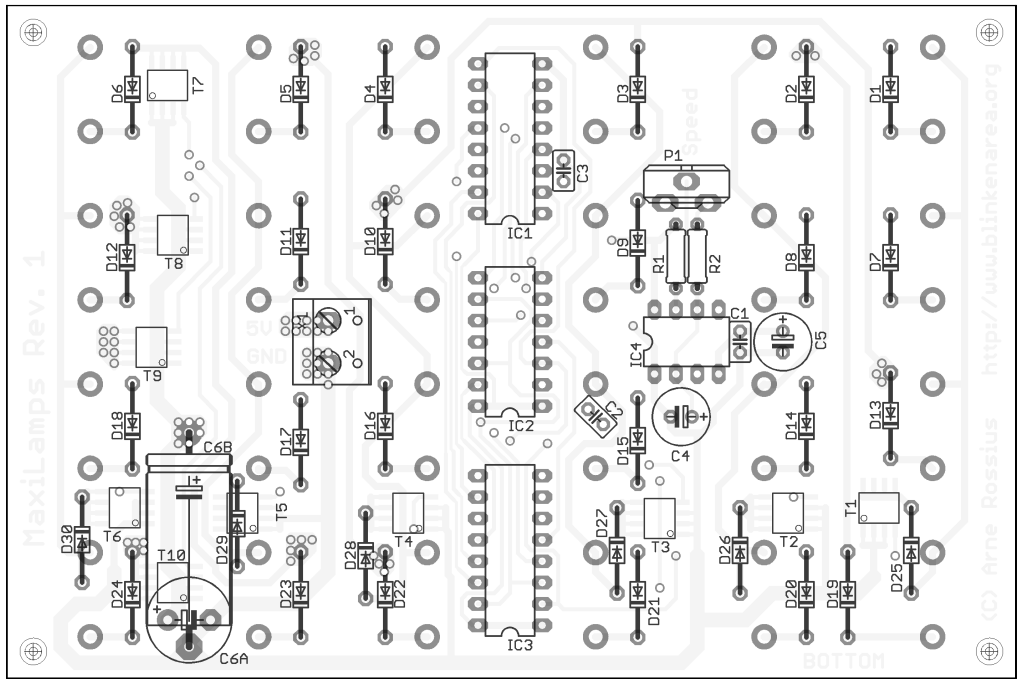
MaxiLamps – Construction Kit

Contents:

1	PCB “MaxiLamps Rev.1”	30	Diodes 1N400x	7	Lamp E10 3.5V 0.2A green
1	Timer IC NE555	2	Resistors 1 kΩ	24	Lamp Socket E10
1	Quad XOR IC 74HCT86	1	Potentiometer 47 kΩ	1	Terminal Block, 2-pin
1	Quad D Register 74HC175	3	Capacitors 100 nF	1	Twin cable (1 m)
1	Hex D Register 74HCT174	1	Capacitor 33 µF	4	Screws M3x6
1	IC-Socket 8-pin	1	Capacitor 100 µF	4	M3 threaded bolts, 15 mm
1	IC-Socket 14-pin	1	Capacitor 2200 µF		
2	IC-Socket 16-pin	7	Lamp E10 3.5V 0.2A clear		(replacement parts are available at the BlinkenArea)
6	MOSFET n-Ch. IRL6342	7	Lamp E10 3.5V 0.2A red		
4	MOSFET p-Ch. IRF9328	7	Lamp E10 3.5V 0.2A yellow		

General Information

- Bend the leads of resistors, capacitors etc. outwards a bit after inserting them into the board to prevent them from falling out when turning the board over
- Clip the leads after soldering, but be careful not to damage the copper traces on the circuit board – don't clip the leads too close to the board
- All components except the lamp sockets go on the “bottom” side of the board.



bottom side component placement

Step 1: MOSFETs (T1~T10)

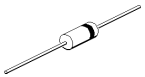
The MOSFETs have a small dot in one corner which must match the circle in the image above. Tin one corner pad, then heat it up again and slide the MOSFET into it sideways. After aligning the MOSFET properly, solder the rest of the pads.

Transistor	Value	Marking
T1~T6	IRL6342	L6342
T7~T10	IRF9328	F9328

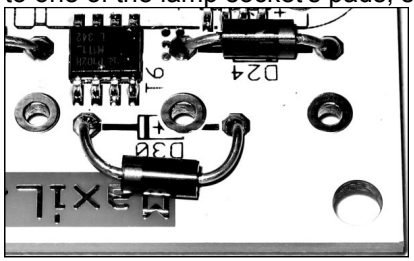
Step 2: Resistors (R1, R2)

Bend the leads as close to the resistor's body as possible before inserting them into the board. Both resistors are the same value (1 kΩ, marking brown-black-red-gold), orientation doesn't matter.

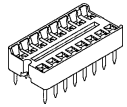
Step 3: Diodes (D1~D30)



Bend the leads of the two diodes and insert them into the board observing polarity (the ring on the diode's body must match the silkscreen on the board). All diodes are the same type (1N400x, where x can be between 1 and 7). D29 sits on top of the MOSFET T5. D30 will block access to one of the lamp socket's pads, so it needs to be bent to the side as shown here:



Step 4: IC Sockets (IC1~IC4)

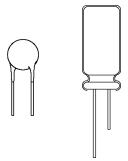


Insert the IC sockets into the board observing the orientation of the notch on one side.

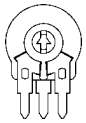
Step 5: Capacitors (C1~C6)

Insert the small 100 nF capacitors (C1~C3) in a way that they don't touch the board, but have 1-2 mm of space below them. Polarity is important for the electrolytic capacitors (C4~C6). On the capacitors, the negative side is marked by a thick line across the side (sometimes with minus signs in it). On the board, the positive side is marked by a small “+” sign next to the pad. C6 should be mounted lying flat on top of T10, so bend the pins 90° about 1-2 mm away from the capacitor.

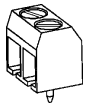
Capacitor	Value	Marking
C1~C3	100 nF	104
C4	33 µF	33 µF
C5	100 µF	100 µF
C6	2200 µF	2200 µF

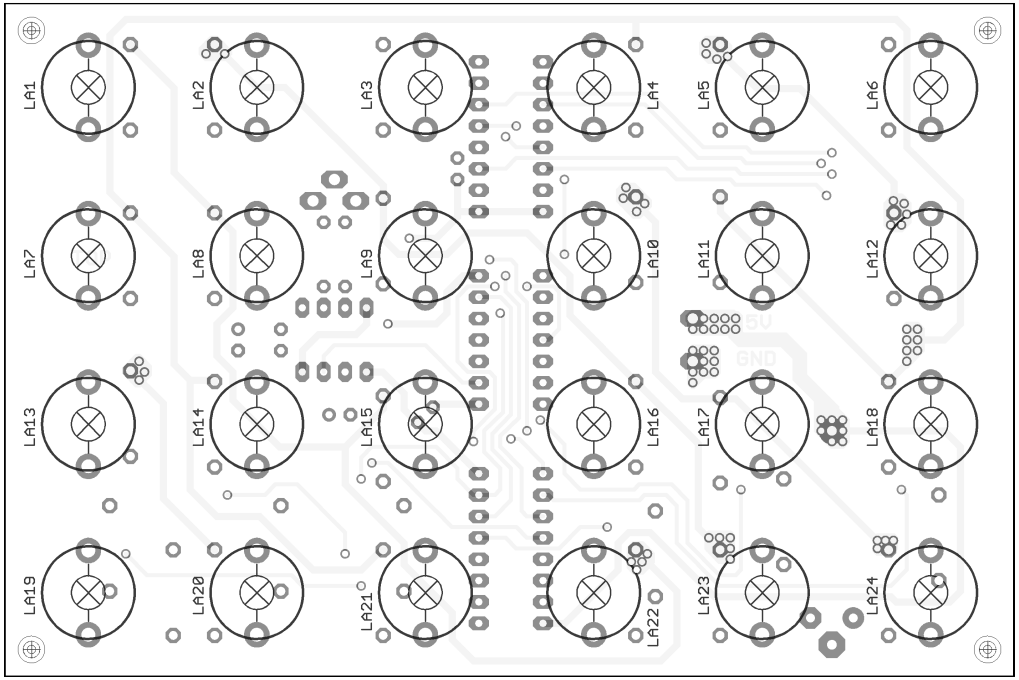


Step 6: Potentiometer (P1)
The potentiometer will only fit in one orientation.



Step 7: Terminal Block (X1)
The terminal block can be mounted facing either way or even on the “top” (lamp) side of the board, but the recommended orientation shown in the silkscreen is on the “bottom” side with the rest of the components, facing the board edge.





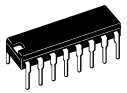
top side component placement

Step 8: Lamp Sockets (LA1~LA24)
Orientation of the lamp sockets doesn't matter. Make sure not to short the wide parts of the lamp socket's pins to adjacent solder joints or traces. The best way to do this is to insert the sockets with the wide part of the pin ending 1-2 mm above the board surface. To make sure all sockets are the same height, insert all of them, turn the board over and prod the pins until all sockets lie flat against the table before soldering.

Step 9: Screws and Bolts
Attach one bolt to each of the four holes in the corners of the board with a screw. The threaded bolts can be used as “feet” for the circuit board or to mount it to something else using additional screws.

Step 10: ICs (IC1~IC4)
Insert the ICs into their respective sockets, once again making sure observe the orientation of the notch. Take extra care not to confuse IC1 with IC3 as the type numbers are very similar.

IC	Type
IC1	74HC175
IC2	74HCT86
IC3	74HCT174
IC4	NE555



Step 11: Wire
Strip the ends of the wire and tin them (or use ferrules if you have them). Insert one end into the terminal block and tighten the screws. Attach the other end to a power supply capable of providing at least 5 A at 5 V (e.g. MeanWell RS-25-05M). Make sure to get the polarity right, the kit might be destroyed if connected backwards. The two terminals are labeled “+5V” and “GND” on the board.

Step 12: Lamps (LA1~LA24)
Insert the lamps into the sockets. Choose your own color pattern. There is one spare lamp of each color in the kit.

Step 13: Turn it on!
Turn on the power and watch it blink! Don't worry if no lamps come on at once, the circuit might have started with a no-light pattern. Depending on the setting of the speed potentiometer, it could take some seconds until the pattern changes. If you're worried that you did something wrong, don't insert the lamps and measure current draw with a lower power or current limited supply first. Current draw without lamps should be around 10 mA.

Questions? Problems? Comments?
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More information
You can find more information about the MaxiLamps in the BlinkenArea wiki:
German: http://wiki.blinkenarea.org/index.php/MaxiLamps
English: http://wiki.blinkenarea.org/index.php/MaxiLampsEnglish