

Overview of the FM-9, a “universal” electric C/L flight manager

The FM-9 flight manager system consists of a very small, light circuit board on the airplane and a remote, powered programmer to set flight parameters for almost every ESC and every ESC mode.

This is the tiny (~2 oz) board for the airplane: a 6-pin connector, the microcontroller, and the start button (or a remote start button).



The FM-9 programmer is housed in a plastic box, about 2½ x 4 x 1¼”, and is powered by a 9-volt battery. It gives this message when first turned on.



If it is connected to the FM-9 circuit board and **if you are holding down the start button**, when you press the “OK” key you get a display of the current flight time:



and you can use the “UP” and “DOWN” key to adjust your flight time (from 1 minute to 9’59”, in second increments). When you press “OK” you get a display of the delay time (how long after you press the start button and get a blip of the motor and the motor starts and flight time begins):

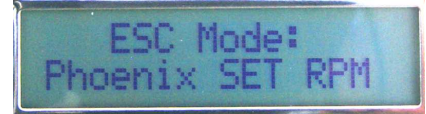


and you can again use the “UP” and “DOWN” keys to adjust as desired (from 2 seconds to 59 seconds).

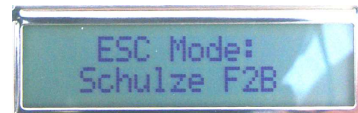
Another press on the “OK” key brings up a choice of ESCs and ESC modes. One of these is the popular Phoenix High RPM governed mode (firmware 3.20 and earlier):



The other available modes are (1) throttle mode (choice of throttle settings from 15% to 100%), (2) compensated throttle (from 59% to 91% with a choice of 14 levels of throttle advance during the flight), (3) the Phoenix Set RPM mode, giving you a choice of any one of the three RPMs, (4) the Schulze Low RPM F2B mode with the Plettenberg motor, (4) the Jeti Spin mode, (5) the Hacker A30 mode, and (6) the Phoenix new High mode (firmware 3.23ff). You can cycle through these choices with the “UP” and “DOWN” keys. Here’s another mode:



and another:



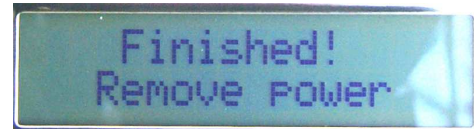
If you choose one of the throttle modes, the next display allows you adjust the percent of throttle to be used in the flight.

If you choose one of the constant/governed RPM modes [Phoenix High RPM, Schulze F2B, Jeti Spin, Hacker A30], **you then get to choose the RPM directly!** (You’re actually choosing a throttle setting but the programmer has a built-in calibration for each of these ESCs, so can program for the flight in terms of an RPM that should be **fairly close** to what you’ll get. More importantly, it is **easily and precisely reproducible!** Adjustments to the RPM are through throttle increments of ±0.5% of full throttle, probably a finer adjustment than most ESCs can utilize.

Here’s an example of choosing the Schulze F2B mode and choosing an RPM of 9,018.



When you are satisfied with your choice of throttle setting(s) or RPM, and press the “OK” key, you get the closing message:



and the new flight parameters are stored in your on-board timer chip. The next time you use the programmer, you need change only what you want to change.

FM-9 Programmer

The FM-9 Programmer is designed to program the FM-9 timer unit for any mode of any ESC. With ESCs that support a governed, constant-RPM mode (currently the Phoenix High RPM mode (both the early firmware version and the latest version), Phoenix Set RPM mode, the Jeti Spin, and the Hacker), the Programmer permits the user to directly select an RPM on the digital display.

For most motors and using these constant-RPM modes, the RPM will be close to what you measure with a tachometer, hopefully, but the most important property is that it is totally reproducible, and it gives you very fine resolution of 1/2 of 1% of full throttle, so you can experimentally determine what gives you the desired lap time and easily fine tune the RPM above and below that for optimum performance in different wind/temperature conditions.

For other, cheaper ESCs, especially those used for sport flying and for 1/2A planes, the Programmer provides a pure throttle mode and a "compensated" throttle mode, in which you specify the % throttle desired as well as how much the throttle should be advanced to compensate for declining battery voltage during the flight (the least at low power settings and the most at high power settings, on a scale from 0 to 15).

The FM-9 Programmer is \$75 and S&H for it and any FM-9 timer units in the U.S. is \$8 (Priority Shipping) and \$12 in other countries (1st Class). **Please indicate if you want a version that supports programmable retractable landing gear parameters.**

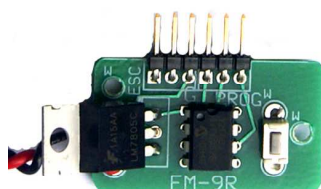
Available FM-9 Timer units

The basic FM-9 timer unit consists of a 6-pin connector to the Programmer, of which the left three pins are the later connection to the ESC, the micro-controller which is programmed for the flight time, delay time, and power/RPM by the Programmer, and a push-to-start button on the board, at \$8.

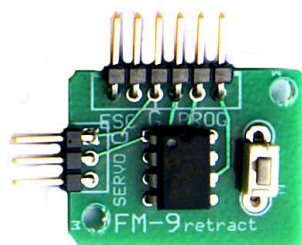


Most flyers with fuselage airplanes will want extended leads (typically 6" in length) for the start pushbutton so that the timer can be inside the airplane and the start button can be on the outside. \$10.

A second version of the FM-9 timer is the FM-9R, for ESCs which don't provide a BEC (like the Schulze), which includes a 5-volt regulator to reduce the battery voltage to 5 volts to power the timer and to provide the proper voltage signal to the ESC. \$12, or \$14 with extended leads to the start button.

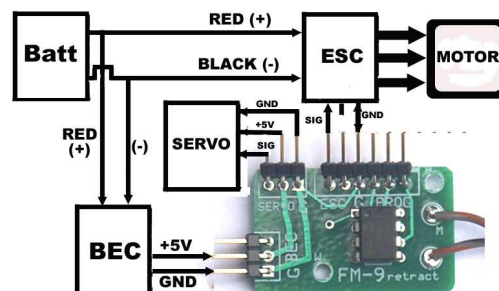


A third version, FM-9retract, includes provision for retracting the landing gear some time after the flight time begins and extending it some time after the warning signal is given. One version of the FM-9 Programmer allows the user to set these times, over a wide range; **specify this version if interested.** (Note that most ESCs don't provide enough BEC current to power retracts. ESCs that use a switching power supply for their BEC, such as the CC ICE, can use this timer.) \$12, or \$14 with extended leads.



A fourth retract version, FM-9retract_BEC, provides for an external BEC, for those ESCs that either don't provide any BEC (the Schulze) or those that don't have enough current capability for

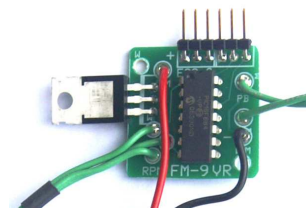
the retract servos (e.g., the Phoenix, but not the ICE). \$18 or \$20 with extended leads.



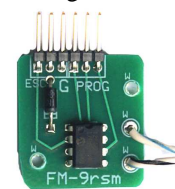
A fifth version, the FM-9V, includes a pot that turns through 270 degrees and allows the user to adjust the RPM without using the programmer, potentially very handy when first trimming a new airplane. The amount of RPM change **must be chosen by the buyer:** anywhere from about +/- 250 RPM, or +/- 500 RPM, or +/- 1000 RPM (based on the Phoenix High RPM mode). The profile version, as shown, with the start button and the pot on the circuit board, is \$12; with extended leads for both, it is \$18.



A sixth version, the FM-9VR, includes a 5-volt regulator, to make it compatible with any ESC that doesn't provide a BEC. As above, the desired RPM change must be specified by the buyer. The profile version with the start button and the pot on the circuit board is \$16; with extended leads for both, as shown, it is \$22.



A seventh version (FM-9rsm) is intended for the larger Hacker ESCs that provide the 5 volts through a switching power supply (as supplied by RSM). It turns out that some of them, at least, provide a little more voltage than the maximum of 5.5V specified for the micro-controller, so this FM-9rsm timer reduces that voltage to a safe value, for longevity. \$12, or \$14 with extended leads (as shown). It can also be used with other ESCs that provide less than 5.5 volts.



If it is desired to update the program in the FM-9 Programmer, for example to be able to program retractable gear parameters, this can be done by either switching the chip yourself @\$5 or by returning the box to me, @\$10 (including S&H).

When only FM-9 timer units are ordered, S&H is \$2 for one and \$3 for two or more (plus \$1 for international shipping).

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