

# **USER MANUAL**

## **TeamAHK SERIES**

### **SENSORLESS BRUSHLESS**

### **SPEED CONTROLLER**

### **FOR CAR AND TRUCK**

Thanks for purchasing a “TeamAHK” series Electronic Speed Controller (ESC). This device can be very dangerous, so please read this manual carefully!! We have no control over the correct use, installation, application, or maintenance of our products. Therefore we shall assume no liability for any damages, losses or costs resulting from the use of this product.

#### **FEATURES**

1. Specifically designed for RC cars and trucks, with excellent start-up, acceleration and linearity features.
2. Compatible with sensorless brushless motors.
3. 3 running modes for different applications (“Forward with Brake” mode, “Forward/Reverse with Brake” mode and “Rock Crawler” Mode).
4. 4 levels of maximum reverse force adjustment.
5. Proportional ABS brake function with 4 levels of maximum brake force adjustment, 8 levels of drag-brake force adjustment, and 4 levels of initial brake force adjustment.
6. 9 start modes (“Punch”) from “Soft” to “Very aggressive”.
7. Multiple protection features: Low voltage cut-off protection for lithium or nickel battery/Over –heat protection/Throttle signal loss protection/Motor blocked protection.
8. 8 levels of timing adjustment.
9. User programmable. Several program methods are supported, such as: The “SET” button on the ESC and the digital LED program card. The program card is pocket-sized and has a user friendly interface.
10. Waterproof and dustproof.

Model	TURNIGY-18A-SL	TURNIGY-25A-SL	TURNIGY-35A-SL	TURNIGY-60A-SL
Cont. Current	18A	25A	35A	60A
Burst Current	50A	90A	190A	380A
Resistance	0.01 ohm	0.005 ohm	0.0015 ohm	0.0007 ohm
Suitable Car	1/18, 1/16 car		1/10 car	
Suitable Brushless Motor	2 cells Lipo 6 cells NiMH	On-road: ≥12T Off-road: ≥18T 2030 size motor	On-road: ≥9T Off-road: ≥12T 3650 size motor	On-road: ≥5.5T Off-road: ≥8.5T 3650 size motor
	3 cells Lipo 9 cells NiMH	On-road: ≥18T Off-road: ≥24T 2030 size motor	On-road: ≥12T Off-road: ≥18T 3650 size motor	On-road: ≥8.5T Off-road: ≥13T 3650 size motor
Battery	4-9 Cells NiMH or 2-3 Cells Li-Po 1) For 4-6 cells NiMH or 2 cells Lipo: You needn't change the fan combined with the ESC; 2) For 7-9 cell NiMH or 2 cells Lipo: You must change the fan combined with the controller because it cannot work with such a high voltage, so please choose a high voltage fan or supply the fan from the receiver (+5V); (*Note1)			
BEC Output	6V/1A		6V/1.5A	
Motor Type	Sensorless Brushless Motor			
Dimension	31.5* 24* 15	31.5* 27.5* 16	31.5* 27.5* 24 (The height of fan is not included)	
Weight	19g (W/O wires)	23g (W/O wires)	30g (W/O wires)	32g (W/O wires)

Note1: For information about the high voltage cooling fan, please refer to the brief introduction on page 3.

## Using Your New ESC

### 1. Connect the ESC, motor, receiver, battery and servo according to the following diagram. "+" and "-"

wires of the ESC are connected with the battery pack, and #A, #B and #C are connected with the motor wires. The "SET" button is used for programming the ESC. The black, red and white control cable is connected to the throttle channel of the receiver (Usually CH2).

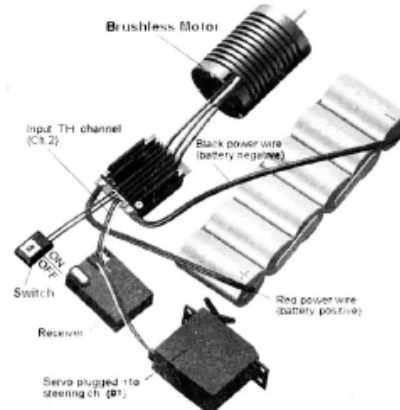
The #A, #B, #C wires of the ESC and be connected to the motor wires freely (without any order). If the motor runs in the opposite direction, please swap any two wire connections.

**Note: You can "reverse" the throttle channel on your transmitter and the motor will run the opposite way. Please calibrate the throttle range again after changing the direction of the throttle channel.**

### 2. Throttle Range Setting (Throttle Range Calibration)

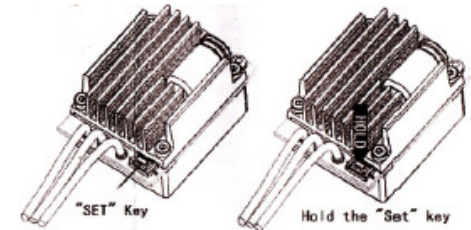
In order to make the ESC operate within the throttle range, you must calibrate it when:

- 1) Installing a new ESC.
- 2) Using a different or new transmitter.
- 3) Changing the settings of the neutral position of the throttle stick, ATV or EPA parameters, etc change.

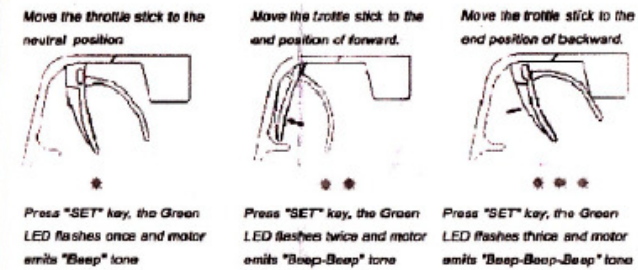


These are 3 points need to be set, "Forward", "Reverse" and "Neutral". The following pictures show how to set the throttle range with a Futaba™ transmitter.

- A) Switch off the ESC, turn on the transmitter, set the direction of throttle channel to "REV", set the "EPA/ATV" value of throttle channel to "100%", and **disable the "ABS" brake function** of your transmitter. (\*Note2)
- B) Hold the "SET" key and then switch on the ESC, when the red LED begins to flash, release the key immediately. (\*Note3) (Please refer to the picture on the right side)



- C) Set the THREE points according to the steps shown in the picture on the right side.
  - 1) Neutral point
  - 2) End point of forward direction
  - 3) End point of backward direction
- D) When the process of calibration is finished, the motor can be started after 3 seconds.



*Note: If you don't release the "SET" key after the red LED begins to flash, the ESC will enter the program mode. To get out switch off the ESC and re-calibrate the throttle range again from step A to step D.*  
*Note: The "SET" key of the TeamAHK ESC is beside the main switch of the controller.*

### 3. The LED Status in Normal Running

- a) In normal use, if the throttle is in the neutral position neither the red or green LED lights up.
- b) The red LED lights up when the car is run forward or backward and it will flash quickly when the car is braking.
- c) The green LED lights up when the throttle stick is moved to the top point of the forward zone.

### [ALERT TONES]

1. Abnormal Input Voltage: The ESC begins to check the input voltage when powered on. If it is out of the normal range, an alert tone will be emitted: "beep-, beep-, beep-" (There is a 1 second delay between every "beep-beep-" tone).
2. Abnormal Throttle Signal: When the ESC can't detect the normal throttle signal, an alert tone will be emitted: "beep-,beep-,beep-" (There is a 2 second delay between every "beep-" tone).

## [PROTECTION FUNCTION]

1. Low voltage cut-off protection: If the voltage of the lithium battery pack drops below the threshold for 2 seconds, the ESC will cut the output power. Please note that the ESC cannot be restarted if the voltage of each lithium cell is lower than 3.5V. For NiMH battery packs, if the voltage of the whole NiMH battery pack is higher than 9.0V but lower than 12V, it will be considered as a 3 cell lithium battery pack. If it is lower than 9.0V, it will be considered as a 2 cell lithium battery pack. For example, if the NiMH battery pack is 8.0V, and the threshold is set to 2.6V/Cell, it will be considered as a 2 cell lithium battery pack, and the low-voltage cut-off threshold for this NiMH battery pack is  $2.6 \times 2 = 5.2V$ .
2. Over-heat protection: When the temperature of the ESC is over a factory preset threshold for 5 seconds, the ESC will cut the output power. You can disable the over-heat protection function.
3. Throttle signal loss protection: The ESC will cut the output power if the throttle signal is lost for 0.2 seconds.

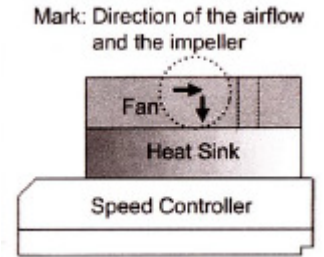
## [TROUBLESHOOTING]

Trouble	Possible Reason	Solution
After power on, motor can't work, no sound is emitted	The connections between battery pack and ESC are not correct	Check the power connections Replace the connectors
After power on, motor can't work, but emits "beep-beep-, beep-beep-" alert tone. (Every "beep-beep-" has a time interval of 1 second)	Input voltage is abnormal, too high or too low.	Check the voltage of the battery pack
After power on, motor can't work, but emits "beep-, beep-, beep-" alert tone. (Every "beep-" has a time interval of about 2 seconds)	Throttle signal is abnormal	Check the transmitter and the receiver Check the wire of the throttle channel
The motor runs in the opposite direction	The wire connections between ESC and the motor need to be changed	Swap any two wire connections between the ESC and the motor.
The motor suddenly stops running while in working state	The throttle signal is lost	Check the transmitter and the receiver Check the wire of the throttle channel
	The ESC has entered the Low Voltage Protection Mode	Replace the battery pack
Random stop or restart or irregular working state	Some connections are not reliable	Check all the connections: battery pack connections, throttle signal wire, and motor connections, etc.
	There is strong Electro - Magnetic interference in flying field.	Reset the ESC to resume normal operation. If the function could not resume, you might need to move to another area to run the car.

## [OPTIONAL ACCESSORIES FOR UPGRADE]

We provide the following optional accessories to upgrade your power system:

1. **Cooling fan (12V):** this high voltage fan is necessary when you are using a NiMH battery pack that is more than 6 cells. It is installed on the heat sink of the ESC. It helps keep the ESC cool. The picture on the right side shows the installation.  
**WARNING! Please note the original fan (5V) combined with the ESC can ONLY work with a 2 cells lithium battery pack or 4-6 cells NiMH battery pack. NEVER use it with a 3 cell lithium battery pack or NiMH battery pack that has more than 6 cells, otherwise it may be destroyed. Please check the label of the fan carefully to confirm its working voltage before using it.**



2. **Program card (Digital LED Display):** The Program card is an optional accessory which needs to be purchased separately. It has a friendly user interface. The process of programming of the ESC becomes quite easy and fast with this pocket-sized device. When you want to change one of the programmable values, just plug the control wires of the ESC into the socket of the program card (The socket is on the right corner, and marked with  $\oplus \ominus$ ). Then connect the main battery pack to the ESC. Each item's value will be shown on the program card. Use the "ITEM" and "VALUE" buttons to select the programmable items and new values, and then press the "OK" button to store the new settings in to the ESC.

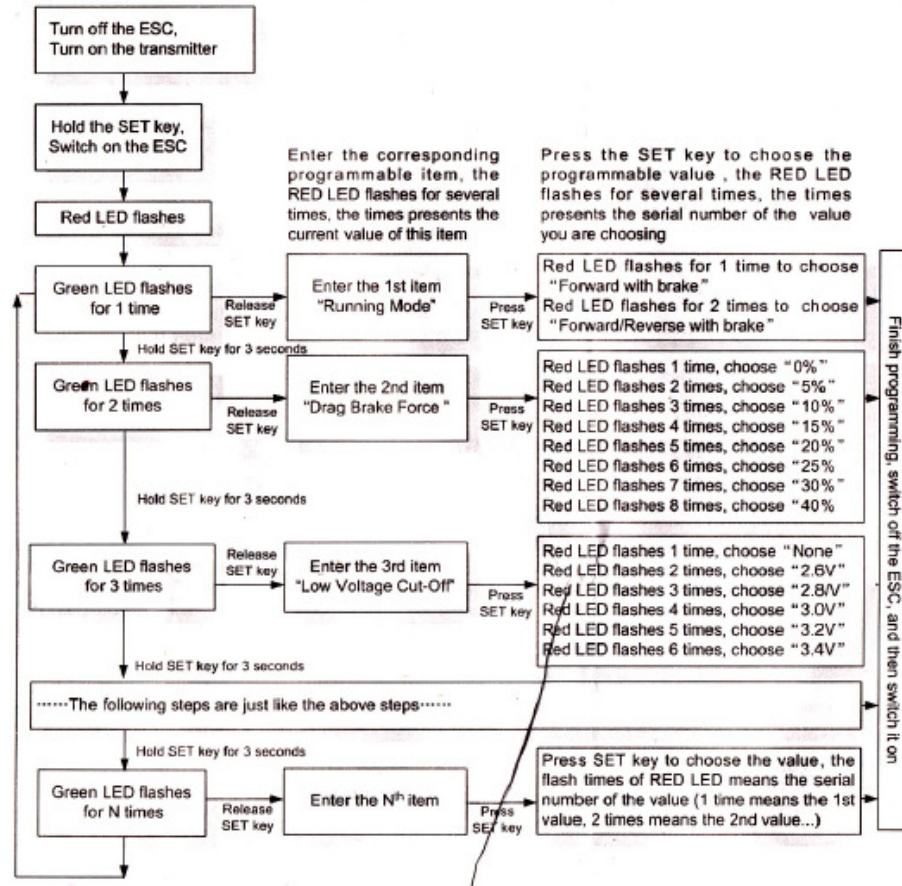


3. **Advanced program box (LCD Display):** The Advanced program box is an optional accessory which needs to be purchase separately. It has LCD display to show the programmable items, so it can work as an individual device to set the ESC and it can also work as an USB adapter to connect the ESC with a PC to update the ESC firmware online.



## [PROGRAM THE ESC]

### 1. Program Method



#### NOTE:

- During the programming process, the motor will emit a "Beep" tone at the same time the LED is flashing.
  - If the "N" is bigger than the number "5", we use a longer flash and longer "Beep---" tone to represent this.
- For example, if the LED flashes as the following:
- "A long flash + a short flash" (Motor sounds "Beep---Beep") = the No. 6 item.
  - "A long flash + 2 short flashes" (Motor sounds "Beep---BeepBeep") = the No. 7 item
  - "A long flash + 3 short flashes" (Motor sounds "Beep---BeepBeepBeep") = the No. 8 item ... and so on.

### 2. Programmable Item List

Programmable Item	Programmable Value								
	1	2	3	4	5	6	7	8	9
<b>Basic Items</b>									
1. Running Mode	Forward with Brake	<i>Forward/Reverse with Brake</i>	Rock Crawler						
2. Drag Brake Force	0%	5%	10%	20%	40%	60%	80%	100%	
3. Low Voltage Cut-Off Threshold	Non-Protection	2.6V /Cell	2.8V /Cell	<b>3.0V /Cell</b>	3.2V /Cell	3.4V /Cell			
4. Start Mode (Punch)	Level1 (Soft)	Level2	L3	L4	L5	L6	<b>L7</b>	L8	L9 (Very Aggressive)
<b>Advanced Items</b>									
5. Maximum Brake Force	25%	50%	75%	<b>100%</b>					
6. Maximum Reverse Force	25%	50%	75%	100%					
7. Initial Brake Force	<i>= Drag Brake Force</i>	0%	20%	40%					
8. Neutral Range	6% (Narrow)	<b>9% (Normal)</b>	12% (Wide)						
9. Timing	0.00 *	3.75 *	7.50 *	11.25 *	<b>15.00 *</b>	18.75 *	22.50 *	26.25 *	
10. Over-heat Protection	<b>Enable</b>	Disable							

Attention: The italic texts in the above form are the default settings.

### 3. Programmable Values

- 3.1 Running Mode:** With "Forward with Brake" mode, the car can go forward and brake, but cannot go in reverse, this mode is suitable for competition; "Forward/Reverse with Brake" mode provides reverse function, which is suitable for training. The "Rock Crawler" mode is only used for rock crawlers.
- Note:** "Forward/Reverse with Brake" mode uses the "Double-Click" method to make the car go in reverse. When you move the throttle stick from forward zone to backward zone for the first time, the ESC begins to brake the motor, the motor slows down but it is still running and not completely stopped. Reverse is NOT happening now. When the throttle stick is moved to the backward zone again (The 2<sup>nd</sup> "click"), if the motor is stopped, the reverse action will occur. The "Double-click" method can prevent mistakenly going into reverse when the brake function is frequently used in steering. With "Rock Crawler" mode, the reverse action will happen immediately when the throttle stick is moved to the backward zone. Please set the "Drag Brake Force" to 100% if you choose the "Rock Crawler" mode".
- 3.2 Drag Brake Force:** Set the amount of drag brake applied at neutral throttle to simulate the slight braking effect of a neutral brushed motor while coasting.
- 3.3 Low voltage cut-of:** The function is mainly to prevent the lithium battery pack from over discharging. When using lithium battery packs, please set a suitable value for low-voltage protection. The ESC monitors the battery's voltage. If at any time the voltage is lower than the threshold, the output power will be reduced to 50% in 2 seconds. Please drive and stop the car off the racing track as soon as possible, the ESC will completely cut off the output power in 10 seconds.

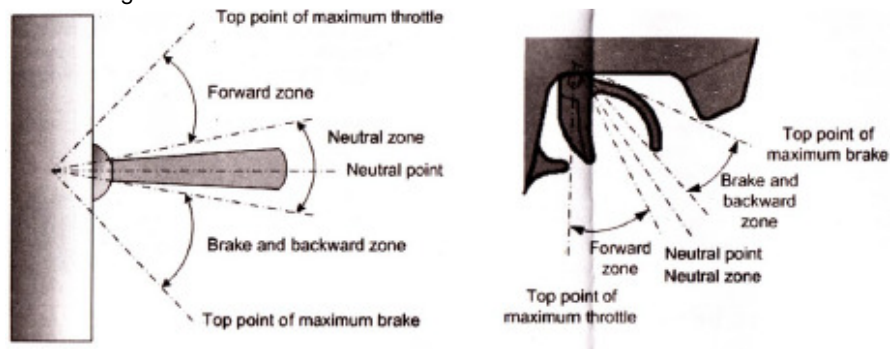
**3.4 Start Mode (Also called “Punch”):** Select from “Level 1 (Soft)” to “Level 9 (Very aggressive)”. Please note that if you choose “Level 7” to Level 9”, you should be using a good quality battery pack with a higher C rating. Otherwise these modes cannot do the bursting start effect you want. If the motor cannot run smoothly (the motor is trembling), it may be caused by the weak discharge ability of the battery pack, please choose a better battery or increase the gear rate.

**3.5 Maximum Brake Force:** The ESC provides proportional brake function. The brake force is related to the position of the throttle stick. Maximum brake force refers to the force when the throttle stick is located at the top point of the backward zone. A very large brake force can shorten the brake time, but it may damage the gears.

**3.6 Maximum Reverse Force:** Sets how much power will be applied in the reverse direction. Different values make different reverse speeds.

**3.7 Initial Brake Force:** It is also called “minimum brake force”, and it refers to the force when the throttle stick is located at the initial position of the backward zone. The default value is equal to the drag brake force, so the brake effect can be very smooth.

**3.8 Throttle Neutral Range:** Please see the following illustration to adjust the neutral range.



**3.9 Timing:** There are many differences among structures and parameters of different brushless motors. A fixed timing ESC is not going to be fully compatible with all brushless motors. To remedy this, it is necessary to make the timing value programmable. Please select the most suitable timing value according to the motor you are using. Generally, a higher timing value brings out higher power output, but the whole efficiency of the system will be slightly decreased.

**3.10 Over-Heat Protection:** If this function is activated, the output power will be cut-off when the temperature of the ESC goes over a factory preset threshold for more than 5 seconds. When the protection happens, the Green LED will flash.

#### 4. **Reset All Items To Default Values**

At any time when the throttle is located in neutral zone (except in the throttle calibration or parameters program process), hold the “SET” key for over 3 seconds, the red LED and green LED will flash at the same time, which means each programmable item has been reset to its default value.



**Action Hobbies Kingsville**

[www.actionhobbieskingsville.com](http://www.actionhobbieskingsville.com) Phone: 519-733-2619

197 Landsdowne Ave.

Fax: 519-733-2830

Kingsville, Ontario N9Y 1S6

Canada