Additional Instruction of 1224_STOCK Firmware

Note! The 1224_STOCK firmware is NOT identical with the 110108_STOCK firmware.

Compared with the previous versions, the 3rd generation STOCK firmware of "**1224_Stock**" has the following improvements:

1. Stronger and quicker acceleration, but the temperature of ESC and motor is even lower than before.
2. The Boost Timing and Turbo Timing can be adjusted more smoothly, with the precision of 1 degree per step.
3. The Turbo timing and boost timing can be composited to be functional together (Total effective timing is 46°).
4. Turbo timing increasing rate (slope) is adjustable.
5. Brake Force is changed from 4 options to 8 options.

CAUTION!

1. Once the new firmware has been loaded into the ESC, you can only use the **LCD Program Box or PC software** to set the programmable parameters, neither the LED Program Card nor the SET button is available for programming the ESC with this new firmware.
2. You must update the firmware of the LCD Program Box to Version "101224" to be compatible with the new firmware of ESC.

HOW TO UPDATE THE FIRMWARE OF THE LCD PROGRAM BOX?

Please check here: http://www.hobbywing.com/upload/manual/USB_LINK_User_Manual.pdf

DESCRIPTION OF THE PROGRAMMABLE ITEMS ABOUT TURBO FUNCTION

#9. Boost Timing：It is effective throughout the entire throttle range and affects the motor speed in the entire track (Curve and straight track). Please note this refers to the maximum value of the ESC internal timing, the actual timing is always dynamically changed every moment according to the motor RPM.

Actual Max Timing (Degree)	0 ° to 38 ° with the trim step of 1 °

#10.Turbo Slope Rate (Degree/0.1s). This refers to the Turbo Timing increasing rate. The higher this parameter, the faster the Turbo Timing increase, and together with a quicker acceleration and higher motor temperature.

Item	1	2	3	4	5	6
Turbo Slope Rate	1.5 ° /0.1s	3 ° /0.1s	6 ° /0.1s	9 ° /0.1s	12 ° /0.1s	All Turbo Timing opened immediately

Example: Turbo Timing is 12 ° and Turbo Slope is 1.5 ° /0.1s, it takes 0.8S to activate the whole Turbo Timing.

#12. Turbo Timing: It is the additional timing that added to the Boosting Timing and only effective when the throttle is fully opened, so usually it is useful for long straight track.

Actual Max Timing (Degree)	0 ° to 30 ° with the trim step of 1 °

The maximum amount of timing (Boot Timing + Turbo Timing) of the ESC is designed to 46°. If the sum

of “Boost Timing + Turbo Timing” is more than 46°, only 46° is effective and the exceeding value is useless.

Boost Timing	***Turbo Timing***	***Max timing before full throttle***	***Additional max timing after full throttle***	***Total Maximum Timing***	***Note***
38	*22*	*38*	*8*	*46*	*The “Additional max timing after full throttle” is only related to the “#10 Turbo Slope Rate” and ”#14 Turbo Delay”, it is not related to “#15 Boost Timing Acceleration”*
35	*10*	*35*	*10*	*45*	
20	*29*	*20*	*26*	*46*	
20	*5*	*20*	*5*	*25*	
30	*30*	*30*	*16*	*46*	
10	*25*	*10*	*25*	*35*	

#13. Boost Start RPM： ESC begins to increase the internal timing when motor speed reaches the Boost Start PRM. A smaller Boost Start RPM value causes a faster rate of boost because the ESC increases the internal timing earlier.

Item	1	2	3	4	5	6	7	8	9	10	11
Motor speed (RPM)	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	12000

#**14. Turbo Delay:** This is the amount of time ‘full throttle’ must be held BEFORE the turbo function engages. If the full throttle time is less than the setting value, the turbo function will NOT be activated.

Item	1	2	3	4	5	6	7	8	9
Time(s)	0s	0.1s	0.2s	0.3s	0.4s	0.5s	0.6s	0.7s	0.8s

#**15. Boost Timing Acceleration**：This refers to the RPM increment that triggers the ESC timing increase of 1 Degree. The lower value it is, the punchier the motor will be but conversely the hotter the motor will get.

Item	1	2	3	4	5	6	7
Timing Acceleration （RPM/Degree）	150	250	350	450	600	750	900

This parameter is often misunderstood. The boost timing change is caused by the RPM increment, so we use this Boost Timing Acceleration parameter to control the increasing rate of Boost Timing.
So the change of RPM is the cause and the change of Boost Timing is the effect.

Generally, the larger the timing you set, the more powerful the motor will be, but hotter the motor will get. The motor may over-heat or even smoke if too much of timing is activated when a motor is running at a low speed. In order to solve the problem, we use the method of dynamic timing. The motor gets small amount of timing in the period of low speed, when the motor speed reaches the Boost Start PRM, then the timing begins to increases together with the RPM.

The Relationship between Speed and Timing			
Example 1： **Boost Start RPM** = 4000 **Boost Timing = 38** ° **Boost Timing Acceleration** =350/degree		Example 2： **Boost Start RPM** =9000 **Boost Timing = 38** ° **Boost Timing Acceleration** =600/degree	
Speed（RPM）	**Timing**	**Speed (RPM)**	**Timing**
<4000	0	<9000	0
4350	1	9600	1
4700	2	10200	2
5050	3	10800	3
5400	4	11400	4
5750	5	12000	5
6100	6	12600	6
6450	7	13200	7
6800	8	13800	8
7150	9	14400	9
7500	10	15000	10
7850	11	15600	11
8200	12	16200	12
8550	13	16800	13
8900	14	17400	14
9250	15	18000	15
9600	16	18600	16
9950	17	19200	17
10300	18	19800	18
10650	19	20400	19
11000	20	21000	20
11350	21	21600	21
11700	22	22200	22
12050	23	22800	23
12400	24	23400	24
12750	25	24000	25
13100	26	24600	26
13450	27	25200	27
13800	28	25800	28
14150	29	26400	29
14500	30	27000	30
14850	31	27600	31
15200	32	28200	32
15550	33	28800	33
15900	34	29400	34

16250	35	30000	35
16600	36	30600	36
16950	37	31200	37
17300	38	31800	38
>17300	38	>31800	38

Caution: If Boost Timing is less than 38°, such as 20°, the Timing will be still 20° when the motor speed is higher than 11000 in the example 1.

Summary:

1. The way to get a higher top speed:
   A. Increase Timing
   B. Reduce FDR
   C. Increase acceleration
2. The way to increase the start acceleration:
   A. Increase Timing
   B. Reduce Boost Start RPM or Boost Timing Acceleration
   C. Increase FDR
   D. Reduce Turbo Delay
   E. Increase Turbo Slope
   F. Increase Start mode
3. The way to decrease motor temperature and get a longer running time:
   A. Reduce Timing
   B. Increase Boost Start RPM or Boost Timing Acceleration
   C. Increase Turbo Delay
   D. Reduce Turbo Slope

The table below is a recommended setting for you. (2 cells Lipo, Motor endbell Timing is 0° to 5°)

Car	Motor	FDR	#9 Boost Timing	#10 Turbo Ramp	#12 Turbo Timing	#13 Boost Start RPM	#14 Turbo Delay	#15 Timing ACC
1/10 On-Road	11.5T	5.5-7.0	26	9°/0.1s	16	7000	0.4	600
	13.5T	5.0-7.0	30	9°/0.1 s	16	4000	0.4	450
	17.5T	5.0-7.0	38	9°/0.1 s	16	3000	0.2	250
1/10 Off-Road	11.5T	7.5-9.5	8	3°/0.1 s	4	6000	off	600
(Normally, turbo function is	13.5T	7.0-9.0	10	3°/0.1 s	6	5000	off	450
NOT recommended for	17.5T	7.0-8.5	12	3°/0.1 s	8	3000	off	250
Off-Road car)								

The FDR depends on the track condition. Generally, gearing down to get a higher top speed in the large track with long straight, or gearing up to improve the punch out of the corner in the small track.