

Additional Instruction of 110211 _STOCK Firmware

NOTE: The word “Degree” in the following statement doesn’t refer to the strict physical concept of “Angle”, it may be understood as the meaning of “Level”.

Compared with the previous versions such as **100518_STOCK**, the 3rd generation STOCK firmware of **“110211_STOCK”** has the following improvements:

1. Stronger and quicker acceleration.
2. Boost Timing (internal normal timing) and Turbo Timing (also known as additional timing) has been designed to allow the end user much more finer adjustability, with the precision of 1 degree per step.
The 100518_STOCK has 29 degrees of total timing, while 110211_STOCK has 64 degrees of total timing.
3. Turbo Timing and Boost Timing (internal normal timing) are designed to be combined as one timing feature with one another (Total effective timing is up to 64°).
4. Turbo Timing increase rate (slope rate) is adjustable.
5. Many more options for “Boost Start RPM” and “Boost Timing Acceleration”.
6. Brake Force has increased from 4 options to 8 options.

CAUTION!

1. Once the 110211_STOCK firmware has been loaded into the ESC, you can only use the **LCD Program Box or the USB-Link 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 “110119” to be compatible with the 110211_STOCK firmware of ESC.

Note: When you attempt to upgrade the LCD program box firmware to Version 110119, the upgrade process may be interrupted (error), please try it again to re-flash the firmware). Usually the upgrade will be successfully completed on the 2nd attempt. We will solve this issue in later updated version.

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 refers to the normal internal timing of the ESC which is effective throughout the entire throttle range and affects the motor speed through the entire track length (no matter around corners or straight parts of the 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.

Boost Timing (Degree)	0° to 64° with the trim step of 1°
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FAQ: *Is the total internal physical timing of 100518_STOCK identical with 110211_STOCK?*

Answer: *Yes. They are same. But 110211_STOCK has more levels, that means the step length of the timing of 110211_STOCK is smaller, so the user can adjust the timing more smoothly. Please check the following form for the comparison.*

Boost Timing of 100518_STOCK Vs. 110211_STOCK								
100518 STOCK	#9=1	#9=2	#9=3	#9=4	#9=5	#9=6	#9=7	#9=8
110211 STOCK	6 Deg	12 Deg	18 Deg	24 Deg	30 Deg	36 Deg	42 Deg	48 Deg

Turbo Timing of 100518_STOCK Vs. 110211_STOCK									
100518 STOCK	#12=1	#12=2	#12=3	#12=4	#12=5	#12=6	#12=7	#12=8	#12=9
110211 STOCK	0 Deg	2 Deg	4 Deg	6 Deg	8 Deg	10 Deg	12 Deg	14 Deg	16 Deg

In the above form, “#9=2” means the 2nd option of the programmable item #9 (Boost Timing) in the 100518_STOCK firmware, the corresponding internal timing of this option in 100518_StOCK has the same physical effect as the “12 Degree (that is: Level 12)” in 110211_STCOK.

#10、 Turbo Slope Rate (Degree/0.1s). It refers to the Turbo Timing increasing rate. The higher it is, the faster the Turbo Timing increases, and together with a quicker acceleration and higher motor temperature.

Item	1	2	3	4	5	6
Turbo Slope Rate (Degree/0.1s)	3°/0.1s	6°/0.1s	12°/0.1s	18°/0.1s	24°/0.1s	Full Turbo Timing opened immediately

Example: Turbo Timing is set to 24° and Turbo Slope Rate is set to 3°/0.1s, it takes 0.8S to activate this 24°Turbo Timing.

12、 Turbo Timing: It is the additional timing that is added to the Boosting Timing and is ONLY effective when the throttle is at 100% end point of activation, so usually it is useful for long straight track.

Turbo Timing (Degree)	0° to 40° with the trim step of 1°
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The maximum amount of effective timing (Boot Timing + Turbo Timing) of the 110211_STOCK firmware is designed to 64°. If the sum of “Boost Timing + Turbo Timing” is more than 64°, only 64° is effective and the exceeding value is useless.

Example 1:

Boost Timing set to 64°, Turbo Timing set to 10°

64° timing can be activated before the throttle is fully opened, but no more timing can be activated after the throttle is at full activation (100% End Point). So basically the 10 Degree of Turbo Timing is useless and will not be functional.

Example 2:

Boost Timing set to 50°, Turbo Timing set to 14°

50° timing can be activated before the throttle is at full activation, and the further 14° timing can be activated after the throttle is at full activation (100% End Point).

Boost Timing	Turbo Timing	Max timing before full throttle	Additional max timing after full throttle	Total Timing	Note
48	30	48	16	64	
30	10	30	10	40	
20	40	20	40	60	
25	40	25	39	64	

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	
Boost Start RPM (RPM)	1000 to 15000 RPM with the trim step of 1000 RPM

#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
Turbo Delay(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 Boost Timing increase of 1 Degree. The lower the value it is, the more torque the motor will produce but at the expense of the motor increasing in temperature.

Item	
Boost Timing Acceleration (RPM/Degree)	50 to 750 RPM/Deg, with the trim step of 50 RPM/Deg

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. Motor may over-heat or even burn 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 will get a small amount of timing in low speed applications, when the motor speed reaches the Boost Start PRM, then the timing begins to increase together with the RPM.

The Relationship between Speed and Timing			
Example 1 Boost Start RPM = 4000 Boost Timing Acceleration =200/degree		Example 2 Boost Start RPM =9000 Boost Timing Acceleration =400/degree	
Speed (RPM)	Timing	Speed (RPM)	Timing
<4000	0	<9000	0
4200	1	9400	1
4400	2	9800	2
4600	3	10200	3
4800	4	10600	4
5000	5	11000	5
5200	6	11400	6
5400	7	11800	7
5600	8	12200	8
5800	9	12600	9
6000	10	13000	10
6200	11	13400	11

6400	12	13800	12
6600	13	14200	13
6800	14	14600	14
7000	15	15000	15
7200	16	15400	16
7400	17	15800	17
7600	18	16200	18
7800	19	16600	19
8000	20	17000	20
8200	21	17400	21
8400	22	17800	22
8600	23	18200	23
8800	24	18600	24
9000	25	19000	25
9200	26	19400	26
9400	27	19800	27
9600	28	20200	28
9800	29	20600	29
10000	30	21000	30
10200	31	21400	31
10400	32	21800	32
10600	33	22200	33
10800	34	22600	34
11000	35	23000	35
11200	36	23400	36
11400	37	23800	37
11600	38	24200	38
11800	39	24600	39
12000	40	25000	40
12200	41	25400	41
12400	42	25800	42
12600	43	26200	43
12800	44	26600	44
13000	45	27000	45
13200	46	27400	46
13400	47	27800	47
13600	48	28200	48
13800	49	28600	49
14000	50	29000	50
14200	51	29400	51
14400	52	29800	52
14600	53	30200	53
14800	54	30600	54
15000	55	31000	55

15200	56	31400	56
15400	57	31800	57
15600	58	32200	58
15800	59	32600	59
16000	60	33000	60
16200	61	33400	61
16400	62	33800	62
16600	63	34200	63
16800	64	34600	64
>16800	64	>34600	64

Note: If the setting value of "Boost Timing" is less than 64°, for example, set to 20°, the Timing will be still 20° even if the motor speed is higher than 8000RPM in example 1.

SUMMARY

1. The way to get a higher top speed:

- A. Increase Timing
- B. Reduce FDR
- C. Increase acceleration

If the straight track is not long enough AND the acceleration is not strong enough, soon the car needs to speed down at the end of straight track while the motor hasn't got a high speed. In such a case, we may mistakenly think that the top speed is too low, but the real reason is the weakness of acceleration, so we need to increase acceleration.

2. The way to increase the start acceleration:

- A. Increase Timing
- B. Reduce Boost Start RPM or reduce Boost Timing Acceleration
- C. Increase FDR
- D. Reduce Turbo Delay
- E. Increase Turbo Slope Rate
- F. Increase Start Punch (This is the programmable item #4 of the ESC, please check the user manual of the ESC)

3. The way to decrease motor temperature and get a longer running time:

- A. Reduce Timing
- B. Increase Boost Start RPM or increase Boost Timing Acceleration
- C. Increase Turbo Delay
- D. Reduce Turbo Slope Rate

The table below is a recommended setting list. (2 cells Lipo, Motor endbell physical timing is 0° to 5°)

Car	Motor	FDR	#9 Boost Timing	#10 Turbo Slop Rate	#12 Turbo Timing	#13 Boost Start RPM	#14 Turbo Delay	#15 Timing ACC
1/10 On-Road	11.5T	6.0-7.0	34°-42°	18°/0.1s	16°-26°	4000	0.4s	300-450
	13.5T	5.0-7.0	34°-54°	18°/0.1s	20°-30°	3000	0.4s	200-300
	17.5T	5.0-7.0	34°-55°	18°/0.1s	20°-30°	3000	0.2s	150-300
1/10 Off-Road (Normally, turbo function is NOT recommended for Off-Road car)	11.5T	7.5-9.5	12°	6°/0.1s	4°	6000	Off	400-500
	13.5T	7.0-9.0	16°	6°/0.1s	8°	5000	Off	200-350
	17.5T	7.0-8.5	20°	6°/0.1s	12°	3000	Off	200-350

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.