

THERMAL PROTECTION CIRCUITRY

This ESC's temperature overload protection will turn off the Dynamic Timing Advance feature and limit the power to the motor in an attempt to prevent thermal overloading of the ESC. This feature can not guarantee the survival of the ESC when subjected to conditions that produce excessive heating of the electronics, it does provide you a tool to help avoid extensive damage.

If you notice a significant decrease in performance of your brushless system during a run, immediately check the ESC & motor temperatures. Reduce gearing or ESC timing settings to lower temperatures!

The ESC's Thermal Protection Circuitry can be disabled, if needed. Follow the steps in the 'CUSTOM PROGRAMMING' section to access the 'Thermal Protection' option via the ESC's Set button.

Using ESC with Thermal Protection disabled lets you to push the equipment to the absolute limit, and well beyond it very quickly. Use EXTREME CAUTION to avoid severe ESC damage! Any damage that occurs after the Thermal Protection Circuitry is turned OFF will NOT be covered by warranty!

**Yellow & White LEDs flashing 1 time = Thermal Protection OFF
Yellow & White LEDs flashing 2 times = Thermal Protection ON**

Note: The thermal protection circuitry can be triggered by heavy BEC loading from high-power servos. An external BEC or receiver pack can solve this problem & allow you to keep the thermal protection turned ON for maximum security!

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 the ESC 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.

Follow these steps to access the 'Hall Sensor Test' option in the ESC's 'CUSTOM PROGRAMMING' selection process to access via the ESC's SET button:

The Hall Sensor Test is at the very end of the programmable ESC parameters after the 'M12 Super-High Speed Mode' -- it is #20 and is indicated by the **BLUE LED BLINKING**.

1. Connect the speed control to a fully charged battery pack, the receiver, and the brushless motor's sensor harness.
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 **BLUE LED is Blinking (not ON solid--that is Drag Brake)**.
4. 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.
5. 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 up when rotating the motor, there is a either a problem with the Sensor Harness Cable (or its connections at the motor or ESC end) or with the motor's Hall Effect Sensors.

If your motor has a user-replaceable sensor harness, try another one to determine if this is this source of the problem. If all three of the LEDs still do not light up, it would appear that one of the sensors inside the motor has been damaged--replace the timing section of your motor, or contact manufacturer for the appropriate service.

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).

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.
- Make sure ESC is plugged into the throttle channel of receiver. Check wiring color sequence of receiver signal harness (Refer to STEP 1).

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 capacitor on receiver to help retain power during high current draw situations (Novak accessory #5626).
- Power Trans-Cap Module damaged/missing—Replace Power Trans-Cap Module.
- 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

- ESC set to incorrect Transmitter/Receiver Rate—Refer to 'CUSTOM PROGRAMMING' section.
- 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

- Improper One-Touch set up—Refer to 'ONE-TOUCH PROGRAMMING' section.

Timing Does Not Operate Properly

- Improper gearing—Refer to 'PROPER GEAR SELECTION' section.
- Timing not turned ON—Refer to 'CUSTOM PROGRAMMING' section.
- Timing Set Points set incorrectly—RPM values may be set incorrectly. Refer to 'CUSTOM PROGRAMMING' section.

Xtra-Timing Does Not Operate Properly

- Timing Level set too low—Timing must be turned ON and the Timing Level must be set to a value of 45° or higher. Refer to 'CUSTOM PROGRAMMING' section.

Speed Control Runs Excessively Hot

- Electronic motor timing set too high—reduce timing level setting in ESC.
- 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'.
- Power Trans-Cap Module damaged/missing—Replace Power Trans-Cap Module.

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 that the input harness from the BEC is plugged into the receiver correctly and the red wire from the ESC's input harness is removed.
- Be sure that the BEC unit switch is turned ON.

ERROR 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 1.
- **Red status LED on solid & Green LED blinking**—Check motor sensor harness connection. Possible internal motor damage.
- **Blue & Green status LEDs both blinking**. Possible ESC shut-down due to locked rotor detection—return throttle to neutral position to regain motor control—check vehicle's 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 & Green (Locked Rotor Detection), or Blue & Red (ESC 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').
- **White status LED blinking**. ESC timing is turned OFF. ESC is operating normal.
- **Red & Yellow status LEDs toggling**. LiPo Safety Cut-Off voltage reached. Remove and charge/replace battery pack.

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).

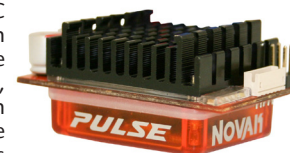
Your ESC is now about to thermally shut-down.
--Reduce pinion size or timing to avoid overheating & potential ESC damage--

PULSE V2 TRACK GUIDE

#55-1756P-2 Rev.1

12-2013

The Novak Pulse V2 Racing Brushless ESC (Novak part #1755) is factory loaded with numerous programmable features. While this may seem overwhelming at first glance, this *Track Guide* was designed to keep with you at the track to use as a quick-reference and help walk you through the explanations and programming of all of the speed control's features.



PULSE

Take the time to thoroughly read through this programming guide before operation to 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 this ESC has to offer.

Visit our web site for the most up to date information and to learn more about other Novak products and services. www.teamnovak.com

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**

- WITH ESC OFF, TURN ON THE TRANSMITTER'S POWER**
- PRESS & HOLD ESC'S ONE-TOUCH/SET BUTTON**
- TURN ON THE SPEED CONTROL'S POWER**
With transmitter at neutral (still pressing SET button), slide ESC's switch to ON position.
- CONTINUE HOLDING SET BUTTON UNTIL RED LED COMES ON**
- RELEASE SET BUTTON AS SOON AS RED LED TURNS ON**
- PULL TRANSMITTER THROTTLE TO FULL-ON POSITION**
Hold it there until green status LED **turns solid green.** (Motor won't run during programming).
- PUSH TRANSMITTER THROTTLE TO FULL-BRAKE/REVERSE**
Hold it there until the green status LED **blinks green.**
- 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.

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. 2.4GHz radio systems are the best to use. High quality FM radio systems are acceptable. **AM radio systems are NOT recommended.**



ESC PARAMETERS

1. Throttle Profile (1 of 5)..... 1-5
2. Drag Brake (1 of 10)..... 0-30%
3. Minimum Brake (1 of 10)..... 0-30%
4. Brake Frequency (1 of 10)..... 1.0-7.5 KHz
5. Timing Level (1 of 5 adjustments of 10°)..... 10-50°
6. Timing Level (1 of 9 adjustments of 1°)..... 1-9°
7. Timing Start RPM (1 of 10 in 6 ranges)..... 1500-30000 RPM
8. Timing Final RPM (1 of 10 in 6 ranges)..... 4000-40000 RPM
9. Timing RPM Range (1 of 6 tables of 10)..... 1500-40000 RPM
10. Drive Frequency (1 of 10)..... 8-36 KHz
11. Dead Band (1 of 5)..... 2-8%
12. Minimum Drive (1 of 10)..... 0-15%
13. ESC Reversing Functionality OFF/ON
14. Voltage Cut-Off Circuitry..... OFF/LiPo
15. Xtra-timing (1 of 8)..... OFF-Dangerously Fast
16. Dynamic Timing Advance OFF/ON
17. Default Data Reset Keep/Reset
18. Thermal Protection Circuitry OFF/ON
19. Transmitter/Receiver Rate Mode..... SSR/Standard
20. Brake Power (1 of 10)..... 10-100%

TIMING ESC WARNING

Due to the nature of timing advance ESCs, vehicle/motor tolerances, settings, and performance, it is impossible to recommend settings that allow ESCs & motors to be used at their highest performance levels without potential for unwanted damage. You MUST use extreme caution setting up electronics and carefully test the application to avoid overloading/overheating either the ESC or motor.

These are racing electronics used in racing conditions, and therefore damage resulting from excessive overheating will not be covered by product's warranty.

Electronic motor timing advancement can generate extremely high speeds and result in an uncontrollable vehicle. Use caution when operating vehicle and do not operate around other people or in an unsafe manner to avoid injuries or damage.

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 when the ESCs electronic motor timing advancement feature de-activated.

At all times when the speed control is powered on and the Dynamic Motor **Timing is turned OFF** (electronic motor timing advancement is set to zero), the ESC's **white status LED will flash** during normal operation.

PROPER GEAR SELECTION

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

Motor & ESC should **NEVER** exceed **160°F MAX** during a 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, ESC/motor damage & failure, **you must start with VERY small pinion sizes** and check ESC & motor temperatures at multiple times throughout the initial runs. 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.

VOLTAGE CUT-OFF CIRCUITRY

If used properly, this ESC's built-in Smart-Stop Voltage Cut-Off Circuitry will allow you to safely use 2S LiPo (Lithium Polymer) batteries, without letting the battery's cells drop below their critical safety voltage which causes internal damage. The ESC's default is LiPo voltage cut-off circuitry is turned ON. If using NiMH or NiCd cells, you will need to switch this feature off. **ESC does NOT cut off 1S LiPo packs.**

Note: ESC will **NOT** revert to LiPo ON setting when the One-Touch Programming is performed.

DO NOT USE 2S LiPo BATTERIES WITH VOLTAGE CUT-OFF TURNED OFF

CUSTOM PROGRAMMING

SUPER-TUNER FLOW CHART

The Pulse V2 ESC features Novak's Super-Tuner programming interface with numerous ESC parameters that can be customized to fine-tune the ESC's feel & response to your liking. The flow chart and the descriptions to the right show the order of the different parameters and how they effect the ESC's feel or response. One-Touch Programming should be completed before customization of ESC parameters that are based off percentages of the trigger's full-throttle and full-brake position.

Note: ESC parameters do NOT default back to the factory settings when the One-Touch Programming is performed.

THE ESC PARAMETERS LISTED IN BOLD IN THE TABLES TO THE RIGHT ARE THE DEFAULT SETTINGS FOR PROFILE #1

The sequence that the status LEDs of the ESC goes through in the Super-Tuner software is easier than ever to follow. Common ESC parameters are grouped together, and the LEDs also light up in order from left to right on the ESC.

The first adjustable item is the ESC's Throttle Profile, next comes a group of 3 Braking adjustments, then 5 Timing settings, followed by 4 forward Drive settings, and then finished up with LiPo ON/OFF, Xtra-Timing, Timing ON/OFF, Thermal Protection ON/OFF, and a motor test mode to check the hall sensors & harness connections.

TO CHANGE PARAMETER SETTINGS:

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

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

3. 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.

4. SELECT PARAMETER VALUE

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

5. 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.



continue holding ESC's SET button to skip steps here

THROTTLE PROFILE

#1 THROTTLE PROFILE SELECTION (1 of 5) BLUE-RED-WHITE LEDs

>> Increasing this setting changes the active Throttle Profile. Each of the Throttle Profiles are independently adjustable once selected.

Profile (# of flashes)	1	2	3	4	5
typical application-->	No-timing	No-timing	Modified	Modified	No-timing
	"Blinky"	"Blinky"	Mild Timing	Med. Timing	"Blinky"
	Slick Tracks	High-Grip	Safe RPMs	Lower RPMs	Slick Tracks
	(smoother)	(more aggressive)	(less aggressive)	(more aggressive)	Reverse ON
ESC Parameter	def.setting	def.setting	def.setting	def.setting	def.setting
Drag Brake	3	5	3	3	3
Minimum Brake	3	5	3	3	3
Brake Frequency	3	3	3	3	3
Timing--10's	1*	1*	1	1	1*
Timing--1's	1**	1**	1**	1**	1**
Timing Start RPM	10*	10*	10	1	10*
Timing Final RPM	10*	10*	10	1	10*
RPM Range	4*	4*	4	4	4*
Drive Frequency	10	10	10	10	10
Dead Band	4	4	4	4	4
Minimum Drive	1	5	1	1	1
Reverse	1	1	1	1	2
Voltage Cut-Off	2	2	2	2	2
Xtra-Timing	1	1	1	1	1
Dynamic Timing	1	1	2 (ON)	2 (ON)	1
Radio System	2	2	2	2	2
Brake Power	6	6	6	6	6

*Even though Dynamic Timing is turned OFF in Throttle Profiles #1 & 2, the timing settings can be adjusted. If Timing is turned ON, the selected values will be active.
 **The 1's Timing setting defaults to 0°, however if you go into the 1's set-up mode you will automatically change it to 1°, or setting #1, and will see the LED flash once.

DRAG BRAKE

#2 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	6	9	12	15	18	21	24	30

MINIMUM BRAKE

#3 MINIMUM BRAKE SETTINGS (1 of 10) YELLOW LED

Amount of braking applied with the first pulse of transmitter braking information sent.
 >> Increasing this setting starts the braking at a stronger/higher 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	6	9	12	15	18	21	24	30

BRAKE FREQUENCY

#4 BRAKE FREQUENCY SELECTION (1 of 10) RED LED

How the ESC's braking response feels with respect to the transmitter's trigger input.
 >> Increasing the Brake Frequency makes the brake response feel smoother and more controllable.

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Brake Freq. (KHz):	1.0	1.5	2.0	2.2	2.5	3.0	3.5	4.5	6.0	7.5

TIMING LEVEL--10'S

#5 TIMING LEVEL 10's SETTINGS (1 of 5) GREEN LED

The first digit, or "tens setting", of the maximum number of degrees of Dynamic Timing Advance applied to the motor. This ESC has 0-55° of Dynamic Timing.
 >> This setting adjusts the 1st digit of the maximum electronic motor timing applied to the motor by ten degree increments.

Whenever the 10's setting is modified, Timing is set to the even 10° increment when the ESC exits programming. So, if you select setting #3, the timing is set to 30° (the 1's value changes to zero until modified--this is how you get 10, 20, 30, & 40°).

Setting (# of flashes)	1	2	3*	4*	5*
Timing Level (degrees):	10	20	30	40	50

WARNING: DO NOT FREE-REV MOTOR TO CHECK TIMING SETTINGS
 *Levels above 30° produce excessive heating & must be used with caution.
 Physical motor timing should be set at/below 30° ("N" on older Ballistic motors)

TIMING LEVEL--1'S

#6 TIMING LEVEL 1's SETTINGS (1 of 9) WHITE LED

The second digit, or "ones setting", of the maximum number of degrees of Dynamic Timing Advance applied to the motor.
 >> This setting adjusts the 2nd digit of the maximum electronic motor timing applied to the motor by one degree increments.

Setting (# of flashes)	1	2	3	4	5	6	7	8	9
Timing Level (degrees):	1	2	3	4	5	6	7	8	9

TIMING START RPM

#7 TIMING START RPM POINT (1 of 10) BLUE & YELLOW LEDs

The RPM trip point at which Dynamic Timing Advance starts being applied.
 >> Increasing this setting will increase the motor RPM at which the electronic motor timing advancement begins coming on.

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Start RPM (in table):	1	2	3	4	5	6	7	8	9	10

Note: Selection chooses a line number from within the selected RPM Range Tables below. First select RPM Table # (step #9), then select desired Start & Final RPM line numbers from table.

TIMING FINAL RPM

#8 TIMING FINAL RPM POINT (1 of 10) BLUE & RED LEDs

The RPM trip point at which Dynamic Timing Advance finishes being applied.
 >> Increasing this setting will increase the motor RPM at which the electronic motor timing advancement stops coming on.

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Final RPM (in table):	1	2	3	4	5	6	7	8	9	10

TIMING RPM RANGE

#9 TIMING RPM LOOK-UP TABLE (1 of 6) BLUE & GREEN LEDs

The speed control software's available look-up tables of Timing RPM trip points (start/final) at which Dynamic Timing Advance starts and ends being applied.
 >> Changing this setting changes the table number that the ESC uses to look-up Start & Final RPM trip points selected in steps #7 & 8 above.

Setting (# of flashes)	1	2	3	4	5	6					
RPM Range:	Table 1	Table 2	Table 3	Table 4	Table 5	Table 6					
typical application-->	1S Racing	Spec Timing	Mod4/2wd	General/SCT	Open/S.Run	10.5/Lg.Track					
Table 1	Table 2	Table 3	Table 4	Table 5	Table 6						
Start	Final	Start	Final	Start	Final	Start	Final	Start	Final	Start	Final
1	1500 4000	4000 10000	9000 15000	10000 20000	21000 31000	6000 16500					
2	1750 4500	4500 10500	9500 16000	11000 21000	22000 32000	6500 18000					
3	2000 5000	5000 11000	10000 17000	12000 22000	23000 33000	7000 19500					
4	2250 5500	5500 11500	10500 18000	13000 23000	24000 34000	7500 21000					
5	2500 6000	6000 12000	11000 19000	14000 24000	25000 35000	8000 22500					
6	2750 6500	6500 12500	11500 20000	15000 25000	26000 36000	8500 24000					
7	3000 7000	7000 13000	12000 21000	16000 26000	27000 37000	9000 25500					
8	3250 7500	7500 13500	12500 22000	17000 27000	28000 38000	9500 26000					
9	3500 8000	8000 14000	13000 23000	18000 28000	29000 39000	10000 27500					
10	3750 8500	8500 14500	13500 24000	19000 29000	30000 40000	10500 29000					

Note: Within the selected RPM Range Table, the Start & Final RPMs (steps #7 & 8) are selected separately from the same table but do not have to be the values across from each other in the table.

DRIVE FREQUENCY

#10 DRIVE FREQUENCY SELECTION (1 of 10) BLUE & WHITE LEDs

>> Increasing makes the throttle response smoother & 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	36

DEAD BAND

#11 DEAD BAND SETTINGS (1 of 5) BLUE-YELLOW-RED LEDs

>> Increasing this setting increases the transmitter trigger's 'free play' around neutral.

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

MINIMUM DRIVE

#12 MINIMUM DRIVE SETTINGS (1 of 10) BLUE-YELLOW-GREEN LEDs

>> Increasing this setting starts forward drive at a stronger/higher level.

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

REVERSE--ON/OFF

#13 REVERSE SELECTION (1 of 2) BLUE-YELLOW-WHITE LEDs

>> Enables or disables the ESC's reversing functionality. OFF = Fwd/Brake only.

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

VOLTAGE CUT-OFF--ON/OFF

#14 LiPo CUT-OFF SELECTION (1 of 2) BLUE-YELLOW-RED-GREEN LEDs

>> Enables or disables the ESC's Smart Stop voltage cut-off circuitry.

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

XTRA-TIMING

#15 XTRA-TIMING SELECTION (1 of 8) ALL 5 LEDs

>> Enables/Adjusts the rate at which the ESC's Xtra-Timing feature advances the motor timing to the maximum amount possible when trigger is held at full-throttle.

Setting (# of flashes)	1	2	3	4	5	6	7	8
Xtra-Timing Level:	OFF	Low	Med	High	Extra	Super	Caution	Danger

TIMING--ON/OFF

#16 ELECTRONIC TIMING SELECTION (1 of 2) YELLOW & RED LEDs

>> Enables or disables the ESC's Dynamic Timing Advance features.

Setting (# of flashes)	1	2
Dynamic Timing:	OFF	ON

DATA RESET

#17 DEFAULT DATA RESET YELLOW & GREEN LEDs

>> This feature resets the ESC's adjustable parameters to factory default values for all throttle profiles. Select setting #2 then Push & Hold to RESET.

Setting (# of flashes)	1	2
Data Reset:	KEEP DATA	RESET ALL DATA

THERMAL PROTECTION--ON/OFF

#18 TEMP. OVERLOAD SELECTION (1 of 2) YELLOW & WHITE LEDs

>> Enables or disables the ESC's Temperature Overload Protection Circuitry.

Setting (# of flashes)	1	2
Thermal Protection:	OFF	ON

TRANS/RECEIVER RATE

#19 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

BRAKE POWER

#20 BRAKE END POINT SELECTION (1 of 10) RED & WHITE LEDs

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

Setting (# of flashes)	1	2	3	4	5	6	7	8	9	10
Brake Power (%):	10	20	30	40	50	60	70	80	90	100