INSTRUCTION MANUAL

SPY

MICRO REVERSIBLE ESC

NOVAK

CE

NOVAK'S MICRO REVERSIBLE IS *THE SPY*

...and this spy gear is high-tech. Designed with ultra-small surface mount technology and all the standard features found in Novak electronic speed controls, the SPY gives you the ultimate controller for the right price.

The SPY is capable of handling 4-7 cells and up to 280 size motors that are used in 1/18th & 1/24th scale Micro R/C cars. The rugged 5V/1A B.E.C. handles most any servo with ease, and **Radio Priority Circuitry** means you'll maintain control of that servo even after the battery has discharged.

Smart Braking Circuitry brings the car to a slow speed before throwing it into reverse to reduce ESC heating, and the electronics will continue to stay cool with the **Polar Drive Technology** that also improves radio system performance. The **Reverse Disable Circuitry** lets you lock-out reverse for racing. And of course, **Novak's original One-Touch Set-Up** means your spy gear is the easiest to program.

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.
- **MICRO SIZE MOTORS ONLY** Use only motors that are intended for use with 1/18th scale or smaller R/C cars. Never use larger than a 280 size motor *(1" diameter/3-5 watts)*.
- **4 TO 7 CELLS ONLY** Never use fewer than 4 or more than 7 cells *(4.8-8.4 volts DC)* in the main battery pack.
- **NO REVERSE VOLTAGE!** Reverse battery polarity can damage speed control—Disconnect battery immediately.
- **NO SCHOTTKY DIODES** External Schottky diodes must **NEVER** be used with reversible speed controls. Using an external Schottky diode will damage the ESC.
- **DISCONNECT BATTERIES WHEN NOT IN USE** Always disconnect the battery pack from the speed control when not in use to avoid possible short circuits.
- **TURN TRANSMITTER ON FIRST** Turn on your transmitter's power before the speed control so you will have control of the radio equipment.
- **INSULATE WIRES** Always insulate exposed wiring with heat shrink tubing or electrical tape to avoid short circuits.

SPY SPECIFICATIONS

Input Voltage	4-7 cells *(1.2VDC/cell)*
Motor Size Limit	280 size *(1"diam./1.2"L)*
Motor Power Limit	10 watts *(continuous)*
Rated Current *(fwd/rev)*	12 amps
On-Resistance	0.019 ohm *(@Transistors)*
B.E.C. Voltage	5.0 volts DC
B.E.C. Current	1.0 amp
PWM Frequency	1000 Hertz
Protection	Thermal Overload
Case Width	0.95 inch *(24.1mm)*
Case Depth	1.12 inches *(28.4mm)*
Case Height	0.48 inch *(12.1mm)*
Weight	0.51 ounce *(14.4 grams)*
Part Number	1870

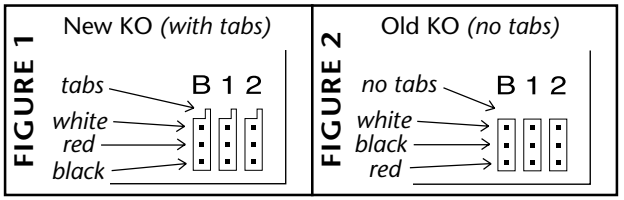
STEP 1 CHANGING INPUT HARNESS

The SPY ESC comes with the industry standard input harness connector that works with all major radio brands. However, with some older style receivers the wiring sequence in the plastic connector needs to be changed. This is an important step, because the electronics inside the receiver may be damaged if the wiring sequence is incorrect. Changing the sequence is easy to do, as described below.

JR • Hitec • New KO • Airtronics Z

JR, Hitec, Futaba, new KO, & Airtronics Z receivers do not need to change the sequence of the ESC's input harness wires. *New Airtronics Z receivers have blue plastic cases & new KO cases have tabs on the input harness openings as in **Figure 1**.*

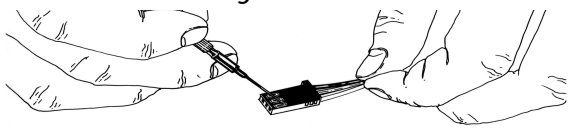
- Insert the input plug into the receiver with the ***BLACK wire toward the outside edge*** of the receiver case.



Old-style KO • Old-style Sanwa/Airtronics

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

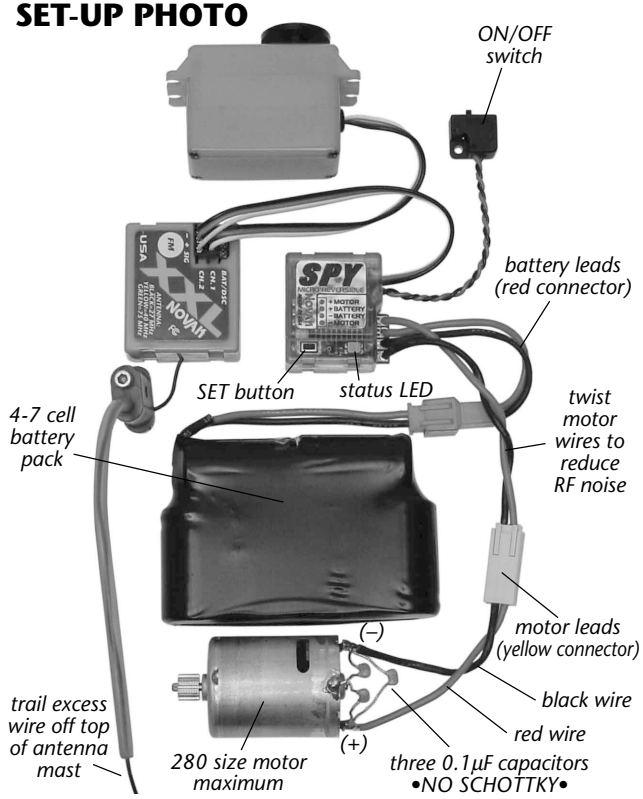
- ***Interchange the red and black wires*** in the plug plastic of the ESC's input harness as shown below.
- Insert the input plug into the receiver with the ***RED wire toward the outside edge*** of the receiver case.



STEP 2 MOUNTING ELECTRONICS

1. **DETERMINE BEST ESC MOUNTING LOCATION**
   The ESC should be positioned away from the receiver and antenna as shown in the Set-Up photo below. Choose a mounting position that will keep the power wires from obstructing movement of suspension or the motor pod.
2. **INSTALL SPEED CONTROL**
   Use the included double-sided tape to mount the ESC.
3. **INSTALL ON/OFF SWITCH**
   Determine a convenient place to mount the switch where it will be easy to get to. Mount the 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. These components all 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.

SET-UP PHOTO



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STEP 3 CONNECTING ELECTRONICS

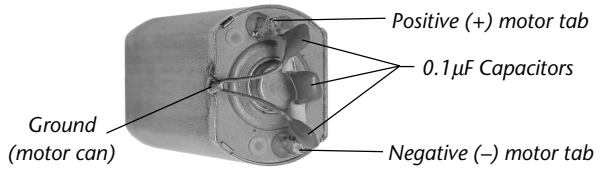
Refer to Set-Up photo on front

1. CHECK MOTOR CAPACITOR INSTALLATION

Electric motors generate radio noise that can interfere with your receiver and cause radio problems. Three 0.1µF (50V) non-polarized, ceramic capacitors are included and *must be installed* on every motor to help reduce the noise generated by the motor and to prevent ESC damage. If your motor does not have all 3 capacitors shown below, they must be added ***(0.1µF capacitors are also available in Novak kit #5620)***.

0.1µF (50V) capacitors should be soldered between:

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



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 (Refer to Step 1), plug the speed control into the **THROTTLE CHANNEL** of the receiver.

4. CONNECT SPEED CONTROL TO THE BATTERY PACK

Plug the **RED** Micro connector from speed control into a 4 to 7 cell battery pack *(1.2 volts DC/cell)*.

***Note: Use of non-OEM Micro connectors voids warranty.**

5. CONNECT SPEED CONTROL TO THE MOTOR

Plug the **YELLOW** Micro connector from speed control into the connector on the motor.

**Repalcement battery/motor leads w/Micro connectors available in Novak kit #5330.*

***TIP:** Twisting the motor wires once or twice as they go to the motor can help reduce any radio noise emitted from the wires.*

CUSTOMER SERVICE

Monday-Thursday: 8:00am-5:00pm (PST)
Friday: 8:00am-4:00pm *(closed every other Friday)*
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STEP 4 TRANSMITTER ADJUSTMENTS

•NOT ALL TRANSMITTERS HAVE THESE ADJUSTMENTS•

1. Set **HIGH ATV** or **EPA** to **maximum** setting.
   [Amount of throw at full throttle]
2. Set **LOW ATV**, **EPA**, or **ATL** to **maximum** setting.
   [Amount of throw at full brakes]
3. Set **EXPONENTIAL** to **zero** setting.
   [Throttle channel linearity]
4. Set **THROTTLE CHANNEL REV. SWITCH** to **either** position.
   [Do not change switch position after programming]
5. Set **THROTTLE CHANNEL TRIM** to **middle** position.
   [Adjusts neutral position/Increases or decreases coast brakes]
6. Set **ELECTRONIC TRIGGER THROW ADJUSTMENT** to **50% throttle** and **50% brake** throw (or 5:5).
   [Adjusts trigger throw on electronic/digital pistol-grip transmitters]
7. Set **MECHANICAL TRIGGER THROW ADJUSTMENT** to position with **1/2 throttle** and **1/2 brake** throw.
   [Adjusts trigger throw on mechanical/analog pistol-grip transmitters]

STEP 5 PROGRAMMING SPEED CONTROL

With ESC connected to receiver & charged battery pack:

1. **TURN ON THE TRANSMITTER, THEN SPEED CONTROL**
2. **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***.
3. **RELEASE ESC SET BUTTON WHEN LED IS RED**
4. **PULL TRANSMITTER THROTTLE TO FULL-ON POSITION**
   Hold it there until the status **LED *turns solid green***.
   NOTE: Motor will not run during programming even if connected.
5. **PUSH TRANSMITTER THROTTLE TO FULL-REVERSE**
   Hold it there until the status **LED *blinks green***.
6. **RETURN TRANSMITTER THROTTLE TO NEUTRAL**
   Status LED will turn solid red, indicating that throttle is at neutral and proper programming has been completed.
   If transmitter settings are changed, programming must be repeated. If you experience any problems, turn off ESC and repeat programming.

STEP 6 DISABLING REVERSE

With ESC connected to receiver & charged battery pack:

1. **TURN ON THE TRANSMITTER, THEN SPEED CONTROL**
2. **PRESS AND HOLD SPEED CONTROL'S SET BUTTON**
   Press and hold the ESC **SET** button until the status **LED *turns from solid red to solid green***.
3. **RELEASE ESC SET BUTTON WHEN LED IS GREEN**
4. **PRESS SET BUTTON TO ENABLE/DISABLE REVERSE**
   SLOW RED FLASH = REVERSE ENABLED
   FAST RED FLASH = REVERSE DISABLED
   NOTE: You must press button soon after the LED begins flashing red.
5. **LED WILL TURN GREEN THEN EXIT PROGRAMMING**
   Green LED indicates ESC is exiting programming mode.

TROUBLE-SHOOTING GUIDE

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.
- 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 motor.
- Excessive motor current—Use milder motor/smaller pinion gear.

Motor and Steering Servo Do Not Work

- Check wires, receiver signal harness wiring & color sequence, radio system, crystals, battery/motor connectors, & battery.
- 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/ESC adjustment—Refer to Steps 4 & 5.

Motor Runs Backwards

- Motor wired backwards—Check wiring and reverse.

SERVICE PROCEDURES

Review the Trouble-Shooting guide and the instructions, as the ESC may appear to have failed when other problems exist.

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

WEBSITE: Print a copy of the ***PRODUCT SERVICE FORM*** from the SERVICE section of the website. Fill out the needed information on this form and return it with the Novak product for servicing.

PHONE/FAX/E-MAIL: If you do not have access to the internet, contact our customer service department by phone, fax, or e-mail as listed in the CUSTOMER SERVICE section below, and they will supply you with current service options.

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

PRODUCT WARRANTY

The SPY 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)*. 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, cross-connection of the battery/motor, using the same-gender connectors on ESC, not using OEM Micro connectors or using motors larger than 280 size, reverse voltage application, damage resulting from thermal overload, not installing three 0.1µF (50V) capacitors on motors, splices to input or switch harnesses, damage from disassembling case, replacing wires, or excessive force when using SET button, tampering with internal electronics, allowing water, moisture, or other foreign material to enter ESC or get onto PC board, incorrect installation/wiring of battery/motor leads, alternate input plug plastic, external receiver battery pack, or FET servo, allowing exposed wiring to short-circuit, use of a Schottky diode, 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.