Using modern high-power LED arrays, it's easy to make a SAFE party strobe which will give a really good display yet won't break the bank.

LED Party Strobe

Photo courtesy The Cowles Centre
Photo by Erik Saulitis
Dancer Leah Gallas

by Ross Tester
and Nicholas Vinen

The LED Party Strobe is in two parts: on the left is the power supply box which contains only the transformer and associated parts while on the right is what could be called the "head unit" with the driver electronics and the all-important 100W ultra-bright white LED array. This is housed in a LED floodlight fitting from Oatley Electronics, the same source for the LED arrays.

Many years ago, **several party strobes**, along with "industrial" types (we'll explain the difference shortly) were described in the magazines of the day – Electronics Australia and Electronics Today. They were very popular as kits, with Dick Smith Electronics, for example, selling thousands of the things.

But they were nasty beasts! (I was going to use another "b" word but the Editor wouldn't let me!).

The Xenon flashtubes they used required dangerously high DC voltages and invariably this was supplied straight from a rectifier on the mains, feeding a high voltage capacitor via a 10W resistor. That means there was about 350V DC or so on the (usually exposed) wires of the flashtube, ready to bite unsuspecting users. Talk about an accident waiting to happen; and they did!

Sure, the magazines described perspex covers to try to keep them a bit safer but the vast majority were built with that part conveniently left off. So after some time, the kits became unavailable – mainly on safety grounds but also, to some degree, because the psychedelic age had passed and strobes were a little passé.

Which was probably just as well, as another generation might have discovered them and discovered (the hard way) just how lethal they could be.

In recent years, though, party lighting has had something of a resurgence, if for no other reason than it is now significantly cheaper than it used to be (did someone mention China?).

By and large, though, party strobes still used those high-voltage xenon tubes. For a short, bright flash, there's nothing better. And yes, you can still buy Xenon flashtubes, although the really high power types seem to have all but disappeared.

Something safer?

But we wondered whether we could come up with a much safer and possibly cheaper alternative. You'd have noticed the proliferation of very bright LED arrays recently. Could they, would they be suitable?

But what is a strobe?

OK, we've got a bit ahead of ourselves here because many readers might not even know what a strobe is!

Originally developed for serious industrial and educational use, stroboscopes (to give them their proper name) are devices which use a very short but accurately repeated flash of light to "stop action" on (mainly) rotating objects.

They do this by synchronising the timing of the pulses so that the rotating object, eg, a fan blade, is always at the same point in its rotation as the flash occurs. With subdued lighting around the object, that flash simply highlights the object so that it appears to be stationary.

Human "persistence of vision" takes care of the rest – the eyes and brain "fill in the gaps" between each flash so that it appears you are seeing a continuous image.

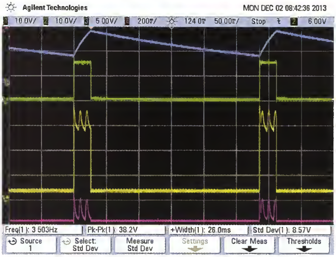
That in itself can be dangerous: many a finger has been sliced when someone who didn't understand what was happening has poked said digit into a rotating fan!

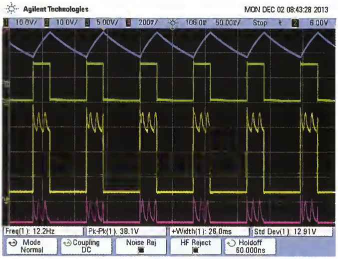
By and large, these "strobes" were relatively low power affairs; after all, you didn't want a blinding flash, you just needed enough to illuminate the subject. The frequency of operation ranged from quite slow to very fast – if the subject was spinning very fast, you needed to be able to match its speed to "stop" it.

If you varied the speed of the strobe a little away from synchronisation, you could make the object appear to be rotating forward, or backward. At half or double the speed, the object appeared to stop rotating again.

It's a similar effect to the backward-rotating wagon wheels in wild west movies, except that here the strobing occurs due to the "stop action" of the movie camera.

As mentioned above, for many years, strobes were made using small, U-shaped Xenon flash tubes, typically rated at 0.5 Joules. These have an operating voltage of 200-400V





These two scope graps show various waveforms at minimum (left – about 3.5Hz) and maximum (right – about 12Hz) flash rates. The pulse width itself remains constant at about 25ms. The top (blue) trace shows the 7555 timing capacitor charging and discharging (pin 2/6), while the green trace is the corresponding Mosfet gate voltage. The yellow trace is the voltage across the LED array itself (the sawtooth waveform on top is 100Hz ripple from the power supply). Finally, the pink trace shows the actual light output of the LED array, as seen by a phototransistor. Note that the light output exactly follows the 100Hz modulation of the power supply.

DC but require a "striking voltage" many times higher – perhaps 3-4kV and often more.

Simply connecting one of these tubes across a voltage source did nothing, that is, until the high voltage trigger pulse was applied. Then they would instantly discharge the voltage source (usually a capacitor) resulting in a bright flash of light as the Xenon in the tube ionised.

The trigger voltage was provided by a special high voltage transformer which in turn received its pulses from some form of oscillator. It was possible (indeed quite usual in party strobes) that this was very simple indeed, with as few as half a dozen parts. It was only when high precision was needed (eg, in an industrial situation where the strobe was also used to measure RPM) that a more accurate oscillator was employed.

The advantage of Xenon tubes was that the flash of light they gave, while intense, was very brief – somewhere between a few nanoseconds and a few milliseconds – dependent on how long it took for the storage capacitor to discharge through the tube.

Once discharged, the current stopped, the gas de-ionised and the tube instantly stopped glowing. The capacitor recharged, the transformer triggered the tube and this repeated while ever power was applied.

Strobes were also used in photography. Again, first of all for industrial applications but also to capture action, for example in nature, that would otherwise be impossible to see. Strobes became more powerful and more portable. The brighter the strobe flash, the better the photographic image.

Somewhere along the line, someone (probably a university student!) realised that in a darkened room, a slow-running strobe also "froze action" of a moving person. And this was never more evidenced than when that person happened to be wildly gyrating – some call it dancing.

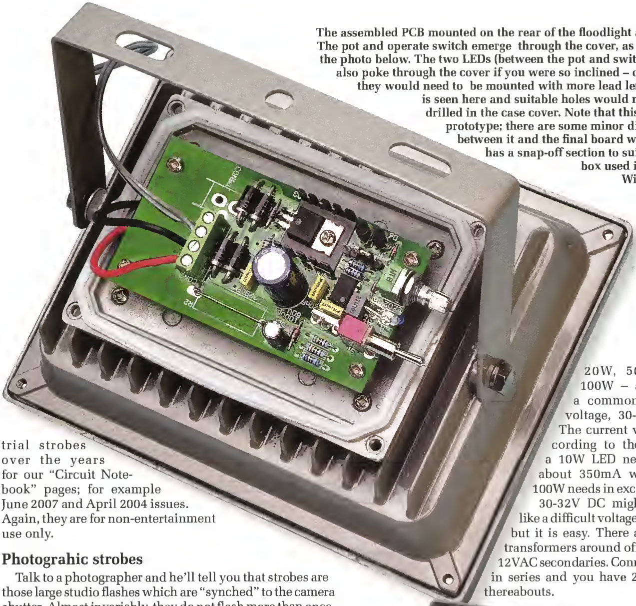
So the industrial strobe was beefed up in power and slowed right down – experimentation showed that flash rates between about five and ten flashes per second were ideal. Any slower and the images were too unrealistic and grotesque; too fast, and the action became almost like it had a continuous light shone on it.

There was a downside, however – at certain flash rates, strobes were found to induce epileptic fits in those predisposed to them (see warning panel).

With the advent of ultra-bright LEDs, some industrial stroboscopes were made using them – and in fact SILICON CHIP described such a strobe in the August 2008 issue. However, it's definitely not for party use – while bright, the white LEDs used are nowhere near bright enough to light a scene.

Several readers have also submitted LED-based indus-

Here's the Power Supply box, shown from the back with the mains input (fused IEC connector) on the left and the 24VAC output socket on the right. The power switch is on the front.



The assembled PCB mounted on the rear of the floodlight assembly. The pot and operate switch emerge through the cover, as shown in the photo below. The two LEDs (between the pot and switch) could also poke through the cover if you were so inclined – obviously, they would need to be mounted with more lead length than is seen here and suitable holes would need to be drilled in the case cover. Note that this PCB is a prototype; there are some minor differences between it and the final board which now has a snap-off section to suit the jiffy box used in the Hot Wire Cutter.

trial strobes over the years for our "Circuit Notebook" pages; for example June 2007 and April 2004 issues. Again, they are for non-entertainment use only.

Photograhic strobes

Talk to a photographer and he'll tell you that strobes are those large studio flashes which are "synched" to the camera shutter. Almost invariably, they do not flash more than once. If you want second and subsequent flashes, you must fire the camera again.

These are NOT the type of strobes we are talking about here – in fact, describing a studio flash as a strobe is a corruption of the word because strobing, the effect, implies movement/rotation. By the way, the word comes from the Greek "strobos" meaning act of whirling.

Using ultra-bright LEDs

Readers will recall two LED array floodlights published in SILICON CHIP. A 10W model was described in February 2012 and a 20W in November of the same year. At the time, we marvelled at how bright these new LED arrays were. But a year is a long time in electronics and now 50W and 100W LED arrays are becoming quite common.

Power

The LED arrays which we tried for this project – 10W, 20W, 50W and 100W – all share a common supply voltage, 30-32V DC. The current varies according to the power; a 10W LED needs only about 350mA while the 100W needs in excess of 3A.

30-32V DC might sound like a difficult voltage to obtain but it is easy. There are many transformers around offering 2 x 12VAC secondaries. Connect them in series and you have 24VAC or thereabouts.

And here's a side-on shot of the business end. The PCB, containing all the driving circuitry, is in the box on top with the speed pot and "operate" switch emerging from the end.

If you remember your bridge rectifier theory, the open circuit (ie, peak) DC output equals AC input voltage, multiplied by 1.414 (the square root of 2), less the voltage drop across the pair of diodes in the bridge (theoretically about 0.6V each or 1.2V) but probably a little more, especially at 1A or so). Let's call it about 2V.

Putting that into a formula, we get (24V – 2V) x 1.414 = 31V!

We can convert that to a reasonably steady DC (the LED will still be happy if it's not perfectly smooth) by placing an electrolytic capacitor across the output and end up with something around 31 or 32V DC.

By the way, if you wanted to make a 100W LED floodlight using one of these LED arrays and this transformer, that is precisely what you'd do.

Making it flash

So we have a high power LED and we have a suitable DC power supply – making it flash should be dead easy, right? Well it is, but . . .

As we mentioned above, getting the flash on-period right is just as important as getting the flash frequency.

Just to reiterate, the frequency is the number of times it flashes per second; the on-period is the length of time the LED is actually turned on.

So we needed a circuit which could adjust both of these paramteters – at least during setup (the frequency should be externally adjustable).

As we mentioned earlier, because it's for entertainment use, it doesn't have to be super accurate.

Beat triggering

In the past, we've seen some strobes which offered "beat triggering" to music – basically a cross between a strobe and a Musicolor.

To be frank, we could never quite see the point – one of the features of a strobe is its consistency of flash, which beat triggering effectively defeats. So we left this one well alone.

If you want something that flashes lights in time with music, build one of the Musicolor projects we've featured! (DSP Musicolor, June-August 2008; LED Musicolor, October-November 2012 and even the Digital Lighting Controller, October 2010).

Believe it or not, the DSP Musicolor also features a "strobe" mode, which can trigger with the beat or trigger by itself but the effect is not as good us-

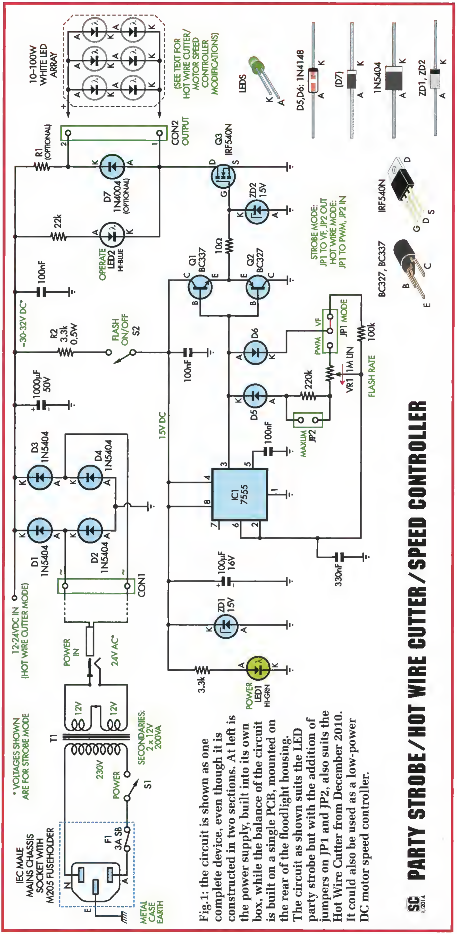


Fig.1: the circuit is shown as one complete device, even though it is constructed in two sections. At left is the power supply, built into its own box, while the balance of the circuit is built on a single PCB, mounted on the rear of the floodlight housing. The circuit as shown suits the LED party strobe but with the addition of jumpers on JP1 and JP2, also suits the Hot Wire Cutter from December 2010. It could also be used as a low-power DC motor speed controller.

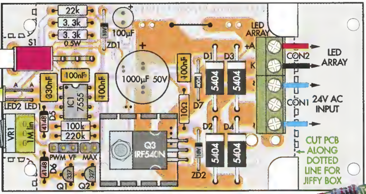
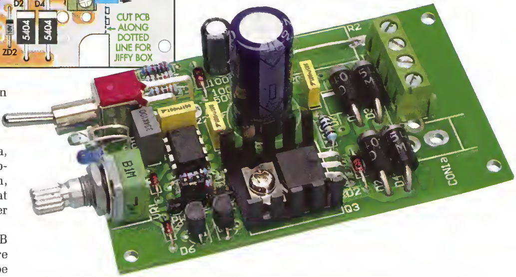


Fig.2: the PCB component overlay. The board may be used as shown for the LED Party Strobe or cut along the dotted line to suit the Jiffy Box used in the Hot Wire Cutter. The photo below is of an early prototype; there are a few minor changes to the final board shown at left, which now has a snap-off section.



ing incandescent bulbs with their even longer filament persistence.

We already have a circuit!

While experimenting with this idea, we recalled an earlier SILICON CHIP project which, with a slight modification, could do exactly what we wanted. That was for our Hot Wire Cutter Controller (December 2010).

We could then make a single PCB which could be used as a Hot Wire Cutter controller OR as a LED Strobe flasher (and even a DC motor speed controller if you wished!).

The circuit is shown in Fig.1.

How it works (strobe mode)

The two 12VAC secondaries of transformer T1 connect in series to Con1 which results in 24VAC being applied to the bridge rectifier (D1-D4). The resultant pulsating DC is smoothed with the 1000µF capacitor following, so a relatively smooth 31V DC supply rail is permanently available for the LED array.

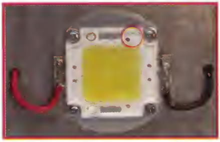
Because the 7555 has a maximum supply voltage of 18V, a low-voltage (15V DC) rail is provided via the 3.3kΩ resistor, 15V zener diode ZD1 and the 100µF electrolytic capacitor following. LED1 shows that power is applied.

A 7555 (CMOS version of the ubiquitous 555 timer) is the heart of the circuit but its connections are a little unusual. Normally pin 7 (discharge) is connected to the supply via a suitable resistor or pot and this is then connected to pins 2 and 6, which in turn connect to the timing capacitor.

In our case, pin 7 is not connected while pins 2 and 6, with the timing capacitor, are connected to the output (pin 3) via potentiometer VR1 and diodes D5 and D6.

The timing capacitor is initially discharged so the 7555 output will be high. Ignoring Q1 and Q2 for a moment, the capacitor starts to charge via D6 at a rate set by the 100kΩ resistor. When its voltage reaches 2/3 of the supply voltage, threshold input pin 6 detects this and sends the output low. This in turn discharges the capacitor via the potentiometer and D5. When its voltage reaches 1/3 supply, pin 2 (the trigger) forces the output high again and the whole process continues.

Due to the combination of VR1 and the 100kΩ and 220kΩ resistors, D5 and D6 cause an unequal charge/discharge rate so that the output high time is very much shorter than the output low time. When the output is high, transistor Q1 turns on, charging the gate of Mosfet Q3 and causing it to turn on, in turn, briefly lighting the LED array (and LED2). As soon as the output goes low, Q2 turns on, discharging the gate of the Mosfet ensuring it is fully turned off.



The LED array mounted on the floodlight housing. Ringed in red – and very hard to see even in good lighting – is the "+" symbol (anode). It's a bit misleading because this is not closest to the LED anode but this is the way it goes: the red wire is the anode, the black wire the cathode.

We neglected to mention the power switch S1: because the LED array (or hot wire element) is totally under the control of the circuit, there's no need to provide a high-current power switch.

S1 switches power to the oscillator/Mosfet and when it's off, it's off! However, there may be times when you want to "remotely control" the strobe, say when it is mounted up high for best effect and the supply is down low.

For this reason, we have shown a mains-rated switch on the transformer primary – if you don't think you need this (eg, you can turn it on and off at a power point), simply wire the transformer direct to the IEC socket.

How it works (hot wire cutter/ speed controller mode):

When JP2 is inserted and JP1 is moved to the left side of its header set, rather than controlling the frequency, VR1 adjusts the duty cycle while the frequency remains fixed. That's because as the wiper of VR1 moves, it increases the on-time by the same amount that it decreases the off-time (or vice versa).

This is more suitable for the hot wire cutter and can also be used as a low-voltage DC motor speed controller, such as featured in November 2008 and

November 2010. Therefore the one PCB can serve a number of purposes.

We should point out that the low operating frequency would give quite a "pulsy" operation if used for either alternative application but if this is easily fixed by reducing the value of the capacitor on pins 2 & 6 of IC1 (to, say, 10nF).

Construction

We decided to use the same floodlight housing/reflector assembly which we used for the 20W LED floodlight project. Both of these are available from Oatley Electronics, along with a 12V+12V 200W toroidal transformer which is perfect for the job. The housing we used suits the 20W, 50W and 100W LED arrays.

The advantage of the floodlight housing is that the front is pre-drilled to take the LED array and the back end has four mounting pillars perfect for mounting the PCB.

With the exception of the mains components and transformer, which we'll get to in a moment, all components (apart from the LED array) are mounted on a single PCB, coded 16101141 and measuring 95 x 49.5mm.

Because we made the PCB suitable for either the Party Strobe or the Hot Wire Cutter (which has a slightly smaller zippy box) the board has a snap-off section. Left intact, the mounting holes to suit the floodlight housing; with the section removed, it fits in a zippy box.

Start assembly with the controller PCB. First are the small resistors – there are only five to mount, then the larger 0.5W 3.3kΩ resistor. The resistor shown as R1 on the circuit and PCB overlay can be replaced with a wire link for the Strobe.

Next are the the eight diodes (watch both their polarity and type – the two smaller diodes are zeners) and then the five capacitors (watch the electrolytic polarity).

We solder the indicator LEDs directly to the PCB because they are really only needed during setup.

Because the LED array is so bright, it makes sense to leave it disconnected until the very last thing (otherwise the blinding flash will . . . blind you!) and the power LED is somewhat redundant once the Party Strobe is completed because you know it's working by the LED array flashing! Make sure the LED anodes (longer lead) go into the holes marked "A".

If you wished, you could have these LEDs emerge from the case by leaving extra long leads and drilling suitable holes in the case.

Both of these components were included more for the Hot Wire Cutter application because you cannot normally see any operation (and you don't really want to test that it's on by touching the wire!).

The last components to be placed before the hardware are transistors Q1 & Q2, Mosfet Q3 and IC1, the 7555 timer.

The Mosfet is mounted on a U-shaped heatsink, itself held in place by the Mosfet mounting screw. Place the Mosfet in position with the gate, drain and source in their appropriate holes (G, D and S) but don't solder them yet. Bend the Mosfet down 90°so that its hole lines up with the hole in the PCB. Slip the heatsink under it and place an M3, 6mm screw through the Mosfet, heatsink and PCB and secure with a nut on the PCB side. Now you can solder the legs in position.

There are arguments for and against using a socket for the 7555 timer – we prefer to solder them directly in place. Either way, ensure the chip or socket is mounted with its notch towards the top.

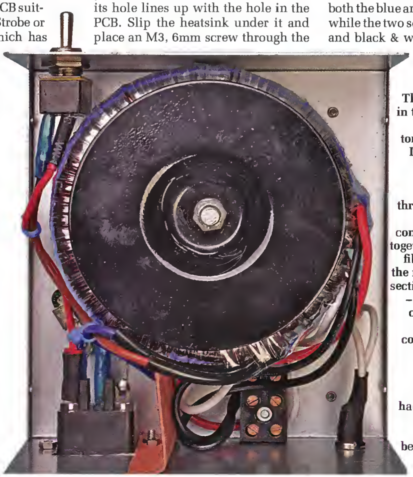
Finally, mount the hardware (two header pin assemblies, two terminal blocks, DC input socket [if needed], power switch and speed potentiometer). The pot mounts side-on to the PCB so its shaft can emerge through the side of the floodlight housing or jiffy box.

Housing and wiring the transformer

For both convenience and safety, the transformer needs to be mounted in some form of sturdy box or case. The specified transformer measures 110mm (diam) x 50mm high, so the case will need to be at least that big.

We used a small folded aluminium case from Jaycar (Cat HB5444) which has plenty of room for the transformer, IEC input socket, switch and fuseholder.

The Oatley transformer comes with 4.8mm female spade connectors for both the blue and brown primary wires while the two secondaries (red & black, and black & white wires), each have



There's not a lot of room in the Power Supply Box. It houses the 12V+12V toroidal transformer, the IEC mains input socket (with fuse-holder), the 2.5mm output socket, power switch and the three-way terminal block (the middle terminals connect the two windings together). Note the sheet of fibre insulation between the mains and low voltage sections plus the cable ties – just in case something comes loose. And all of the "bitey bits" are covered with heatshrink tubing (along with the exposed 24V output socket) – again, just in case. Incidentally, we had to cut the end off the transformer mounting bolt to allow it to fit below the top of the box.

6.5mm spade connectors.

Probably the easiest and safest way to connect the transformer is to mount a chassis-mounting IEC male connector in the box, because it has 4.8mm spade lugs on the back.

The type we used has an integrated fuseholder, even though the transformer has a self-resetting thermal fuse, a supply of this type could do quite a bit of damage before that fuse trips.

We secured a 70 x 40mm L-shaped piece of fibre insulation under one of the IEC socket nuts to act as a barrier between the mains and low voltage sections of the supply.

Second power switch

As we mentioned earlier, a power switch is not really needed on the transformer box but it could be handy if you want to mount the Party Strobe up high and run it from the power supply down low. So we fitted a mains-rated power switch as well.

It is essential that the metal box is earthed back to the mains earth (ie, via the 4.8mm male earth lug on the IEC connector). The earth wire must securely connect to the case via a crimped lug held in place by a suitable screw, nut and shakeproof washer.

Even if mounted in a plastic box, the main bolt holding the transformer in place must be similarly earthed because this bolt can be touched from outside the box.

It was easiest to cut the spade connectors off the secondary wires and secure them in a terminal block. The secondaries are connected in series – the two black wires are joined (but don't connect to anything else) while the 24VAC is taken from the red and white wires.

Because we are only dealing with low voltage and reasonably low current, the cable from the power supply box to the Party Strobe itself could be figure-8 or a similar gauge 2-wire lead. Length shouldn't be a major problem – we'd suggest 10m or so should be fine.

Note that we have a 2-way terminal block for AC input on our prototype but the final version has a 3-way terminal with the centre unused, so you can join the transformer secondaries here if you wish.

Do not be tempted to use mains lead (ie, brown, blue and green/yellow) for the inter-connection – mains lead should be used for mains and nothing else.

Parts list – LED Party Strobe

1 double-sided PCB, coded 16101141, 95 x 49.5mm
1 SPDT PCB-mount right-angle toggle switch (S1) (eg, Altronics S1320)
1 medium sized LED floodlight housing (Oatley Electronics).
1 3-way terminal block (CON1)
1 2-way terminal block (CON2)
1 PCB-mount DC socket (optional; replaces CON1)
1 3-way pin header (JP1) with 2-pin shorting block
1 2-way pin header (JP2) with 2-pin shorting block
1 6073B-style heatsink
4 M3 x 6mm machine screws and nuts
1 short length tinned copper wire
1 knob to suit VR1

Semiconductors
1 7555 CMOS timer (IC1)
1 BC337 NPN transistor (Q1)
1 BC327 PNP transistor (Q2)
1 IRF540N Mosfet (Q3)
1 high-brightness white LED array, 20-100W (eg Oatley Electronics 100W)
1 3mm green high-brightness LED (LED1)
1 3mm blue LED (LED2)
4 1N5404 3A diodes (D1-D4)
2 1N4148 signal diodes (D5,D6)
1 1N4004 1A diode (D7) (optional, for motor speed control)
2 15V 1W Zener diodes (ZD1,ZD2)

Capacitors
1 1000µF 50V electrolytic
1 100µF 25V electrolytic
1 330nF MKT *(code 334, 330n or 0.33µF)*
3 100nF MKT *(code 104, 100n or 0.1µF)*

Resistors (0.25W, 1% unless otherwise stated)
1 220kΩ *(code red red yellow brown or red red black orange brown)*
1 100kΩ *(code brown black yellow brown or brown black black orange brown)*
1 22kΩ *(code red red orange brown or red red black red brown)*
2 3.3kΩ 0.5W *(code orange orange red brown or orange orange black brown brown)*
1 10Ω *(code brown black black brown or brown black black gold brown)*
1 1MΩ linear 9mm potentiometer (VR1)

Power Supply box

1 200VA toroidal transformer, secondaries 12V + 12V with mounting hardware
1 aluminium or steel box, at least 120 x 150 x 60mm (eg Jaycar HB-5444)
1 IEC mains lead
1 IEC male chassis-mounting mains socket with integrated M205 fuseholder
1 2A M205 slow-blow fuse
1 3-way terminal block
1 mains-rated panel mounting SPST power switch, min 3A contacts
1 2.5mm DC power socket, chassis-mounting
1 2.5mm DC power plug
1 length (to suit) figure-8 or other 2-wire cable (supply to strobe head)
1 100mm length heavy duty hookup wire fitted with 4.8mm insulated female spade connectors
1 50mm length earth wire (green or green/gold) fitted with 4.8mm female spade connector one end and 5mm crimped earth lug (box earth lead) the other
1 M4 x 20mm screw with two nuts and star washer (box earth)
3 M3 x 10mm screws with nuts
1 70 x 40mm fibre insulation sheet (eg Elephantide) bent into "L" shape
2 cable ties (to secure mains wiring)
Heatshrink tube scraps to cover the "bitey bits"

Warning: Possible Epilepsy Trigger

Back in the early days of strobes, considerable research was undertaken when it was found that some people suffered epileptic episodes with flashing lights.

It's called photosensitive epilepsy.

Usually, the people affected were those who had some pre-disposition to epilepsy. Unfortunately, some had no idea that they were in the danger group. Fortunately, these days much more is known about the disorder and most people are on some form of drug regimen to control attacks.

Not all people suffering from epilepsy will suffer photosensitive epilepsy – apparently, it's only about one in twenty or even less.

And it's not just strobe lights which cause it: back in 1997, the game "Pokemon" caused a sudden spike in episodes when they brought out a game which flashed! It can also be caused by many other forms of repititon – even driving past a paling fence, for instance!

Most people in the danger group will already know about it and make sure they don't subject themselves to triggers. Tightly shutting and covering the eyes is a good "first line of defence".

But when using the LED Party Strobe, if you find that anyone suffers from either an epileptic episode, or partially or completely feints, feels disoriented, giddy or generally unwell, turn the strobe off and ensure that the person is taken outside the sphere of influence (ie, where flashes cannot be seen, even at a distance) before any further use.

In the event of a full seizure, treat as you would for any epileptic episode:

Stay calm

Prevent injury. During the seizure, you should exercise your common sense by insuring there is nothing within reach that could harm the person if he or she struck it.

Pay attention to the length of the seizure.

Make the person as comfortable as possible.

Keep onlookers away – gawkers and do-gooders are definitely not welcome!

Do not hold the person down. If the person having a seizure thrashes around there is no need for you to restrain them. Remember to consider your safety as well.

Do not put anything in the person's mouth. Contrary to popular belief, a person having a seizure is incapable of swallowing their tongue so you can breathe easy in the knowledge that you do not have to stick your fingers into the mouth of someone in this condition. They are more than capable of biting down hard on your fingers.

Do not give the person water, medication or food until fully alert.

If the seizure continues for longer than five minutes, call 000.

Be sensitive and supportive, and ask others to do the same.

Just one point to keep in mind: it won't affect operation, but one side of the 24V AC mains is earthed via the case. (This only normally matters if you want to take scope imates).

Testing

First check the output from your transformer box – it should be around 24VAC. If it is zero, you've made a mistake somewhere (eg, connected the two transformer windings out of phase) or perhaps you've blown the fuse in the IEC connector. You did put a 5A M205 fuse in the IEC connector, didn't you?!!!

At the head end, check your component placement, polarity and soldering and if everything is correct, connect the 24VAC from your transformer, with S2 (the operate switch) off and both jumper shunts off. With S1 on, you should have around 30-32V DC between the cathodes of D1/D2 and the anodes of D3/D4.

Now turn S2 on and check that LED1 lights and that you have 15V DC between pins 8 and 1 of IC1 (or between the collectors of Q1 and Q2).

If all checks out correctly, place one jumper shunt across the "VF" (variable frequency) pair of JP1 (leave the other shunt off) and you should also find that you have quick flashes from LED2, with the rate varying as you vary the potentiometer (VR1)

Now all that's left is to switch it off, connect the LED array to CON2 (anode to top) and briefly switch on to prove it works! Don't look directly at the LED array, nor leave it running for more than, say, a second because the LED array needs to be mounted on a heatsink.

Incidentally, if you get the connections to the LED array back to front, you won't do any harm.

Mounting in the floodlight enclosure

Solder wires to the LED array as shown, determining which is the anode (+) and which is the cathode (-) from our photos.

There are six holes drilled in the front of the enclosure. Four are tapped (M3) and suit the LED array while the other two are to pass the wires through to the back.

First apply a generous dollop of heatsink compound to the back of the LED array and then screw it in position using the M3 4-6mm screws supplied. Make sure the LED array is tight down on the surface.

Feed the two wires through the other holes and turn the enclosure over. Mount the PCB on the four tapped pillars provided and connect the wires from the LED array to CON2 (shorten them as required). For the moment, connect your 24VAC supply wires to CON1 and switch on. OK, it all works.

Now we need to drill a hole in the enclosure rear cover to suit the potentiometer shaft. Mark the position on the cover as accurately as possible and drill this out to suit the pot shaft (usually about 6-7mm).

There is already a hole in the cover for the power wires to enter – indeed, the box should also contain a gland to help keep it watertight.

Finally, disconnect power again and connect the LED array wires to their respective positions on CON2.

Finishing off

Fit the reflector to the front of the housing with the screws provided and remove the protective film. Then screw the glass cover to the housing, making sure you first put the seal underneath it.

Similarly, fit the cover to the back of the housing (ie, over your PCB) again with its seal. Place the knob on the shaft and your Party Strobe is ready to use.

One warning: don't touch the LED array. It gets hot – and the oil on your skin probably won't do it a great deal of good! **SC**

The LED array, housing and 200VA 12V+12V toroidal transformer used in this project all came from Oatley Electronics – www.oatleyelectronics.com