

ADDITIONAL SPECIFICATIONS	
Case Dimensions	1.57 x 1.33 x 0.62
Weight w/o HS oz.	1.58
On-Resistance (Ω)	0.0030
Rated Current (amps)	1.76
Braking Current (amps)	50
Current Efficiency	over 99%

THE NOVAK T4 AND T1

The Novak T4 (#1425) and T1 (#1125) are low-frequency, electronic speed controls designed for use with 4-10 nickel-cadmium cells. They feature internal thermal sensors to protect the electronics from overloads. Both the T4 and T1 are pre-wired and include plugs for easy installation.

Other features include a built-in BEC (5.0 V) to power the radio system, an LED for easy pot adjustments, and the Novak Input Plug System™ for compatibility with all popular radio systems.

Designed for use in R/C electric cars (both on and off-road, 1/12 and 1/10 scale), electric boats (with proper cooling and water protection)—Novak's Hydro Cooling System III is recommended, and electric airplanes.

NOVAK ELECTRONICS, INC.
18910 Teller Avenue • Irvine, CA 92715
(714) 833-8873 • FAX (714) 833-1631

INSTRUCTION MANUAL

FOR THE
T4 AND T1
SPEED CONTROLS

Team NOVAK

STEP 2 HEAT SINK INSTALLATION

PRECAUTIONS Heat sinks are provided with all Team Novak speed controls so that they will run cool and efficiently. You should use the heat sinks at all times to prevent thermal shut-down, overheating, and damage to the speed control. The heat sinks will also make your car run faster and brake better. To prevent possible short-circuits, make sure that the heat sinks do not touch each other or any exposed metal.

Be careful not to use too much force when installing the heat sinks so that you do not damage any of the components under the MOSFETs. **Never use a vise to install the heat sinks!**

INSTALLING THE HEAT SINKS (Refer to Figure 6)

- Place the ESC on a flat surface and press the heat sinks onto the MOSFETs' metal tabs until they are just secure.
- Mount the large heat sink on the six in-line metal tabs (six drive MOSFETs) and the small heat sink on the offset metal tab (brake MOSFET).
- If any of the heat sinks fit loosely, carefully bend each set of fins on the heat sink together with pliers until the fit is secure on the MOSFET's metal tabs. The heat sinks are designed to fit tight for maximum heat transfer. Do not glue the heat sinks onto the MOSFETs!

CAUTION! The heat sinks will get hot during normal operation of the speed control. Be careful not to touch the heat sinks when they are hot. If the heat sinks get extremely hot they can melt plastic parts mounted too close.

STEP 3 MOUNTING INSTRUCTIONS

PRECAUTIONS (1) DO NOT allow the heat sinks to short out to any metal components of the model—such as the chassis, solder joints, or motor case. (2) Wires or plastic may melt if draped over the heat sinks. (3) The ESC may overheat and shut itself off if the MOSFETs are not properly cooled.

- SPEED CONTROL** Mount the ESC with the included mounting tape and install in model to obtain **maximum airflow through the heat sinks** (refer to Figure 4). The motor has more power when the heat sinks are properly cooled. For off-road cars (RC-10, JR-X2, etc.), the ESC must be placed on the chassis.
To prevent radio interference, ALWAYS mount the receiver as far away from the ESC as possible.
Mount the ON/OFF switch in a convenient place with the included mounting tape.
 - RECEIVER** To maximize the receiver's range and
- Continued →

TROUBLE-SHOOTING GUIDE	
PROBLEM	WHAT'S WRONG
Receiver Glitches or Stutters During Acceleration	• The four required motor capacitors are not installed or have broken (refer to STEP 4). • Receiver is dropping out due to a large voltage drop during acceleration. Either use (1) a Novak Stutter Stopper (#5450), (2) an external battery, or (3) a receiver that is designed to be used with ESCs, such as a Novak receiver (AM or FM). • Receiver mounted too close to ESC. • Bad power plugs.
Model Runs Slow or Has No Acceleration	• SPEED pot not properly adjusted. • Bad power plug(s) or bad battery. • Motor brushes are hanging up or worn (replace) or motor is bad.
Steering Servo Works & Motor is Dead	• Motor brushes are hanging up or worn (replace) or motor is bad.
Overheated Motor	• Car is geared too high. • Shorted motor.
Hot Power Plugs	• Motor is geared too high. • Defective or loose plug(s). • Shorted motor.
Motor Runs Backwards	• Motor wired backwards. • Battery hooked up backwards.

SPEED CONTROL DOES NOT WORK	
PROBLEM	WHAT'S WRONG
Motor & Steering Servo are Dead	• Dead batteries. • Bad power plug or broken wire. • Internal damage.
No Brakes	• Transmitter adjusted incorrectly. • Brake transistor is blown. • Case is Melted
ESC Runs with Switch Off	• Drive transistor is blown.

TROUBLE-SHOOTING GUIDE

This section provides the most common problems, causes and solutions. If you are still unable to solve problems, call our Customer Service for assistance. If you determine that the item must be sent in for repair, follow the service procedures (next column). If your transmitter is not listed in the Transmitter Adjustments section, and/or you cannot set up your transmitter properly, call our Customer Service for assistance.

STEP 1 CHANGING THE INPUT PLUG

Included with both the Novak T4 and T1 are our exclusive Input Plug System™ to convert the ESC's input harness to be compatible with the Airtronics, Futaba J, KO, Kyosho, and JR radio systems. To change the input plug from the installed Futaba J to another type, refer to Figures 1-3.

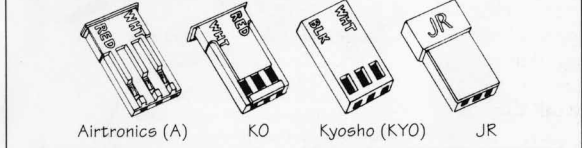


FIGURE 1 With a small flat-head screwdriver, press on each of the three metal prongs until the wires are easily removed. Remove wires.

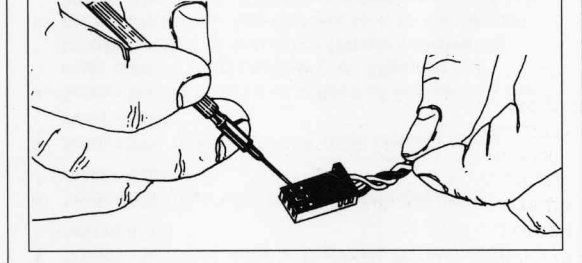


FIGURE 2 With the screwdriver, carefully lift up each of the metal locking tabs to the angle shown.

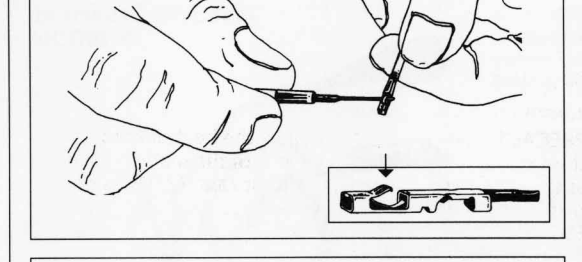


FIGURE 3 Insert each wire pin into the correct plug slot. Each pin should click in. (The Airtronics plug is shown)

The locking tab must not extend outside the plastic plug housing.

WHT = White wire terminal (signal)
BLK = Black wire terminal (negative)
RED = Red wire terminal (positive)

PRECAUTION: Improper installation of these wires may cause damage to the receiver, servo and/or ESC.

PRODUCT WARRANTY

Novak Electronics, Inc. guarantees the T4 and T1 to be free from defects in materials or workmanship for a period of 90 days from the original date of purchase (verified by a sales receipt). This warranty does not cover poor installation, component damage by use, damage due to the application of reverse voltage, damage due to excessive heat, component damage due to excessive force when installing heat sink(s), allowing water, moisture or any foreign material on the ESC's PC board, installing an alternate input plastic incorrectly, or allowing any exposed wire to short.

In no case shall our liability exceed product's original cost. We reserve the right to modify the provisions of this warranty without notice. Because Novak Electronics, Inc. has no control over the installation and use of the ESC, no liability may be assumed nor will liability be accepted for any damage resulting from using this product. Every ESC is thoroughly tested and cycled before leaving our facility and is therefore, considered operational. By the act of installing or operating this speed control, the user accepts all resulting liability.

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The Novak T4 and T1 were designed and manufactured in the U.S.A. Input Plug System™ is a trademark of Novak Electronics, Inc.
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SEND UNIT TO NOVAK ELECTRONICS, INC.
18910 Teller Avenue, Irvine, CA 92715

WHAT TO SEND Fill out enclosed ESC Service Return Card (or brief letter explaining problem) for each item. Include a legible name and return street address (no PO Boxes, please) inside package.

FOR WARRANTY WORK Customer MUST CLAIM WARRANTY on the ESC Service Card and include a valid, dated, cash register or charge card receipt or a previous repair invoice with the speed control. If any warranty provisions have been voided, there will be a charge for the repair.

SERVICE COSTS Customer assumes responsibility for service costs (parts, labor and shipping/handling charges.) All ESCs are returned UPS/COD CASH ONLY—unless a VISA or MasterCard account number is specified on the ESC Service Card. Pre-approved personal checks will also be accepted (refer to Service Card).

CUSTOMER SERVICE HOURS (PST)
Monday-Friday/8-4 • (714) 833-8873

THE NOVAK T4 AND T1

The Novak T4 (#1425) and T1 (#1125) are low-frequency, electronic speed controls designed for use with 4-10 nickel-cadmium cells. They feature an internal thermal sensor to protect the electronics from overloads. The Novak T4 is wired with a Tamiya battery plug and an Associated motor plug. The Novak T1 is packaged with a Dean's Ultra Plug.

Other features include a built-in BEC (5.0 V) to power the radio system, an LED for easy pot adjustments, and the Novak Input Plug System™ for compatibility with all popular radio systems.

Designed for use in R/C electric cars (both on-road and off-road, 1/12 and 1/10 scale), electric boats (with proper cooling and water protection)—Novak's Hydro Cooling System #6420 is recommended, and electric airplanes.

ADDITIONAL SPECIFICATIONS		
	T4	T1
Case Dimensions	1.57 x 1.33 x 0.62	
Weight w/o HS oz.	1.74	1.58
On-Resistance (Ω)	0.0045	0.0030
Rated Current (amps)	1.76	2.76
Braking Current (amps)		50
Current Efficiency		over 99%

TO PREVENT POSSIBLE DAMAGE TO THE SPEED CONTROL, IT IS IMPORTANT THAT YOU TAKE THE FOLLOWING PRECAUTIONS

- (ESC=ELECTRONIC SPEED CONTROL)
- Never use more than 10 cells (12 volts total) in the main battery pack.
 - Never force adjustment pots past their stops.
 - Never apply reverse voltage to the ESC or cross-connect the motor and battery connections.
 - Always install three 0.1µF (50 V) and one 47µF (25 V) electrolytic capacitors on every motor.
 - Never force on the heat sinks with a vise.
 - Never allow water, moisture, or any foreign material onto the ESC's PC board.
 - Frayed wire may cause damage to the ESC. Always insulate exposed wire with heat shrink tubing or electrical tape.
 - Always disconnect the battery pack from the ESC when not in use. Nickel-cadmium batteries can carry extremely high currents for a short period of time and may explode.
 - Never turn on the ESC without first connecting it to the receiver and turning on the transmitter—the model may take off.
- CAREFULLY FOLLOW ALL INSTRUCTIONS**

Continued from other side

to minimize the possibility of glitching, mount the receiver and antenna at least two inches away from the motor, servo, wiring, or any large piece of metal such as a metal chassis. For off-road cars the receiver and antenna should ALWAYS be mounted on the rear shock tower.

Mount the antenna as close to the receiver as possible. If your antenna is longer than 18 inches, follow the receiver manufacturers' recommended antenna routing and mounting.

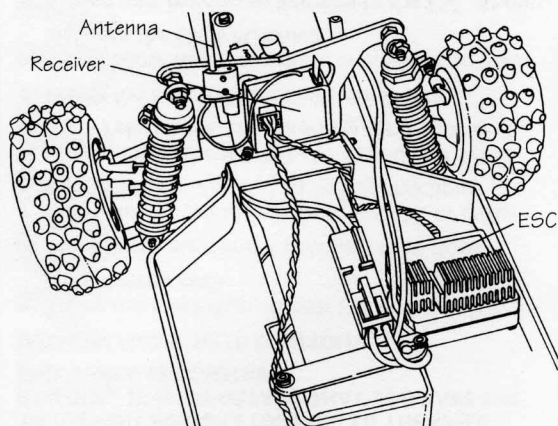


FIGURE 4 Always mount the ESC to obtain maximum parallel air flow THROUGH the transistors. For off-road cars (RC-10, JR-X2, etc.), the ESC should mount on the chassis as shown, and the receiver and antenna should mount on the rear shock tower.

STEP 4 HOOK-UP INSTRUCTIONS

PRECAUTIONS (1) Never allow wires to fray and always insulate any exposed wire with heat shrink tubing. (2) Never use more than 12 volts in the main pack. (3) Three 0.1µF (50 V) capacitors and one 47µF (25 V) electrolytic capacitor must be properly installed on each motor. (4) Cross connecting the motor and battery connections will damage the ESC.

1. INSTALLING MOTOR CAPACITORS

(Refer to Figure 5)

Motors are capable of producing high voltage spikes which will lower the ESC's performance and may damage the unit. The three included 0.1µF (50 V) ceramic disc capacitors and one included 47µF (25 V) electrolytic capacitor MUST be installed on EVERY motor.

Solder a 0.1µF (50 V) capacitor between:

- POSITIVE (+) motor brush tab & NEGATIVE (-) motor brush tab (also solder the 47µF here).
- POSITIVE (+) motor brush tab & GROUND tab†.
- NEGATIVE (-) motor brush tab & GROUND tab†.

Extra 0.1µF capacitors are available (Novak accessory kit #5620).

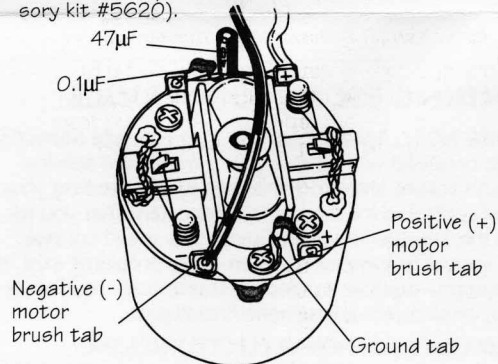


FIGURE 5 Proper installation of the four (4) required motor capacitors

†Use the can of the motor if your motor does not have a ground motor tab. Make sure the can is grounded.

2. PLUGGING THE ESC INTO THE RECEIVER

After the proper input plug plastic has been installed to match the receiver (STEP 1), plug it into the throttle channel of the receiver. Remove any power harness going to the battery channel of the receiver (unless an external battery pack is used—refer to STEP 7). The ESC has an internal voltage regulator which supplies the proper voltage (5 V) to the receiver and servo. If more than one servo is used, an external battery pack must be used to power the radio system (STEP 7).

3. TWO SMALL RED WIRES

The internal voltage regulator is bypassed when the two small red wires are soldered together.

4-cell operation: solder the wires together.

6-cell operation: solder the wires together.

(if the speed control and servo begin to glitch, leave the wires unsoldered)

7-10 cell operation: leave the wires unsoldered

4. BATTERY & MOTOR CONNECTIONS (Figure 6/7)

The Novak T4 and T1 are designed to be used with 4 to 10 nickel-cadmium cells (1.2 V connected in series) in the main battery pack, and can be used with any motor—stock or modified, with any number of turns.

Since the T4 is designed as an entry-level ESC, it is pre-wired with battery and motor connectors for easy installation.

WHEN WIRING A NOVAK T4:

- **BATTERY PACK CONNECTION** Simply plug the Tamiya connector from the ESC into the female Tamiya connector on your battery pack. Black wire indicates negative (-) polarity, red wire indicates positive (+) polarity.
- **MOTOR CONNECTION** Plug the female Associated connector from the ESC into the male Associated connector on the motor.

If you do not have the female Tamiya plug on your battery pack and/or male Associated connectors on your motor, Novak accessory kit #5810 is available with the plugs installed on 14 gauge silicone wire.

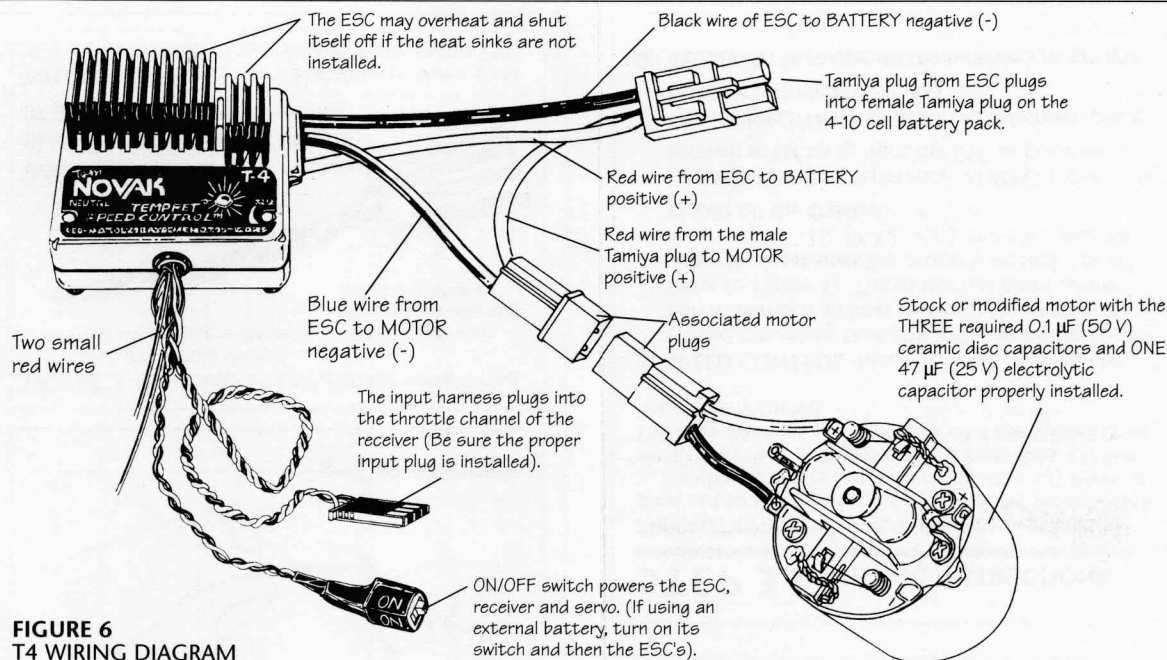


FIGURE 6
T4 WIRING DIAGRAM

STEP 4 Continued:

WHEN WIRING A NOVAK T1:

- Solder ESC black wire to the male battery plug negative (-).
- Solder ESC blue wire to the female negative (-) motor brush tab.
- Solder ESC red wire to the male battery plug positive (+).
- Solder the included extra piece of red wire to the male battery plug positive (+). Measure the length needed to reach the female positive (+) motor brush tab. Cut the red wire to the proper length and solder it to the positive (+) female tab.

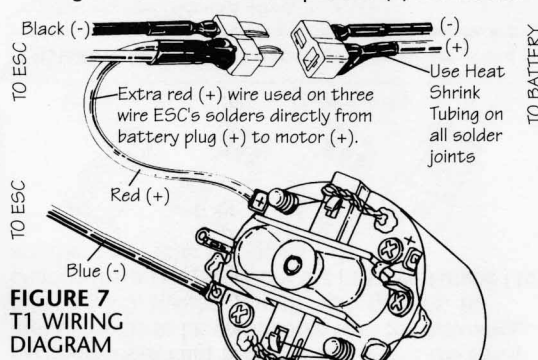


FIGURE 7
T1 WIRING DIAGRAM

STEP 5 TRANSMITTER ADJUSTMENTS

Adjusting your transmitter's throttle channel is probably the most critical step to insure proper ESC set-up. The basic transmitter throttle adjustments are:

ATV, EPA or ATL—High ATV/EPA controls the amount of throw from neutral to full throttle. Low ATV/EPA/ATL controls the amount of throw from neutral to full brake (PUSH BRAKE).

EXP or EXPO—Controls the linearity of the throttle channel. It should be set to zero or normal.

SUB TRIM—Usually used to center a servo. An ESC does not use this adjustment, and it is set to zero.

TH TRIM or COAST BRAKE—Usually used to control the amount of coast brakes of the ESC. This comes in handy during racing since the brakes can be adjusted at any time.

Several transmitters are listed below. Refer also to the transmitter manufacturer's original manual.

TRANSMITTER NOT LISTED?

If your transmitter is not listed, follow these basic settings:

- ATV/EPA, or ATL—set all to maximum.
- TH TR and SUB TR—set all at neutral or zero.
- Set throttle reversing switch at normal.

TX CHART LEGEND		CW = Clockwise ↻	
— = None	Nor = Normal	CCW = Counter CW ↺	
BR = Brake	Rev = Reverse	G. D. A. = Grip Dial Adj.	
Mid = Middle	TH = Throttle	↑ = Up	↓ = Down
L = Low	TR = Trim	⇒ = Right	⇐ = Left

TX TYPE	TH	ATL	ATV or EPA	TH	SUB	REV	MECH	COAST	PUSH
	EXP		Hi	Low	TR	SW	ADJ	BRAKE	BRAKE
FUTABA									
T2PKA	—	—	10	6	-5	⇒	Pos 2	CH2 TR	ATV-L
T3PG	0	—	10	—	-5	Nor	Pos 2	BR TR	BR Lim
T2P	—	—	—	—	-5	Rev	1/3	—	—
T2PB	—	—	—	—	-5	Rev	Mid	—	—
T2PD	—	5	10	10	L-5	0	Rev	1/3	ATL
T2PBKA	—	—	10	10	L-5	—	Rev	Mid	ATV-L
T2NCS	—	—	—	—	↓	—	—	—	—
T2NBR	—	—	—	—	↓	—	—	—	—
T3PB	0	10	10	10	N	0	Rev	1/3	TH TR
AIRTRONICS									
CL-3P	0%	—	100%	<60	Mid	—	—	TH TR	EPA-L
XL-2P	—	—	Max	Max	Mid	Nor	—	TH TR	EPA-L
CS-2P	Nor	—	CW	CW	Mid	Nor	—	TH TR	EPA-L
VT-2P	—	—	—	—	L	⇐	↓	—	—
JR PROPO									
BEAT 2	—	—	10	10	Mid	Nor	—	TH TR	EPA-L
PCM	—	—	—	—	CCW	Nor	3:1	—	—
R756	0%	Max	110%	50%	Mid	0	Nor	—	G. D. A.
KO PROPO									
EX-1	Min	—	Max	—	Mid	⇐	—	CH2 TR	—
EX-1 FM	Min	—	Max	—	0	↑↑	—	TH TR	BR
EX-11	—	—	Max	—	Mid	↑	—	BR TR	—
EX-5	—	—	Max	—	Mid	⇒	—	—	BR TR
EX-7	—	—	—	—	CCW	⇐	—	—	—
EX-9	CCW	—	Max	Max	Mid	⇐	Pos B	CH2 TR	EPA-L
EX-10	0%	—	110%	50%	Mid	0	Nor	TH TR	G. D. A.
PULSAR									
2000	—	—	—	—	⇐	Nor	1/3	—	—
2001	—	—	+	0	⇐	Nor	1/3	—	EPA-L
TRAXXAS									
2025	—	—	Max	0	—	⇒	1/3	—	—
2201	—	—	—	0	—	⇒	1/3	—	—

STEP 6 SPEED CONTROL ADJUSTMENTS

PRECAUTIONS (1) NEVER force the pots past their stops—this can cause board and/or component damage. (2) For proper operation, transmitter MUST be adjusted (STEP 5) before setting the speed control's SPEED or NEUTRAL adjustments.

- If ESC is not plugged into the receiver and main battery pack, do it now. Make sure the motor is disconnected.
- Make sure the NEUTRAL adjustment pot is at its full clockwise (↻) position, and the SPEED pot at its full clockwise (↻) position.
- Turn on transmitter and then ESC. If an external battery pack is used, turn its switch on first and then the ESC's switch.

ADJUSTING NEUTRAL & SPEED POTS

1. Slowly rotate the NEUTRAL pot counter-clockwise (↺). The LED will decrease in brightness to full off and then switch to full on. Stop rotating pot when the LED switches to full on—this is neutral.
2. Advancing the transmitter throttle will make the LED go off and stay off. If the LED goes off and then slowly gets brighter, flip the transmitter throttle reversing switch and redo #1.
3. With the transmitter throttle at full speed, slowly rotate the SPEED pot counter-clockwise (↺) until the LED switches on again—this is full speed. Slowly release the throttle. The LED should switch off at about 85% full throttle.
4. Your ESC should now be properly set. Plug in the motor and check for proper operation. When the LED is on and the motor is running, the ESC will always be at full speed.
5. If your transmitter is equipped with a coast brake adjustment, use it to dial in more or less brake. If your transmitter does not have a coast brake adjustment, rotate the ESC's NEUTRAL pot a few degrees clockwise (↻) for desired brake. Re-adjust the SPEED pot as described in #3.
6. Seal the NEUTRAL and SPEED adjustment holes with the enclosed rubber plugs to keep out dirt and moisture.

STEP 7 USING AN EXTERNAL BATTERY

An external battery pack is recommended if more than one servo is used, as in an airplane or boat, or if erratic radio operation is experienced during acceleration (especially when using low-turn motors).

Simply remove the red wire from the ESC's input harness and plug the input harness into the receiver's battery slot. Insulate exposed metal and wires. Turn on the external battery pack's switch first, and then the ESC's ON/OFF switch.

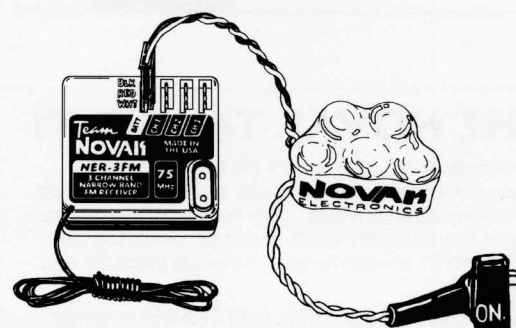


FIGURE 8 Plug the external battery pack into the battery terminal of the receiver. Be sure the ESC's red input wire is removed & the exposed pin or wire is properly insulated.

Team
NOVAK

TROUBLE-SHOOTING GUIDE & REPAIR PROCEDURES ON
BACK SIDE OF INSTRUCTIONS