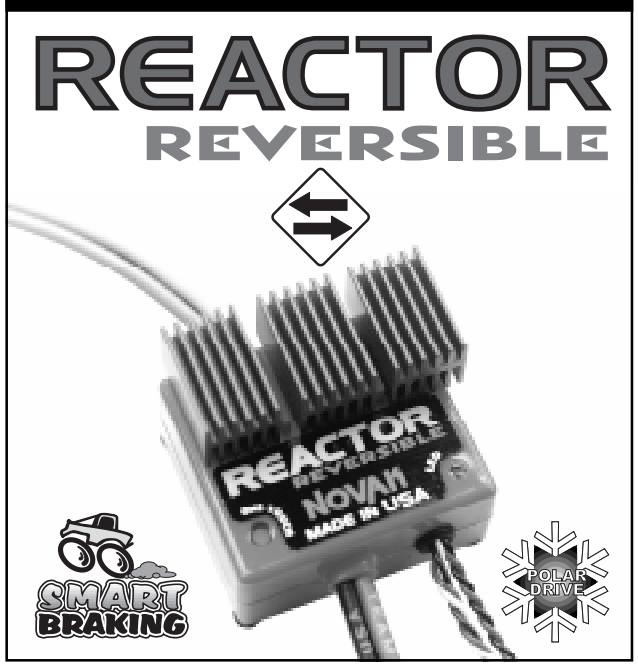
OPERATING INSTRUCTIONS



REACTOR REVERSIBLE

The **Reactor Reversible** electronic speed control (ESC) brings together all of the key elements to provide you with the reliability and ruggedness you've come to expect from Novak.

The Reactor Reversible features extra-tough **HYPERFET III** transistors, and the original Novak **One-Touch Set-Up** *(The first, the easiest, & the fastest set-up in the world)*.

Exclusive Novak **Polar Drive Technology** provides smooth throttle response and improved radio system performance. **Reverse Disable Circuitry** locks out reverse gear for racing or forward only operation, and **Smart Braking Circuitry** brings the model to a slow speed before hitting reverse to save your vehicle's gearbox and reduce speed control heating.

Other features include Novak's **Radio Priority Circuitry** to maintain steering control even after the battery has discharged, **Thermal Overload Protection**, and the Novak **Input Plug System** for compatibility with all popular radio systems.

SPECIFICATIONS

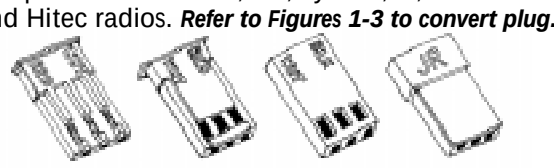
Input Voltage *(1.2 VDC/cell)*	6-7 cells
Case Width	1.63 inch
Case Depth	1.42 inch
Case Height	0.69 inch
Weight	1.81 oz *(2.05 w/h.sinks)*
On-Resistance–Forward	0.004 Ω *(@ transistors)*
On-Resistance–Reverse	0.008 Ω
Rated Current–Forward	160 amps *(@ 25°C)*
Rated Current–Brk/Rev	80 amps *(@ 25°C)*
Reverse Delay *(after Smart Braking)*	Zero seconds
BEC Voltage	5.0 volts DC
BEC Current	0.5 amps
Power Wire	16 gauge/6 inch
Motor Connector	Bullet style
Battery Connector	Tamiya style
Transistor Type	HYPERFET III
PWM Frequency	1000 Hz
Signal Harness	26 gauge/6 inch
Part Number	1810

PRECAUTIONS

- **WATER & ELECTRONICS DON'T MIX!** Do not operate model in or around water. Never allow water, moisture, or other foreign materials to get inside the ESC.
- **6 or 7 CELLS ONLY** Never use fewer than 6 or more than 7 cells *(7.2-8.4 volts DC)* in main battery pack.
- **MOTOR CAPACITORS REQUIRED** Three 0.1µF (50V) ceramic capacitors *(included)* must be properly installed on every motor to prevent radio interference. Additional capacitors are available in Novak kit #5620.
- **ALWAYS USE HEAT SINKS** Three heat sinks are included with the Reactor and must be used for proper cooling and performance. Replacement Reactor heat sinks are available in Novak kit #5406.
- **NO REVERSE VOLTAGE!** Reverse battery polarity can damage speed control—Disconnect battery immediately.
- **NO SCHOTTKY DIODES** External Schottky diodes must ***NOT*** be used with reversible speed controls. Using an external Schottky diode will damage the ESC.
- **DON'T LET TRANSISTOR TABS TOUCH** Never allow separate transistor banks to touch each other or any exposed metal. This will create a short circuit and damage the ESC.
- **DISCONNECT THE BATTERIES** Always disconnect the battery pack from the speed control when not in use.
- **TRANSMITTER ON FIRST** Always turn on the power of your transmitter first so that you will have control of the radio equipment when you turn on the speed control.
- **DON'T GET BURNT!** Transistor tabs and the heat sinks can get extremely hot, so be careful not to touch them until they cool. Supply adequate air flow for cooling.
- **INSULATE WIRES** Always insulate exposed wiring with heat shrink tubing or tape to prevent short circuits.

CHANGING INPUT PLUGS

Included with the speed control is the Novak Input Plug System to convert the Futaba signal harness to be compatible with Sanwa, KO, Kyosho, JR, Airtronics Z, and Hitec radios. ***Refer to Figures 1-3 to convert plug.***



Sanwa (A) *KO* *Kyosho (KYO)* *JR/Hitec/AirZ*

FIGURE 1 *With a small standard screwdriver, press on each of the three metal prongs until the wires are easy to remove. Remove wires.*

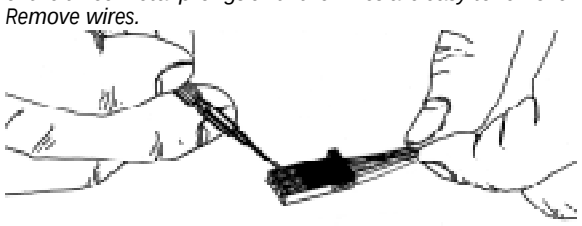


FIGURE 2 *With the screwdriver, carefully lift each of the metal locking tabs to the angle shown.*

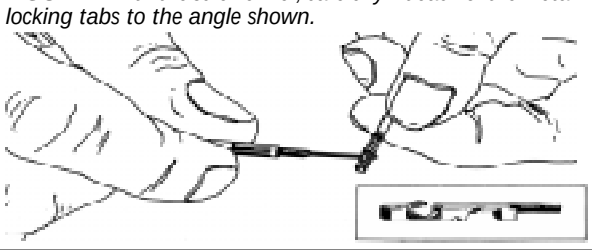
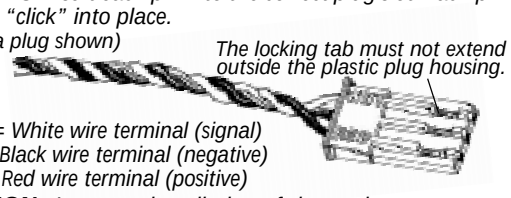


FIGURE 3 *Insert each pin into the correct plug slot. Each pin should "click" into place. (Sanwa plug shown)*



WHT = *White wire terminal (signal)*
BLK = *Black wire terminal (negative)*
RED = *Red wire terminal (positive)*
CAUTION *Improper installation of these wires may cause damage to the receiver, servo, and speed control.*

REACTOR SET-UP

REFER TO STEPS 1 THROUGH 6 ON BACK

A. INSTALL SPEED CONTROL

Use double-sided tape to mount speed control in model where the power wires are neatly routed away from the receiver and antenna. For more details refer to Step 2.

B. CONNECT SPEED CONTROL TO RECEIVER

Plug the speed control input signal harness into the throttle channel of receiver. Make sure the proper plug plastic is installed on ESC signal harness. Refer to Changing Input Plugs.

C. CONNECT SPEED CONTROL TO BATTERY

With the speed control's switch in the off position, plug the JST/Tamiya connector from speed control into a 6 or 7 cell battery pack (1.2 volts DC/cell).

D. TURN ON TRANSMITTER POWER

Refer to Step 4 for transmitter adjustments.

E. TURN ON SPEED CONTROL

Slide **ON/OFF** switch to ***ON*** position.

F. PRESS AND HOLD ONE-TOUCH BUTTON

With the transmitter throttle in neutral position, press and hold One-Touch button until the status LED turns solid red, then release.

G. PULL THROTTLE TO FULL-FORWARD POSITION

Hold until status LED turns solid green.

H. PUSH THROTTLE TO FULL-REVERSE POSITION

Hold until status LED blinks green, then return throttle to neutral position. LED will then turn solid red indicating proper programming and throttle is in neutral position.

I. CONNECT SPEED CONTROL TO MOTOR

Turn off speed control then transmitter.

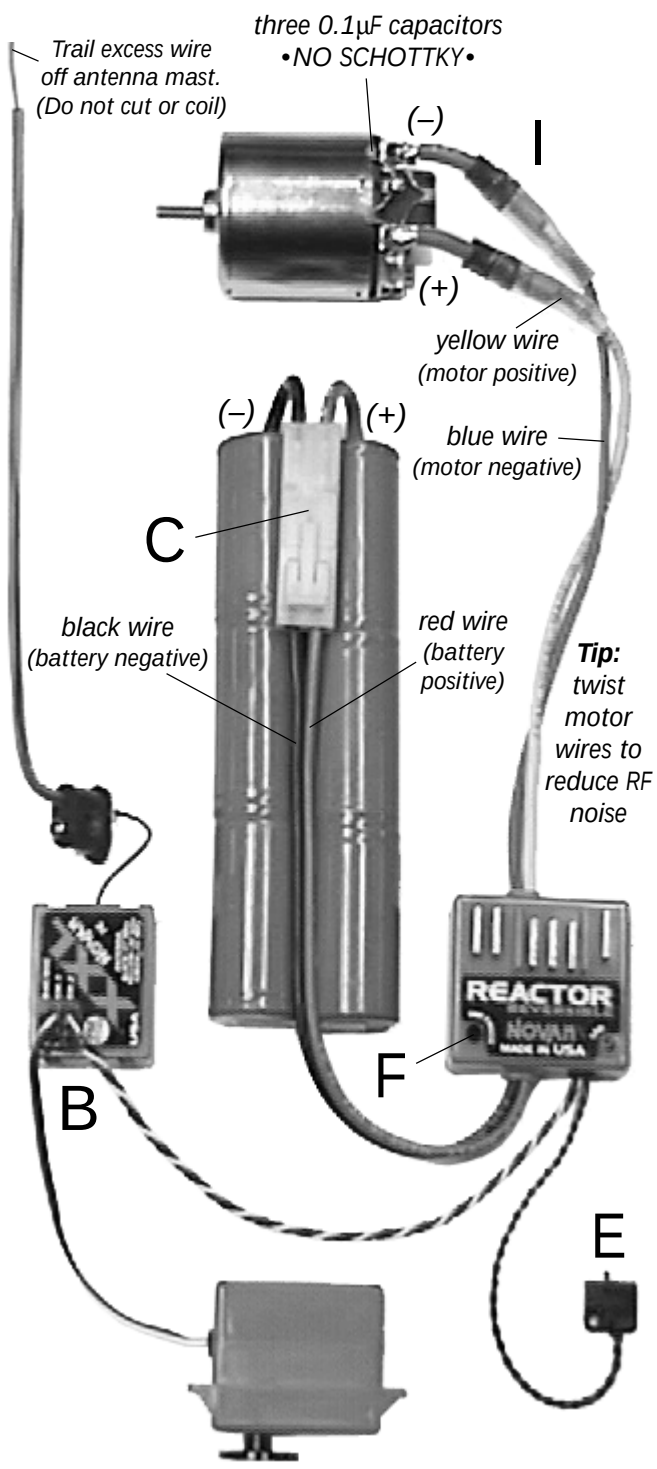
Plug the bullet connector on the YELLOW wire of speed control to motor positive.

Plug the bullet connector on the BLUE wire of speed control to motor negative.

J. KICK-UP A ROOST!

Turn on transmitter and then speed control.

Please refer to Step 6 for instructions on disabling the reverse portion of the speed control for use when racing.



NOVAK RACING ELECTRONICS

NOVAK ELECTRONICS, INC.
18910 Teller Avenue
Irvine, CA 92612
www.teamnovak.com

STEP 1
HEAT SINK INSTALLATION

Heat sinks are required with the Reactor Reversible for optimum performance and power handling. Included with the Reactor are heat sinks to fit onto the ESC's three separate transistor tab banks.

1. INSTALL THE HEAT SINKS

Place ESC on a flat surface and press one heat sink onto each of the individual transistor tab banks. Each bank is separated by a plastic divider and is on a different level than the adjacent banks.

The heat sinks should press onto the transistors with a snug fit. If installed upside-down *(longer fins up)* or shifted to one side, they will be too loose.

NOTE: *Do not use too much force when installing the heat sinks because you can damage the transistors or other components on the PC board. Never use a vise or pliers to install heat sinks.*

2. DO NOT USE GLUE

Do not use glue or adhesives to attach the heat sinks to the transistors.

3. DO NOT SHORT CIRCUIT HEAT SINKS

Each bank of heat sinks should never contact each other or other conductive objects *(metal, etc.)*, or they will short circuit and damage the ESC.

STEP 2
MOUNTING INSTRUCTIONS

1. DETERMINE BEST ESC MOUNTING LOCATION

The ESC should be positioned away from receiver and antenna as shown in the Set-Up photo on the front. Choose a mounting position that will keep the power wires clear from obstructing movement of the suspension or the motor pod.

Remember, cooler operating temperatures mean higher efficiency. So, choose a mounting position that allows maximum airflow through the heat sinks.

2. INSTALL SPEED CONTROL

Use the included double-sided tape to mount the ESC.

3. INSTALL ON/OFF SWITCH

Choose a convenient place to mount the switch where it will be easy to get to. Mount switch using a piece of double-sided tape or with a screw through the hole in the base of the switch housing.

4. INSTALL RECEIVER

Mount the receiver as far from the motor, power wires, battery, and servo as possible. All of these components emit radio noise when the throttle is being applied. On graphite or aluminum, place the receiver on edge with the crystal and antenna as far above the chassis as possible. Mount the antenna close to the receiver and trail any excess wire off the top of the antenna.

STEP 3
HOOK-UP INSTRUCTIONS

Refer to Set-Up photo on front page

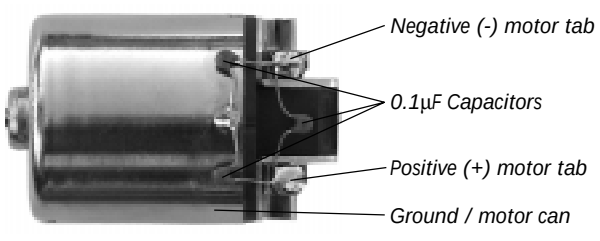
1. INSTALL MOTOR CAPACITORS

Electric motors generate radio noise that can interfere with your receiver and cause radio problems. Included in the ESC accessory kit are three 0.1µF (50V) non-polarized, ceramic capacitors. These capacitors must be installed on every motor to help reduce the noise generated by the motor and to prevent ESC damage.

Solder 0.1µF (50V) capacitors between:

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

**If your motor does not have a ground tab, solder the capacitor leads to the can of the motor as shown below.*



Extra 0.1µF capacitors are available in Novak kit #5620

2. IMPORTANT NOTE ABOUT SCHOTTKY DIODES

NO SCHOTTKY DIODES

Schottky diodes must NOT be used with reversible speed controls. Using a Schottky diode will damage the speed control and will void the warranty.

3. CONNECT SPEED CONTROL TO THE RECEIVER

After the proper input plug plastic has been installed to match the receiver *(See front page)*, plug the speed control into the **THROTTLE CHANNEL** of the receiver.

4. CONNECT SPEED CONTROL TO THE BATTERY PACK

Plug the JST/Tamiya connector from the speed control into a 6 or 7 cell battery pack (1.2 volts DC/cell).

5. CONNECT SPEED CONTROL TO THE MOTOR

Plug the bullet connector on the **YELLOW** wire of the speed control to motor ***positive***.

Plug the bullet connector on the **BLUE** wire of the speed control to motor ***negative***.

TIP: *Twist BLUE & YELLOW motor wires once or twice as they go to the motor to reduce any radio noise emitted from power wires.*

STEP 4
TRANSMITTER ADJUSTMENTS

For proper speed control operation and programming set the transmitter adjustments as follows:

1. Set **HIGH ATV** or **EPA** to **maximum** setting.
[Controls amount of throw from neutral to full throttle]

2. Set **LOW ATV, EPA,** or **ATL** to **maximum** setting.
[Controls amount of throw from neutral to full brakes]
[Reduce this after ESC adjustment to reduce amount of brakes]

3. Set **EXPONENTIAL** to **zero** setting.
[Controls the linearity of the throttle channel]

4. Set **THROTTLE CHANNEL TRIM** to **middle** setting.
[Adjusts the neutral position of speed control]
[Increase or decrease after ESC adjustment to adjust coast brakes—to give braking in neutral trigger position]

5. Set **THROTTLE CHANNEL REVERSING SWITCH** to **either** position.
[Do not change switch position after programming]

6. Set **ELECTRONIC TRIGGER THROW ADJUSTMENT** to **50% throttle** and **50% brake/reverse** throw (or 5:5).
[Adjusts pistol-grip transmitter's throttle trigger throw on electronic/digital transmitters]

7. Set **MECHANICAL TRIGGER THROW ADJUSTMENT** to **1/2 throttle** and **1/2 brake/reverse** throw.
[Adjusts pistol-grip transmitter's throttle trigger throw on mechanical/analog transmitters]

STEP 5
SPEED CONTROL PROGRAMMING

Speed control should be connected to receiver and to a charged battery pack, and the transmitter adjusted.

1. TURN ON THE TRANSMITTER

2. TURN ON THE SPEED CONTROL

3. PRESS AND HOLD THE ESC'S ONE-TOUCH BUTTON
With transmitter throttle at neutral, press and hold the speed control's **One-Touch** button until the status **LED *turns solid red***.

4. RELEASE ESC ONE-TOUCH BUTTON WHEN LED IS RED

5. PULL THROTTLE TO FULL-FORWARD POSITION
Hold it there until the status **LED *turns solid green***.
NOTE: the motor will not run during programming even if it is connected to the speed control.

6. PUSH THROTTLE TO FULL-REVERSE POSITION
Hold it there until the status **LED *blinks green***.

7. RETURN TRANSMITTER THROTTLE TO NEUTRAL
Status ***LED will turn solid red***, indicating that throttle is at neutral and proper programming has been completed.

8. CHECK OPERATION OF THE SPEED CONTROL
With no throttle or brake applied the status LED should be solid red and the motor should not be running. At full-throttle position the status LED should be solid green and the motor running full speed. At full-reverse position the status LED should be green and the motor should be running full speed in reverse.

OPTIONAL SETTING FOR ESC WHEN REVERSE IS DISABLED

SET THE COAST BRAKE AT TRANSMITTER

Adjust **THROTTLE CHANNEL TRIM** on the transmitter to get more or less coast brake. This is accomplished by slightly shifting the neutral position. *After adjustment be sure that the status LED is still green at full throttle.*

Speed control is programmed & ready to run!

If transmitter settings are changed, it will be necessary to complete the programming sequence once again.

If you experience any problems during programming, turn off the speed control and repeat the programming process.

STEP 6
REVERSE DISABLE PROGRAMMING

Speed control should be connected to receiver and to a charged battery pack, and the transmitter adjusted.

1. TURN ON THE TRANSMITTER

2. TURN ON THE SPEED CONTROL

3. PRESS AND HOLD THE ESC'S ONE-TOUCH BUTTON
Press and hold the speed control's **One-Touch** button until the status **LED *turns from solid red to solid green***.

4. RELEASE ESC ONE-TOUCH BUTTON WHEN LED IS GREEN

5. PRESS ONE-TOUCH BUTTON TO ENABLE/DISABLE REVERSE
SLOW red flash = reverse ***ENABLED***
FAST red flash = reverse ***DISABLED***
NOTE: You must press the One-Touch button very soon after the LED begins flashing red (slow or fast).

6. LED WILL TURN GREEN THEN EXIT PROGRAMMING
Green LED indicates ESC is exiting programming mode.

CUSTOMER SERVICE

CUSTOMER SERVICE HOURS (PST)

Monday-Thursday: 8:00am-5:00pm
Friday: 8:00am-4:00pm ***(closed every other Fri.)***

(949) 833-8873 • FAX (949) 833-1631

All Novak speed controls are designed and manufactured in the U.S.A. Reactor Reversible, HYPERFET III, Polar Drive Technology, Radio Priority Circuitry, One-Touch Set-Up, Smart Braking Circuitry, Digital Anti-Glitch Circuitry, Reverse Disable Circuitry, and Input Plug System are all trademarks of Novak Electronics, Inc.

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TROUBLE-SHOOTING GUIDE

ESC Will Not Program Properly

- Too little transmitter throw—Increase ATV/EPA setting.
- Make sure ESC is plugged into the throttle channel of receiver. Check throttle channel operation with a servo.
- ESC One-Touch button not held long enough—Press and hold One-Touch button during programming until status LED turns solid red.

ESC Will Not Go In Reverse

- Reverse circuitry disable—Refer to Step 6 to enable.

Steering Channel Works But Motor Will Not Run

- Speed control has thermally shut down—Allow ESC to cool down—Use milder motor or smaller pinion gear.
- Check motor connections. Check motor and brushes.
- Make sure ESC is plugged into the throttle channel of receiver. Check throttle channel operation with a servo. Check the wiring color sequence & metal socket insertion of receiver harness.
- Possible internal damage—Refer to Service Procedures.

Receiver Glitches/Throttle Stutters On Acceleration

- Motor capacitors broken or missing—Refer to Step 3.
- Receiver or antenna too close to speed control, power wires, battery, or motor—Refer to Step 2.
- Bad connections—Check wiring and connectors.
- Motor brushes worn—Replace brushes.
- Excessive current to motor—Use a milder motor or a smaller pinion gear.

Motor and Steering Servo Do Not Work

- Check wires, receiver signal harness wiring and color sequence, radio system, crystals, battery and motor connectors, and battery pack.
- Possible internal damage—Refer to Service Procedures.

Motor Runs Slowly / Slow Acceleration

- Check motor and battery connectors—Replace if needed.
- Bad battery or motor—Check operation with another.
- Incorrect transmitter or speed control adjustment—Refer to Steps 4 and 5.

Motor Runs Backwards

- Motor wired backwards—Check wiring and reverse.
- Backwards motor timing—Reverse motor end bell.

ESC Melted Or Burnt/ESC Runs With Switch Off

- Internal damage—Refer to Service Procedures.

**For more help check our website or call our Customer Service Dept.*

SERVICE PROCEDURES

Before sending in your Reactor for service, review the Trouble-Shooting guide and the instructions. The ESC may appear to have failed when other problems exist.

PLEASE NOTE: **Speed controls that operate normally when received will be charged a minimum service fee and return shipping costs.**

WHAT TO SEND: Fill out all of the information requested on the enclosed ***REVERSIBLE ESC SERVICE CARD*** *(also available on our website)* and return it with your ESC.

WARRANTY WORK: For warranty work, you *MUST CLAIM WARRANTY* on the ***REVERSIBLE ESC SERVICE CARD*** and include a valid cash register receipt with purchase date, or an invoice from previous service work. If warranty provisions have been voided there will be a service charge.

SERVICE COSTS: Customer is responsible for all service costs (parts, labor, and shipping/handling charges). See ***REVERSIBLE ESC SERVICE CARD*** for payment and shipping options.

ADDITIONAL NOTES:

- Hobby dealers or distributors are not authorized to replace speed controls thought to be defective.
- If a hobby dealer returns your speed control for service, submit a completed ***REVERSIBLE ESC SERVICE CARD*** to the dealer and make sure it is included with the ESC.
- Novak Electronics, Inc. does not make any electronic components (transistors, resistors, etc.) available for sale.
- To provide the most efficient service possible to our customers, it is not our policy to contact customers by phone or mail.

PRODUCT WARRANTY

★ 120 DAY WARRANTY

Novak Electronics, Inc. guarantees the Reactor Reversible ESC to be free from defects in materials and workmanship for a period of 120 days from original date of purchase (verified by dated, itemized sales receipt). Warranty does not cover incorrect installation, components worn by use, damage from using fewer than 6 or more than 7 cells (1.2 volts DC/cell) input voltage, short-circuiting heat sinks, cross-connection of battery/motor, reverse voltage application, damage from use of an external Schottky diode or incorrect installation of FET servo or receiver battery pack, damage from excessive force while installing heat sinks or pushing One-Touch button, not installing three 0.1µF (50V) capacitors on motor, splices to switch or receiver signal harnesses, using same type and gender battery and motor connectors, damage from disassembling case, tampering with internal electronics, allowing water, moisture, or any other foreign material to enter ESC or get onto PC board, incorrect installation of alternate input plug plastic, allowing exposed wiring to short-circuit, or any damage caused by a crash.

In no case shall our liability exceed product's original cost. We reserve the right to modify warranty provisions without notice.

Because Novak Electronics, Inc. has no control over connection and use of the ESC, no liability may be assumed nor will be accepted for damage resulting from the use of this product. Every ESC is thoroughly tested and cycled before leaving our facility and is, therefore, considered operational. By the act of connecting/operating ESC, the user accepts all resulting liability.