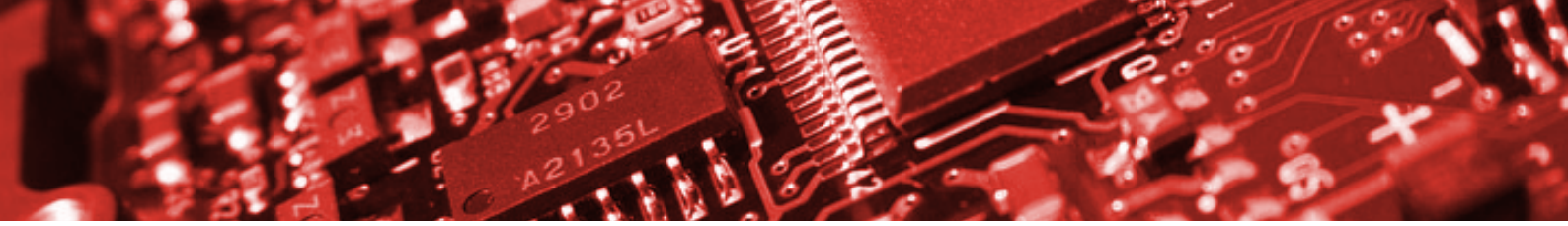


LCL ELECTRONICS
WORLD CLASS ASSEMBLY

PATERSON
PHOTOGRAPHIC EQUIPMENT

LogicaTronics
ENABLING CREATIVE TECHNOLOGY

CASE STUDY

Perfect timing for LCL and Paterson Photography

As a leading contract electronics manufacturer, LCL Electronics is always keen to seek out opportunities to promote innovation and manufacturing throughout the Midlands and beyond.

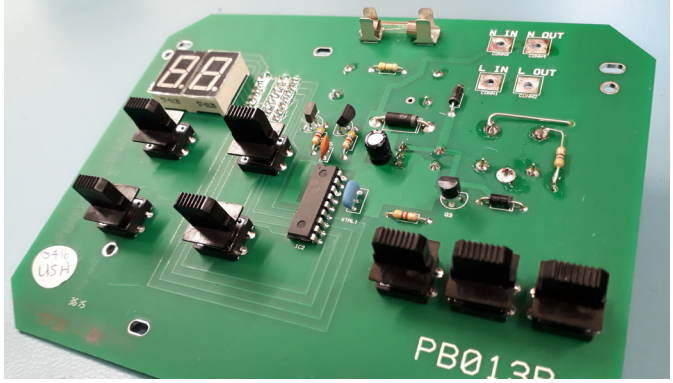
Exhibitions are a great way to meet like-minded companies and individuals who share our passion for electronics, manufacturing and industry and Subcon 2016 was no exception. After meeting Paterson Photographic Ltd, a fellow exhibitor at the Subcon show at the NEC Birmingham last June, we quickly realised we shared the same values and vision for manufacturing in the Midlands.

Paterson Photographic is known worldwide for its darkroom equipment manufactured in the West Midlands at their facility in Tipton. Paterson is developing its products to combine traditional forms of lighting equipment with new technology, and was looking for an electronics partner to deliver a first-class product.

After a brief discussion at the show and a follow up meeting a few weeks later, a project to revamp Paterson's 2000D enlarger timer, a mains operated digital timer unit, was launched.

Out with the old

The electronics and technology employed inside the timer had not changed since the mid 1980's and needed a revamp. Paterson were experiencing obsolescence issues and uncertainty in the supply for several the old through-hole components. The existing boards were 100% hand built in a conventional way; a time-consuming and sometimes inaccurate process. In addition, Paterson sold four variants of the timer for global regions including North America, Europe and Australia, which was ineffective to manufacture and produce and could lead to inconsistencies, and required extra stock holding of components.



The challenges of designing for the future

LCL enlisted the assistance and experience of design engineer, Richard Oliver of LogicaTronics Ltd.

The first challenge was that the product used a microcontroller; its firmware was unsuitable for re-use and its source code was unavailable. It wasn't possible to read the existing firmware from the original sample board, therefore new source code had to be written from scratch.

However, the biggest challenge was to solve electrical issues because the product needed to operate directly from 120V and 240V mains without using an external power supply or selector switch. The original product had a low cost transformerless circuit and its inherent electric shock hazards were considered during the redesign to improve safety. Double insulation was already used, but the PCB layout was inferior in several ways.

The project progressed with the design of a new modern circuit board using surface mount components and more readily available parts to future-proof the electronics against obsolescence. The team managed to convert over 80% of the new parts to surface mount (SMT) followed by wave soldering, which improved speed and accuracy throughout the production process. To improve safety, the new implementation incorporated fault tolerant components, a neutral referenced "ground plane" and mains voltage warning notices printed directly onto the PCB.
Over four weeks, LCL and Richard, alongside Paterson, created working prototypes and a final design that was far more robust and efficient than the original circuit board. The new design also uses less power than before and fixes operational problems within the original firmware. Further improvements were also made to the timer unit to simplify the manufacturing process.

Illuminating results

Previously Paterson would manufacture and hold in stock four variants of the timer to be sold in the global regions. The new timer now works across all these regions using one circuit board, making the assembly easier and above all, reducing the stock holding for Paterson. LCL Electronics also made improvements to the interconnection between the various mains input leads and the timer circuit board. This again has simplified the unit and reduced the manufacturing costs.

Speed and cost for the PCB has reduced through the new SMT assembly, wave soldering and technology used on the new boards.

LCL has made further savings on the mains cable so overall there has been a slight cost reduction in the board production for Paterson. Coupled with the speed of assembly and potential improvements in accuracy due to using machines for assembly rather than hand, the benefits are greater than just cost savings.

As a result of the successful prototype and subsequent production of PCBs for the timer, LCL has already shipped a large number of boards and secured an order for 500 units.

Moving forward, LCL will be working with Paterson on several new developments. These include assisting with studio lights, and developing a new LED light. LCL is also supplying all mains cable and accessories to Paterson.

Phil Stanley (pictured in the middle), Managing Director of Paterson Photographic said: *"A chance meeting at an exhibition has led to us being able to revamp our timer, something which is a great benefit for the company because of time and cost savings. Working with LCL and Richard was an easy process, and the swift turnaround and quality of service impressed us immensely".*

www.**lclelectronics**.co.uk | www.**patersonphotographic**.com | www.**logicatronics**.com