

# Z TRON FF ESC Controller and Timer

## Model FF, rev 1.0

The FF timer/ESC controller is a programmable small lightweight board, about 2 grams, without the push-button switch (not included), which may vary from model to model. Here are the basic features,

1. ESC (Electronic Speed Controller) controller and timer for your F1Q and other FF flights to a programmed duration from 1 second to 63 seconds in 1 second steps.
2. Motor speed, from full-off to full-on and anywhere in between in 63 steps.
3. Dethermalizing servo output programmable activation times, from 0.25 minute to 15 minutes, in 0.25 minute steps.
4. Soft motor speed ramp up and ramp down to conserve the motor gears and avoid excessive current spikes.
5. Works with brushed or brushless ESC motor controllers.
6. Programmed parameters are saved in non-volatile memory and they don't need to be re-entered every time.
7. Default mode can program all parameters at once (details below). The Timer is shipped with default values.
8. Safety lock prevents the timer from accidentally restarting the motor after the task completion.

## Programming and Operational Modes

### Operational Mode

If you power up the Timer without pressing the push-button (PBS) switch, you go into the Operational Mode.

In this mode the Timer powers up from the ESC and waits for the PBS to be pressed. When you are ready to fly, press the PBS and hold it pressed. The Motor will start ramping up and it will go to the selected speed, which most of the times is the full speed. Now you are ready to launch the model, while the PB is still pressed. When you launch the model the PB gets released and that starts the duration timer. The motor will stay at that speed till the duration expires. Then it will ramp down and stop.

The motor will stop at the programmed duration but the timer continues counting for the dethermalizing (D/T) activation. At the end of the programmed D/T time, the D/T servo output will swing the servo to the other side and after two seconds it will return to its original position. The Timer at this point has finished with its programmed tasks and it will continue sending out pulses to the ESC and the D/T servo in order to keep them from moving. It will do this till the system power is turned off. At this point it cannot be restarted by pressing the PB switch. It could only be restarted after a power cycle (by power switch activation or disconnecting and re-connecting the battery).

### Programming Mode

If you power up the Timer while holding the push-button (PBS) switch pressed, you go into the Programming Mode.

Hold the PB switch pressed for a couple of seconds after power on to make sure the Timer understands it has to go to Programming Mode. Then release the PB switch.

You have the option of programming the duration, the D/T time and the Motor speed. You can program one, two or all three of the parameters at any time.

To program the **duration**, first set the DIP switches (sw1 – sw6) as explained in the **DIP Switch settings**. The selected units represent seconds of duration. Then press and hold the PB switch for about **1 second** and then released it. Wait for a couple of seconds. This way the timer knows you have finished entering the duration and it will save the data into the non-volatile memory.

Now you can turn the system off or continue with the next parameter programming.

To program the **D/T time** first set the DIP switches (sw1 – sw6) as explained in the **DIP Switch settings**. Please note the D/T time intervals are 1/4 minute long. For example, to program 4 minutes to D/T set the DIP switches to 16 (16 / 4 = 4 minutes). The maximum D/T time is 15 minutes and the minimum is 1/4 minute. Then press and hold the PB switch pressed for about **5 seconds**.

Again, after the D/T programming you have to wait for a couple of seconds for the timer to save the data into non-volatile memory.

To program the **Motor speed** first set the DIP switches (sw1 – sw6) as explained in the **DIP Switch settings**. Then press and hold the PB switch for about **10 seconds** and then release it. Values from 1 to 4 are for motor off. Values from 5 to 54 are for motor speeds, the higher the number the higher the speed. Values above 54 are for full speed. A little practice will show you what speeds to program for testing purposes.

**Default values selection.** If you press the PB switch during programming mode for about 20 seconds, regardless of DIP switch settings, the default parameters will be selected. That is, duration = 25 sec's, D/T time = 3 minutes and motor speed = full on.

**Please note**, when you program a new parameter value, the old value will be erased from the non-volatile memory.

Non-volatile memory simply means the data you have programmed will be there even after you have turned the system power off. So next time you power on, the programmed data will load automatically and you are ready to go.

**Warning.** NiCad or NiMH batteries are OK for FF but LiPo batteries might discharge below their minimum allowable voltage which destroys the cells beyond repair, if the model cannot be located for some time. Timer and ESC cannot protect against that. Before you use LiPo batteries, make sure you understand the critical voltage discharge limitations of the LiPo batteries.

**Power off-on.** If you turn power off wait for about 5 seconds and then turn power on again to insure proper system startup.

**DIP switch settings**

The values you enter on the DIP switches #1 to #6 are entered in binary form. If you are not familiar with the binary code the easiest way of calculating the value is by individual switch addition. Switch #1 adds 1 unit if on, switch #2 adds 2 units, switch #3, adds 4 units, switch #4 adds 8 units, switch #5 adds 16 units and switch #6 adds 32 units. If switch is off, adds nothing.

For example, to select 25 units, turn on switches 5, 4 and 1 (16 + 8 + 1 = 25). All other switches should be off.

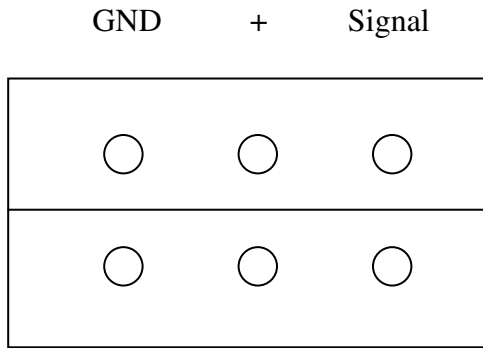
All switches on will give you the maximum (32 + 16 + 8 + 4 + 2 + 1 = 63). All switches off will give you the default value for the particular parameter, 25 for duration, 3 minutes for D/T and full motor speed.

**Setup Instructions**

With the power off (battery disconnected), connect the 3 pin ESC cable to the 3 pin ESC Timer connector. Observe the wire colors. Black (GND, negative, close to the edge of the board) and red (+, positive) in the middle.

As soon as you power up the system, the Timer will send a full off pulse to the ESC for about 2 seconds. Some ESCs need that in order to operate normally.

The top 3-pin header connector is for the ESC connection and the bottom (close to the edge of the board) 3-pin header connector is for the D/T servo connection (see diagram below).

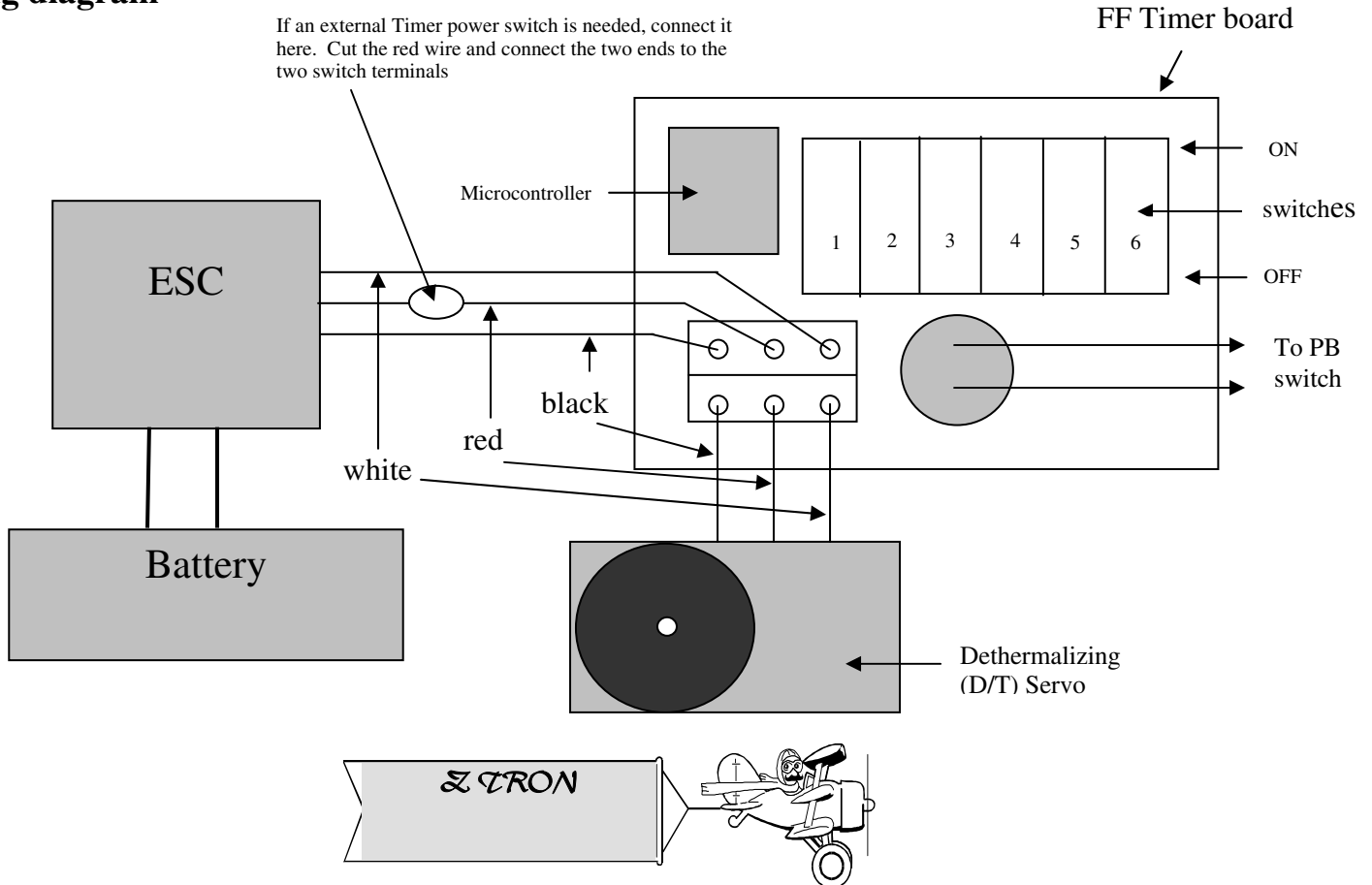


ESC Connector

D/T servo Connector

**Note:** Since the servo connector is on the opposite side of the board, make sure the negative (GND) cable is the one close to the edge of the board

**Wiring diagram**



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