A very simple FET timer for brushed 6/7mm pager motors

The following notes describe the construction of a very simple electronic timer for indoor free flight made from 3 major components, a FET (Field Effect Transistor), a resistor and a capacitor. This thread guides the interested, hesitant newcomer through the culture shock of an electronic discipline which many find tricky to get to terms with. …..worry ye not, this is not as difficult as you think!!

This timer has been developed extensively by Peterborough MFC over 3 years and can be made by anyone with average soldering skills. It is intended for use with a single cell LiPo giving motor run times anywhere in the range 5-55 secs. The timer has been tested with a stalled motor to 4amps, weighs 0.8gm less wires, costs less than £1 and takes 15mins to make.

The theory (you do not need to read this but it will help no end if you do make the effort)

If you apply a voltage to the Gate (G) of a FET, the Source/Drain (S/D) pins will conduct. If you put a battery and motor in this circuit , it will switch on. You get the voltage on (G) by charging or 'zapping' the capacitor with an external battery. The resistor gradually drains the capacitor until the (G) voltage dissipates. The (S/D) resistance increases and the motor switches off. By varying the magnitude of the voltage applied to the capacitor, you can vary the motor run time.

Making the FET timer

Refer to the MK1_timer graphic. Solder the capacitor and resistor to the (G) and (S) pins of the FET. The capacitor is polarised and must go brown stripe (or positive) to (G). The resistor doesn't care which way around it goes. Solder a red wire to the (D) pin (on the back of the FET) and a black wire to the(S) pin. A 10-15 Watt iron with a 1mm tip makes things easy. Maplins are a good source but check the tip before you buy and treat yourself to the finest tip you can find.
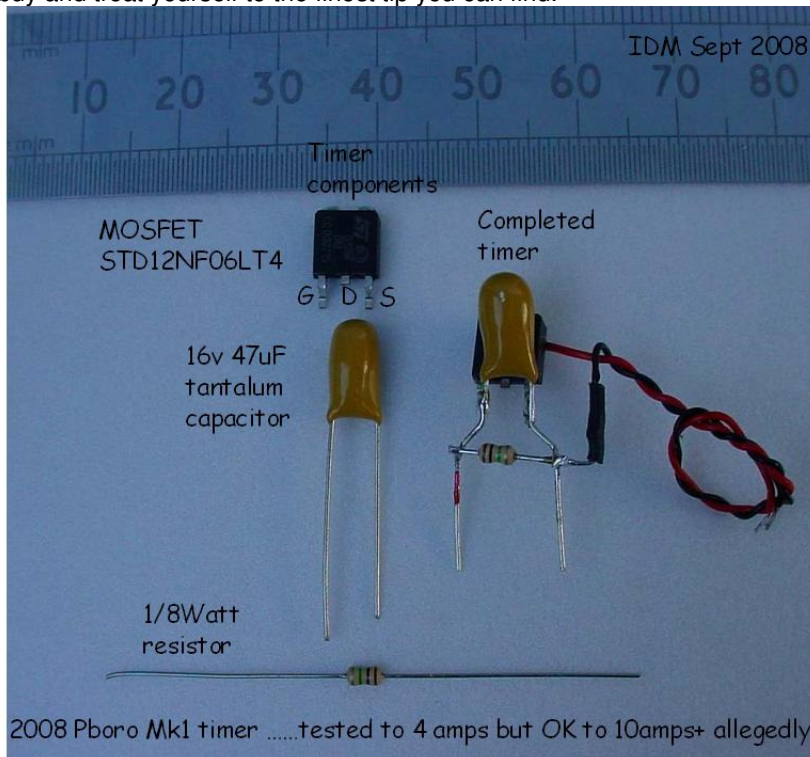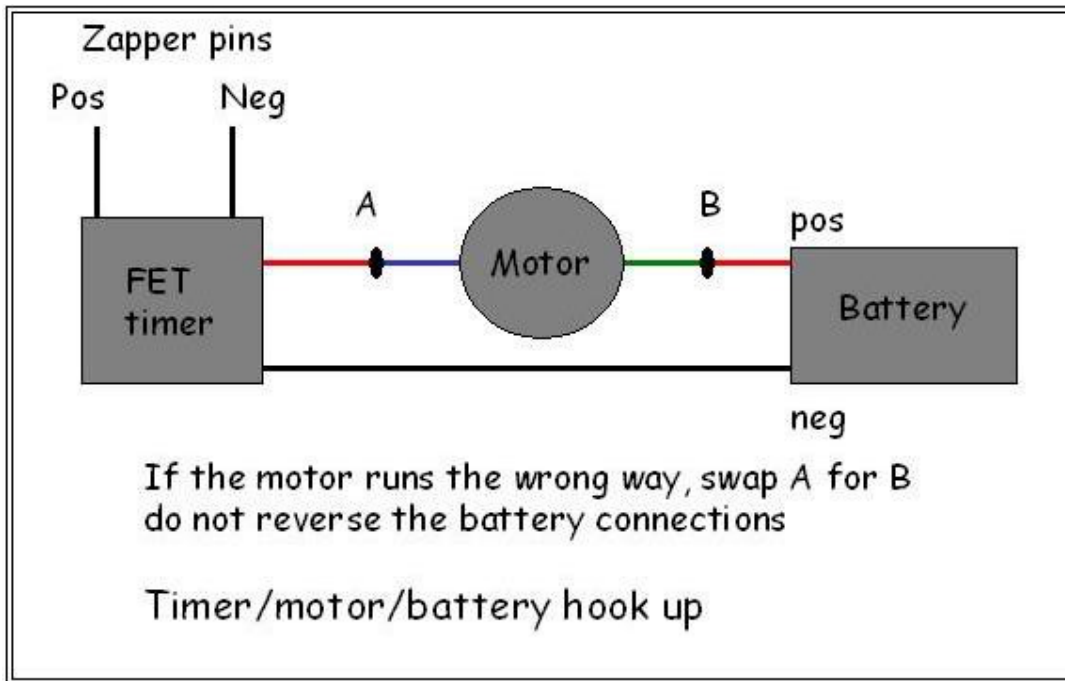

MK1 timer graphic. All the bits you will need to assemble a FET timer

Wiring it up into a motor/battery circuit

Refer to the 'FET_motor_hookup' graphic. Access the 'connectors' thread on FlyQuiet (http://www.flyquiet.co.uk/smf/index.php?topic=1332.0) and use a non polarised type 4 set up on the motor and polarised type 6 on the battery. On the first
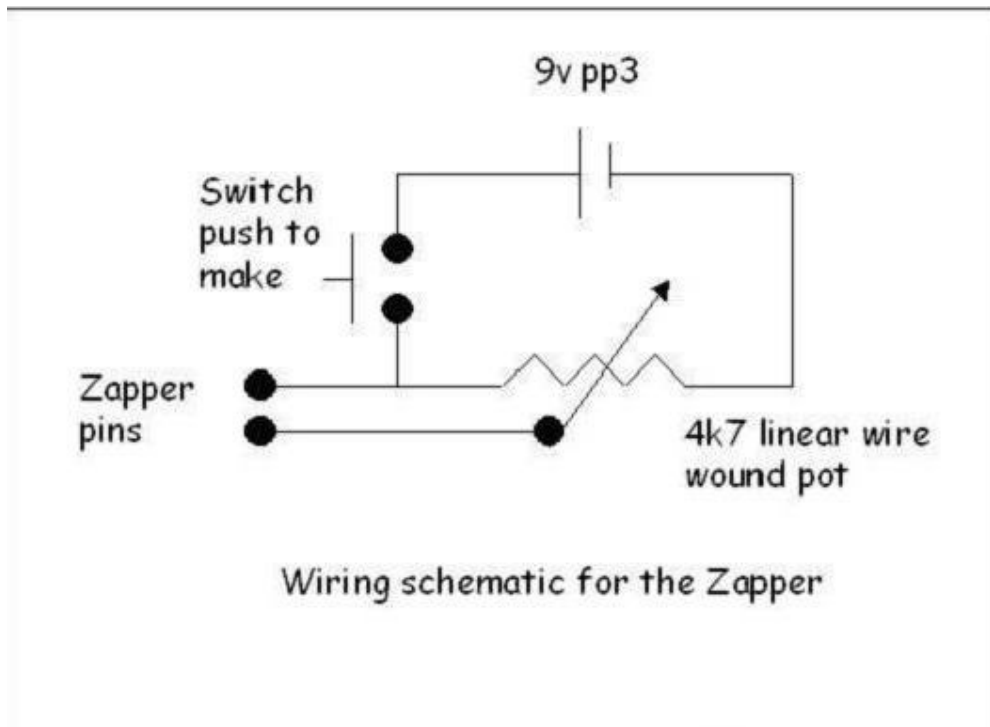
set up, the wise man builds a test rig to become familiar with the use and operation of the timer.

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Zapper pins

Pos          Neg
                                    A              B
                                                      pos
  FET                                   Motor
  timer                                            Battery

                                                      neg

  If the motor runs the wrong way, swap A for B
  do not reverse the battery connections

  Timer/motor/battery hook up
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FET_motor_hookup……….how to connect motor and battery

Making a Zapper

To vary the run time you have to have a system that varies the voltage applied to the capacitor. The PMFC use a 9v PP3 and a 4k7 wire wound linear pot to 'potential divide' the battery voltage, to say, 3.5 - 9v. A schematic circuit is shown as zapper_scem. Very easy to make as all the bits are chunky. My Zapper is shown and is very tatty having survived 3 seasons. It was made from scrap stuff so I do not have part numbers to give you. Maplins or Rapid will provide.

9v pp3

Switch
push to
make

Zapper
pins

4k7 linear wire
wound pot

Wiring schematic for the Zapper

Competition model
If found please ring
01733 380754
Reward

Aged tatty Zapper

Zapper_scem : Basically a potential dividing circuit to provide 4-9volt to the FET pins

Typical models

The timer has seen service in 15 or so models, samples of which are shown in the indoor_stuff graphic. These are 2mm Depron with tissue printed finish applied with Johnsons Klear running 6/7mm coreless pagers with 50/90/130mah 1s LiPo and PMFC FET timers......AUW ranges from 12.4 to 19.5gm. The models give about 10 30 sec motor runs before recharging ....a Didel BiCha is the PMFC preferred charger, capable of charge rates of 10-150 ma in 10 ma steps.

Indoor stuff: Some examples of what can be run with a FET timer, a 6/7mm pager motor a 1s 50-120mah LiPo and a sheet of 2mm Depron

If you doubt your ability to specify motor/battery/prop then tell me what you want to do and I can advise accordingly for both indoor and light outdoor FF stuff.

I hope these notes may help in encouraging those wanting to try electric FF to chance their arm and get stuck in as I and the Peterborough MFC will be all too willing to help out if you get stuck.

The Mk2 FET timer

This is a modification of the basic Peterborough timer and replaces the fixed 470k resistor with a variable potentiometer. Part number 67-0656 (Rapid) gives you a 1M side mount cermet pot which will provide motor run times of 5s to 130s. The disadvantage of this scheme is that it is trickier to set but you do not have to make a Zapper. All you need is a 9v pp3 battery. For those who cannot contemplate soldering, Ted Szklaruk provides a ready built timer at a small cost. Refer to the 'Contacts' section and contact Ted through the Chairman Bernie Nichols.

The Mk3 FET timer

A further variation of the FET timer is again to negate the need to make a Zapper. If you make the resistor 'pluggable' you can vary the motor run time using the resistor value as the variable. Typical motor run times for each resistor are as follows……….

| Resistor value	Rapid part no	Approx motor run time (sec)
150k	64-0052	19
270k	64-1012	34
390k	64-1014	49
470k	64-0142	59
560k	64-1016	71
680k	64-0068	86
820k	64-1018	104
1000k	64-0072	127

All you need to start the motor is a 9v pp3 battery.

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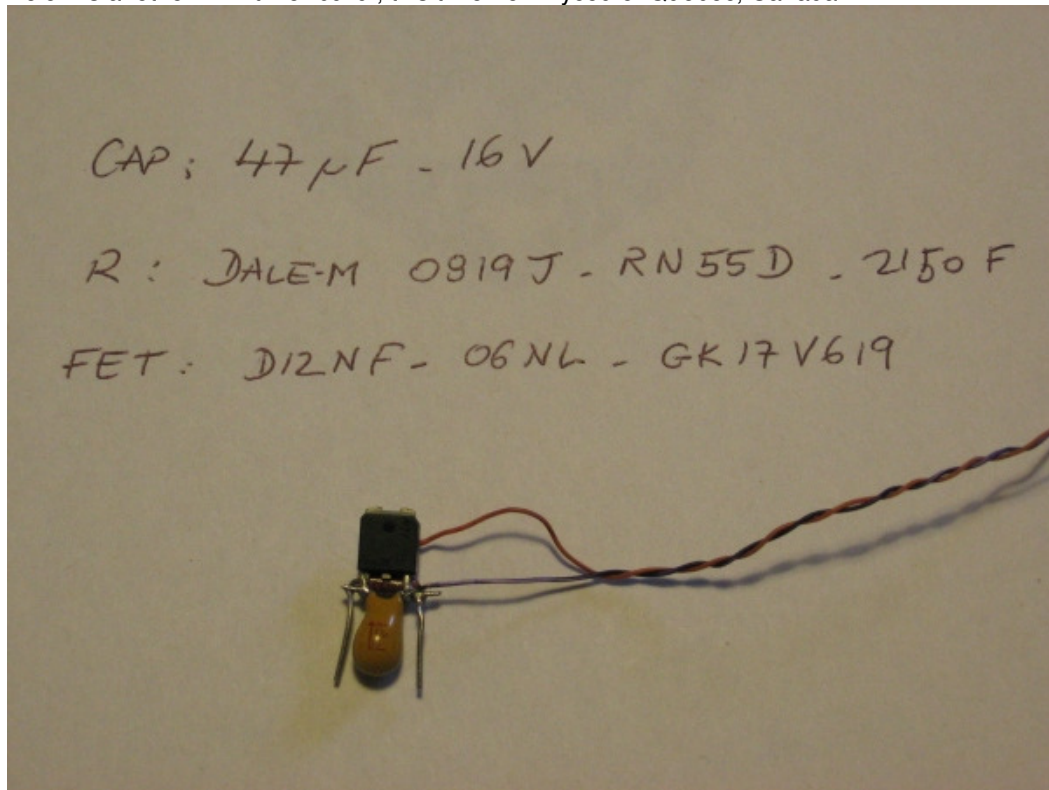A Peterborough Timer and Zapper from Dave Andreski , US

In April 2011, I received an email from Dave Andreski who had made a Peterborough FET timer and Zapper from notes in the Peterborough website 'Technical Articles/A Simple FET Timer for brushed 7/8mm pager motors'.

Dave did not have much trouble in finding the necessary components in the US and used the recommended STD12NF06L FET. A bare timer came out at 0.64gm and 0.94gm with wires. He included some photographs of his endeavours, together with an outdoor FF model, The Truant, weighing in at 33 gm ready to fly. He made a very nice job of his Zapper. I must rebuild mine someday. He did not say what motor he was using but it might be a DD 12mm can motor.

Good to know that writing projects up is of use to other modellers.
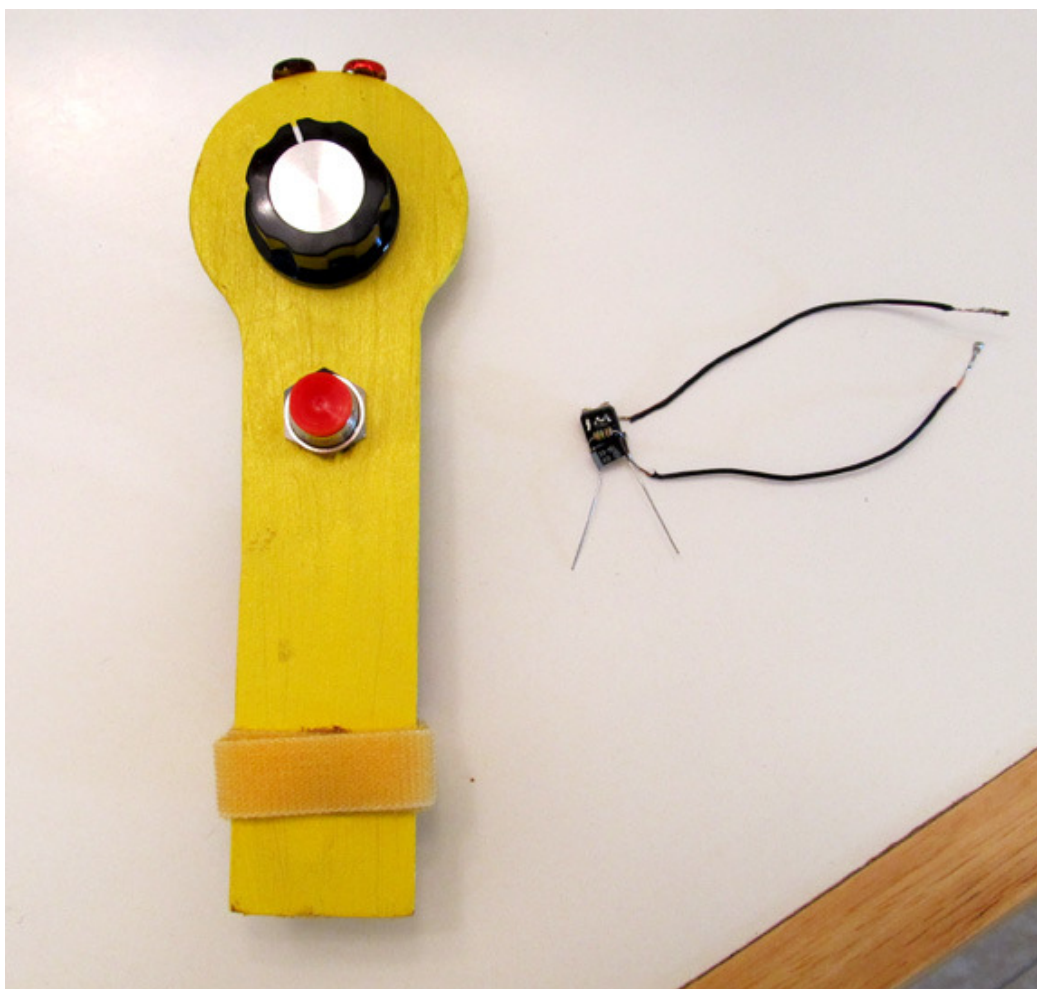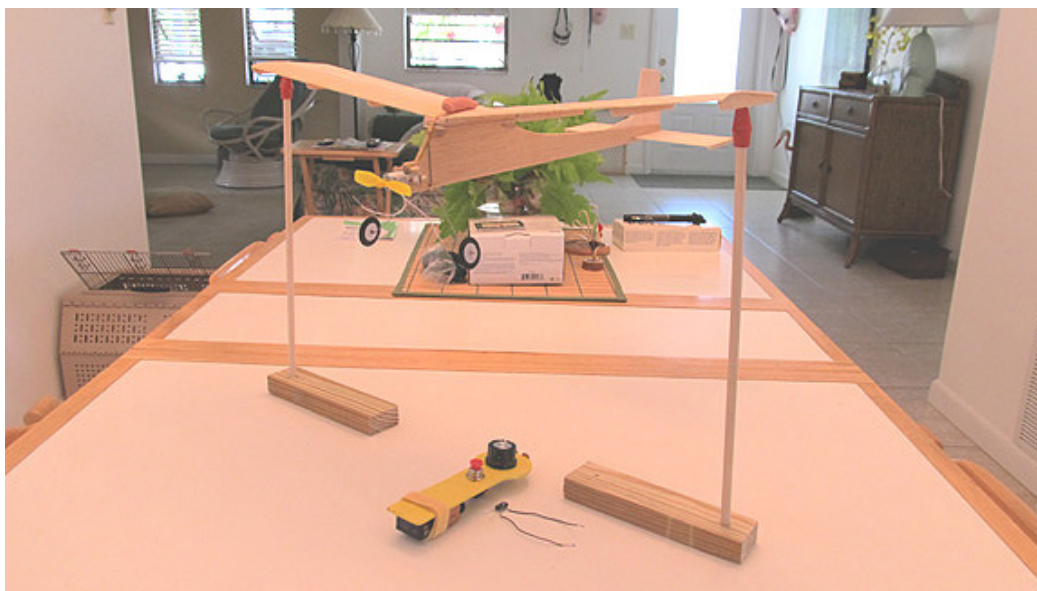
Below is another FET timer build , this time from flyced of Quebec, Canada.

CAP: 47μF - 16V

R: DALE-M 0819J - RN55D - 2150F

FET: D12NF - 06NL - GK17V619

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