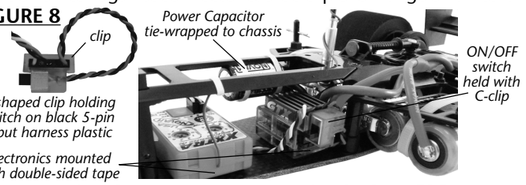
STEP 4–MOUNTING ESC

Be sure to mount the GTX where its power wires are away from other electronics, and will not interfere with any moving parts.

- Mount GTX to the vehicle's chassis with the included double-sided tape *(use two layers of other double-sided tapes for adequate damping).*
- Mount Power Capacitor to chassis with double-sided tape or tie-wrap. ***If Power Cap. becomes dented/damaged, ESC failure can occur**--replace immediately. **Longer Power Capacitor wires decrease performance.***
- You can use one of the included C-shaped plastic clips to secure the ON/OFF switch to the side of the GTX's black 5-pin power switch/input harness plastic facing either forward or back *(see below)*. Position switch against connector & slide clip over flange on switch.

FIGURE 8



- Be sure receiver & antenna are mounted as far from ESC, power wires, battery, and servo as possible--these components all emit RF noise when throttle is being applied. On graphite or aluminum chassis vehicles, it may help to place receiver on edge with crystal & antenna as far above chassis as possible.

Note: Mount antenna as close to receiver as possible--trail any excess wire off top of antenna mast (cutting or coiling excess antenna wire will reduce radio range).

STEP 5–TRANSMITTER ADJUSTMENTS

For proper ESC operation, adjust transmitter as follows:

A. Set **HIGH ATV** or **EPA** to **maximum** setting.
[amount of throw at full throttle]

B. Set **LOW ATV, EPA,** or **ATL** to **maximum** setting.
[amount of throw at full brakes]

C. Set **EXPONENTIAL** to **zero** setting. *[throttle channel linearity]*

D. Set **THROTTLE CHANNEL REV. SWITCH** to **either** position.

E. Set **THROTTLE CHANNEL TRIM** to **middle** setting.
[adjusts neutral position/increases or decreases coast brakes]

F. Set **ELECTRONIC TRIGGER THROW ADJUSTMENT** to **70% throttle** and **30% brake** throw (or 7:3).
[adjusts trigger throw electronic/digital pistol-grip transmitters]

G. Set **MECHANICAL TRIGGER THROW ADJUSTMENT** to position with **2/3 throttle** and **1/3 brake** throw.
[adjusts trigger throw on mechanical/analog pistol-grip transmitters]

•NOT ALL TRANSMITTERS HAVE THESE ADJUSTMENTS•

STEP 6–ONE-TOUCH PROGRAMMING

With GTX connected to (at least) a receiver & a charged battery pack:

1. **TURN ON THE TRANSMITTER'S POWER**
2. **PRESS & HOLD GTX'S ONE-TOUCH/SET BUTTON**
3. **TURN ON THE SPEED CONTROL'S POWER**
   With transmitter throttle at neutral, and still **pressing the SET button**, slide the GTX's **ON/OFF switch** *to ON position*.
4. **CONTINUE HOLDING SET BUTTON UNTIL RED LED COMES ON**
5. **RELEASE GTX'S SET BUTTON AS SOON AS LED TURNS RED**
6. **PULL TRANSMITTER THROTTLE TO FULL-ON POSITION**
   Hold it there until the **green status LED** ***turns solid green***.
   Note: Motor will not run during programming even if connected.
7. **PUSH TRANSMITTER THROTTLE TO FULL-BRAKES**
   Hold it there until the **green status LED** ***blinks green***.
8. **RETURN TRANSMITTER THROTTLE TO NEUTRAL**
   Red status LED will ***turn solid red***, indicating that throttle is at neutral, and proper programming has been completed--you're done.

NOTE: If transmitter setting are changed, programming must be repeated. If you experience any problems, turn off ESC and repeat programming.

TROUBLE-SHOOTING GUIDE

Steering Channel Works But Motor Will Not Run

- Check motor connections. Check motor and brushes.
- Make sure input signal harness is plugged into throttle channel of receiver and the ESC. Check throttle channel operation with a servo. Check wiring color sequence of receiver signal harness.
- Possible thermal shut-down *(blue & red status LEDs flashing)*—Check motor, brushes, & drive train. ESC is being severely over-loaded.
- Possible internal damage—Refer to Service Procedures.

Receiver Glitches/Throttle Stutters During Acceleration

- Receiver or antenna too close to ESC, power wires, battery, or motor.
- Bad connections—Check wiring and connectors.
- Motor brushes worn—Replace brushes.
- Excessive motor current—Use milder motor or smaller pinion gear.
- External Power Capacitor damaged/not installed—Replace Power Capacitor.

Motor and Steering Servo Do Not Work

- Check wires, receiver signal harness wiring & color sequence, radio system, crystals, battery & 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/ESC adjustment—Refer to Steps 4 & 5.
- External Power Capacitor damaged/not installed—Replace Power Capacitor.
- Schottky diode damaged—If using external Schottky, check that diode is installed correctly/Refer to Step 2. Possible internal Schottky damage.

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 assistance call our Customer Service Department.

SERVICE PROCEDURES

Before sending your GTX in for service, review Trouble-Shooting guide & instructions. ESC may appear to have failed when other problems exist.

After reviewing instructions, if you feel your GTX requires service, please obtain the most current product service options & pricing by the following:
WEBSITE: Print a copy of the ***PRODUCT SERVICE FORM*** from the CUSTOMER SERVICE section of the website. Fill out the needed information on this form and return it with the Novak product that requires servicing.
PHONE/E-MAIL: If you do not have access to the internet, contact our customer service dept. by phone or e-mail as listed on the front page.
WARRANTY SERVICE: For warranty work, you *MUST CLAIM WARRANTY* on ***PRODUCT SERVICE FORM*** & include a valid cash register receipt with purchase date and dealer name & phone# on it, or an invoice from previous service. If warranty provisions have been voided, there will be service charges.
GTX ESCs returned without a serial number will not be serviced under warranty.

ADDITIONAL NOTES:

- Hobby dealers or distributors are not authorized to replace Novak products thought to be defective.
- If a hobby dealer returns your GTX for service, submit a completed ***PRODUCT SERVICE FORM*** to the dealer and make sure it is included with the ESC.
- Novak Electronics, Inc. does not make any electronic components *(transistors, resistors, etc.)* available for sale.

PRODUCT WARRANTY

The GTX speed control is guaranteed to be free from defects in materials or workmanship for a period of 120 days from the original date of purchase *(verified by dated, itemized sales receipt)*. Warranty does not cover incorrect installation, components worn by use, damage to case, damage from using fewer than 4 or more than 7 cells *(1.2 volts DC/cell)* input voltage, cross-connection of battery/motor, overheating solder tabs, reverse voltage application, damage from incorrect installation of FET servo or receiver battery pack, not installing three 0.1µF (50V) capacitors on motor, incorrect installation of a Power Capacitor on the ESC or from using a damaged Power Capacitor, using a non-Novak Power Capacitor, splices to input harness, damage from excessive force when using the One-Touch/SET button or from disassembling case, tampering with internal electronics, allowing water, moisture, or any other foreign material to enter ESC or get onto the PC board, incorrect installation/wiring of input plug plastic, allowing exposed wiring or solder tabs to short-circuit, or any damage caused by a 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 the connection & use of the speed control or other related electronics, no liability may be assumed nor will be accepted for any damage resulting from the use of this product. Every Novak speed control is thoroughly tested & cycled before leaving our facility and is, therefore, considered operational. *By the act of connecting/operating speed control, user accepts all resulting liability.*

BASIC SET-UP GUIDE -- GTX

GTX

High-Performance Programmable Racing ESC

★ 120 DAY WARRANTY

#IM-1780-2
9-2004

NOVAK

SPECIFICATIONS

Input Voltage	4-7 cells *(1.2 volts DC/cell)*
Motor Limit	Any brushed-type R/C motor
Case Size	1.11"x0.86"x0.60" *[28.2x21.8x15.2mm]*
Weight *(w/o wires)*	0.64 ounce *[18 grams]*
On-Resistance *@ Transistors***	0.00034 Ω
Rated Current *(forward/braking)*	150/60 amps
B.E.C. Voltage/Current	6.0 volts DC/3.0 amps
Schottky Diode	36 amps *(built-in)*
Power Wire	10 inches/14G
Signal Harness *(replaceable)*	9 inches *[22.8 cm]*
Throttle Programs	7 *(6 fixed/1 adjustable)*
Minimum Brake *(all Programs)*	0%-50%
PWM Frequency	1-11 kHz

***Transistor rating @ 25°C*

SMALL...LIGHTWEIGHT...EXTREMELY POWERFUL...EASY-TO-USE...RELIABLE.....*any other requests?*

You told us what you wanted in a programmable ESC, and here it is. The GTX is smaller & lighter than any other racing speed control Novak has ever produced, and now it's even easier to use. Right out of the box, this highly customizable ESC is loaded with 7 factory-installed Throttle Programs, with the top pro driver's favorite Profile always loaded as the default.

You choose how the GTX works best for you--select from the 7 factory programs, or customize the 7th program just how you want it. Minimum Brake settings are individually stored for each program, and the 7th program lets you select from ***7 Drive Frequencies, 5 Minimum Drive percentages, 5 Brake Frequencies, 7 Minimum Brake percentages, 5 Dead Band percentages, 2 styles of braking,*** and ***7 Drag Brake percentages***.

The GTX has Novak's ***Variable Throttle Step Technology***, with ***up to 2600 discrete steps*** *(1300 for drive & 1300 for braking)* for the smoothest ESC available—no matter what frequency you select ***(1-11kHz)***. As an added safeguard, your GTX is equipped with ***Thermal Overload Protection***, and that's something that can save you some serious money considering the motors that are being used in today's racing. Add to this the ease & convenience of user-replaceable power wires, power capacitor, ON/OFF switch, & input harness, and the GTX is just what you asked for!

Because of this ESC's advanced technical features, PLEASE READ ALL INSTRUCTIONS before using GTX

PRECAUTIONS

WATER & ELECTRONICS DON'T MIX!

Never allow water, moisture, or other foreign materials to get inside the speed control or on the PC Board.
Water damage will void the warranty!

DISCONNECT BATTERIES WHEN NOT IN USE

Always disconnect the battery pack from the speed control when not in use to avoid short circuits and possible fire hazard.

4 TO 7 CELLS ONLY

Never use fewer than 4 or more than 7 cells *(8.4 volts DC)* in the vehicle's main battery pack.

NO REVERSE VOLTAGE!

Reverse battery polarity can damage speed control—Disconnect the battery immediately if a reverse connection occurs.

POWER CAPACITOR RECOMMENDED

An external power capacitor is supplied & installed, and ***SHOULD*** be used with your GTX. ***Failure to use Power Capacitor will result in higher ESC operating temperatures & possible thermal shut-down!***

TRANSMITTER ON FIRST

Always turn on the power of the transmitter first so that you will have control of the vehicle when you turn it on.

INSULATE WIRES

Always insulate exposed wiring with heat shrink tubing or electrical tape to prevent short circuits, which can damage ESC.

NO SOLVENTS

Exposing the speed control's Lexan® case to any type of solvents will damage the plastic.

NO CA GLUE

Exposure to CA glue or its fumes can cause damage to internal components of the speed control and result in premature failure.

OPTIONAL ACCESSORIES

POWER CAPACITORS ***[#5675]***
An external power capacitor is installed, and ***SHOULD BE USED*** to maintain cool and smooth operation. ***Refer to Fig.5 Set-Up Photo***
Replacement Power Capacitor is available in Novak kit #5675.

RACING SCHOTTKY MOTOR MODULES ***[#5636]***
The GTX has a built-in 36A Schottky diode and does not require an external one for most usage. The external Schottky will optimize the ESC's braking and motor performance in applications with heavy or repeated braking or low-turn modified motors.
Racing Schottky Motor Module is available in Novak kit #5636.

MOTOR CAPACITORS ***[#5620]***
Additional motor capacitors are available in Novak kit #5620.

14G SUPERFLEX SILICONE POWER WIRE ***[#5500 & 5505]***
Replacement GTX battery & motor wire is available in Novak kits #5500 (36"red & 36"black) & #5505 (36"red & 36"blue).

12G SUPERFLEX SILICONE POWER WIRE ***[#5530 & 5535]***
12 guage silicone battery & motor wire is available in Novak kits #5530 (36"red & 36"black) & #5535 (36"red & 36"blue).

GTX INPUT/SWITCH HARNESS ***[#5305]***
The user-replaceable combo power switch/input harness comes with ON/OFF switch and both long & short length input pigtails.
GTX Input/Switch harness available in Novak kit #5305.

Novak Electronics, Inc.
(949) 833-8873 • FAX (949) 833-1631
Customer Service e-mail: ***cs@teamnovak.com***
Monday-Thursday: 8:00am-5:00pm (PST)
Friday: 8:00am-4:00pm *(closed every other Friday)*
www.teamnovak.com

STEP 1–CONNECT INPUT HARNESS

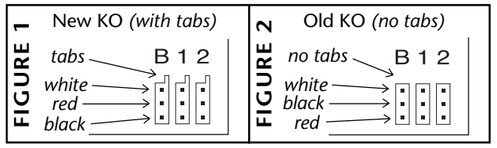
The GTX speed control is epuipped with the industry standard connector on a user-replaceable combination power switch/input harness--***the 3-pin connector on the end of this harness <u>works with all the major radio brands new receivers</u>***. However, some very old receivers must have the wiring sequence inside the plastic 3-pin connector housing changed. ***This is an important step, because the receiver electronics may be damaged if the sequence is not correct.***

CHANGING WIRING SEQUENCE @ RECEIVER END

JR • Hitec • Futaba • New KO • Airtronics Z

JR, Hitec, Futaba, new KO, & Airtronics Z receivers do not need input harness re-wiring. *Airtronics Z receivers have blue plastic cases & new KO cases have tabs on the input harness openings as in* ***Figure 1****.*

- Plug the 3-pin connector end of the input harness into the receiver with the ***BLACK wire toward the outside edge*** of receiver case.
- Plug the 5-pin end of the power switch/input harness onto 5-pin header on the side of the GTX's case with the ***WHITE wire toward the 'S' (signal) marking*** by the corner of the ESC's case.



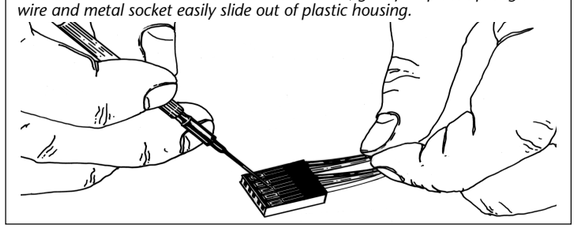
Old-style KO • Old-style Sanwa/Airtronics

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.*

- Using a small standard/flat blade screwdriver, ***remove the red and black wires*** from the plastic 3-pin connector housing at the receiver end of the input harness as in ***Figure 3*** below.
- ***Interchange the red and black wires*** in the plastic 3-pin connector housing at the receiver end of the input harness.
- Insert modified 3-pin end of the harness into the receiver with the ***RED wire toward the outside edge*** of receiver case.

FIGURE 3 *With a small standard screwdriver, gently lift plastic prong until wire and metal socket easily slide out of plastic housing.*



CHANGING INPUT HARNESS PIGTAIL LENGTH

The GTX is supplied with both a long and short length input signal pigtail to allow you to get a custom looking install without all the extra signal wire that needs to be bundled up in the vehicle.

To change the input signal pigtail, follow above instructions for removal of old pigtail. Select proper wiring sequence as described above, then insert the new pigtail, and you're done.

USING A RECEIVER BATTERY PACK

If using an external receiver battery pack with the GTX:

1. Plug an external 5 cell (1.2VDC/cell) receiver battery pack into the battery slot of the receiver.
2. Leave the **GTX's ON/OFF switch** in the ***OFF*** position, and **use receiver battery pack's ON/OFF switch** to turn the ***system power on and off***—Do not use the GTX's switch.

STEP 2–MOTOR PREP

1. MOTOR CAPACITORS

Electric motors generate RF noise that causes interference. The included 0.1µF (50V) non-polarized, ceramic capacitors must be used on all motors to reduce motor noise & prevent ESC damage.

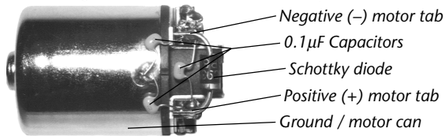
Note: Some motors come with capacitors built-in. If your motor only has two capacitors, you need to install a capacitor between the positive & negative motor tabs—If you experience radio interference when using only built-in capacitors, install external ones.

<u>Solder 0.1µF (50V) capacitors between:</u>

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

**If motor has no ground tab (below), solder the capacitors to motor can.*

FIGURE 4



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

2. INSTALLING OPTIONAL SCHOTTKY DIODE

The GTX has a built-in 36A Schottky diode and does not require an external one under most conditions. The external Schottky will optimize the ESC's braking and motor performance in applications with heavy or repeated braking *(lap after lap)*, or when using very low-turn modified motors.

- If using a <u>Schottky diode with axial leads</u> like shown in the photo above *(older Novak style--35V/8A minimum)*, 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 to the ***NEGATIVE (–) motor tab***.
- If using the Novak <u>Racing Schottky Motor Module</u> *(this is the best perfoming Schottky diode available)*, solder the ***red wire*** from the module to the ***POSITIVE (+) motor tab***. Solder the ***black wire*** from the Schottky module to the ***NEGATIVE (–) motor tab***.

If Schottky diode is installed backwards it will be destroyed. Replace only with Schottky diodes with a minimum rating of 35 volts/8 amps.

Racing Schottky Motor Modules are available in Novak kit #5636.

STEP 3–WIRING SPEED CONTROL, MOTOR, & BATTERY

The GTX is an extremely powerful ESC, capable of very efficient delivery of battery power to your vehicle's motor, and thus requires very good connections between the battery, ESC, & motor to obtain the best performance. A common cause of perfomance problems & ESC failures is poor solder joints--If you have any doubts about your soldering skill, we suggest seeking assistance at your hobby shop or track.

SELECT A MOUNTING LOCATION:

- Keep the ESC and its power wires away from other electronics in the vehicle, especially the receiver & antenna.
- Do not bundle receiver/signal wires with other wires--messy installations account for nearly all radio interference *(glitching)* problems. A clean looking install almost always works better.
- Route ESC wires to clear any moving parts in the vehicle.
- Airflow through the ESC's heat sink is a huge performance plus. Like a real car, cooling is everything--if you can mount the ESC where it will see some air flow, it will run cooler; and that means that the ESC will be even more efficient *(and make you faster!)*.

Once you've decided where to put the GTX, it's time for some wiring. The GTX uses a 3-wire system where the battery & motor share the same red wire. The recommended wiring method is direct soldering for a system with the least amount of resistance. *Installations can also use battery/motor connectors & will be discussed at the end of this section.*

1. <u>PREP & SOLDER SPEED CONTROL'S RED WIRE</u>

Depending on your vehicle's configuration, there are two main ways that you can make the red wire connections--making a "Y" (or "T") out of the red wire to go to the motor & battery, or a single wire set-up where the red wire goes to the battery and then continues on to the motor (or vice versa).

USING THE SINGLE WIRE METHOD:

A. Position the GTX where it will be mounted, strip a 1/4-3/8" section of insulation from the mid-section of its red wire where you will solder it to positive *(+)* of the motor or battery *(component that is in the middle)*. Tin the exposed section of wire with solder.

B. Solder the exposed section of wire to positive *(+)* tab of the motor or the positive *(+)* end of the battery pack ***[see Figure 5: Set-Up Photo]***.

C. Cut the GTX's red wire *(after the first connection)* to the proper length so it will reach the final component *(battery positive or motor positive)* and strip 1/8-1/4" of insulation off the end. Twist & tin the wire.

D. Solder the tinned end of the GTX's red wire to the final component--battery positive *(+)* or positive *(+)* tab of the motor.

continued →

USING THE "Y" METHOD: *(Figure 6)*

A. Strip a 1/4-3/8" section of insulation from the mid-section of the GTX's red wire where you want to split and go to the motor & battery. Tin the exposed section of wire with solder.

B. Strip a 1/4" of insulation off the one end of the extra piece of red wire that came with the GTX. Twist & tin the wire.

C. Slide the supplied piece of heat shrink tubing over the red wire coming from the GTX, and slide it all the way to the ESC.

D. Solder the tinned end of the extra piece of red wire to the tinned section along the GTX's red wire & shrink the tubing over the solder joint with a heat gun *(a lighter or match also works well)*.

E. Cut one end of the GTX's red wire *(after the "Y")* to the proper length so it will reach the positive *(+)* tab of the motor and strip 1/8-1/4" of insulation off the end. Twist & tin the wire.

F. Solder this end of the GTX's red wire to the positive *(+)* motor tab.

G. Cut the other end of the GTX's red wire to the proper length so it will reach battery pack positive *(+)* and strip 1/8-1/4" of insulation off the end. Twist & tin the wire.

H. Solder this end of the GTX's red wire to battery positive *(+)*.

2. <u>PREP & SOLDER GTX'S BLUE & BLACK WIRES</u>

A. Cut the end of the GTX's blue wire to the proper length so it will reach the negative *(–)* tab of the motor and strip 1/8-1/4" of insulation off the end. Twist & tin the wire.

B. Solder the end of the GTX's blue wire to motor negative *(–)*.

C. Cut the end of the GTX's black wire to the proper length so it will reach battery pack negative *(–)* and strip 1/8-1/4" of insulation off the end. Twist & tin the wire.

D. Solder the end of the GTX's black wire to battery negative *(–)* of a charged 4 to 7 cell pack.

TIP: *Twisting BLUE & RED wires once or twice around each other as they go to the motor helps reduce RF noise emitted from power wires.*

USING BATTERY & MOTOR CONNECTORS

Battery & motor connectors can be used for making your connections, however they will never have as low of resistance as a good solder joint. If you are going to use connectors for your battery and/or motor, we suggest the Dean's Ultra Connectors--do not use crimp on types.

When using battery and motor connectors, please note the following:

- If you have any doubts about your soldering skills, seek assistance from your hobby shop or track, or see our website for tips.
- Use connectors that cannot be plugged in backwards--reverse voltage will damage the GTX and void the warranty.
- Use a female connector on battery packs to avoid shorting.
- If using connectors for both battery & motor leads, use a male connector on the GTX's battery lead and a female on the GTX's motor lead to prevent cross connection *(also voids warranty)*.

For additional information on connector usage, visit our website.

REPLACING POWER WIRES @ SOLDER TABS

When replacing the battery or motor power wires at the GTX's solder tabs, it's important to not overheat PCB *(printed ciruit board)* with the soldering iron by applying prolonged or excessive heating.

- Remove wires from the tab by first removing GTX from vehicle to access solder joints on the bottom of the tabs. Use a soldering iron to apply heat to the wire's solder joint while gently pulling on the wire to remove it from the hole in the PC Board.
- Replace the wires by stripping 1/8-1/4" of insulation from the end of the new wire. Tightly twist the wire strands and lightly tin with solder. Insert the wire end into the proper hole in the PC Board *(if there is still solder in the hole you can melt it with the iron while pushing the wire through the hole)*. Apply heat to the section of wire that is sticking through the tab's hole, and add solder to the tip of the soldering iron and to the wire. ***Add just enough solder to form a clean & continuous joint from the plated area of the solder tab up onto the wire.*** Use side cutters to trim excess wire above tab *(about 1/16")*.

<u>FIGURE 5: SET-UP PHOTO</u>

(in-line 'single wire method' of red wire shown)

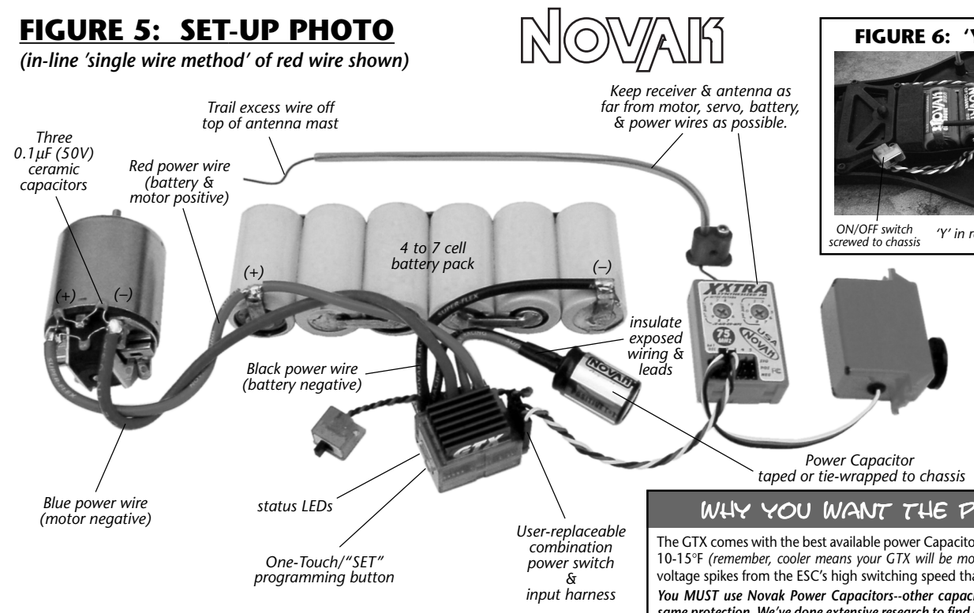
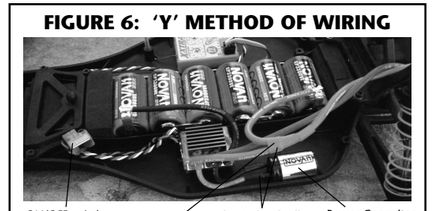


FIGURE 6: 'Y' METHOD OF WIRING



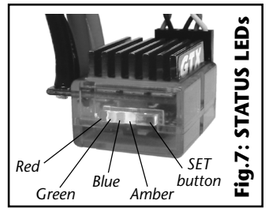


Fig.7: STATUS LEDs

WHY YOU WANT THE POWER CAPICTOR

The GTX comes with the best available power Capacitor that drops ESC operating temperatures by 10-15°F *(remember, cooler means your GTX will be more efficient & faster)* and dissipates noise & voltage spikes from the ESC's high switching speed that makes the GTX so smooth.

You MUST use Novak Power Capacitors--other capacitors with similar ratings don't provide the same protection. We've done extensive research to find capacitors with the very best quality factors.