

Free Flight Timer

Warning: The max voltage is 5.5V

The min reliable voltage is 3.0V although it will still operate at > 2.2V

Hopefully these instructions make some kind of sense!!!!!!! If not please get in touch and I will try and sort anything out.

Overview:

The timer can be programmed to control the throttle signal to an ESC and a servo to activate up to 5 positions during a flight. There is a start button that needs to be held for approx 2 seconds to start the timing and a led for indication. Both the timings for motor run and servo operation start when the button is released, so it needs to be located in a suitable position on the model to allow it to be pressed and held until launch. Once started the motor will run at the programmed throttle position until release, if at any time after release the button is pressed again then the timer will shut down and will need to be restarted by cycling the power off and on again. There is no possibility of the motor restarting once its run time has elapsed without cycling the power to prevent any injuries to people retrieving models. If the power is left connected for more than 2 minutes after the DT time has elapsed then the throttle and servo signals are completely switched off, most ESC's, if applicable will activate an alarm tone that could help to locate a model that has landed in long grass or behind a hedge, it also serves as a reminder if its forgotten about and left plugged in.

The programmer unit consists of a 16 character 2 line led display, 2 buttons to increase or decrease each setting value and an enter button to move down the list. It uses power from the timer battery and when plugged in tells the timer to enter programming mode. The Supply Voltage to the timer chip is briefly displayed for reference. Once all the settings have been entered the display then enters a summary mode and scrolls back through each setting so they can be reviewed before sending to the timer, if a setting needs to be changed, holding the increase button will jump back to the beginning. When the programmer is plugged in and powered up the current settings are loaded from the timer so they can be checked through before a flight, and when programming is finished the settings are saved in the timers memory so they can be re used each time on start up without needing reprogramming. During testing the programmer only used approx 12mAh with less than 20mAh being the highest value so there isn't a problem running it from a 30mAh lipo if weight is a premium.

The following is a list of settings that can be adjusted in the order they appear:

Text	Values	Description
Throttle:	1-120%	Throttle value
Run time:	0.1-25.0secs	Motor run time
Time 1:	0.1-25.0secs	Time for first servo move
Time 2:	1-250secs	Time for second servo move
Time 3:	1-999secs	Time for third servo move
Time 4:	1-999secs	Time for DT position
Position 1:	1-120%	Servo start position
Position 2:	1-120%	Servo first position
Position 3:	1-120%	Servo second position
Position 4:	1-120%	Servo third position
Position 5:	1-120%	Servo DT position
Failsafe:	0.1-12V	Failsafe voltage setting
Reset	at the start/end	Servo reset position

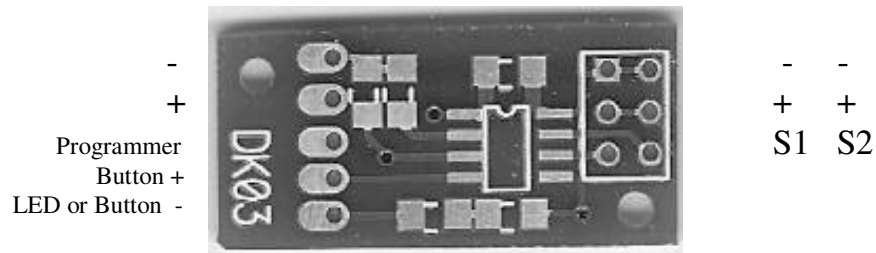
Holding the increase button at this point will loop back to the start
Pressing the enter button at this point will send the settings to the timer

Installation:

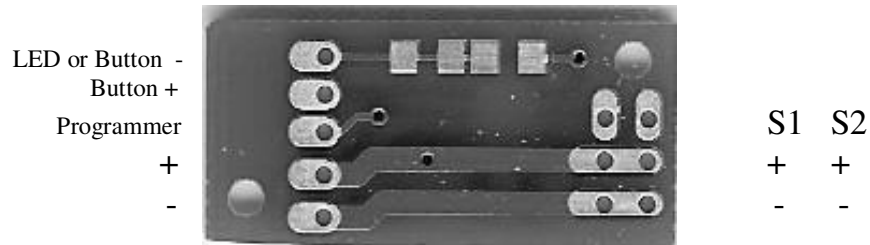
The timer may be fixed using the 2 x 2mm holes. One method would be to screw it to the back of a thin ply plate that includes a hole for the led to shine through; this is then mounted into the model. (Small squares cut from thin plastic make ideal 'nuts' for screwing small self tapping screws into) The programming lead, if applicable needs to be readily accessible to make any changes and the start button needs to be in a suitable position so it can be pressed and held with the model in the launch position.

The standard timers are fitted with angled pins that are spaced for normal 'rc' servo connectors, the row of pins nearest the pcb are for the servo and the row furthest from the pcb are for the esc. The Negative pin for both channels is nearest the board edge. For any other pin configuration or if soldering direct to the provided pads please refer to the attached diagrams.

Top View



Bottom View



S1 = Servo Signal Output

S2 = ESC Signal Output

Where servo leads are used they will be standard 'rc' colours as follows:

- Positive = red
- Negative= black/brown
- Signal = white/orange/yellow

Failsafe voltage:

Note: This feature is mostly aimed at using small single lipo operation in say a rubber model and not when the unit is being supplied by the b.e.c of an ESC. If the model is electric and powered by the same single lipo then consideration must be given to voltage drop when the motor is running.

A failsafe voltage level can be selected to prevent a model fly away due to a flat battery. During operation the supply voltage to the chip is checked continuously and if it drops below this level then the servo is forced to the final DT position regardless of any time remaining. When the unit is first powered up it checks the supply voltage, if it is below the set level then the timer shuts down and the led has a flash-flash-pause sequence. If this feature is not desired then the set point can be lowered to 0.1V which effectively disables it.

Low Battery Warning:

If the battery voltage is less than 0.3V greater than the failsafe voltage AT START UP, instead of a solid LED it will flash slowly warning that the battery needs charging although the timer will still function as normal.

Eg;

Battery volts = 3.5v

Failsafe setting = 4v	Timer shuts down, LED has a flash-flash-pause sequence
Failsafe setting = 3.3v	Timer is ready, LED has a slow flash sequence
Failsafe setting = 3.0v	Timer is ready, LED is on continuous

Servo Reset Position:

After the dt time has finished the servo can be programmed to either return straight back to the starting position or remain at the last position, and then only move to the start upon the next power up to allow the trip wires / arms to be relocated. In this mode the servo reverses sequentially back through each position with a 2 sec pause at each. If this feature is selected and the timer is cancelled before the dt time has operated, ie the model lands early, it is preferable to cancel the time with the button before unplugging the power, this then stores the current servo position so upon next start up the servo resets from there otherwise it will travel to the last position and release any remaining functions by mistake.

Servo Positions:

As can be seen from the settings list the servo direction can be reversed simply by swapping the values over and the end points adjusted to suit each installation without concerns about the servo binding or travelling the wrong way.

Once the timer is running the servo will stay at the first position until the first time expires, then it will move to the second position until the second time expires and so on. The servo positions don't need to be sequential; it could go from one end to the other and back to the middle if required.

If only the DT time is to be used then the first, second, third and fourth positions should be made the same as the start position so the servo only moves to the last position after the DT time has finished and all other times / positions will be ignored.

E.g.:

Position 1 = 1%

Position 2 = 1%

Position 3 = 1%

Position 4 = 1%

Position 5 = 100%

While familiarising yourself with the operation of the timer it may be a good idea to use 2 servos so there is no chance of any fingers getting caught in rotating props.

Using the timer without changing settings

When first connected the timer waits briefly to check for a signal from the programmer, if it's not detected then the settings from the previous flight are loaded from the memory, if the servo is set to 'reset at the start' then it will move back to its start position. The timer then gives 2 short flashes to indicate it is ready and the led will now indicate the current battery voltage. Holding the start button for approx 2 secs will start the motor (if applicable) which will ramp up to full throttle, during this ramp time the led will be on (if its not already on) and will go out as soon as the throttle is at the programmed level. As long as the button continues to be held the timer will wait at this point and the times will only start when released. The model should only be launched after the led is extinguished otherwise the throttle will still be ramping up.

Using the timer and changing settings:

The programmer must be connected before connecting the power as it is only checked for at the beginning. Depending on the options the programmer either plugs into a flying lead or onto straight pins coming from the timer. If it is detected then the settings from the previous flight are loaded into it, during data transfer the led flashes short flashes to indicate activity.

Once the welcome screens and timer supply voltage indication have cleared the throttle setting screen comes on and the value can be increased or decreased with the buttons.

Once the required value has been set then pressing the enter button will move on to the motor run time setting screen and the value can be increased or decreased with the buttons.

Continue on through the menus adjusting each as required.

The last setting is the 'Servo Reset' setting, after that the programmer enters the summary mode where it continuously scrolls through each of the settings so they can be reviewed. If a setting is found that requires changing then holding the increase button jumps back to the beginning so adjustments can be made.

When the settings are correct then pressing the enter button will send them to the timer, it will then save them, indicated by 2 short flashes and then start as above.

DO NOT unplug the power or programmer until the timer gives 2 short flashes indicating the settings have been accepted and saved

During programming there is no signal sent to the ESC so there is no chance of it starting accidentally although most will go into alarm due to no valid signal.

The timers are calibrated to have an error less than 2secs per minute of run time so it is recommended to check any setting changes before flying the model. Once the times have been selected they have proven to be very repeatable during testing.

Assembling the programmer:

The programmer is supplied finished and tested but will need to be installed into a suitable enclosure. The led display has mounting holes in the corners that can be used for fixing screws or it can be fixed with blobs of epoxy. Mount the 3 buttons in a suitable place to allow easy access while entering settings and thread the lead/socket outside. A simple method is to cut a notch out of the enclosure and lay the lead in it, and then close the lid over the top. A method of strain relief is recommended on the lead to prevent it being accidentally torn out.