

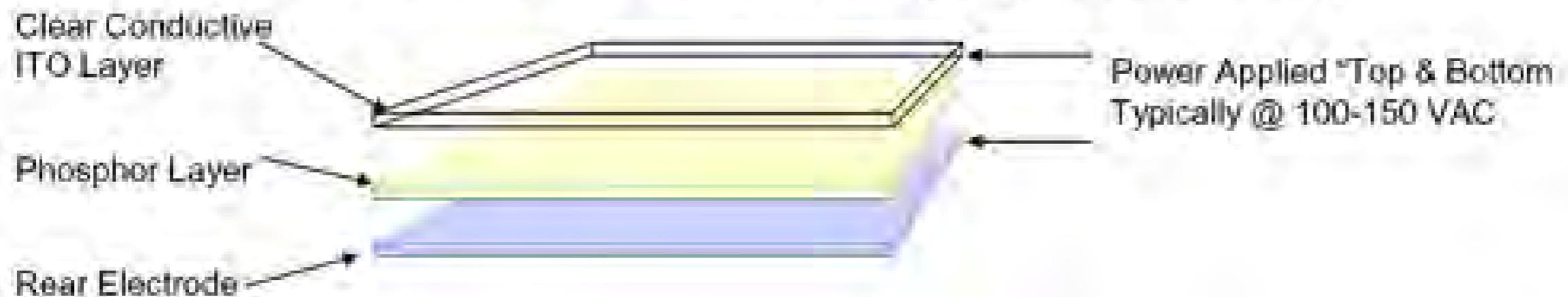
**MAKING  
ELECTROLUMINESCENT  
SIGNS FOR YOUR  
LAYOUT**

**BY**

**BRIAN W. SHERON, MMR**

- **What Are Electroluminescent Signs?**
- **Electroluminescent Signs are Signs that Glow Similar to a Neon Sign When an Electric Current is Applied**

#### ❖ Traditional "Parallel Plate" EL lamps (a basic look)



# How an EL Sign Works

- **When an AC current is passed through the Phosphor layer, as the current rises, this adds energy, and the electrons in the phosphor atoms jump to a higher energy state.**
- **As the current decreases, the electrons fall back to their lower energy state**
- **In order to go to a lower energy state, they give off energy they gained in the form of photons (light)**

# Benefits of Electroluminescent (EL) Lamps

- Thin, Flexible, Easy to Use
- Uniform Brightness When Looked on at All Angles
- Low Power Requirements
- Relatively Low Cost
- Note: voltage needed for signs is 100 to 150 Volts AC. Unlike your wall outlet voltage, while the electronic circuits step up the 4.5 VDC to 100+ VAC, it is very low current
- You will only feel a “tingle” if you touch the

# Disadvantages of EL Signs

- **Require a relatively high AC voltage**
- **Not a lot of Lumens per watt**
- **Over time, they wear out and brightness will decrease. Useful lifetime varies with EL material used**

- **Typical uses (besides model railroading) are watch face dials, signs (such as exit signs), and automotive dashboard gauges**
- **A principal supplier of EL lamps for model railroaders is Miller Engineering**
- **Other manufacturers are now starting to market EL signs for model railroaders**

# What's Available?

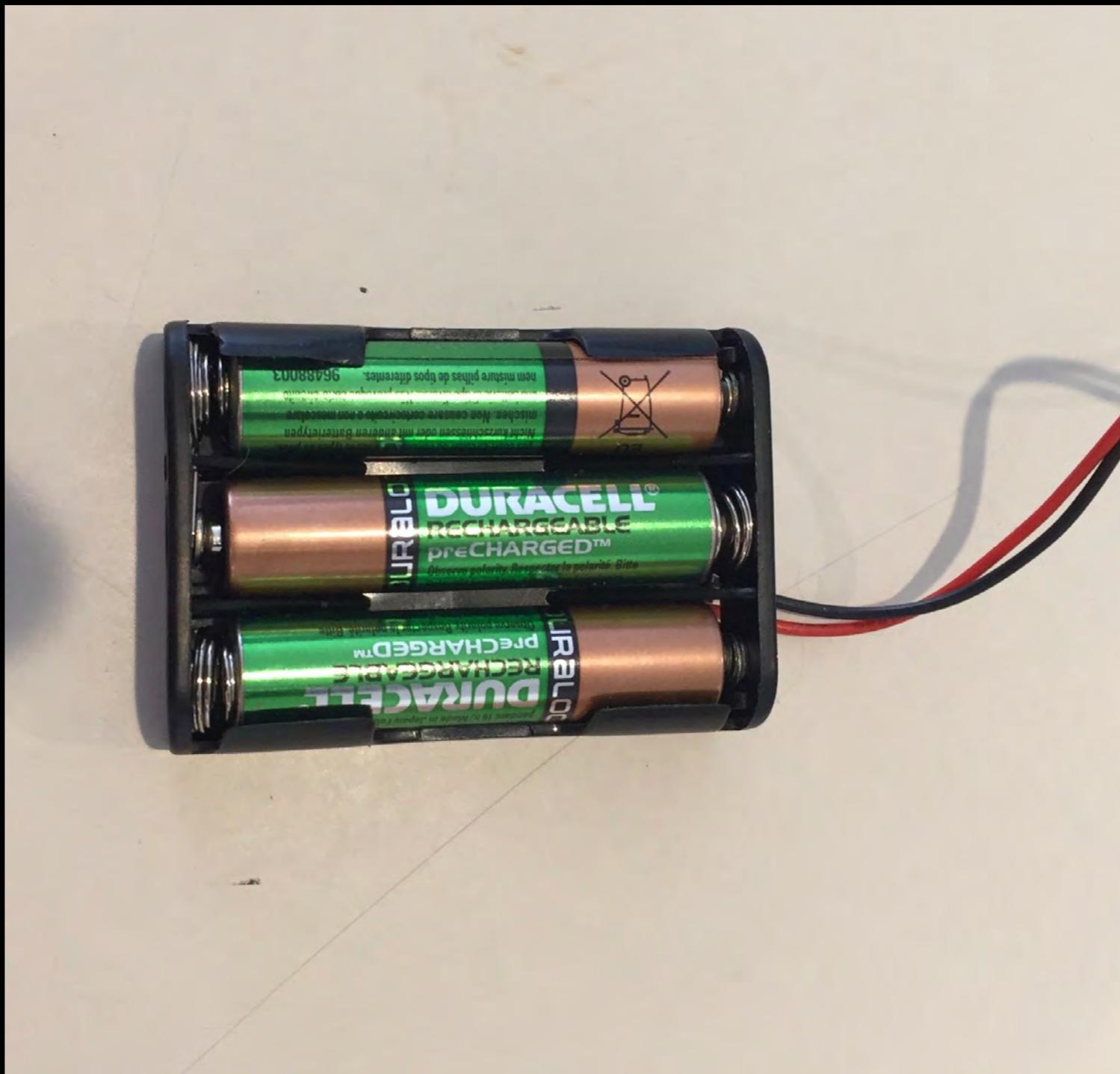
- **Miller Engineering sells ready-made signs, such as billboards and window signs**
- **They also sell Experimenter's Kits so you can create your own signs**
- **Don't be afraid! EL lamp kits are easy to use and will add some impressive signs to your layout**

# Ready-Made Signs

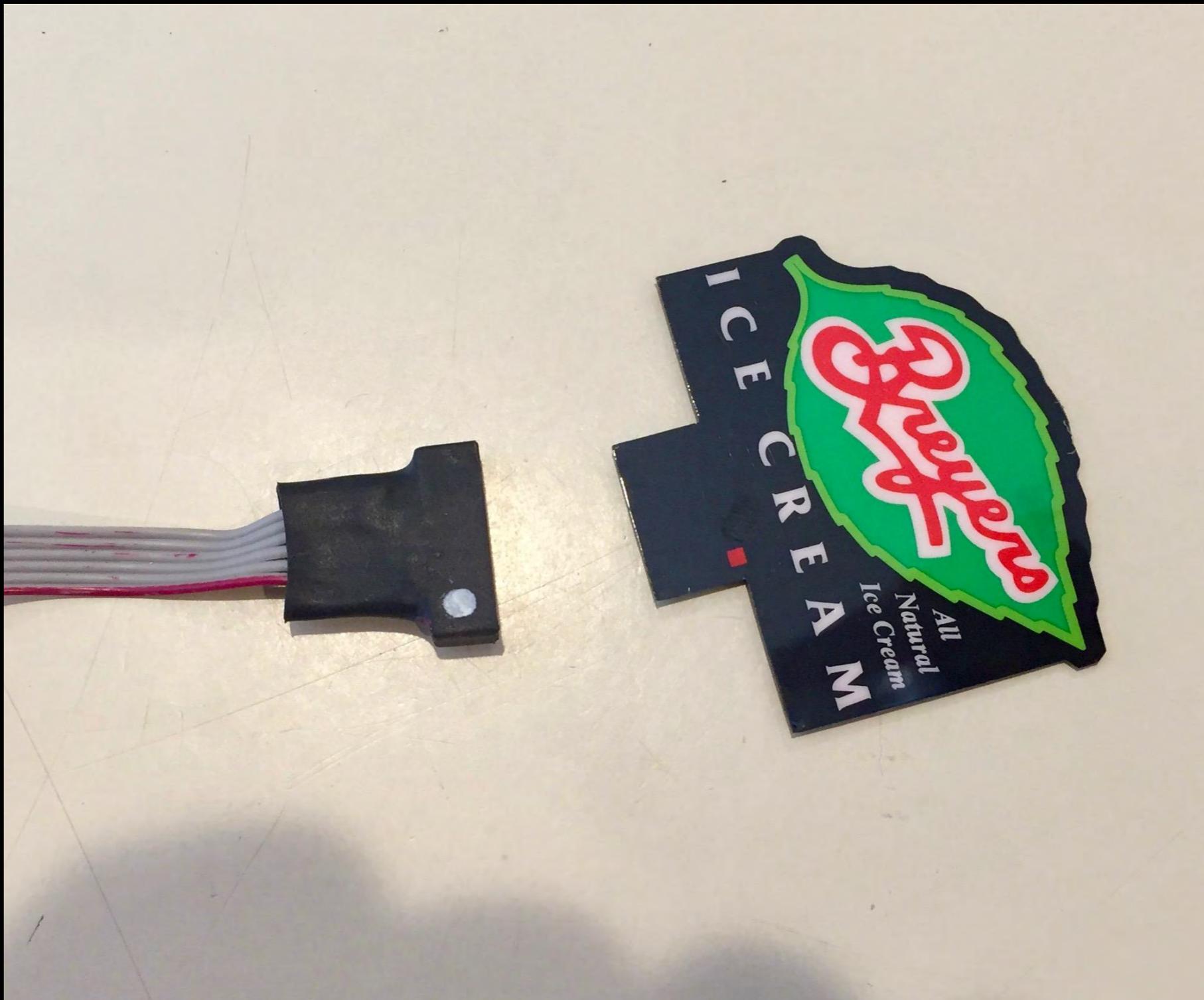
- **These are by far the easiest to construct and install on your layout**
- **Cost is usually between \$25-\$50/sign**
- **They consist of**
  - **a pre-made sign**
  - **electronic circuit**
  - **battery holder for 3 AAA batteries**

- **To connect, install 3 AAA batteries in battery holder**
- **Plug in connector from electronic circuit board to sign (align white dot on plug and red dot on sign to assure correct connection)**
- **Switch on circuit board will turn the sign on or off**

- **Multicolored billboards are provided with a multitude of “chase patterns”, which are flashing sequences for the various parts of the sign**
- **A push-button switch on the electronic circuit board will change the chase pattern**
- **At least a dozen chase patterns are programmed into the circuit board**



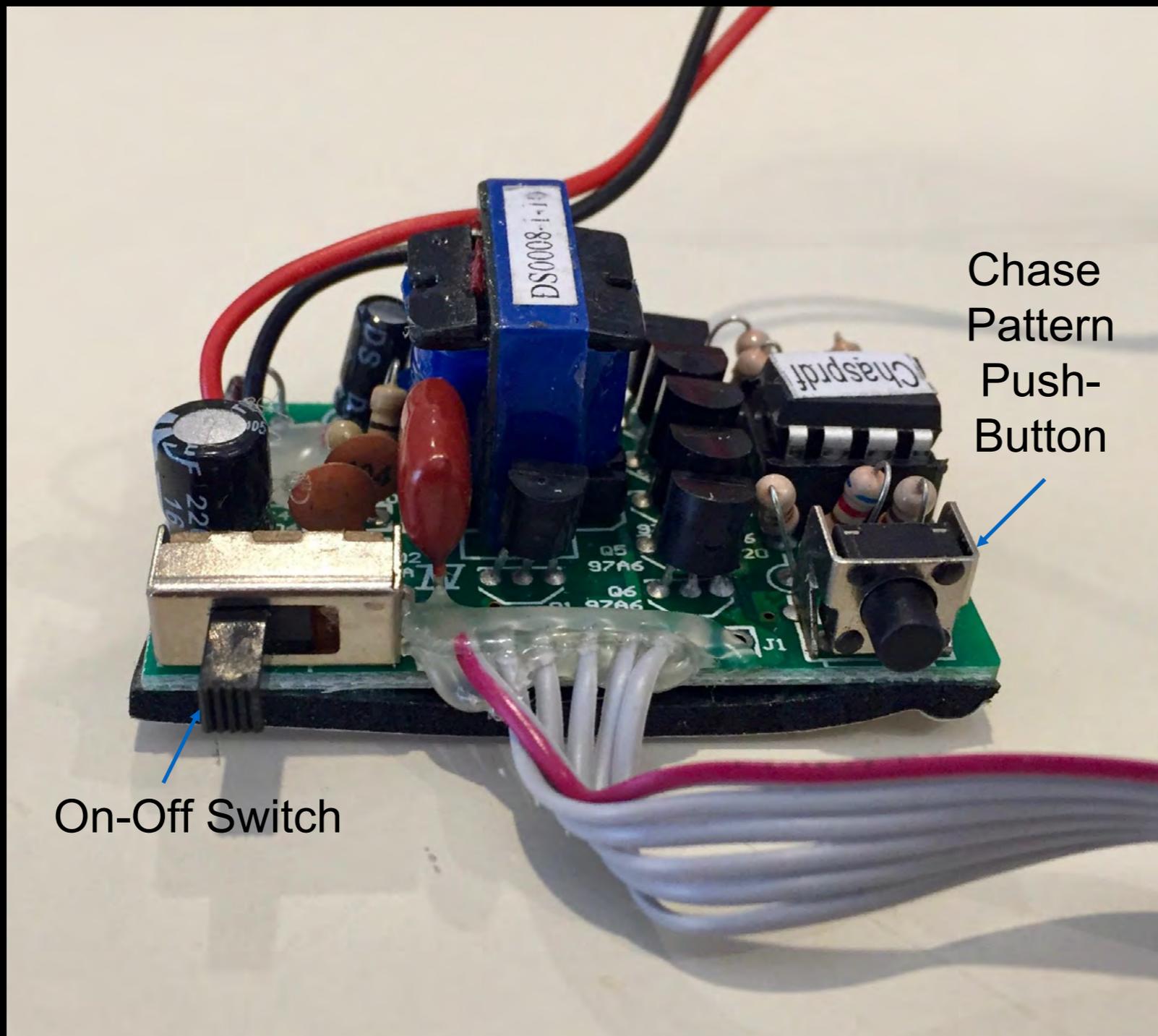
**Insert 3 AAA Batteries or connect  
to a 4.5 VDC power supply**



**Align dot on plug with dot on sign**



**Push plug into sign connection**



**Turn sign on with switch at left  
Set chase pattern with push-button  
on right**

- **Best to select chase pattern you like before installation**
- **Mount billboards on the roof of buildings, and window signs inside of windows. Miller makes rooftop billboard support brackets or you can make your own**



**Esso sign on Miller sign supports**



**Ballentine Beer sign with strip styrene brackets**



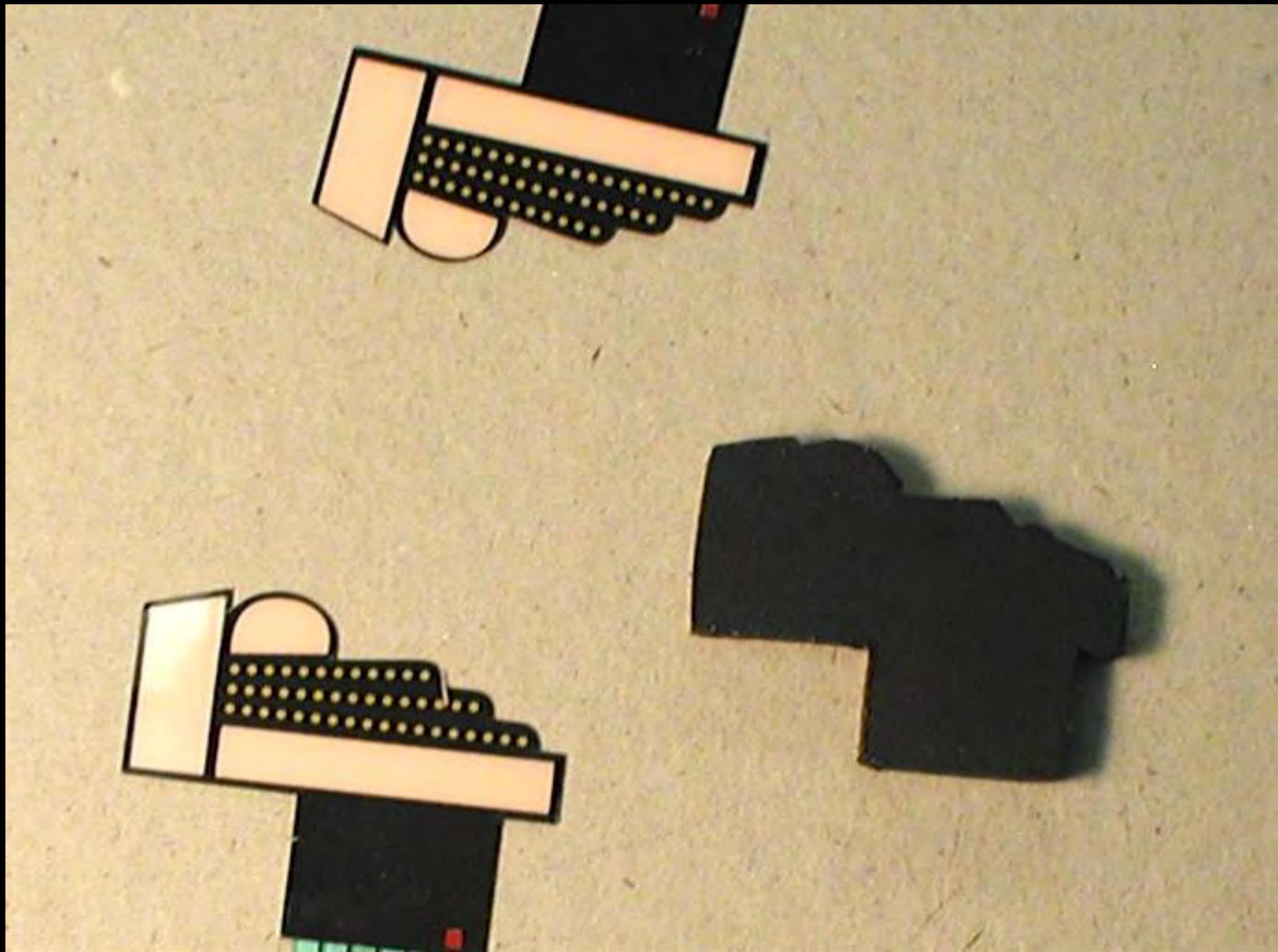
**PRR station sign on Miller supports**



**Rear view of PRR sign**

# Double-sided signs

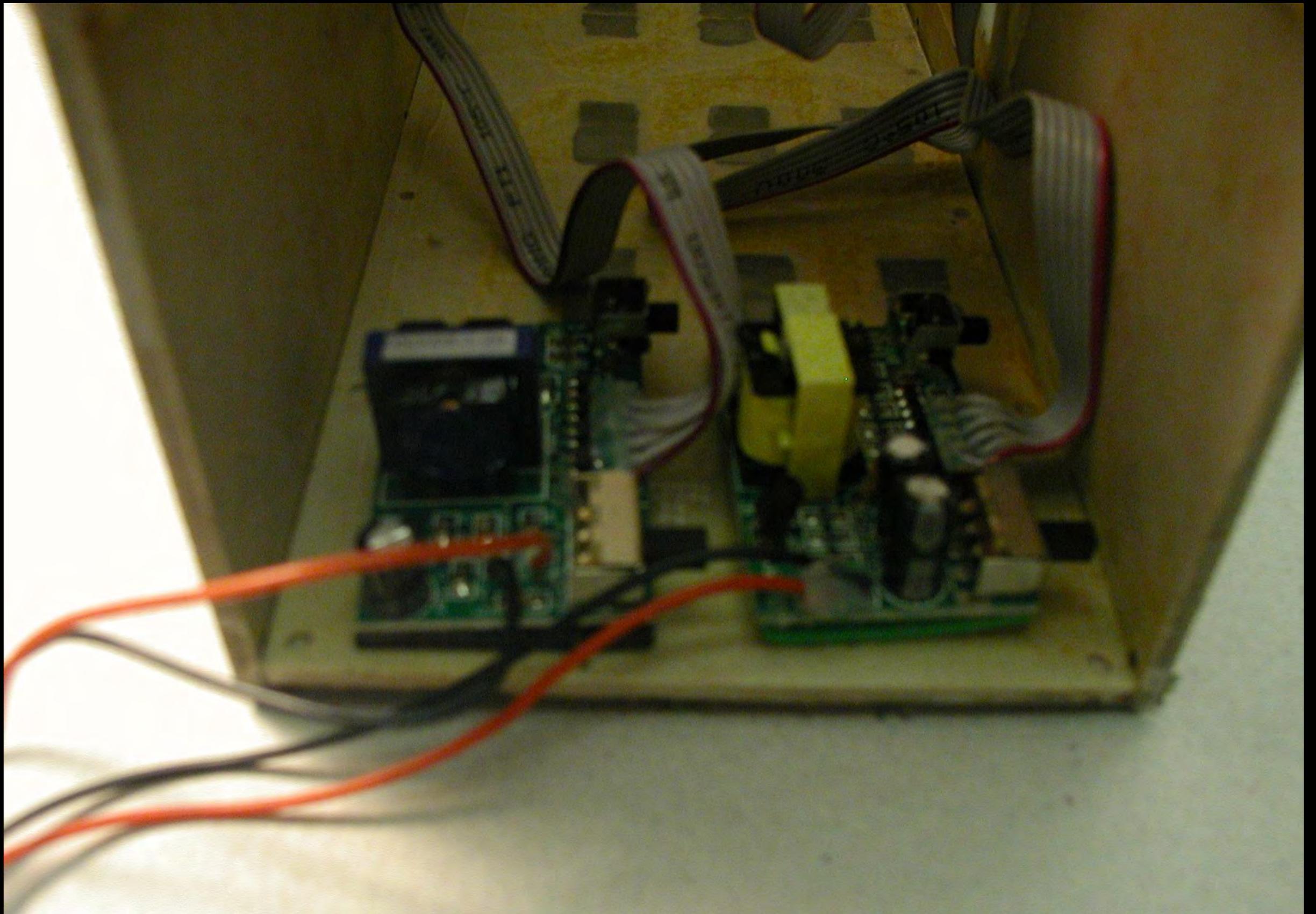
- **Miller makes several commercial signs (both RH and LH) that project perpendicular to a building**
- **You need a spacer between the signs in order to make a two-sided sign**
- **Spacer must be thick enough so connector plugs have clearance to plug into signs**



**RH and LH signs and styrene spacer**



**Double-sided “Tastee Ice Cream” signs mounted on spacer and on building**



- **Consider adding a power cutoff switch that is easily accessible so you can turn off sign without having to lift building to access switch on electronic circuit**
- **For roof-mounted signs, cut a slot on the roof of the building and feed plug connector from inside the building through the slot and connect to sign**

# Powering Your Signs

- **Miller sells two 4.5 VDC power supplies that plug into a wall outlet**
- **One will power 3 signs. Other will power 10 signs**
- **Power supplies will plug into a distribution panel**

- **Distribution panel has red and black terminals**
- **Connect red wire from sign to red side of terminal**
- **Connect black wire from sign to black side of terminal**
- **This assures polarity will be correct**



# Distribution Panel and Power Supply

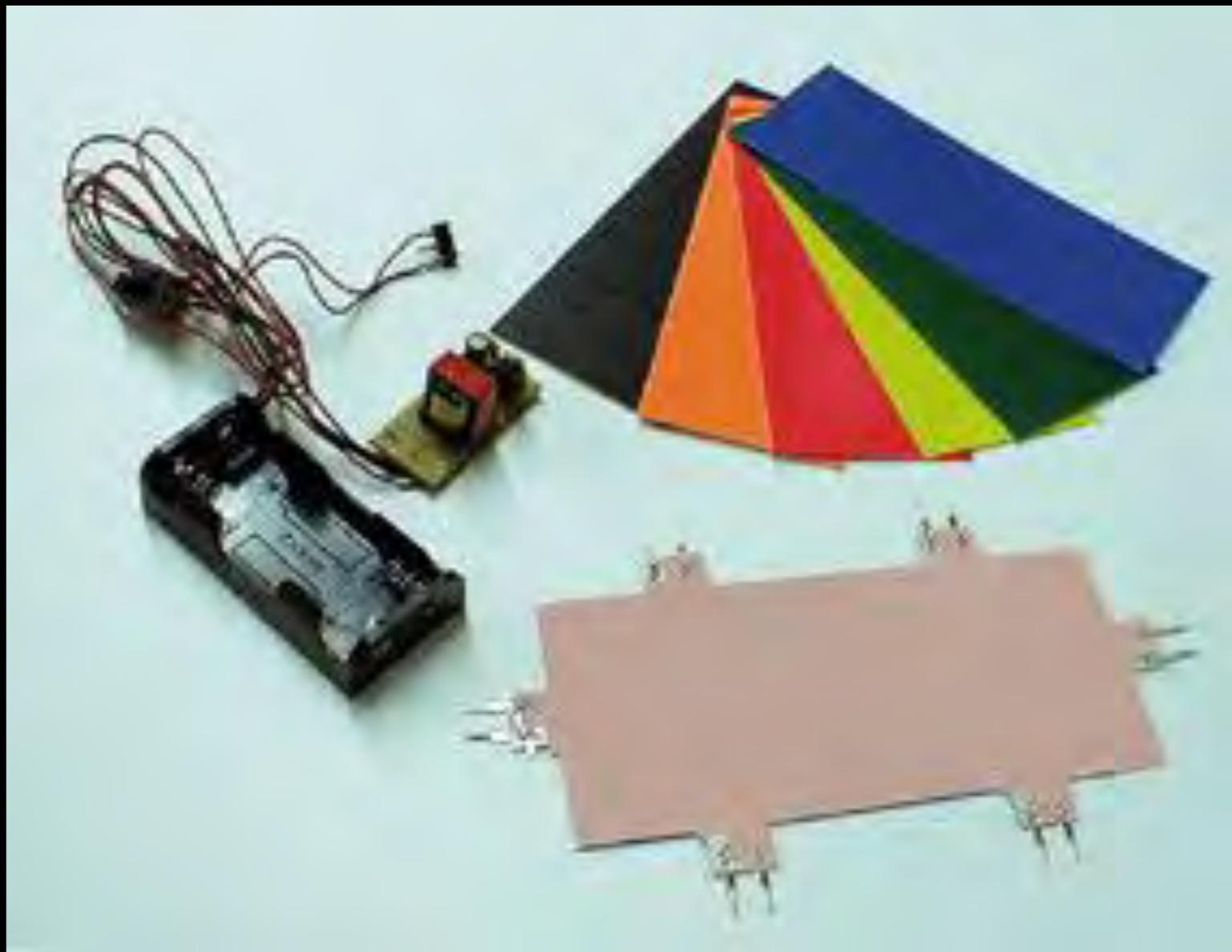
- **Miller also sells a 4.5 VDC power supply that connects to track power**
- **Trick to successfully mounting the Miller signs is to hide the sign plug**
- **Be creative in finding ways to hide the plug**



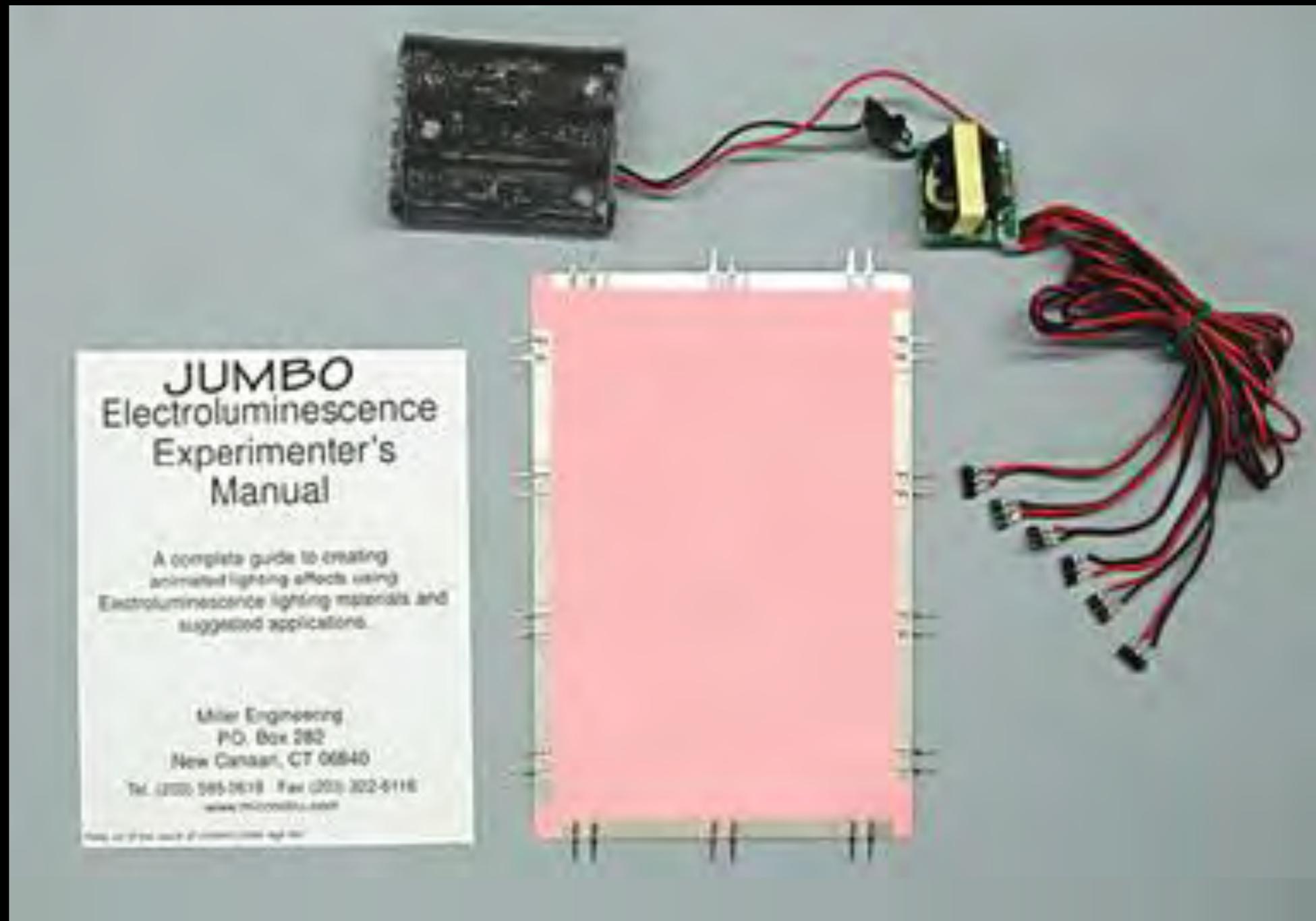
**Plug for Miller Theater Marquee sign is on left of the sign, and comes through a slot in the Hardware Store (where white and red dots are)**

# Making Your Own Signs

- You can make custom EL signs for your layout
- Miller makes several experimenter's kits that come with:
  - Instructions
  - Electronic circuit board
  - EL lamp sheet
  - Six colored, translucent sheets



- **Translucent sheets in an assortment of colors with adhesive backings**
- **Retail price is from about \$23 to \$33**

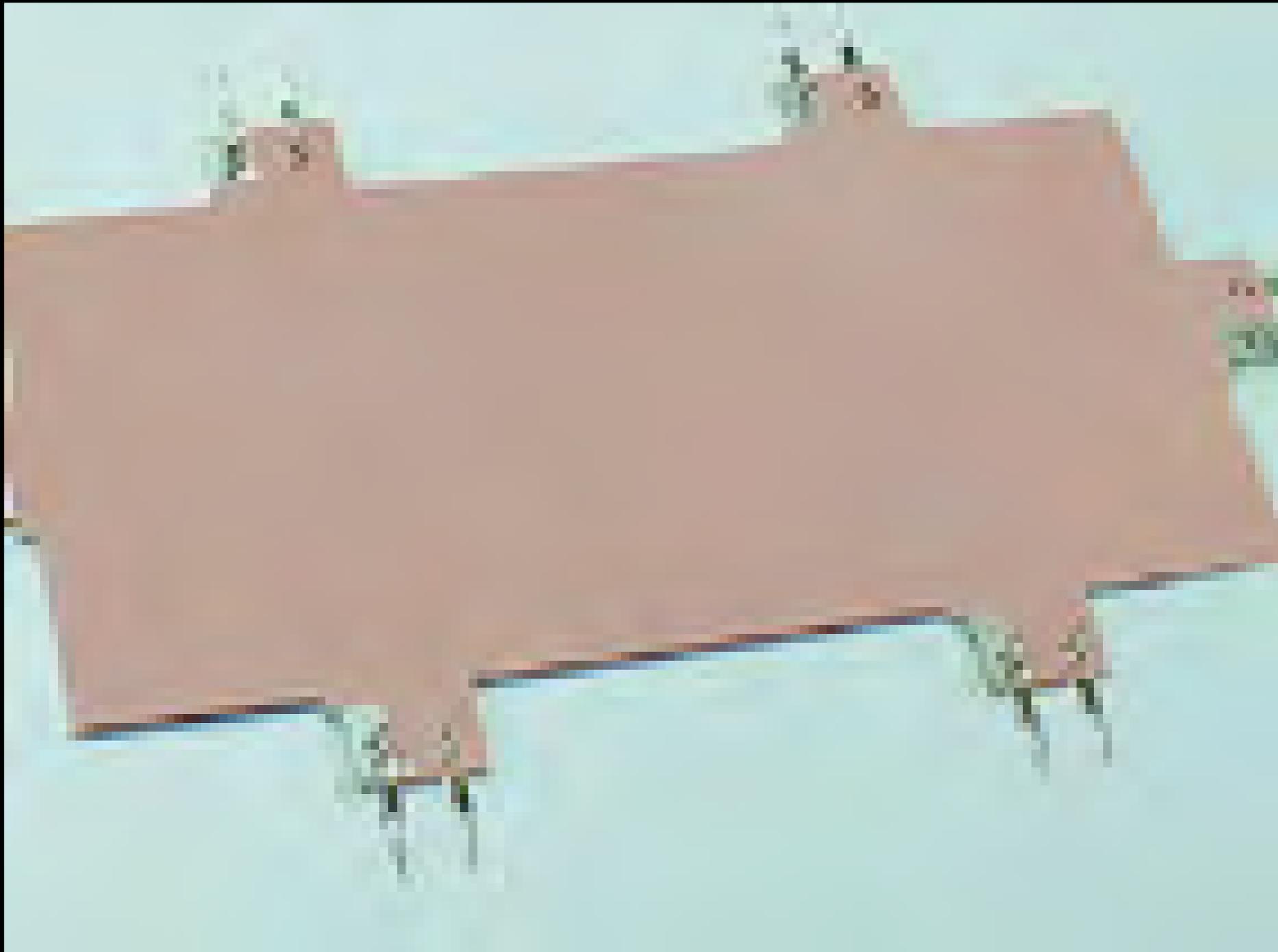


**Jumbo Experimenter's Kit Allows you to make signs with chase patterns (primarily designed for creating letters with a sequential chase pattern)**

- **Two main aspects to making your own EL signs**
- **Making the sign itself**
- **Making a mounting for the sign**

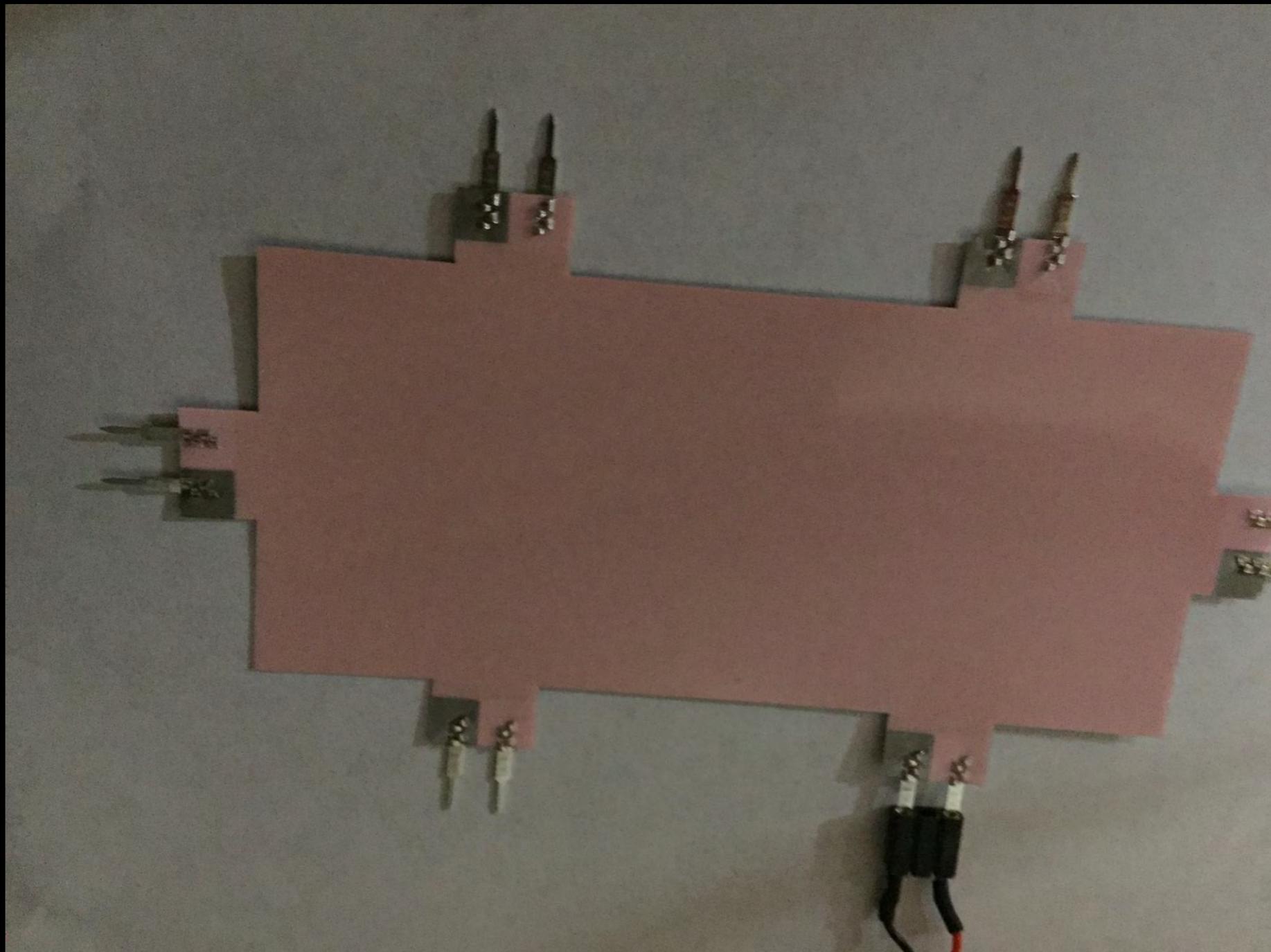
# Making the sign

- **The EL Lamp**
  - **About 2" x 5"**
  - **6 pairs of electrical connectors around the lamp sheet**

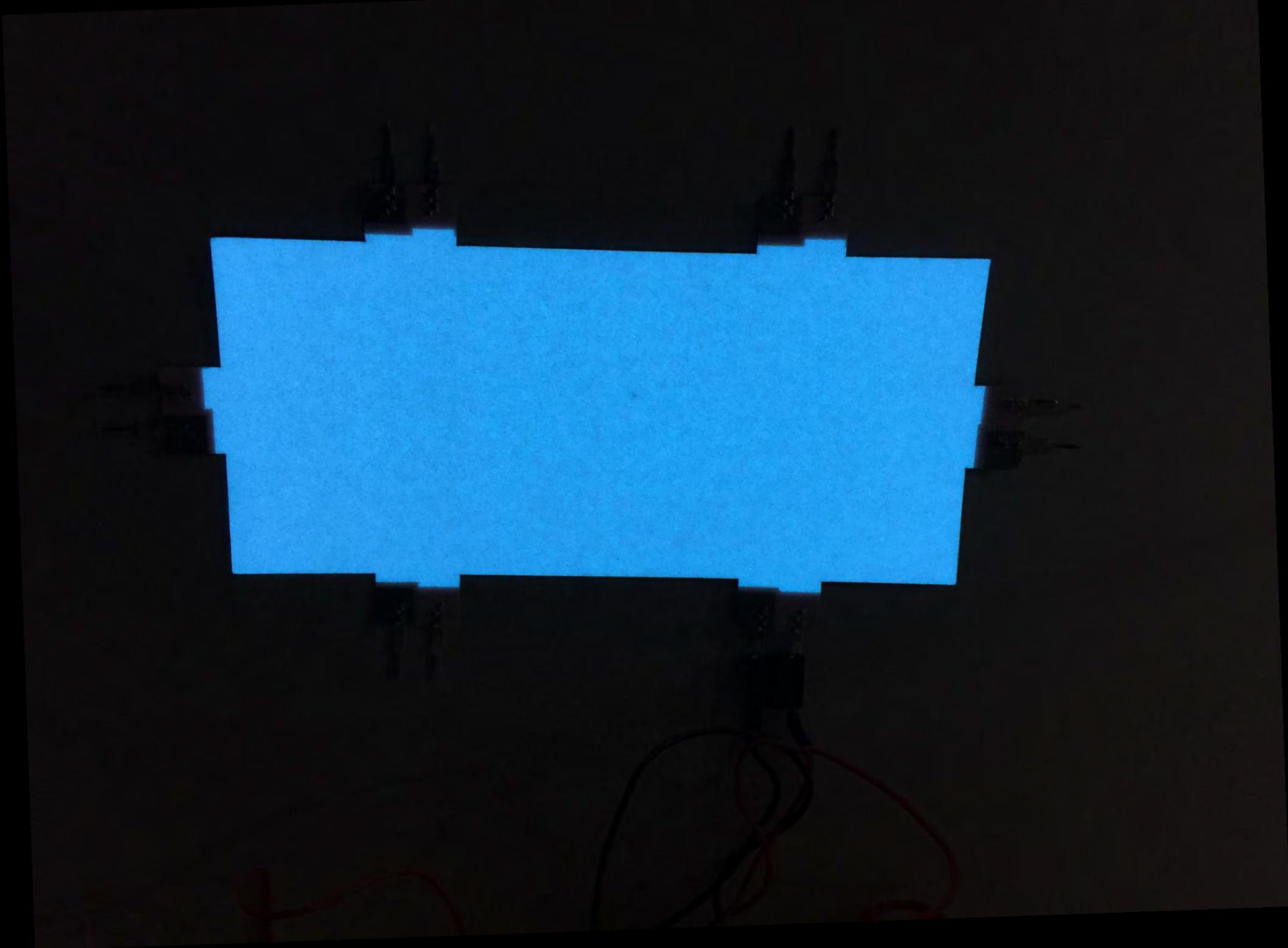


**Miller EL Lamp with 6 electrical connections**

- **Applying voltage from electronic circuit output wires to any of the 6 sets of electrical contacts will cause entire lamp to light**
- **You can cut EL lamp with scissors or Xacto blade into smaller signs of any size**
- **Any piece of the EL lamp connected to electrical contacts will continue to light up when voltage is applied**

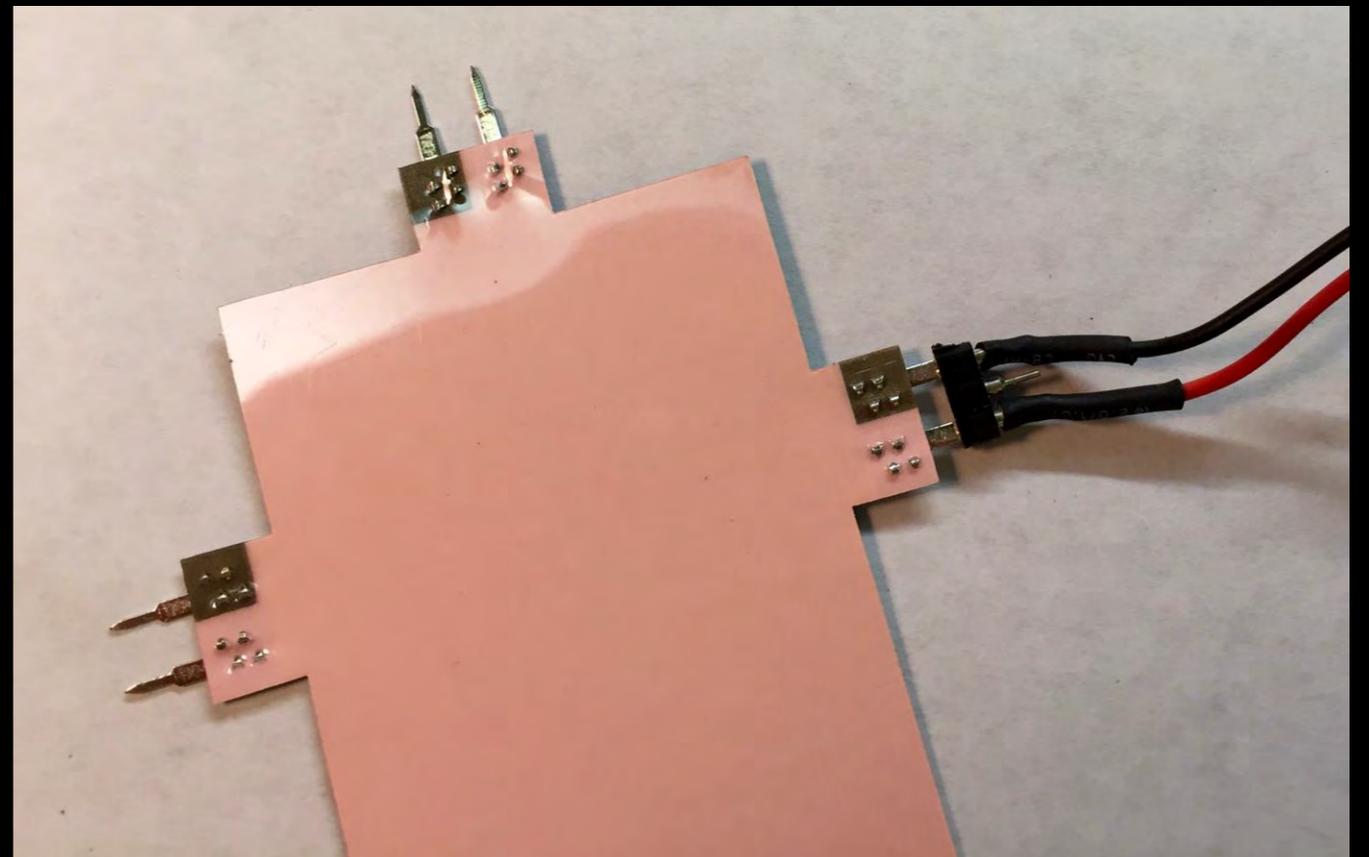
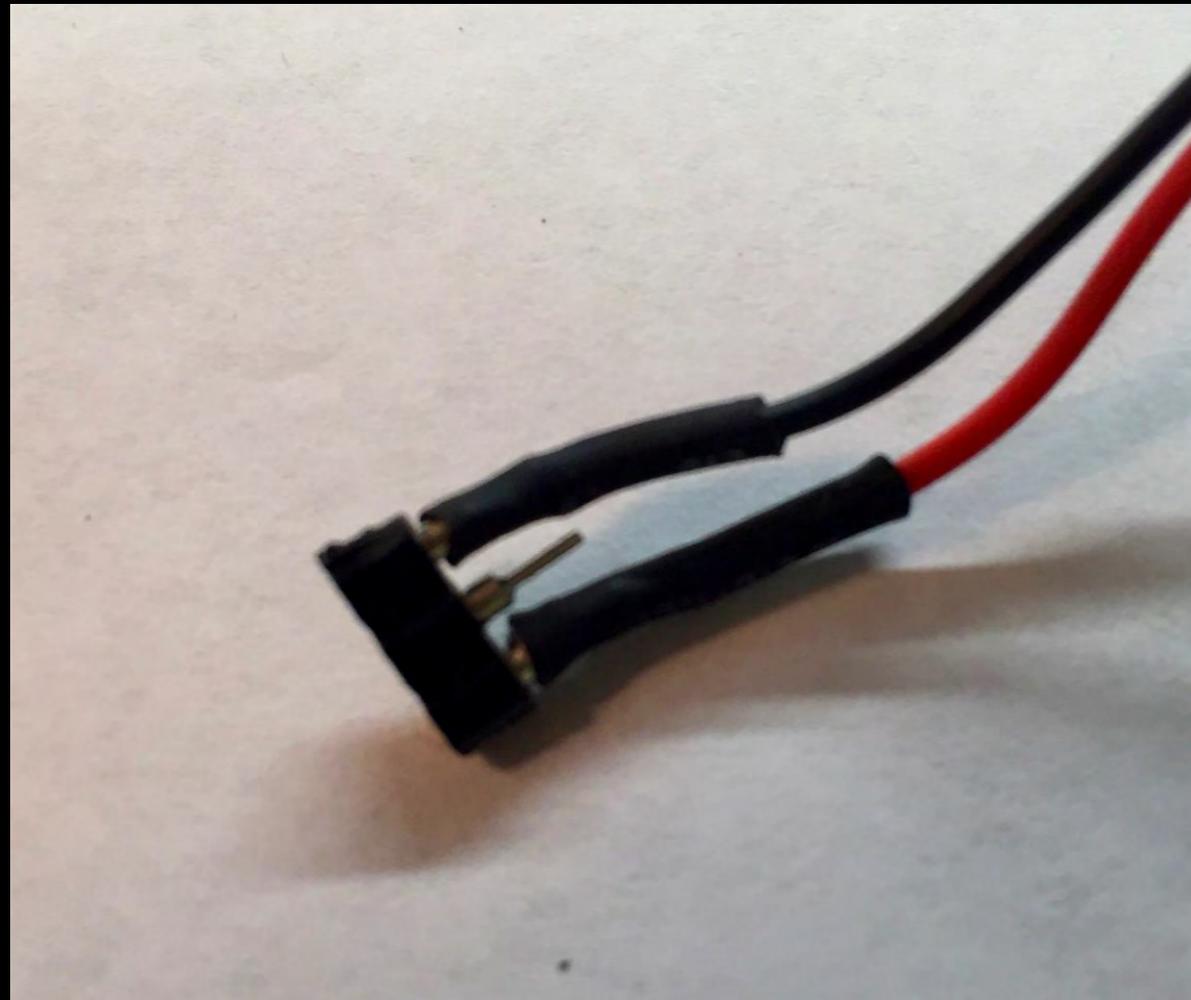


**EL Lamp with connector attached  
(note that the EL lamp terminals are  
not polarity-dependent)**



**Same EL lamp with power turned  
on**

- **How can I power multiple signs from one electronic circuit?**
- **Easiest way is to cut off plug connector and connect wires to a distribution terminal block**
- **Each sign can now have wires soldered onto the electrical contacts and connected to the terminal block**



**Plug Connector for EL Lamp**

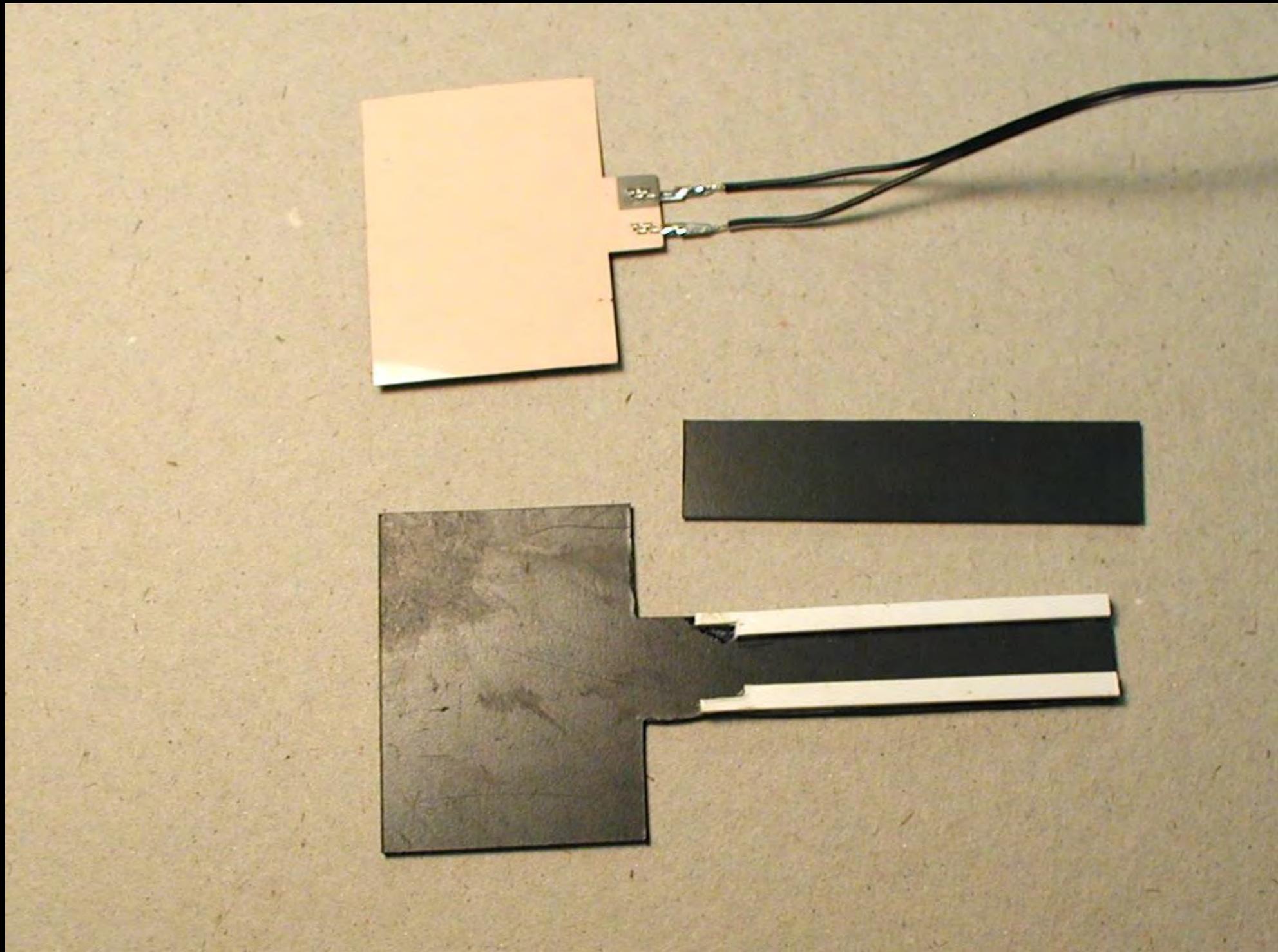
# **Making the Sign Mounting**

- **Sheet and strip styrene seem to work fine**
- **Main concern is discretely hiding the electrical connections**

# WARNING!

- When affixing the EL lamp to the styrene (or any type) backing, **DO NOT USE A SOLVENT-BASED GLUE!**
- Solvent-based glues will dissolve the rear electrode (the back-side of the EL lamp) and short it out
- I found this out the hard (and expensive) way.

- **I informed Miller Engineering and they said they will add a warning in the next run of instruction sheets**
- **I have found that artist's spray adhesive, found in most crafts stores, works fine to attach EL lamps to a backing**
- **I also found double-sided tape works well. Attach it to back side of sign, then use xacto knife to trim excess away from sign**



**EL sign with wires soldered to terminals and styrene plastic mount**

# Electrical Connections

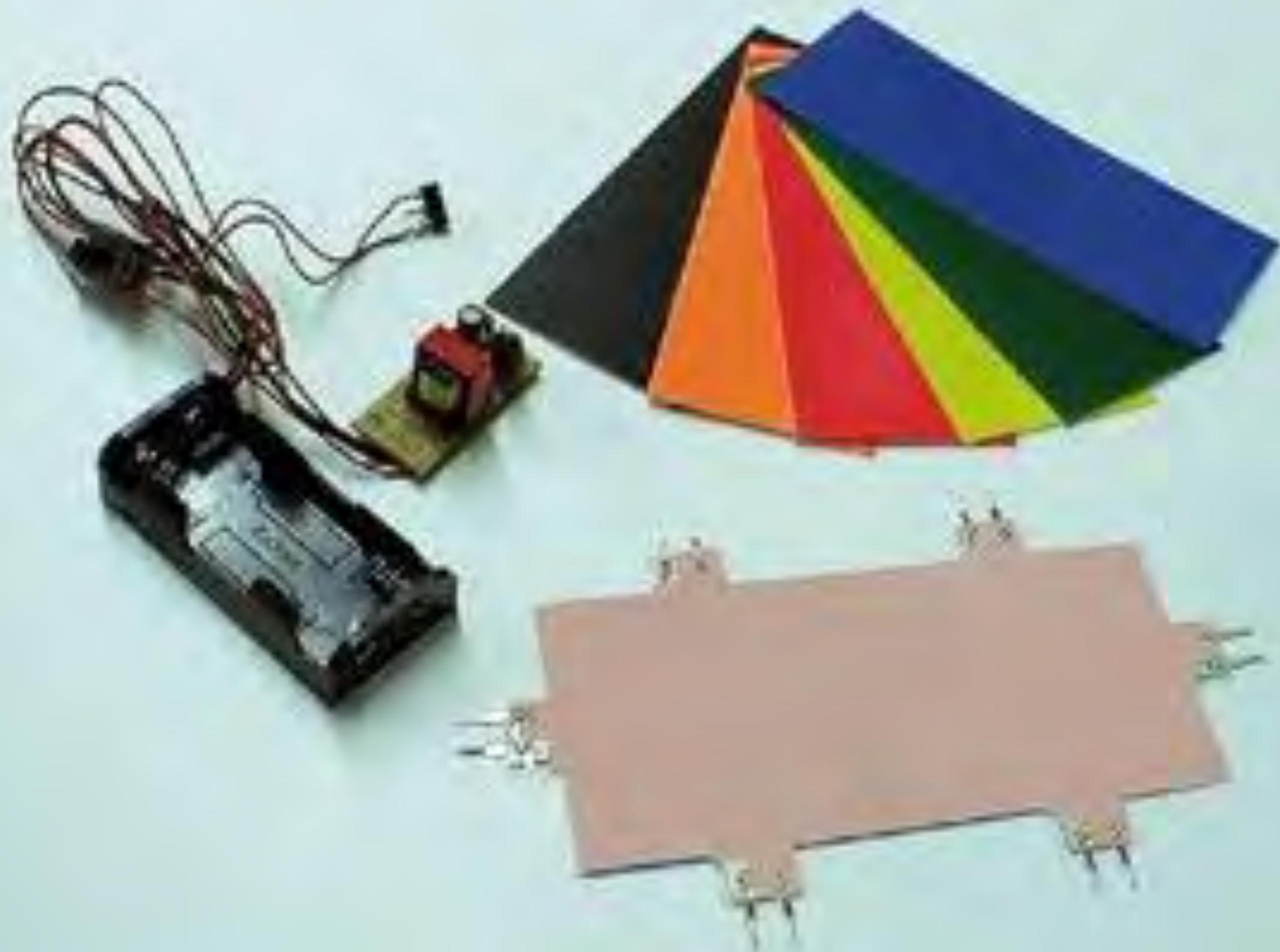
- **Access to interior of buildings desirable (change chase pattern, replace interior building lights, or trouble-shoot)**
- **Don't glue buildings down**
- **Plug-type connectors that allow building to be removed from layout quickly are desirable**

- **Small, two-pin connectors work well**
- **I like to use Miniatronics Corp 2-pin Micro Mini connectors (50-001-02)**
- **Other, less expensive connectors available**
- **For multiple signs and/or lights in same building, wrap different colored electrical tape around connectors to color code connectors**



# Color and Letters

- **Each Miller Experimenter's Kit comes with 6 sheets of colored, translucent adhesive-backed film**
- **Easiest way to attach these to an EL sign is to cut EL lamp to desired size**
- **Stick adhesive-backed film to EL sign and trim excess**



# Lettering

- **Standard decal letters, such as Microscale lettering sheets, can be used**
- **After letter decals have dried, lightly overspray with a sealer**
- **You can also make letters, or the entire sign, including background color, on the computer using clear decal paper**
- **Clip-Art figures and symbols printed on decal paper can also be used**

- **Electroluminescent light will shine through lighter colors printed with ink-jet and laser printers**
- **Electroluminescent light will not shine through darker colors**



**Completed sign with black lettering made on clear decal paper by computer, on top of yellow translucent sheet, all affixed to EL lamp**



**“Kelsey’s Seafood” sign lit at night**



**Hartman's Department Store at night with custom EL signs**



**Two custom EL signs and  
Miller's "Diner" sign**



**Decal (top), translucent film (middle) and EL lamp (bottom)**



**The same scene at night**



**“Citgo Fuel” during the day**



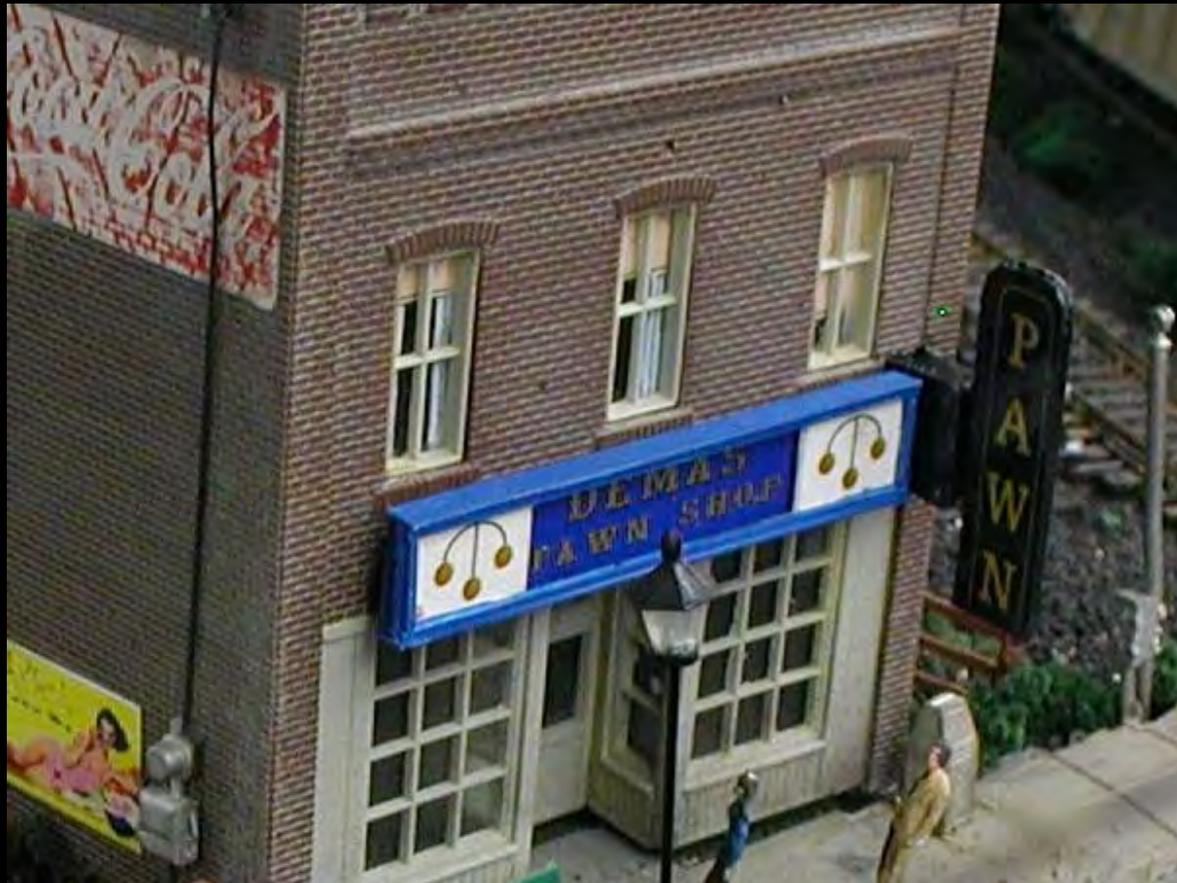
**“Citgo Fuel” at night**



**“Sheron’s Marine” sign uses an orange translucent film over the EL lamp, and then a decal made on the computer with clear decal paper. It has a black background, and no color (or white) for the letters**



**When lit, only the letters will appear lit. The black background of the decal blocks the EL lamp's light**



**The “DEMAS PAWN SHOP” signs  
(named for my friend Bill Demas)**



**The “DEMAS Pawn Shop” signs  
at night**



**Tommy Fischer's Appliance Store Sign in Daytime**



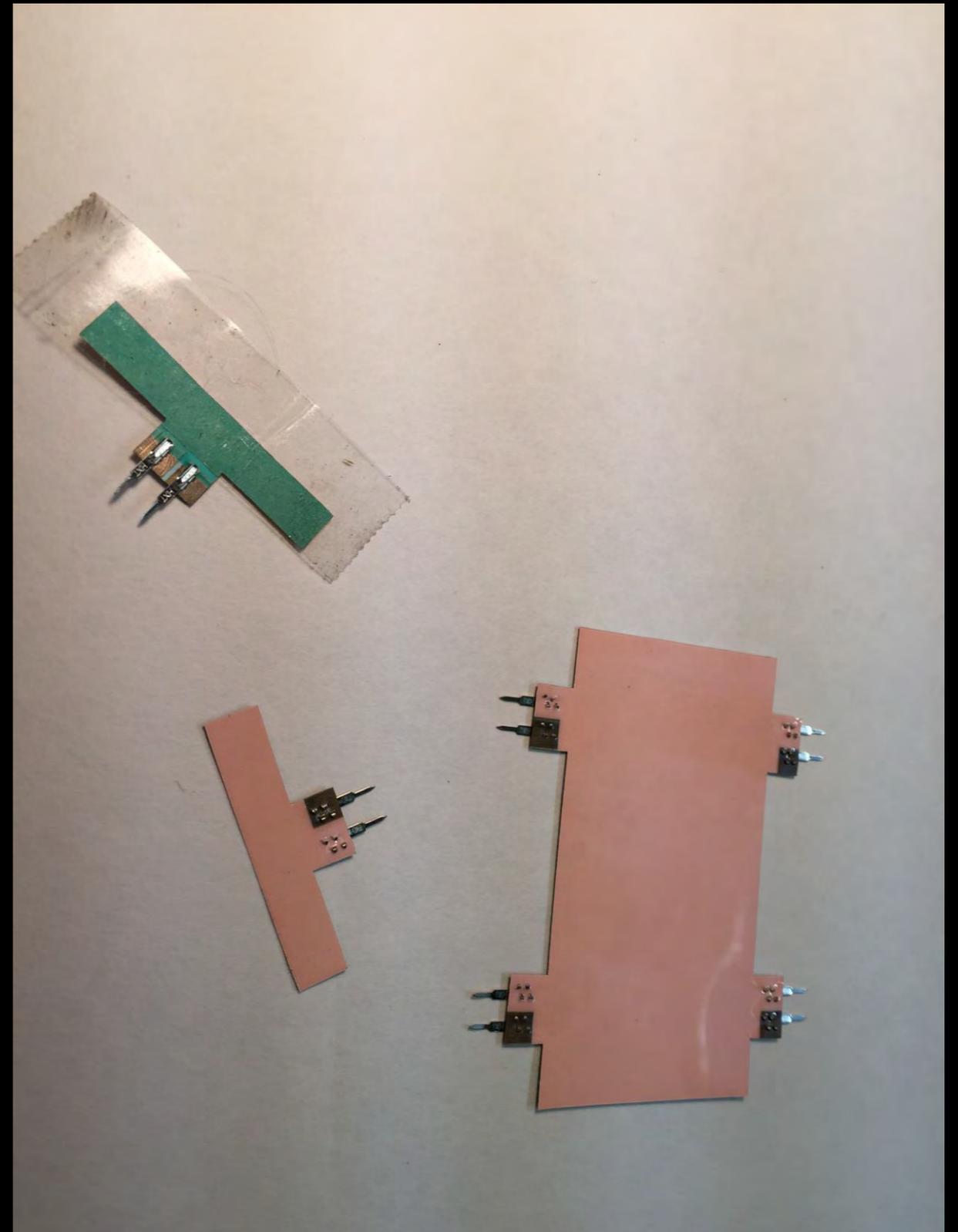
**Tommy Fischer's Appliance  
Store Sign at Night**

- **Note that vertical Miller signs come with several adhesive decals with various business names**
- **You can use these extra decals with the experimenter's kit to make additional signs**
- **“Pawn” sign was made using extra Miller “Pawn Shop” vertical sign**

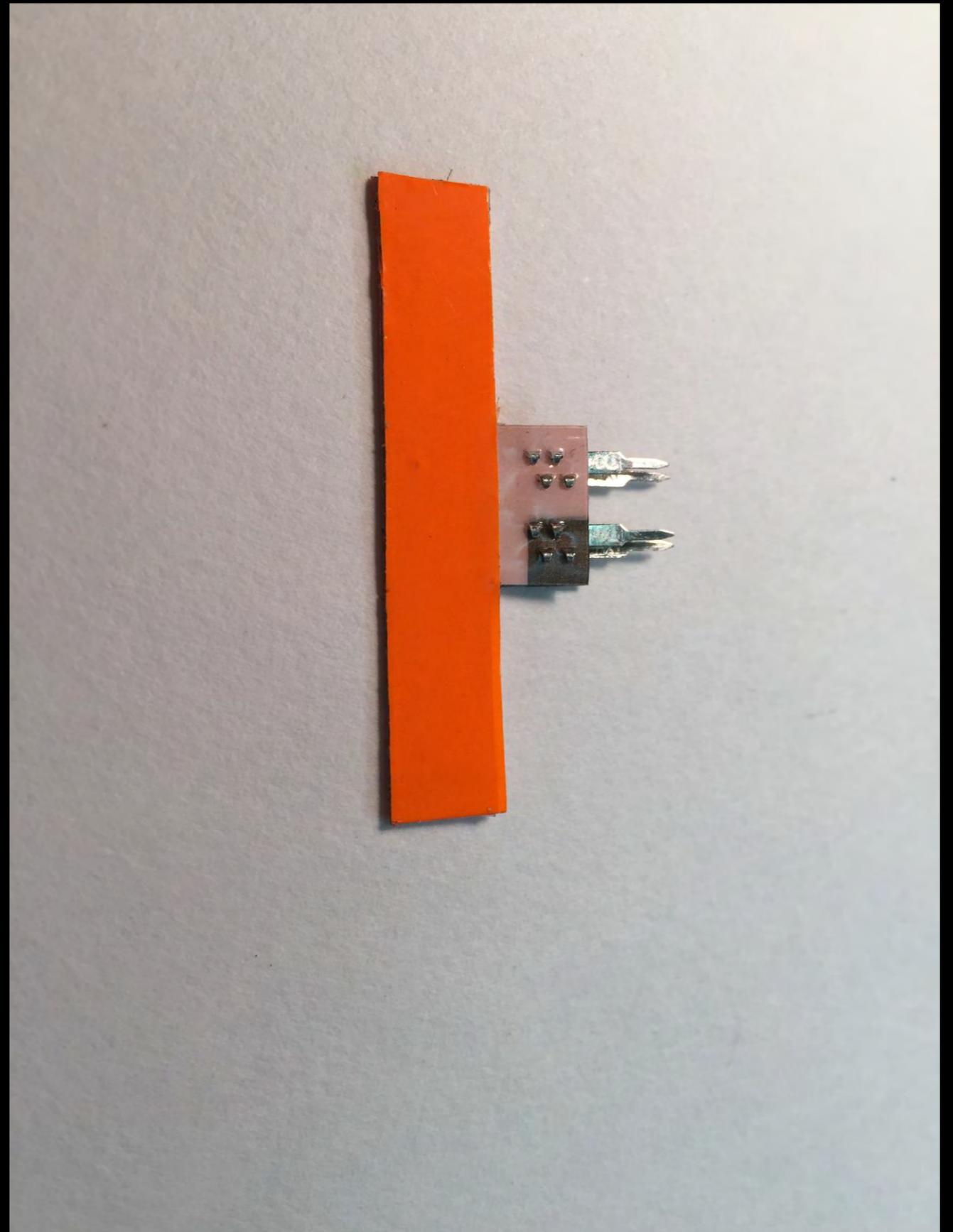
- **Two EL lamps, the size of the Pawn Shop vertical sign, were cut out and glued back-to back**
- **The two electrical terminals on each EL sign can then be soldered together and only a single pair of wires are needed to connect to both signs**
- **Remember, EL lamps are not polarity dependent, so terminal orientation is not important**

# Making a Vertical Building Sign

- Decide on dimensions and cut
- from EL lamp
- Sign at right is being made by
- cutting off ends of EL lamp
- Sign half at upper left has
- two-
- sided tape applied to back
- of
- the EL lamp



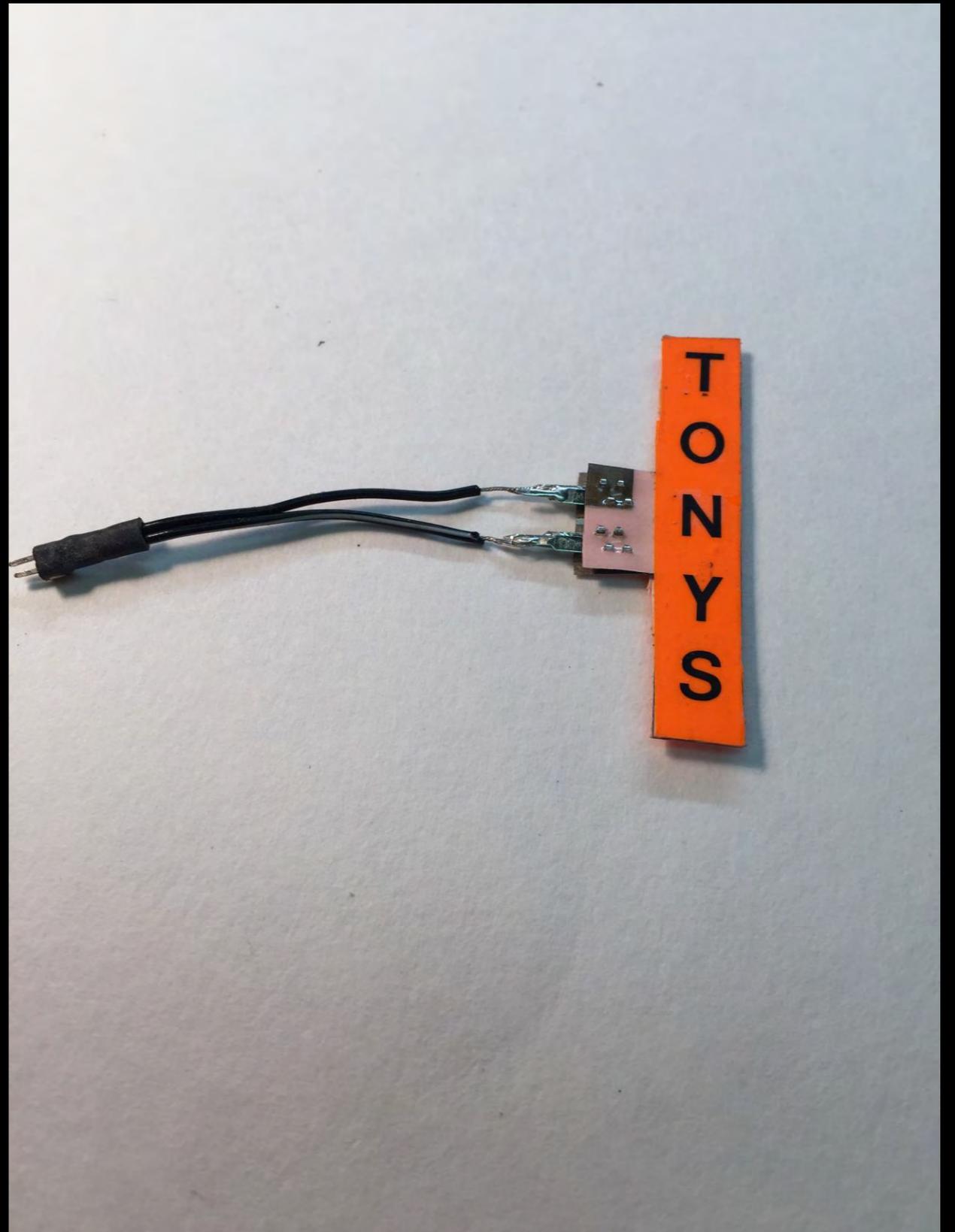
Add  
Translucent  
Film to Both  
Sides of Sign



Use Decals to  
put Desire  
Lettering on  
the Sign



# Solder Electrical Connections to the EL Lamp Terminals





Cut a slot in the building where You want to mount the sign. Make it just wide enough so electrical connector can pass through it



Mount the  
Sign in the slot  
and connect  
up the wires







**Night Scene of Huntington, NY on  
my Layout**



**Another Night Scene of Huntington**



**Another View**



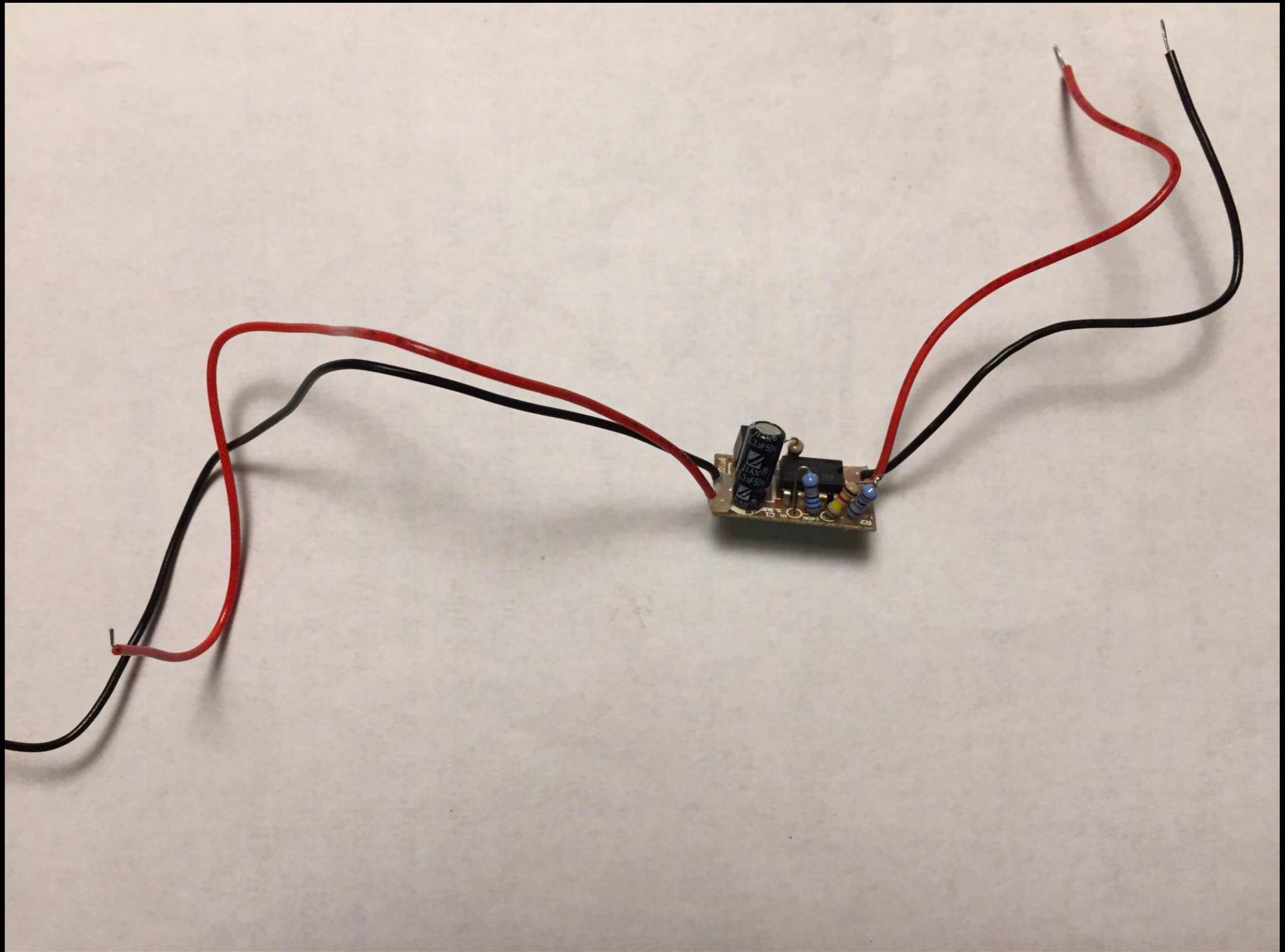
**And another View**



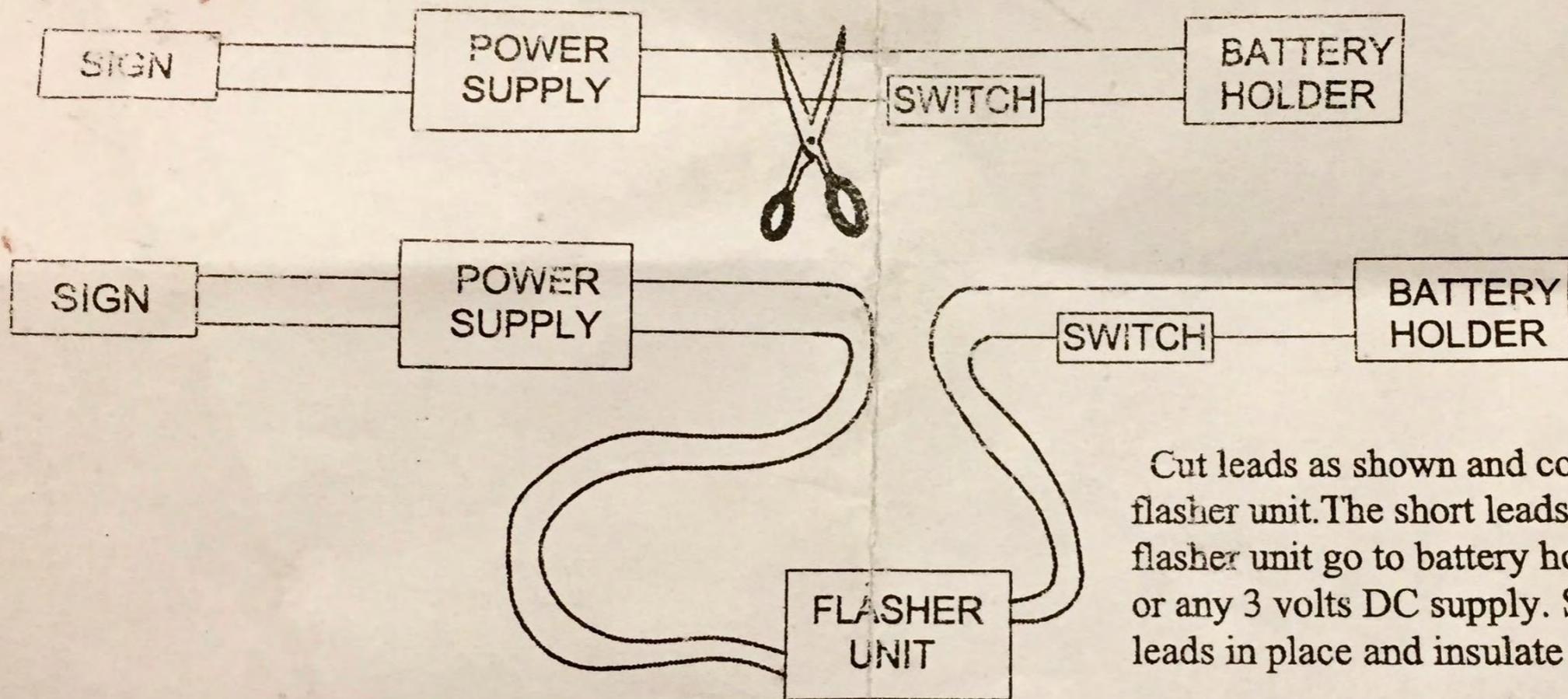
**Night Scene of East Northport**



**Flasher Circuit Connected in Series  
with a Custom Sign will Make  
Custom Sign Flash every 1/2  
second**



**Flasher Circuit**



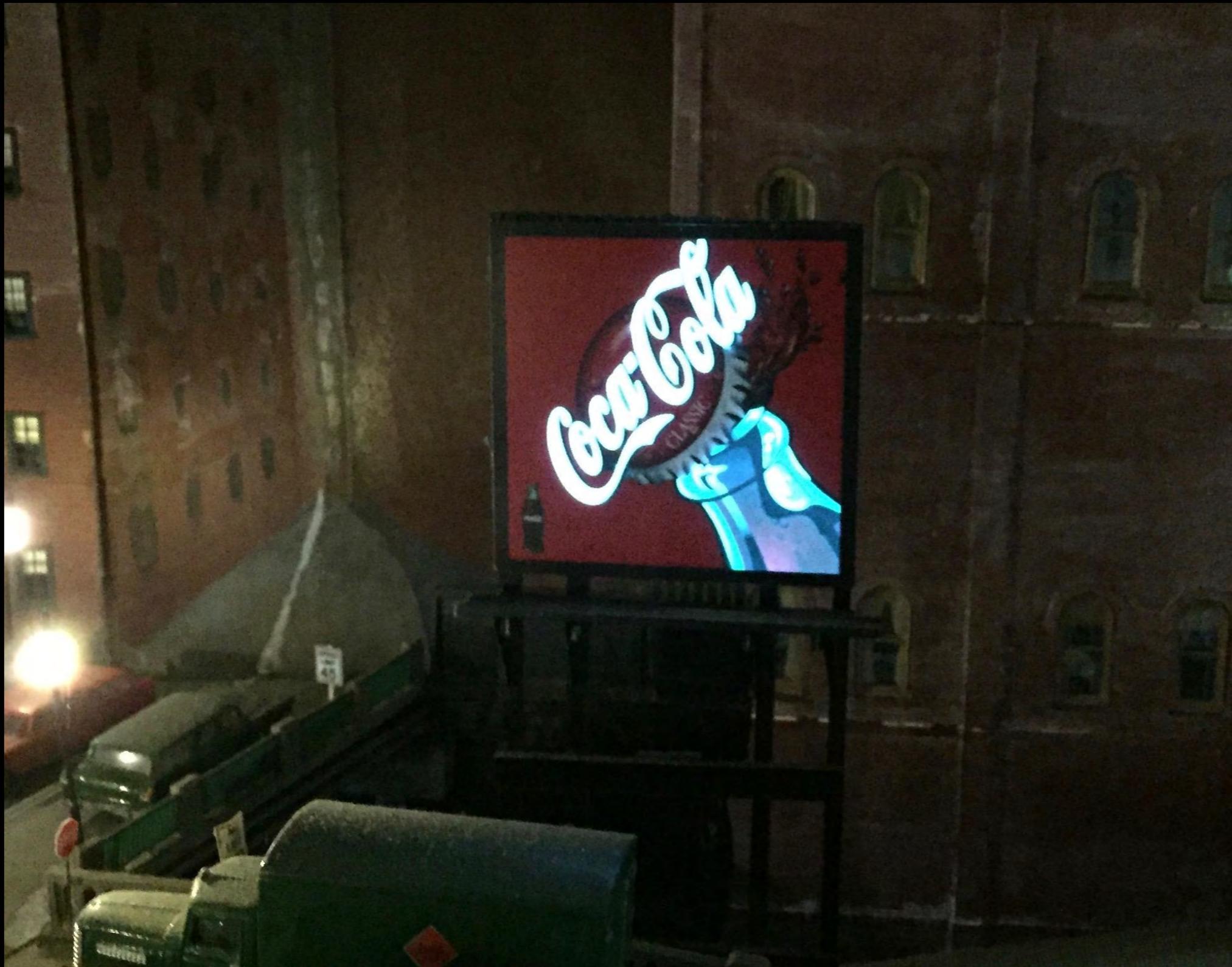
Cut leads as shown and connect flasher unit. The short leads on flasher unit go to battery holder or any 3 volts DC supply. Solder leads in place and insulate with tape.

# Instructions to Connect the Flasher Circuit

# **Other Animated Sign Vendors**



**Animated Billboard available on eBay from  
Vendor in Greece (eBay name is  
Lianokladi)**



**Nighttime View**



**“New York Pizza” and “Petlife” EL signs from Lianokladi (Greece)**



# Miniatronics “Beer on Tap” Sign

**In Summary, Making and  
Installing  
Electroluminescent Signs  
is relatively inexpensive,  
easy, fun, and can  
enhance the realism of  
your Layout**

**The Slides for this Clinic  
can be found at [Potomac-  
NMRA.org](http://Potomac-NMRA.org)**

**Follow links to “Clinics”**

**Thank You for Your  
Attention**

**Any Questions?**