

# GTB3 TRACK GUIDE

#55-1747P-1

2-2014

This Brushless Electronic Speed Control (ESC) is factory loaded with programmable features. While this may seem overwhelming at first glance, this *Track Guide* is designed to keep with you at the track to use as a quick-reference and help walk you through the programming of all of the speed control's features.

Take the time to thoroughly read through this programming guide before attempting to make any programming adjustments so you fully understand the different ESC parameters, and how they can be used to fine tune your ESC's feel and performance. Most importantly, enjoy all of the technical benefits and features the ESC has to offer.

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# ESC PARAMETERS

The following parameters are adjustable to help fine-tune the feel and response of the speed control to your liking:

1. Drag Brake (1 of 10) ..... 0-30%
2. Minimum Brake (1 of 10)..... 0-30%
3. Brake Power (1 of 10) ..... 10-100%
4. Drive Frequency (1 of 10) ..... 8-36KHz
5. Brake Frequency (1 of 10) ..... 1.5-8KHz
6. Minimum Drive (1 of 10) ..... 0-15%
7. Dead Band (1 of 5) ..... 2-8%
8. ESC Reversing Functionality ..... OFF/ON
9. Motor Rotation ..... CCW/CW
10. Voltage Cut-Off ..... OFF/LiPo
11. Transmitter/Receiver Rate Mod ..... SSR/Standard

# ONE-TOUCH PROGRAMMING

This ESC is compatible with standard rate radio systems and also the super-high speed Airtronics M12 radio system operating in its SSR mode. *ESC must first be switched to the correct radio system mode before it will recognize the receiver and allow the One-Touch Set-Up programming.* ESC ships from Novak in the Standard Rate Mode and is ready to program if this is what type of system you are using.

**For standard rate systems, skip steps A-D below and simply follow Steps 1-8.**

**If installing ESC with an M12 radio system operating in SSR mode, follow Steps A-D below to switch modes** (detailed steps in 'Custom Programming' on back), **then complete Steps 1-8 afterwards.** (Steps A-D need only be done the 1st time with different rate receiver)

**With at least 2 of the Motor power wires disconnected & the ESC connected to a charged battery pack, the receiver, & the motor's sensor harness:**

- TURN ON THE SPEED CONTROL'S POWER**
- PRESS & HOLD ESC'S SET BUTTON until Red & Green status LEDs come on**  
You must continue holding button until you pass through all of the ESC's programming options. Release SET button once Red & Green status LEDs are lit.
- SELECT PROPER RADIO SYSTEM MODE (2 LED flashes = Std / 1 flash = SSR)**  
Quick press & release the ESC's SET button to change the selection.
- PRESS & HOLD ESC'S SET BUTTON TO STORE NEW SELECTION**

- 1. WITH ESC OFF, TURN ON THE TRANSMITTER'S POWER**
- 2. PRESS & HOLD ESC'S ONE-TOUCH/SET BUTTON**
- 3. TURN ON THE SPEED CONTROL'S POWER**  
With transmitter at neutral (still pressing SET button), slide ESC's switch to ON position.
- 4. CONTINUE HOLDING SET BUTTON UNTIL RED LED COMES ON**
- 5. RELEASE SET BUTTON AS SOON AS RED LED TURNS ON**
- 6. PULL TRANSMITTER THROTTLE TO FULL-ON POSITION**  
Hold it there until green status LED *turns solid green.* (Motor won't run during programming).
- 7. PUSH TRANSMITTER THROTTLE TO FULL-BRAKE/REVERSE**  
Hold it there until the green status LED *blinks green.*
- 8. RETURN TRANSMITTER THROTTLE TO NEUTRAL**  
Red status LED will *turn on solid*, indicating ESC is at neutral and programming is complete. *White LED may also be on/blinking, indicating that Timing Advance is OFF (0%).*

**If transmitter settings are changed, One-Touch Set-Up must be repeated.**

**NOTE: ESC will NOT revert back to the factory-default settings when the One-Touch set-up is performed. Refer to 'Data Reset' in Custom Programming.**

# TRANSMITTER ADJUSTMENTS

Transmitter adjustments may not be needed to complete **ONE-TOUCH PROGRAMMING**, however, if you have any problems with it, adjust your transmitter as follows and repeat the **ONE-TOUCH PROGRAMMING** step.

## THROTTLE CHANNEL ADJUSTMENTS

- Set HIGH ATV or EPA to 100% setting. [amount of throw at full throttle]
- Set LOW ATV, EPA, or ATL to 100% setting. [amount of throw at full brakes]
- Set EXPONENTIAL to zero setting. [throttle channel linearity]
- Set THROTTLE CHANNEL REV. SWITCH to either position.
- Set THROTTLE CHANNEL TRIM to middle setting.  
[adjusts neutral position/increases or decreases coast brakes]
- Set ELECTRONIC TRIGGER THROW ADJUSTMENT to 50% throttle and 50% brake throw—best for reversible ESCs.  
[adjusts trigger throw electronic/digital pistol-grip transmitters]
- Set MECHANICAL TRIGGER THROW to 1/2 throttle and 1/2 brake position.

NOT ALL TRANSMITTERS HAVE THESE ADJUSTMENTS

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# PROPER GEAR SELECTION

**Motor operating temperature is the ONLY way to properly set vehicle gearing**

The Motor and Speed Control should not exceed **160°F MAX** at any time during run!

Change the gearing to avoid overheating!

**DO NOT FREE-REV MOTOR!**

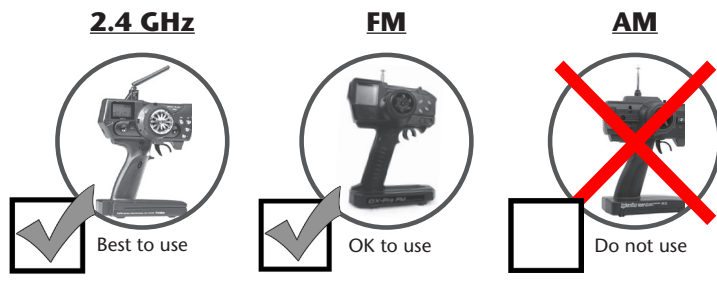
*Free-running your brushless motor in a no-load condition can cause rotor failure & ESC transistor damage that will not be covered by the product's warranty.*

Because of the potential danger of overheating and ESC/motor damage and failure, **you must start with VERY small pinion sizes** and check the speed control and motor operating temperatures at multiple times throughout the initial runs after installation. This is the only way to ensure that you are not causing excessive heating..

If ESC & motor temperatures remain low & stable, you can slowly increase the pinion size while again monitoring the temperatures to determine the safe gearing for your vehicle, motor, and climate/track conditions. Because these variables can change or be modified, **you MUST continually monitor ESC & motor temperatures** to protect your electronics from damage.

# GOOD QUALITY RADIO SYSTEM SUGGESTED

With the higher performance of brushless systems, undesirable radio system noise may occur when used with lower quality radio systems. good quality 2.4GHz radio systems are the best to use. FM radio systems are acceptable, as long as the system is high quality. **AM radio systems are not recommended.**



# TIMING INDICATOR LED

To conform to ROAR's Sportsman Class rules and help organizers monitor driver compliance in non-timing race classes, we have included a feature in this ESC to indicate that there is Zero/NO electronic motor timing advancement.

At all times when the speed control is powered ON (and not in the programming mode), the ESC's **white status LED will flash** during normal operation.

# CUSTOM PROGRAMMING OPTIONS

## ESC SOFTWARE FLOW CHART

This speed control features many parameters that can be customized to fine-tune the ESC's feel & response to your liking.

The flow chart below and the adjustment steps to the right describe the different parameters and how they effect the ESC.

One-Touch Programming must be completed before customization of parameters, as all ESC parameters are defaulted back to the factory settings whenever the One-Touch Programming is performed.

**DEFAULT SETTINGS FOR THE ESC PARAMETERS ARE LISTED IN BOLD IN THE TABLES TO THE RIGHT**

### TO CHANGE PARAMETER SETTINGS:

1. CONNECT THE ESC TO A CHARGED BATTERY PACK, RECEIVER, AND MOTOR'S SENSOR HARNESS.

2. TURN ON TRANSMITTER.

3. SLIDE THE ESC'S ON/OFF SWITCH TO 'ON' POSITION

4. WITH ESC AT NEUTRAL, PRESS & HOLD SET BUTTON

Release ESC's SET button once LEDs are lit for the desired setting.

To skip a parameter, continue to press & hold SET button until desired parameter is reached.

5. SELECT PARAMETER VALUE

LED flashes to indicate active setting (refer to tables at right). Quick press & release SET button to select desired setting.

6. PRESS & HOLD SET BUTTON TO STORE NEW SELECTION

When SET button is pressed and held for about 1 second, the new selection is stored in ESC's memory—Status LEDs will scroll across to indicate ESC is exiting programming & ESC returns to neutral.

**There is no time constraint during selection of custom parameters.**

### ESC STATUS LED ORDER:

BLUE YELLOW RED GREEN WHITE

@NEUTRAL  
RED LED on solid

press & hold SET button

DRAG/HILL BRAKE  
BLUE

MIN. BRAKE  
YELLOW

BRAKE POWER  
RED

DRIVE FREQ.  
GREEN

BRAKE FREQ.  
WHITE

MIN. DRIVE  
BLUE & YELLOW

DEAD BAND  
BLUE & RED

REVERSE  
BLUE & GREEN

MOTOR ROTATION  
BLUE & WHITE

VOLTAGE CUT-OFF  
BLUE-YELLOW-RED-GREEN

TRANS./REC RATE  
RED & GREEN

HALL SENSOR TEST  
Blinking BLUE

@NEUTRAL  
RED LED on solid

continue holding ESC's SET button to skip steps here

## DRAG BRAKE

### #1 DRAG BRAKE SETTINGS (1 of 10)

BLUE LED

Amount of braking being applied while transmitter is at neutral. AKA 'coast' brakes. >> Increasing this setting makes the motor slow down more without pushing the transmitter's trigger into the brake/reverse direction.

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Drag Brake (%):	0	3	<b>6</b>	9	12	15	18	21	24	30

## MINIMUM BRAKE

### #2 MINIMUM BRAKE SETTINGS (1 of 10)

YELLOW LED

Amount of braking applied with first pulse of transmitter braking information sent. >> Increasing this setting starts the braking at a stronger level. This is useful to compensate for heavier vehicles to minimize the amount of trigger throw required before effective braking is applied.

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Minimum Brake (%):	0	3	<b>6</b>	9	12	15	18	21	24	30

## BRAKE POWER

### #3 BRAKE POWER SETTINGS (1 of 10)

RED LED

>> This setting changes the maximum braking power at full brake throw.

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Drive Freq. (KHz):	10	20	30	40	50	<b>60</b>	70	80	90	100

## DRIVE FREQUENCY

### #4 DRIVE FREQUENCY SETTINGS (1 of 10)

GREEN LED

How the ESC's throttle response feels with respect to the transmitter's trigger input.

>> Increasing the Drive Frequency makes the throttle response feel smoother and more controllable.

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Drive Freq. (KHz):	8	10	12	14	16	21	23	26	32	<b>36</b>

## BRAKE FREQUENCY

### #5 BRAKE FREQUENCY SETTINGS (1 of 10)

WHITE LED

How the ESC's braking response feels with respect to the transmitter's trigger input.

>> Increasing Frequency makes the brakes feel smoother/more controllable.

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Brake Freq. (KHz):	1.5	2	<b>2.2</b>	2.5	3	3.5	4.5	6	7	8

# CUSTOM PROGRAMMING OPTIONS

## MINIMUM DRIVE

### #6 MINIMUM DRIVE SETTINGS (1 of 10) BLUE & YELLOW LEDs

Amount of forward drive applied with first pulse of transmitter throttle information.

>> **Increasing this setting starts the forward drive at a stronger level. This is useful to compensate for heavier vehicles to minimize the amount of trigger throw required before effective drive is applied.**

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Minimum Drive (%):	0	1	2	3	4	6	8	10	12	15

## DEAD BAND

### #7 DEAD BAND SETTINGS (1 of 5) BLUE & RED LEDs

The space between Minimum Brake and Minimum Drive, with Neutral in the middle.

>> **Increasing this setting increases amount of 'free play', or distance the transmitter's trigger must move before forward drive or braking begins. This is useful for triggers that don't center accurately or have worn pots.**

Setting (# of flashes)	1	2	3	4	5
Dead Band (%):	2	3	4	5	8

## REVERSE

### #8 DRIVE/BRAKE MODE SELECTION (1 of 2) BLUE & GREEN LEDs

>> **Changing this setting activates or deactivates the ESC's motor reversing functionality. When OFF, the ESC has forward and brakes only. When ON, the ESC has forward with brakes, then reverse with a second push of trigger after braking to a slow speed.**

Setting (# of flashes)	1	2
Reverse:	OFF	ON

## MOTOR ROTATION

### #9 MOTOR ROTATION SELECTION (1 of 2) BLUE & WHITE LEDs

>> **Changing this setting changes the rotational direction of the motor's output/pinion shaft. Counter-clockwise rotation is the standard in most remote control vehicles. For optimal motor performance, use counter-clockwise rotation instead of reversing the transmitter's throttle channel throw.**

*Counter-clockwise rotation is standard in most vehicles.*

**Note:** Novak Spec & Mod motors come factory-timed to 30° timing and are optimized for primarily forward-only operation when the motor is operating in the CCW rotation.

Setting (# of flashes)	1	2
Rotation Direction:	CCW ↺	CW ↻

## VOLTAGE CUT-OFF

### #10 VOLTAGE CUT-OFF (1 of 2) BLUE-YELLOW-RED-GREEN LEDs

>> **Changing this setting enables or disables the built-in Auto-Detect Smart Stop voltage cut-off circuitry, and also sets the voltage cut-off point based on the number of cells in the vehicle's main battery pack.**

**DO NOT USE LiPo BATTERIES WITH THE ESC'S VOLTAGE CUT-OFF CIRCUITRY TURNED OFF**

Setting (# of flashes)	1	2
Voltage Cut-Off Type:	OFF (NiMH/NiCd)	LiPo

## TRANS/RECEIVER RATE

### #11 RECEIVER RATE SELECTION (1 of 2) RED & GREEN LEDs

>> **Selects type of transmitter/receiver rate ESC will work with.**

Setting (# of flashes)	1	2
Radio System Mode:	M12 SSR MODE	STD RATE Rx MODE

## HALL SENSOR TEST

### #12 MOTOR SENSOR TEST Blinking BLUE LED

>> **This is a diagnostic feature that allows you to easily check the functionality of your brushless motor's hall effect sensors & sensor harness and its connections at the speed control and motor. Once activated, slowly rotate the motor's output/pinion shaft and the appropriate LED will light up if a signal is received for its sensor in the motor. Refer to 'MOTOR HALL SENSOR TEST' section.**

Motor Hall Sensor	A	B	C
LED Color:	BLUE	YELLOW	RED

## RESTORING FACTORY DEFAULTS

**Every time the speed control's One-Touch Programming is performed, the ESC will automatically revert back to the factory default settings.**

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Note: ESC Parameter values are subject to change due to ongoing development. Refer to our web site for updated values and more information on ESC parameters.

## MOTOR HALL SENSOR TEST

The Hall Sensor Test diagnostic feature in this ESC allows you to easily check the sensors in the brushless motor connected to it to determine if they are operating normally. This will help you pinpoint the cause of problems in your system, and hopefully reduce the down time and expenses associated with sending your product in for service when you can resolve the issue yourself.

*To access this feature, simply follow these steps:*

1. Follow the steps in the 'CUSTOM PROGRAMMING OPTIONS' section to access the Hall Sensor Test option via the ESC's SET button.
2. Slowly rotate the motor's output/pinion shaft. If motor is installed in a vehicle, slowly rotate the drive train so that the motor also rotates.
3. The status LEDs on the speed control should cycle through illuminating the BLUE, YELLOW, and RED status LEDs.

If the BLUE, YELLOW, and RED LEDs light up one after another as the motor's shaft is rotated, the Hall Sensors in the motor are operating normally.

If any one of the BLUE, YELLOW, or RED status LEDs do not light while rotating the shaft, there is a problem with the Sensor Harness Cable (or its connections at the either end) or with the actual Hall Effect Sensors in the motor's timing section.

If your motor has a user-replaceable double-ended sensor harness, replace it with another one to determine if this is the problem. If, after replacing the harness, all 3 of the LEDs still do not light up, it would appear that one of the motor's sensors has been damaged--replace the timing section of your motor, or if your motor is not user-rebuildable, send it in the manufacturer for the appropriate service.

## VOLTAGE CUT-OFF CIRCUITRY

This speed control features Novak's Smart-Stop Voltage Cut-Off Circuitry built-in, and when used properly will allow you to safely use LiPo type batteries, without letting the cells drop below their critical safety voltage during operation.

The default setting is that the Voltage Cut-Off is turned ON and is set to LiPo. If you are using NiMH or NiCd cells, you will need to switch the Voltage Cut-Off feature OFF.

**Note: Whenever the speed control's One-Touch Programming is performed, this setting will revert to the LiPo default setting.**

**DO NOT USE LiPo BATTERIES WITH VOLTAGE CUT-OFF TURNED OFF**

## ULTRA-HIGH SPEED PPM MODE

This ESC is equipped with a high-rate PPM firmware update making it compatible with the Airtronics M11x & M12 radio systems operating in SSR & SHR modes and being used with one of their High Response receivers. The ESC still works with all standard rate radio systems (as well as M12 operating in its normal rate mode).

The PPM rate of these high response receivers in SSR/SHR mode is so high, the ESC must first be switched to the correct radio system mode **before** it will recognize the receiver signal and allow the One-Touch Set-Up to be programmed. The ESC leaves Novak programmed for operation with standard rate transmitters/receivers and is ready to program if this is what type of radio system you are using.

**Follow these steps to access the 'Trans/Receiver Rate' option in the ESC's 'CUSTOM PROGRAMMING' selection process to access via the ESC's SET button:**

The Transmitter/Receiver Rate is at the end of the programmable ESC parameters after 'Thermal Protection' and before the 'Hall Sensor Test' -- it is the 19th item in the adjustable parameter line-up and is indicated by the GREEN & RED LEDs ON SOLID.

1. Connect ESC to a fully charged battery pack, the receiver, and the brushless motor's sensor harness. **Disconnect at least 2 of the motor power wires.**
2. Slide the ESC's power switch to 'ON' position.
3. With ESC at neutral, Press & Hold ESC's Set button. Release Set button once the RED & GREEN LEDs come ON solid. (LEDs flash together to indicate setting #)
4. Quick Press & Release ESC's Set button to change the radio system mode.  
**1 Flash = High Response Rx Mode    2 Flashes = Standard Rate Rx Mode**
5. Press & Hold ESC's Set button to store the desired radio system mode.

Now that the ESC is set for the correct Transmitter/Receiver PPM rate, it will recognize the connected receiver and is ready for the basic One-Touch Set-Up programming procedure (Steps 1-8 in 'One-Touch Programming' section).

## EXTERNAL BEC CONNECTION

### Using a Non-Novak External BEC

To use a non-Novak BEC with this ESC, follow the BEC manufacturer's instructions.  
-Remove the RED wire from the plug plastic on the ESC's receiver input signal harness.  
-Turn ON the ESC's power switch, then turn ON the BEC's power switch.

### Using a Novak External BEC

-Connect the Novak BEC's main power input leads (heavier 20G gauge silicone wires) to ESC's Positive & Negative battery solder tabs (RED to Positive, BLACK to Negative).  
-Plug the BEC's receiver power output lead into any open channel of your receiver.  
-Remove the RED wire from the plug plastic on the ESC's receiver input signal harness--insulate removed wire to avoid short circuits, as it is "live".  
-Turn ON the ESC's power switch, then turn ON the BEC's power switch.  
-Turn the system's power OFF in the reverse order--BEC then ESC.

## TROUBLE-SHOOTING GUIDE

### Steering Channel Works But Motor Will Not Run

- Possible receiver damage—Check operation with a different receiver.
- Possible internal damage—Refer to 'SERVICE PROCEDURES' section.
- Check motor or motor connections.
- Check ESC is plugged into receiver's throttle channel. Check signal harness wire sequence.

### Receiver Glitches/Throttle Stutters During Acceleration

- Receiver or antenna too close to ESC, power wires, battery, or motor.
- Bad motor sensors, sensor harness, or connections—Check wiring, sensor harness, & connections, perform hall sensor test (Refer to 'MOTOR HALL SENSOR TEST' section).
- Low voltage to receiver—Try Novak Glitch Buster (#5626) on receiver to retain power.
- PowerCaps damaged—On-board PowerCaps (or external modules) must be replaced.
- Battery pack damaged or weak—Try a different battery pack.
- Motor magnet weak or overheated—Replace rotor (Refer to motor manufacturer's website).
- Excessive current to motor—Use a milder motor or a smaller pinion gear.
- Untidy wires or signal and power wired bundled together. Input harness and servo wires should be bundled separately. Power wires should be as short as possible.

### Motor and Steering Servo Do Not Work

- Check wires, receiver signal harness wiring & color sequence, radio system, crystals, battery/motor connectors, & battery pack.
- Possible receiver damage—Check operation with a different receiver.
- Possible internal damage—Refer to Service Procedures.

### Motor Runs Backward

- Reverse motor rotation direction—Refer to 'CUSTOM PROGRAMMING OPTIONS' section.
- Improper One-Touch set up—Refer to 'ONE-TOUCH PROGRAMMING' section.

### Speed Control Runs Excessively Hot

- Gear ratio too low—Increase gear ratio/Reduce pinion (refer to 'PROPER GEAR SELECTION').
- Motor is damaged—Try a different motor.

### Model Runs Slowly/Slow Acceleration

- Gear ratio too high—Reduce gear ratio/Increase pinion (refer to 'PROPER GEAR SELECTION').
- Check battery & connectors—Check battery pack & connectors. Replace if needed.
- Incorrect transmitter/ESC adjustment—Refer to 'TRANSMITTER ADJUSTMENTS'.
- PowerCaps damaged—On-board PowerCaps (or external modules) must be replaced.

### ESC Is Melted Or Burnt/ESC Runs With Switch Off

- Internal damage—Refer to Service Procedures.

### No Power to the BEC

- Check power wire connections to your battery, ESC and BEC unit.
- Check BEC input harness is plugged into receiver & ESC's red wire is removed from harness.
- Be sure that the BEC unit switch is turned ON.

## ERROR/LED CODES

- **Red & Green status LEDs on solid**—Check input signal harness connections at ESC and receiver. Check input signal harness wiring sequence—Refer to STEP 3.
- **Red status LED on solid & Green LED blinking**—Check motor sensor harness connection. Possible internal motor damage.
- **Blue & Green status LEDs both blinking**. Misfire shut-down—return throttle to neutral position to regain motor control—check drive train for free operation.
- **Blue & Red status LEDs blinking**. Possible ESC thermal shut-down—Check gear ratio & free operation of drive train for possible overloading/ESC is being severely overloaded—allow system to cool & return throttle to neutral position to regain motor control. LEDs will continue to blink until system is cooled down.
- **Blue & Yellow status LEDs blinking**. Possible Motor thermal shut-down—Check gear ratio & free operation of drive train for possible overloading/Motor is being severely overloaded—allow system to cool & return throttle to neutral position to regain motor control. LEDs will continue to blink until system is cooled down.
- **Blue & Green (Misfire Detection), Blue & Red (ESC Thermal Shut-Down), or Blue & Yellow (Motor Thermal Shut-Down) status LEDs blinking**. ESC may have shut-down & ESC's neutral point is too far off to sense that transmitter throttle has been returned to neutral (Refer to 'ONE-TOUCH' & 'TRANSMITTER ADJUSTMENTS').
- **Red & Yellow status LEDs toggling**. LiPo Cut-Off voltage reached. Recharge battery.
- **White status LED blinking**. Normal—LED blinks to indicate zero timing advance.

## TEMPERATURE MONITORING

This ESC has a built-in diagnostic temperature monitoring feature that lets you quickly check the ESC's operating temperature at any time. While connected to a battery and ESC powered ON, **simply tap the ESC's SET button and one (or all) of the status LEDs will flash 4 times** to indicate operating temperature of ESC.

If all 5 LEDs light up momentarily after the temperature LED flashes, this indicates that the ESC's Thermal Protection Circuitry has previously been turned OFF.

**WHITE** flashing LED = normal operating temp--under 135°F (57°C).

**BLUE** flashing LED = medium operating temp--136-147°F (58-64°C).

**YELLOW** flashing LED = hot operating temp--148-167°F (65-75°C).

**GREEN** flashing LED = hotter operating temp--168-194°F (76-90°C).

**RED** flashing LED = **hottest** operating temp--195-215°F (91-102°C).

You are pushing ESC extremely hard--Be very careful to avoid overheating & shut-down.

**All LEDs flashing = DANGEROUS operating temp--216-239°F (103-115°C).**

**Your ESC is now about to thermally shut-down.**

--Reduce pinion size or timing to avoid overheating & potential ESC damage--