TECH ARTICLE

MANUALLY PROGRAMMING AE-3 ESC

Follow these steps to change settings on your Axial AE-3 ESC without a computer.

CAUTION: *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 (None) within the first section (Voltage Cutoff). 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 and explanations:
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.

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.

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6. Dead Band
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
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 (Default)
This setting automatically detects the number of LiPo cells you have plugged in. It will automatically set the cut-off to 3.2 volts per cell. It will beep the number of cells in your LiPo pack between the initialization tones and the arming tones on initial power up the controller.
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.
Setting 5 : 9v
Cuts off/limits acceleration when the pack gets down to 9 volts.
Setting 6 : 12v
Cuts off/limits acceleration when the pack gets down to 12 volts.
Setting 6 : 12v
Cuts off/limits acceleration when the pack gets down to 12 volts.

8. 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 6 000Kv 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.

Axial ESC Programming Reference:

1: Brake/Reverse Type	2: Brake Amount	3: Reverse Amount
Option 1 : Reverse Lockout (D)*	Option 1 : 25%	Option 1 : 25%
Option 2 : Forward/Brake Only	Option 2 : 50% (D)*	Option 2 : 50% (D)*
Option 3 : Forward/Brake/Reverse	Option 3 : 75%	Option 3 : 75%
	Option 4 : 100%	Option 4 : 100%

4: Punch Control	5: Drag Brake	6. Throttle Dead Band
Option 1 : High	Option 1 : Disabled (D)*	Option 1: Large - 0.1500 ms
Option 2 : Medium	Option 2 : 10%	Option 2: Normal - 0.1000 ms (D)*
Option 3 : Low	Option 3 : 20%	Option 3: Small - 0.0750 ms
Option 4 : Lowest	Option 4 : 30%	Option 4: Very Small - 0.0500 ms
Option 5 : Disabled (D)*	Option 5 : 40%	Option 5: Smallest - 0.0250 ms

7: Voltage Cutoff	8: Motor Timing	9: Motor Type
Option 1: None	Option 1: Lowest	Option 1: Brushless (D)*
Option 2: Auto-Lipo (D)*	Option 2: Normal (D)*	Option 2: Brushed Reversing
Option 3: 5	Option 3: Highest	Option 3: Brushed High Power
Option 4: 6		
Option 5: 9		
Option 6: 12	*Denotes Default Setting	