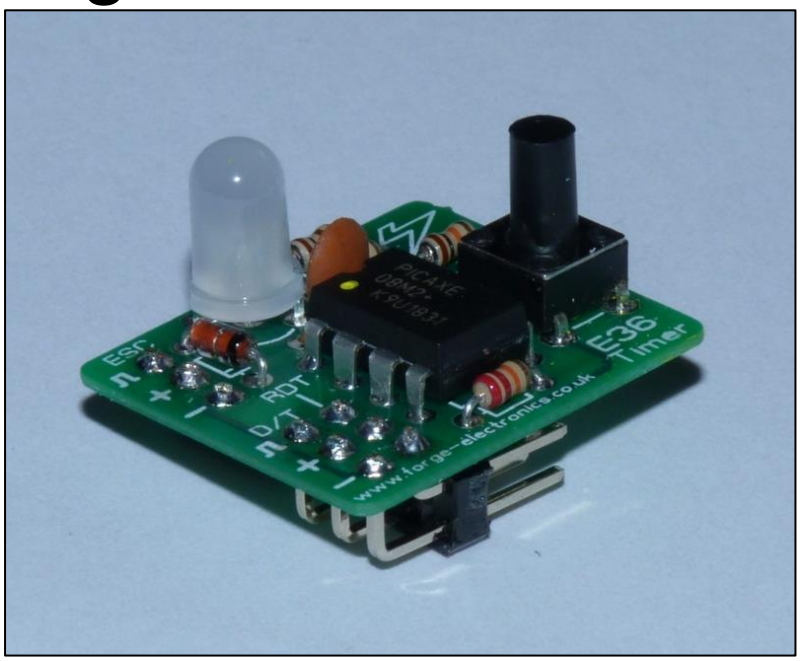
F1E Magnet Steered Glider Timer



This is bespoke version of the E36 Competition Timer MK2 adapted to a customer requirement for F1E use. The former ESC output now drives a bunt servo instead. As the customer did not require the various configuration options of the E36 Timer these have been omitted to simplify the user interface – so only the bunt and DT servo timings can be adjusted.

Key Features

- bunt servo operation adjustable up to 20 secs in 0.1sec increments
- RDT compatible (Leo Bodnar / Aeris)
- fail-safe of D/T in event of radio system malfunction
- fail safe period adjustable up to 10 minutes in 15 sec increments
- battery check feature
- simple to operate pushbutton/bi-colour LED user interface
- timer powers the RDT receiver – no ‘Y’ lead required

AVAILABILITY

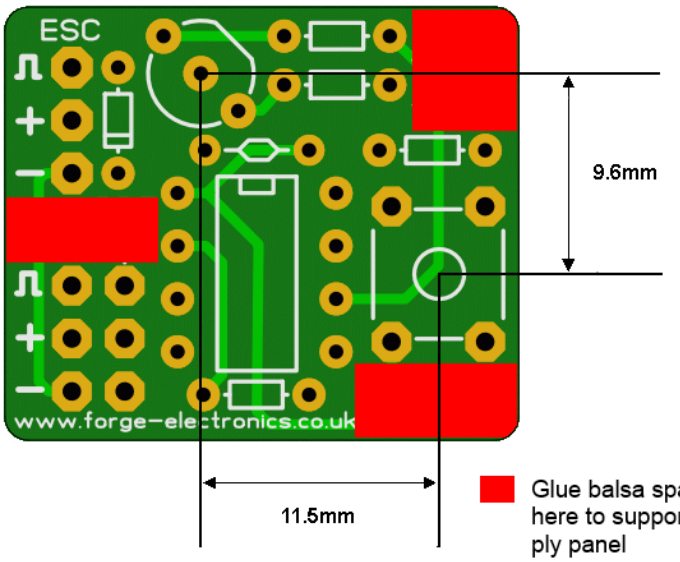
Exclusively from ***Forge Electronics*** - made to special order only

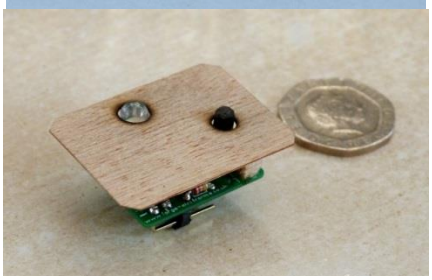
Contact me for price and delivery details:- afbond@gmail.com

PACKAGING

The timer has been designed to be mounted on a thin ply panel mounted flush on the side of the fuselage, the push button and LED protruding through holes in the panel.

Three areas on the PCB have been left clear onto which the user can glue spacers, the ply panel being subsequently stuck to the spacers as shown in the photos below. Scraps of balsa sheet were used for the spacers in the version shown here. Deluxe Materials “Super ‘Crylic” glue is recommended.

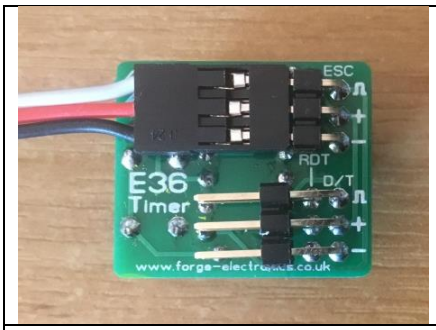
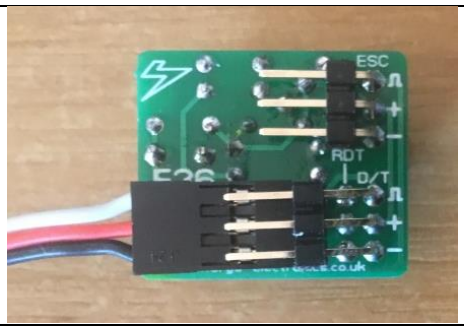
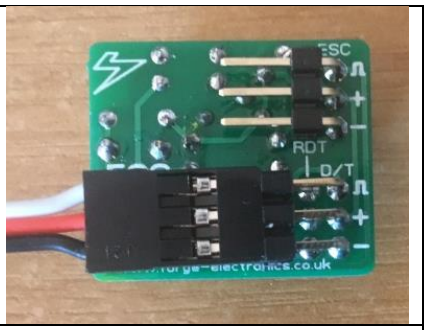




POWER

The timer is powered from an onboard battery a single cell Li-Po (3.7v) is assumed. *The maximum voltage rating for the microcontroller chip is 5.5v and this must not be exceeded.*

CONNECTIONS

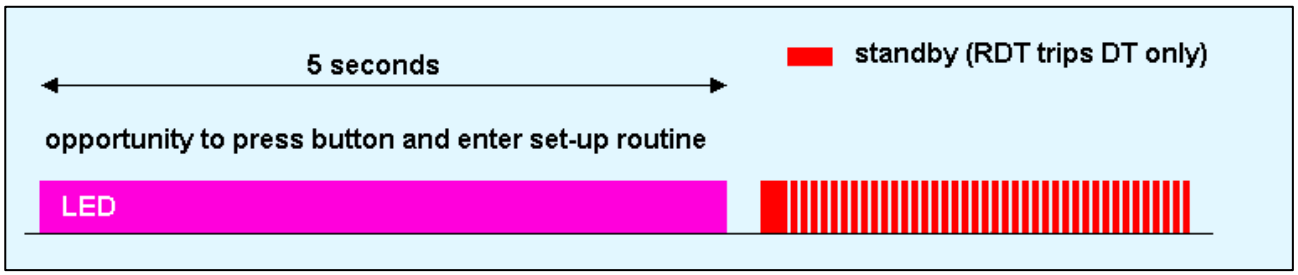
		
Bunt Servo	**RDT Receiver**	**D/T Servo**

The silk screening on the PCB identifies the ESC connector (used for bunt servo) and the polarity of its connections. Note the silk screened ‘RDT’ and ‘D/T’ legends are aligned to the connector’s soldered pins so users may trace back to which row of pins to plug into if this document is not to hand.

	**Battery** As the E36 PCB used for this F1E version has no need of a battery connector, users need to employ a Y' lead from either the DT servo or RDT receiver connectors to allow the battery to be connected. The image is representative of the many 'Y' leads to be found on eBay etc.

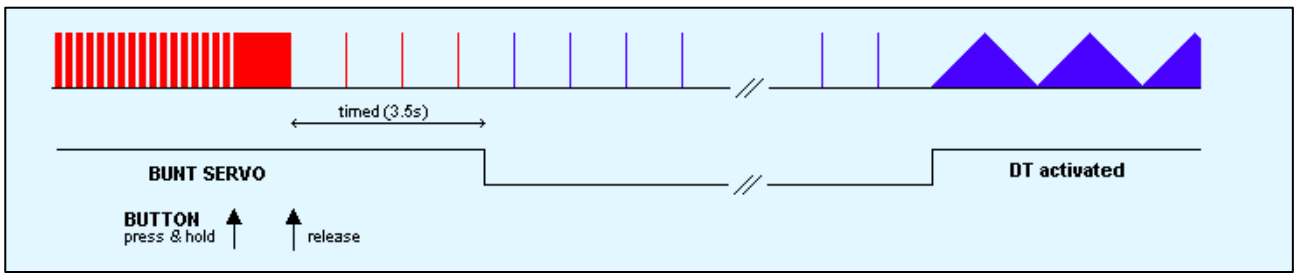
QUICK GUIDE

POWER UP



- connect battery
- battery voltage is checked (once only) – if less than 3.3v the DT operates and the timer enters an endless loop, the LED repeatedly fading from full magenta to off at one second intervals
- bunt and DT servos assume operating positions
- wait 5 seconds whilst the LED is bright magenta (chance to enter setup routine)
- after a brief pause the unit enters standby mode – LED flickers red

FLY



- from standby mode, press and hold the button – the LED goes solid red for the duration of the button hold.
- when ready to launch, release the button – the timing period now commences, the LED goes out and then briefly flashes red to indicate each second being counted off
- re-pressing the button during the bunt or DT timing periods returns the timer to the standby condition above
- following the successful end of the bunt period, the LED now flashes blue counting off the remaining seconds until a DT is initiated. The LED then slowly fades up and down indicating this point in the flight profile occurred
- press and release button to reset the timer. The timer returns to the power-up condition (LED MAGENTA) giving the user the option to alter settings. The battery voltage is checked (once only) – if less than 3.3v the DT operates and the timer enters an endless loop, the LED repeatedly fading from full magenta to off at one second intervals

DETAILED GUIDE

POWER UP

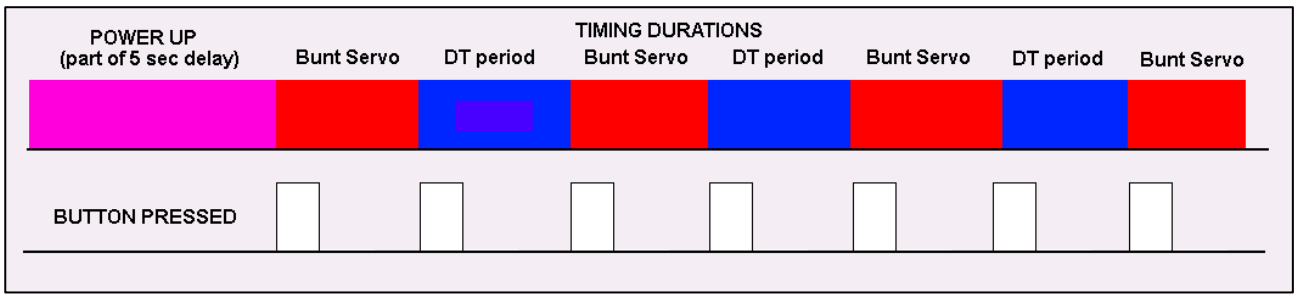
There is a five second delay at power up, during which the LED shows magenta. The purpose of this is that having mated the battery connector the user still has time to press the button to enter the set-up routine.

SET-UP ROUTINE

During the first five seconds after power up, whilst the LED shows magenta, the parameter to be modified is selected by making a number of brisk button presses as follows. The LED lights in different colours to help identify the parameter to be altered for each press, though it is only necessary to count the pushes.

PRESS	LED	FUNCTION	TYPE
1	RED	Set Bunt Servo Timing	Adjustment
2	BLUE	Set DT Period	Adjustment

The length of time the button is held pressed is not critical but following (each) release there is a two second timeout during which the user can elect to press again to move onto the next parameter or wait until the timeout occurs whereupon the selected parameter is now ready to be adjusted. These timeouts allow the timer to ascertain when the user has finished pressing the button.



[1] Set Bunt Servo Timing

Once in the bunt servo set-up routine, the user has the option to make a number of long or short button presses to set the duration of the motor run as follows

- long press – add one second
- short press – add tenths of seconds

During a short press the LED flickers, but if the button continues to be held the LED then lights fully, indicating that a long press has been made. Again there is a two second timeout between pushes

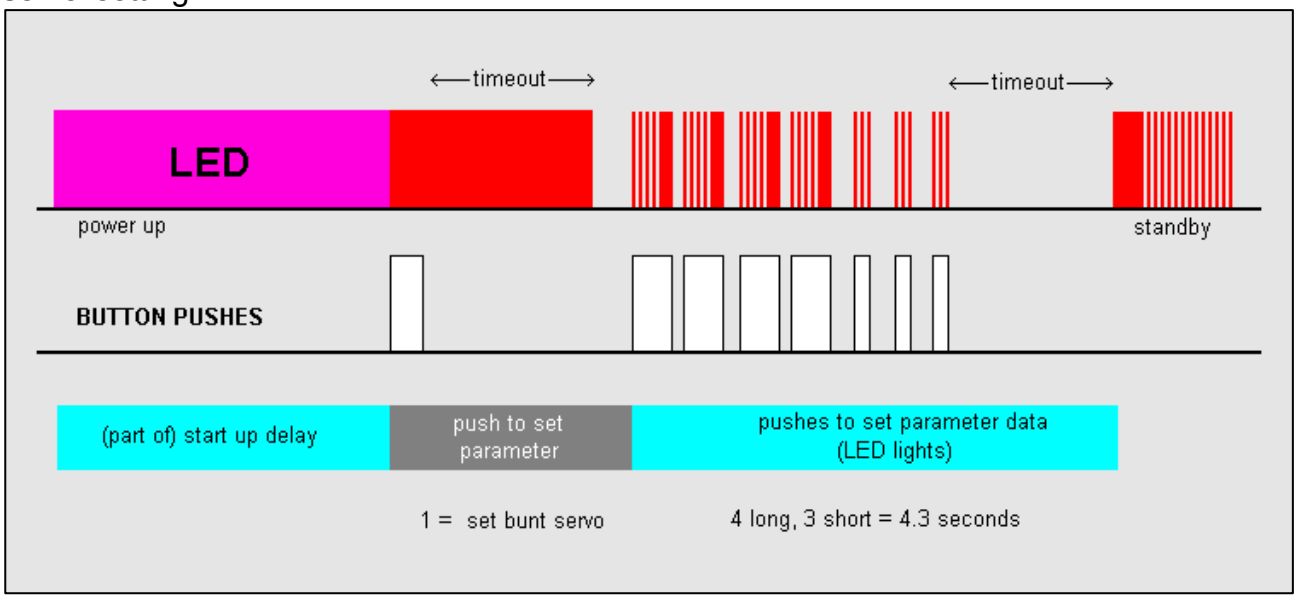
Short and long presses may be made in any order and the overall time is accumulated and stored in memory. Any presses which cause the entered period to exceed the maximum value of 20 seconds result in the period being truncated at that maximum value.

Short presses in excess of nine roll over and accumulate as seconds eg 15 presses would result in adding 1.5 seconds to the total

When data entry is complete, after a brief pause the LED verifies the settings entered by a series of flashes and then by a series of flickers as follows.

- LED flashes – units of one second
- LED flickers – units of one tenth of a second

Note that if no presses are made the current bunt servo timing remains unaltered, but the timer reports the value set in the method described above. So selecting 'set bunt servo' and waiting until the data entry timeout is a useful method of checking the current 'bunt servo' setting.



When modifying the bunt servo duration, if the user enters a duration which equals or exceeds the current DT period, then when the timer reverts to standby mode to prevent the user operating with this dangerous condition, the timer is inhibited and enters an endless loop with the LED showing permanent MAGENTA. Power must be cycled and the bunt servo or DT period altered to safe non-overlapping values.

[2] Set DT Period

Once in the DT period set-up routine, the user has the option to make a number of long or short button presses to set the duration of the DT period as follows

- long press – add one minute
- short press – add fifteen seconds

During a short press the LED flickers, but if the button continues to be held the LED then lights fully, indicating that a long press has been made. Again there is a two second timeout between pushes

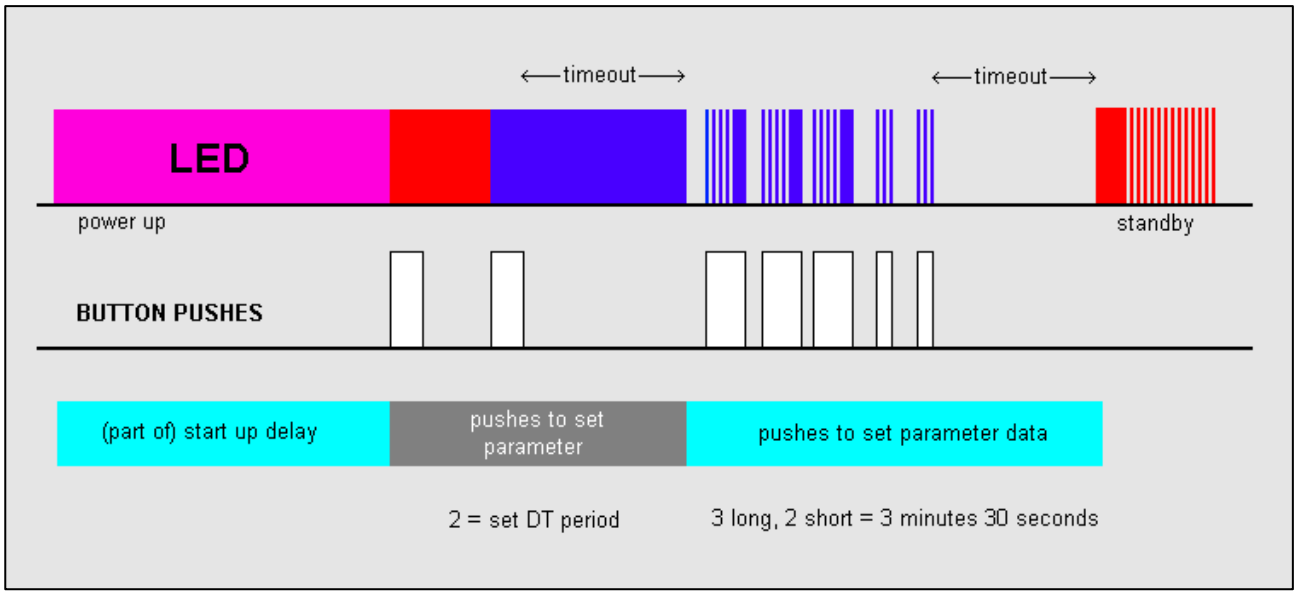
Short and long presses may be made in any order and the overall time is accumulated and stored in memory. Any presses which cause the entered period to exceed the maximum value of 10 minutes result in the period being truncated at that maximum value.

Short presses in excess of four roll over and accumulate as minutes eg six presses would result in adding one minute thirty seconds to the total

When data entry is complete, after a brief pause the LED verifies the settings entered by a series of flashes and then by a series of flickers as follows.

- LED flashes – units of one minute
- LED flickers – units of fifteen seconds

Note that if no presses are made the DT period remains unaltered, but the timer reports the value set in the method described above. So selecting ‘set DT period’ and waiting until the data entry timeout is a useful method of checking the current ‘DT period’ setting.



When modifying the DT period, if the user enters a duration which equals or is less than the bunt servo period, then when the timer reverts to standby mode to prevent the user operating with this dangerous condition, the timer is inhibited and enters and endless loop with the LED showing permanent MAGENTA. Power must be cycled and the bunt servo or DT period altered to safe non-overlapping values.

APPENDIX: MORE ABOUT RDT

There are two different types of RDT systems on the market. Some are sold as ‘stand-alone’ which means they drive the DT servo directly so cannot be interfaced to a timer.

Other RDT systems which feed a trip signal to the timer, the latter controlling the DT servo, are referred to as ‘host timer’ systems. There are a number of these ‘host timer’ systems but it has not been possible to test the timer with every single one of them. It is known to work with the Aeris and LeoBodnar ‘host timer’ systems – both of which issue negative going pulses to trip the DT and it is understood that other popular systems use similar trip protocols. So I would ask users of other systems to report their success or otherwise of using them with this timer such that RDT compatibility information can be shared with the rest of the FF community. The timer has a pullup resistor on its RDT input so that open collector or open drain devices can operate it. It can resolve a pulse as narrow as 5mSec from the Aeris – the LeoBodnar pulse is 100mSec wide.

Users should also be aware that in order to minimize power consumption (in gliders or ic powered models where the RDT receiver runs from a small single cell LiPo battery rather than from the main propulsion battery via the ESC's built in BEC) some RDT receivers go to sleep and only wake every few seconds to see if an RDT transmission is being made so there may be a delay between operating the transmitter and the receiver issuing a trip pulse.

SAFETY

The LED used is a high brightness type to ensure good visibility outdoors in bright sunlight. If the timer is operated in the workshop under poor lighting conditions avoid looking directly at the LED to avoid potential damage to your eyes.