QUASAR PROJECT 3169 - VERSATILE PIC FLASHER

General Guidelines for Electronic Kits and Assembled Modules

Thank you for choosing one of our products. Please take some time to carefully read the important information below concerning use of this product. The assembly and operating instructions are on the following pages. Help with component identification can be found on our website at www.quasarelectronics.com/componentid.htm. If you are unsure about any aspect of the assembly or use of this product please contact our Support Team before proceeding.

WEEE Directive (Waste Electrical and Electronic Equipment)
Notice To All European Union Citizens. Important environmental information about this product.
The crossed out wheeled bin symbol on this product, package or documentation indicates that disposal of this product after its lifecycle could harm the environment. Do not dispose of this product (or batteries if used) as unsorted municipal waste. It should be disposed by a specialized company for recycling.
The unit should be returned to your distributor or to a local recycling service. Please respect the local environmental rules. If in doubt contact your local authorities about waste disposal rules.

Safety: General rules concerning safe use of our Kits or Modules.
To ensure your safety, please observe these safety measures. In no way are these complete. As safety requirements vary, please check with your local authorities, in order to comply with local requirements. If in doubt, seek the help of a qualified person.

Battery or wall-adaptor operated devices are safe devices. They do not require special attention unless mains voltage is connected to an output e.g. a relay.

To ensure electrical safety, and also protection from fire or personal injury, make sure your mains operated equipment complies with these safety hints:

- Use a suitable plastic enclosure. If a metal enclosure is used, make sure it is properly earthed.
- Use a power switch if the device consumes more than 10W. Use a double pole switch for mains operated, transformer-less kits.
- Mount a fuse in series with the mains switch. Use a slow blow (T) 50mA fuse for transformers up to 10W and a 100mA fuse for transformers up to 20W.
- Use a mains input connector, or a robust power cord with a clamp.
- Internal wiring carrying mains voltages must have a minimum cross-sectional area of 0.5mm^2.

If supplied, attach the power rating label near the power cord of the device and fill-out the mains voltage, frequency, power consumption and fuse values.

Troubleshooting and Support
90% of non working kits are due to poor soldering.
We operate a Get-You-Going service for non-working kits but there is a charge based on the time and components needed to complete the repair. Quite often it is not economically viable for us to repair and it is cheaper to supply a new ready made product at full cost.

Disclaimer
Quasar Electronics reserves the right to change product specifications or to discontinue products without notice. Quasar Electronics cannot be held responsible for any loss or damage, direct or indirect, which might occur from the use of a product. Quasar Electronics Kits or Modules are intended for educational and demonstration purposes only. They are not intended for use in commercial applications. If they are used in such applications the purchaser assumes all responsibility for ensuring compliance with all local laws. In addition, they are not suitable for use as or as a part of life support systems, or systems that might create a hazardous situation of any kind.

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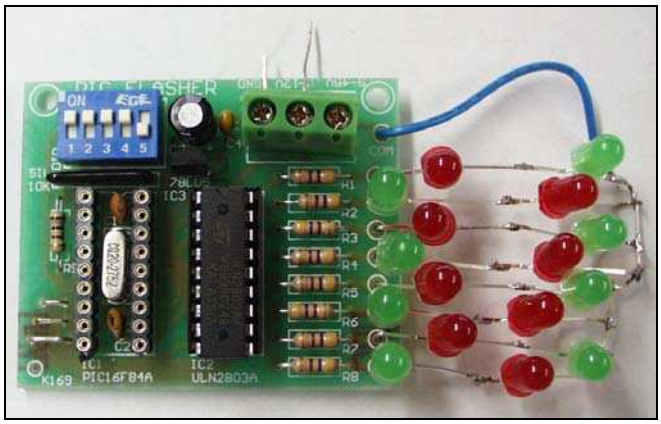
There is no doubt that micro-controllers (uC) are taking over. Almost every kit we do these days is uC based. Kits which control flashing lights have been a constant favorite for many years. So it was only to be expected that the uC's would come into this area as well and do it better and cheaper than could be done before.

This is a versatile LED or filament bulb flashing kit. As we shall see the user can add almost any number of LEDs they want to from 1 up to about 160. It was first published in the UK magazine Everyday Practical Electronics in December, 2002. We have modified the design to use a ULN2803A chip instead of all the transistor/resistor combinations which allows not only for quicker construction but even more LEDs than the original design. The PIC code is the code as supplied on the EPE website. The design and the code are used with permission from the Editor of EPE.

We have given a copy of the article with this documentation rather than copy out huge chunks of it. Compare the schematic on page 853 of the article with my schematic below and you will see how we have modified it. Please read the article for all the technical details about the kit. By adding the ULN2803A and splitting the power supplies more LEDs can be controlled by the kit. You can get a copy of the ULN2803A data sheet from:
http://www.quasarelectronics.com/ds/uln2803a.pdf



Assembly. Follow the overlay. You can see we have put the crystal and two ceramic capacitors under the 16F84A to save space. Solder these into place first. Then cut one of the 18 pin IC socket **IN HALF** at both ends and trim off the lugs. Solder the halves in IC1 around the crystal. Spread the legs of IC1 apart a little to insert in the cut halves. There are 3 links to add to the board. Use offcuts from the resistor legs for these. For testing we attached two LED's per output (one red and one green) with a 470R current limiting resistor on each output. Make sure the **cathodes** (short leg/ flat on the body) of each LED point towards the current limiting resistors and each output of the ULN2803A driver. Note the resistor network must be put in the correct way. The dot on the resnet goes in the box on the overlay of the component. On the back of the PCB we put a summary of what each DIP switch does. Read the EPE article to give you the details but once the kit is running you will quickly see what the DIP switches do.

COMPONENTS

Resistors 5%, 1/4W		
470R yellow violet brown	R1-R8	8
1K brown black red	R9	1
Resistor network 6P5R 'A' type 10K		1
Ceramic capacitors 10p	C1 C2	2
Ecap 100uF/16V	C3	1
Monoblok capacitor 0.1uF	C4	1
78L05 voltage regulator	IC3	1
ULN2803A	IC2	1
PIC16F84A programmed	IC3	1
20.47MHz Crystal	XTAL	1
5 position DIP Switch	DIP	1
Super-bright LED 5mm		8
Green LED 5mm		8
18 pin IC socket		2
3 pole terminal block		1
3169 PCB		1

As you will see from the EPE article it is for the user to arrange the LEDs in the pattern they want. For just these 16 LEDs you can jumper connect the two positive power supplies together and just apply 9V-12VDC.

How Many LEDs? Read the article on p853. Basically, 1.8V is required per LED with some left over for the current limiting resistor. At 45V supply for the ULN2803A this gives about 22 normal LEDs per output making a total of 22x8, or 176 LEDs. That should be more than enough for anyone to put together.

In this kit we have supplied 8 super bright red and 8 green LEDs with a current limiting resistor of 470R. Assemble these as in the photo. The colour photo may be downloaded from:
http://www.quasarelectronics.com/images/3000/3169_1.jpg

On the right hand side all the anodes have been commoned together and connected by a single wire to the COM pad. If any LEDs do not flash then first look to see that the flat/ cathode of that particular LED is towards the current limiting resistor and so the output of IC2 on the board. You may get the detailed specs of the supplied LEDs at
http://www.quasarelectronics.com/ds/gb-333gd.pdf

http://www.quasarelectronics.com/ds/gb-333rhd.pdf

Firmware. This is preprogrammed into the PIC16F84A. The code is straight from the EPE website. It can also be downloaded from
http://www.quasarelectronics.com/zip/3169.zip

Note that the hex file does not have the config fuses set in the code. So if you program your own chips you will have to set the Oscillator to XT, while WDT and PWRTE must both be disabled.

(Documentation: 1 April, 2003.)

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