Laser Timer and Circuits

Task:
To design a rear a laser timer for your Formula Schools car/ Schools Marine/Formula Sun Boat.

Introduction
Sometime we need to be as accurate as we can with our work. The use of high intensity light sources or lasers can help us to achieve such accuracy.

Research Section
How is laser light generated?
What key factors influence the design of the circuit?
What materials can be used to make the holders?
Produce a table showing what materials can be used and which cannot and the reasons behind your choices.
Why is laser light more useful?
What are the alternatives than using a Darlington pair in the circuit?

Design Section
Collect the information you need to design the Circuit. Model the circuit on a computer using crocodile technology or similar software.
Develop a circuit board similar to the one shown.
Decide on the method that you will use to house the laser and the LDR
Show the processes involved.
Material availability.
Processing availability.
Produce full working drawing using the most appropriate system with either manual or a CAD package. (Such as pro-desktop)

Manufacturing Section
Accurately measure some sample components using a Vernier calliper or Micrometer and check your findings against others.
Using the correct machine, produce one sample of the housings for the Laser or LDR.
Etch your PCB
Use soldering equipment to manufacture your design.

Health and safety
Carry out a risk assessment on the main process you plan to use to produce the Circuit Board. Consider the following; Chemicals, materials, machine, tools, environment, training, protective equipment, and any action you have to take if a problem occurs.
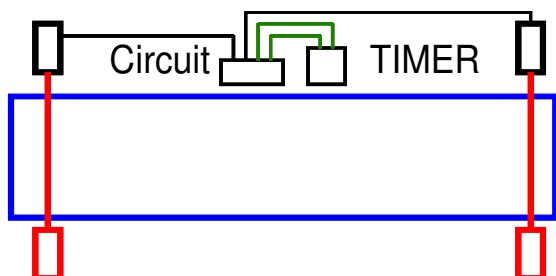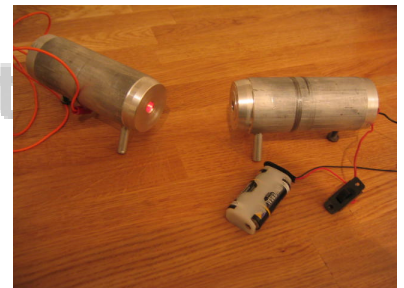
Laser and LDR housings
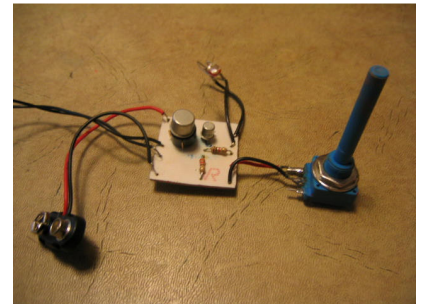
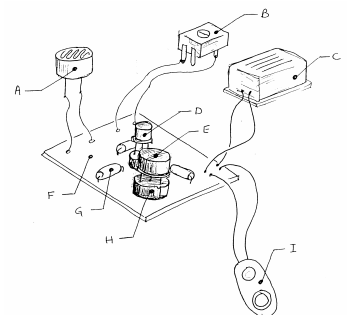The circuit assembled on board
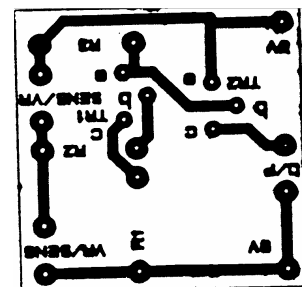
PCB Image

Pictorial Diagram

Circuit TIMER

INPUT; where 'A' is the LDR, you will need to replace this with 2 x 4mm lead connectors to make moveable sensors. The position of A and B can be changed if your circuit does not work in the correct way, i.e. output is reversed.

It is suggested these are mounted in a deep and heavy block as shown so that they can be positioned easily and be stable and avoid the interference of ambient light. If you make 2 and link them is series this will enable you to have a start and a finish light beam, when your lasers a fried onto them.

OUTPUT; shown in the diagram as 'C' this can be changed to leads to connect to you stop clock. Each time the beam is broken, it will trigger a start and stop for you to record the timings.

CAUTION: *When using lasers, ensure sensible use and power selection. Refer to manufacturers instructions and ensure not shone into eyes.*

Components

Description	Value	Number off
Variable Resistor	100Ω	1
Transistor	BC108	
Transistor	BFY51	
Switch	-	1
LED	-	1
LDR	-	2
Laser	650nm : <1mW	2
Fixed Resistor	1KΩ	1
Fixed Resistor	330R	2
PP3 Battery Snap		1
2 x AAA Holder		2 for lasers
Timer		
Case	Suitable size	1

Extension Task
Connect you LDR's to the main circuit with the use of Opto electronics, this can be infer red. This will eliminate the need for lots of cabling. Alternatively link the output with infer red so that you stop clock can be at a distance away from you track.

Cross Curricular Information.
You can use this type of product to help you understand other subjects better. If you lag and record the times, you can input the data into graphs and spreadsheets and use in Maths and Science for data logging experiments.