

The FM-9 Programmer and FM-9 Timers

Because Control Line (CL) and Free Flight (FF) models are being powered by electric motors and electronic speed controllers (ESCs) that were developed for radio control (RC) models, we require a **substitute** for the **throttle channel** of an RC receiver that controls the ESC and thence the motor. The throttle signal required is just the standard servo signal because it originally went to a servo that mechanically moved the throttle on a glow or gas motor.

So now we need a “flight manager” or “timer” that controls the throttle after the model is released. CL fliers also wish to **delay** full flight power until they get to the center of the circle and pick up the handle, to avoid wasting battery charge.

This timer can be set to control the flight time, the delay time, and the flight throttle either by (a) adjustment potentiometers (“pots”) on the board (FM-0e, FM-0c, FM-Hornet, etc.) or (b) a separate programming box and accompanying timers (the FM-9 System).

The FM-9 Programmer is relatively expensive but the on-board timers that it programs are cheaper, smaller, and lighter than the earlier FM series. Even more important, the FM-9 Programmer allows the user to set the three flight parameters with digital precision and reproducibility, as well as adding considerable flexibility. The Programmer’s liquid crystal display (LCD), with “UP” and “DOWN” and “OK” buttons make the programmer very user-friendly.

Thanks to its microcontroller basis, the FM-9 System has great versatility in assisting the user in choosing the best throttle values. (It works with any ESC except the ElectriFly™ ESC that has a unique power-on requirement.) In its most basic “throttle” mode, the user can choose the throttle value directly (up to 100%). Then, in its “Compensated Throttle” mode, the throttle can be advanced a programmed amount during the flight to compensate for the normal decline in battery voltage for a simple ESC (emulating the popular FM-0c).

Competition CL fliers usually choose ESCs that promise to **govern**, keeping the RPM **constant** during the flight by increasing the current as necessary as the voltage declines—if there is enough “headroom.” This means that, for a motor with a given number of poles, there is a unique throttle value for every RPM! The FM-9 Programmer has a “look-up table,” based on test-stand measurements, so that the user can select an RPM directly (for a 14-pole motor). The FM-9 Programmer then embeds this calculated throttle value, with ½ of 1% resolution, into the FM-9 timer being used.

The ESCs with a constant-RPM mode are the **Brodak Hornet ESC**, as sold by Brodak, the various Castle Creations ESCs that are programmed with Castle Link for “High RPM” or “Set RPM,” and the Jeti Spin, Hacker X30, and Schulze.

The FM-9 Programmer additionally supports retractable landing gear parameters: how long after the flight power begins to retract the gear and how long, if at all, to keep the power on after the gear has extended at the end of the flight.

All FM-9 timers blip the motor one second after the start button is pushed (to confirm that timing has started), followed by the delay time, followed by the programmed flight time and flight power, followed by a one-second decrease in power as a warning at the end of flight time, followed by flight power for an additional five seconds, followed by motor shut-off. All FM-9 timers, as well as the earlier ones, have the safety feature that pressing the “start” button during the “flight time” will stop the motor and (if used) drop the landing gear.

The FM-9 timers available from Brodak include the basic timer for profile models (with the start button on the timer board), the timer with a 6” cable for the start button, and the timer with extended start, for retracts.