

DIY LED Exposure Box

Note: This project requires a degree of understanding re Electricity (AC and DC) and these instructions are guidelines - you may build larger, smaller, or even use different components. I am not responsible for your safety or success, or your electrocution or destruction of property if you make a mistake. :-)

That said, if you can use a saw, hammer, screw driver, glue gun, and can remember that for DC red is positive (+) and black is negative (-), and for AC white is neutral (N) and black is 'hot' (and that 120V can hurt you if you are not careful) you can build your own LED light box.

Below is a description and resource list for the one I built - my final build is capable of evenly burning 24x36" screens with halftones in ~11.7 seconds give or take pending emulsion thickness.

- It is portable
- It can be build from scraps - the lid does not need to be as deep as mine, but the exposure box needs to have a minimum spacing of ~5 inches from the LED board to the underside of the glass for the UV rays to spread across the surface - otherwise you risk hot spots and uneven exposure.

I had most of the wood and tapes laying around as scraps so no idea what those would cost - standard dimensional lumber was used 1"x8", 1"x3", and 1/4 plywood. I also had 2 x hinges and handles laying around too. Best guess is the lumber would run you about \$45 and the hinges and handles another \$8. The glass was the most expensive component at \$65. I am all in at ~\$240.00 US, but I had all the wood, tape, and some other bits....

If you don't have a saw for cutting the lumber can probably have your local lumber folks cut what you need. (See cut list).

See the resource list for cut list and all the electrical stuff I used.

You will need a single pane sheet of glass for inside. Buy only *non-UV-blocking* glass. UV blocking glass (like from a window), will likely fail you. I ended up going with the recommendation of the glass shop and don't recall the thickness though I think it is ~1/8" or so - just tell them that you need to set some weight on it and need to shine UV light through it and they should be able to get you set up.

The unit has 4 primary components: the box (the base and the lid), the LED board, the control panel and transparent (non-UV blocking) plate glass.

TLDR instructions:

1. Build a box with a lid that you can fit your largest screen in with room for moving things around - e.g. add a couple inches on all sides of the screen. This is you interior dimension. Add 1.5" to these measurements for board lengths and bottom/lid of 1/4" plywood.
2. Add control panel if not repurposing an existing exposure unit.
3. Build an LED board using foil-tape covered 1/4 ply cut to be about 2" smaller than the interior of the box. Cover this board with UV LED strips spaced 10mm apart.
4. Cut non-UV blocking glass to 1/8" smaller than interior of box and place on cleats placing glass surface ~5 inches above the LED board surface.

While you are making stuff consider screen to film presses - I cut 3/4" plywood to slightly smaller than the interior dimensions of my screens and added 5/8" foam to one side and handles to the other - this with a 5lb weight presses the screen against my film and glass.

The Box

The base measures 27"x38.5" made of 1"x8" stock and sits on top of similar sized 1/4 plywood... It is easiest to cut holes for the panel and incoming power before putting the box together - easier to manipulate single boards and leaves room for the coping saw. I used screws to assemble. Make sure to check for square as you assemble!



The box has a lid made of 1"x3" stock and 1/4" plywood.

Both the base and the lid sides are mitered 45°

- use of framing clamps will help here
- if you don't miter that's okay, just account for the shorter lengths on two of the boards. Noted in cut list.

The box has a lip on it made from 1/4 ply to help make it light tight.

Once assembled the base sides are smoothly lined with shiny aluminum tape

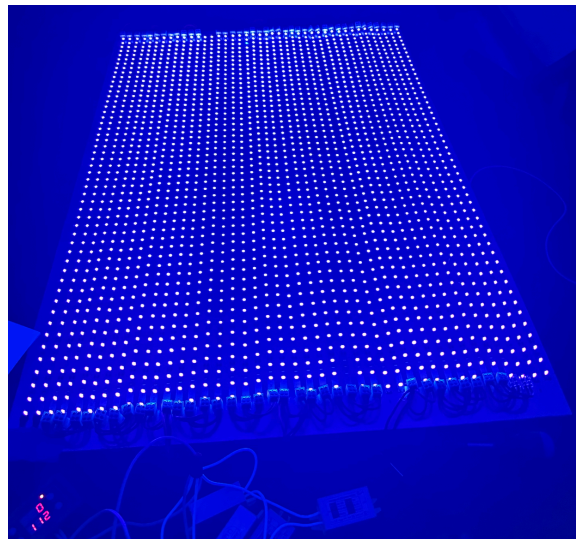
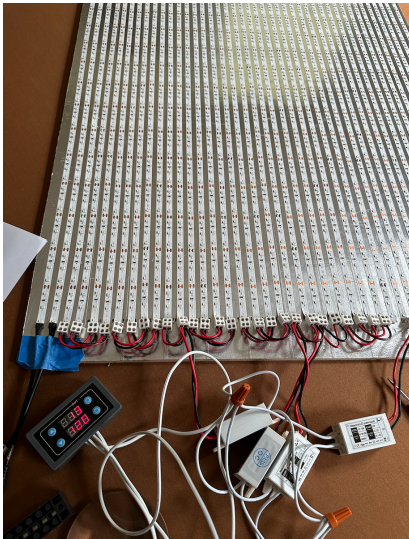
I painted the raw wood black.

The on/off switch, timer panel, and LED switches are mounted to a scrap of plexiglass I had laying around. Spray painted black leaving a view to the interior . Power is provided by a removable "computer" power cord. (See parts list)



The LED board

The LED board which sits in the box on 3 - 1/4 ply strips (to run wires underneath - I used nylon standoffs leftover from a computer build) is 1/4" plywood covered with shiny aluminum tape and measures ~25"x37".



The LED strips fill the LED board ~24" x 34" leaving ~1/2" on each side and ~1.5" at the ends for the connectors to be glued down. LED strip suppliers provide instructions for how to cut strips to length etc. so I won't go into those details.

1. Cover the board with the aluminum tape.
2. Starting in the center of the board measure and draw the edge lines for your LED strips ~10mm apart. As a rule of thumb you can put them closer together.
 1. Note this does not need to be super precise, and may be different depending on the strips you use, but take your time and rough this out because you don't want wonky gaps between strips as those will be uneven/weak exposure spots
3. Cut and lay your LED strips down one at a time
 1. leave about an inch at each end loose'ish to facilitate addition of connectors
 2. Place one connector at each end.
 3. Repeat these steps for all your LED stripsNote you can cut and temporarily tape down using masking tape before final fitment.
4. Strip short lengths of 14 gauge black and red wires to the specification of the connection blocs you have. These wires may be pre-attached to about half of the blocks used.
 1. If you have 40 strips you will need 80 connectors and 40 red and 40 black wires prepared.
 2. I used connection blocks because they are fast and easier than soldering
 3. Use black and red because polarity is important - LEDs only work with the correct polarity
 4. Use black on the strips '-' and red on the strips '+' terminals
5. Attach

The power supplies and terminal strips are mounted to the box interior on the right hand side near the control panel and power input.

The Glass

The glass sits on four cleats that run around the sides about an inch below the top edge of the box and is held in place by two cleats on top sandwiching the glass so it doesn't flop around when you move the box. Best to purchase the glass after the box is built and working.

Control Panel

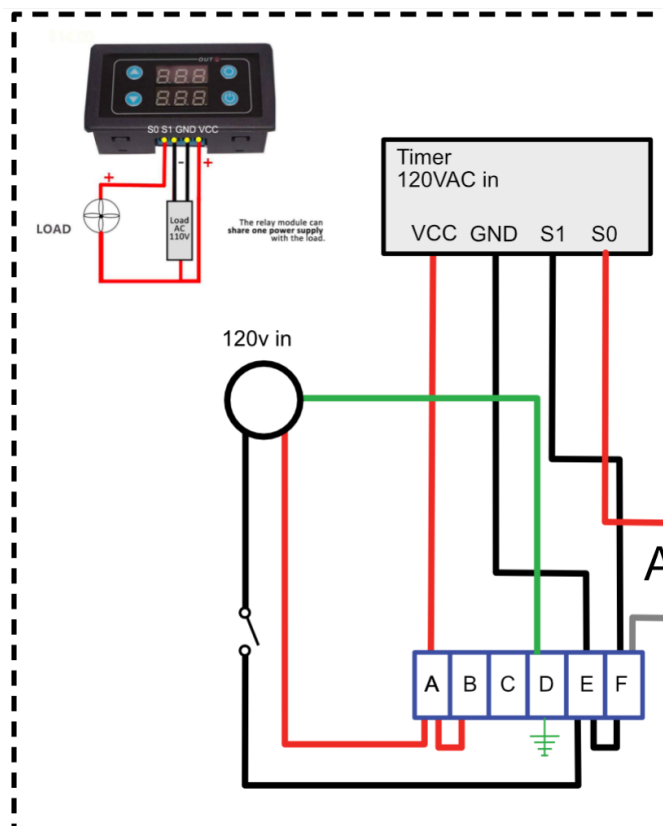
Note: if you are reusing an existing exposure box that has a timer and AC you don't need to do this part you can just skip it and follow the LED Circuit portion of the below diagram where the "AC in" label indicates AC to the LED AC/DC converters.

Using the specs from the controller and switches I cut up a bit of plexiglass.

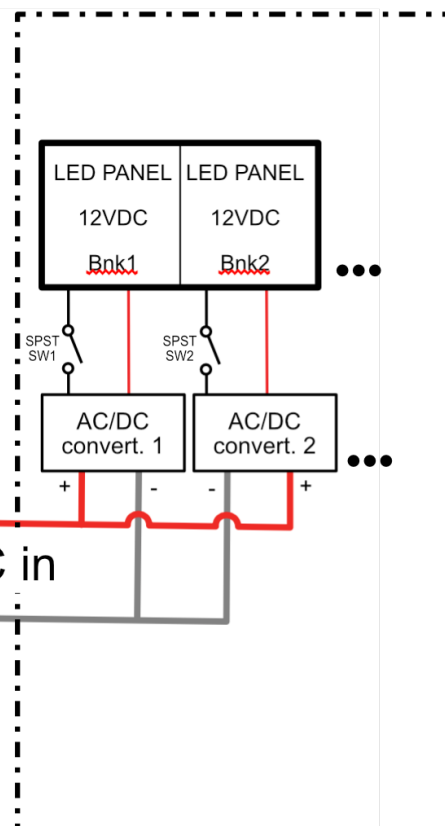
1. Drill four mounting holes and starter holes for the switches and controller
2. Used a coping saw to cut the holes - you could use a saber saw if you have one.
3. file the holes smooth and snap in the switches.
4. Once cut and everything test fitted, cut the hole in the box to receive the panel

Note: Don't mount it until you have run and fit all the wiring as the thickness of the box makes it difficult to get access to the spades on the switches etc.

Timer Circuit



LED Circuit



Basic "schematic" in two parts

Wiring

Wiring the Timer Circuit panel is straight forward following the above diagram. You can skip the SPST switches if you do not want to control the LED banks.

Note on the Converters

The converters I used are 15W and in my exposure box these adequately fire the LEDs at about 12 rows/converter. I just did not want to spend the \$\$\$ to upgrade to a larger wattage converter.

Tools

- Carpenters and Speed square
- Hand saw or miter saw
- Coping or saber saw
- Screw driver (for whatever type of screws you have)
- Sander if you want to round over corners remove splinters Smoot for painting etc.

Resources

Wood

I used scrap wood and plexiglass I had from other projects so not much help there cost wise.

Cut list

Box

Base:

- 2 - 1"x8"x 27" (or 25.5" if not mitering)
- 2 - 1"x8"x38.5"
- 1 - 27"x38.5" 1/4" plywood
- 4 - 1.25" strips of 1/4 plywood cut to length to fit inside the base as light block when the lid is closed, extend 3/8-1/2 inch above top of box
- 4 - 3/4"x1" glass support cleats cut to length to fit inside the base roughly 5" from top of LED board.

Lid:

- 2 - 2 1"x3"x 27" (or 25.5" if not mitering)
- 2 - 1"x3"x38.5"
- 1 - 27"x38.5" 1/4" plywood

LED board

- 1 - 25"x37"x1/4" plywood
- 3 - 1"x37" strips or 1/4" nylon standoffs (this lets you run wires under the board if needed).

Glass

1 sheet - non-UV-blocking glass per retailer recommendations cut to fit completed box I had mine cut ~1/8" smaller on each side to facilitate placement on the cleats.

NOTE: squareness of your box will help greatly here!

Electronics

I don't have an electronics shop anywhere near so ordered everything off Amazon hence the links...

¹Timer Controller (AC) [\$15.99]:

<https://www.amazon.com/gp/product/B075GSGH85>

LED strips [\$29.99 x 2]:

<https://www.amazon.com/dp/B09Q2STPXX>

LED Connectors [\$19.99]:

<https://www.amazon.com/dp/B0B34RXPLX>

¹ Do not need if repurposing timer from current box, Purchase if building from scratch

Dark Red LEDs (for backlighting films and screens for registration) [\$6.99]:
<https://www.amazon.com/gp/product/B01DBZIQ24>

AC/DC Convertors (1/LED bank, +1 if you add the Dark Red LEDs - I used 5) [3@15.99]
<https://www.amazon.com/dp/B08YDCL87G>

Terminal blocks (2) [\$6.99]:
<https://www.amazon.com/dp/B07B4CBCZ4>

Switches for LEDs [\$6.99]:
<https://www.amazon.com/dp/B07Y1GDRQG>

Switch for Safelight (dark red). [\$6.99]:
<https://www.amazon.com/gp/product/B09TXLNQVZ>

²Plug and Cord:
Plug [\$5.99]:
<https://www.amazon.com/dp/B081C32LWG>

Cord [\$6.99]:
<https://www.amazon.com/dp/B0BZ7SLJVB>

Misc:
Aluminum foil tape - hardware store.

Sm (2.5mm?) Crimp spade connectors used for connecting switches - auto parts store.
Crimp connectors used for connecting wiring - auto parts store

Lid supports [\$7.99]:
<https://www.amazon.com/dp/B0B15B76GF>

² Purchase if building from scratch