



CASTLE DRIVER'S ED

*Instruction manual for all Castle Creations
Car and Truck Brushless Power Systems*

drive castle



WARNING: This is an extremely powerful brushless motor system. We strongly recommend removing your pinion gear for your own safety and the safety of those around you before performing calibration and programming functions with this system. Please keep your hands, hair, pets, fuzzy purple shorts and garden gnomes clear from the gear train and wheels of an armed high performance system.

Rubber tires will "grow" to extreme size on a high speed vehicle. **DO NOT** hold the vehicle in the air and run it up to full throttle. Tire failures at speed can cause serious injury! Make sure your tires are securely glued to the rims and check them often!

Always disconnect the battery from the ESC when you are finished using your vehicle. The switch on the ESC controls the power that is delivered to the receiver and servos. The controller will always draw current when it is connected to the battery and will completely discharge batteries if they are connected for long durations. This may cause failure of your batteries.

Your Castle ESC is programmed to sound a tone every thirty seconds to remind you that it is still powered. It will also sound a warning tone every five seconds when it is powered but receiving no radio signal.

QUICK START GUIDE

1. Solder a high quality battery connector to the ESC.
2. Mount the ESC and motor into the car.
3. Plug in the 3 motor wires to the 3 motor wires on the ESC.
4. Plug in the ESC Rx lead to CH2 on your receiver.
5. Make sure the ESC's switch is off.
6. Plug in a battery.
7. Holding full throttle on your transmitter, turn the switch ON.
 - A. After a few seconds you'll hear multiple tones and the red LED will come on.
 - B. Now hold full brake and after a few seconds you'll hear multiple tones and the yellow LED will come on.
 - C. Now relax to neutral and after a few seconds you'll hear multiple tones and ALL the LEDs will light up.
 - D. A few seconds later the ESC will arm with a double tone and you're ready to go!

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EASY TO USE, SOPHISTICATED ENOUGH TO WIN EVERYTHING

Castle controllers are extremely simple to set up and optimize for your application. Most users may simply plug the controller into their motor, radio and battery and run it immediately.

Advanced users may wish to access the incredible tuning features using their Windows based PC and the Castle Link interface (sold separately) or the provided USB cable for Mamba Max. With the Castle Link software, you can tune the ESC exactly with point and click ease!

Please make sure to read this manual completely to get the most from your Castle ESC.

A Word About Batteries And Connectors

As with any extremely high powered electric power system, the primary limitations to ultimate vehicle performance are the batteries and connectors. Use the best batteries and connectors that you can find. The better the batteries, the more punch you'll have! **Hint: Look for the batteries with the lowest resistance, not necessarily the coolest labels.**

Top-of-the-line cells aren't required for this system to operate normally, but the best cells will certainly allow your Castle system to put more power to the ground!

Poor quality battery connectors can be a roadblock to performance. Avoid the common "white plastic" connectors commonly seen on many battery packs. A fast brushless setup will draw many times the power that these connectors can safely handle. Invest in connector sets made for high powered electric systems such as our CC Bullets or Deans Ultra plugs.

Power Wiring

Your Castle ESC has motor connectors on the motor wires and the battery input wires are bare. You must add the connector of your choice to the battery leads. We recommend a connector rated for 40-100amps, such as CC Bullets, Deans Ultra or Astro Flight Zero Loss.

Proper polarity is essential here! Make absolutely sure positive (+) connects to positive (+), and negative (-) connects to negative (-) when you plug in your battery! If reverse polarity is

applied to your ESC from the battery, it **WILL** damage your ESC. **This WILL NOT be covered under warranty!**

CONNECTIONS

Brushless Motor Wiring

(See Figure 1: Brushless Motor Setup)
For brushless motor connection, the three wires from the ESC to the motor have no polarity. Connect the red, white and black motor wires to the three wires coming from the motor. If you are using a motor other than a Castle Creations CM36 motor, you may

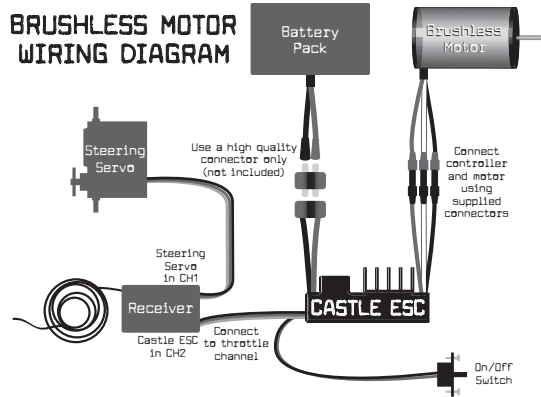


Figure 1: Brushless Motor Setup

need to either solder on matching male bullet plugs to your motor, or solder the ESC wires directly to the motor wires.

If you choose to direct solder or to shorten the motor wires, you may do so on the Castle Creations CM36 motors only. **DO NOT CUT** any part of the wire length from any other motor, regardless of brand or type. In most cases, only the last 1/4 inch or so of most motor wires is able to be soldered. If they are clipped shorter you may not be able to solder the remaining portion of the wire and the motor will not run properly, if at all. If the motor is supplied with connectors you do not want to use, simply unsolder the original motor connectors from the wires - do not cut them off.

There is no polarity on the three ESC-to-motor wires, so do not worry about how you connect them initially. You may find it necessary to swap two wires if the motor runs in reverse. This will be explained below.

Brushed Motor Wiring

Reversing Brushed Motor Mode:

(See Figure 2: Reversing Brushed Motor Setup) Use this mode if you wish to use reverse. Use only the red and black motor wires from the ESC. In most applications, the red wire from the ESC will connect to the red wire (or **positive +** side hood) on your motor, and the black wire to the black wire (or **negative -** side hood) of the motor. The white motor wire is not used. After calibration, (explained below) you may need to swap the two motor wires to get the wheels to spin

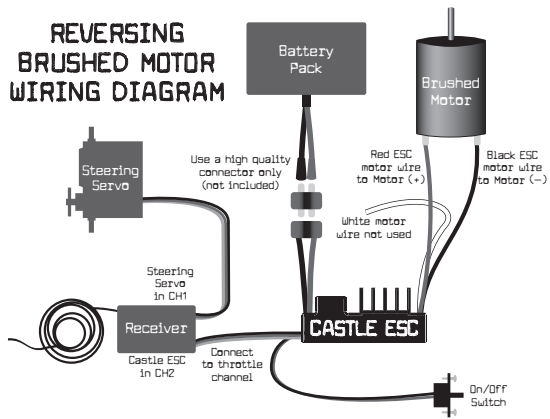


Figure 2: Reversing Brushed Motor Setup

HIGH POWER BRUSHED MOTOR WIRING DIAGRAM

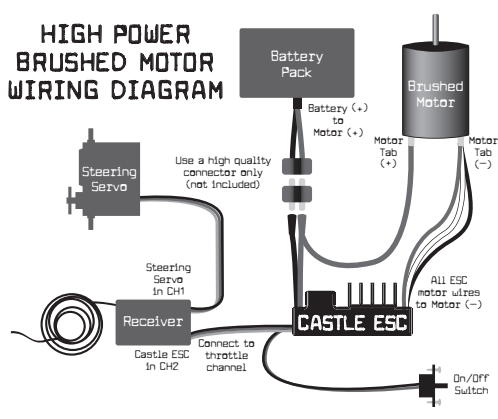


Figure 3: High Power Brushed Motor Setup

in the right direction.

High Power Brushed Motor Mode:

(See Figure 3: High Power Brushed Motor Setup) Connect all three of the ESC motor wires to the negative (-) side of the motor. You can either use a "Y" harness from the ESC battery input positive wire to connect to both the battery and the positive side of the motor, or use a single wire from the positive ESC input to the positive battery pole and then continue to the positive (+) side of the motor.

RADIO CONNECTION

Your Castle ESC plugs into the throttle channel of your receiver. This is usually channel 2. Your Castle ESC provides 5 volts to the receiver to power the receiver and the steering servo. No separate receiver battery is needed to power the radio system.

Castle ESC receiver plugs are made to be used with any receiver, so you will need to make sure the polarity is correct. The signal wire is orange, the positive wire is red, and the negative is brown. Some radio systems use white for signal, red for positive and black for negative color scheme. Check your receiver documentation for correct connection polarity if it's not marked. (Most receivers use negative to the outside of the case and signal towards the inside of the case.)

ESC SETUP

ESC/Radio Calibration

Individual transmitter's signals for neutral, full and full brake vary. You must calibrate your Castle ESC so that it will operate most effectively with your transmitter. Anytime the ESC is powered up with a new transmitter, or with different throttle channel settings, it will need to be calibrated to "know" what the transmitter's throttle settings are. It will also need to be calibrated after updating with new software via Castle Link.



If you are using a Futaba or Futaba OEM brand transmitter, you will need to set the transmitter's throttle channel direction to the REVERSE (Rev) position. This is either an external micro switch on the transmitter or an option available within the computer programming of the transmitter's throttle channel.

Please start by zeroing out any throttle trim that you may have set in your transmitter. **Don't plug in the battery yet!** Make sure that the battery polarity and input polarity on the ESC are correct. Check the on/off switch of the Castle ESC to make sure that it is in the OFF position ("ON" is marked in small letters on one side).



We recommend removing your pinion gear before calibration as a safety precaution!

How to Calibrate the ESC

STEP 1: Start with the transmitter ON and the ESC switched OFF and not connected to the battery.

STEP 2: Plug a battery into your Castle ESC.

STEP 3: Hold full throttle on the transmitter and turn the ESC's switch ON. Keep holding full

throttle on the transmitter. If all your connections are correct, you will hear one multi-toned initialization "ring" from the motor (all tones are played by the ESC vibrating the motor).

STEP 4: After a second or two, the green LED on the ESC will blink rapidly and the motor will "ring" 4 times rapidly in a row (accepting the full throttle endpoint). After the green LED flashes and tones, the ESC will blink the red LED. At this point the full throttle endpoint has been set within the ESC and now it's looking for the full brake endpoint (red LED blinking).

STEP 5: Move the throttle trigger to the full brake position and hold full brake. After a few seconds, the ESC will flash the red LED and ring 4 times rapidly (accepting full brake endpoint).

STEP 6: After accepting the full brake endpoint the ESC will then blink the yellow LED. Now relax the trigger to the neutral position. The ESC will now ring 4 times and flash the yellow LED rapidly to accept the neutral position.

After accepting the neutral position, the ESC will ring twice and flash ALL the LEDs. This is the arming tone and LED indication that the ESC IS NOW ARMED and the car will respond to throttle inputs from your transmitter.

From this point on, when you connect batteries and turn the switch on, the ESC will give the initialization tone and flash after a battery is plugged in and the switch is turned on, and the arming tone will ring a second or two later. If the ESC is programmed for the Auto-Lipo setting, it will beep the number of cells in your Lipo pack between the initialization tones and the arming tones. After the arming tone plays, the ESC is ACTIVE and will respond to throttle application.

If you have problems calibrating your transmitter with the Castle ESC, please see the troubleshooting guide on page 37 for more tips. Once you are calibrated and armed, do one last check before going out and experiencing the Castle brushless difference. Slowly advance the throttle and check the rotation direction of the motor and the color of the LEDs on the

ESC. If the motor is spinning in the right direction and the GREEN LED is blinking green, then you are ready for a test run before going into the settings of the ESC. If the ESC shows the green LED with throttle, but the wheels spin in the wrong direction, you'll need to switch any two of the motor wires (example: switch from red to red and black to black to red to black and black to red).

CASTLE LINK SET-UP

Your Mamba Max ESC comes with a USB cable and a CD with the Castle Link installation software.

Other Castle ESCs may be linked with the optional Castle Link USB adapter (sold separately).

The Castle Link software will give you access to a whole new world of tuning options. You may use Castle



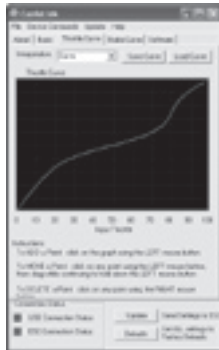
Link to tune your throttle curve and brake curve, set your drag brake feel, and use the incredible PUNCH CONTROL to keep the front end of your car on the ground with all the power you have at your command. As new features become available, you can install them in your Castle ESC for "real time" updates! All of this is free and ensures your Castle ESC will be the best that it can be.

TO USE CASTLE LINK

Mamba Max users should install the software on their computer, connect the large end of the supplied USB cable to a USB port on your PC, and start the Castle Link software. Connect the



Screen shot of the basic settings page of the Castle Link software for the Mamba Max



The brake and throttle response curves are fully manipulatable

small end of the USB cable to the side of your Mamba Max ESC and enjoy the Castle Creations difference!

All other Castle Car ESCs will require that the Castle Link USB adapter (sold separately) be connected to a computer running Windows and the Castle Link software. Connect the ESC to the USB Link via the throttle cable.

Castle ESCs may also be manually programmed using your transmitter and receiver. Manual programming may not provide access to all of the Castle ESC's features.

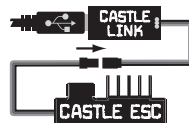
MANUAL PROGRAMMING

Follow these steps to change settings on your Castle

CASTLE LINK CONNECTIONS



USB cable connects your PC directly to Mamba Max for tuning via Castle Link software



Castle Link USB adapter connects your Castle ESC to a USB cable for tuning via Castle Link software on your Windows PC

ESC without a computer.

Remove your pinion gear before calibration and manual programming as a safety precaution!

STEP 1: Start with the transmitter ON and the ESC switched OFF and not connected to the battery.

STEP 2: Plug a battery into the ESC. Hold full throttle on the transmitter and turn the ESC switch ON. After a few seconds you will get the four rings in a row signaling full throttle calibration. Keep on holding full throttle. After a few more seconds, you will hear another four rings in a row. After the second group of four rings, relax the throttle to neutral. If you have successfully entered programming mode, the ESC will beep twice, pause, and repeat the two beeps.

STEP 3: The programming sequence is always presented in sequential order and always starts with the first setting (Reverse Lockout) within the first section (Reverse Type). The first

beep(s) signifies which section of the programming you are in and the second beep(s) signifies which setting is waiting for a "yes" or "no" answer.

As you go sequentially through the options, you will need to answer "yes" by holding full throttle, or answer "no" by holding full brake until the ESC accepts your answer by beeping rapidly. Once an answer has been accepted, relax the throttle back to neutral for the next question. After a "no" answer is accepted, the ESC will then present you with the next option in that section. After a "yes" answer is accepted, the ESC knows you aren't interested in any other option in that section, so it skips to the first option in the next section.

SETTINGS & EXPLANATIONS

The Castle ESC is extremely flexible and may be "tuned" like any other part of your car or truck. The following section explains all the settings available to you via manual programming and what each one does to change the reactions of the ESC in order to tune it to your specific preferences. More settings are available via Castle Link.

1. Brake/Reverse Type

Sets whether reverse is enabled or not, and exactly how it can be accessed.

Setting 1: Reverse Lockout (Default)

This setting allows the use of reverse only after the ESC senses two seconds of neutral throttle. Use it for race practice sessions and bashing, but check with your race director to see if this setting is allowed for actual racing.

Setting 2: Forward/Brake Only

Use this setting for actual sanctioned racing events. Reverse cannot be accessed under any circumstances with this setting.

Setting 3: Forward/Brake/Reverse

Reverse or forward is accessible at any time after the ESC brakes to zero motor RPM (if the vehicle is moving).

2. Brake Amount

Sets what percentage of available braking power is applied with full brake.

Setting 1: 25% Power

Allows only 25% of available braking power at full brake.

Setting 2: 50% Power (Default)

Allows only 50% of available braking power at full brake.

Setting 3: 75% Power

Allows 75% of available braking power at full brake.

Setting 4: 100% Power

Allows all available braking power at full brake.



3. Reverse Amount

Sets how much power will be applied in the reverse direction, if reverse is enabled.

Setting 1: 25% Power

Allows only 25% power in reverse.

Setting 2: 50% Power (Default)

Allows only 50% power in reverse.

Setting 3: 75% Power

Allows only 75% power in reverse.

Setting 4: 100% Power

Allows 100% power in reverse.



4. Punch/Traction Control

This setting controls how fast the throttle position within the ESC can be changed over time. This smooths high power starts and limits punch somewhat. As explained previously, acceleration is a matter of battery capability, but you may not want 100% of what the battery can deliver in every situation.

This setting is crucial to drag racing as it can be used as a "traction control" to match traction conditions.

The lower the setting, the less throttle change limiting there is. For pure burnout and wheelie action, use a very low setting or the disabled setting. For softer acceleration or for a low-grip surface, raise it up to a higher setting.

Don't be afraid to use these settings! It may be fun to watch your car do back flips, but sooner or later you are going to want to be able to drive it under some semblance of control.

This is *THE* setting to put you back into control.

Setting 1: High

Very limited acceleration. Good for 2WD vehicles on hard dirt, or for general bashing when you want to be gentle on the transmission.

Setting 2: Medium

Medium acceleration limiting. Good for 2WD vehicles on soft dirt, and 4WD vehicles on hard dirt.

Setting 3: Low

Light acceleration limiting. Good for 4WD vehicles on soft dirt.

Setting 4: Lowest

Very light acceleration limiting. Good for most situations including 4WD vehicles on dirt and

asphalt, and 2WD vehicles on asphalt.

Setting 5: Disabled (Default)

Acceleration is only limited by battery ability. This setting is good for 4WD sedans on carpet, high traction drag racing, or bashing where unlimited wheelie power is desired.

5. Drag Brake

Sets the amount of drag brake applied at neutral throttle to simulate the slight braking effect of a neutral brushed motor while coasting.

Setting 1: Drag Brake OFF (Default)

Vehicle will coast with almost no resistance from the motor at neutral throttle.

Setting 2: Drag Brake 10%

Low amount of braking effect from the motor at neutral throttle.

Setting 3: Drag Brake 20%

More braking effect from the motor at neutral throttle.

Setting 4: Drag Brake 30%

Fairly high braking effect from the motor at neutral throttle.

Setting 5: Drag Brake 40%

High braking effect from the motor at neutral throttle.

6. Dead Band (NEW!)

You may adjust the neutral throttle "width" of the controller with this setting. Smaller values make the controller enter forward or brake/reverse with a smaller movement of your throttle trigger for finer control. Be careful, some transmitters offer better resolution than others, if your ESC will not respond to "Neutral" throttle, make this setting larger.

Setting 1: Large - 0.1500 ms

Setting 2: Normal - 0.1000 ms (Default)

Setting 3: Small - 0.0750 ms

Setting 4: Very Small - 0.0500 ms

Setting 5: Smallest - 0.0250 ms

7. Cutoff Voltage

Sets the voltage at which the ESC lowers or removes power to the motor in order to either keep the battery at a safe minimum voltage (Lithium Polymer cells) or the radio system working reliably (NiCad/NiMH cells).

Setting 1: None (Default)

Does not cut off or limit the motor due to low voltage. Do not use with any Lithium Polymer packs!

Applications: Any racing or bashing situation with 6-8 cell NiCad or NiMH packs.



Use this setting ONLY with NiCad or NiMH packs. With continued driving, the radio system may eventually cease to deliver pulses to the servo and ESC, and the vehicle will not be under control.

You will irreversibly damage Lithium Polymer packs with this setting!

Setting 2: Auto-Lipo

This setting allows you to go back and forth between 2 and 3 cell lipo packs without having to change the cutoff voltage for each one. The ESC automatically sets the cutoff voltage correctly for a 2 or 3 cell pack when that pack is plugged in.

Setting 3: 5v

Cuts off/limits the motor speed/acceleration when the pack gets down to 5 volts. A good

setting for racing or bashing in any vehicle using 8-12 NiMH or NiCad packs.

Setting 4: 6v

Cuts off/limits acceleration when the pack gets down to 6 volts.



A MUST USE setting for 2 cell (7.4v) Lithium Polymer packs. You will irreversibly damage your packs using a lower cutoff voltage!

Setting 5: 9v

Cuts off/limits acceleration when the pack gets down to 9 volts.



A MUST USE setting for 3 cell (11.1v) Lithium Polymer packs. You will irreversibly damage your packs using a lower cutoff voltage!

Setting 6: 12v

Cuts off/limits acceleration when the pack gets down to 12 volts.



A MUST USE setting for 4 cell (14.8v) Lithium Polymer packs. You will irreversibly damage your packs using a lower cutoff voltage! Use of a 4 cell LiPo pack is covered under warranty ONLY on Monster Max ESCs.

B. Motor Timing

Advancing the timing on an electric motor can have varying effects. Lowering the timing advance will reduce the amp draw, increase runtime, reduce motor/battery temperature, and may slightly reduce top speed and punch. Raising the timing advance will increase amp draw, decrease runtime, increase motor/battery temperature, and may slightly increase top speed and punch.

If you are after maximum top speed, it's better to "gear up" to get it rather than advance the

timing too far.

For brushed motors, always keep this setting on NORMAL and use the end bell of the motor to "tweak" it to max RPM per the motor's instructions.

Setting 1: Lowest

A maximum efficiency setting giving long runtimes and cooler motor temps. Very useful with high Kv (low turn) motors to increase motor life and reduce motor/battery temperatures.

Setting 2: Normal (Default)

The best mix of speed, punch, and efficiency for all motors.

Setting 3: Highest

Increases amp draw, reduces runtimes, increases motor/battery temperatures, and may increase top speed/punch slightly.



Use with care, and monitor motor and battery temps often! DO NOT use any setting above "normal" with 6000Kv or higher motors.

9. Motor Type

This setting sets which type of motor you will be using with the Castle ESC. The ESC may be damaged if this setting does not match the motor type/hook-up method in the car, and this damage is not covered under warranty.

Setting 1: Brushless (Default)

(See Figure 1: Brushless Motor Setup on page 8) Uses all three of the ESC motor wires connected to all three of the brushless motor wires. If the motor spins the wrong way with forward throttle, swap any two of the wires to get the correct direction.

Setting 2: Brushed Reversing

(See Figure 2: Reversing Brushed Motor Setup on page 10) Uses the Red and Black ESC motor

wires to connect to the (+) and (-) side of the brushed motor. If the motor spins in the wrong direction with forward throttle, reverse the motor wires for correct motor direction.

Setting 3: Brushed High Power

(See Figure 3: High Power Brushed Motor Setup on page 11) Connect all three of the ESC motor wires to the negative (-) side of the motor. You can either use a "Y" harness from the ESC battery input positive wire to connect to both the battery and the positive side of the motor, or use a single wire from the positive ESC input to the positive battery pole and then continue to the positive (+) side of the motor.



TROUBLESHOOTING

If you're still having difficulties with your Castle ESC after trying the suggestions offered here, please contact Castle Creations technical support at the e-mail or phone number in the next section.

Problem: My Castle ESC may or may not arm, but it will not calibrate to my transmitter.

Solution: Most calibration issues can be solved by changing settings on the transmitter. Make sure you have both your throttle and brake endpoints (called EPA or ATV on your radio) on the throttle channel out to between 100 to 120%. Make sure if you have a Futaba or Futaba made transmitter to have the throttle channel set to the reversed position.

Problem: My ESC calibrates for the full throttle and full brake positions but won't calibrate to the neutral throttle position (yellow LED keeps flashing).

Solution: Try moving the throttle trim one way, then the other (usually towards the throttle side is best). If your transmitter has a 50/50 and 70/30 setting for the throttle, set it for 50/50 and retry calibration. Also, if you have changed the dead band to a narrower band you may want to try going back to the "normal" setting.

Problem: My vehicle acts like it has "turbo lag" (poor acceleration/punch for the first few feet or yards, and then it "kicks in").

Solution: Make sure you're using high quality batteries and a battery connector capable of high amp flow (40-100 amps). This behavior is very typical of a battery pack that is having

difficulty providing the power your vehicle/system requires for top performance.

Use copper bars to connect cells rather than welded tabs. Copper bars have a much lower resistance.

Problem: My battery pack is plugged into the ESC and nothing is working - no steering and no throttle.

Solution: Make sure the ESC's receiver plug is plugged into channel 2 on the receiver, and that it's plugged in with the correct orientation. Double check your solder connections on the battery plug, and make sure the battery is showing good voltage.

Look for more troubleshooting tips on the Castle Creations website at:

www.castlecreations.com/support/faq.html

TECHNICAL SUPPORT

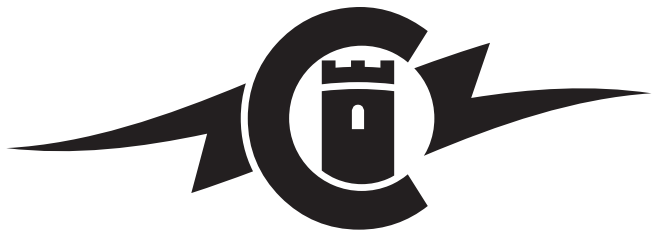
You may contact our world class technical support department 24/7 via e-mail, or from 9am to 5pm Central time Monday through Friday.

E-mail: support@castlecreations.com

Phone: (913) 390-6939

CONTACT & WARRANTY INFO

Your Castle ESC is warranted for one (1) year from date of purchase to be free from manufacturing and component defects. This warranty does not cover abuse, neglect, or damage due to incorrect wiring, over voltage, or overloading. If you have any questions, comments, or wish to return your Castle ESC for warranty or non-warranty repair or replacement, please contact Castle Creations, Inc.



Castle Creations, Inc.

235 South Kansas Avenue, Olathe, Kansas 66061 USA

www.castlecreations.com

Phone: (913) 390-6939



CASTLE CAR ESC PROGRAMMING REFERENCE

1: Brake/Reverse Type

- Option 1: Reverse Lockout (D)*
- Option 2: Forward/Brake Only
- Option 3: Forward/Brake/Reverse

2: Brake Amount

- Option 1: 25%
- Option 2: 50% (D)*
- Option 3: 75%
- Option 4: 100%

3: Reverse Amount

- Option 1: 25%
- Option 2: 50% (D)*
- Option 3: 75%
- Option 4: 100%

4: Punch Control

- Option 1: High
- Option 2: Medium
- Option 3: Low
- Option 4: Lowest
- Option 5: Disabled (D)*

5: Drag Brake

- Option 1: Disabled (D)*
- Option 2: 10%
- Option 3: 20%
- Option 4: 30%
- Option 5: 40%

6. Throttle Dead Band

- Setting 1: Large - 0.1500 ms
- Setting 2: Normal - 0.1000 ms (D)*
- Setting 3: Small - 0.0750 ms
- Setting 4: Very Small - 0.0500 ms
- Setting 5: Smallest - 0.0250 ms

7: Voltage Cutoff

- Option 1: None (D)*
- Option 2: Auto-Lipo
- Option 3: 5
- Option 4: 6
- Option 5: 9
- Option 6: 12

8: Motor Timing

- Option 1: Lowest
- Option 2: Normal (D)*
- Option 3: Highest

9: Motor Type

- Option 1: Brushless (D)*
- Option 2: Brushed Reversing
- Option 3: Brushed High Power

*Denotes Default Setting



castlecreations.com

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