



PART #1655

## INTRODUCING THE RACER-EX ESC

The Novak Racer-EX ESC combines the simplicity of One-Touch Set-Up™, high frequency operation, huge 12-gauge SuperFlex™ wire, and CLC II™ current limiter circuitry to provide maximum power and driveability.

Features include Radio Priority Circuitry™ to maintain control of the radio even after the battery pack has "dumped", dual-level thermal protection, and digital glitch-prevention to reduce radio problems.

Other features include the Novak Input Plug System™ and exclusive Solid State RVP™ for maximum reverse voltage protection without the use of fuses.

| ADDITIONAL SPECIFICATIONS  |                             |
|----------------------------|-----------------------------|
| Voltage Input              | 4 to 10 Cells (1.2VDC/cell) |
| Case Size (w/o heat sinks) | 1.63" x 1.72" x 0.65"       |
| Weight                     | 2.10 oz. Race-ready         |
| On-Resistance              | 0.0012 Ω                    |
| Rated Current              | 350 amps                    |
| Braking Current            | 140 amps                    |
| BEC Output                 | 6.0 Volts/1.5 Amps          |

## IMPORTANT PRECAUTIONS

- (ESC= ELECTRONIC SPEED CONTROL)
- Do not operate near water! Never allow water, moisture, or any liquid to touch the ESC.
  - Never use more than 10 cells in main battery pack.
  - Do not mix instructions. If you are building a kit that has a mechanical speed control, do not use the wiring diagram included with the kit.
  - Never cut or splice the ESC input harness wires.
  - Three 0.1μF (50V) ceramic capacitors must be properly installed on every motor.
  - A Schottky diode must be properly installed on every motor.
  - Never allow the heat sinks to touch each other or any exposed metal or graphite surface.
  - Always disconnect the battery pack from the ESC when not in use.
  - Never turn on the ESC before plugging it into the receiver and switching on the transmitter.
  - Do not touch the heat sinks when they are hot.
- PLEASE FOLLOW ALL INSTRUCTIONS CAREFULLY**

## PREVENTING RADIO PROBLEMS

Radio interference can cause the speed control to rapidly switch between forward and full brakes, causing overheating of the brake transistors and possible damage to the ESC. Here are a few of the most common causes of radio problems:

- **CAPACITORS NOT INSTALLED ON MOTOR** Electric motors generate radio noise that can interfere with the receiver. To prevent radio problems, every motor should have three 0.1μF (50V) ceramic capacitors installed (see back page).
- **RECEIVER MOUNTED ON GRAPHITE OR METAL CHASSIS** Graphite and metal chassis transmit radio noise generated by the motor. To prevent radio problems, mount the receiver on the rear shock tower or away from the chassis. If the receiver is mounted on the chassis, stand it on its side with the crystal as far from the chassis as possible.
- **RECEIVER ANTENNA CUT OR MOUNTED WRONG** If the receiver's antenna is cut, the range will be reduced. The antenna should be mounted away from the motor and power wires. Coiling the antenna wire, or keeping the entire antenna inside the body will reduce the range and increase the risk of radio problems.

## CURRENT LIMITER ADJUSTMENT

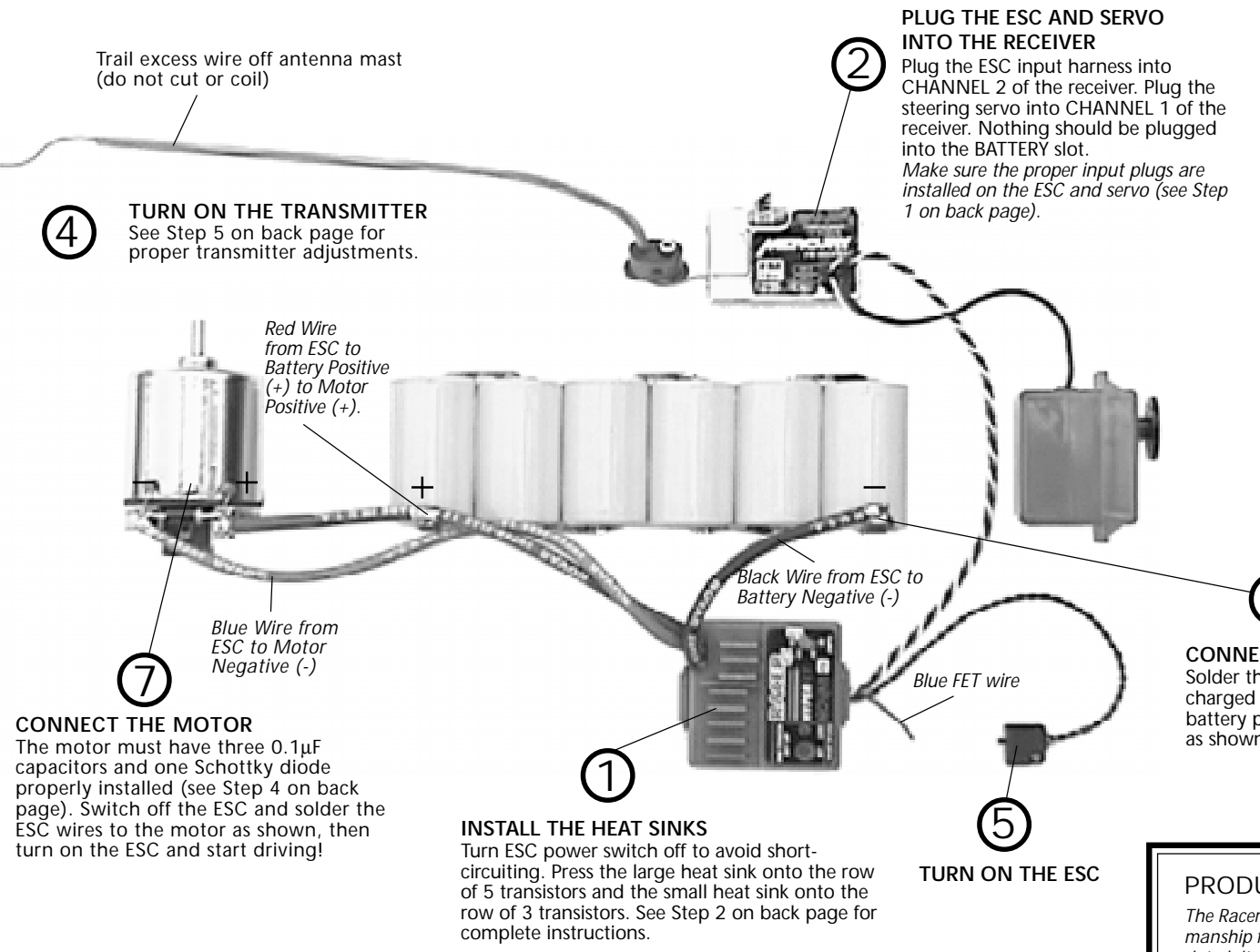
The Racer-EX ESC is equipped with CLC II current limiting circuitry. CLC II can be used to prevent excessive amp draw which wastes energy and overheats the batteries and motor. And, for slippery tracks, CLC II can be used as traction control.



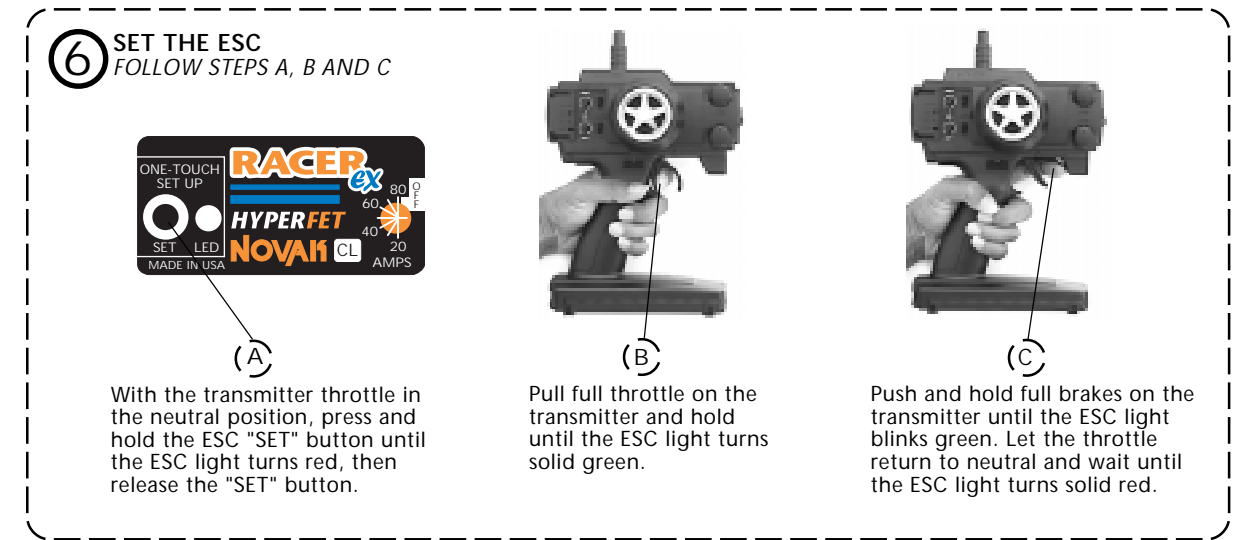
New CLC II is smooth and efficient. The "OFF" position bypasses the current limiter for maximum punch. Setting CLC II is simple— just turn the knob to the maximum amp draw. Use practice time at the track to set the current limiter to match track conditions.

- **TO REDUCE WASTED ENERGY** We recommend starting at a high level and adjusting downward to suit the track conditions. The perfect setting is just above the point where the CLC II starts making the acceleration of the motor feel slower.
- **TO CONTROL TRACTION ON SLIPPERY TRACKS** We recommend starting at the lowest setting and adjusting upward. The perfect setting is just below the point where the car is difficult to control during acceleration.
- **FOR MAXIMUM PUNCH** Turn the knob to the "OFF" position and get ready to race!

## QUICK SET-UP *If necessary, refer to back page for more detailed instructions.*



- ONE-TOUCH SET-UP NOTES:**
- The motor does not run during the Set-Up sequence (even if it is connected).
  - The ESC memorizes the settings until the Set-Up sequence is run again.
  - If the transmitter settings are changed, run the Set-Up sequence again.
- PRO TUNING FOR ONE-TOUCH SET-UP:**
- **PREVENTING BRAKE LOCK-UP** For slippery tracks, the maximum brake setting may cause the brakes to lock up. To reduce the amount of braking power, set the ESC normally, then reduce the LOW ATV/EPA/ATL setting on the transmitter. Make sure to return the setting to maximum before the Set-Up sequence is run again.
  - **INSTANT-ON THROTTLE** For drag racing, some drivers want to reach maximum throttle quickly. To make the throttle reach 100% before the trigger is at 100%, hold the throttle at less than maximum during the Set-Up sequence. This setting is not recommended for applications requiring smooth throttle response.



**PRODUCT WARRANTY**

The Racer-EX ESC is guaranteed to be free from defects in materials or workmanship for a period of 120 days from original date of purchase (verified by dated, itemized sales receipt). This warranty does not cover incorrect installation, components worn by use, damage from using fewer than 4 or more than 10 cells, not using heat sinks, short circuiting the heat sinks, component damage from excessive force when applying the heat sinks, cross-connection of battery/motor, using the same type and gender plugs for both the battery and motor connections, damage from excessive force to the Current Limiter knob, not properly installing three 0.1μF (50V) capacitors on the motor, damage from incorrect installation of an external receiver battery pack, damage from incorrect installation of a FET servo, any splices into the input harness or switch harness, component damage from excessive force to the "SET" button, tampering with the internal electronics, allowing water, moisture, or other foreign material to enter ESC or get onto PC board, incorrect installation of an alternate input plug, allowing any exposed wire to short-circuit, or any damage caused by crash, flooding, or act of God.

In no case shall our liability exceed the 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.

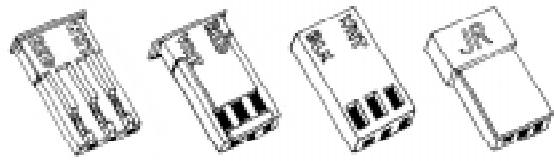
**120 DAY WARRANTY**

## DETAILED INSTRUCTIONS (STEPS 1-6)

### STEP 1

#### CHANGING THE INPUT PLUG

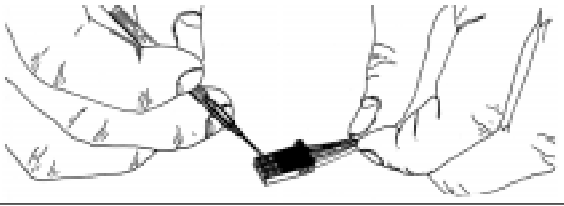
If the factory-installed Futaba J style plug installed on the ESC is not compatible with your receiver, follow Figures 1-3 to change the input plug. The Novak Input Plug System™ will convert the ESC's input plug for use with Airtronics, KO, Kyosho, & JR radios.



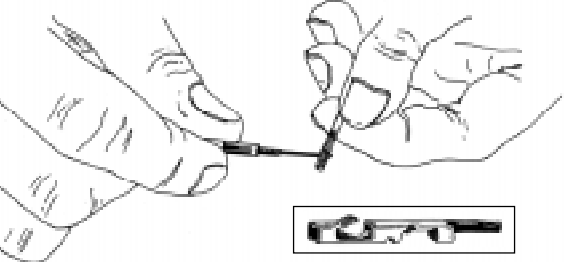
Airtronics (A) KO Kyosho (KYO) JR\*

\*JR plug can be used in place of Airtronics "Z" Connector

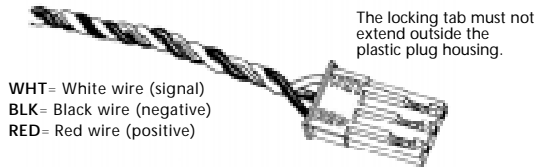
**FIGURE 1** Using a small standard screwdriver, press each of the three metal locking tabs and remove each pin from the plug.



**FIGURE 2** Using the screwdriver, carefully bend 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.



**CAUTION** Improper installation of these wires may cause damage to the receiver, servo, and ESC.

### STEP 2

#### HEAT SINK INSTALLATION

The included heat sinks will make the ESC run cooler and faster when they are properly installed.

**1. INSTALLING THE LARGE HEAT SINK** Place the ESC on a flat surface and press the large heat sink onto the row of 5 transistors on the left side of the ESC.

**2. INSTALLING THE SMALL HEAT SINK** Press the small heat sink onto the row of 3 transistors on the right side of ESC.

The heat sinks should press onto the transistors with a snug fit. If they are installed upside-down or shifted off-center, the fit will be either too tight or too loose.

To prevent damage to the components under the transistors, **never use a vise or pliers to force the heat sinks onto the transistors.** Do not use glue to attach heat sinks.

To prevent short-circuits, **never allow the heat sinks to touch each other or any exposed metal or graphite.**

### STEP 3

#### MOUNTING INSTRUCTIONS

**1. MOUNTING THE ESC** Use the included mounting tape to mount the ESC in a location that provides maximum airflow through the heat sinks. For off-road cars, the ESC should be mounted on the chassis.

Mount the ON/OFF switch in a convenient place with a piece of mounting tape or screw.

**2. MOUNTING THE RECEIVER** To minimize glitching, mount the receiver and antenna away from the ESC, motor, servo, power wires, or any large piece of metal (such as a chassis) or graphite.

If you must mount the receiver on the chassis, mount it on its side with the crystal & antenna as far above the chassis as possible to reduce the chances of radio interference.

Mount the antenna as close to the receiver as possible. Follow the receiver manufacturer's instructions for recommended antenna routing and mounting.

#### USING A RECEIVER BATTERY PACK

The Racer-EX does not require an external receiver battery pack for most racing situations. Built-in Radio Priority Circuitry™ provides complete control of the steering servo even after the main battery pack has "dumped" and can no longer provide the power required to operate the motor. However, applications using multiple high-powered servos, and/or main battery packs with 8 or more cells require the use of an external receiver battery pack to prevent overloading of the ESC's voltage regulator. Failure to use a receiver battery pack in these applications may result in damage to the voltage regulator and will void the product warranty.

1. Plug an external 5-cell nickel cadmium (1.2 VDC/cell) receiver battery pack into the battery slot of the receiver.
2. Leave the ESC's ON/OFF switch in the OFF position. This switch is not used with this configuration.
3. Use the ON/OFF switch on the external receiver battery pack to turn the system power on and off.

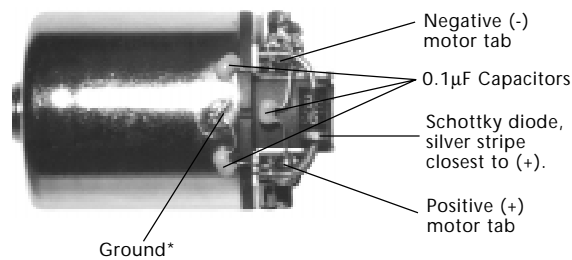
### STEP 4

#### HOOK-UP INSTRUCTIONS

**1. INSTALLING MOTOR CAPACITORS** Motors generate radio noise that can cause radio problems. **Capacitors must be used at all times on every motor to prevent damage to the ESC.**

Solder the included three 0.1µF, 50 V, non-polarized, ceramic capacitors between:

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



Extra 0.1µF capacitors are available in Novak kit #5620  
Extra Schottky diodes are available in Novak kit #5640  
\*Stock motors do not have ground tabs, solder to the can of the motor.

**2. INSTALLING THE SCHOTTKY DIODE** Solder the included Schottky diode between POSITIVE (+) motor tab & NEGATIVE (-) motor tab. The diode is polarized and must be installed with the silver stripe (+) closest to the POSITIVE motor tab.

**3. PLUGGING INTO THE RECEIVER** Plug the ESC into CHANNEL 2 (or THROTTLE CHANNEL) of the receiver. Plug the servo into CHANNEL 1. Nothing should be plugged into the BATTERY CHANNEL.

**4. BATTERY & MOTOR CONNECTIONS** Solder the included extra piece of red wire from BATTERY POSITIVE (+) to MOTOR POSITIVE (+).

Splice the ESC red wire into the extra red wire and insulate the solder joint with heat shrink tubing.

Solder the ESC blue wire to MOTOR NEGATIVE (-).

Solder the ESC Black wire to BATTERY NEGATIVE (-).

**5. USING PLUGS FOR BATTERY & MOTOR CONNECTION** High-quality/low-resistance connector plugs, such as Dean's Ultra Plugs, can also be used to connect the Racer-EX. While these connectors make component changes quick and easy, the connection will never have the low resistance of a good solder joint.

Use connectors that can not be connected backwards, as this will damage the ESC and void the warranty.

It is good practice to use a female connector on battery to keep from short-circuiting on conductive surfaces.

If you use connector plugs for battery and motor, use a male connector on the ESC battery wires and a female connector on the motor wires. Doing this, will avoid plugging the battery into the motor output of the ESC.

### STEP 5

#### TRANSMITTER ADJUSTMENTS

For proper ESC operation, the basic transmitter throttle adjustments are:

**HIGH ATV, EPA**—Controls the amount of throw from neutral to full throttle. **Set to maximum setting.**

**LOW ATV/EPA/ATL**—Controls the amount of throw from neutral to full brakes. **Set to maximum setting.**

**EXP or EXPO**—Controls the linearity of the throttle channel. **Set to zero or middle setting.**

**SUB TRIM**—Usually used to center a servo. **Set to zero or middle setting.**

**TH TRIM or COAST BRAKE**—Controls coast brakes of the ESC. **Set it to middle setting.**

**MECHANICAL ADJUSTMENT**—Adjusts throw of throttle trigger. **Set the throw for 2/3 throttle, 1/3 brake.**

**THROTTLE REVERSING SWITCH**—Set in either position. Do not change the setting after ESC Set-Up.

See ONE-TOUCH SET-UP NOTES on front page

### STEP 6

#### SPEED CONTROL SET-UP

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 SPEED CONTROL'S SET BUTTON  
With transmitter throttle at neutral, press and hold the ESC SET button until the status LED turns solid red.
4. RELEASE ESC SET BUTTON WHEN LED IS RED
5. PULL TRANSMITTER TRIGGER TO FULL THROTTLE  
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 TRANSMITTER THROTTLE TO FULL-BRAKE  
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.

**Speed control is programmed & ready to race!**

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

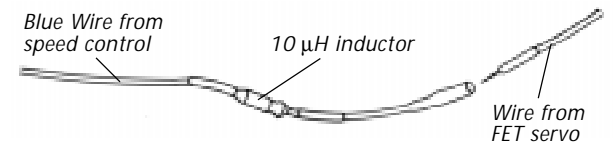
*If you experience any problems during programming, turn off the speed control and repeat programming.*

#### FET SERVO CONNECTION

The Racer-EX is wired for connecting a FET Servo. This type of servo requires a fourth wire connection. The fourth wire from the servo is connected to the small, blue 24-gauge silicone wire coming out of the ESC. In the Racer-EX, this wire supplies 6 volts of power to the servo and is controlled by the speed control's ON/OFF switch.

**NOTE: Do not allow the blue FET servo wire to come in contact with the chassis or battery terminal, as this may damage the power switch, switch wires and the speed control's PC board, consequently voiding the product warranty.**

If you experience radio glitching with the installation of the FET servo, try installing a 10µH inductor (usually supplied with servo) in series with the blue wire.



#### 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 SET button not held long enough—Press and hold SET button until status LED turns solid red.
- Make sure metal sockets on Input Harness are locked in place in plastic plug.
- Check to be sure transmitter and receiver crystals are a matched set
- Possible transmitter, receiver, or crystal problem.

##### Steering Channel Works But Motor Will Not Run

[Status LED is solid RED at all throttle positions]

- No signal from receiver—Make sure speed control is plugged into throttle channel of receiver. Check throttle channel operation with a servo. Check the wiring color sequence & metal socket insertion of receiver harness.

##### Steering Channel Works But Motor Will Not Run

[Status LED is RED at neutral / GREEN at full throttle]

- Check motor connections. Check motor and brushes.
- Not programmed—Repeat programming.
- Thermal Shutdown—Allow to cool/Check for adequate airflow through heat sinks.
- Check wiring and connections—Check operation of system without speed control.

##### Receiver Glitches/Throttle Stutters During Acceleration

- Motor capacitors broken or missing—Refer to Step 4.
- Receiver or antenna too close to speed control, power wires, battery, or motor—Refer to Step 2.
- Bad connections—Check wiring and connectors.
- Graphite or Aluminum Chassis—Refer to Step 2.
- Excessive current to motor—Use a milder motor or a smaller pinion gear.

##### ESC Is Melted Or Burnt/ESC Runs With Switch Off

- Internal damage—Refer to Service Procedures.

\*For more help call our Customer Service Department.

#### SERVICE PROCEDURES

Before sending your speed control in for service, review the Trouble-Shooting Guide and Instructions. The speed control may appear to need service when other problems exist in the system such as a problematic transmitter, servo, battery, connectors or motor.

**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 requested information on the enclosed ESC SERVICE CARD and return it with your receiver. Service cards can also be downloaded from our website at [www.teamnovak.com](http://www.teamnovak.com).

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

**SERVICE COSTS:** Customer is responsible for service costs (parts, labor and shipping/handling charges). ESCs are returned UPS/COD CASH ONLY. See ESC SERVICE CARD for other payment and shipping options.

##### ADDITIONAL NOTES:

- Hobby dealers/distributors are not authorized to replace speed controls thought to be defective.
- If a hobby dealer sends your speed control for service, submit a completed ESC SERVICE CARD to the dealer and make sure it is sent with the speed control.
- 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.

##### FOR SERVICE, SEND ESCs TO:

Novak Electronics, Inc.  
Attn: Service Department  
18910 Teller Ave., Irvine, CA. 92612 USA

##### CUSTOMER SERVICE HOURS (PST):

M-Th: 8am-5pm; F: 8am-4pm (Closed every other Friday)  
(949) 833-8873 • FAX (949) 833-1631

Visit us at [www.teamnovak.com](http://www.teamnovak.com)

# RACER<sub>EX</sub>