

# QUASAR PROJECT KIT 3163 - 12V DC XENON FLASHER (v4 PCB)

This Kit builds the circuit to trigger a high voltage xenon flashtube using a 12V DC input from a power supply. The flash rate can be varied between 1 and 2 flashes per second using an onboard potentiometer. Component changes can move the flash rate range faster or slower.

The Kit is constructed on a single-sided printed circuit board (PCB). Protel Autotrax and Schematic were used to design the board.

## ASSEMBLY INSTRUCTIONS

First check the components supplied against the Component Listing. Follow the overlay on top of the PCB. Note the orientation of the Xenon tube (red dot), the trigger coil, the electrolytic capacitors C1 and C3 and the diodes. **Two** capacitors have been supplied for C2. **You only need one of them.** See below. Do not try to install both (although this is possible and you could experiment with doing so later.)

This V4 PCB can take either a 2.2uF/630V MPE capacitor or an electrolytic capacitor. In this kit we have supplied a 33uF/350V ecap.

## CIRCUIT DESCRIPTION

There are three parts to the circuit:

- an **oscillator** centered around T1 transformer which charges the capacitor C3
- an **RC network** C2, R2 and P1 which controls the flash rate
- the **flash circuit** itself

**Oscillator.** This is a self-oscillating circuit centered around T1. Applying power turns on Q1 via current flow through R1. This causes current to flow in the primary winding of T1. The resulting magnetic field causes a voltage to be induced into the secondary winding. The polarity of this voltage (at pin 5) is such that it turns off Q1. Current stops flowing in the primary, the magnetic field collapses and the induced secondary voltage reverses polarity. This voltage now causes Q1 to turn off and the whole process repeats.

The turns ratio between the primary winding (pins 1 & 4) of T1 and the secondary winding (pins 2 & 3) is high (25turns to 600turns resp.) So the voltage induced at pin 2 is high. This alternating voltage is half-wave rectified by diode D2. This produces a DC voltage across C3 of about 300V. You can see the specification of the transformer on our website at

<http://www.quasarelectronics.com/ds.pdf>

**RC Network.** Capacitor C2 is charged at a rate determined by resistor R2 and potentiometer P1. This charging rate determines the flash rate. (more later).

**Flash Circuit.** The voltage across C2 is also applied across the sidac Q2 via pins 1 and 2 of the trigger transformer T2. When this voltage reaches about 130V (the firing voltage of the sidac) Q2 conducts and

delivers a current pulse into the trigger transformer T2 from the discharge of C3. This produces a voltage of hundreds of volts on to the surface of the flash tube. The electric field inside the tube initiates a breakdown and the tube flashes. The cycle then begins again.

When the sidac conducts it discharges C2. The current through the sidac now drops below its holding current value and the sidac returns to a high resistance value.

The sidac is a relatively new electronic component. You can get an introduction to it from our website at

<http://www.quasarelectronics.com/ds.pdf>

You will note that one of the application circuits given (Fig. 9.13) is similar to that used in this kit. The sidac can in fact be either way around.

**Flash Rate.** This is determined by the time constant of the RC network of C2, R2 and P1. The time constant is given by the equation  $T = R \times C$ .

Reducing T will reduce the charge time and increase the flash frequency rate. Conversely, increasing T will increase the charge time and reduce the flash rate.

With P1 set at maximum (1Mohm) the flash rate is about 1 per second using the 0.47uF capacitor for C2. Setting P1 to minimum (0Ω) doubles the flash rate (approx). You can experiment by changing resistor R2 and/or capacitor C2 to alter the flash rates. Increasing either value will slow down the flash rate. Decreasing the value will speed it up. We have supplied a 0.1uF/400V capacitor which you may use **in place of** the 0.47uF capacitor for C2 and so get a higher flash-rate range. **Do not put both in at the same time.** The extra capacitor is for you to experiment with to adjust the flash rate.

**Brightness.** Increasing the value of C3 say from 33uF to a higher value will increase the flash brightness.

**WARNING:** Before handling this kit please **discharge capacitor C3. This could be charged to over 300V and will give you a nasty shock if you touch it. Discharge the C3 best by shorting it with a 1K resistor.**

Note that the Trigger coil T2, and the Xenon Flash U-tube used in this kit are the same as are used in Kit 3162, our 6VDC Xenon Flasher.

We have run this kit at 15VDC. The H1061 gets a bit hot and you should attach a small heat sink to it if you run the kit in the 13V – 15VDC range.

## WHAT TO DO IF IT DOES NOT WORK

Poor soldering is the most likely reason that the circuit does not work. Check all solder joints carefully under a good light. Next check that all components are in their

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correct position on the PCB. Check that the diodes and electrolytic capacitor are the right way round. Check also transistor Q1. The metal tab should be facing away from the transformer.

See our website at

<http://www.quasarelectronics.com>

### PARTS LIST – 3163 (ecap version)

#### Resistors (1W)

620 blue red brown .....R1..... 1

1M brown black green .....R2..... 1

#### Capacitors

0.47uF/630V 474 polyester C2..... 1

0.1uF/400V 104 polyester ..C2 alternative..... 1

1uF 50V electrolytic .....C1..... 1

33uF/350V ecap or 2.2uF/630V MPE.....C3..... 1

#### Semiconductors

1N4007 .....D1,2 ..... 2

H1061 transistor, NPN.....Q1 ..... 1

K1300E70 sidac.....Q2 ..... 1

#### Miscellaneous

Potentiometer, 1M .....P1 ..... 1

Transformer EE1934.....T1 ..... 1

Trigger coil (TC35).....T2 ..... 1

Fuse holder.....FS1 ..... 1

Fuse, 1amp..... 1

Xenon U-flashtube, (U106A) ..... 1

PCB, 3163V4..... 1

