NESC-1X

INSTRUCTION PAMPHLET FOR THE NESC-1X SPEED CONTROL

NOVAK SPEED CONTROLS

	NESC-1X	NESC-1	NESC-4
CASE SIZE	1.8"L X 1.5"W X 0.57"H	1.45"L X 1.30"W X 0.50"H	1.45"L X 1.30"W X 0.50"H
WEIGHT	2.0 oz.	1.4 oz.	1.4 0z.
RESPONSE	15-25 mSEC		
EFFICIENCY	OVER 99% CURRENT EFFICIENT		
MAX. CONTINUOUS CURRENT	360 A	180 A	120 A
VOLTAGE DROP W/ 12 A LOAD	0.015 V	0.03 V	0.06 V
VOLTAGE INPUT	FOUR TO TEN CELLS		
POWER CONSUMPTION	20 M Amp at 7.2 Volts		
PLUGS	FUT G, FUT J, KO & AIRTRONICS		

Although it is possible to install unit without reading instructions, failure to follow proper set up may cause damage to your unit, void the warranty, and result in **expensive repair costs!**

PLEASE READ AND FOLLOW INSTRUCTIONS CAREFULLY. SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE.

Mounting

1. Mount controller with double-sided sticky tape and install so that there will be maximum air flow over the transistors or the optional heat sinks. (The cooler the heat sinks, the more power to the motor.) Mounting the controller on the front of the rear shock tower in the RC-10 gives minimum cooling and will cause damage. **Mount the controller in the pan of the RC-10.**

2. Take precautions so that no metal comes in contact with the metal transistor tabs or the optional heat sinks. Place a piece of double-sided sticky tape between the drive and brake transistor heat sinks.

3. Mount the ON/OFF switch in a convenient place with double-sided sticky tape.

4. If your car has a metal chassis and your radio is in the 75 mhz band, do not mount the receiver or antenna on the chassis. This set up may decrease the range of your radio by as much as 50%. Mount the equipment as high in the car as possible (i.e. place receiver and antenna on the front of the rear shock tower in 1/10 scale cars, and the speed controller in chassis). Remember, always keep your receiver antenna at least 2 inches away from any wiring.

5. Cover adjustment holes with tape to keep out dirt particles.

6. Care should be taken to prevent metal parts from shorting out to the chassis, solder joints, motor cases, etc.

7. PROTECT ALL SOLDER JOINTS AND EXPOSED WIRE WITH HEAT SHRINK TUBING.

Hook Up

1. SPEED CONTROL PLUG: Plug the speed control connector into the throttle channel of the receiver. Remove any harness going to the power input of the receiver. No other power supply is necessary for the receiver or servo because the controller supplies a regulated output voltage. If more than one servo is to be used, as in an airplane or helicopter, cut the red wire in the speed control plug harness and insulate wire ends. The receiver is then hooked up with a separate power supply plugged into the power input of the receiver.

2. WIRES: The wiring hook up is as per diagram on pages 6 & 7. KEEP ALL WIRES AS SHORT AS POSSIBLE TO MINIMIZE VOLTAGE DROP.

3. TWO SMALL RED WIRES: The two small red wires, when soldered together, bypass the internal voltage regulator. For 4-cell operation, the wires must be soldered together, and for 7-cell operation the wires must be left disconnected. For 6-cell operation, the wires are normally left connected.

NOVAK servos and receivers are designed to work directly from 6 cells, although other radio equipment may not. If your brand of radio equipment will not work correctly on 6 cells, leave the two small red wires disconnected.

4. FUSE: Included with the speed control is a 30 amp fuse used to prevent damage to the unit if a drive motor shorts. It has negligible voltage drop and can be mounted in a convenient place

with double-sided sticky tape. The fuse should be installed as per diagram on pages 6 & 7. INSULATE FUSE LEADS WITH INCLUDED HEAT SHRINK TUBING. NOT USING THE FUSE VOIDS THE WARRANTY. Fuse holders cause excessive voltage drop and should not be used.

5. CAPACITORS: To prevent glitching of the receiver, the three included 0.1μF disc capacitors must be installed on the motor. One capacitor must be placed between the brushes of the motor and the other two capacitors must be placed from each brush to the motor case. The enclosed 47μF capacitor should be soldered to the motor plug on the speed control side. The long lead of the 47μF capacitor indicates the positive terminal. Insulate leads with the enclosed vinyl tubing. REFER TO DIAGRAM ON PAGES 6 & 7 FOR PLACEMENT OF THE CAPACITORS.

6. BATTERY PACKS: This controller is designed to be used with a minimum of four and a maximum of ten 1.2 volt, nickel-cadmium batteries.

7. TRANSMITTER: Directions on how to adjust the controller to your transmitter are presented in the next section. Once the controller is adjusted, it will only need to be readjusted if you change transmitters. Changing motors, batteries or receivers will not affect the controller adjustments.

Adjustments

1. Place model on a stand so that the drive wheels or propeller may rotate freely. If controller is being used in an airplane or helicopter, be sure model is strapped down. **Extreme care** must also be used with airplanes or helicopters. Since the propeller or blades will rotate several times when the controller is turned on, make certain that all parts of your body are out of the way when turning on the controller. Before adjusting high speed, be sure to disconnect the propeller or blades.

2. Adjust transmitter— refer to next page.

3. Turn on the transmitter, then the model.

4. Rotate the neutral pot on the controller until the motor just stops.

5. Advancing the throttle should speed up the motor. If not, flip the throttle reversing switch and repeat step 4.

6. Connect a digital voltmeter between the motor negative and the battery negative. Adjust to a 10 or 20 volt scale.

7. Advance the throttle to full and adjust the speed pot counter-clockwise so that the voltage just goes to minimum. Slowly release the transmitter throttle trigger and the voltage should start rising at 80-85% throttle. This insures maximum throttle at high speed with a proportional speed through the entire throttle throw.

8. The brake is adjusted with the transmitter brake trim. If more brake is necessary, rotate the neutral pot a few degrees counter-clockwise. Readjust as per steps 6 & 7.

TRANSMITTER ADJUSTMENTS

MAGNUM JUNIOR:
(refer to Futaba FP-2PK instructions)

1. Set mechanical throttle neutral adjuster to position 2 as per Fig. 5.
2. Set throttle trim knob to either position 5. Do not adjust again.
3. Set throttle ATV high pot to 10.
4. Set throttle ATV low pot to 6. This is the adjustment you use for more or less brakes, not throttle trim.

MAGNUM SENIOR:
(refer to Futaba FP-3PG instructions)

1. Set throttle neutral adjuster to position 2 as per Fig. 3.
2. Set brake trimmer knob to minimum.
3. Set throttle high side trim knob to maximum.
4. Set throttle exponential knob to minimum.

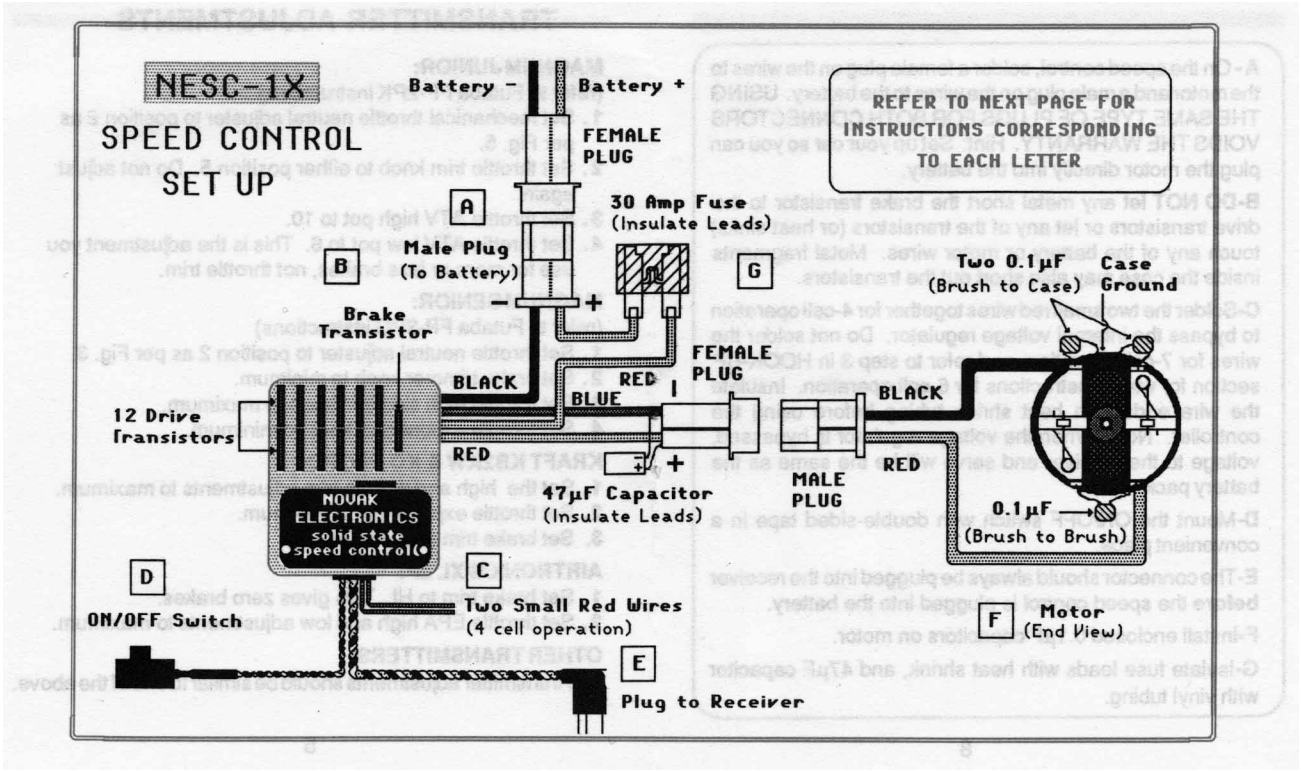
KRAFT KB2KW & KO PROPO:

1. Set the high and throttle trim adjustments to maximum.
2. Set throttle exponential to minimum.
3. Set brake trim to minimum.

AIRTRONICS XL 2P:

1. Set brake trim to HI. This gives zero brakes.
2. Set throttle EPA high and low adjustments to maximum.

OTHER TRANSMITTERS:
The transmitter adjustments should be similar to one of the above.



A- On the speed control, solder a female plug on the wires to the motor and a male plug on the wires to the battery. USING THE SAME TYPE OF PLUGS FOR BOTH CONNECTORS VOIDS THE WARRANTY. Hint: Set up your car so you can plug the motor directly into the battery.

B-DO NOT let any metal short the brake transistor to the drive transistors or let any of the transistors (or heat sinks) touch any of the battery or motor wires. Metal fragments inside the case may also short out the transistors.

C-Solder the two small red wires together for 4-cell operation to bypass the internal voltage regulator. Do not solder the wires for 7-cell operation, and refer to step 3 in HOOK-UP section for wiring instructions for 6-cell operation. Insulate the wire ends with heat shrink tubing before using the controller. Note: When the voltage regulator is bypassed, voltage to the receiver and servo will be the same as the battery pack.

D-Mount the ON/OFF switch with double-sided tape in a convenient place.

E-The connector should always be plugged into the receiver **before** the speed control is plugged into the battery.

F-Install enclosed 0.1µF capacitors on motor.

G-Isulate fuse leads with heat shrink, and 47µF capacitor with vinyl tubing.

Heat Sinks

1. The NESC-1X speed control does not require heat sinks under normal racing conditions. However, the use of a heat sink will keep it cooler, increasing its efficiency and therefore increasing your overall speed. Simply press the two metal heat sinks onto the transistors until they bottom out. The large heat sink mounts between the two rows of six drive transistors, and the small heat sink mounts on the off-set brake transistor (the vertical transistor to the right of the drive transistors). CARE MUST BE TAKEN SO THAT THE TWO HEAT SINKS DO NOT TOUCH. Metal must not come between the heat sinks because they will short out. If this happens, serious damage may be done to the controller and the warranty will be voided. Therefore, insulate between heat sinks with double-sided tape.

2. DO NOT GLUE HEAT SINKS ONTO TRANSISTORS!

3. Do not drape any wires or plastic over the controller. Install controller in model to allow maximum air flow over transistors and/or heat sinks.

Trouble Shooting

SPEED CONTROL WORKING:

RADIO GLITCHES: Re-read step 4 of MOUNTING and step 5 of the HOOK UP section. If problems persist, call NOVAK ELECTRONICS before returning equipment for repair.

BLOWN OUT FUSE: Motor is shorted or there is a short in the power wires.

EXTREMELY HOT MOTOR: Car is overgeared or motor is shorting.

HOT POWER PLUGS: Defective plugs.

SPEED CONTOL WORKS LIKE AN ON/OFF SWITCH: High speed pot adjusted too far counter-clockwise. Readjust as per step 7 of ADJUSTMENTS.

CAR RUNS SLOW AND LONGER THAN NORMAL: The high speed pot is adjusted too far clockwise. Re-adjust as per step 7 of ADJUSTMENTS.

CAR IS TOO QUICK OUT OF THE HOLE: Adjust transmitter throttle exponential pot (if available) towards maximum, until you get desired effect.

STEERING SERVO OPERATES, BUT MOTOR IS DEAD: Motor brushes are either hanging up or worn out.

SPEED CONTROL NOT WORKING & SHOULD BE RETURNED FOR REPAIR:

MOTOR AND STEERING SERVO ARE DEAD AND FUSE IS NOT BLOWN: Internal damage.

NO BRAKES: Brake MOSFET transistor is blown, usually caused by using the same plugs on the speed control and plugging the battery pack into speed control motor output, or by not using the brake heat sink.

SPEED CONTROL GETS EXTREMELY HOT WHILE NOT RUNNING: Could be caused by reversing the polarity of the power wires to the speed control. This could also damage the receiver and servo.

CASE IS MELTED: Internal damage.

CAUSES OF OVERHEATING:
(Overheating causes damage and voids the warranty)

1. INADEQUATE VENTILLATION: Caused by not having good airflow over the heat sinks. Do not mount controller on the front of the rear shock tower in the RC-10 (it should be mounted in the pan), or in a sealed box. If the controller is mounted inside a body, make sure an airscoop is provided for incoming air.
2. BADLY BINDING TRANSMISSIONS.
3. BAD MOTORS.

Repairs

ALL SPEED CONTROLLERS SHOULD BE SENT TO NOVAK ELECTRONICS, INC. FOR REPAIR.

128-C EAST DYER ROAD
SANTA ANA, CA 92707

For warranty repair work, proof of purchase (sales receipt) MUST be submitted with the repair. Repair estimates will not be provided. Customer assumes responsibility for repair costs, which will never exceed 50% of the list price. Repairs are returned UPS/COD/CASH.

In order to guide the technician, a letter explaining problems must accompany repair. Letter must include a legible name and street address. No PO box numbers.

Hobby dealers will not replace units thought to be defective. These units must be returned to NOVAK ELECTRONICS, INC. for repair or replacement.

ITEMS THAT SPECIFICALLY VOID THE WARRANTY

1. Using the same polarity connectors on the battery and motor wires coming from the speed control— see diagram for proper installation.
2. Not using the fuse as shown in the diagram.
3. Not insulating the heat sinks properly.
4. Allowing water or moisture into the speed controller.
5. Using a separate power supply in addition to the controller (refer to step 1 in HOOK UP for exception).
6. Using more than 10 nickel-cadmium batteries (12 Volts).
7. Not using heat shrink tubing over solder joints or allowing any of the wires to become frayed.
8. Any alteration to wires or harnesses installed by NOVAK ELECTRONICS, INC. (For example: Removing/ Splicing input plug or switch harness.)
9. Allowing speed control to get excessively hot due to inadequate ventillation.

To obtain maximum performance from your NESC-1X speed control, you may choose to delete the power plugs and the fuse. This procedure greatly increases the chances of errors which can result in damage to the speed control. under these conditions, the terms of our warranty will be applied only upon NOVAK Electronic's inspection of any inoperative NESC-1X speed controls.