USER GUIDE

SE 70S
COMPETITION BRUSHLESS SPEED CONTROLLER

INTRODUCTION

Congratulations on your purchase of Speed Energy 70S competition brushless speed controller! Your new speed controller is specifically designed for 1/10 scale, non-boosted electric RC racing. No matter which level of competition you race in, the 70S will help you achieve better results. Before you start, please read through this instruction manual carefully. It contains important safety information as well as setup tips from our team racing drivers.

SAFETY INFORMATION

- This product is NOT a toy. It is not suitable for children under 14 years old. Keep this product out of reach of children.
- This product is designed only for RC model car use. It is not suitable for any other purpose.
- Never leave this product unattended while it is connected to a power source.
- Never use a battery with nominal voltage higher than 7.4V (2S LiPo or 6S Ni-MH)
- Make sure all cables are in good condition and securely fastened. Keep in mind that vibration during operation may loosen connections and cause loss of control.
- Do not connect in reverse polarity.
- To prevent short-circuits, please make sure that all cables and connectors are properly insulated.
- Keep this product away from water, oil, fuel or other conductive liquids. If this product becomes damp, immediately stop using it and let it dry completely.
- Avoid using excessive force when tightening the cooling fan screws. Over tightening them may permanently damage the aluminum housing.
- Make sure to use suitable gear ratios for your track condition. Unsuitable gear ratios may overload and damage your speed controller and motor.
- Never operate with full throttle when the motor has no load. Running the motor without load may cause damage and risk of fire or burn.

DISCLAIMER OF WARRANTY

Speed Energy, ("Manufacturer") warrants to the original user that this Product is free from manufacturing defects in material and workmanship. This warranty is limited in duration to one year from the date of purchase, or for longer period if required by law. If the Product is found to have manufacturing defect, the Product will be, in Speed Energy's sole discretion, either repaired or replaced by a new Product. This limited Warranty is the sole express warranty made with regard to this Product so far as the law allows and is made in lieu of all other warranties whether oral or written. All implied warranties, including, without limitation, warranties of merchantability or fitness for a particular purpose, are excluded and shall be limited in duration to the duration of this warranty. Manufacturer and its Resellers shall have no liability for incidental, or consequential damages whatsoever and howsoever caused and in no event shall Manufacturer and its Resellers be liable for any damages in excess of claimant's purchase price for the Product.

This Limited Warranty does not apply to:

- any damage to the Product caused in whole or in part by abuse, accident, short circuit, over heat, water, chemical corrosion, use for other than its intended purposes, unlawful use, faulty installation, or installation not according to the Manufacturer's instructions.
- claims made when repairs alterations or modifications have been made to the Product without the Manufacturer's consent.

By installing and using the Product, the original user is deemed to have accepted the terms and conditions of this Limited Warranty. This Limited Warranty shall be governed, construed, and interpreted in accordance with the laws of Hong Kong.

FEATURES AND SPECIFICATIONS

- 2 colour LEDs for quick status display
- Variable drive and brake frequency tuning for stock class racing
- Fully configurable throttle and brake response
- Low voltage and over temperature protection
- Aluminum heat sink with 25 mm high rpm cooling fan
- User upgradable firmware

Input Voltage :	4.8 - 7.4V (2S LiPo or 6S NiMH)
Rated Current :	70A continuous / 400A pulse
BEC Output :	6V / 2A
Dimensions :	30 x 28 x 21 mm
Weight :	32g
Supported Motor Type :	Min. 8.5T 540 size brushless motor with sensor
Cooling Fan Size :	25 x 25 x 10 mm

BASIC INSTALLATION

Soldering Battery Wires, Motor Wires, and Capacitor

Make sure to use a soldering iron with sufficiently high temperature. Never leave the soldering iron on the mounting point for longer than 5 seconds. If it takes longer than 5 seconds to melt the solder between the joints, switch to a higher temperature solder iron. Overheating the mounting points will damage the ESC!

Pay special attention to the polarity marking below the mounting point. Make sure you connect each phase (A,B,C) of the motor to the corresponding (A,B,C) mounting point on the ESC. We recommend using a red colour wire for the positive battery input terminal, and a black colour wire for the negative terminal. Connecting a battery in reverse polarity will damage the ESC!

Remember to solder the included power capacitors to the battery input mounting point!

Running the motor without connecting capacitor will damage the ESC!

CE

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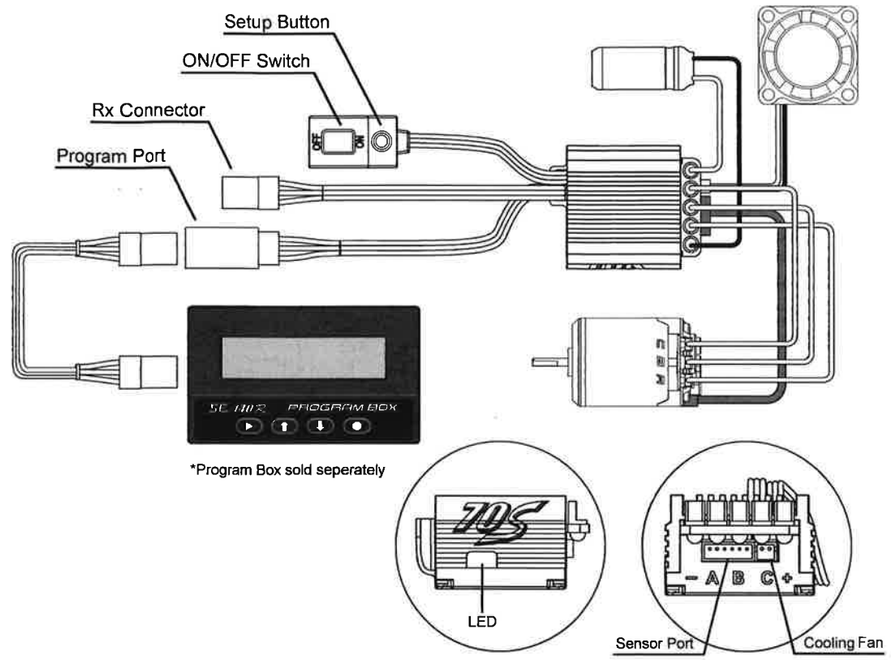
BASIC INSTALLATION

Connection and Mounting

Connect the Rx connector to the throttle channel (CH2) of your radio receiver.
Connect one end of the sensor cable to the motor's sensor port, and the other end to the ESC's sensor port.
Secure the ESC, power switch, and capacitor on your model car's chassis with double sided tape.
If necessary, install the included cooling fan on top of the ESC with screws, and make sure to check for correct polarity when connecting to the cooling fan power port.



Powering ON Your ESC

Always power ON your transmitter first before powering ON your ESC to avoid unexpected operation of the motor. For your safety, motor operation is automatically disabled until neutral throttle signal is detected from the radio receiver.

Synchronizing the ESC and Transmitter

In order for the ESC to recognize the full throttle range of your radio, a throttle range calibration is required.
Before starting, make sure your radio's throttle EPA and D/R is set at 100%. The trim and sub-trim should be zero.

Warning: To prevent any chance of loss of control or damage and injuries, make sure to remove the pinion gear from the motor during the calibration process!

1) Turn on your radio, making sure the throttle is at neutral

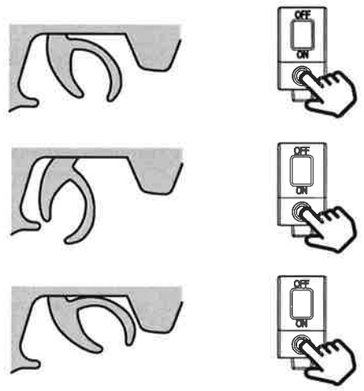
2) Turn on your ESC while pressing the setup button. Release the setup button when the blue LED light up solid.

3) Press the setup button once to set the neutral throttle position. The LED will blink to indicate position is memorized.

4) When the red LED light up solid, hold full throttle and press the setup button once. The LED will blink to indicate full throttle position is memorized. Make sure to hold full throttle until the LED stop blinking.

5) When the red and blue LED light up solid, hold full brake and press the setup button once. The LED will blink to indicate full brake position is memorized.

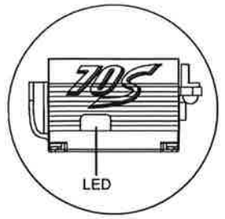
6) Turn off the ESC to finish the calibration.



LED STATUS INDICATOR

There are 2 different colour LEDs on the side of the ESC for status indication. Please refer to following table for their meaning:

Red solid	Full Brake or Reverse
Red single flash (* * * *)	Over Temperature Protection Activated
Red double flash (** ** **)	Low Voltage Protection Activated
Blue solid	Power ON and Neutral Signal from Rx
Red + blue constant flash during power ON	Sensor cable not detected
Red + blue flash once when power ON	Input voltage less than or equals to 8.0V
Red + blue flash twice when power ON	Input voltage greater than 8.0V



During Power ON, the motor will sound to remind you the battery voltage.

Beep Tone	Meaning
__- __-	Input voltage less than or equal to 8.0V
-- -- --	Input voltage greater than 8.0V

PROGRAMMING WITH SETUP BUTTON

To enter program setup mode by setup button, please do the following:

Step 1: Connect the ESC to battery pack
Step 2: Make sure your transmitter is at neutral throttle position or turned off
Step 3: Turn ON the ESC, and wait a few seconds for the ESC to initialize
Step 4: Press and hold the setup button for 3 seconds, all LED will flash 3 times then light up solid. You are now in program setup mode.

Press the setup button once to cycle to the next function. The Blue LED will flash to indicate the current function you have selected. Count the number of flashes, and refer to below table to determine the current function. To change setting for the selected function, press and hold the setup button for 2 seconds. The Red LED will flash to show the current setting for this function. Count the number of flashes, and refer to below table to determine the current setting. Pressing the setup button once will cycle to the next setting. To save the setting, long press the setup button for 2 seconds. All LED will flash 3 times to indicate setting is saved. You will now return back to the function menu. You can press the setup button once again to cycle to the next function, or turn OFF the ESC to exit programming mode. ESC will exit program mode if no action taken after 20 seconds.

	Blue LED Flash	Default	Red LED Flash 1	2	3	4	5	6	7	8	9	10
A1. Punch Rate	1 *	5	1	2	3	4	5	6	7	8	9	10
A2. Min Throttle (%)	2 **	3%	1	3	5	7	9	11	13	15		
A3. Drive Feel (kHz)	3 ***	8	2	4	8	16						
A4. Neutral DB (%)	4 ****	6%	0	3	6	9	12					
D1. Min Brake (%)	5 *****	Drag	Drag	0	6	12	15					
D2. Drag Brake (%)	6 ******	10	0	4	8	10	12	15	20			
D3. Drag Feel (kHz)	Program Box Only	2	2	4	8	16						
D4. Max Brake (%)	7 *******	100	75	80	85	90	95	100				
D5. Brake Feel (kHz)	8 ********	2	2	4	8	16						
F1. Temp Trigger	Program Box Only	90C	OFF	80C	90C							
F2. LVC Trigger	9 *********	3.2V / cell	none	2.9V/cell	3.0V / cell	3.2V / cell						
F3. Reverse Drive	10 **********	For / Brake	For / Brake	For / Rev / Brake								
F4. Reverse Limit (%)	Program Box Only	25	25	50	75	100						
F5. Spin Reverse	11 **********	Normal	Normal	Reverse								

PROGRAMMING WITH PROGRAM BOX

You may also use the SE140R Program Box (sold separately) to customize the settings.

*** Note the program box firmware must be updated to SE70S specific version. SE70S compatible firmware versions are indicated by suffix "A", e.g. Version 1.0A**

Using the Program Box
Before starting, place your model car on a stand and avoid touching any moving parts.

Step 1: Turn ON the ESC.
Step 2: Connect the ESC's program port to program box, making sure to connect in correct polarity.
Step 3: The program box display will turn ON, and display the current software version.
Step 4: Press the scroll button ▶ to cycle through the program function menu.
Step 5: Press the up ▲ or down ▼ button to change the settings.
Step 6: Press the save button ● to save your setting. **Make sure the save action is completed before disconnecting the program box from the ESC! Interruption during save action may damage the program memory!** If you press the scroll button again without pressing the save button first, changes will not be saved.
Step 7: When the display has returned to program menu, you can disconnect the ESC from the program box.
Step 8: Turn OFF the ESC first before using again.

PROGRAMMABLE FUNCTIONS

* Note the program name as appeared in the program box is shown inside ( ).

A. Throttle Settings

A1. Punch Rate (A1 Punch Rate)
This setting fine tunes the responsiveness of throttle. Set a higher value for more immediate throttle response. Set a lower value for more smooth response. You may lower your motor temperature by using a lower setting. For modified motor, we suggest to use setting 1 - 5.

A2. Initial Throttle (A2 Min Throttle)
This setting adjusts the initial (minimum) throttle. Set a higher value for stronger initial throttle response. Light throttle input may become impossible if initial throttle is set too high. High initial throttle is recommended for stock class motor only.

A3. Drive Feel (A3 Drive Feel)
This setting adjusts the throttle feel at partial throttle by varying the PWM frequency for forward drive. Set a higher frequency for smoother feel at partial throttle and lower frequency for stronger acceleration. Note efficiency will get worst at higher frequency.

A4. Neutral Dead Band (A4 Neutral DB)
This setting adjusts the width of neutral dead band suitable for your RC system. Set a lower value for high quality 2.4GHz R/C system. Set a higher value for low cost 2.4GHz or FM/AM RC system. Smaller value gives you more immediate response. If the value is set too small for your RC, the brake may be engaged accidentally at neutral.

D. Brake Settings

D1. Initial Brake (D1 Min Brake)
This setting adjusts the initial (or minimum) brake level. Set a higher level for more initial bite.

D2. Drag Brake (D2 Drag Brake)
This setting adjusts the level of drag brake at neutral throttle position. Set a high level for stronger drag brake.

D3. Drag Brake Feel (D3 Drag Feel)
This setting adjusts the drag brake PWM frequency. The brake feel and efficiency will vary depending on the frequency and motor rpm. Set a higher frequency for smoother feel and lower frequency for more initial bite.

D4. Max Brake Limit (D4 Max Brake)
This setting adjusts the maximum brake level at full brake position. Set a higher level for stronger brake force. Note the motor will also run hotter if brake force is set too high. The actual brake force will also be affected by gear ratio and rotor size.

D5. Brake Feel (D5 Brake Feel)
This setting adjusts the brake PWM frequency. The brake feel and efficiency will vary depending on the frequency and motor rpm. Set a higher frequency for more progressive brake feel and lower frequency for more initial bite.

F. General Settings

F1. Thermal Protection Threshold Temperature (F1 Temp Trigger)
This setting adjusts the thermal protection shut down temperature. Note the internal temperature sensor requires a brief moment to detect temperature change. In case of sudden current overload, the thermal protection may not shut down in time.

F2. Battery Low Voltage Protection Threshold (F2 LVC Trigger)
This setting adjusts the desired threshold for battery low voltage cut-off. Depending on the booster and turbo settings, battery voltage may drop significantly during high current discharge. Most racers prefer to turn LVC off during race.

F3. Reverse Drive ON/OFF (F3 Reverse Drive)
This setting allows selection between Forward and Brake Only or Forward with Brake and Reverse. If you plan to use reverse drive, make sure the motor's end bell timing is adjusted to zero degree advance.

F4. Max Reverse Limit (F4 Reverse Limit)
This setting adjusts the limit of maximum reverse speed. Set a higher setting for higher reverse speed.

F5. Rotor Shaft Direction (F5 Spin Reverse)
This setting reverses the spinning direction of the motor's rotor shaft. Enable this setting if your chassis requires a different spinning direction.

CUSTOMER SUPPORT

Please visit our website at *www.speedenergy.hk* for customer inquiries and the latest update.

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