OPERATING INSTRUCTIONS

CYCLONE & CYCLONE^{TC}

The Novak **Cyclone** and **Cyclone^{TC}** touring edition are all-digital, microprocessor-based ESC's *(Electronic Speed Controls)* using advanced components and the best HYPERFET III transistors to deliver the highest performance with the smallest size and lightest weight. Each have three user-selectable throttle profiles and the ability to store a fourth custom profile created by the optional ***Pit Wizard*** *(#1035)* or ***Profile Software*** *(#1030)*, giving you extreme flexibility.

Novak's ***Constant Force Braking*** provides more effective braking at lower motor RPMs, while a minimum brake adjustment pot lets you set initial braking from 0-75%.

Low-resistance solder posts and Super-Flex 12™ wire give minimal voltage drop and high current handling, while allowing quick and easy wire replacement and positioning.

Novak's ***Polar Drive Circuitry*** gives you increased power and reduced operating temperatures. This means even smoother throttle response, increased radio system range, quicker acceleration, and longer run times.

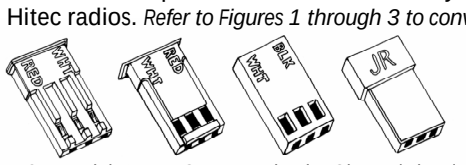
Other features include the original ***One-Touch Set-Up***™, ***Radio Priority & Digital Anti-Glitch Circuitry***™, the Novak ***Input Plug System***™, a heavy-duty BEC to handle high power servos, and low-voltage operation down to 2 volts.

SPECIFICATIONS

Input Voltage	4-7 cells (1.2 volts DC/cell)	
Case Width	1.73 inches [4.40 cm]	
Case Depth	1.10 inches [2.79 cm]	
Case Height	0.79 inch [1.99 cm]	
Weight (w/o heat sinks)	1.42 ounces [40.26 g]	
On-Resistance *@ Transistors*	0.00058Ω	*@ 25°C transistor junction temp.*
Rated Current	480 amps	
Braking Current	160 amps	
BEC Voltage / Current	6.0 volts DC / 3.0 amps	
Wire Size (Battery/Motor)	12 gauge (Super-Flex 12™)	
Wire Length (Battery/Motor)	9 inches [22.8 cm]	
Signal Harness Length	8 inches [20.3 cm]	
Minimum Brake Range	0 to 75 % Full Brake	
Minimum Drive (% Full Drive)	6.0-6.0-1.5 (TC: 1.0-2.0-3.0)	
Deadband (% Full Throttle)	6.0-6.0-4.0 (TC: 7.0-3.0-3.0)	
Drive Frequency (kHz)	5.86-7.8-15.6 (TC: 15.6-11.7-7.8)	
Brake Frequency (kHz)	3.9-5.86-3.9 (TC: 3.9-5.86-7.8)	

STEP 1
CHANGING THE INPUT PLUG

Included with the Cyclone and Cyclone^{TC} is the Novak Input Plug System™ to convert the Futaba J style signal harness to be compatible with Sanwa, KO, Kyosho, JR, and Hitec radios. *Refer to Figures 1 through 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.*

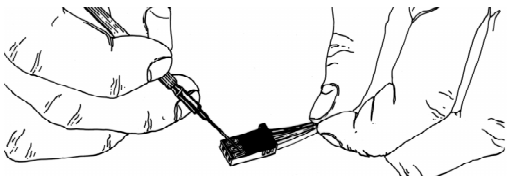


FIGURE 2 *With the screwdriver, carefully lift each of the metal locking tabs to the angle shown.*

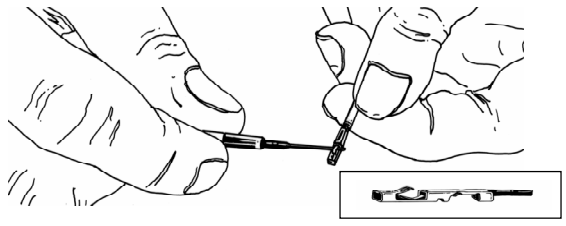
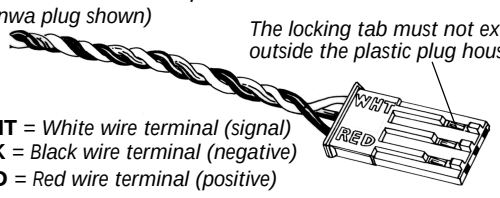


FIGURE 3 *Insert each pin into the correct plug slot. Each pin should "click" into place.*
(Sanwa plug shown)



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.*

STEP 2
MOUNTING INSTRUCTIONS

1. DETERMINE BEST ESC MOUNTING LOCATION
Speed control should be positioned away from the receiver and antenna as shown in set-up photo *(back page)*. Choose a mounting position that will keep power wires away from the receiver and antenna. Choose position that will provide maximum airflow through transistor tabs or heat sinks to allow for proper cooling.

2. INSTALL THE SPEED CONTROL
Use the included double-sided tape to mount ESC.

3. INSTALL THE ON/OFF SWITCH
Determine 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 THE RECEIVER AND ANTENNA
Mount receiver as far from ESC, motor, power wires, battery, and servo as possible. These components all emit radio noise when the throttle is being applied. On graphite or aluminum, it may help to 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 mast.

Cutting or coiling excess wire will reduce radio range.

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.
- **4 to 7 CELLS ONLY** Never use more than 7 cells (8.4 volts DC) in the main battery pack.
- **MOTOR CAPACITORS REQUIRED** Three 0.1µF (50V) ceramic capacitors must be properly installed on every motor to prevent radio interference.
- **POWER CAPACITOR REQUIRED** An external power capacitor must be used to ensure the highest efficiency and best protection for your Cyclone or Cyclone^{TC}.
- **NO REVERSE VOLTAGE!** Reverse battery polarity can damage speed control—Disconnect battery immediately.
- **DON'T LET TRANSISTOR TABS TOUCH** Never allow the two transistor tab banks to touch each other or any exposed metal. The short circuit will 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 can get hot, so be careful. If transistor tabs get extremely hot use optional heat sinks.
- **INSULATE WIRES** Always insulate exposed wiring with heat shrink tubing to prevent short circuits.

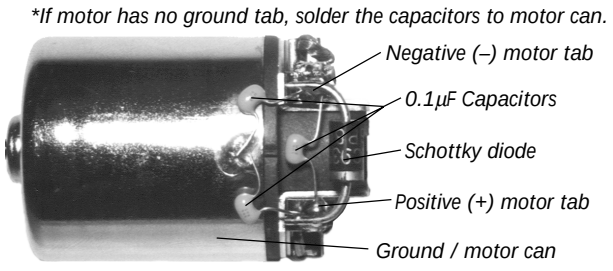
STEP 3
HOOK-UP INSTRUCTIONS

Refer to Set-Up photo on back

1. INSTALL MOTOR CAPACITORS
Electric motors generate radio noise that can interfere with your receiver and cause radio problems. Included in the accessory kit with the ESC are three 0.1µF (50V) non-polarized, ceramic capacitors. These capacitors must be installed on every motor to help reduce noise generated by the motor and also to prevent possible 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 motor has no ground tab, solder the capacitors to motor can.*



Extra 0.1µF capacitors are available in Novak kit #5620.

2. INSTALL SCHOTTKY DIODE
Solder the lead ***CLOSEST*** to the silver stripe on the body of the Schottky diode to the ***POSITIVE*** (+) motor tab.

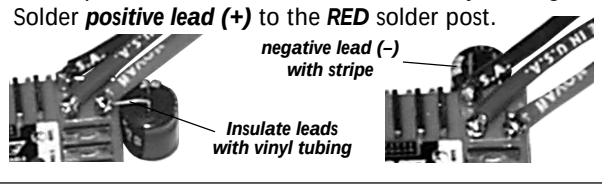
Solder the lead ***OPPOSITE*** the silver stripe on the body of the Schottky to the ***NEGATIVE*** (–) motor tab.

If installed backwards, a Schottky diode will be destroyed. The body of a bad diode will normally crack open. Replace only with Schottky diodes that have a minimum rating of 35 volts / 8 amps. ***Schottky diodes are available in Novak kit #5640.***

3. INSTALL POWER CAPACITOR
The included power capacitor will drop the speed control's operating temperatures by 10-15°F, and will help dissipate noise and voltage spikes from the ESC's high switching speed.

To allow greater flexibility for your application, you can install the power capacitor up against the side or back of the ESC, or heat shrink it along the power wires.

<u>To install capacitor alongside the speed control:</u>
Use included double-sided tape to hold the capacitor against the side or back of the speed control's case.
Bend ***negative lead (–)*** *{shorter/marked with stripe}* toward the ***BLK*** solder post. Insulate lead with included vinyl tubing.
Solder ***negative lead (–)*** to the ***BLK*** solder post.
Bend ***positive lead (+)*** *{longer/unmarked}* toward the ***RED*** solder post. Insulate lead with included vinyl tubing.
Solder ***positive lead (+)*** to the ***RED*** solder post.



ACCESSORIES

MOTOR CAPACITORS
To prevent radio interference, you must have three 0.1µF capacitors properly installed on every motor. Three 0.1µF (50v) capacitors are included for one motor. Additional 0.1µF (50V) capacitors are available in Novak kit #5620. Refer to Step 3 for motor capacitor installation instructions.

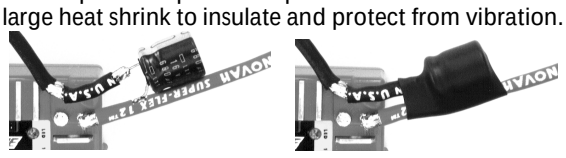
SCHOTTKY DIODES
The Cyclone and Cyclone^{TC} have an internal Schottky diode. External Schottky diodes are also included, and should be used for optimum ESC, braking, and motor performance. Refer to Step 3 for installation instructions. *Additional Schottky diodes are available in Novak kit #5640.*

HEAT SINKS
Heat sinks are not required with the Cyclone or Cyclone^{TC}. However, added cooling from heat sinks can increase efficiency. An optional Heat Sink Set is available as Novak kit #5407. Heat sinks are recommended for heavy load applications and set-ups with limited air circulation, or if the transistors get excessively hot during operation.

POWER CAPACITORS
An external power capacitor is included, and must be used to maintain cool and smooth operation.
Refer to Step 3 for installation instructions.
Additional Power Capacitors are available in Novak kit #5670.

STEP 3
HOOK-UP INSTRUCTIONS *(Cont.)*

<u>To install capacitor along the ESC's power wires:</u>
Install capacitor as close to the speed control as possible.
Make a small splice on the black and red power wires. Solder the ***negative lead (–)*** to the splice on the ***black wire***. Solder the ***positive lead (+)*** to the splice on the ***red wire***. Secure power capacitor to power wires with included large heat shrink to insulate and protect from vibration.



4. CONNECT SPEED CONTROL TO THE RECEIVER
After the proper input plug plastic has been installed to match the receiver (Refer to Step 1), plug the speed control into the **THROTTLE CHANNEL** of the receiver.

5. CONNECT SPEED CONTROL TO THE BATTERY PACK
Cut the **BLACK** wire to the desired length and strip about 1/8"-1/4" of insulation off each end. Solder to the ***negative*** side of a completely charged 4 to 7 cell battery pack and the other end to the ***BLK*** solder post.

Cut the **RED** wire to desired length *(to go from ESC to battery positive to motor)* and strip about 1/8"-1/4" of insulation off each end. Strip a short section of insulation (1/4"-3/8") from the middle section of the **RED** wire where it will attach to ***positive*** of battery pack. Solder the stripped section of **RED** wire to ***positive*** of battery pack and one end to the ***RED*** solder post.

NOTE: Prolonged or excessive heating of solder post can result in the post desoldering from PCB and short-circuiting.

6. CONNECT SPEED CONTROL TO THE MOTOR
Solder the free end of the **RED** wire to ***positive*** motor tab.
Cut the **BLUE** wire to desired length and strip about 1/8"-1/4" of insulation off each end. Solder to the ***negative*** tab of the motor and to the ***BLUE*** solder post.

TIP: *Twisting the BLUE & RED motor wires one or two times around each other as they go to motor can help reduce any radio noise that may be emitted from the power wires.*

7. 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 motor and battery pack. While connectors make component changes quick and easy, they will never have the low resistance of a good solder joint.

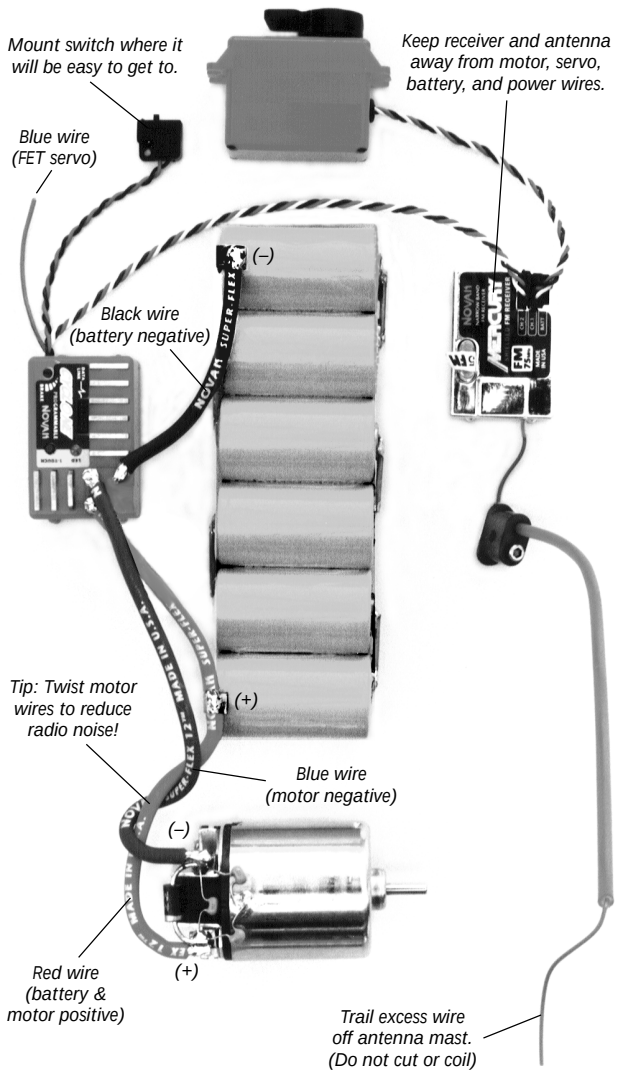
Use connectors that can not be connected backwards.

It is good practice to use female connectors on batteries to avoid shorting the connector and the battery.

If you use connectors for the battery and the motor, use a male connector on the ESC wires going to the battery and a female connector on the wires going to the motor. By doing this, you will avoid plugging the battery into the motor output of the ESC by mistake.

NOVAK EST. 1978 RACING ELECTRONICS

SET-UP PHOTO



STEP 4
TRANSMITTER ADJUSTMENTS

For proper ESC operation adjust transmitter 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 programming to reduce amount of brakes]
3. Set **EXPONENTIAL** to **zero**.
   [Controls the linearity of the throttle channel]
4. Set **THROTTLE CHANNEL TRIM** to **middle** setting.
   [Adjusts neutral position/Increases or decreases coast brakes]
5. Set **CHANNEL REVERSING SWITCH** to **either** position.
6. Set **ELECTRONIC TRIGGER THROW ADJUSTMENT** to **70% throttle** and **30% brake** throw (or 7:3).
   [Adjusts pistol-grip transmitter's throttle trigger throw]
7. Set **MECHANICAL TRIGGER THROW ADJUSTMENT** to position with **2/3 throttle** and **1/3 brake** throw.
   [Adjusts pistol-grip transmitter's throttle trigger throw]

STEP 5
SPEED CONTROL PROGRAMMING

Before beginning this step, the speed control should be connected to the receiver and to a charged 4 to 7 cell battery pack, and the transmitter should be adjusted.

1. **CONNECT THE BATTERY**
2. **TURN ON TRANSMITTER THEN THE SPEED CONTROL**
   Slide the **ON/OFF** switch to the ***ON*** position.
3. **PRESS AND HOLD ESC'S 1-TOUCH BUTTON**
   With the transmitter throttle in the neutral position, press and hold the **SET** button on the speed control until the status **LED *turns solid red***.
4. **RELEASE ESC'S 1-TOUCH BUTTON**
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-BRAKE POSITION**
   Hold it there until the status **LED *blinks green***.
7. **RETURN TRANSMITTER THROTTLE TO NEUTRAL**
   The status **LED** will ***turn solid red***, indicating that the throttle is in the neutral position and also that proper programming has been completed.

The speed control is programmed and 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.

NOVAK ELECTRONICS, INC.
18910 Teller Avenue
Irvine, CA 92612
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CYCLONE
FULLY PROGRAMMABLE ESC

STEP 6
THROTTLE PROFILE SELECTION

The Cyclone and Cyclone™ allow you to choose between three user-selectable throttle profiles that are programmed at the factory. This chart gives the specifics of each profile:

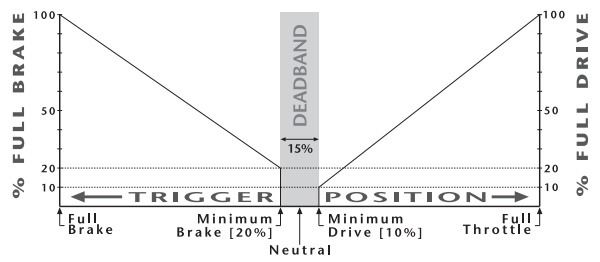
Profile	Description (**default)	Dead Band %	Drive Frequency kHz	Minimum Drive %	Brake Frequency kHz	Dr.Brake Toggle	
1	Stock	6.0	5.86	6.0	3.90	OFF	CYCLONE
2	Drag Brake	6.0	7.80	6.0	5.86	ON	
3	**Modified	7.0	15.60	1.5	3.90	OFF	
1	**World Cup	7.0	15.60	1.5	3.90	OFF	CYCLONE™
2	High Traction	3.0	11.70	2.0	5.86	OFF	
3	Touring Stock	3.0	7.80	3.0	7.80	OFF	

Experiment with each profile to determine which works best for you!

1. **TURN ON THE TRANSMITTER**
2. **TURN ON THE SPEED CONTROL**
3. **PRESS & HOLD ESC'S 1-TOUCH BUTTON** until the status **LED *turns solid green***. The LED will first turn red, then a few seconds later it will turn green.
4. **RELEASE 1-TOUCH BUTTON** and then the status ***LED will begin to blink red***. The number of times the LED blinks indicates the profile number selected.
5. **PRESS & RELEASE 1-TOUCH BUTTON TO SELECT PROFILE** Each press will change to the next consecutive profile number. *NOTE: After profile #3, the sequence begins again at profile #1.*
6. If 1-TOUCH button is not pushed for about five seconds, the **ESC LOADS THE SELECTED PROFILE INTO MEMORY**, and the status **LED *turns solid red***, indicating that the speed control has exited the profile selection mode and is in neutral.

*Both ESCs can store a custom fourth profile that is created with either of the optional programming devices, the **Pit Wizard** (#1035) or the **Profile Software** (#1030). Once a custom profile has been created and downloaded into the ESC, there will be four profiles to choose from. Both programming devices come with complete details on creating your own custom profiles and give you the ability to modify the following parameters: Neutral Postion, Full Throttle Position, Full Brake Position, Dead Band Value, Drag Brake Value, Drag Brake Frequency*, Drive PWM Frequency*, Minimum Drive Value, Brake PWM Frequency*, and the Drag Brake Toggle.* *Adjustable from 122-23,400 Hz*

Illustration below shows graphical display of adjustable parameters



STEP 7
MINIMUM BRAKE ADJUSTMENT

The ***BRAKE*** pot on the Cyclone and Cyclone™ allows you to adjust the percentage of total braking power applied with the initial trigger movement in the brake direction. Refer to above illustration for indication of Minimum Brake Value.

- Turning ***BRAKE*** pot clockwise, increases amount of minimum braking up to a maximum of 75% of the total brake force.
- Turning ***BRAKE*** pot all the way counter-clockwise, sets the amount of minimum braking at the lowest value of 0.39%, or 1/256th *(one step)* of the total brake force.

RECEIVER BATTERY PACK

The Cyclone and Cyclone™ speed controls should not require an external receiver battery pack for most racing situations. The built-in Radio-Priority Circuity™ provides complete control of the steering servos even after the main battery pack has 'dumped' and can no longer provide the power required to turn the motor. However, applications with multiple high-power servos, and some 4-cell set-ups may require an external receiver battery pack to prevent overloading or underpowering of the speed control's voltage regulator.

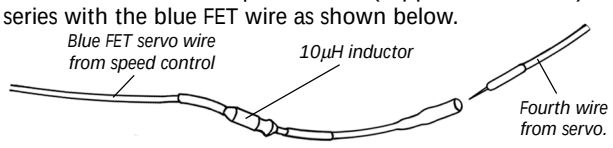
1. Plug the external 5 cell nickel cadmium receiver battery pack into the battery slot of the receiver.
2. Leave the speed control's **ON/OFF** switch in the ***OFF*** position. This switch is not used with this configuration.
3. Use the **ON/OFF** switch on the external receiver battery pack to turn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

Note: *If using a FET servo with an external receiver battery pack, the separate power wire from the servo must be connected to the red or positive servo wire. For this application do not use blue wire from ESC.*

FET SERVO CONNECTION

The Cyclone and Cyclone™ speed controls are wired for connecting a FET servo that requires seperate power connection. The fourth wire from the servo is connected to the small blue 24 gauge silicone wire exiting the ESC along with the signal and switch harnesses. This wire supplies 6 volts DC to the servo, and is controlled by the ESCs ON/OFF switch.

Be sure to install the 10µH inductor (supplied with servo) in series with the blue FET wire as shown below.



NOTE: Do not allow the blue FET servo wire to contact the battery or any condutive surfaces, as this may cause damage to the speed control and will void the warranty.

TROUBLE-SHOOTING GUIDE

This section describes possible speed control problems, causes, and solutions.

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 wiring color sequence of receiver signal harness.
- Possible internal damage—Refer to Service Procedures.

Receiver Glitches/Throttle Stutters During 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.

Model 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.
- Optional external Schottky diode installed backwards or damaged—Refer to Step 3.

Motor Runs Backwards

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

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 in your Cyclone 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 ***ESC SERVICE CARD*** (also available on website) and return it with your speed control.

WARRANTY WORK: For warranty work, you *MUST CLAIM WARRANTY* on the ***ESC SERVICE CARD*** and include a valid cash register receipt with the purchase date on it, 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 ***ESC SERVICE CARD*** for payment and shipping options.

ADDITIONAL NOTES:

- The custom fourth profile may be lost during repair. We suggest storing it in the Pit Wizard or Profile Software.
- Novak Electronics, Inc. does not make any electronic components (transistors, resistors, etc.) available for sale.
- To provide the most efficient service to our customers, it is not our policy to contact customers by phone or mail.
- 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.

PRODUCT WARRANTY

★ 120 DAY WARRANTY

Novak Electronics, Inc. guarantees the Cyclone and Cyclone™ 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)*. Warranty does not cover incorrect installation, components worn by use, damage from using fewer than 4 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 resulting from thermal overload, damage from incorrect installation of FET servo or receiver battery pack, damage from excessive force while installing heat sinks, not installing three 0.1µF(50V) capacitors and a power capacitor on the motor, splices to input or switch harnesses, damage from excessive force when using SET button or BRAKE pot or 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 wires or solder posts 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 the connection and use of the speed control, 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.

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.

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