

ERROR CODES

The Havoc ESC is equipped with internal protection. The following is a list of error codes depicted through LEDs—most flash when throttle is applied.

- **All status LEDs scroll from left to right**—Blue sensor harness wire disconnected or motor does not have temperature protection—Replace blue sensor harness wire or use motor with temperature protection. Check Novak Web site for motor compatibility list.
- **Red & Green status LEDs on solid**—Check input signal harness connections at ESC and receiver. Check input signal harness wiring sequence—Refer to Step 1.
- **Red status LED on solid & Green LED blinking**—Check motor sensor harness connection. Possible internal motor damage.
- **Blue & Green status LEDs both blinking**—Possible ESC shut-down due to locked rotor detection—Return throttle to neutral position to regain motor control—Check vehicle's drive train for free operation.
- **Green & Red status LEDs on toggle**—Li-Po Cut-Off triggered—Replace or charge battery. Battery voltage may be too low.
- **Blue & Red status LEDs blinking**—Possible ESC thermal shut-down—Check gear ratio & free operation of drive train for possible overloading/ESC is being severely over-loaded—allow system to cool & return throttle to neutral position to regain motor control. LEDs will continue to blink until system is cooled down.
- **Blue & Amber status LEDs blinking**—Possible motor thermal shut-down—Check gear ratio & free operation of drive train for possible overloading/motor is being over-loaded—allow system to cool & return throttle to neutral position to regain motor control. LEDs will continue to blink until system is cooled down.
- **Blue & Green (Locked Rotor Detection), Blue & Red (ESC Thermal Shut-Down), or Blue & Amber (Motor Thermal Shut-Down) status LEDs blinking**—ESC may have shut-down & ESC's neutral point is too far off to sense that transmitter throttle has been returned to neutral—Refer to Step 4.

TRANSMITTER ADJUSTMENTS

If you have any problems with Step 4, adjust transmitter as follows and then repeat One-Touch programming in Step 4:

- Set **HIGH ATV** or **EPA** to **100%**. [amount of throw at full throttle]
- Set **LOW ATV**, **EPA**, or **ATL** to **100%**. [amount of throw at full brakes]
- Set **EXPONENTIAL** to zero setting. [throttle channel linearity]
- Set **THROTTLE CHANNEL REV. SWITCH** to either position.
- Set **THROTTLE CHANNEL TRIM** to **middle** setting. [adjusts neutral position/increases or decreases coast brakes]
- Set **ELECTRONIC TRIGGER THROW ADJUSTMENT** to **50% throttle & 50% brake throw**—best for reversible ESCs. [adjusts trigger throw electronic/digital pistol-grip transmitters]
- Set **MECHANICAL TRIGGER THROW ADJUSTMENT** to position with **1/2 throttle & 1/2 brake throw**.

• NOT ALL TRANSMITTERS HAVE THESE ADJUSTMENTS •

USING A RECEIVER BATTERY PACK

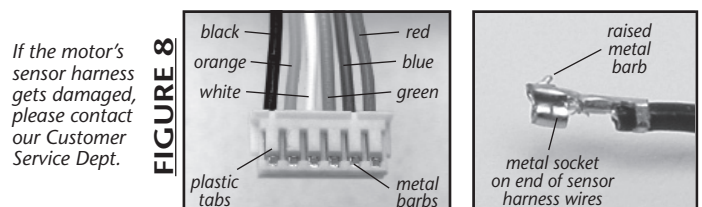
The Havoc ESC has an internal 6V/1.5A BEC, so a receiver battery pack is unnecessary. If you would like to use a receiver battery pack or external BEC, please follow these steps to ensure normal operation:

- Connect receiver battery pack/external BEC into battery slot of the receiver. Receiver battery pack/BEC should have an ON/OFF switch installed.
- Leave the ESC's input harness intact. First turn the receiver battery pack ON, then cycle the ESC's switch from ON to OFF. The ESC power will remain on even though the switch is OFF.

After running your vehicle, simply turn OFF receiver battery pack/external BEC. Always disconnect main battery pack when vehicle is not in use.

SENSOR HARNESS WIRING

Should any of the sensor harness wires pull out of the connector on the end of the motor's sensor harness, re-insert them in the appropriate slot in the connector as shown below. There is a small plastic tab that grabs a small raised barb on the back of the metal socket crimped onto the wire's end. The plastic tab should be checked to make sure it has not deformed excessively before inserting the metal socket into the plastic connector housing with the barb toward to plastic tabs.



If the motor's sensor harness gets damaged, please contact our Customer Service Dept.

FIGURE 8

TROUBLE-SHOOTING GUIDE

- Motor Does Not Operate and ESC LEDs Are Scrolling**
- Motor may not have temperature protection—**ESC will not operate if used with a motor that does not have built-in Thermal Protection.** Check Novak Web site for the complete motor compatibility list.
 - Blue sensor harness may be disconnected—Check connection.

Steering Channel Works But Motor Will Not Run

- Possible receiver damage—Check operation with a different receiver.
- Possible internal damage—Refer to Service Procedures.

Receiver Glitches/Throttle Stutters During Acceleration

- Low voltage to receiver—Try Glitch Buster capacitor on receiver (Novak part #5626).
- Receiver or antenna too close to ESC, power wires, battery, or motor.
- Battery pack damaged or weak—Try a different battery pack.
- Bad connections—Check wiring, connectors, & sensor harness.
- Motor's magnet has weakened or overheated—Replace rotor (#5908).
- External Power Capacitor damaged/not installed—Replace Power Capacitor (Novak #5682).

Motor and Steering Servo Do Not Work

- Check wires, receiver signal harness wiring & color sequence, radio system, crystals, battery/motor connectors, & battery pack.
- Power wires too close to signal wires—Do not bundle power & signal wires.
- Possible receiver damage—Check operation with a different receiver.
- Possible internal damage—Refer to Service Procedures.

Brushless Motor Runs Backwards

- Reverse motor rotation direction—Refer to 'Programming/Gearing' sheet.

Speed Control Runs Excessively Hot

- Gear ratio too low (pinion too big)—Increase gear ratio (use smaller pinion) (see 'GEAR SELECTION').

Model Runs Slowly/Slow Acceleration

- Gear ratio too high—Reduce gear ratio (see 'GEAR SELECTION').
- Check battery & connectors—Try another battery; replace connectors/battery if needed.
- Incorrect transmitter/ESC adjustment—Refer to Step 4.
- External Power Capacitor damaged/not installed—Replace Power Capacitor (Novak #5682).
- Bad battery—Replace Battery Pack.

ESC Is Melted Or Burnt/ESC Runs With Switch Off

- Internal damage—Refer to Service Procedures.

***For more assistance call our Customer Service Department or check our Web site.**

SERVICE PROCEDURES

Before sending your speed control or brushless motor system in for service, review Trouble-Shooting guide and instructions. System may appear to have failed when other problems exist.

After reviewing instructions, if you feel that your ESC/system requires service, please obtain the most current product service options and pricing by the following ways:

WEB SITE: Print a copy of the **PRODUCT SERVICE FORM** from the CUSTOMER SERVICE section of the Web site. Fill out the needed information on this form and return it with the Novak product that requires servicing.

PHONE/FAX: If you do not have access to the internet, please contact our customer service department by phone or fax as listed below.

WARRANTY SERVICE: For warranty work, you **MUST CLAIM WARRANTY** on the **PRODUCT SERVICE FORM** & include a valid cash register receipt with purchase date and dealer name & phone number on it, or an invoice from previous service. If warranty provisions have been voided, there will be a charge.

- **ESCs returned without a serial number will not be serviced under warranty •**

ADDITIONAL NOTES:

- Dealers/distributors are not authorized to replace products thought to be defective.
- If a hobby dealer returns your product for service, submit a completed **PRODUCT SERVICE FORM** to the dealer and make sure it is included with product.
- Novak Electronics, Inc. does not make any internal electronic components (transistors, resistors, etc.) available for sale.
- Products that operate normally will have a service charge.

NOVAK ELECTRONICS, INC.

(949) 833-8873 • FAX (949) 833-1631

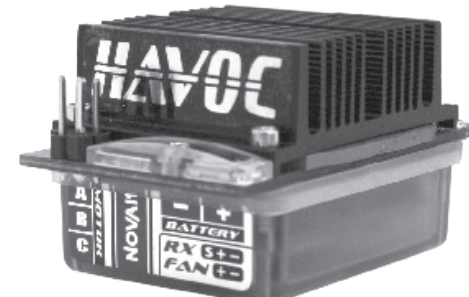
Customer Service e-mail: cs@teamnovak.com

www.teamnovak.com

BASIC SET-UP GUIDE — HAVOC SPORT ESC

• See Programming/Gearing sheet for Proper Gearing, Profile Selection, Custom Programming, & LiPo Cut-Off •

NOVAK



HAVOC
25 SPORT ESC



#55-1732-5
11-2010

Sensor-Based and Fully Programmable to Wreak Some Havoc!

The Havoc Sport Sensor-Based Brushless System exceeds expectations in performance and affordability. It contains nine adjustable parameters to fine-tune brake and throttle response, including Throttle Curves and Brake Frequency.

The Havoc Sport ESC is compatible with all sensor-based brushless and brush motors with built-in thermal protection. The Havoc ESC features Novak's Smart Braking II, Thermal Overload Protection, high-power B.E.C. for strong/fast servo response, Polar Drive & Digital Anti-Glitch circuitries for cool & smooth operation, auxiliary fan power output, and Radio Priority circuitry for the ultimate in control, right down to the end of the charge. Add to this the LiPo Voltage Cut-Off Circuitry, user-replaceable battery wires, power capacitor, & input harness, and the Havoc Sport ESC has it all!

To benefit from all of the technical features of the Havoc Sport ESC, PLEASE READ ALL INSTRUCTIONS BEFORE OPERATION

PRECAUTIONS

HAVOC SPORT DESIGNED FOR NOVAK BRUSHLESS MOTORS
This ESC is designed for Novak Thermally Protected Sensor-Based Brushless Motors!
ESC will ONLY operate if motor is replaced with a sensor-based motor (down to 8.5T) that has **built-in thermal protection**. Check Novak Web site for motor compatibility.

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 SCHOTTKY IN BRUSHLESS-MODE!
Schottky diodes are never used with reversible ESCs, including brushless.
Do not use Schottky diodes with Havoc ESC!

DO NOT FREE REV OR OPERATE WITHOUT LOAD!
This includes running the motor without a pinion or holding the car in the air and running the motor at or close to full power. Free revving will void the warranty!

DISCONNECT BATTERIES WHEN NOT IN USE
Always disconnect batteries from ESC to avoid short circuits and possible fire hazard.

2S LiPo OR 4 TO 7 CELL NiMH ONLY
If using LiPo batteries, ONLY use a 2-cell (2S) pack for vehicle's main battery & be sure the LiPo Cut-Off option is turned ON (refer to page 6). For NiCd or NiMH batteries, NEVER use fewer than 4 or more than 7 cells (1.2VDC/cell) in the main battery pack.

GOOD QUALITY LiPo BATTERIES SUGGESTED
Using LiPo batteries that cannot supply the required current of this system will result in ESC, or motor, or battery damage, and will void the warranty. We suggest 25C rating minimum.

NO REVERSE VOLTAGE!
Reverse battery polarity can damage ESC & void warranty. Disconnect battery immediately if a reverse connection occurs.

POWER CAPACITOR REQUIRED
An external power capacitor is installed on ESC & MUST be used. Failure to use Capacitor will result in higher temperatures & possible thermal shut-down or damage.

TRANSMITTER ON FIRST
Always turn the transmitter on first so you have control of the vehicle when it turns on.

GOOD QUALITY TRANSMITTER SUGGESTED
With the higher performance of brushless systems, undesirable radio system noise may occur when used with lower quality transmitters (like some RTR radios).

DO NOT BUNDLE POWER & SIGNAL WIRES TOGETHER
RF noise in the power wires can adversely affect radio system performance.

INSULATE WIRES
Always insulate exposed wiring with heat shrink tubing or electrical tape to prevent short circuits, which can damage ESC.

NO CA GLUE
Exposure to CA glue or its fumes can cause damage to internal components of the speed control and result in premature failure.

SPECIFICATIONS

Input Voltage.....	2S LiPo, 4-7 cells (1.2 VDC/cell)
ESC Footprint	1.18"x1.54" [30x39.1mm]
ESC Weight (w/o wires)	1.49 ounce [42 grams]
B.E.C. Voltage	6.0 volts DC
B.E.C. Current	3.0 amps
Power Wire (Battery/Motor).....	14G Super-Flex Silicone
On-Resistance.....	0.0012Ω @25°C trans.temp.
Rated Current (Brushless)	120A [per phase] @25°C trans.temp.
Rated Current (Brush-Mode).....	120A [Fwd & Brakes] @25°C trans.temp.
Motor Limit (Brushless)	Down to 8.5-turn Novak (@6 cell/2S)
Motor Limit (Brush-Mode)	27T 540-size motor/12T 550-size motor
Operation (Sensored Brushless).....	Forward/Brake/Reverse (with Rev. Disable)
Operation (Brush-Mode).....	Forward/Brake/Reverse

OPTIONAL ACCESSORIES

REPLACEMENT POWER CAPACITOR HARNESS [Novak kit #5682]
This is the replacement for the Havoc Sport's factory-installed Power Capacitor, which **MUST BE USED** to maintain cool & smooth operation.

SUPER-FLEX SILICONE 14G WIRE [Novak kits #5500 & 5508]
Novak Super-Flex wire for power wiring. 14 gauge silicone wire in kit #5500 (36"red & 36"black) or kit #5508 (2 each of 9"red/black/blue/yellow/orange).

INPUT SIGNAL HARNESS [Novak kits #5315 & 5320]
User-replaceable input signal harness is available in both short and long lengths. 4.5" harness in Novak kit #5315, and 9.0" harness in Novak kit #5320.

30x30x6MM CLEAR COOLING FANS [Novak kits #5648 & 5652]
Novak cooling fans fit Havoc's heat sink perfectly & have correct power plug for easy connection. Single fan in Novak kit #5648 and 2-pack of fans in Novak kit #5652.

LEAD-FREE 3% SILVER RACING SOLDER [Novak kit #5831, 5832 & 5833]
High silver content for making ultra low-resistance solder joints for high efficiency and better performance. 6g in Novak #5831, 15g in Novak #5832 and 100g in Novak #5833.

LOW-LOSS POWER CONNECTORS-3.5MM [Novak kit #5731]
High-power, gold-plated connectors for low-resistance and to maximize runtime. 3.5mm connectors with heat shrink: 5-pair #5731

ESC SWITCH HARNESS [Novak kit #5600]

Replacement switch for Havoc ESC and all Novak ESCs with switches.

POWER TRANS-CAP MODULE [Novak kit #5679]
Optional Power Cap Module for improved efficiency and lower operating temperatures.

PRODUCT WARRANTY

The Havoc Sport Brushless/Brush ESC is guaranteed to be free from defects in materials or workmanship for a period of 120 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 from using fewer than 4 or more than 7 cells (1.2 volts DC/cell) or more than 2 Li-Po cells input voltage, using insufficient Li-Po batteries that cannot supply the amount of current required by this system, cross-connection of battery/motor power wires, overheating solder tabs, reverse voltage application, damage resulting from thermal overload or short-circuiting motor (or connecting a brushless motor sensor harness while operating in Brush-Mode), damage from incorrect installation of FET servo or receiver battery pack, damage due to free revving of motor, damage due to using a non-Novak motor, a non-sensored motor or a motor lower than 8.5 turns, not using or incorrect installation of a Power Capacitor on the ESC or from using a damaged Power Capacitor, using a Schottky diode in Brushless-Mode, using non-Novak Power Capacitor or motor, splices to input, ON/OFF switch, or sensor harnesses, damage from excessive force when using the One-Touch/SET button or from disassembling case, 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 Novak 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 Novak 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. We reserve the right to modify warranty provisions without notice. Designed by Novak Electronics, Inc. in Irvine, CA and assembled with globally sourced components.

©2010 Novak Electronics, Inc. • All Rights Reserved • No part of these instructions may be reproduced without the written permission of Novak Electronics, Inc. • Havoc Sport ESC, Smart Braking II, Polar Drive Technology, Radio Priority Circuitry, & One-Touch Set-Up are all trademarks of Novak Electronics, Inc.

STEP 1--CONNECT INPUT HARNESS

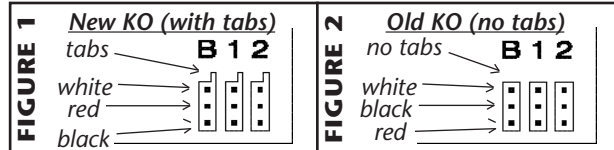
The Havoc Sport ESC has the industry-standard receiver input connector on a user-replaceable input harness & works with all major radio brand's new receivers. However, some very old receivers must have the wiring sequence in the plastic 3-pin connector housing changed. **This is important, because receiver & servo electronics may be damaged if the sequence is incorrect.**

CHANGING WIRING SEQUENCE AT RECEIVER

JR • Hitec • Futaba • New KO • Airtronics Z

JR, Hitec, Futaba, new KO, and Airtronics Z receivers do not need input harness re-wiring. Airtronics Z receivers have blue plastic cases & new KO cases have tabs on the input harness openings, as in Figure 1.

- Plug one end of the input signal harness into the THROTTLE CHANNEL (#2) of receiver with the BLACK wire toward the outside edge of receiver case.
- Plug the other end of the input harness into the ESC's PC board with the WHITE wire toward the outside edge of the ESC (Note the 'S' (signal) marking on the pin-out label on the front of the ESC's case below the PC board).



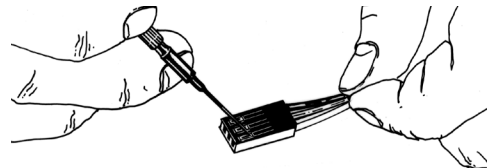
Old-style KO • Old-style Sanwa/Airtronics

If you have an older KO or Sanwa/Airtronics, you must change the sequence of the ESC's input harness wires—Old Sanwa/Airtronics cases are black color & Old KO cases do not have tab openings, as in Figure 2 above.

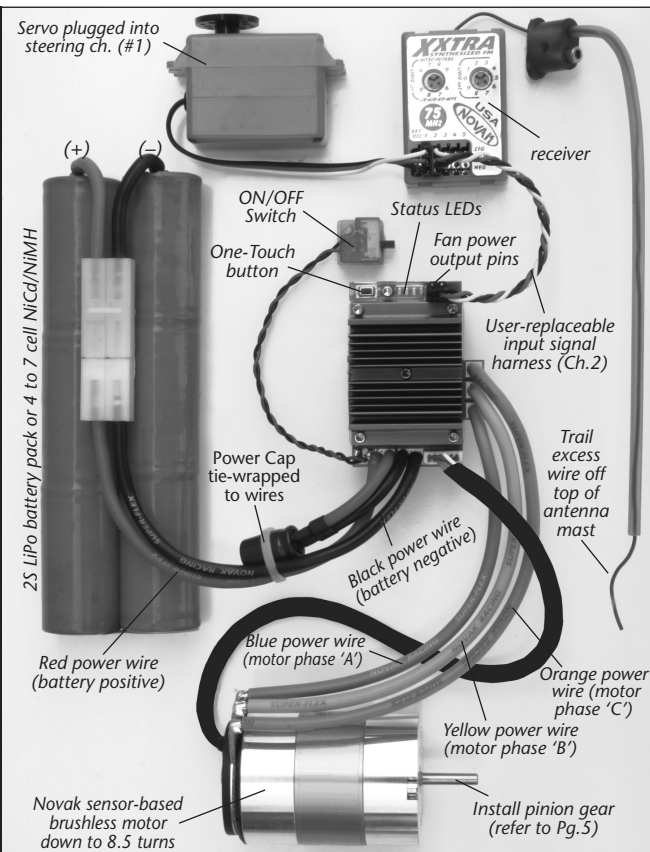
- Using a small flat blade screwdriver, remove the red & black wires from the plastic housing at the receiver end of the input harness as in Figure 3 below.
- Interchange the red and black wires in the plastic 3-pin connector housing at the receiver end of the input harness.
- Insert modified end of the harness into the THROTTLE CHANNEL (#2) of receiver with the RED wire toward the outside edge of receiver case.
- Plug the other end of the input harness into the ESC with the WHITE wire toward the 'S' (signal) marking on the ESC's case.

FIGURE 3

With a small flat-bladed standard screwdriver, gently lift plastic prong until wire and metal socket easily slide out of plastic housing.



BRUSHLESS-MODE SET-UP PHOTO (FIGURE 4)



STEP 2--ESC/MOTOR/BATTERY WIRING

NOVAK BRUSHLESS MOTORS (Figure 4)

1. THERMALLY PROTECTED BRUSHLESS MOTOR REQUIRED

This ESC is designed for Novak brushless motors (down to 8.5T) and WILL NOT operate if used with motors that do not have built-in thermal protection.

2. DO NOT USE SCHOTTKY DIODES WITH HAVOC ESC

Schottky diodes must NOT be used with reversible ESCs (including brushless). Schottky diode usage will damage the ESC & void warranty.

3. FACTORY-INSTALLED POWER CAPACITOR REQUIRED

The factory-installed Power Capacitor MUST be used with brushless & brush-type motors. If Power Capacitor becomes dented or damaged, ESC failure can occur—replace immediately. Longer Power Capacitor wires will decrease performance.

4. CHECK FOR PROPER GEARING

Refer to the 'PROPER GEAR SELECTION' portion of the PROGRAMMING/GEARING Sheet (Pg.5) to determine proper gearing & avoid overheating.

5. SOLDER MOTOR POWER WIRES TO MOTOR

*Skip this step if installing complete system with ESC factory-wired to motor.

A. Cut the BLUE, YELLOW & ORANGE silicone motor power wires to the desired length, and strip 1/8-3/16" of insulation from the end of each wire. Tightly twist the exposed strands of wire, and tin the exposed end section of each wire with solder with a good, high heat iron.

B. Solder the ESC's BLUE Phase 'A' motor wire to the motor's phase 'A' solder tab. Apply heat to exposed wire with soldering iron, and add solder to the tip of the iron & the wire—Add just enough solder to form a clean & continuous joint from the solder tab up onto the wire.

IMPORTANT NOTE: DO NOT OVERHEAT SOLDER TABS

Prolonged/excessive heating of solder tabs (motor or ESC) will cause damage.

C. Solder the ESC's YELLOW Phase 'B' motor wire to the motor's phase 'B' solder tab as described in Step 5B above.

D. Solder the ESC's ORANGE Phase 'C' motor wire to the motor's phase 'C' solder tab as described in Step 5B above.

Note: Make sure no wire strands have strayed to an adjacent solder tab, this will result in short-circuiting & severe ESC damage, which will void the warranty.

6. CONNECT MOTOR'S SENSOR HARNESS TO ESC

Insert the 6-pin connector on the end of the motor's sensor wires into ESC's sensor harness socket—the connector is keyed and will only go together in one direction.

7. INSTALL PINION GEAR (refer to Proper Gear Selection on p.5)

8. CONNECT SPEED CONTROL TO BATTERY PACK
Connect the speed control's Tamiya-style JST battery connector to a charged 2-cell Li-Po or 4 to 7 cell (1.2VDC/cell) battery pack.

Note: ESC comes with LiPo Cut-Off Circuitry turned ON for operation with LiPo batteries—be sure to turn feature OFF if using NiMH or NiCd cells (Pg.6).

BRUSH-TYPE MOTORS (Figure 5)

1. DISCONNECT BRUSHLESS MOTOR SENSOR HARNESS

The Havoc ESC automatically switches to Brush-Mode when the ESC power is switched ON and no brushless sensor harness is connected.

2. INSTALL MOTOR CAPACITORS

Electric brush-type motors generate RF noise that causes interference. Three 0.1µF (50V) non-polarized, ceramic capacitors must be used on all motors to reduce motor noise & prevent ESC damage.

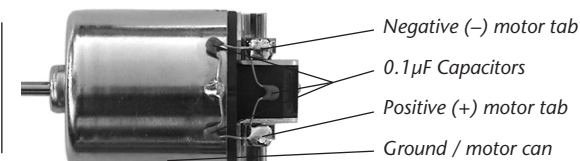
Note: Some motors come with built-in capacitors. If your motor only has 2 capacitors, you need to install a capacitor between the positive & negative motor tabs—if you experience radio interference with built-in capacitors only, install external ones.

Solder 0.1µF (50V) capacitors between:

- POSITIVE (+) & NEGATIVE (-) motor tabs.
- POSITIVE (+) motor tab & GROUND tab*.
- NEGATIVE (-) motor tab & GROUND tab*.

*If motor has no ground tab (as shown here), solder the capacitors to motor can.

FIGURE 5



3. SOLDER MOTOR POWER WIRES TO MOTOR

With brush-type motors, the Havoc Sport ESC's BLUE and YELLOW wires must be connected to the motor. It is recommended to use Novak's 3.5mm Low-Loss Power Connectors (#5730-5733) for a strong connection.

- The ORANGE wire is unused with brush-type motors. It can be either desoldered from the ESC's PCB, or heat shrunk and zip tied to prevent shorting.
- Connect the BLUE ESC wire to the NEGATIVE (-) Motor Tab.
- Connect the YELLOW ESC wire to the POSITIVE (+) Motor Tab.

4. INSTALL PINION GEAR (refer to Proper Gear Selection on Pg.5)

CONNECTORS AND WIRING HINTS

If you are going to use connectors, we suggest low-loss battery connectors (do not use crimp type) like Dean's Ultra.

- Use polarized connectors. Reverse voltage will damage the ESC & void warranty.
- Use a female connector on battery packs to avoid shorting.

When wiring the vehicle's electronics, short wires & neat/clean installations will give you better performance, higher efficiency, & less radio problems (glitching, etc.). Try your best to keep power wires away from signal wires & the receiver and antenna.

STEP 3--MOUNTING ESC

Mount the speed control with the power wires away from other electronics & moving parts. Select a location that allows airflow through heat sinks.

If the ESC gets air flow, it will run cooler, and that means it will be more efficient and you will go faster!

1. MOUNT SPEED CONTROL IN VEHICLE

Use the included double-sided tape to mount ESC in vehicle (do not glue). Avoid contact with side walls or other components to minimize vibration.

Be sure the receiver and antenna are mounted as far from the speed control, power wires, battery, & servo as possible—these components all emit RF noise when the throttle is applied. On graphite or aluminum chassis vehicles, it may also help to place the receiver on its edge with the crystal and antenna as far above chassis as possible.

Note: Mount the antenna as close to receiver as possible—trail any excess antenna wire off the top of the antenna mast (cutting or coiling excess antenna wire will reduce the radio range).

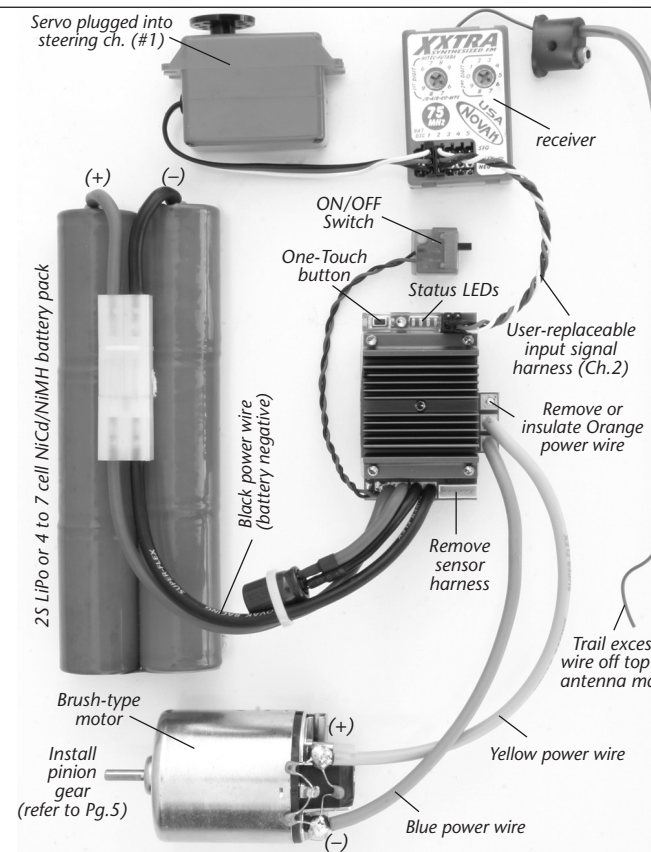
2. SECURE POWER CAPACITOR TO CHASSIS

Use the included double-sided tape, or a tie-wrap, to mount the Power Capacitor to the vehicle's chassis or shock tower. Power Capacitor can also be tie-wrapped along the power wires—this requires less space on the chassis.

3. INSTALL ON/OFF SWITCH

Use a screw or the included double-sided tape, and mount the switch where it will be easy to access—be sure to select a position where it will not get damaged or get switched OFF during a crash or roll-over.

BRUSH-MODE SET-UP PHOTO (FIGURE 6)



STEP 4--ONE-TOUCH PROGRAMMING

With ESC connected to (at least) a receiver & a charged battery pack:

1. TURN ON THE TRANSMITTER'S POWER
2. PRESS & HOLD ESC'S ONE-TOUCH/SET BUTTON
3. TURN ON THE SPEED CONTROL'S POWER
With transmitter throttle at neutral, and still pressing the SET button, slide the ESC's ON/OFF switch to ON position.
4. CONTINUE HOLDING SET BUTTON UNTIL RED LED COMES ON
5. RELEASE SET BUTTON AS SOON AS LED TURNS RED
Hold it there until the green status LED turns solid green.
6. PULL TRANSMITTER THROTTLE TO FULL ON POSITION
Note: Motor will not run during programming even if connected.
7. PUSH TRANSMITTER THROTTLE TO FULL BRAKES
Hold it there until the green status LED blinks green.
8. RETURN TRANSMITTER THROTTLE TO NEUTRAL
Red status LED will turn solid red, indicating that speed control is at neutral and that proper programming has been completed.

NOTE: If transmitter settings are changed, One-Touch Programming must be repeated. If you experience any problems, turn off ESC & repeat One-Touch.

REMEMBER: Whenever the One-Touch Programming is performed, the ESC automatically reverts back to the factory default settings.

THROTTLE PROFILES

NOTE: The Havoc's software has an Auto-Detect Brush-Mode. This feature will automatically switch the ESC from the Brushless Throttle Profile to Brush-Mode when it does not have a brushless motor's sensor harness plugged into it at start-up.

	BRUSHLESS PROFILE	BRUSH-MODE
	1	2
w/Reverse	on	on
Reverse %	100%	100%
Programmable	yes	yes
Minimum Brake %	0%	0%
Drag Brake	off	off
Dead Band %	6%	6%
Minimum Drive %	1%	1%
Throttle Curve	expo	linear
Brake Frequency	4 kHz	3 kHz fixed
Motor Rotation	CCW	N/A
Li-Po Cut-Off	on	on

The Havoc ESC reverts back to default settings when One-Touch set-up is performed.

The Havoc ESC is fully programmable, refer to Pg.6 for fine-tuning options.

AUXILIARY FAN OUTPUT

The Havoc ESC features a set of power output pins for running auxiliary cooling fans for the motor, the ESC, or both, and they will switch on & off with the ESC's power switch. These pins output 6.0 VDC (same as the BEC), so you will get maximum output from your cooling fans without over-powering them by running directly from the battery pack's voltage.

The pin-out label located on the front lower section of the ESC's case (under the pins, push button, & LEDs) shows the polarity of the fan power output pins.

They are the 2 pins on the front edge of the circuit board—Positive (+) is on the left, and Negative (-) is on the right.

The set of 3 pins behind them are for the user-replaceable input signal harness--The polarity of those is the same: Positive in the middle, Negative on the right, and the extra pin on the left is for the input signal.

The Novak 30x30x6mm clear cooling fan (Novak kit #5648) is recommended for the Havoc ESC. It not only fits the size of Havoc's heat sink perfectly, it also comes with the connector already on it to match the pins on the Havoc.

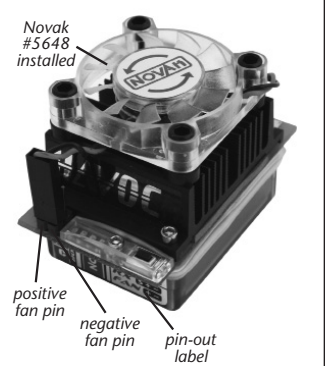


FIGURE 7