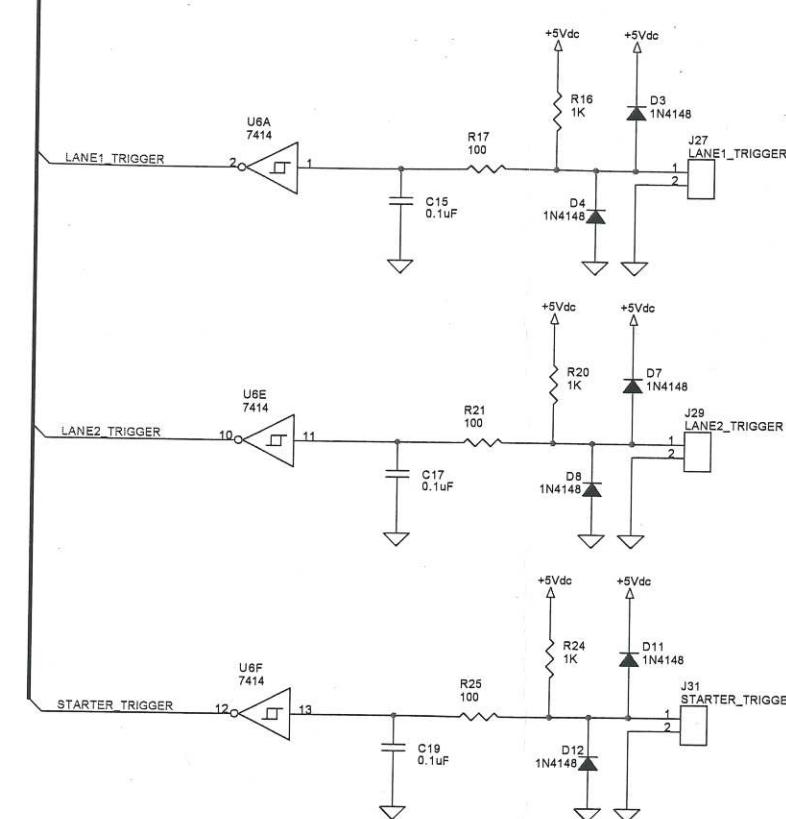


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 2. ALL CAPACITANCE VALUES IN MICRO  
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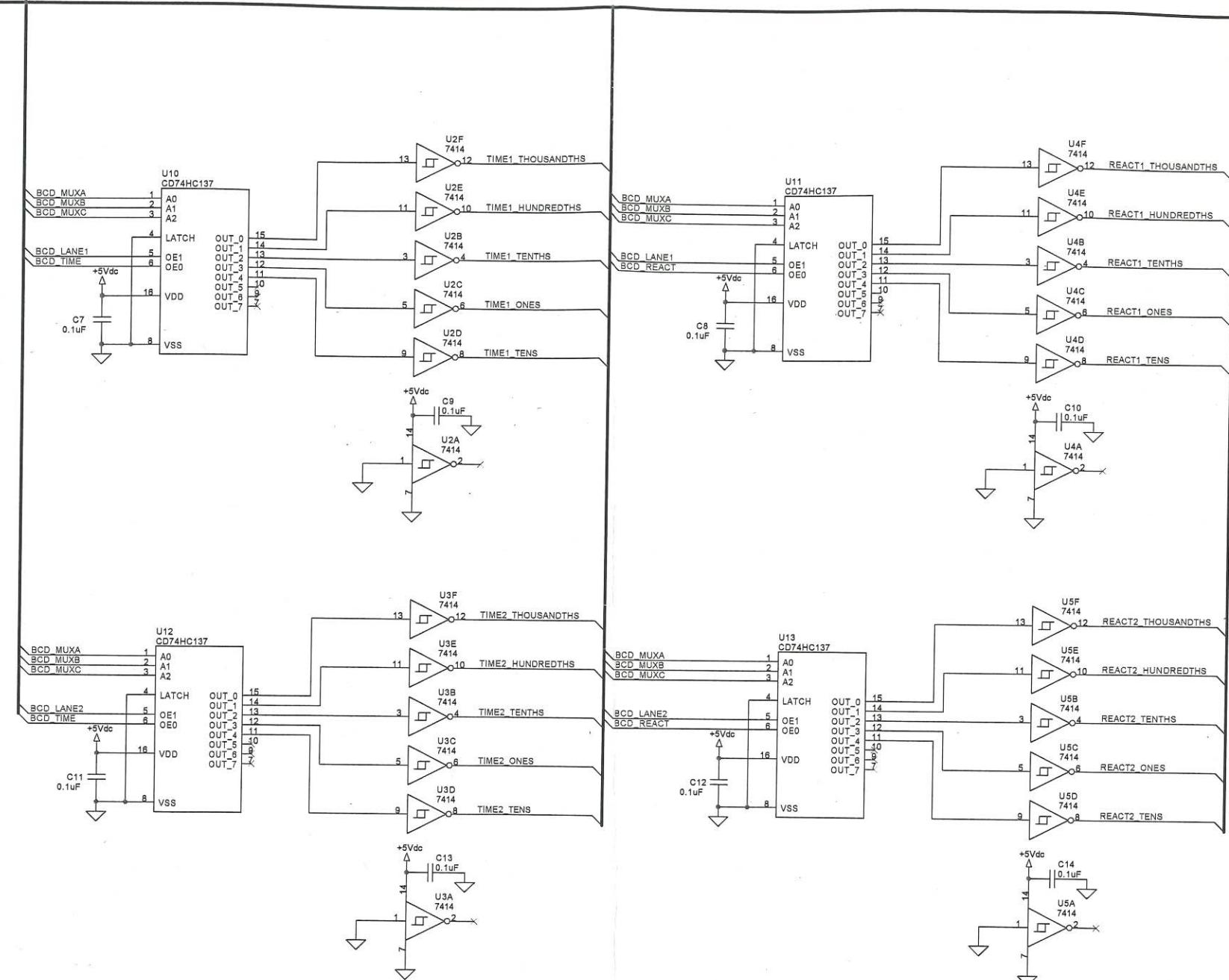


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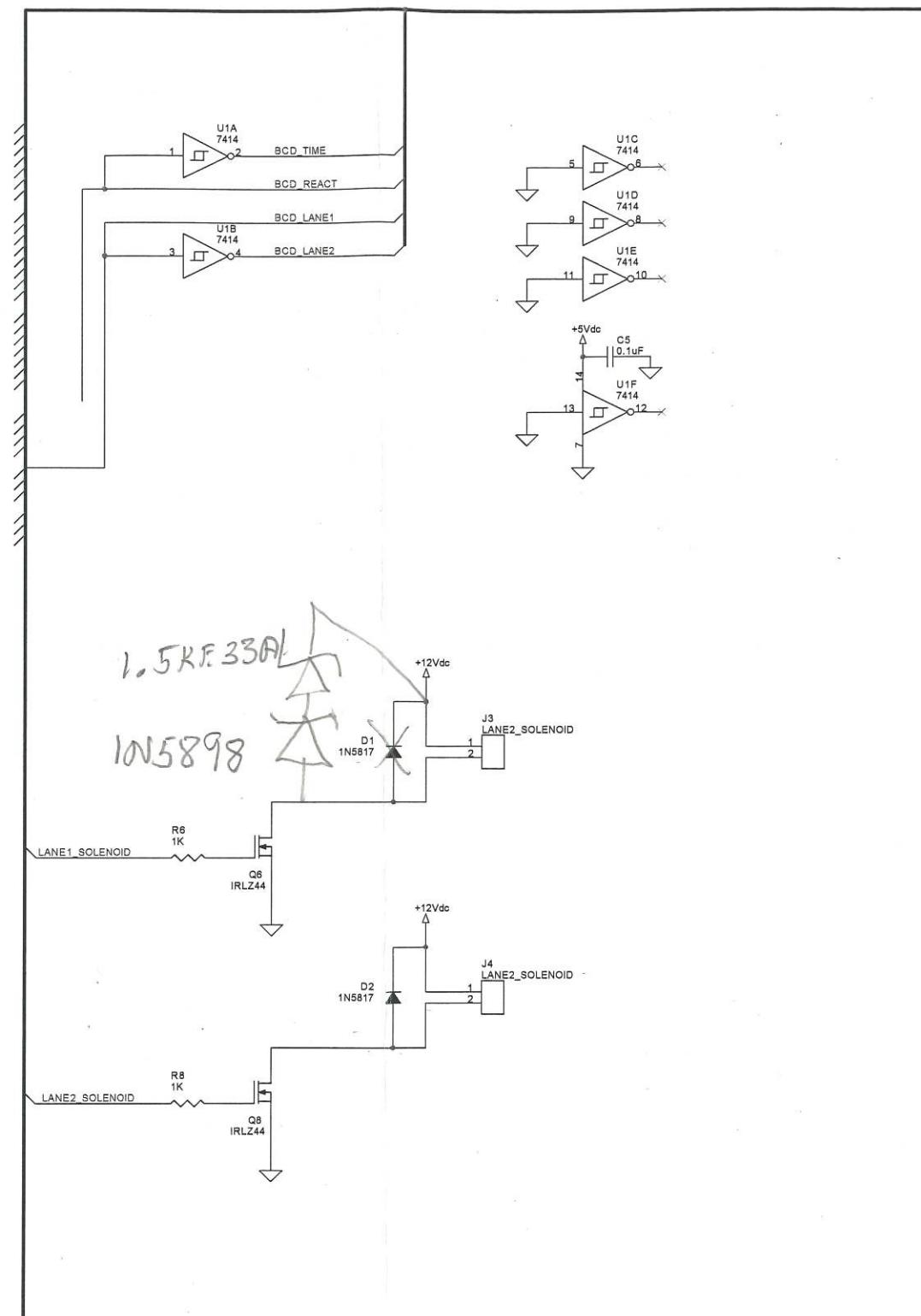
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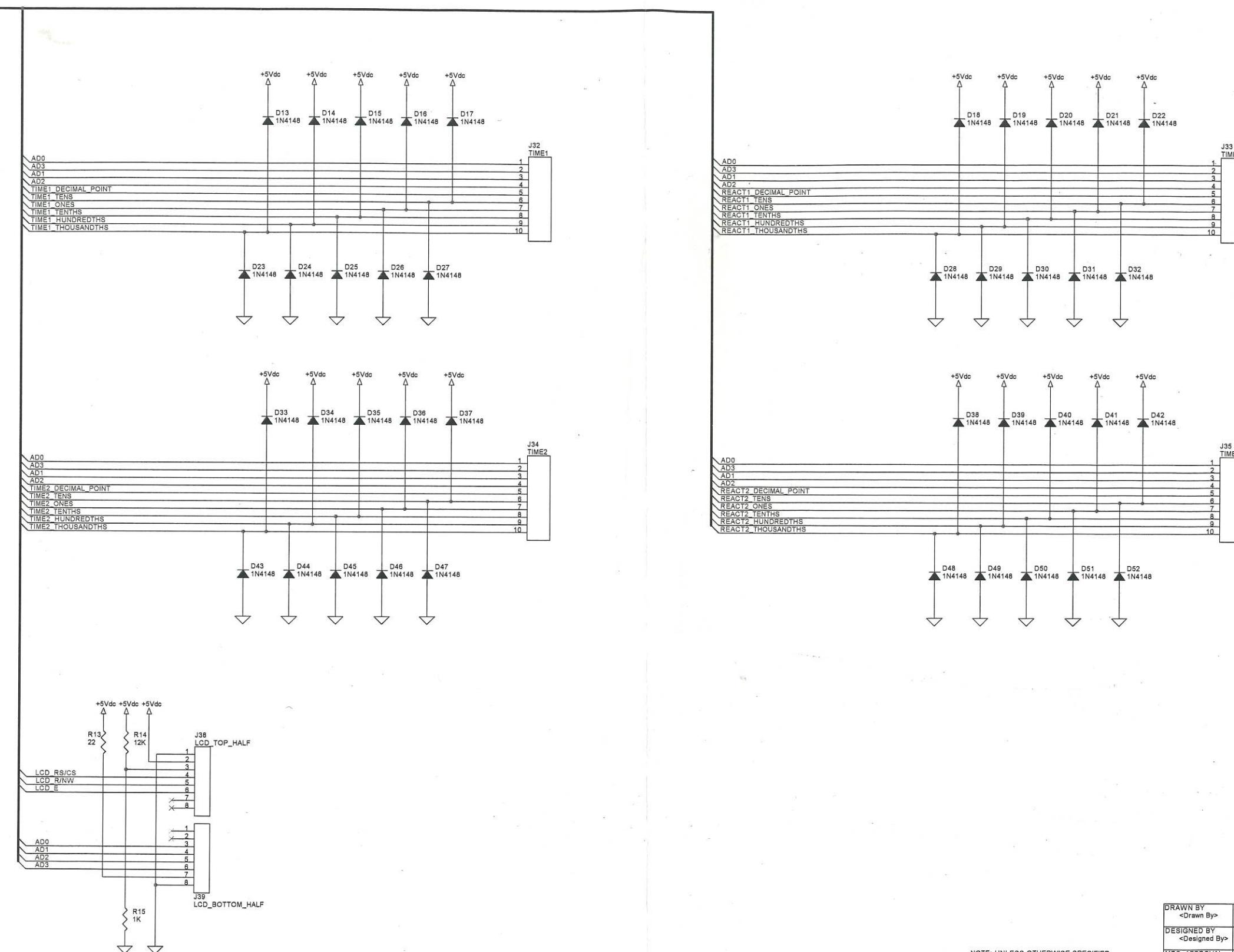
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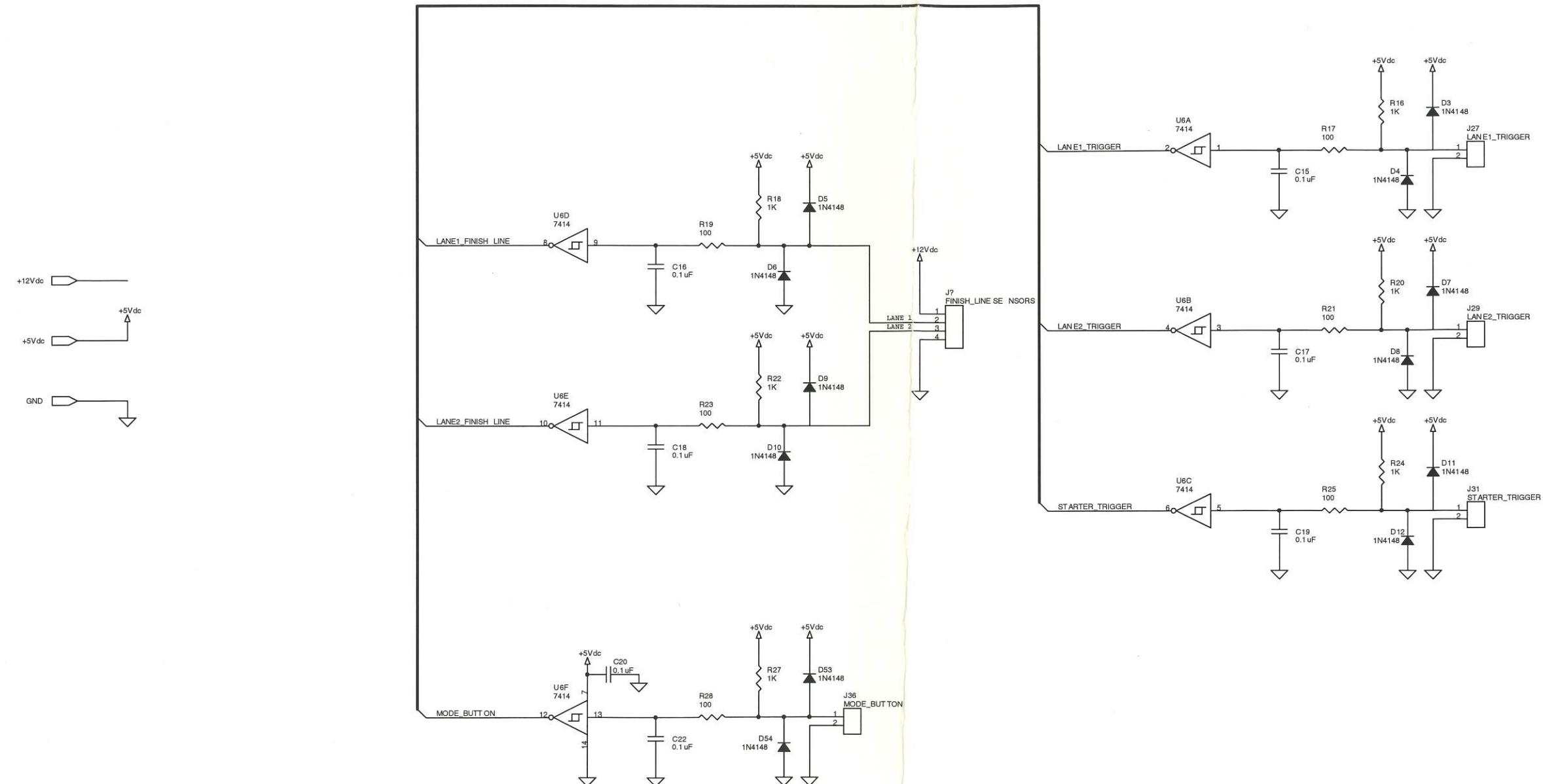
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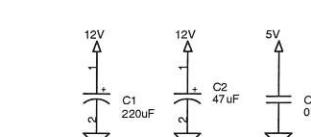
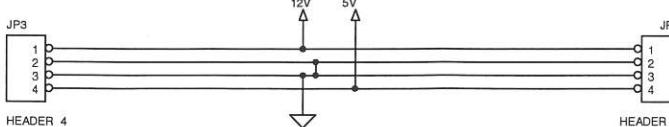
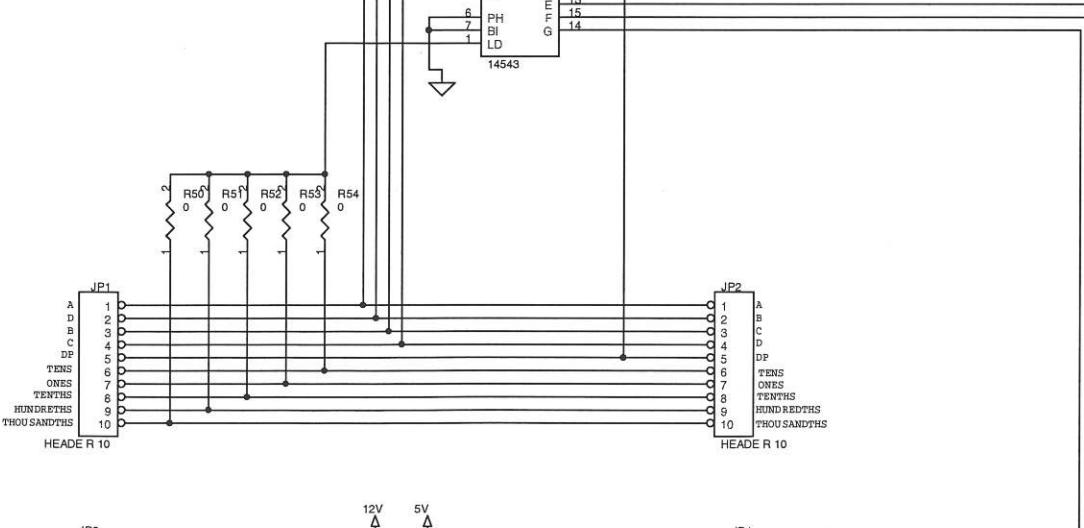
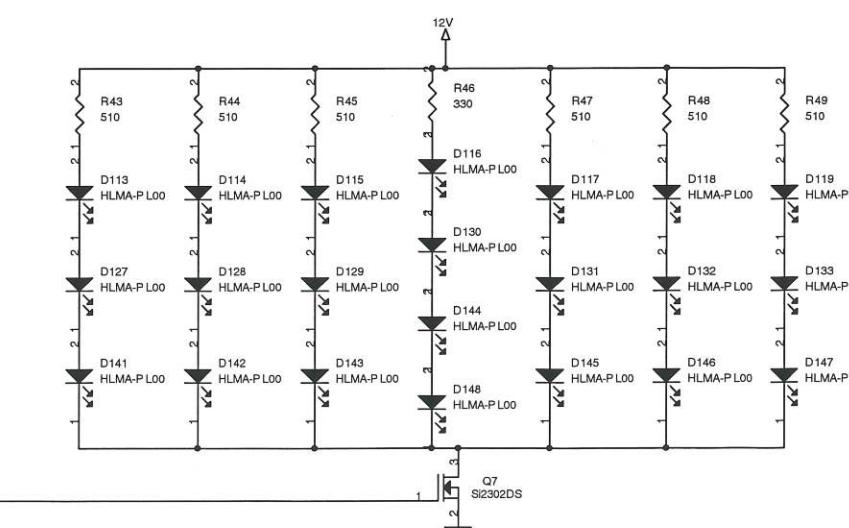
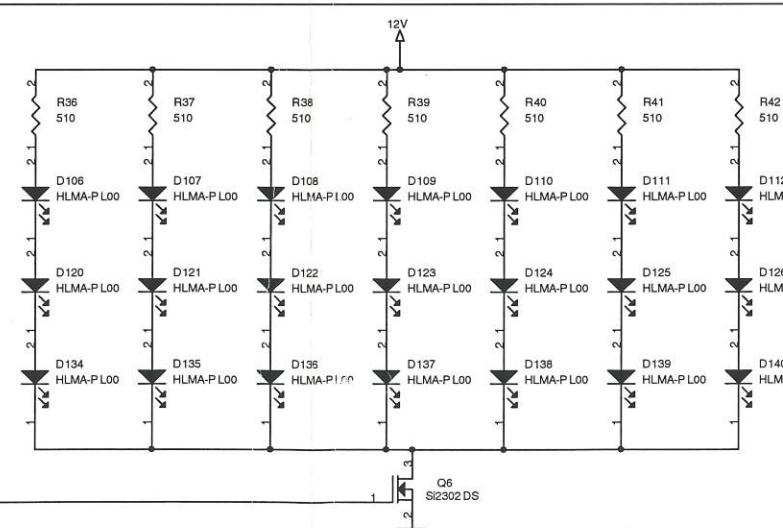
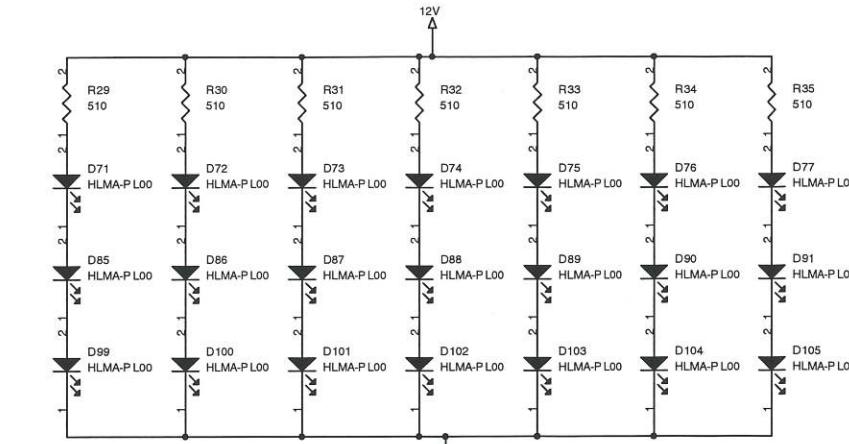
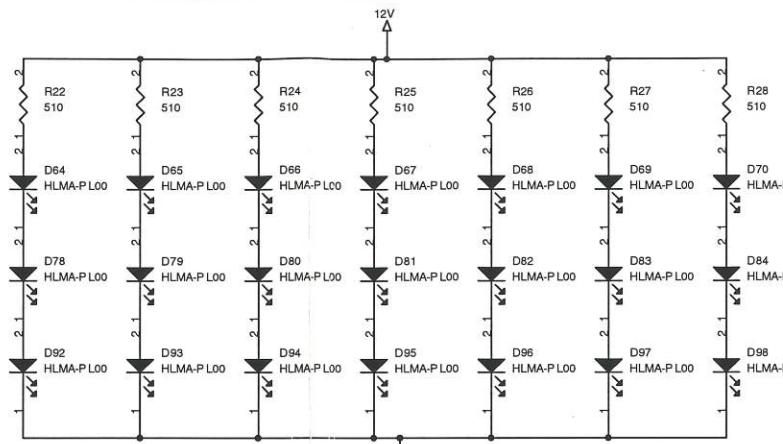
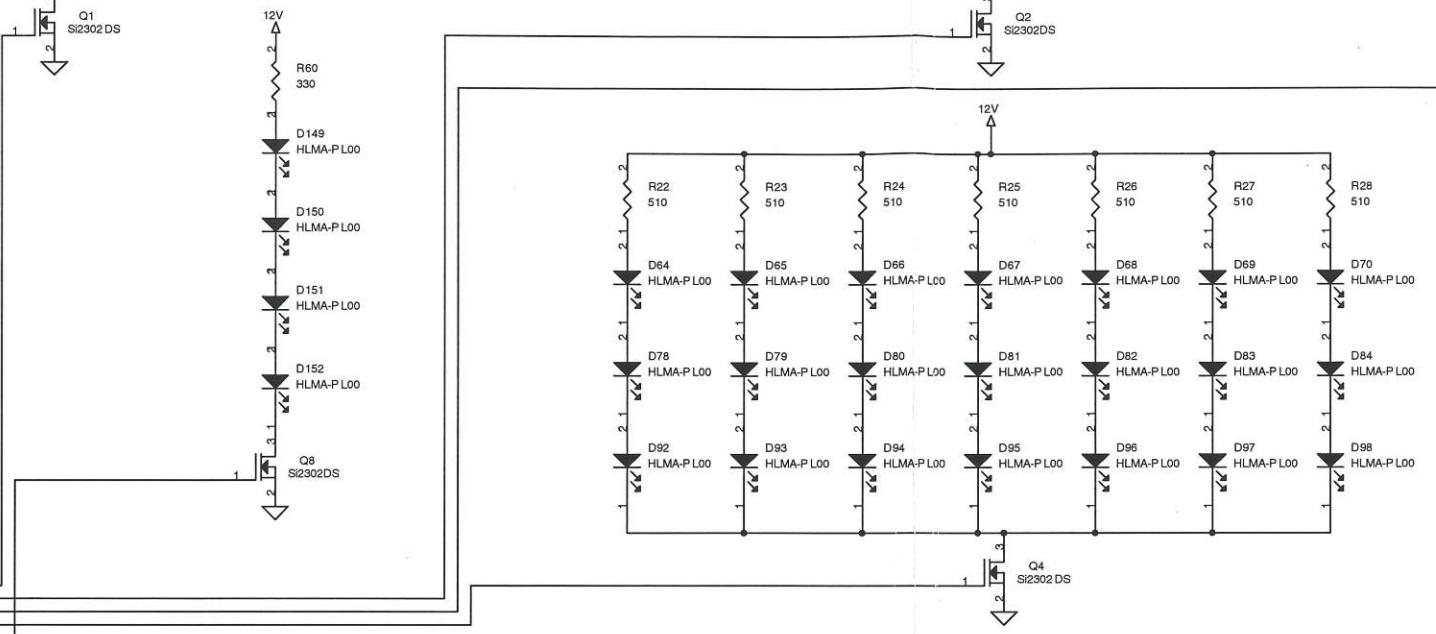
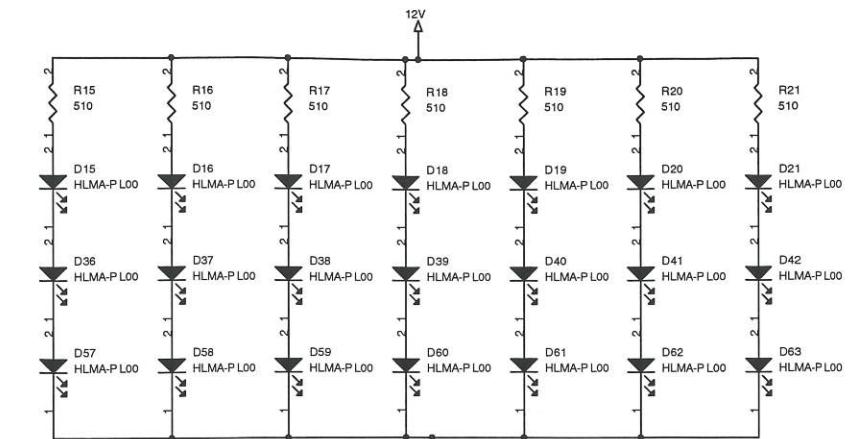
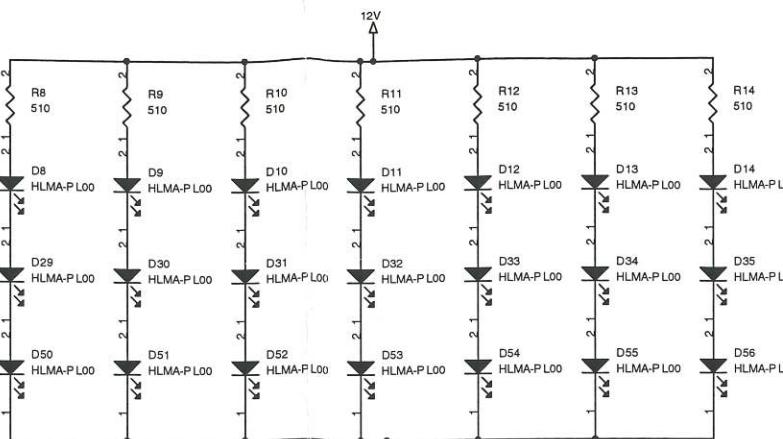
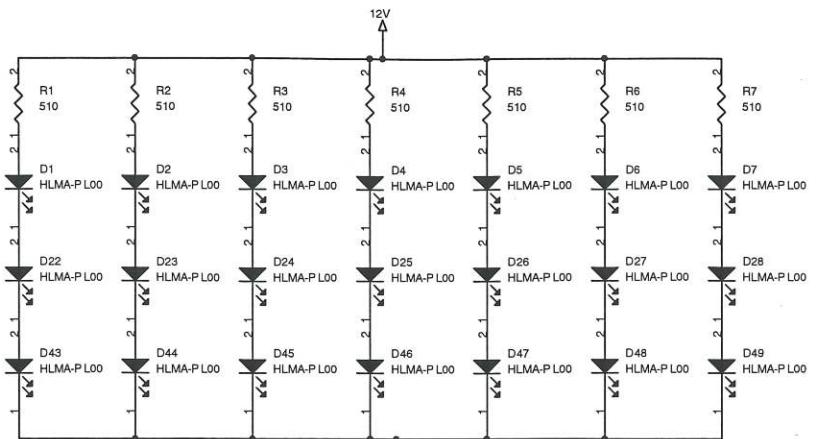
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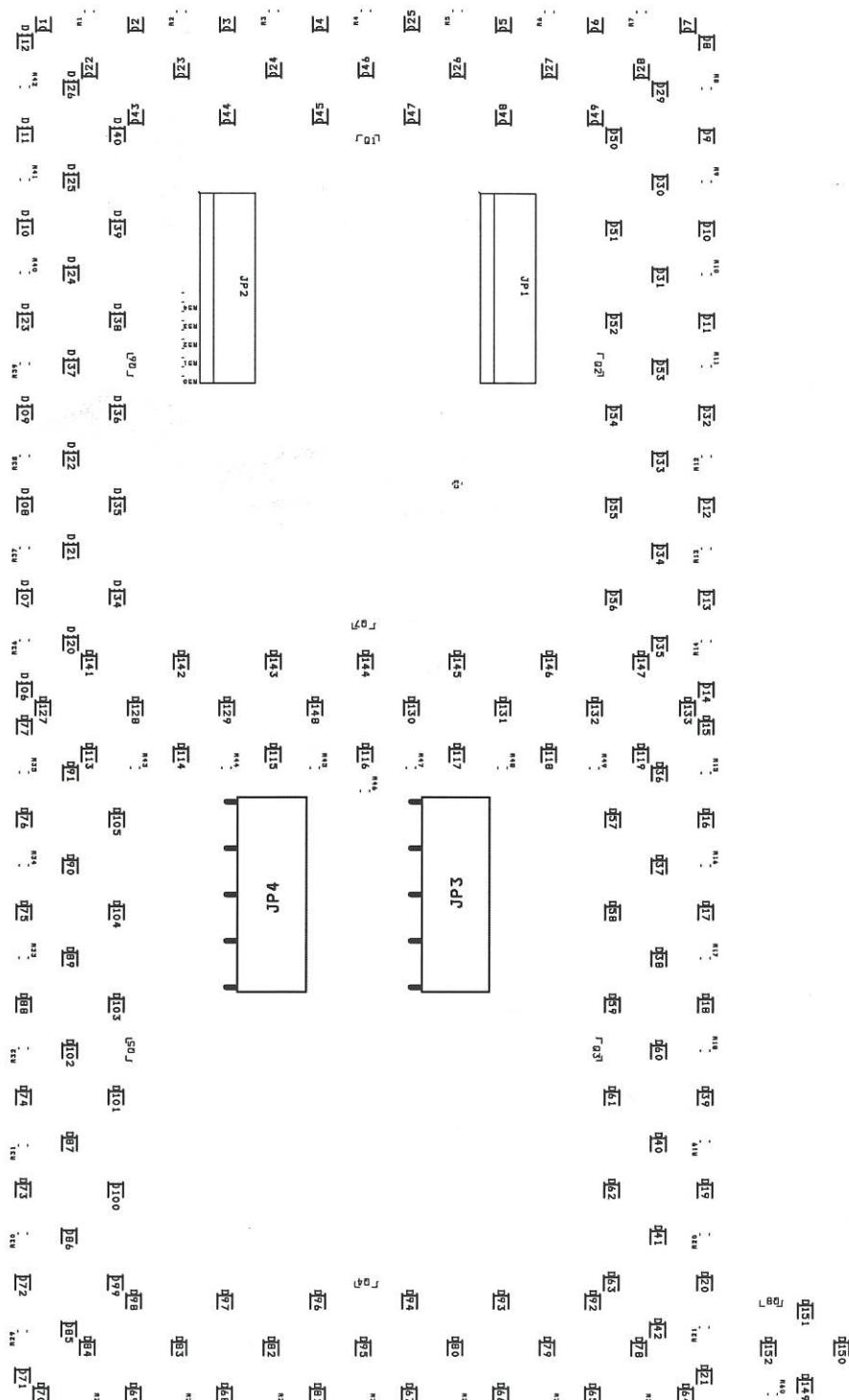
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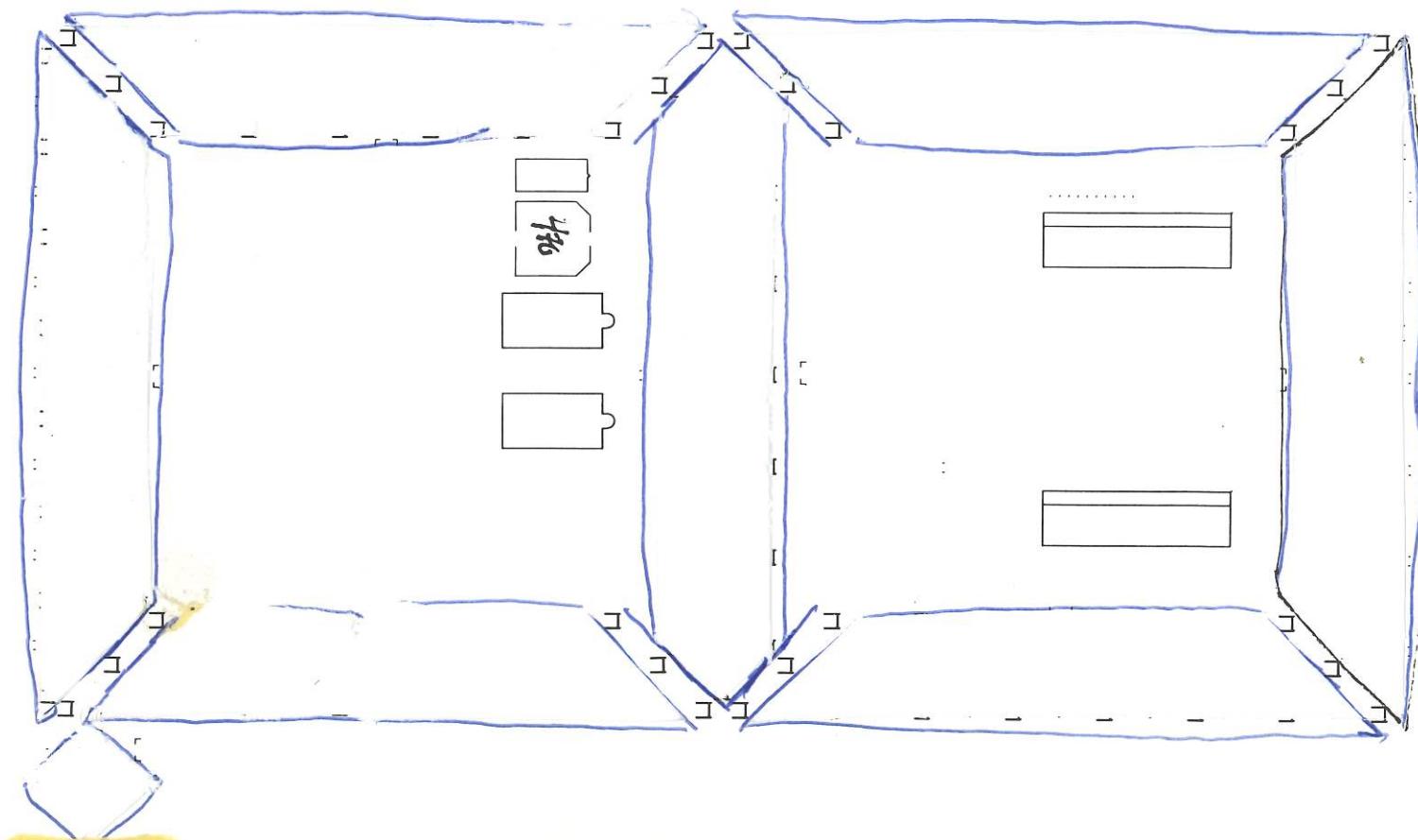
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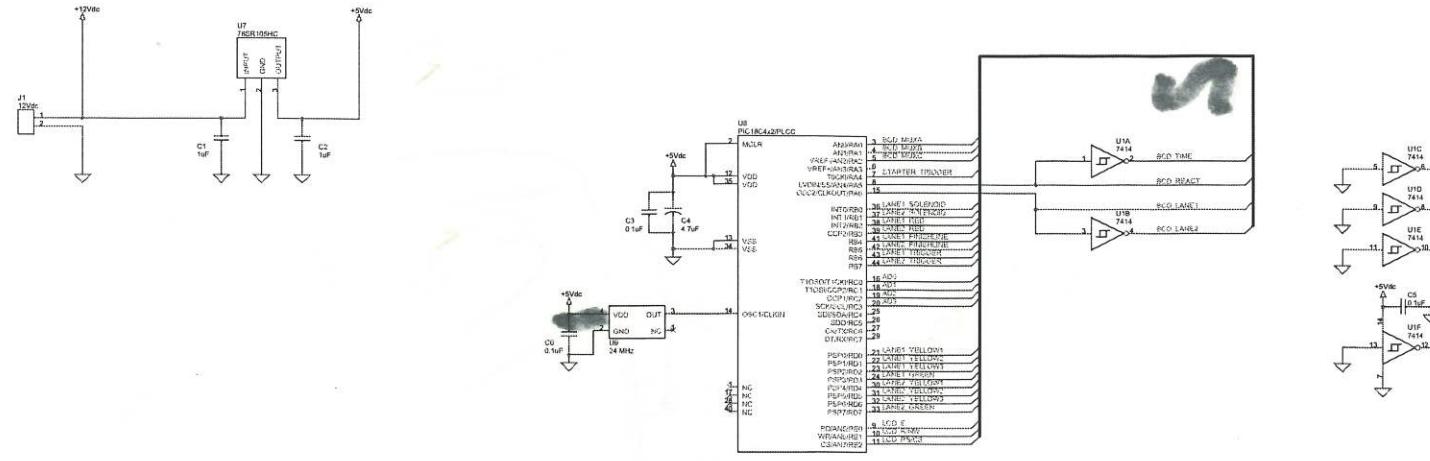
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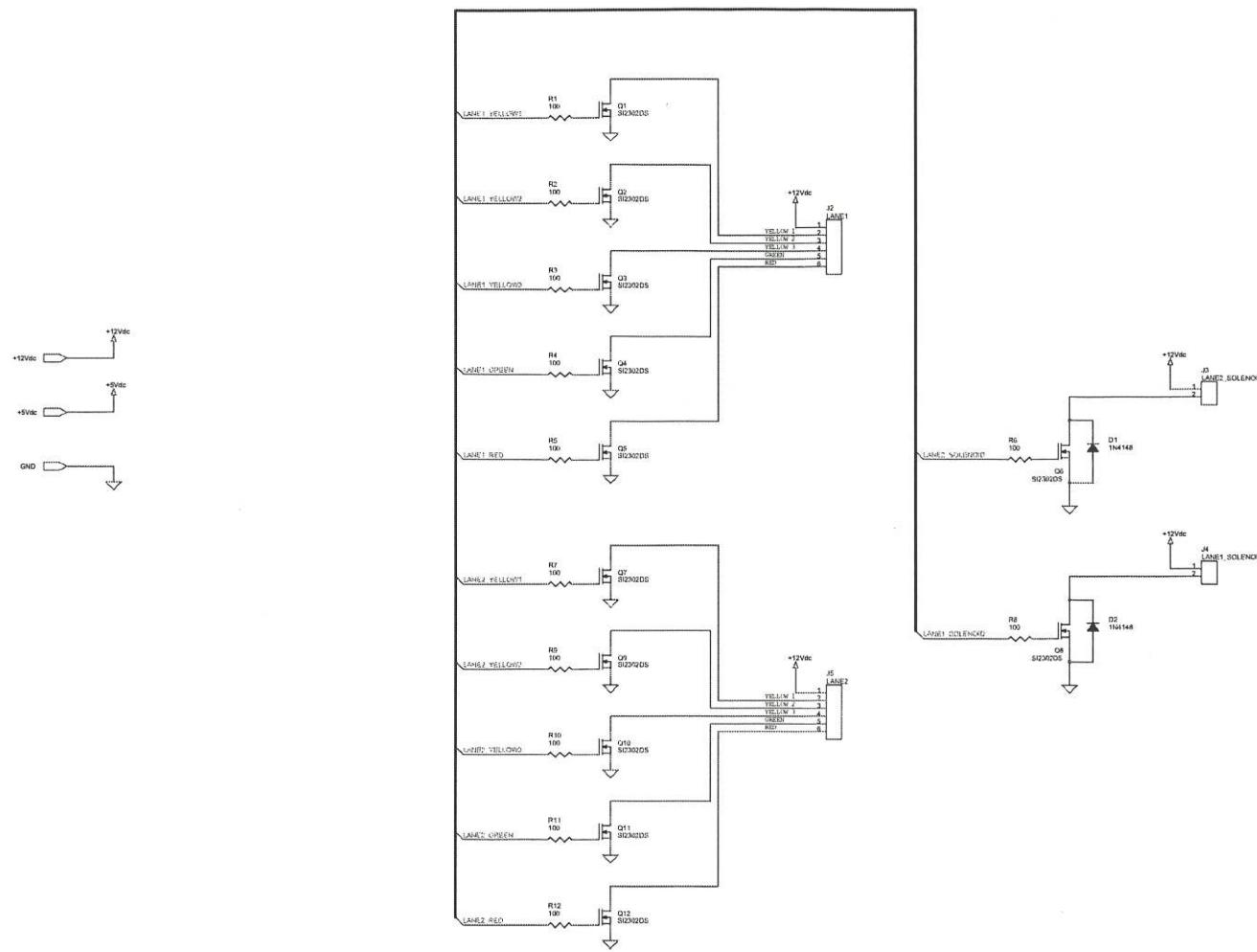
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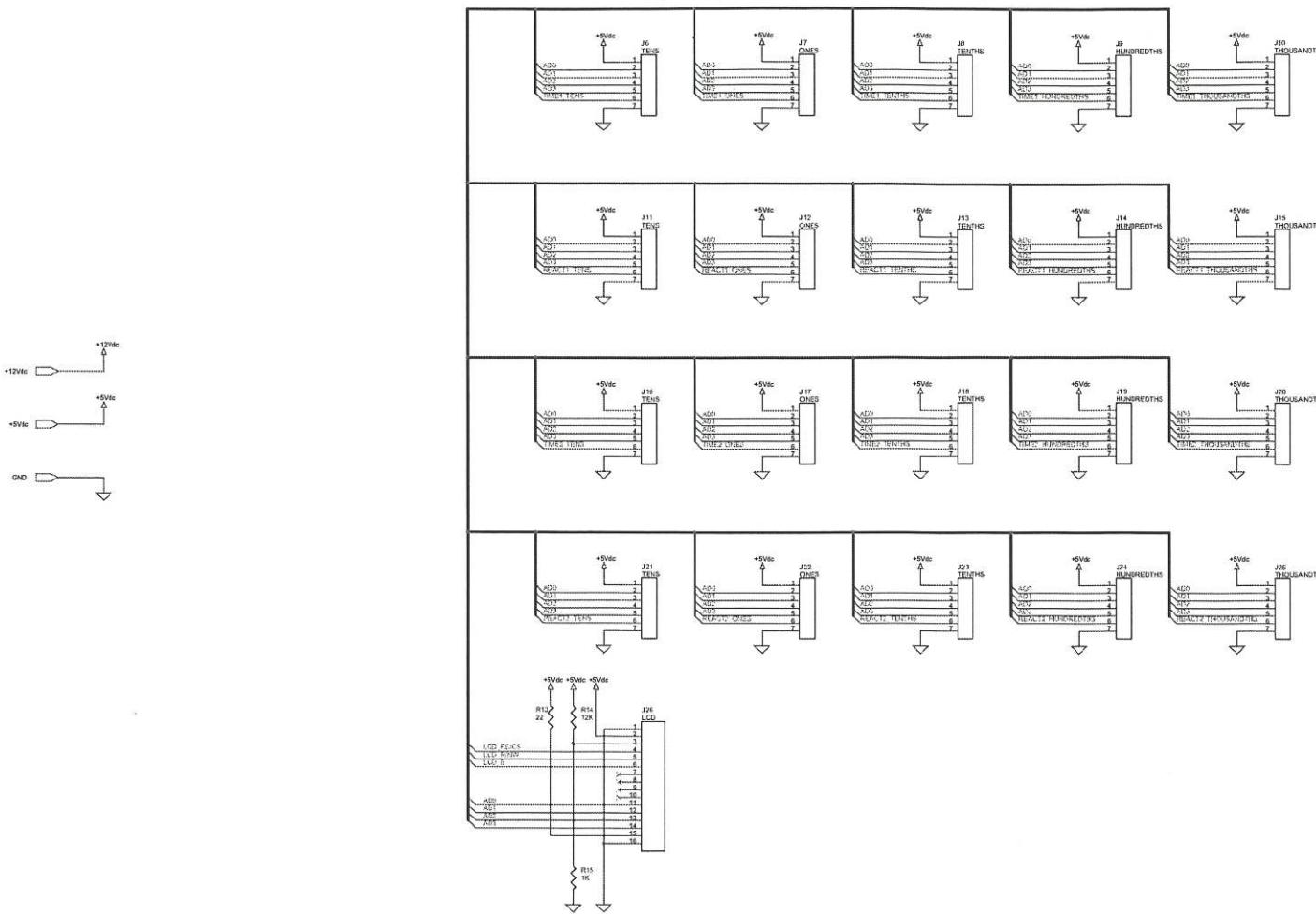


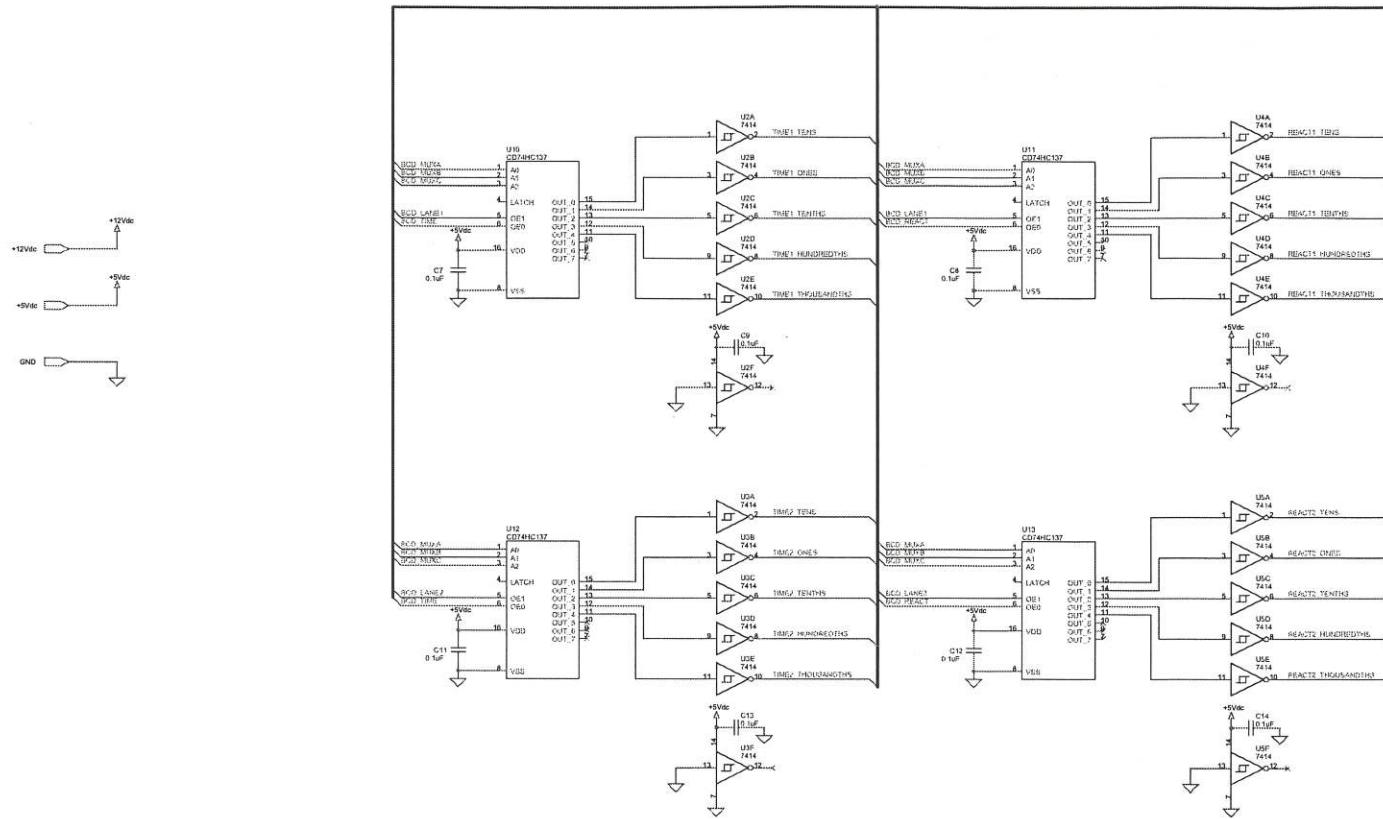
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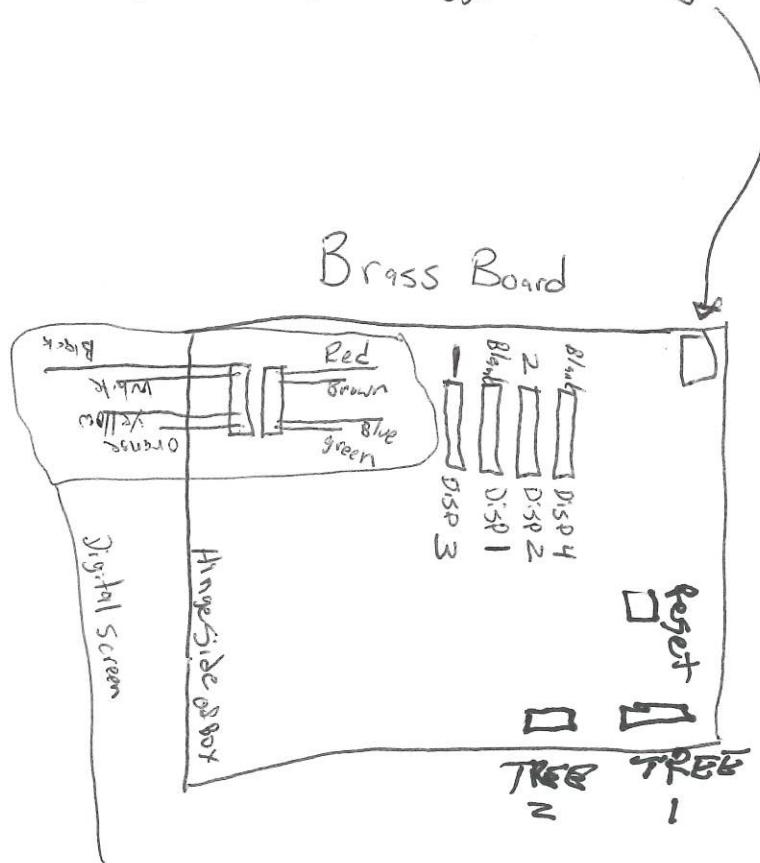


## Display

- |     |                    |
|-----|--------------------|
| 1.  | <u>Black</u>       |
| 2.  | <u>Brown</u>       |
| 3.  | <u>Red</u>         |
| 4.  | <u>White</u>       |
| 5.  | <u>Orange</u>      |
| 6.  | <u>Yellow</u>      |
| 7.  | <u>Green</u>       |
| 8.  | <u>Blue</u>        |
| 9.  | <u>Violet</u>      |
| 10. | <u>Grey</u>        |
| 11. | <u>White</u>       |
| 12. | <u>White/Black</u> |
| 13. | <u>White/Brown</u> |
| 14. |                    |
| 15. |                    |
| 16. |                    |
- 11, 12, 13, 14, 15, 16 → Jumpered

TRIGGERS can go in 2 ways make sure there right

Need to Fix Trigger 1 plug



Red Button changes Mode

Mode 1 Top yellow light Reaction time

Mode 2 2nd yellow Light Pro <sup>Mod</sup> Reaction time

Mode 3 Blue Trigger turns Both lights



-SMALL STAPLES

-**Receiver**

-**FIX RCVR**

IR

SHCD

NC

BLK + SHCD

NC

BRN + SHCD

LANE 1 <sup>WHT</sup>

RED + SHCD

LANE 2 + <sup>WHT</sup>  
~~SHRD~~  
GND

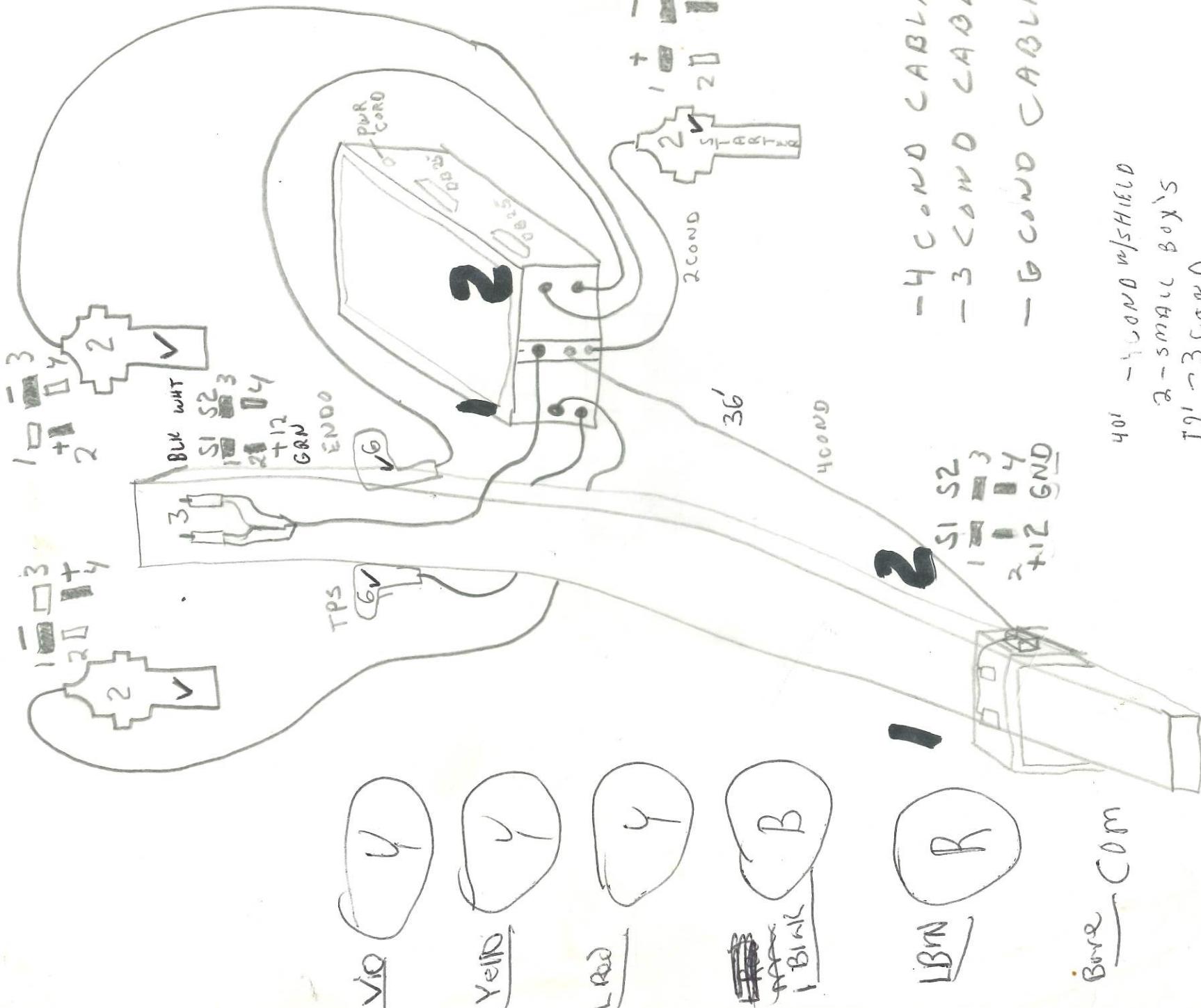
YEL/ORG

~~SHD~~ + 12V BN

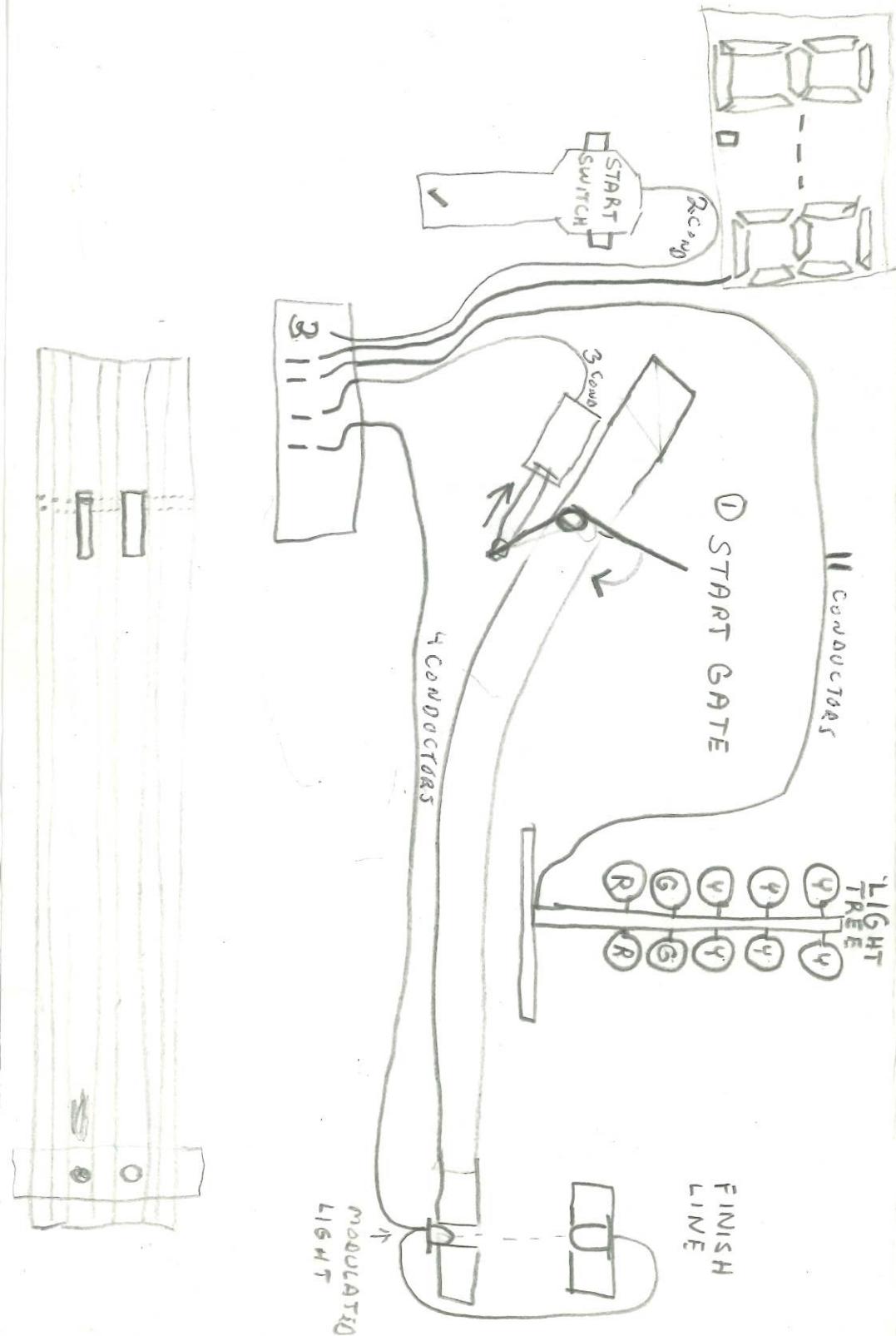
VIO/GRN

~~+12V~~ GND BLU

DARKEENED AREA  
IS A CONDUCTOR



- 4 COND CABLE
- 3 COND CABLE
- 6 COND CABLE
- 40' - 1 COND M/FIELD
- 2 - SMALL BOX'S
- 12' - 3 COND
- PWR CORD
- SUPPLY
- DISPLAY CONNECTORS
- 3 -SMOKED PLUG GLASS



- ~~CHURCH DISK~~
- ~~TRACK~~
- ~~SUPER GLUE~~
- SHIELD UNITS
- LEAVES
- ~~GARAGE DOOR OPENER~~
- ~~SHELLYS GARBAGE~~
- O - SILICONE CHIMNEY CAP
- LAWN MOWER BRACKETS <sup>BING TO TUMI</sup>
- SPRINGS ON GARAGE DOOR

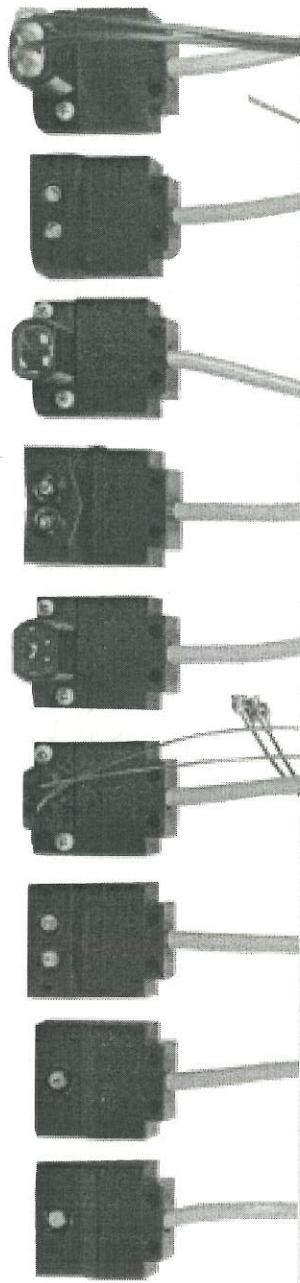


ECONO-BEAM® Sensors

the photoelectric specialist

**ECONO-BEAM® Sensors**

Miniature Self-Contained DC Sensors

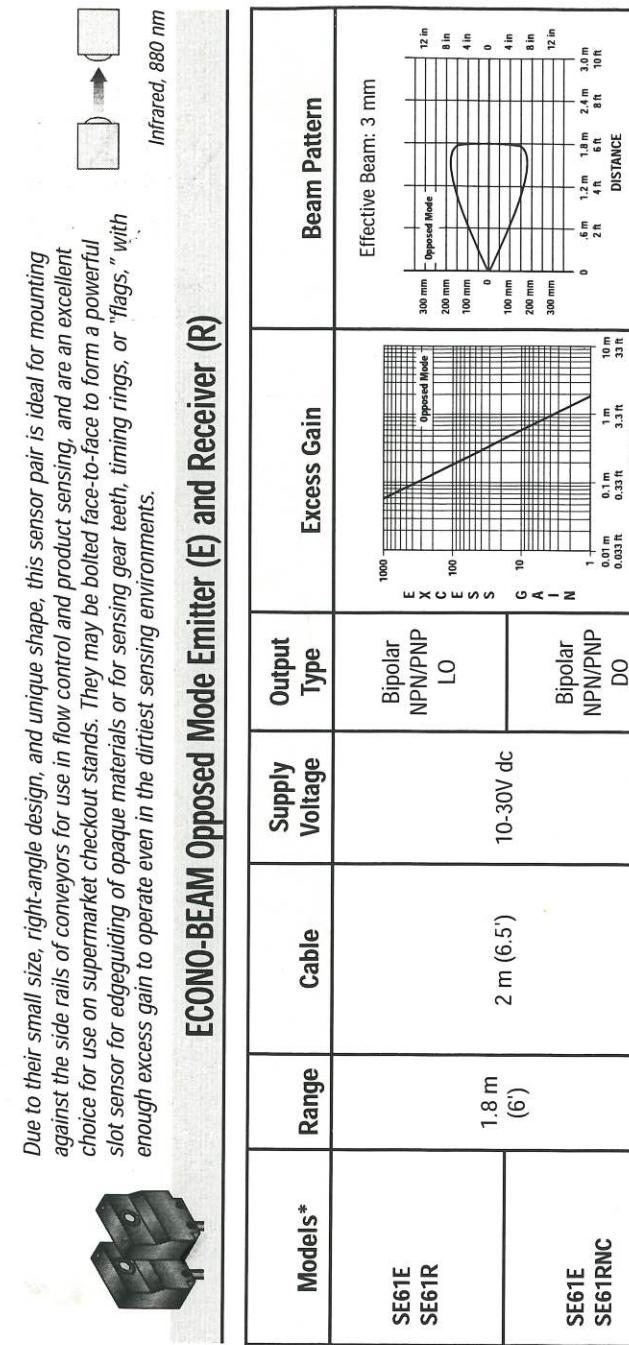


## ECONO-BEAM Features

- Small, low cost, self-contained sensors engineered to provide reliable sensing, primarily in straightforward OEM applications
  - Simple installation with no adjustments
  - 10 to 30V dc operation
  - Bipolar outputs (one NPN and one PNP); each output rated at 150 milliamps
  - Choose models for light operate or dark operate
  - Totally solid-state and epoxy-encapsulated for unlimited life
  - Very compact, yet rugged enough to withstand tough sensing environments; rated IP66, NEMA 4X



- Small, low cost, self-contained sensors engineered to provide reliable sensing. Primarily in straightforward OEM applications



*Due to their small size, right-angle design, and unique shape, this sensor pair is ideal for mounting against the side rails of conveyors for use in flow control and product sensing, and are an excellent choice for use on supermarket checkout stands. They may be bolted face-to-face to form a powerful slot sensor for edgeguiding of opaque materials or for sensing gear teeth, timing rings, or "flags," with enough excess gain to operate even in the dirtiest sensing environments.*



CONTINUATION

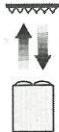
- \* NOTES:
    - 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., **SE61RNC W/30**).
    - High-speed models may be ordered by adding suffix "**MHS**" to the model number of any standard ECONO-BEAM dc sensor (e.g., **SE61EMHS**).
    - Response time for these sensors decreases to 1 millisecond; faster response comes at the expense of lower excess gain.

# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors



The 1/2" diameter effective beam of retroreflective model SE612LV measured at 1' from the lens, makes it a good choice for sensing relatively small objects when opposed sensing is not possible. The visible beam simplifies alignment to the retroreflective target. Use the largest retroreflective target possible. If sensing materials with shiny surfaces, scan at an angle of at least 10° to the shiny surface to minimize false light return ('proxing' effect).

Visible red, 650 nm



## ECONO-BEAM Non-Polarized Retroreflective Mode

Models*	Range†	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SE612LV	4.5 m (15')	2 m (6.5')	10-30V dc	Bipolar NPN/PNP LO		
SE612LVNC				Bipolar NPN/PNP DO		

† Specified using model BRT-3 retroreflector (3" diameter). Actual range may vary depending on retroreflector size and efficiency.



Ideal for applications where the target's reflectivity and profile are sufficient to return a large percentage of the emitted light back to the sensor. Divergent diffuse mode model SE612W is particularly useful for sensing transparent or translucent objects (clear plastic or glass) and for dependable sensing of irregular surface features; its excess gain falls off sharply beyond 1". As a result, it may be used when it is necessary to ignore background objects.

## ECONO-BEAM Diffuse Mode

Models*	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SE612D	200 mm (8")	2 m (6.5')	10-30V dc	Bipolar NPN/PNP LO		
SE612DNC				Bipolar NPN/PNP DO		

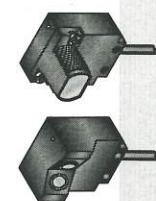
  

Models*	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SE612W	76 mm (3")	2 m (6.5')	10-30V dc	Bipolar NPN/PNP LO		
SE612WNCC				Bipolar NPN/PNP DO		

# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors

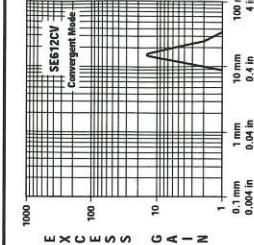
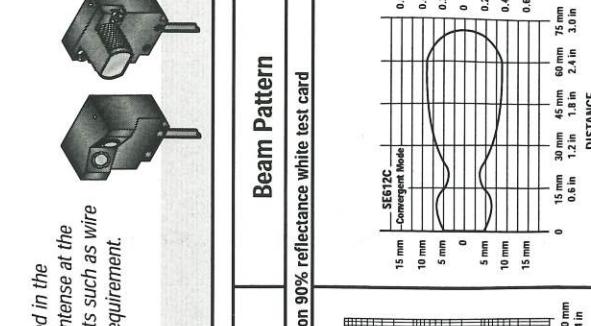
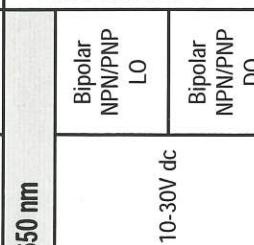
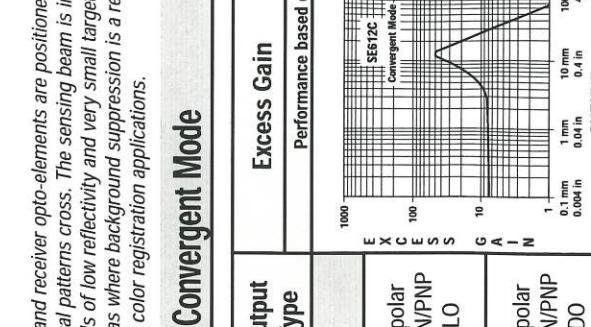
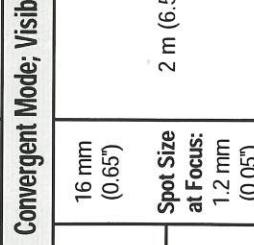
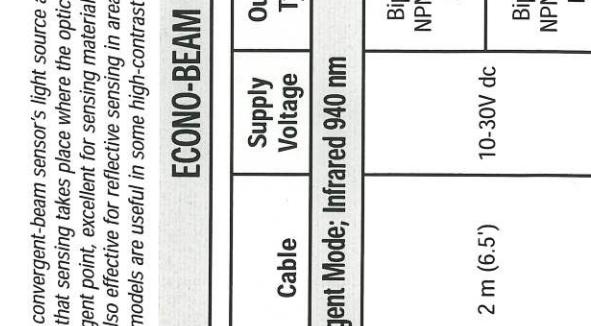
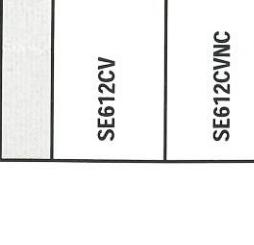
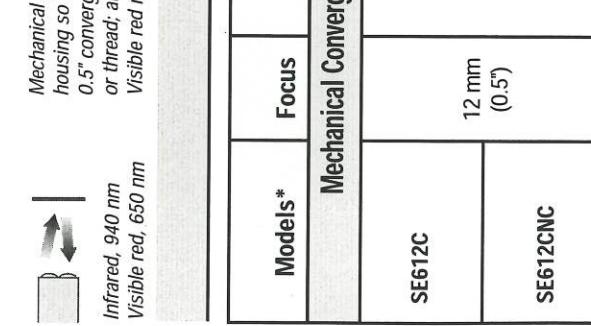


Infrared, 940 nm  
Visible red, 650 nm



Mechanical convergent-beam sensor's light source and receiver opto-elements are positioned in the 0.5" convergent point, excellent for sensing materials of low reflectivity and very small targets such as wire or thread; also effective for reflective sensing in areas where background suppression is a requirement.

## ECONO-BEAM Convergent Mode

Models*	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
<b>Mechanical Convergent Mode; Infrared 940 nm</b>						
Performance based on 90% reflectance white test card						
SE612C	12 mm (0.5")	2 m (6.5')	10-30V dc	Bipolar NPN/PNP LO		
SE612GNC				Bipolar NPN/PNP DO		
<b>Convergent Mode; Visible Red 650 nm</b>						
SE612CV	16 mm (0.65")	2 m (6.5')	10-30V dc	Bipolar NPN/PNP LO		
SE612CVNC	Spot Size at Focus: 1.2 mm (0.05")			Bipolar NPN/PNP DO		

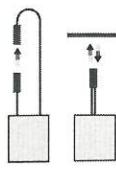
### \*NOTES:

- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., **SE612C W/30**).
- High-speed models may be ordered by adding suffix "MHS" to the model number of any standard ECONO-BEAM dc sensor (e.g., **SE612CMHS**). Response time for these sensors decreases to 1 millisecond; faster response comes at the expense of lower excess gain.

# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors



Ideal for situations where hostile environments or space restrictions prohibit placing the sensor itself in the sensing position. The response time required by model SE612F is 10 milliseconds (0.01 seconds). If fast-moving objects are to be detected, select a fiber optic assembly which senses the object for a long period of time. (For example, a bifurcated fiber optic with a rectangular bundle termination like model BR22.53S may be positioned so that the object is detected while it passes along the entire length of the rectangular sensing area.) Not recommended for applications requiring bending or repeated flexing of fibers.



Infrared, 880 nm

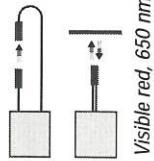
## ECONO-BEAM Glass Fiber Optic

Models*	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
SE612F	Range varies by sensing mode and fiber optics used	2 m (6.5')	10-30V dc	Bipolar NPN/PNP LO	Diffuse mode performance based on 90% reflectance white test card	<p>Graph showing Diffuse mode beam pattern for SE612F. The Y-axis is Excess Gain (0 to 1000) and the X-axis is Distance (0 to 40 in). The curve shows a peak at 0 mm and a secondary peak at 100 mm. Labels include: SE612F, Opposed Mode, 75 mm, 50 mm, 25 mm, 0, 25 mm, 50 mm, 75 mm, BT23S, RT13S, 100 mm, 200 mm, 300 mm, 400 mm, 500 mm, 12 in, 16 in, 20 in, DISTANCE.</p>
SE612FNC				Bipolar NPN/PNP DO		<p>Graph showing Diffuse mode beam pattern for SE612FNC. The Y-axis is Excess Gain (0 to 1000) and the X-axis is Distance (0 to 40 in). The curve shows a peak at 0 mm and a secondary peak at 100 mm. Labels include: SE612F, Diffuse Mode, Glass Fibers, 1.9 mm, 1.3 mm, 0.65 mm, 0.45 mm, 0.25 mm, 0, 0.65 mm, 1.3 mm, 1.9 mm, BT23S, RT13S, 7.5 mm, 15 mm, 22.5 mm, 30 mm, 37.5 mm, 0.3 in, 0.6 in, 0.9 in, 1.2 in, 1.5 in, 1.8 in, DISTANCE.</p>

\*NOTES:

- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., SE612F W/30).
  - High-speed models may be ordered by adding suffix "MHS" to the model number of any standard ECONO-BEAM dc sensor (e.g., SE612F MHS).
- Response time for these sensors decreases to 1 millisecond; faster response comes at the expense of lower excess gain.

# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors



An excellent option where sensing must be accomplished in tight, inaccessible or volatile areas. Fibers withstand vibration and shock and are immune to electrical noise. Plastic fibers function well at temperatures between -30° and +70°C. (-20°F to +158°F), and stand up to repeated flexing. Most are easy to shorten in the field, to develop custom installations. Not recommended for severe environments.



## ECONO-BEAM Plastic Fiber Optic

Models*	Range	Cable	Supply Voltage	Output Type	Excess Gain		Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card		
SE612FP	Range varies by sensing mode and fiber optics used	2 m (6.5')	10-30V dc	Bipolar NPN/PNP LO			
SE612FPMC				Bipolar NPN/PNP DO			

### \*NOTES:

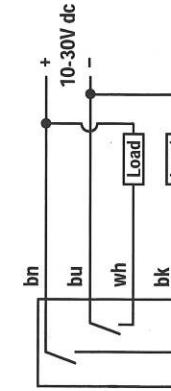
- 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., **SE612FP W/30**).
- High-speed models may be ordered by adding suffix "**MHS**" to the model number of any standard ECONO-BEAM dc sensor (e.g., **SE612FPMHS**). Response time for these sensors decreases to 1 millisecond; faster response comes at the expense of lower excess gain.

# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors

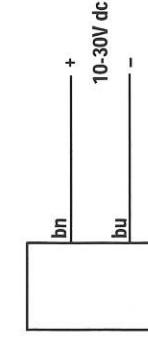
ECONO-BEAM DC Specifications	
Supply Voltage and Current	10 to 30V dc (10% maximum ripple) at less than 20 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Bipolar: One current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Rating	150 mA maximum each output Off-state leakage current $\leq$ 5 nA Output saturation voltage (PNP output) less than 1 volt at 10 mA and less than 2 volts at 150 mA Output saturation voltage (NPN output) less than 200 millivolts at 10 mA and less than 1 volt at 150 mA
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	Less than 10 milliseconds ON and OFF; independent of signal strength (NOTE: 100 millisecond delay on power-up; outputs do not conduct during this time.) <b>MHS Models:</b> 1 millisecond (Faster response comes at the expense of lower excess gain.)
Repeatability	0.4 ms; MHS models 0.06 ms; independent of signal strength.
Indicators	All models except emitter-only units have a top-mounted LED indicator that lights whenever the receiver "sees" its modulated light source.
Construction	Reinforced thermoplastic polyester (models LV, CV, F and FP) or polycarbonate (other models) housing, totally encapsulated for protection against moisture, vibration and corrosion.
Environmental Rating	Meets NEMA Standards 1, 3, 3S, 4, 4X, 12, and 13; IEC IP66
Connections	PVC-jacketed 4-wire 2 m (6.5') or 9 m (30') cables
Operating Conditions	Temperature: 0° to +50°C (+32° to 122°F) Maximum relative humidity: 90% at 50°C (non-condensing)
Certifications	

## ECONO-BEAM DC Hookups

### All Sensors Except Emitters



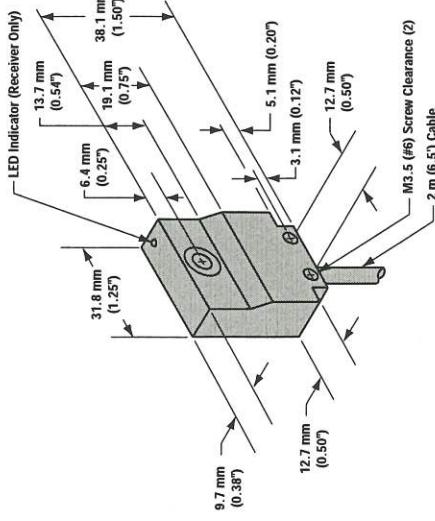
### SE61E Emitters



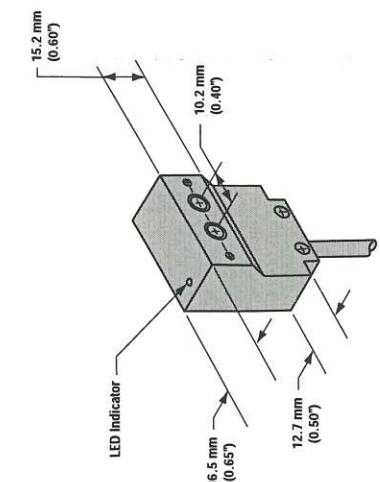
# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors

## ECONO-BEAM DC Dimensions

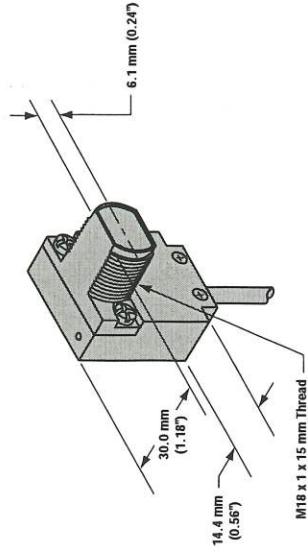
### Opposed Mode (model suffix E & R)



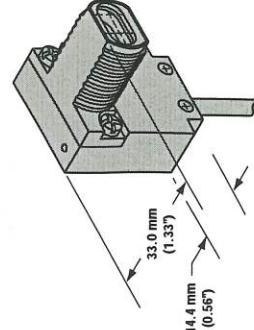
### Diffuse & Divergent Mode (model suffix D & W)



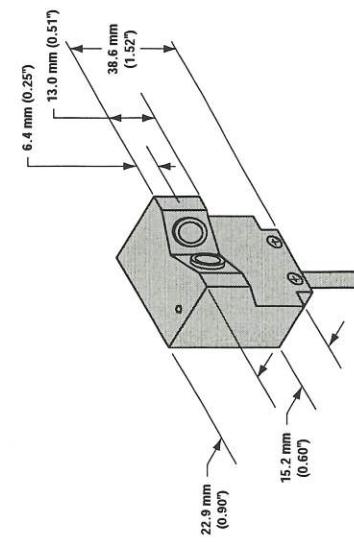
### Retroreflective & Convergent Mode (model suffix LV & CV)



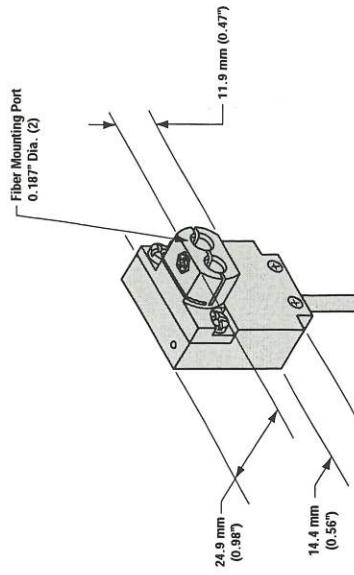
### Glass Fiber Optic (model suffix F)



### Mechanical Convergent Mode (model suffix C)



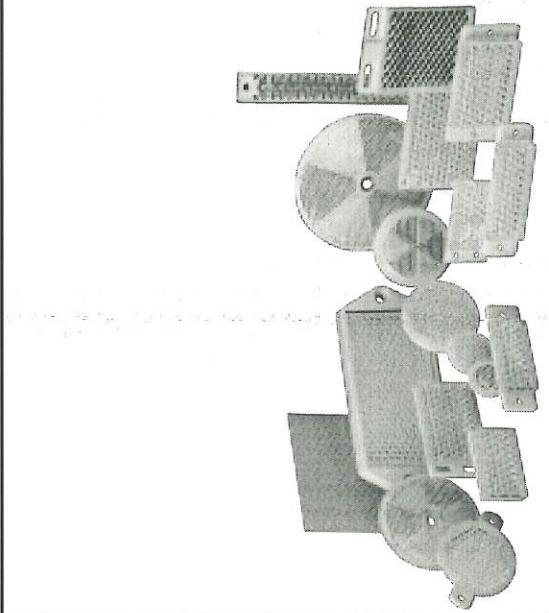
### Plastic Fiber Optic (model suffix FP)



# ECONO-BEAM Sensors – Miniature Self-Contained DC Sensors

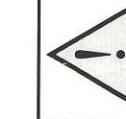
## Retroreflective Targets

Retroreflective Targets			
Model	Reflectivity Factor	Maximum Temperature	Size
BRT-3*	1.0	65°C (150°F)	84 mm diameter
BRT-2A	1.0	65°C (150°F)	56 mm diameter
BRT-50	1.0	65°C (150°F)	51 mm diameter
BRT-1.5	1.0	65°C (150°F)	46 mm diameter
BRT-1	1.0	65°C (150°F)	25 mm diameter
BRT-.6	1.0	65°C (150°F)	20 mm diameter
BRT-50D*	1.0	65°C (150°F)	51 mm diameter
BRT-42D	1.0	50°C (120°F)	42 mm diameter
BRT-50R*	1.0	50°C (120°F)	51 mm diameter
BRT-25R	1.0	50°C (120°F)	25 mm diameter
BRT-42A	1.0	50°C (120°F)	42 mm diameter
BRT-100X55A	1.5	50°C (120°F)	132 mm x 55 mm
BRT-92X92C*	3.0	50°C (120°F)	100 mm x 100 mm
BRT-77X77C*	2.0	50°C (120°F)	85 mm x 85 mm
BRT-100X50	1.5	50°C (120°F)	101 mm x 51 mm
BRT-2X2	1.0	50°C (120°F)	51 mm x 61 mm
BRT-36X40BM	1.2**	50°C (120°F)	51 mm x 61 mm
BRT-60X40C*	1.4	50°C (120°F)	41 mm x 60 mm
BRT-48X32	1.0	50°C (120°F)	33 mm x 48 mm
BRT-48X32A	1.0	50°C (120°F)	33 mm x 65 mm
BRT-48X32B	1.0	50°C (120°F)	33 mm x 57 mm
BRT-40X23	1.4	50°C (120°F)	24 mm x 40 mm
BRT-40X23B	1.4	50°C (120°F)	24 mm x 48 mm
BRT-35X20A	1.4	50°C (120°F)	24 mm x 55 mm
BRT-40X18A	1.0	50°C (120°F)	18 mm x 60 mm
BRT-53X19A	1.4	50°C (120°F)	19 mm x 72 mm
BRT-100X18A	1.4	50°C (120°F)	19 mm x 120 mm
BRT-L	0.8	65°C (150°F)	165 mm x 19 mm
BRT-41AH	1.0	200°C (390°F)	41 mm diameter
BRT-4HT***	.15	480°C (900°F)	100 mm x 100 mm



NOTE: The range of all retroreflective sensors is specified using target model BRT-3. Sensing range and signal strength at any given sensor-to-target distance will vary due to target reflectivity and target area. A "Reflectivity Factor" is included for each target model to help predict sensor performance, relative to the excess gain curve plotted for target model BRT-3. Consider, also, target area when predicting performance.

\* Optional brackets are available; see Banner Photoelectric Product Catalog  
\*\* Target has micro-prism geometry



### WARNING • • • Not To Be Used for Personnel Protection

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.



the photoelectric specialist

**WARRANTY:** Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.