



Driver's Ed Guide

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

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

ALWAYS disconnect the battery from the ESC when you are finished enjoying your vehicle. The switch on the ESC controls the power that is delivered to the receiver and servo(s). 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. Ghost-RC is not responsible for any damage as a result of batteries left plugged in to your ESC. Your Ghost-RC ESC is programmed to sound a tone every ten seconds to remind you that it is still powered.

GETTING STARTED

1. Solder a high-quality battery connector to the ESC. See “Connectors and Power Wiring” - page 2
 2. Mount the ESC and motor into the vehicle.
 3. Connect motor to the ESC. See “Motor Wiring” – page 2-3
 4. Plug in the ESC RX lead and AUX lead. See “Radio Connection” - page 3
 5. Calibrate your ESC to your radio. See “How to Calibrate the ESC” - page 4
- You are now ready to go!

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EASY TO USE, SOPHISTICATED ENOUGH TO WIN EVERYTHING! Ghost-RC 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 USB adapter via a standard Type-C data capable USB cable. With Castle Link software you can tune the ESC exactly with point-and-click ease!

Please make sure to read this guide completely to get the most from your Ghost-RC ESC.

A WORD ABOUT BATTERIES

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!

Recommended capacity for Outlaw drag racing 8000mAh or higher. 120C continuous discharge is highly recommended. Batteries with 8 AWG wire is also highly recommended.

Top-of-the-line cells are required for this system to operate normally, using underpowered, old, and/or damaged batteries will negatively impact performance and can lead to component failure.

CAPACITOR PACK

A capacitor pack must be used with Ghost-RC ESCs when used in drag racing applications. Install the cap pack as close as possible to the ESC. The further away from the ESC the less effective it becomes.

CONNECTORS AND POWER WIRING

Appropriately sized and high quality battery connectors are just as important as your batteries. If the connector is too small, think of it like a clog in a pipe. It will limit energy flow and negatively impact performance; it can even damage the ESC. Ghost-RC highly recommends QS8 anti-spark connectors or 8mm bullets.

Make battery wires as short as possible. This reduces resistance and voltage loss to the ESC, increasing performance.

Your Ghost-RC ESC has 6.5mm female bullet connectors on the board. You must use matching, high-quality 6.5mm male connectors on the motor wires.

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!

MOTOR WIRING

Brushless Motor Wiring, Sensorless (Figure 1)

For sensorless brushless motor connections, the three wires from the ESC to the motor have no polarity.

Connect the three wires coming from the motor to the ESC's motor connections in any order. (Figure 1)

Brushless Motor Wiring, Sensored Motors (Figure 2):

For sensored brushless motor connections, the three wires from the ESC to the motor DO HAVE polarity. Connect the ESC to the motor. Connect A to A, B to B, C to C, and install the sensor wire to the back of the motor. In order to change the motor direction, use Castle Link Link or transmitter programming.

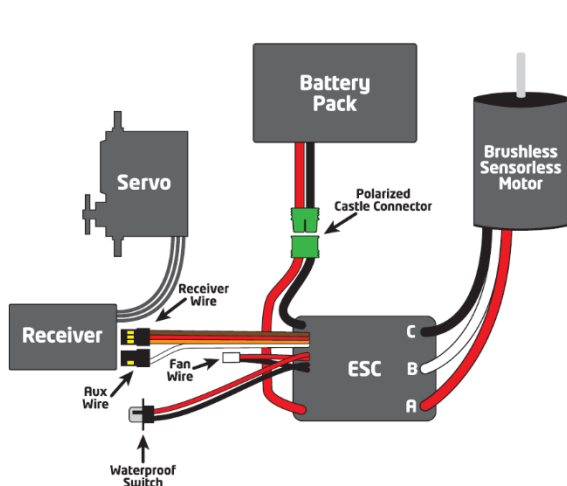


Figure 1: Sensorless

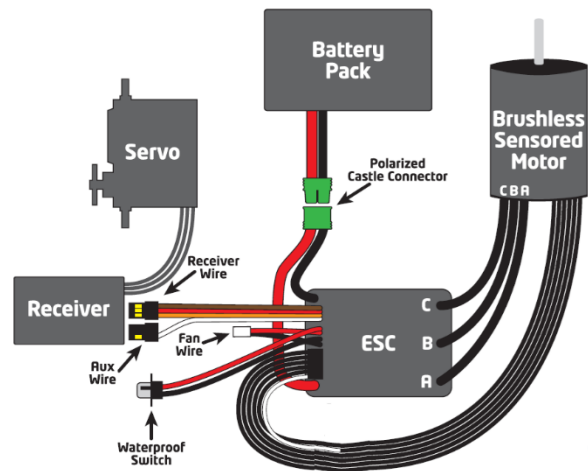


Figure 2: Sensored

RADIO CONNECTION

RX Wire (Orange/Red/Brown)

Your Ghost-RC ESC RX wire plugs into the throttle channel of your receiver. This is usually channel 2. Your Ghost-RC ESC provides power to the receiver and the steering servo. No separate receiver battery is needed to power the radio system. Some servos can draw more current than the on-board BEC can handle and will require an external BEC or receiver pack.

AUX Wire (White Signal Wire)

The Auxiliary or "AUX" wire allows you to adjust a setting "on-the fly" using an auxiliary channel on your receiver. The AUX wire function is programmable via Castle Link.

Ghost-RC ESC receiver plugs are designed to work with any current receiver, but you will need to make sure the polarity is correct when connected to the receiver. The ESC signal wire is orange or white, the positive wire is red, and the negative wire is brown. Check your receiver documentation for correct connection polarity if it's not marked.

Most receivers use negative (brown) towards the outside of the case and signal (orange/ white) towards the channel markings on the case.

Ghost-RC ESC / Radio Calibration

Individual transmitter signals for neutral, full throttle, and full brake vary. You must calibrate your Ghost-RC ESC so that it will operate 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 the transmitter's throttle settings. The ESC may also need to be calibrated after updating to new software via Castle Link.

If you are using a Futaba-made 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. Please start by zeroing out any throttle trim that you may have set in your transmitter.

How To Calibrate The ESC

Safety First! Remove the pinion prior to calibration.

Step 1: Start with the transmitter ON, the battery disconnected, and the ESC switch in the OFF position (if your ESC has a switch).

Step 2: Plug a battery into the ESC. If your ESC does not have a switch, hold full throttle on your transmitter before plugging in the battery.

Step 3: Hold full throttle on the transmitter and turn the ESC 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 sounds are played by the ESC vibrating the motor).

Step 4: If the ESC's voltage cutoff is set to Auto-LiPo (the default setting), then the ESC will emit a sequence of beeps indicating the number of battery cells. If the number of beeps does NOT match the number of cells, disconnect the battery and confirm that it is fully charged.

Step 5: After the beeps, the green LED on the ESC will blink rapidly. If the red LED is blinking instead, reverse your throttle channel. After a couple of seconds, the motor will "ring" four times in a row. Next, the ESC will rapidly blink the red LED and the motor will beep continuously. 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 6: Move the throttle trigger to the full brake position and hold full brake. After a few seconds, the motor will "ring" four times rapidly. The ESC will then blink the yellow LED and the motor will beep continuously. At this point, the full brake endpoint has been set within the ESC and now it's looking for the neutral endpoint (yellow LED blinking).

STEP 7: Now relax the trigger to the neutral position. The ESC will now "ring" four times and flash the yellow LED rapidly to accept the neutral position. After accepting the neutral position, the ESC will "ring" twice, flash all the LEDs, and the yellow LED will illuminate. This is the arming tone and LED indication that the ESC IS NOW ARMED and the vehicle 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 "ring" followed by battery cell count beeps (only in Auto-LiPo mode), and then after the arming delay the ESC will "ring" twice, indicating it is ARMED and will respond to throttle application.

If you have problems calibrating your transmitter with the Ghost-RC ESC, please see the troubleshooting guide on page 8, visit www.Ghost-rc.com/

Final Check

Once you are calibrated and armed, do one last check before going out and experiencing the Ghost-RC 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, then you are ready for a test run. If the ESC shows the green LED with throttle, but the wheels spin in the wrong direction, you'll need to change the motor direction. See Motor Wiring, pages 3-4. Closely monitor your ESC and motor temperatures during the first run to ensure they stay within the safe operating limits.

AUDIBLE ALERTS

Ghost-RC ESCs provide you with audible alerts that notify you of various issues and error conditions to help you diagnose problems in your setup. These alerts only occur when the vehicle is stopped and the ESC is in neutral. They repeat every five seconds until the ESC's power is cycled.

Your ESC will emit a single beep every ten seconds to let you know the ESC is powered. This is NOT an error condition. This is simply a reminder to disconnect the battery.

If you wish to silence these features, they can be disabled using Castle Link. See "Idle/Error Beeping" on the "Basic" tab in Castle Link.

The audible alerts consist of a sequence of long and short beeps, repeating every five seconds. To determine the cause of the alert, record • for short beeps and - for long beeps, then match the code you heard to the following list.

The red LED will always blink, even if silenced.

Audible Tone	Key	Description
• •	Start Fail	The ESC was unable to start the motor. Check your motor wiring and make sure there is nothing interfering with your drive train.
• • •	Sensors Lost	The ESC detected a bad signal for the motor's sensor. This can be caused by not connecting the sensor wire, a bad sensor wire, or a bad sensor in the motor.
• • -	Radio Glitch	The ESC is not detecting a valid radio signal. Ensure the ESC is plugged into the correct channel and orientation on the receiver. Make sure the "Link Live" feature is disabled. Can also be caused by a bad receiver harness on the ESC.
• - •	Over-Temperature	The ESC reached an over-temperature condition. Occurs when operated under too high a load or operated without proper cooling airflow.
- • •	Auxiliary Wire Radio Glitch	The ESC detected unusual signals or loss of signal on the AUX wire. Note: if you are not utilizing the AUX wire function, disable the AUX wire mode via Castle Link.

– • – **BEC Over- Temperature** The ESC detected that the integrated BEC is overheating due to current draw above the rating of the BEC. This is commonly caused by faulty servos or a servo that exceeds the amp rating of the BEC. (e.g. digital servos with very high torque/speed values)

– • **Motor Over- Temperature** The ESC detected that the sensed motor's temperature has exceeded the Motor Temperature Cutoff value set in Castle Link. Motor Temperature Cutoff is only available when running a sensed motor. Motor temperature sensors vary. Always check motor temperatures periodically after making system adjustments. This alert is disabled by default and can be adjusted via Castle Link.

DATA LOGGING*

Ghost-RC ESCs are able to measure and record important power system information during your race, turn-by-turn. After your run, you can download and analyze this log using Castle Link. You will be able to inspect many parameters including battery voltage, motor RPM, ESC temperature, motor temperature**, and more.

Recording Duration

The ESC writes the recorded data to a limited amount of memory. Recording time varies with the parameters selected and the sample rate. The ESC compresses data wherever possible; periods at idle or constant throttle do not take very much memory. Use Castle Link to select or deselect parameters logged by the ESC. Cobra Series ESCs do not “fill up” and will overwrite the oldest data.

Automatic Data Reset (X-series only)

At power up, Automatic Data Reset checks the amount of memory used. If that value is more than the programmed limit, the controller will erase the entire data log. This ensures that the last few runs are saved to memory and available for analysis. The ESC will emit a long beep tone after the arming “rings” to alert you that the data log was erased.

Manual Data Reset (X-series only)

Recorded data can be erased manually by holding your transmitter at full reverse when powering up the ESC. The motor will emit the normal power up chimes. Leave throttle at full reverse for six seconds and the motor will emit a long beep tone. The ESC will then erase the entire data log. Return the throttle to neutral and the ESC will arm.

AUXILIARY WIRE MODES

Your ESC can be connected to an additional radio channel using the AUX wire (white signal wire) to adjust driving parameters on-the-fly. Enable this feature with Castle Link to dynamically reign in your vehicle's power, enable reversing, and more.

The AUX signal has fixed endpoints of 1.1ms and 1.9ms, so there's no need to calibrate anything to use the AUX wire. If the AUX wire becomes disconnected from the receiver, the ESC will use the value selected in Castle Link instead.

Max Throttle Adjustment

The ESC's maximum power is scaled from 10% to 100% depending on the signal received on the AUX wire. Perfect for passing the controls to children, neighbors, or your boss.

Max Reverse Adjustment - The ESC's maximum reverse power is scaled from 10% to 100% depending on the signal received on the AUX wire.

Max Brake Adjustment - The ESC's maximum braking power is scaled from 10% to 100% depending on the signal received on the AUX wire.

Drag Brake Adjustment - The ESC's drag brake setting is scaled from 0% to full brake depending on the signal received on the AUX wire.

Reverse Enable/Disable (Only works in modes with reverse) - Reversing is disabled when the controller receives an AUX wire signal above 50% (>1.5ms). When the controller receives an AUX wire signal below 50% (<1.5ms) or if the AUX wire is disconnected, reverse capability is enabled.

Torque Control Adjustment - The ESC's torque control setting is scaled from 0.1 to 5.0 depending on the signal received on the AUX wire. Torque control is disabled when the input exceeds 1.9ms. Great for finding the perfect torque control setting for your track and tires.
(Motor test must be performed before using this setting.)

TUNING WITH CASTLE LINK™

All Ghost-RC ESCs may be connected to your PC using the Castle Link USB adapter. X-series ESCs require the Castle Link V3 USB adapter; Cobra series ESCs require the Castle Link V4 adapter. The Castle Link 2 software will give you access to a whole new world of tuning options. You may use Castle Link to tune your throttle and brake curves, set your drag brake feel, and use the incredible Torque Limit to keep the front end of your car on the ground with all the power you have at your command. As new software becomes available, you can install it in your Ghost-RC ESC for new and updated features. All of this ensures your Ghost-RC ESC will be the best that it can be.

Castle Link Quick Connect

Experienced modelers go to great lengths to tie down their servo and throttle leads - and some find that unplugging a Ghost-RC controller from the receiver disrupts all their work. The Castle Link Quick Connect allows you to connect the Castle Link USB adapter without removing wires from your receiver. Visit www.castlecreations.com/quickconnect to purchase online.

Using Castle Link

Disconnect the RX (Orange/Red/Brown) wire from your receiver and connect it to the Castle Link USB adapter. Align the brown wire with the “-” negative symbol on the Castle Link circuit board.

TROUBLESHOOTING

If you're still having difficulties with your Ghost-RC ESC after trying the suggestions offered here, please contact Ghost-RC technical support in the next section.

Problem: My Ghost-RC 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 set to between 100 to 120%. If you have a Futaba-made transmitter, make sure to have the throttle channel set to the reversed position. See Ghost-RC ESC/Radio Calibration on page 4.

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 with single beeps).

Solution: Try moving the throttle trim one way, then the other. If your transmitter has a 50/50 and 70/30 setting for the throttle, set it for 50/50 and retry calibration. If you have changed the throttle dead band to a narrower band using Castle Link, you may want to try going back to the "normal" setting.

If you have changed the motor type to "Sensored only" using Castle Link and the ESC is not beeping, the yellow flashing light at neutral is normal and the ESC is ready for use.

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

Solution: Make sure the ESC's RX wire 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 charged.

For more troubleshooting tips visit www.Ghost-RC.com/

GHOST-RC TECHNICAL SUPPORT

You may contact our world-class technical support department via e-mail anytime.

Website: www.Ghost-RC.com

E-mail: <https://www.ghost-rc.com/contact>