Simple Test for an Smiths RVI Tacho

The smiths RVI style tacho is a common fitment in many 1970's UK classic cars. It uses a internal current loop through which passes the ignition coil current (and it is ***essential*** it is only the ignition coil current) and each interruption of the current by the points or their equivalent gives a pulse. As the RPM increases the increasing frequency of the pulse train is averaged by an electronic circuit uses a single transistor in conjunction with a saturable transformer. The circuit style is known in electronic circles as a blocking oscillator, it is very simple, and when using the saturable reactor is output reading virtually insensitive to variations in the supply voltage and only effected by the RPM

To test such a tacho the very simplest test circuit that I can dream up uses a single Field Effect Transistor (FET), a couple of resistors, one high power resistor or a stop tail bulb or similar 12V car bulb, and a traditional battery charger (one that uses a transformer and a full wave rectifier Not a modern switching type that use a Switched Mode Power Supply these supply a virtually ripple free constant current whereas for the proposed test a rectified unsmoothed DC source is required.

The basic principle uses the fact that the mains from most networks (50Hz in the UK and 60Hz in the US) is generally very carefully controlled in frequency. This fact permits a stable source of pulses to be found to permit a calibration of a Tacho.

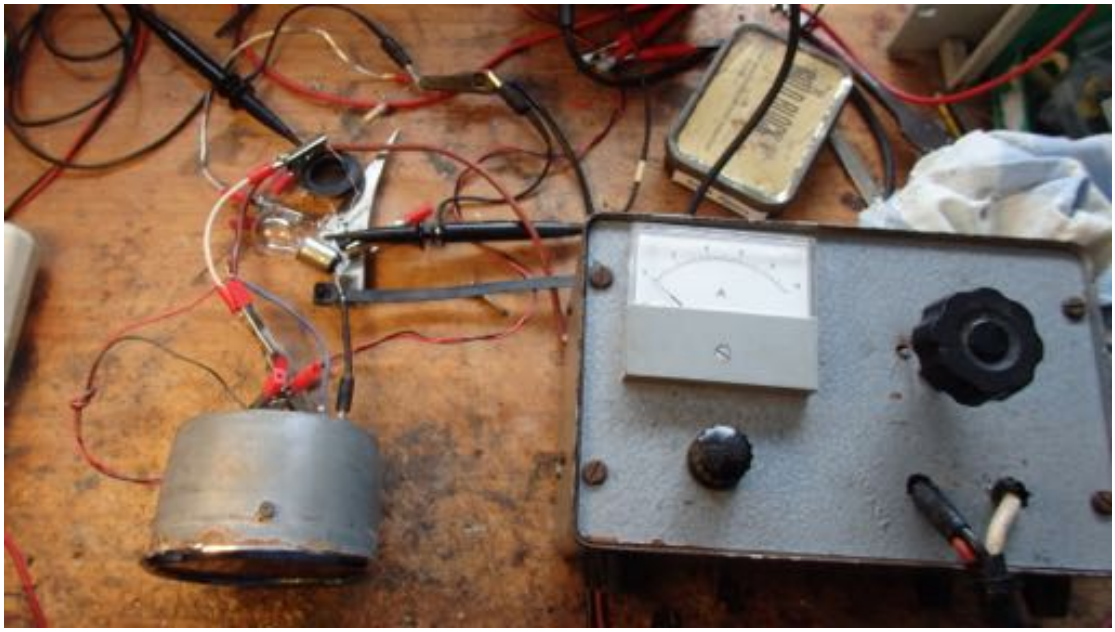
The circuit is shown attached together with some pictures of the "lashup nature" of the test set up I used. The FET is used to switch a bulb on when the pulses from the battery charger pass around 14V peak. For charging a 12V battery the peak of the rectified pulse will be around 17V to 22V. When the pulses fall below around 14V the FET turns off and the cycle repeats for each rectified pulse.

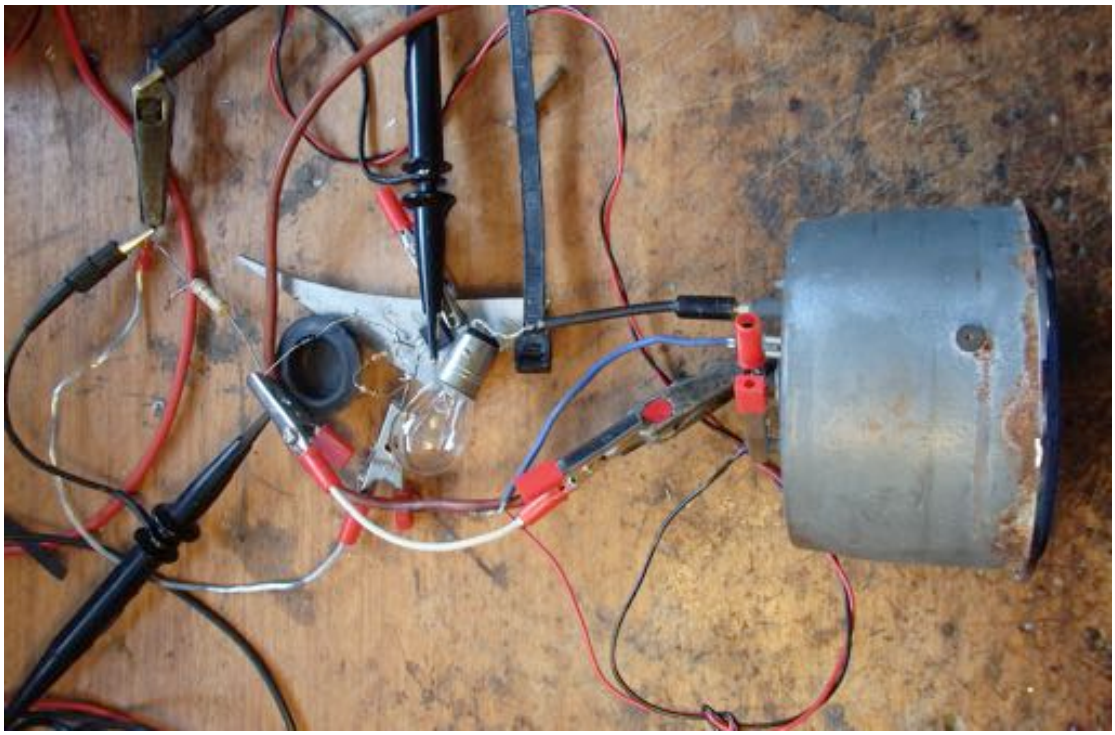
On a RVI 2417/00 (a form used I think on the MG midget) that I had lying around for 5 years or more it powered up fine to 3000rpm and was constant in displayed rpm value at any supply voltage from 11V to 15V. the current my battery charger supplied read around 1.5A (meter accuracy could be questionable)

Those with electronic experience may make mods to fit better FET driver, variable oscillator to cover a wide range of frequencies and so forth but as my bench lash up shows the perceived fiddly or delicate

nature of electronics circuits should not deter someone who is comfortable with fixing and restoring classic cars from having a go.

I would recommend that the supply for the tacho is fed via a 0.5A fuse and the battery charger output from a 2A fuse. As seen below a few croc clips and a odd off cut of ally to hold the tab of the FET to prevent it overheating. The bulb I used was a stop tail 12V 21W/6W.

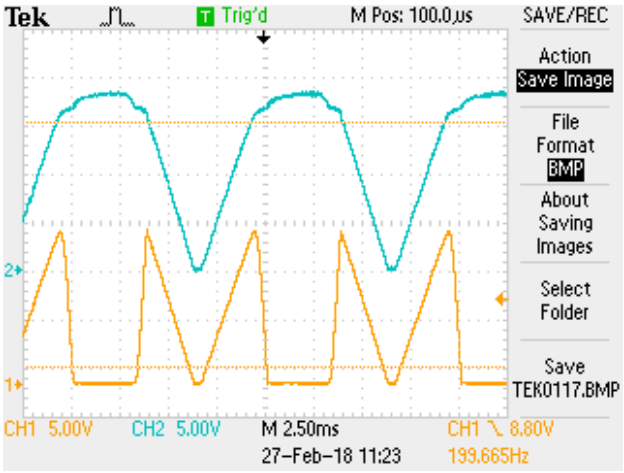




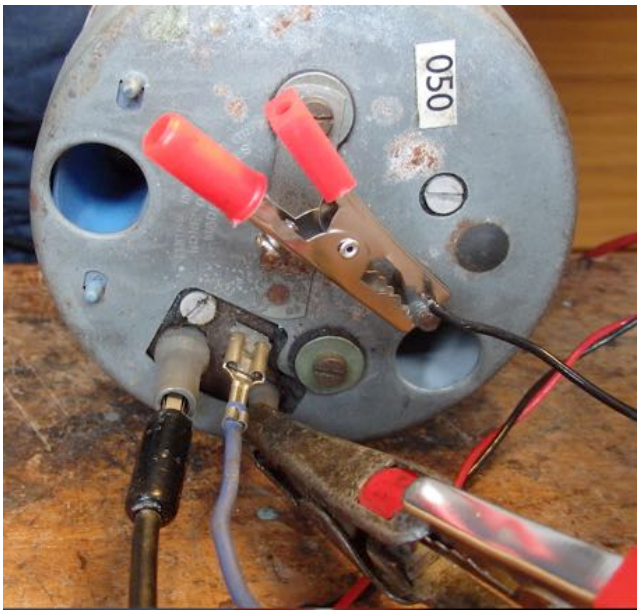
For those with electronic experience (or just interested) oscilloscope shots of the battery charger output and the FET switching action waveforms

are shown below. Note the use of the 150ohm resistor or another small bulb across the battery charger output. This is to provide a minimum steady load ensures that the waveform described below are obtained without any distortions stray capacitance effects in the set up.

The effect of stray capacitance may result the battery charger voltage not going to zero between pulses which may distort the waveforms but in practice did not alter the performance of the tacho.

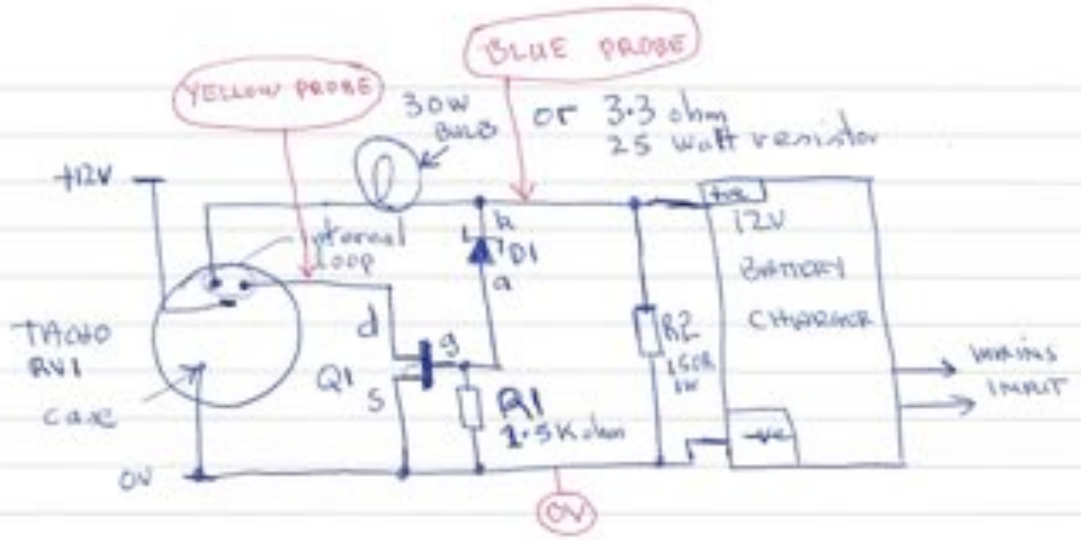


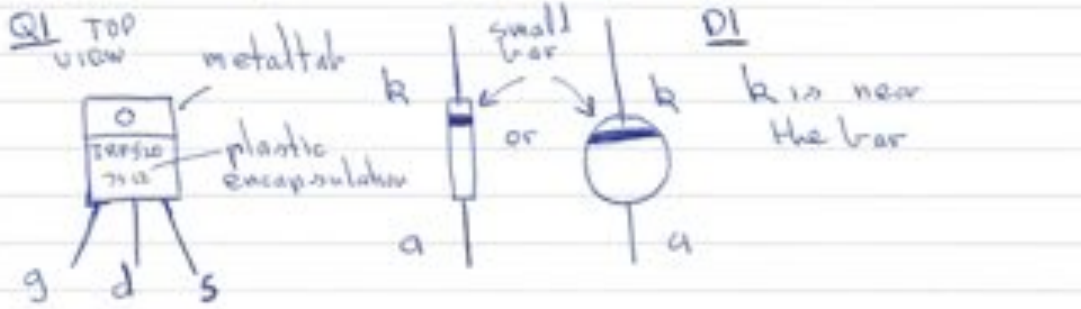
Blue shows the rectified but unsmoothed output of the battery charger. While the Yellow waveform shows FET switching waveform on the d terminal of the FET. Each waveform is 5V /division and the time base is 2.5mS/div so there is 1 pulse per 10mS or 100pps from the 50Hz mains



The connection to the RVI tacho is shown left. The positive of the battery charger output goes to the male bullit while the FET d connection goes to the female bullit these are the connections to the internal current loop.

The positive of the +12V to power the tacho goes to the ¼" spade connector with the negative of the 12V supply connects to the metal case of the tacho.





For a Tacho set up for a 4 cylinder engine with 50hz mains gives 100 pulse/sec and this is 3000 rpm

with 60hz mains gives 120 pulse/sec and this is 3600 rpm

R1 1.5K ohm (1500 ohm) 1/4 watt resistor
R2 150 ohm 1 watt (or 2/3W bulb)
D1 is a 10V regulator (or zener) diode