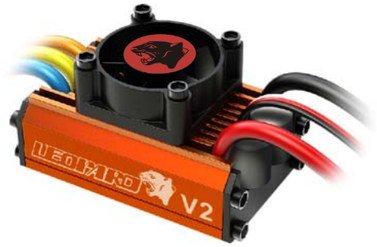
INSTRUCTION MANUAL

LEOPARD

Version 2

1/10 SCALE BRUSHLESS ESC



INTRODUCTION

Leopard 60A ESC is high performance 1/10 Scale Brushless Motor Electronic Speed Control. The speed controller is specially designed to offer high power and high efficiency combined with low weight and compact dimensions.

SAFETY NOTE

⚠ **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, cloth, clear from the gear train and wheels of an armed high performance system.

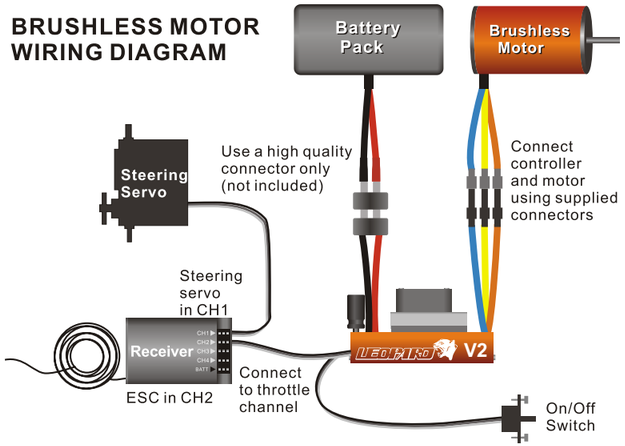
- **WATER & ELECTRONICS DON'T MIX*!***
  Never allow water, moisture, or other foreign materials to get inside ESC, motor, or on the PC Boards.
  Water damage will void the warranty!
- **NO REVERSE VOLTAGE*!***
  Reverse battery polarity can damage ESC & void warranty. Disconnect battery immediately if a reverse connection occurs.
- **DISCONNECT BATTERIES WHEN NOT IN USE**
  Always disconnect the battery pack from the speed control when not in use to avoid short circuits and possible fire hazard.
- **2 - 3 LI-PO CELLS ONLY**
  Never use fewer than 2 or more than 3 LIPO cells in the vehicle's main battery pack. The Leopard 60A ESC handles up to 3S LIPO input (12.6 Volts MAX).
- **TRANSMITTER ON FIRST**
  Turn on the transmitter first THEN turn on the speed control.
- **1/10 SCALE**
  The Leopard 60A ESC is intended for 1/10 scale vehicles.
- **INSULATE WIRES**
  Always insulate exposed wiring with heat shrink tubing or electrical tape to prevent short circuits, which can damage ESC.

CONNECTIONS

Brushless Motor Wiring

Connect the blue, yellow and orange motor wires to the motor. 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.

BRUSHLESS MOTOR WIRING DIAGRAM



ESC/TRANSMITER CALIBRATION

IMPORTANT NOTE: Calibration is necessary for the first use of the ESC, or whenever used with a new/different transmitter.

For users with a Futaba Transmitter, you must reverse the throttle channel signal on your transmitter. Please refer to your Futaba instructions.

Individual transmitter's signals for full throttle, full brake and neutral vary. You must calibrate your ESC so that it will operate more effectively with you transmitter.

How to Calibrate ESC

- ESC switch OFF.
- Turn on the Transmitter.
- Hold full throttle on your transmitter and turn the ESC's switch ON. Keep holding full throttle on the transmitter. The ESC will ring the initialization tones.
- Wait 2 seconds
- The motor will rings 4 times indicating full throttle measured.
- Whiles beeping,indicating it's time to push full brake. Move throttle trigger to full brake and wait few seconds, the ESC will rings 4 times indicating full brake measure.
- Whiles beeping,indicating it's time for neutral. Relax trigger to neutral (center). The ESC will now ring 4 times and flash the yellow LED rapidly to accept the neutral position.
- ESC will ring twice indicating that it is armed.

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

ESC PROGRAMMING

1)Programming Card(Optional Part)

Programming Card allows you to modify the most commonly used settings in your Leopard 60A ESC controller all at the touch of a single button. No computer needed. Simply connect the Programming Card to the throttle lead of the controller and power the programming card as described below. Click the button to scroll through and change the indicated settings. All the settings will show on the programming card at once. Can't get any easier!

Instruction for Program Card

- Turn off the ESC and disconnect the throttle lead from the receiver.
- Connect the throttle lead from ESC to the 3 pin connector on the Program Card.
- Turn on the ESC to apply power to both ESC and Program Card.
- All the current settings will be displayed on the correspond LEDs. Press and release button to move between settings.
- Press and hold button to change the value for that setting.
- Turn off the ESC and disconnect the throttle lead from Program Card and connect it back to the receiver.

2)Manual Programming

Manual Programming Leopard 60A ESC is as simple as answering a few questions. The Leopard 60A ESC asks questing by beeping a setting number, followed by the possible setting values. There are eight settings that can be programmed in the Leopard 60A ESC.

You must answer "yes" (full throttle) or "no" (full brake) to the setting values as they are presented by Leopard 60A ESC. When you enter programming mode the ESC will emit a sequence of beeps that tell you which programming step you are in. There are two parts to the beep sequence. The first set of beeps indicates the 'Setting Number (Question), e.g. Brake/Reverse Type, and the second set of beeps indicates a Setting Value, e.g. Reverse Lockout. Answering "No" to a Setting value will cause the ESC to ask for the next value 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.

Yes(full throttle)

No(full brake)

Note: If you answer "no" to all Setting Values for a particular Setting Number, the ESC will keep whatever value had been previously programmed. Only by answering "Yes" to a Setting Value will the ESC store/change that value.

How to Enter Programming Mode

- Plug Battery into the Leopard 60A ESC
- Hold full throttle on your transmitter
- Turn the ESC switch ON
- Leopard 60A ESC rings once
- Wait few seconds
- Leopard 60A ESC rings 4 times indicating that it is ready for CALIBRATION mode
- Continue to hold full throttle
- Leopard 60A ESC beeping
- Wait another few seconds
- Leopard 60A ESC rings 4 times

- Leopard 60A ESC beeping indication that you are in PROGRAMMING mode
- Let trigger go neutral (Centre)

At this point the Leopard 60A ESC will be flashing/beeping the following sequence: Beep-Pause-Beep... and then repeats.
This indicates that you are at Question 1 and it is asking to accept/reject value 1.

When answering a question, you will need to move the trigger to yes (full throttle) position or the no (full brake) position and keep it there for about 3 seconds. When the ESC has accepted your answer it will confirm your reply by emitting a beeping tone. Release the trigger allowing it to go to Neutral to confirm that you are ready for ESC to ask you next question. You are not required to continue through all eight programming options. For example, if you wish only to change the Brake/Reverse Type (Option 1) then after programming that setting you can disconnect power from the ESC and you're ready to run. Disconnecting the controller in the middle of programming simply retains the values for the remaining programming options that were previously set up.

Programmable Features

Question(Setting)	Value	Description
1)Brake/Reverse Type	***1)Reverse Lockout(D)****	Allow the use of reverse only after the ESC senses two seconds of neutral throttle.
	2)Forward/Brake Only	No reverse function.
	3)Forward/Brake/Reverse	Reverse or forward is accessible at any time after the ESC brakes to zero motor RPM.
2)Brake Amount	1)25%	Allow only 25% of available braking power at full brake.
	2)50%(D)*	Allow only 50% of available braking power at full brake.
	3)75%	Allow only 75% of available braking power at full brake.
	4)100%	Allow all available braking power.
3)Reverse Amount	1)25%	Allow only 25% power in reverse.
	2)50%(D)*	Allow only 50% power in reverse.
	3)75%	Allow only 75% power in reverse.
	4)100%	Allow all power in reverse.
4)Punch Control	1)High	Very Limited acceleration. Good for 2WD vehicles.
	2)Medium	Medium acceleration limiting.
	3)Low	Light acceleration limiting. Good for 4WD vehicles on soft dirt.
	4)Lowest	Very light acceleration limiting. Good for most situation.
	5)Disable(D)*	Acceleration is only limited by battery ability. This setting is good for 4WD on high traction drag racing.
5)Drag Brake	***1)Disable(D)****	Vehicle will coast with almost no resistance from the motor at neutral throttle.
	2)10%	Low amount of braking effect from the motor at neutral throttle.
	3)20%	More braking effect from the motor at neutral throttle.
	4)30%	Fairly high braking effect from the motor at neutral throttle.
	5)40%	High braking effect from the motor at neutral throttle.
6)Throttle Dead Band	Large	0.1500ms
	Normal(D)*	0.1000ms
	Small	0.0750ms
	Very Small	0.0500ms
	Smallest	0.0250ms
7)Voltage Cutoff	1)None	Does not cut off or limit the motor due to low voltage. Use this setting ONLY with NiCad or NiMH Packs. Do not use with any LiPo Packs!
	2)Auto-Lipo(D)*	Automatically detects the number of LiPo cells you have plugged in.
	3)5V	Cuts off/limits acceleration when the pack gets down to 5 volts.
	4)6V	Cuts off/limits acceleration when the pack gets down to 6 volts. A must use setting for 2 cells LiPo packs.
	5)9V	Cuts off/limits acceleration when the pack gets down to 9 volts. A must use setting for 3 LiPo packs
	6)12V	Cuts off/limits acceleration when the pack gets down to 12 volts.
8)Motor Timing	1)Lowest	A maximum efficiency setting giving long runtimes and cooler motor temperature.
	2)Normal(D)*	The best mix of speed, punch and efficiency for all motors.
	3)Highest	Increases ampere draw, reduces runtimes, increase motor temperatures and my increase top speed/punch slightly.

Note: Factory Defaults are indicated by asterisk (D)*

SPEED CONTROL SPECIFICATION

Controls, Leopard 60A ESC	Fwd/Brk or Fwd/Brk/Rev
Input Power (Cells)	2-3S LiPo, 4-8 NiCd/NiMH
Brake	Proportional
On Resistance,Brushless	0.001 Ohm Per Phase
Continuous / Burst Current	60 Amp / 90Amp
Linear BEC	5 Volts, 2 Amp
Input Power (Cells) 2S LiPo 3S LiPo	Motor Limits On-road: ⩾9.0T Off-road: ⩾10T On-road: ⩾10.0T Off-road: ⩾13T
Thermal Overload Protection	Yes
Dimensions(LxWxH)	51.6x30x27.4mm (2.03x1.18x1.08in)
Weight (With wires)	78g (2.75oz)

TROUBLE SHOOTING

***Problem**: My LEOPARD 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.*

Solution: Try moving the throttle trim one way, then the other (usually to wards 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 battery pack is plugged into the ESC and nothing is working*

Solution: Make sure the ESC's receiver plug is plugged into channel 2 on the receiver with the correct orientation. Check solder connections and make sure the battery is showing good voltage.

PRODUCT WARRANTY

The Leopard 60A ESC Brushless ESC is guaranteed to be free from defects in materials or workmanship for a period of 90 Days from the original date of purchase (verified by dated, itemized sales receipt). Warranty does not cover incorrect installation, components worn by use, damage to case or exposed circuit boards, damage due to timing, damage from using more than 3 Li-Po cells input voltage, cross-connection of battery/motor power wires, overheating solder tabs, reverse voltage application, improper use or installation of external BEC, damage resulting from thermal overload or short-circuiting motor, damage from incorrect installation of FET servo or receiver battery pack, tampering with internal electronics, allowing water, moisture, or any other foreign material to enter ESC or get onto the PC board, incorrect installation/wiring of input plug plastic, allowing exposed wiring or solder tabs to short-circuit, or any damage caused by a crash, flooding or natural disaster. Because SKYRC has no control over the connection & use of the speed control or other related electronics, no liability may be assumed nor will be

accepted for any damage resulting from the use of this product.Every SKYRC speed control & motor is thoroughly tested & cycled before leaving our facility and is, therefore, considered operational. By the act of connecting/operating speed control, user accepts all resulting liability. In no case shall our liability exceed the product's original cost.

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Manufactured by
SKYRC TECHNOLOGY CO., LTD.
www.skyrc.com

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