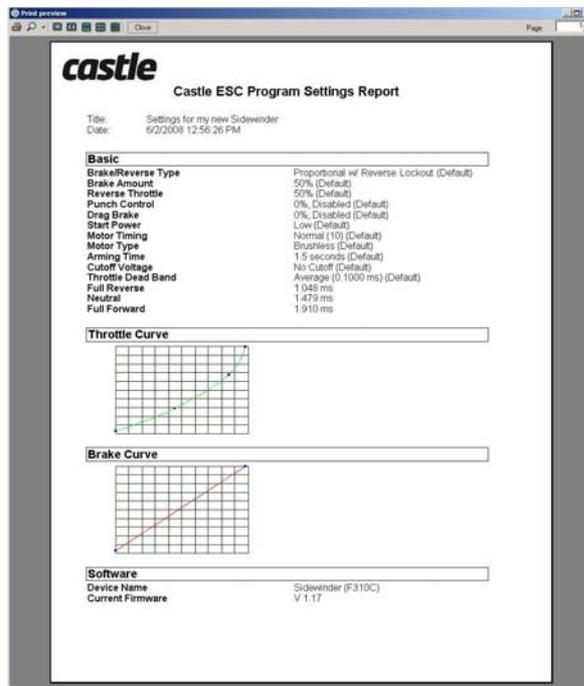
No more "pings" when the brake is used. There was just something wrong about a scale plane pinging around in the sky.

All Castle Products

Quick Print Button

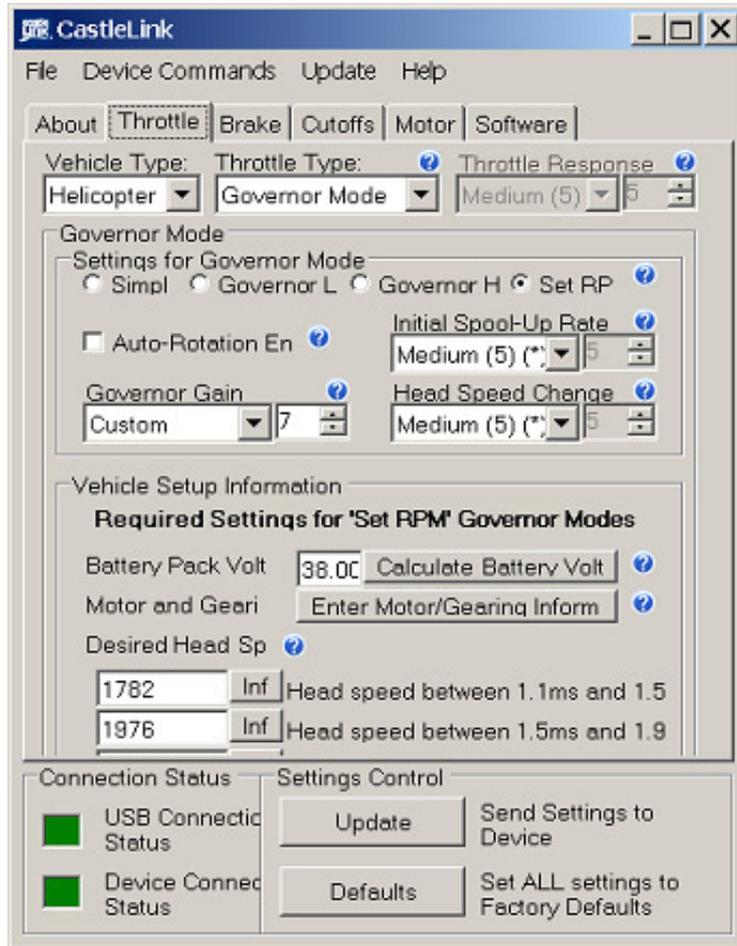
This is a quick and easy way to review/print the settings currently programmed into your Castle controller. The software will prompt you for a name for the setup and will imprint the computer's date and time.

This feature is a new function of Castle Link software and it applies to all Castle controllers, so forgive the Throttle Curve and Brake Curve in the image. These graphs are not applicable to AIR controllers.



USAGE NOTES:

Some early beta users have noted that the interface seems to be scrunched on their screen like this example.



Please note that the screens are re-sizable. You MAY click and drag the bottom right corner to enlarge the windowed screen. This should help.

We have designed this screen to fit most standard settings, if you have selected extra large screen fonts, there is little that we can do to shoehorn it all in. (Personal note: *I am reaching that time in my life when I am starting to enlarge the screen fonts too, and I am using a huge screen to begin with! I do understand the issues a little more personally.* © Lee)