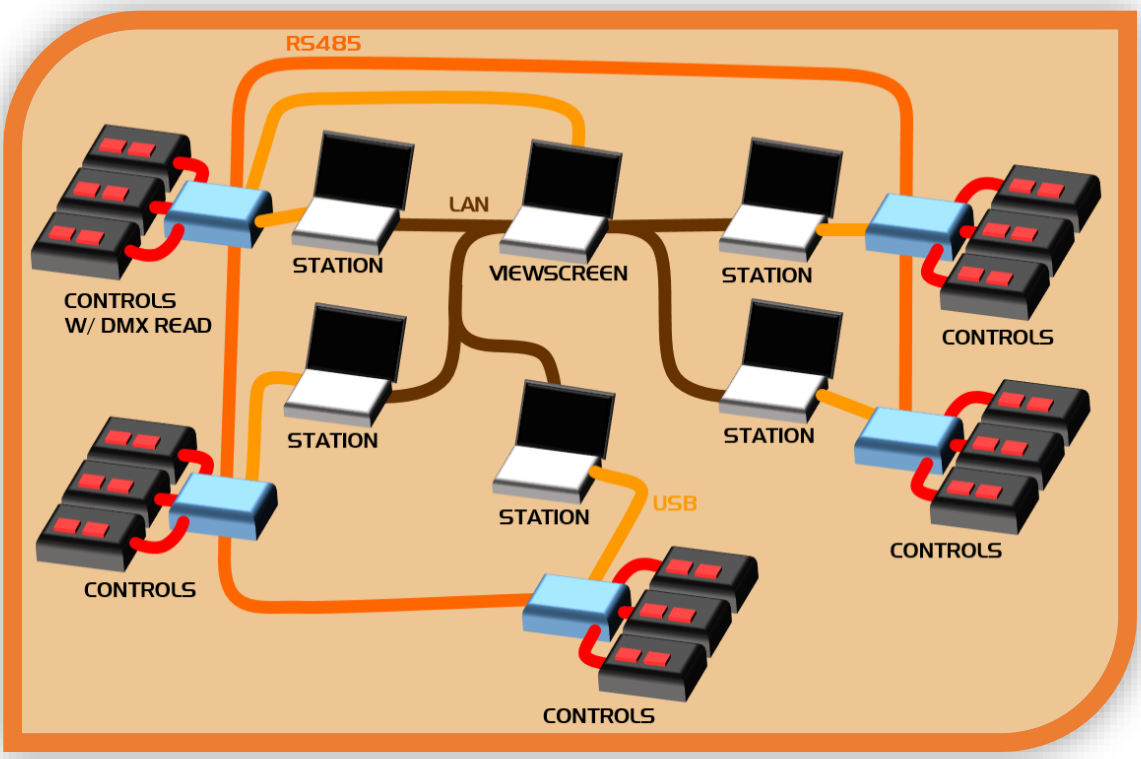
Overview and Guide

ACP3 Control Panel System for Artemis Spaceship Bridge Simulator



by Angel of Rust

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Appendix – ACP3 circuit board schematics

1.0 Introduction and Scope

The purpose of this guide is to introduce the reader to the ACP3 control panel system for *Artemis Spaceship Bridge Simulator* (Artemis SBS). This control panel system is not required to play Artemis SBS. However, some people may find the inclusion of this optional hardware enhances the gameplay experience.

The ACP3 control panel system allows for the construction of custom controls for Artemis SBS with appearances emulating various popular sci-fi designs. The purpose of these controls is to enhance emersion and role playing as part of the Artemis gameplay experience. The ACP3 control panel system includes a set of microcontrollers that communicate with PCs running Artemis SBS through mouse and keyboard commands input via USB HID interface. These microcontrollers are programmed to respond to various digital and analog hardware inputs such as buttons and sliders.

This guide contains the following information:

- Overall function of the ACP3 system (Section 2.0)
- Recommended parts and connections to build a functional set of custom controls for Artemis SBS (Section 3.0)
- List of ACP3 system parts including 1) microcontroller assemblies, 2) hardware needed to build custom controls, 3) pre-designed ACP3 control hardware (Section 4.0)
- Lists of data useful for programming ACP3 controllers (Section 5.0)
- Steps to updated microcontroller software (Section 6.0)
- Troubleshooting common problems (Section 7.0)

2.0 ACP3 Overview

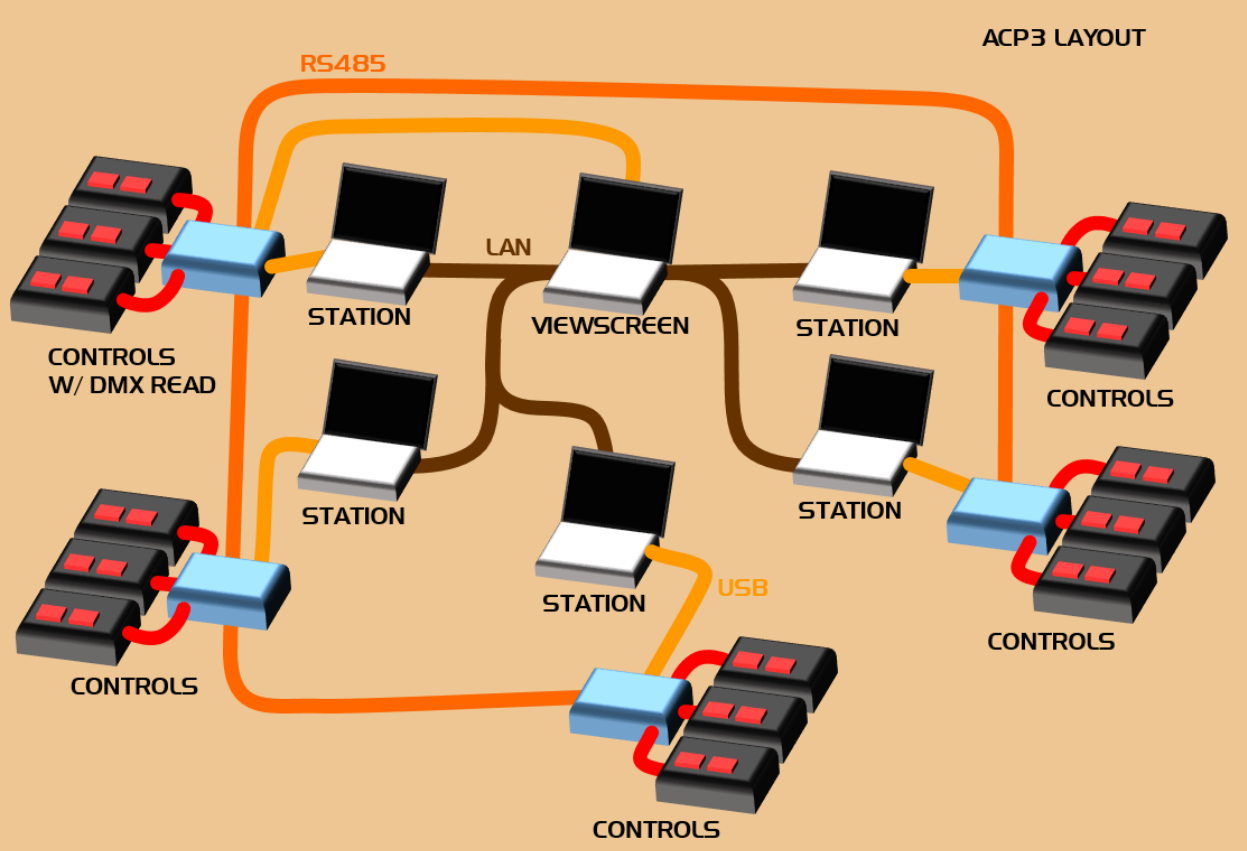
2.1 ACP3 Concept

In Artemis SBS, the server/mainscreen communicates with the client stations over a set of LAN/ethernet connections. It is possible to connect custom hardware controls to each Artemis SBS client station that actuate the in-game controls through keystrokes and mouse clicks, etc. These controls can be powered, interpreted, and interfaced with Artemis SBS via programmable microcontrollers connected to the PC via USB (i.e., the ACP3 controllers). It is also possible to use the DMX output that is built-in native to Artemis SBS to read a number of in-game states (such as red alert, shields up, etc.). When equipped with a suitable reader, a microcontroller can interpret this output and use it to create user feedback and interconnects with hardware controls.

In ACP3, all controls are equipped with an RS485 transceiver. They are therefore able to both receive and transmit information to the other units on an RS485 communications bus. To maintain order, one of the controllers is designated as the “master controller” that will send transmit commands to each controller individually when it is each controller's turn to transmit. After the commanded transmission, the next signal will always come from the master controller, ensuring only one device is transmitting at a time. The master controller will be receiving information about the game from both the DMX cues and the commands generated by the players using the control panels. With these two sets of information, the controller can infer many interesting and useful game states with which to animate the lights and displays. Moreover, context-specific controls can be programmed on each panel.

Each controller receives input and output from several control panels that are connected to the controller via specialized ribbon cables. The controller can drive a matrix of LEDs, read a matrix of buttons, and read a limited number of analog controls via the ribbon cables. The sections below describe the specific pinouts, hardware, and functions for these panel connections.

Finally, the ACP3 control panel system is modular, with several common parts shared between the controllers and the connected panels. This modular arrangement streamlines programming, allows selected hardware replacements, and simplifies the correct design, construction, and installation of the component parts.



Conceptual Layout of ACP3 Control Panel System

2.2 Bridge Building Guide

ACP3 support bridge building at the following levels:

Level I: wiring schematics, PCB design files, Arduino code, and data tables -- this level is for bridge builders who want to build everything from scratch, but would like some guidance on some of the electronics details that I worked out on this project. All design information will be provided in an online repository.

Level II: control boards and panel developer boards -- this level is for bridge builders who would like the ease-of-use of the centralized controllers, but want to implement their own button layouts and designs. The hardware for these kits will include a built controller board, ribbon cables with connectors, and three panel boards (shift register boards).

Level III: control boards and control panel kits -- this level is for bridge builders who want to drop in functional controls in the least amount of time possible. The kits will include a built controller board and housing, ribbon cables with connectors, control panel boards, and faceplate parts. For back-lit panels, the bridge builder will need to paint the pre-cut acrylic faceplate and mount the edge LEDs. All electronic parts are provided. Acrylic housings and faceplates are provided. Paint, furniture, and any other design decisions outside of the functional buttons fall to the bridge builder.

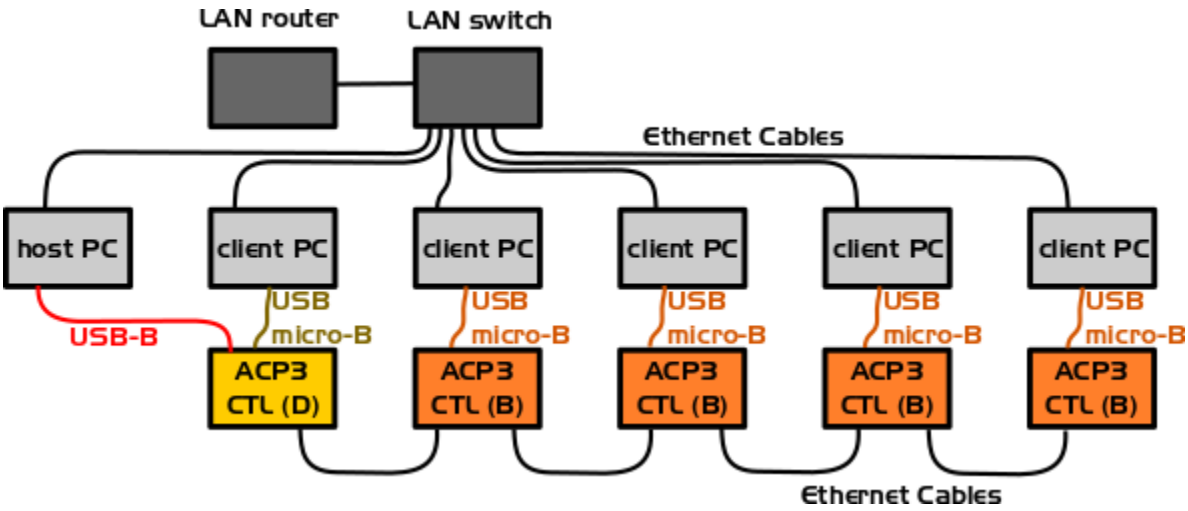
3.0 Recommended ACP3 Configurations

3.1 Overview

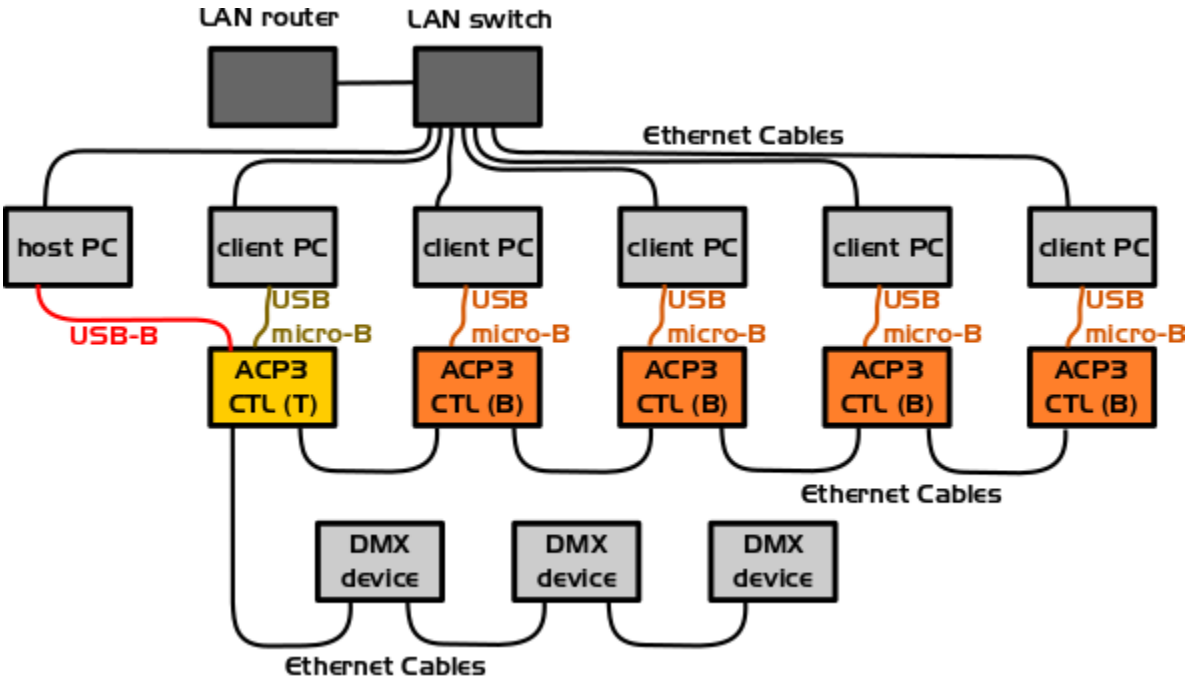
In all configurations, each ACP3 controller is connected to an Artemis SBS client PC via micro-B USB cable and to the control panel hardware via ribbon cables. For Level II bridge builders, the ribbon cables connect to shift register development boards that are then connected to LEDs, buttons, and other interface hardware selected by the bridge builder. For Level III bridge builders, the ribbon cables connect to pre-designed circuit boards specific to each Artemis SBS station (i.e., Helm, Weapons, Engineering, Science, and Comms).

The following subsections illustrate the proper connection of the ACP3 hardware with the Artemis SBS host and clients.

3.2 Controls-only



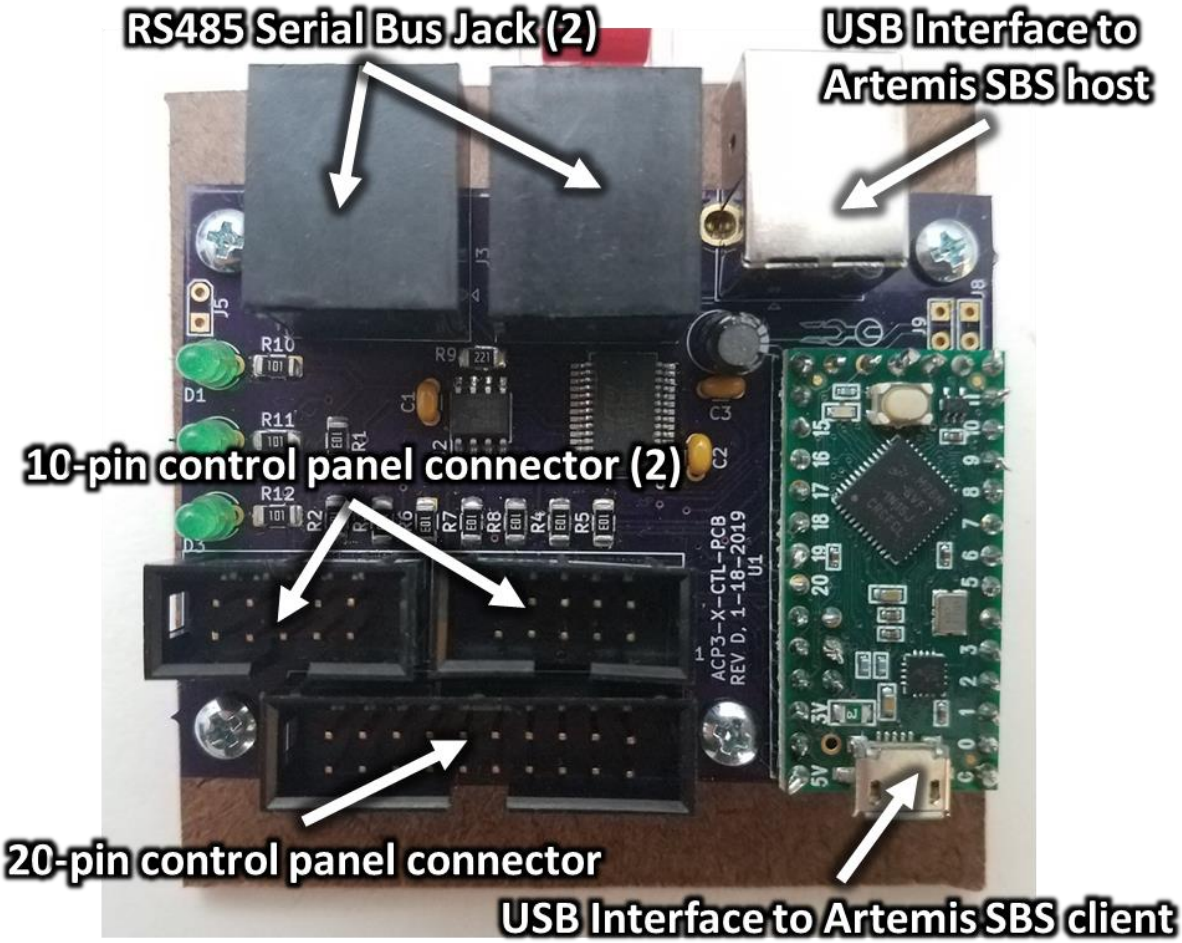
3.3 Controls with DMX Output

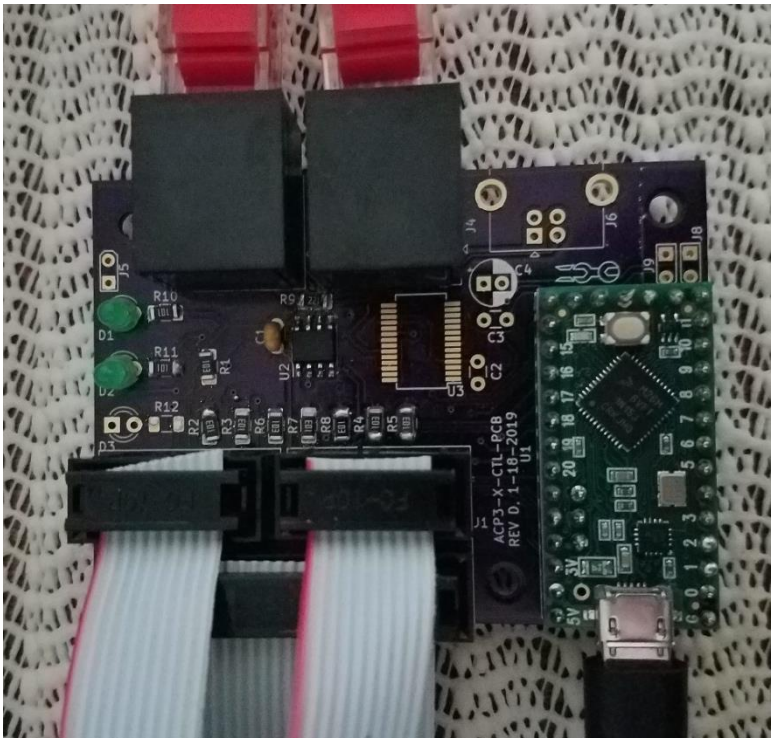


4.0 ACP3 Parts

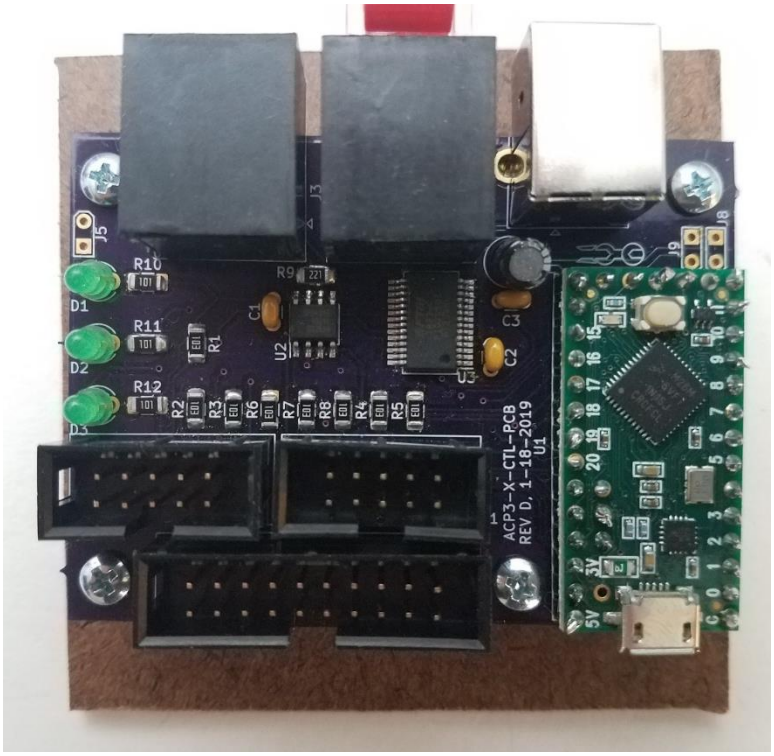
4.1 Controller Parts

	Features			
Controller Variant	runs control panels	communicates with other ACP3 controllers	Reads DMX output from Artemis	Output to DMX devices
ACP3-X-CTL(I)	◆			
ACP3-X-CTL(B)	◆	◆		
ACP3-X-CTL(D)	◆	◆	◆	
ACP3-X-CTL(T)	◆	◆	◆	◆

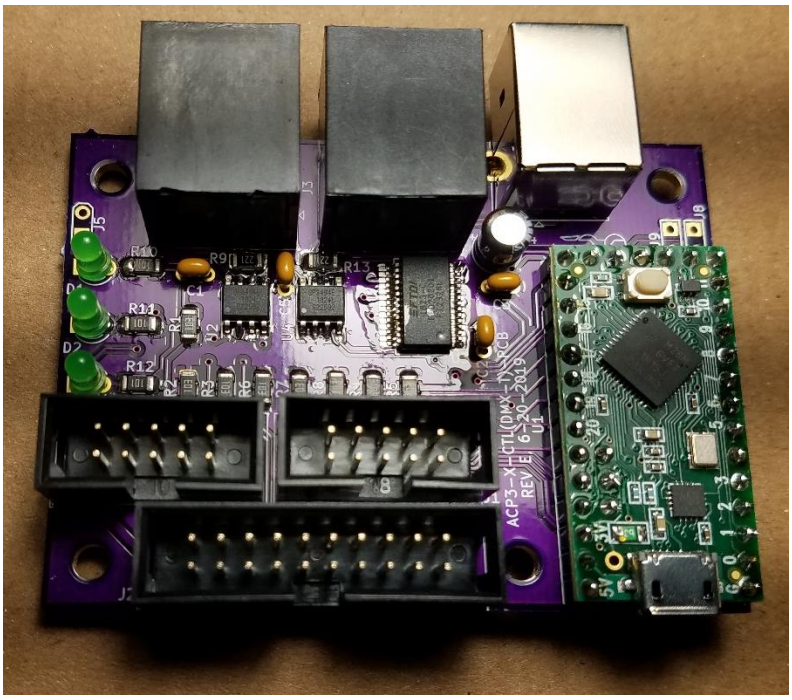




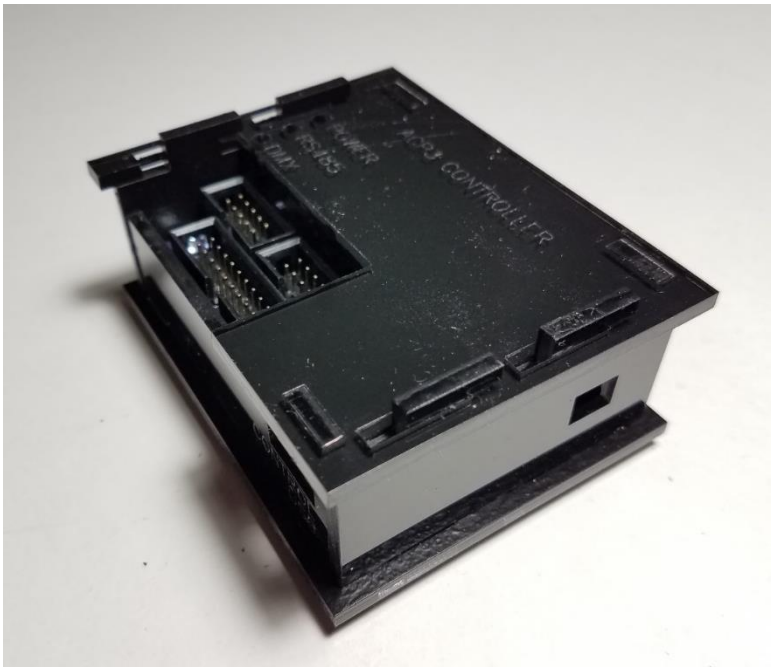
ACP3-X-CTL(B) – basic controller variant



ACP3-X-CTL(D) – DMX reader variant

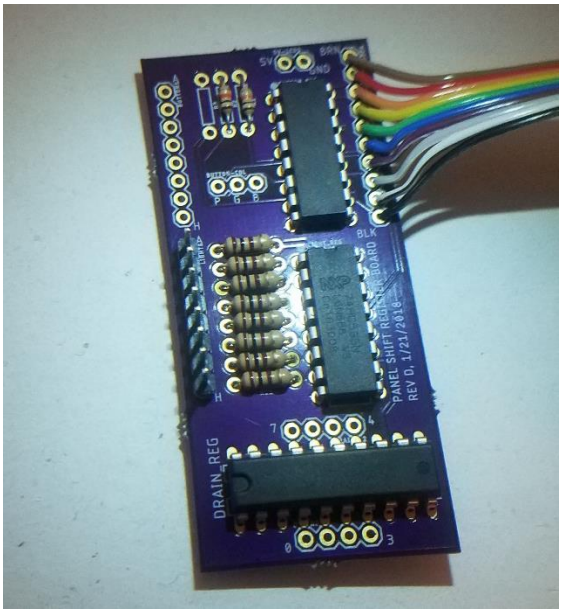


ACP3-X-CTL(T) – DMX-Through variant



enclosure

4.2 Control Panel Developer (Level II) Parts



Shift Register Board

Two ACP3 shift register board variants are planned:

- ACP3-X-SRB10-PCB – ten-pin "side" panel variant
- ACP3-X-SRB20-PCB – twenty-pin "center" panel variant

4.3 Complete Control Panel Kit (Level III) Parts

control panel	assembly	PCB#	Faceplate	Sticker
general panel controller	ACP3-X-CTL	ACP3-X-CTL-PCB	ACP3-CTL-ENC	-
DMX through controller	ACP3-X-CTL(T)	ACP3-X-CTL(DMX-T)-PCB	ACP3-CTL-ENC	-
helm center panel	ACP3-H-PRI	ACP3-H-PR1-PCB	ACP3-H-PRI-FCP	ACP3-H-PRI-STK
		ACP3-H-PR2-PCB		
		ACP3-H-PR3-PCB		
		ACP3-H-SLD-PCB		
		ACP3-X-JOY-PCB		
SRS side panel	ACP3-X-SRS	ACP3-X-SRS-PCB	ACP3-X-SRS-FCP	ACP3-X-SRS-STK
nav side panel	ACP3-X-NAV	ACP3-X-NAV-PCB	ACP3-X-NAV-FCP	ACP3-X-NAV-STK
status side panel	ACP3-X-STA	ACP3-X-STA-PCB	ACP3-X-STA-FCP	ACP3-X-STA-STK

control panel	assembly	PCB#	Faceplate	Sticker
				ACP3-X-STA-STK2
weapons center panel	ACP3-W-PRI	ACP3-W-PR1-PCB	ACP3-W-PRI-FCP	ACP3-W-PRI-STK
		ACP3-W-PR2-PCB		
		ACP3-W-PR3-PCB		
		ACP3-X-JOY-PCB		
engineering center panel	ACP3-E-PRI	ACP3-E-SLD-PCB	ACP3-E-PRI-FCP	ACP3-E-PRI-STK
		ACP3-E-BTN-PCB		
engineering preset side panel	ACP3-E-KEY	ACP3-E-KEY-PCB	ACP3-E-KEY-FCP	ACP3-E-KEY-STK
science center panel	ACP3-S-PRI	ACP3-S-PR1-PCB	ACP3-S-PRI-FCP	ACP3-S-PRI-STK
		ACP3-S-PR2-PCB		
		ACP3-S-PR3-PCB		
		ACP3-X-JOY-PCB		
science interconnect panel	ACP3-S-INT	ACP3-S-INT	ACP3-S-INT	ACP3-S-INT
communications panel	ACP3-C-PRI	ACP3-C-PR1-PCB	ACP3-C-PRI-FCP	ACP3-C-PRI-STK
		ACP3-C-PR2-PCB		
		ACP3-C-PR3-PCB		
		ACP3-X-JOY-PCB		
communications computer panel	ACP3-C-CMP	ACP3-X-NAV-PCB	ACP3-C-CMP-FCP	ACP3-C-CMP-STK
bridge control panel	ACP3-C-BRG	ACP3-C-BRG-PCB	ACP3-C-BRG-FCP	ACP3-C-BRG-STK

5.0 Data Tables

5.1 ACP3 Control Panel Pinouts

panel connector pin position	function	Teensy-LC pin#		
		connector J0	connector J1	connector J2
		right panel	left panel	center panel
1	ground	GND	GND	GND
2	5V	5V	5V	5V
3	3V	VCC	VCC	VCC
4	Serial clock (SRCLK)	2	2	2
5	register clock (RCLK)	3	3	3
6	output enable (OE)	4	4	4
7	serial data (SER)	5	24	8
8	digital input 1	6	25	10
9	digital input 2	7	26	11
10	alternate input	22	23	12
11	analog/alternate input 1			14
12	analog/alternate input 2			15
13	analog/alternate input 3			16
14	analog/alternate input 4			17
15	analog/alternate input 5			18
16	analog/alternate input 6			19
17	analog/alternate input 7			20
18	analog/alternate input 8			21
19	analog/alternate input 9			22
20	analog/alternate input 10			23

5.2 RS485 Ethernet Cable Pinouts

pin position	wire color	function
1	orange'	data A
2	orange	data B
3	green'	
4	blue	5V (optional)
5	blue'	5V (optional)
6	green	
7	brown'	GND
8	brown	GND

5.3 DMX Ethernet Cable Pinouts

pin position	wire color	function
1	orange'	data D+
2	orange	data D-
3	green'	
4	blue	
5	blue'	
6	green	
7	brown'	GND
8	brown	GND

5.4 Internal command codes

Button presses and other hardware inputs trigger commands in a queued/timer arrangement in the code. The queue is an array of numbers with each command represented by a code number as follows:

command #	console	command	key
10	Helm	zoom -	Y
10	weapons	console-	Y
11	Helm	zoom +	T
11	weapons	console+	T
12	Helm	view f	F2
12	weapons	view f	F2
13	Helm	view lt	F3
13	weapons	view lt	F3
14	Helm	view rt	F4
14	weapons	view rt	F4
15	Helm	view aft	F5
15	weapons	view aft	F5
16	Helm	tac	F6
16	weapons	tac	F6
17	Helm	lrs	F7
17	weapons	lrs	F7
18	Helm	info	F8
18	weapons	info	F8
19	Helm	view cam	click
19	weapons	view cam	click
20	Helm	shd up	K
20	weapons	shd up	K
21	Helm	shd dn	L
21	weapons	shd dn	L

command #	console	command	key
22	Helm	req dock	R
23	Helm	pitch up	INSERT
24	Helm	pitch dn	DELETE
25	Helm	init jump	click
26	Helm	confirm	click
27	Helm	cancel	click
28	Helm	e jump f	click
29	Helm	e jump r	click
31	weapons	homing	1
32	weapons	nuke	2
33	weapons	mine	3
34	weapons	EMP	4
35	weapons	pshock	5
36	weapons	beacon	6
37	weapons	tag	7
38	weapons	probe	8
39	weapons	E-torp	SHIFT I
40	weapons	torp-E	SHIFT U
41	weapons	fire 1	SHIFT 1
42	weapons	fire 2	SHIFT 2
43	weapons	fire 3	SHIFT 3
44	weapons	fire 4	SHIFT 4
45	weapons	load 1	click
46	weapons	unload 1	click
47	weapons	load 2	click
48	weapons	unload 2	click
49	weapons	load 3	click
50	weapons	unload 3	click
51	weapons	load 4	click
52	weapons	unload 4	click
53	weapons	auto b	B
54	weapons	freq lt	LEFT
55	weapons	freq rt	RIGHT
56	weapons	select	CLICK
56	science	select	CLICK
56	comms	select	CLICK
57	weapons	load enable	*
58	weapons	fire enable	*
59	weapons	abs pos	*
60	science	zoom +	UP
61	science	zoom -	DOWN

command #	console	command	key
62	science	scan	ENTER
63	science	nearest	Y
64	science	next	U
65	science	prev	I
70, 80	engineering	0	0, SHIFT 0
71, 81	engineering	1	1, SHIFT 1
72, 82	engineering	2	2, SHIFT 2
73, 83	engineering	3	3, SHIFT 3
74, 84	engineering	4	4, SHIFT 4
75, 85	engineering	5	5, SHIFT 5
76, 86	engineering	6	6, SHIFT 6
77, 87	engineering	7	7, SHIFT 7
78, 88	engineering	8	8, SHIFT 8
79, 89	engineering	9	9, SHIFT 9
90	engineering	reset p	SPACE
91	engineering	reset c	ENTER
92	engineering	cool up 1	click
93	engineering	cool up 2	click
94	engineering	cool up 3	click
95	engineering	cool up 4	click
96	engineering	cool up 5	click
97	engineering	cool up 6	click
98	engineering	cool up 7	click
99	engineering	cool up 8	click
100	engineering	cool dn 1	click
101	engineering	cool dn 2	click
101	comms	1	CNTRL 1
102	engineering	cool dn 3	click
102	comms	2	CNTRL 2
103	engineering	cool dn 4	click
103	comms	3	CNTRL 3
104	engineering	cool dn 5	click
104	comms	4	CNTRL 4
105	engineering	cool dn 6	click
105	comms	5	CNTRL 5
106	engineering	cool dn 7	click
106	comms	6	CNTRL 6
107	engineering	cool dn 8	click
107	comms	7	CNTRL 7
108	comms	8	CNTRL 8
109	comms	9	CNTRL 9

command #	console	command	key
110	comms	0	CNTRL 0
111	comms	red alert	CNTRL R
120	Helm	i adjust	*
121	Helm	w mode	*
122	Helm	w adjust	*
123	Helm	m adjust	*
124	Helm	j course	*
125	Helm	m course	*
126	weapons	mode	*
127	weapons	autoload	*
128	weapons	tp adjust	*
129	weapons	bp adjust	*
130	weapons	sc enable	*
131	science	map mode	*
132	science	up	*
133	science	left	*
134	science	right	*
135	science	down	*
136	science	pwr adj	*
137	science	auto start	*
138	science	auto stop	*
140	Helm	0	*
140	science	0	*
141	Helm	1	*
141	science	1	*
142	Helm	2	*
142	science	2	*
143	Helm	3	*
143	science	3	*
144	Helm	4	*
144	science	4	*
145	Helm	5	*
145	science	5	*
146	Helm	6	*
146	science	6	*
147	Helm	7	*
147	science	7	*
148	Helm	8	*
148	science	8	*
149	Helm	9	*
149	science	9	*

command #	console	command	key
150	Helm	prog	*
150	science	prog	*
151	Helm	hdg	*
151	science	hdg	*
152	Helm	dist	*
152	science	dist	*
153	Helm	enter	*
153	science	enter	*
160	engineering	str/rcl	*

note: * indicates that this command accesses higher-level functions within the control program

5.5 ACP3 Communication

byte	name	purpose
1	start	lets the receiver know that a new packet has begun (255)
2	type	type of data in packet
3	data	up to 8 bytes of data to communicate status, ends on next start byte
4	data	
5	data	
6	data	
7	data	
8	data	
9	data	
10	data	

name	purpose	type code	data
Administration			
poll controllers	request controllers to check in	210	console
request data	request controllers to report their data	220	console
check in	respond to poll request	212	console
pass token to master control	reliquish transmission rights to master control	215	
Top-Down Game State			
Red Alert	DMX state pass-through from Artemis	101	3
Shields on	DMX state pass-through from Artemis	101	7
Within Nebula	DMX state pass-through from Artemis	101	15
Tractored for Dock	DMX state pass-through from Artemis	101	17
Docked	DMX state pass-through from Artemis	101	18
Helm in Reverse	DMX state pass-through from Artemis	101	19
ship damage 20	DMX state pass-through from Artemis	101	32

name	purpose	type code	data
ship damage 40	DMX state pass-through from Artemis	101	33
ship damage 60	DMX state pass-through from Artemis	101	34
energy 20	DMX state pass-through from Artemis	101	40
energy 40	DMX state pass-through from Artemis	101	41
energy 60	DMX state pass-through from Artemis	101	42
energy 80	DMX state pass-through from Artemis	101	43
energy 100	DMX state pass-through from Artemis	101	44
any tube ready to fire	DMX state pass-through from Artemis	101	56
any tube empty	DMX state pass-through from Artemis	101	57
nuke ready to fire	DMX state pass-through from Artemis	101	66
Top-Down Game Events			
front shield low	DMX event pass-through from Artemis	102	8
rear shield low	DMX event pass-through from Artemis	102	9
jump initiated	DMX event pass-through from Artemis	102	10
jump executed	DMX event pass-through from Artemis	102	11
jump fizzled	DMX event pass-through from Artemis	102	12
damcon casualty	DMX event pass-through from Artemis	102	37
just killed damcon member	DMX event pass-through from Artemis	102	38
energy low	DMX event pass-through from Artemis	102	39
unloading tube	DMX event pass-through from Artemis	102	46
loading tube	DMX event pass-through from Artemis	102	51
finished loading tube 1	DMX event pass-through from Artemis	102	58
finished loading tube 2	DMX event pass-through from Artemis	102	59
finished loading tube 3	DMX event pass-through from Artemis	102	60
finished loading tube 4	DMX event pass-through from Artemis	102	61
finished unloading tube 1	DMX event pass-through from Artemis	102	62
finished unloading tube 2	DMX event pass-through from Artemis	102	63
finished unloading tube 3	DMX event pass-through from Artemis	102	64
finished unloading tube 4	DMX event pass-through from Artemis	102	65
homing torp fired	DMX event pass-through from Artemis	102	67
nuke fired	DMX event pass-through from Artemis	102	68
mine fired	DMX event pass-through from Artemis	102	69
emp fired	DMX event pass-through from Artemis	102	70
pshock fired	DMX event pass-through from Artemis	102	71
Interpreted Game States			
front shield low	flagged until logic releases state	103	8
rear shield low	flagged until logic releases state	103	9
energy low	flagged until logic releases state	103	39

name	purpose	type code	data
Interpreted Game Events			
minor front shield hit	context-specific event	104	30
major front shield hit	context-specific event	104	30
minor rear shield hit	context-specific event	104	31
major rear shield hit	context-specific event	104	31
minor internal hit	context-specific event	104	28
major internal hit	context-specific event	104	28
Console Commands			
All	send control code to panels (see table)	110	console
move mouse	allows click and drag operations	110	console
mouse button down	allows click and drag operations	110	console
mouse button up	allows click and drag operations	110	console
reverse on	internal command at Helm to reverse impulse	110	console
reverse off	internal command at Helm to reverse impulse	110	console
clear slider change cmd	releases the mouse for the next slider change	110	console
mouse relative move	moves the mouse pointer a small amount	110	console
clear mouse pointer cmd	releases the mouse for the next pointer move	110	console
mouse frame delay	do nothing for one command frame	110	console
type number	input jump coords	110	console
backspace key	input jump coords	110	console
Console Data			
Engineering	power_levels	120	beam
Helm	warp_state	121	0-4
Helm	impulse_state	122	0-100
Helm/Science	course_array	123	course
Helm/Science	active_course	124	course
Helm	jump_state	125	0-3
Weapons	tube_state	126	tube
Weapons	autoload_on	127	0-1
Weapons	autofire_on	128	0-1
Weap/Sci	science_control_on	129	0-1
Weap/Sci	beam_freq	130	1-5
Science	scan_counter	131	0-6
Science	autoscan_state	132	0-1
All	system active	133	system #

name	purpose	type code	data
Console Requests			
All	adjust_power	150	system 1-8

5.6 DMX Script Channels

The following table shows the SMX channels assigned to each in-game cue by the recommended "DMXcommands.xml" script.

Group	Cue	Channel	continuous?	notes
General	NORMAL_CONDITION_1	0	yes	
	GAME_OVER	1	yes	
	WAR_TURN_WARNING	2		
	RED_ALERT	3	yes	
	ITEM_COLLECTED	4		
Shields	PLAYER_SHIELDS_RAISED	5		
	PLAYER_SHIELDS_LOWERED	6		
	PLAYER_SHIELDS_ON	7	yes	
	FRONT_SHIELD_LOW	8	no	
	REAR_SHIELD_LOW	9	no	
Helm	JUMP_INITIATED	10	no	
	JUMP_EXECUTED	11	no	
	JUMP_FIZZLED	12	no	
	ENTERING_NEBULA	13		
	EXITING_NEBULA	14		
	WITHIN_NEBULA	15	yes	
	START_DOCKING	16		
	TRACTORED_FOR_DOCKED	17	yes	
	COMPLETELY_DOCKED	18	yes	
	HELM_IN_REVERSE	19	yes	
Damage	SOMETHING_HITS_PLAYER	20	no	
	NPC_BEAM_HITS_PLAYER	21	no	
	PLAYER_BEAM_HITS_PLAYER	22	no	
	TORPEDO_HITS_PLAYER	23	no	
	MINE_HITS_PLAYER	24	no	
	LIGHTNING_HITS_PLAYER	25	no	
	COLLISION_HITS_PLAYER	26	no	
	DRONE_HITS_PLAYER	27	no	
	PLAYER_TAKES_INTERNAL_DAMAGE	28	no	
	PLAYER_TAKES_SHIELD_DAMAGE	29	no	

Group	Cue	Channel	continuous?	notes
	PLAYER_TAKES_FRONT_SHIELD_DAMAGE	30	no	
	PLAYER_TAKES_REAR_SHIELD_DAMAGE	31	no	
	SHIP_DAMAGE_20	32	yes	
	SHIP_DAMAGE_40	33	yes	
	SHIP_DAMAGE_60	34	yes	
	PLAYER_DESTROYED	35	no	
	SELF_DESTRUCTED	36	no	
	DAMCON_CASUALTY	37	no	
	JUST_KILLED_DAMCON_MEMBER	38	no	
Energy	ENERGY_LOW	39	no	
	ENERGY_20	40	yes	
	ENERGY_40	41	yes	
	ENERGY_60	42	yes	
	ENERGY_80	43	yes	
	ENERGY_100	44	yes	
	ENERGY_200	45		
Torpedos	UNLOADING_TUBE	46	no	
	UNLOADING_TUBE1	47	no	does not work
	UNLOADING_TUBE2	48	no	does not work
	UNLOADING_TUBE3	49	no	does not work
	UNLOADING_TUBE4	50	no	does not work
	LOADING_TUBE	51	no	
	LOADING_TUBE1	52	no	does not work
	LOADING_TUBE2	53	no	does not work
	LOADING_TUBE3	54	no	does not work
	LOADING_TUBE4	55	no	does not work
	ANY_TUBE_READY_TO_FIRE	56	yes	
	ANY_TUBE_EMPTY	57	yes	
	FINISHED_LOADING_TUBE1	58	no	
	FINISHED_LOADING_TUBE2	59	no	
	FINISHED_LOADING_TUBE3	60	no	
	FINISHED_LOADING_TUBE4	61	no	
	FINISHED_UNLOADING_TUBE1	62	no	
	FINISHED_UNLOADING_TUBE2	63	no	
	FINISHED_UNLOADING_TUBE3	64	no	
	FINISHED_UNLOADING_TUBE4	65	no	
	NUKE_READY_TO_FIRE	66	yes	
	TORP_HOMING_FIRED	67	no	
	TORP_NUKE_FIRED	68	no	
	TORP_MINE_FIRED	69	no	

Group	Cue	Channel	continuous?	notes
	TORP_EMP_FIRED	70	no	
	TORP_PSHOCK_FIRED	71	no	

6.0 Updating Software

The ACP3 controller uses a programmable Teensy-LC microcontroller development board to accomplish most functions. To update the ACP3 software on the Teensy-LC, a micro-B USB cable connection to a PC running Arduino and Teensyduino is needed.

Arduino software: https://www.arduino.cc/en/Main/Software
Teensyduino software: https://www.pjrc.com/teensy/td_download.html

Install the above software following the instructions provided in the links. Once installed, the Arduino sketches (code) for various pre-designed control panels can be opened. These sketches are available here:

https://github.com/angelofrust/ACP3

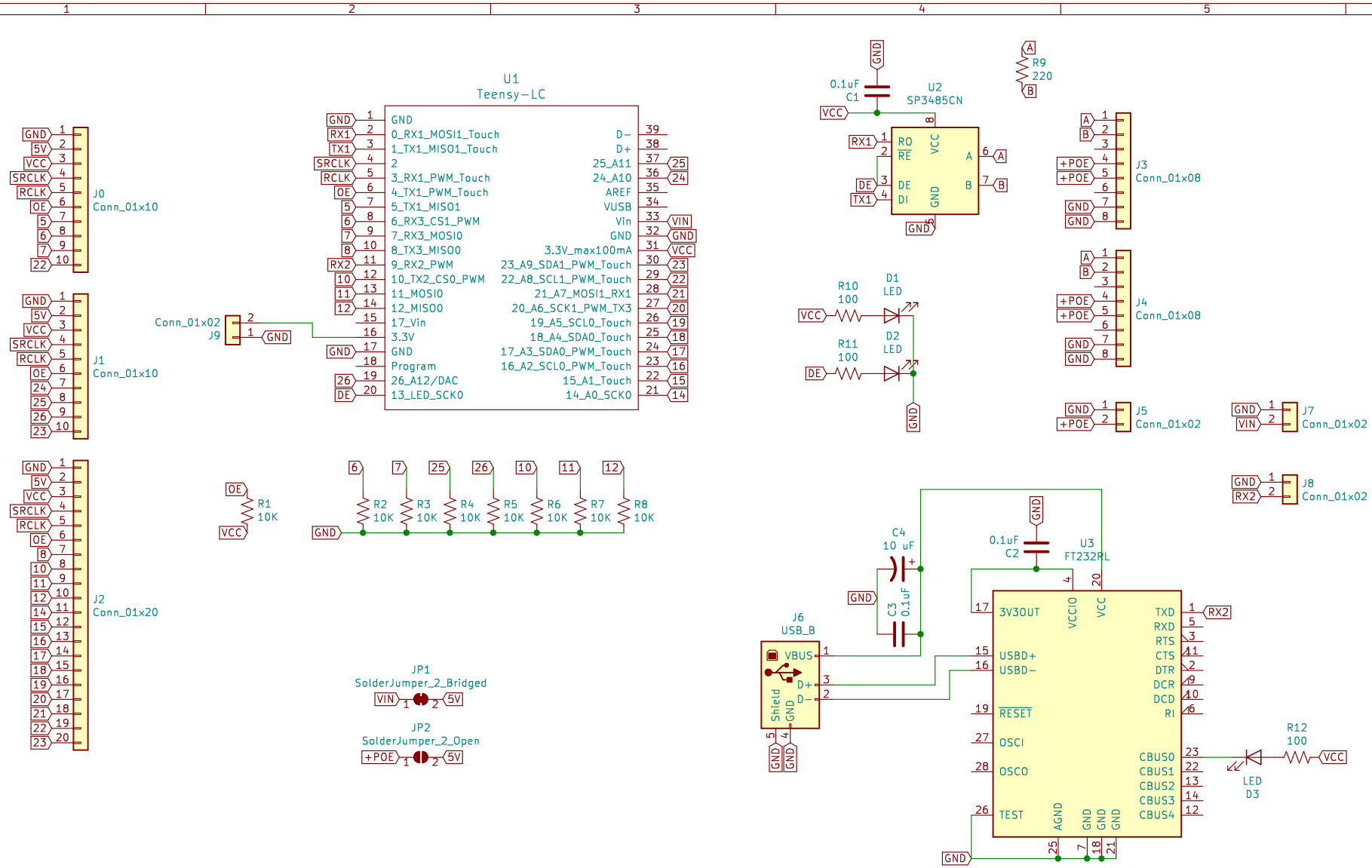
Before compiling and uploading the sketch, make sure the following settings are selected in the Arduino software:

Tools > Board: “Teensy-LC”
Tools > USB Type: “Serial + Keyboard + Mouse + Joystick”

Once the sketch is loaded and the above settings are made, click Sketch > Upload to compile and upload to the controller. It is recommended to unplug the ribbon cable from the controller during this step because the engineering control program will make multiple click-and-drag mouse movements on the screen when booting with the control panel attached. These movements can make unexpected changes to the Arduino sketch on screen.

7.0 Troubleshooting

Problem	Potential Cause	Solution
no lights or controls (power light is off)	not plugged in to active controller	make sure the ribbon cable is plugged into an ACP3 controller that is powered by a micro-B USB cable from a PC.
no communication between controllers (no blinking RS485 light)	Ethernet cables not connected (or loose) to RS485 jacks in daisy chain	connect Ethernet cables according to recommended configuration
no communication between controllers (no blinking RS485 light)	No master controller on bus	make sure exactly one controller is loaded with a master controller version of the ACP3 software
no DMX signal from Artemis SBS host (no blinking DMX light)	FTDI drivers on PC not installed	download and install FTDI drivers for PC
no DMX signal from Artemis SBS host (no blinking DMX light)	USB cable from “viewscreen” position (USB B) not connected to host	connect USB B cable to Artemis SBS host PC
no DMX signal from Artemis SBS host (no blinking DMX light)	Artemis SBS host did not initiate DMX stream correctly	exit and restart Artemis SBS host



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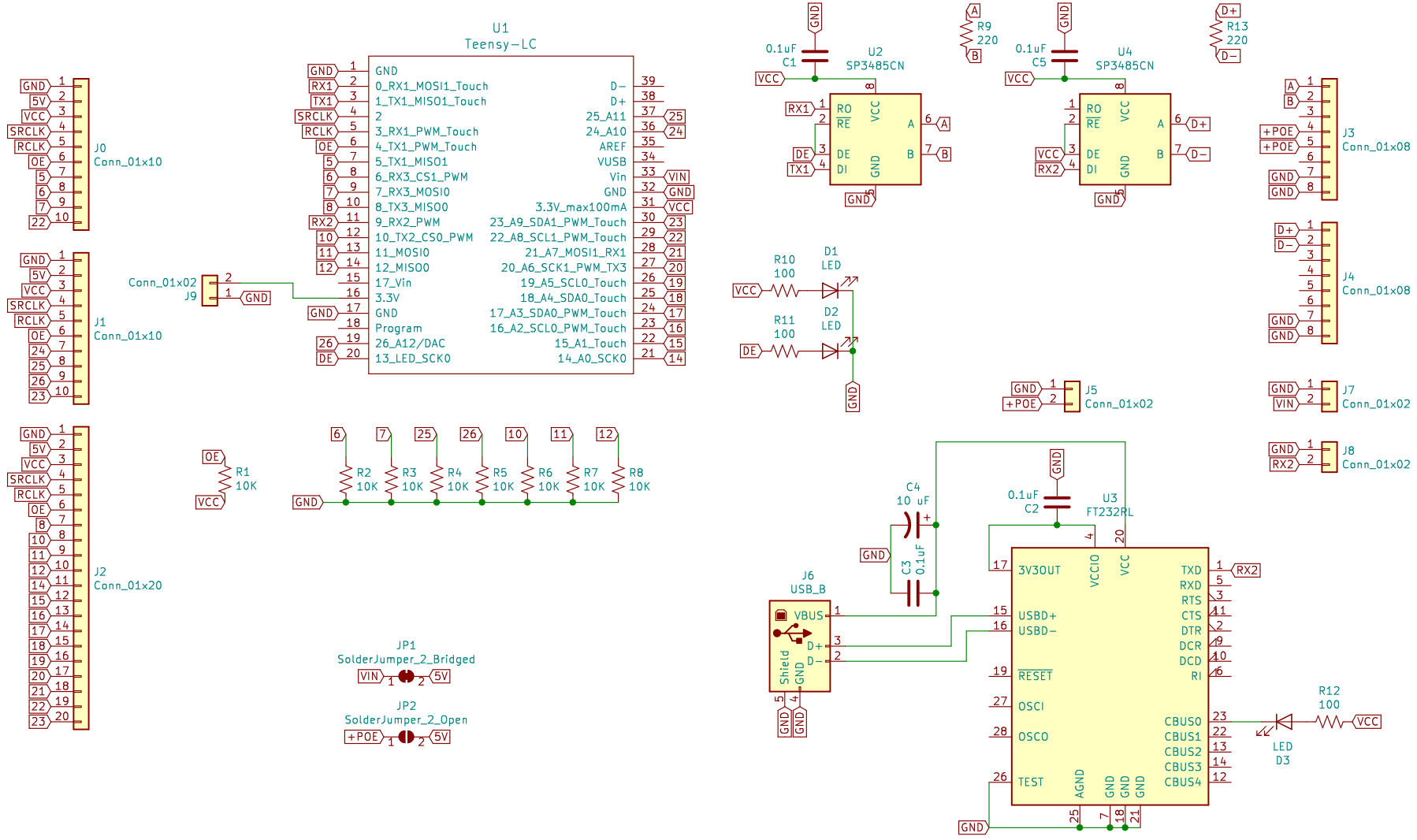
Size: USLetter	Date: 1-21-2019
KiCad E.D.A. eeschema (5.0.0)	Id: 1/1

Rev: D



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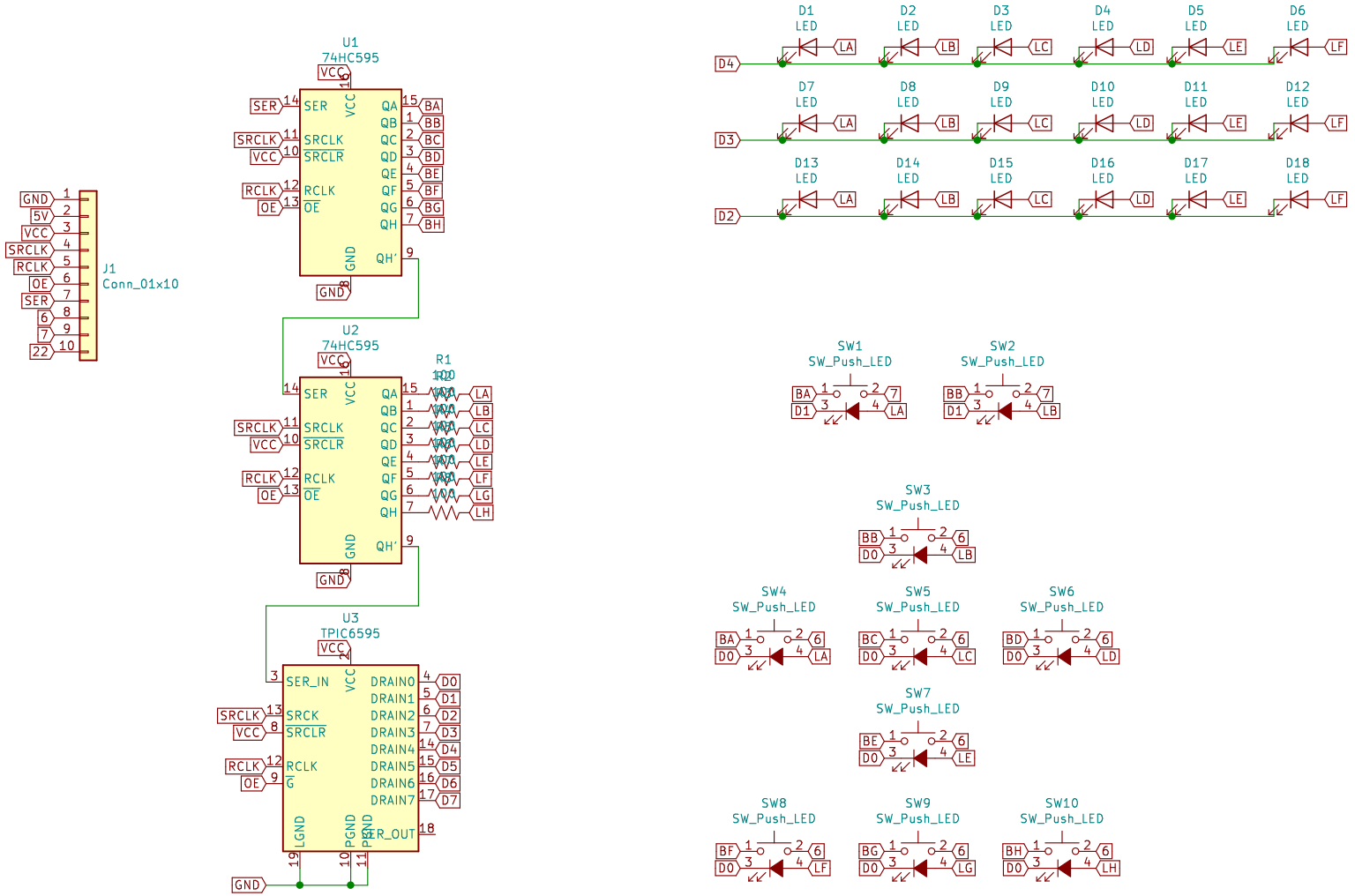

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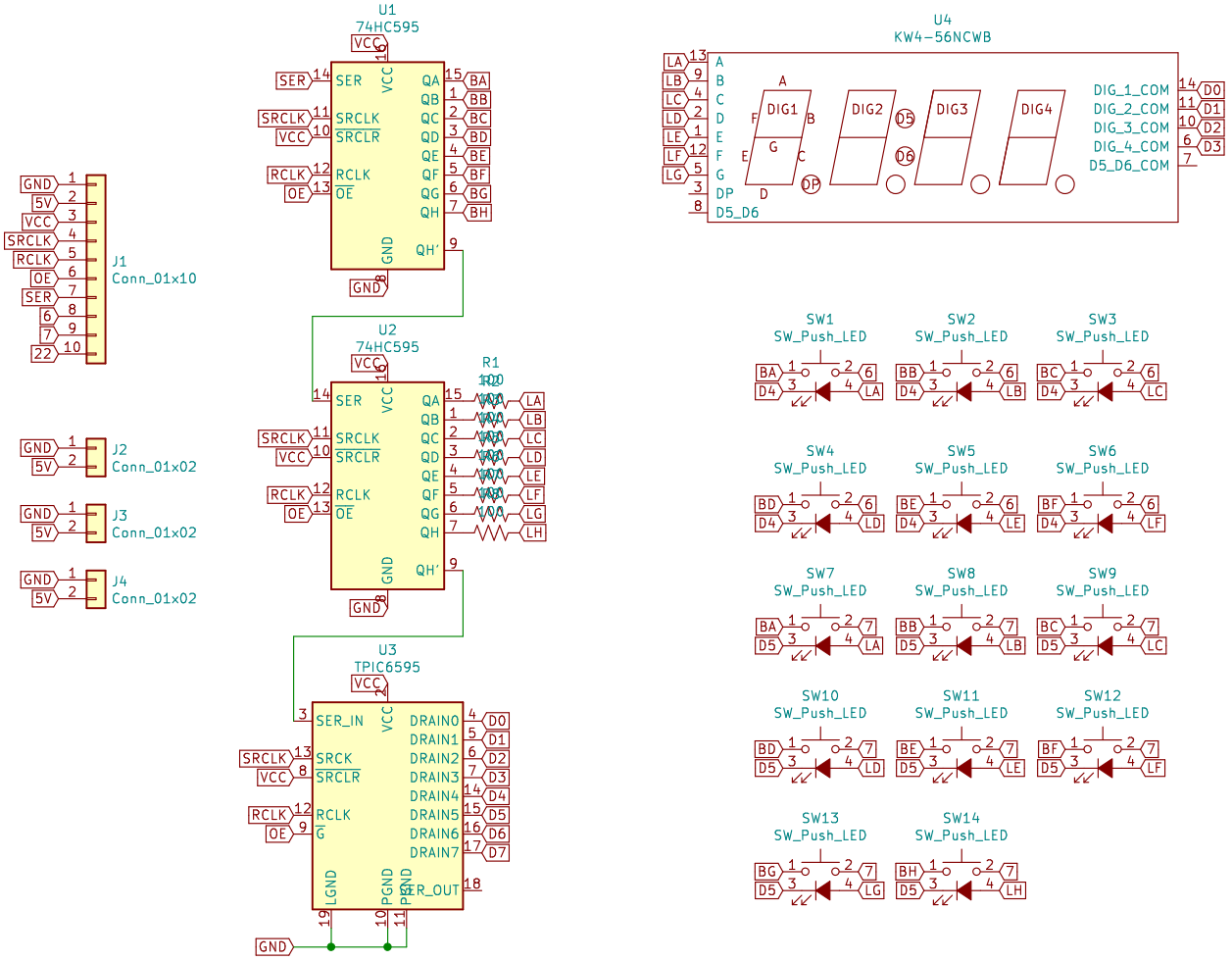
Rev: A



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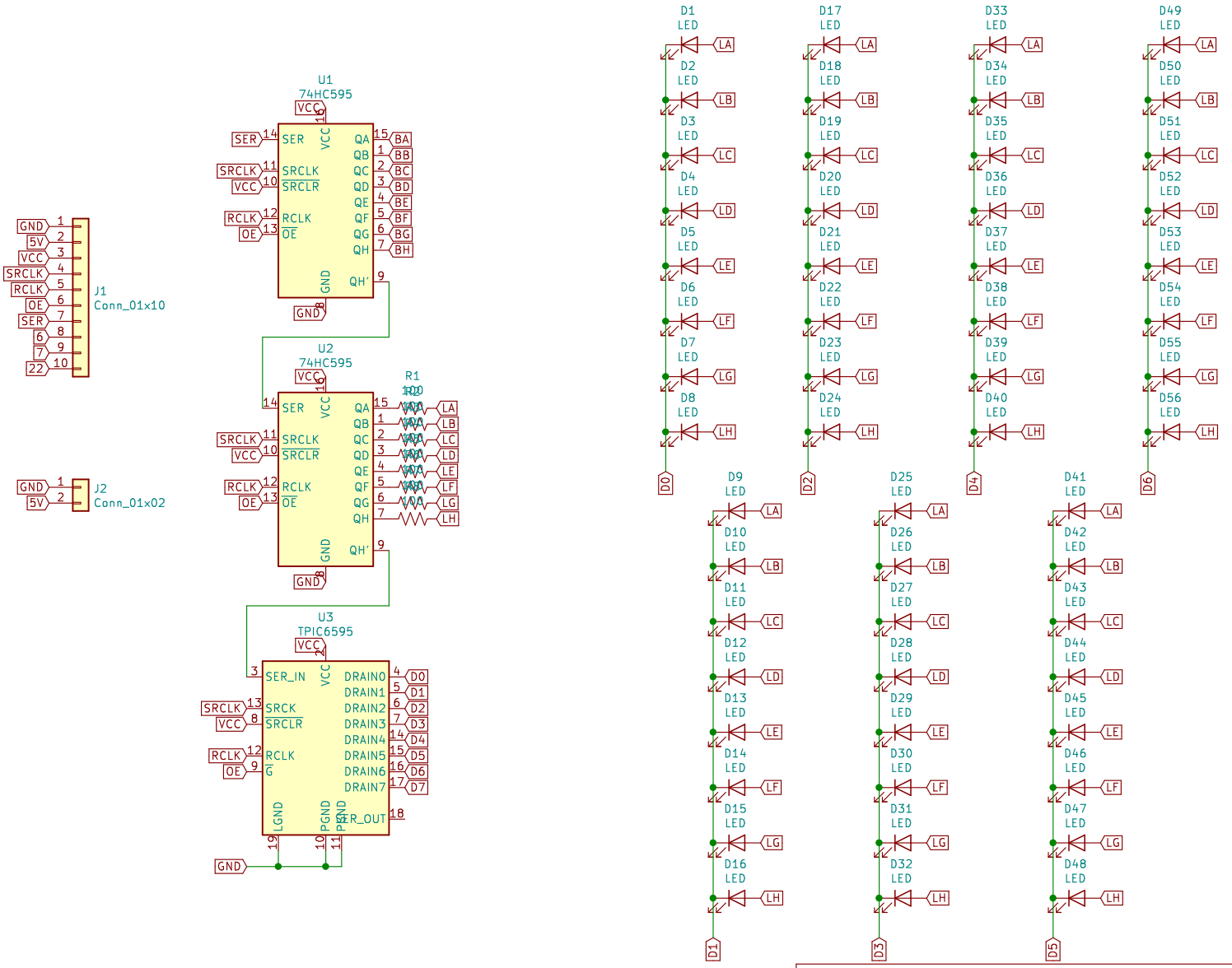

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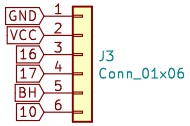

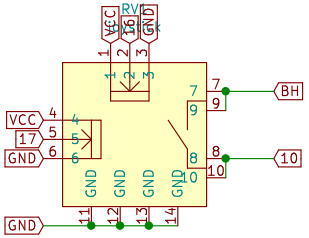

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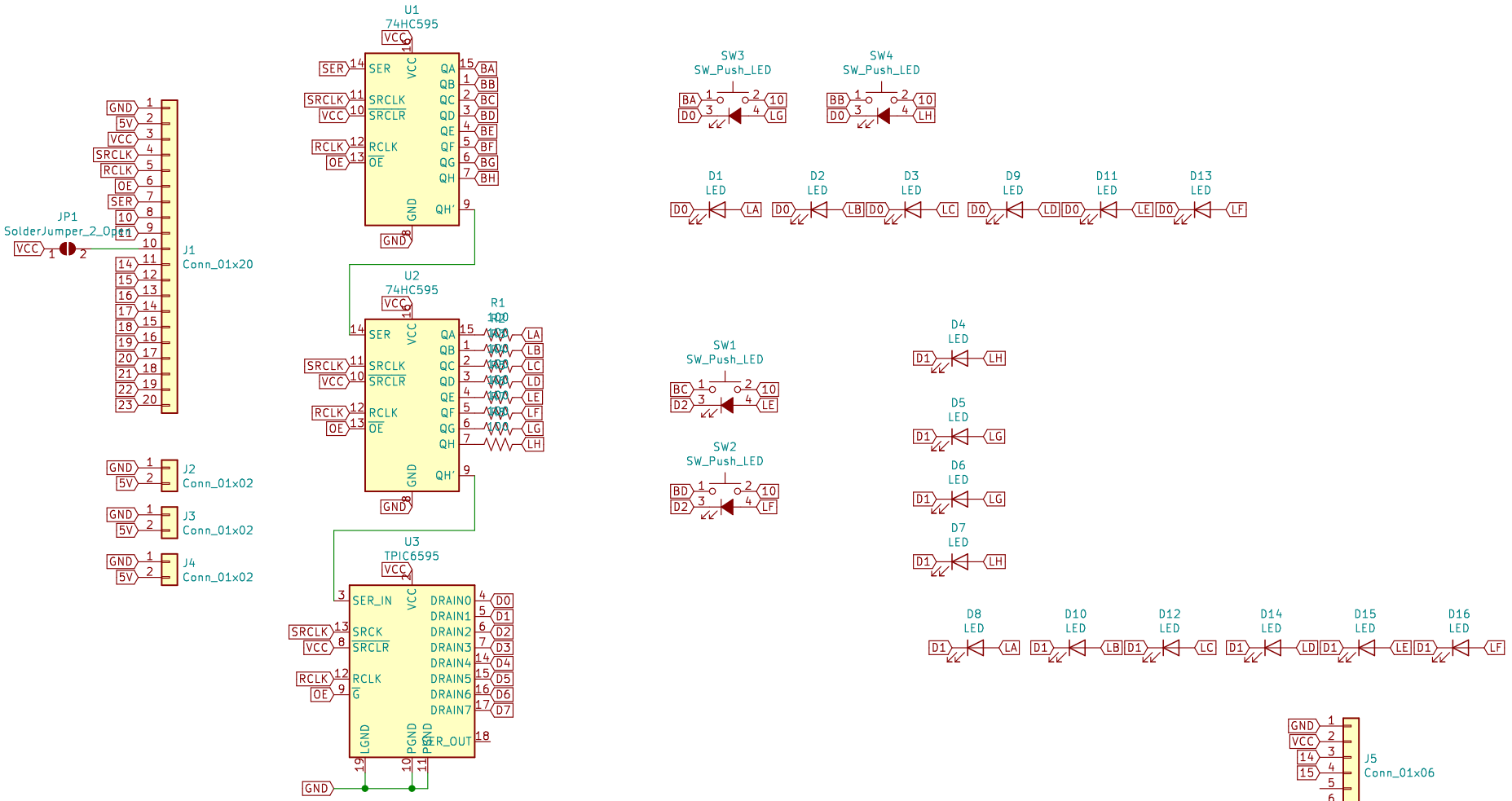

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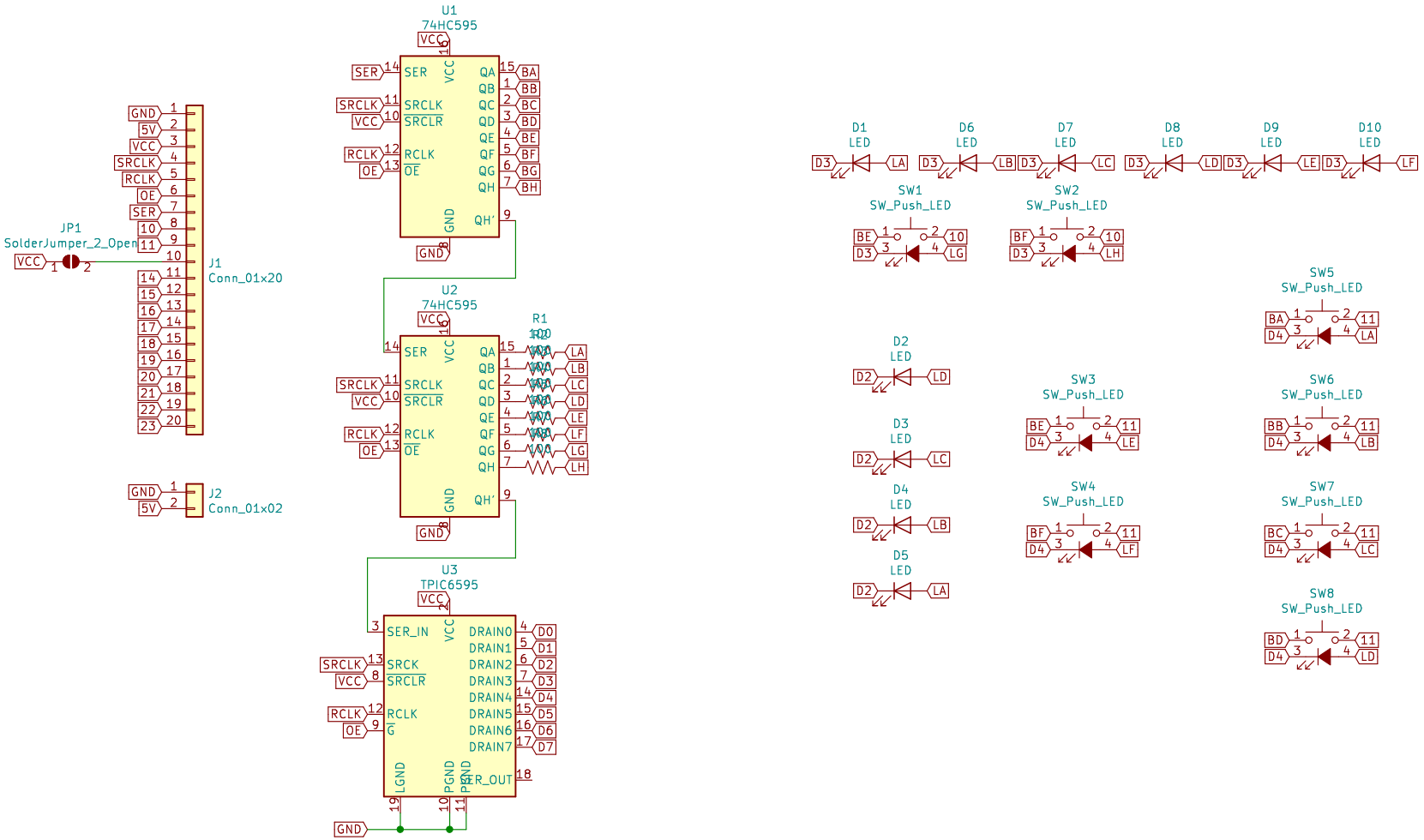

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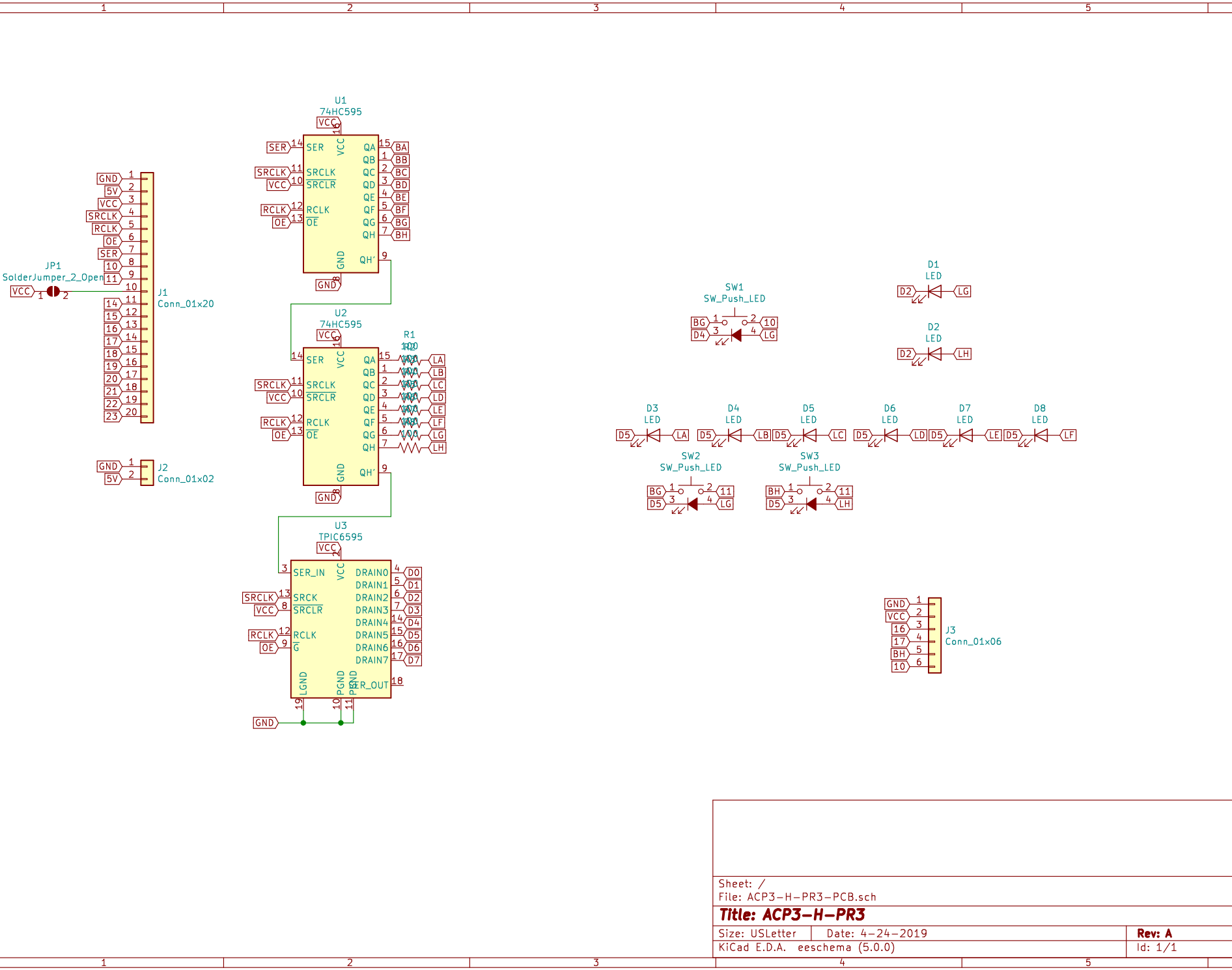
Rev: A



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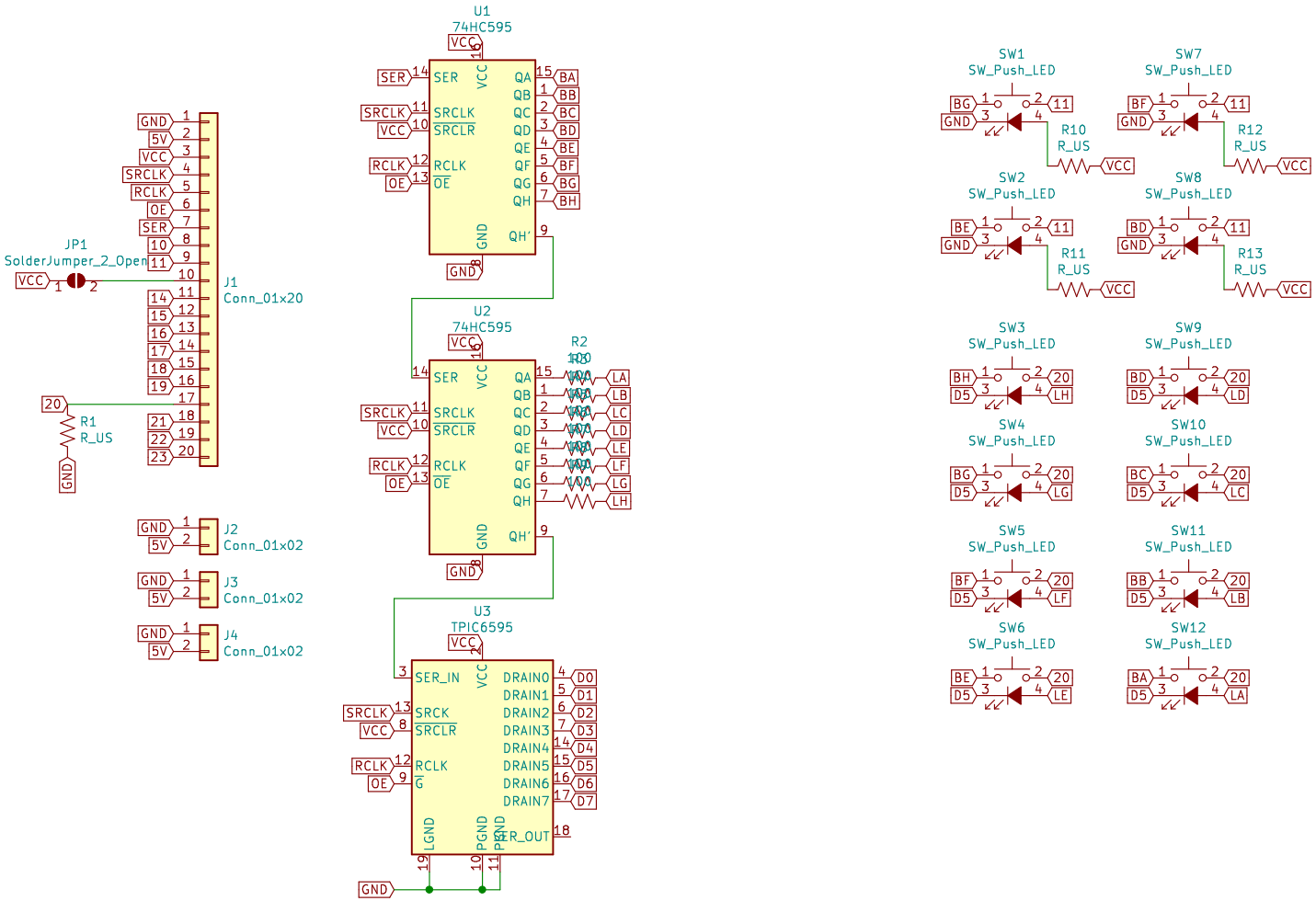

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Size: USLetter | Date: 6-3-2019	**Rev: A**
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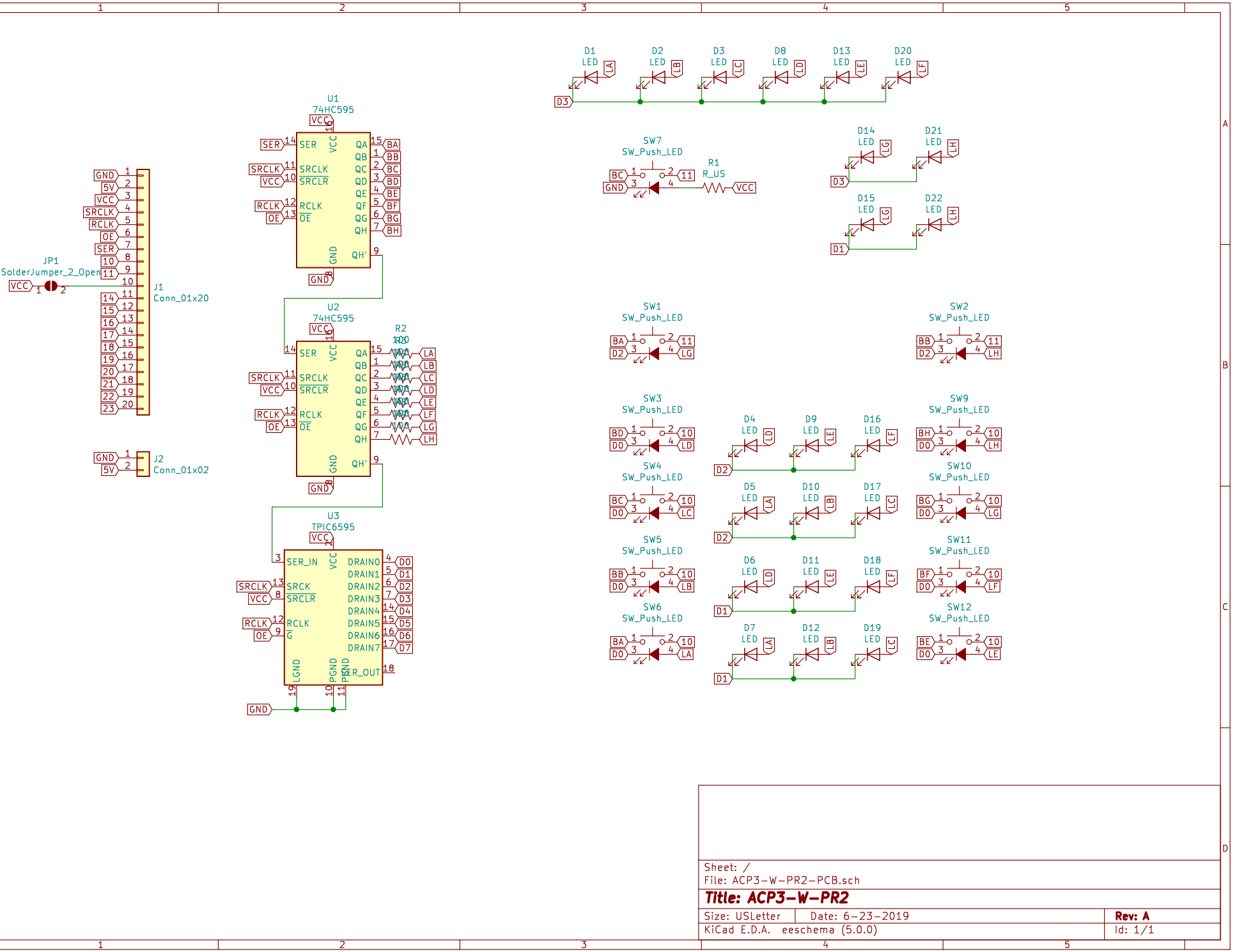
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U2
74HC595
U3
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Conn_01x20
J2
Conn_01x02
JP1
SolderJumper_2_Open
R1
R_US
R2
SW1
SW_Push_LED
SW2
SW_Push_LED
SW3
SW_Push_LED
SW4
SW_Push_LED
SW5
SW_Push_LED
SW6
SW_Push_LED
SW7
SW_Push_LED
SW9
SW_Push_LED
SW10
SW_Push_LED
SW11
SW_Push_LED
SW12
SW_Push_LED
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Rev: A
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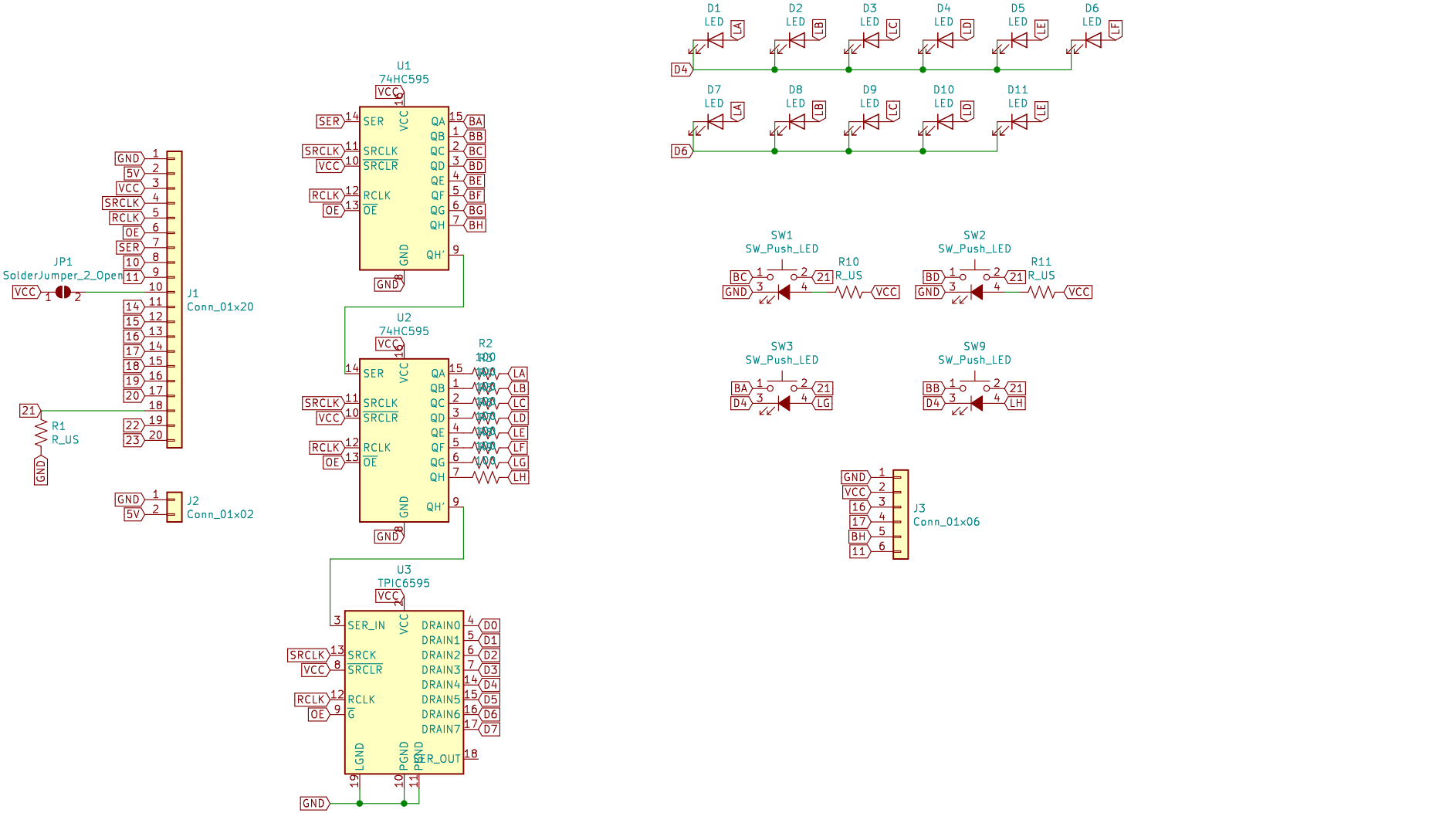

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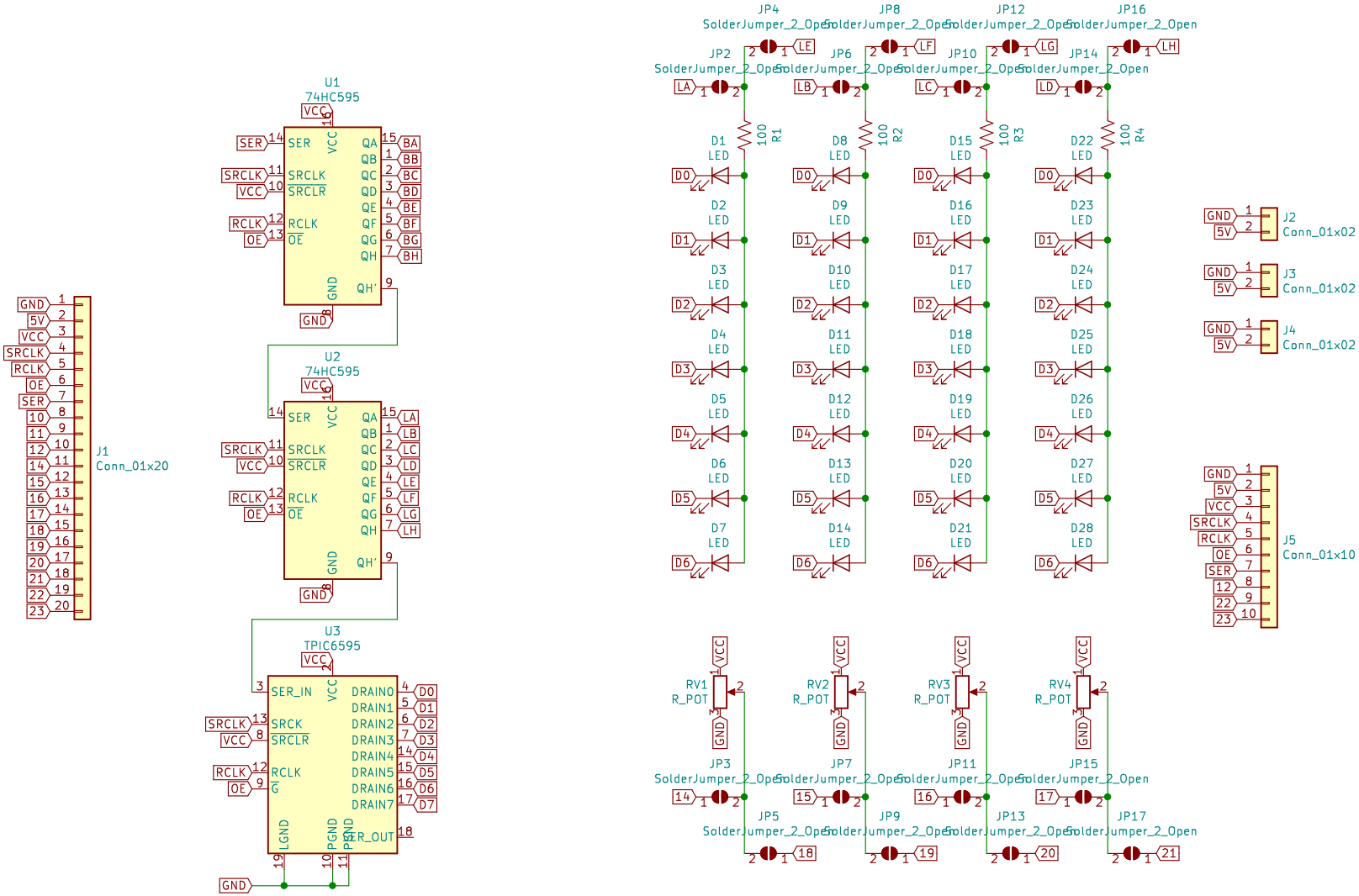

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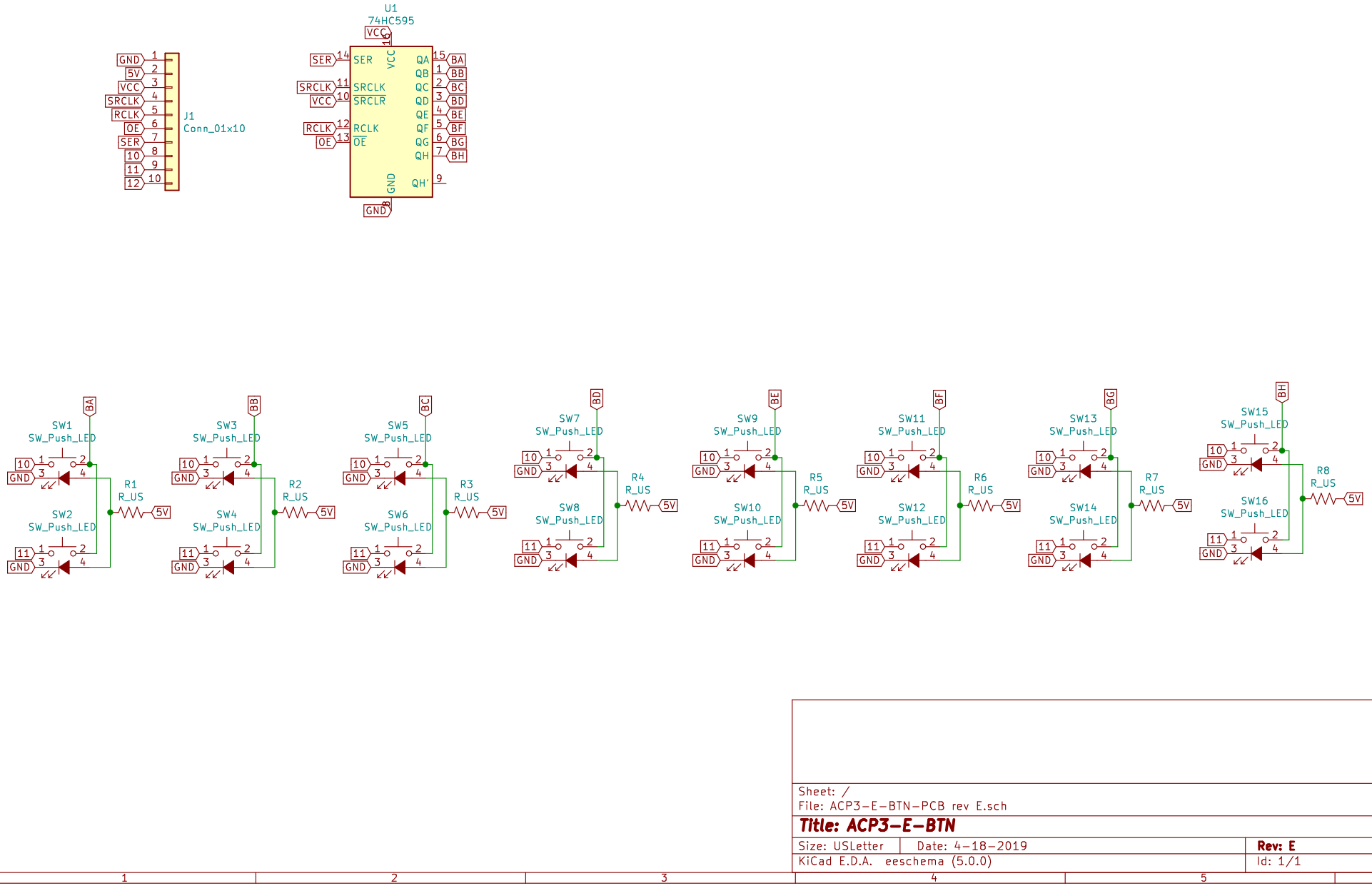
Rev: E



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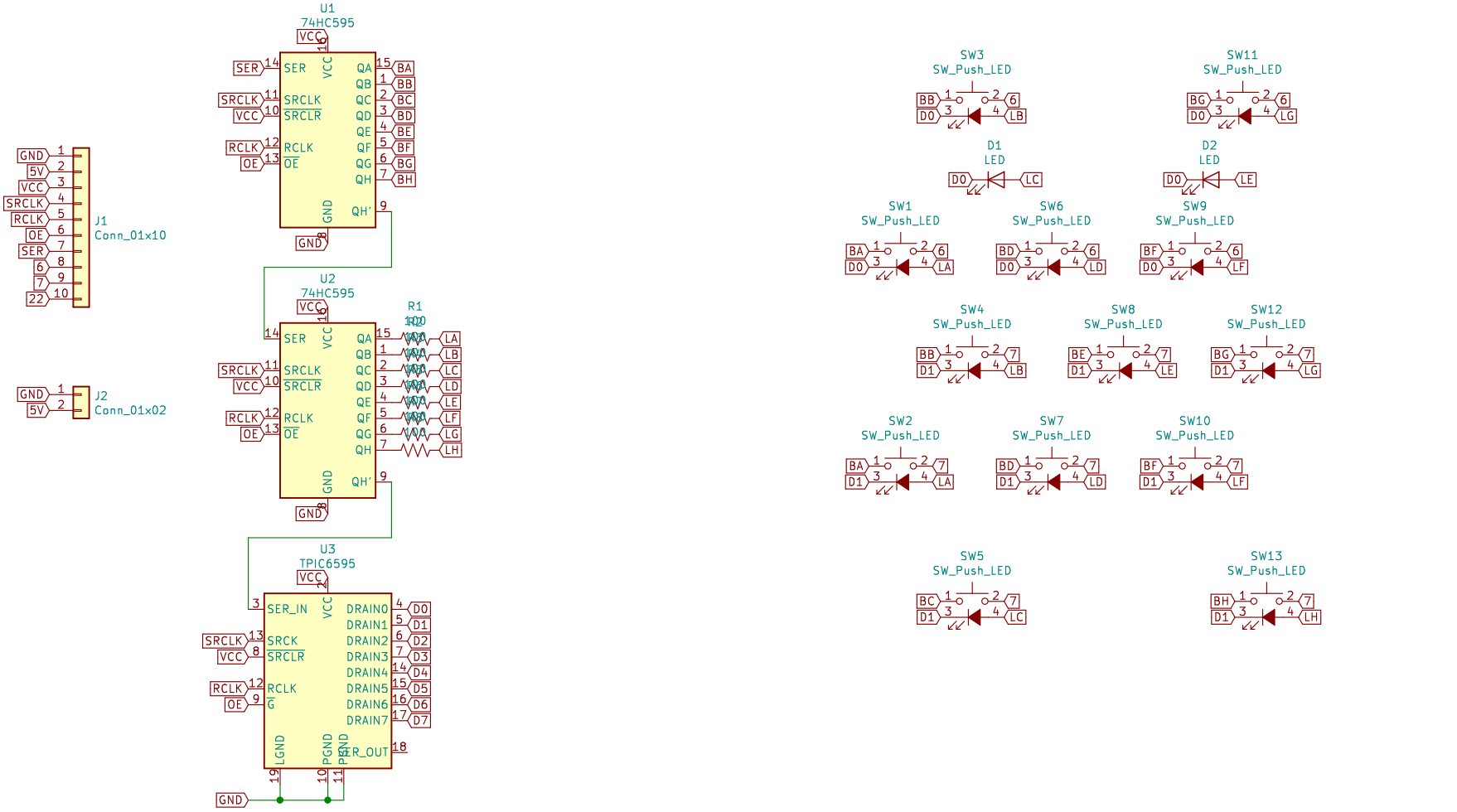

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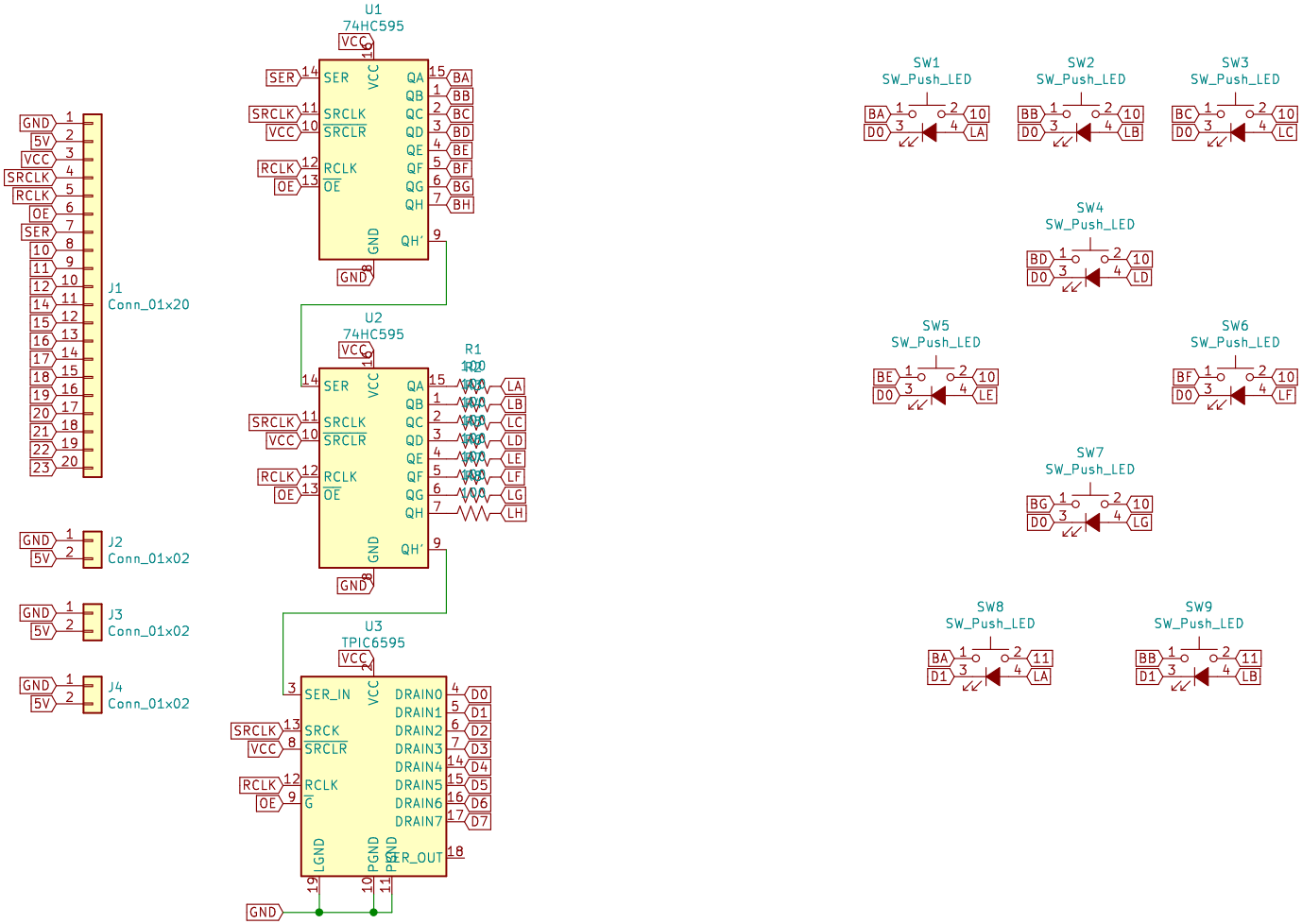

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Size: USLetter Date: 7-5-2019	**Rev: A**
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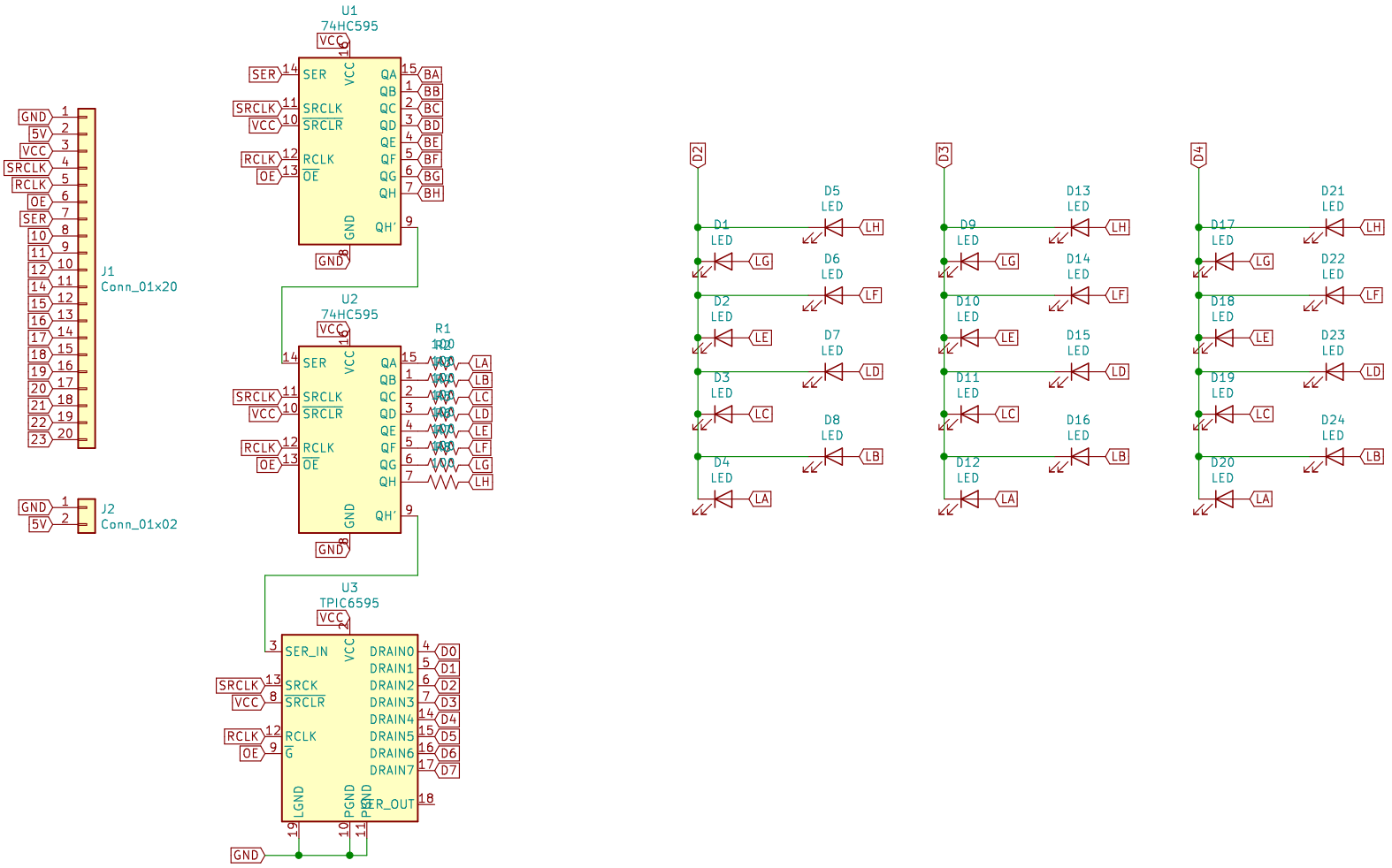

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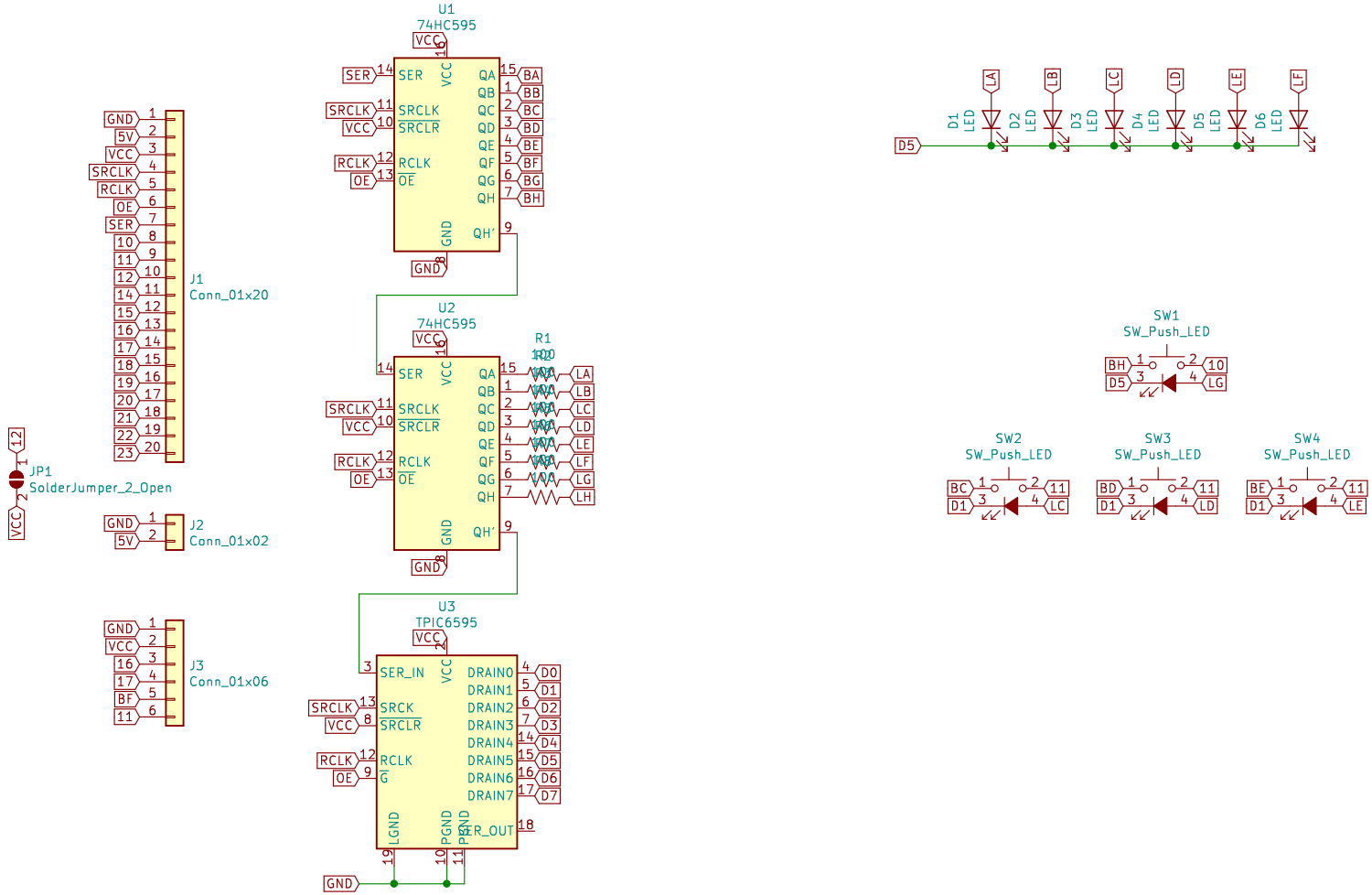

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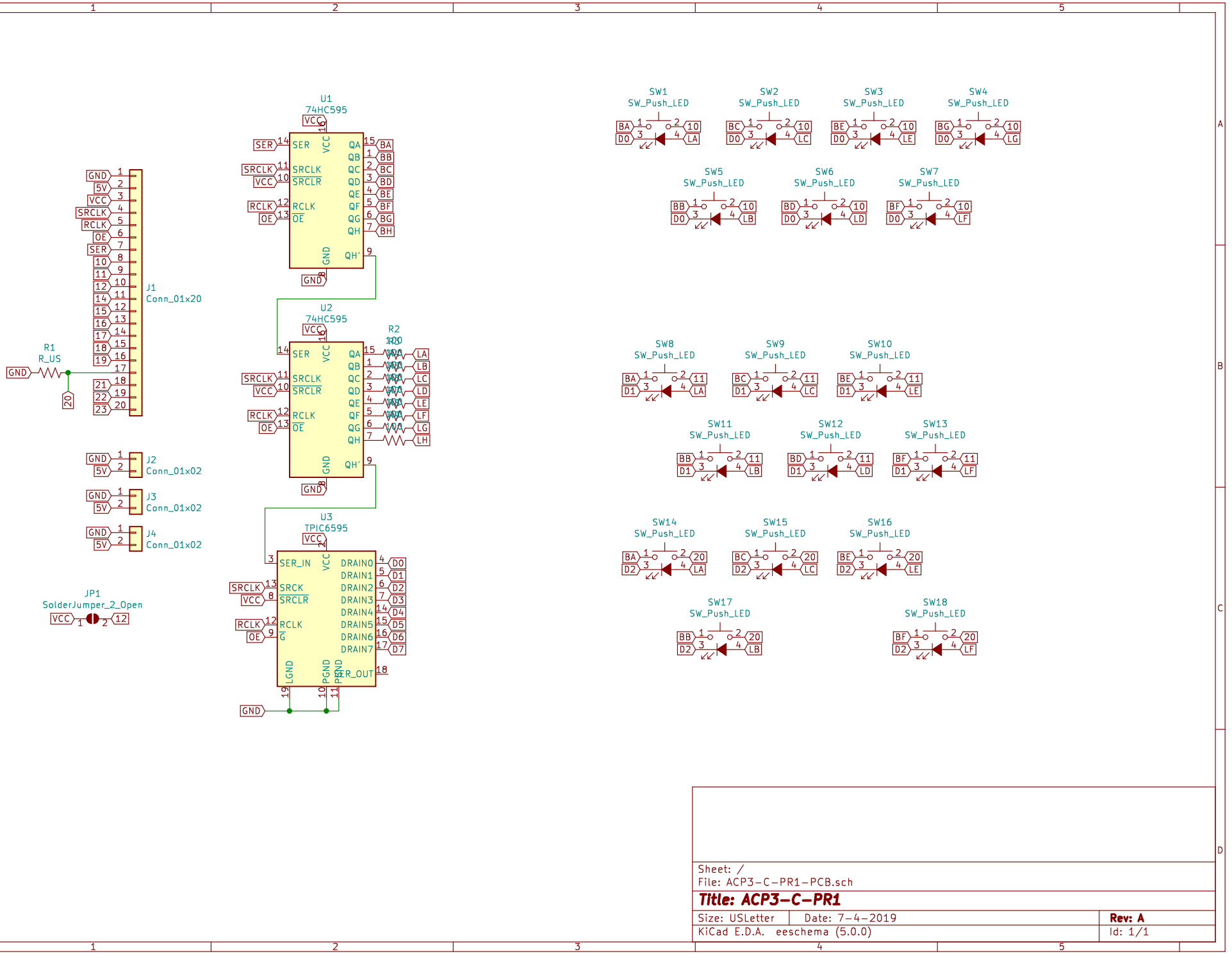
Rev: A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U3
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J3
Conn_01x02
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Conn_01x02
JP1
SolderJumper_2_Open
R1
R_US
R2
SW1
SW_Push_LED
SW2
SW_Push_LED
SW3
SW_Push_LED
SW4
SW_Push_LED
SW5
SW_Push_LED
SW6
SW_Push_LED
SW7
SW_Push_LED
SW8
SW_Push_LED
SW9
SW_Push_LED
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SW13
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SW16
SW_Push_LED
SW17
SW_Push_LED
SW18
SW_Push_LED
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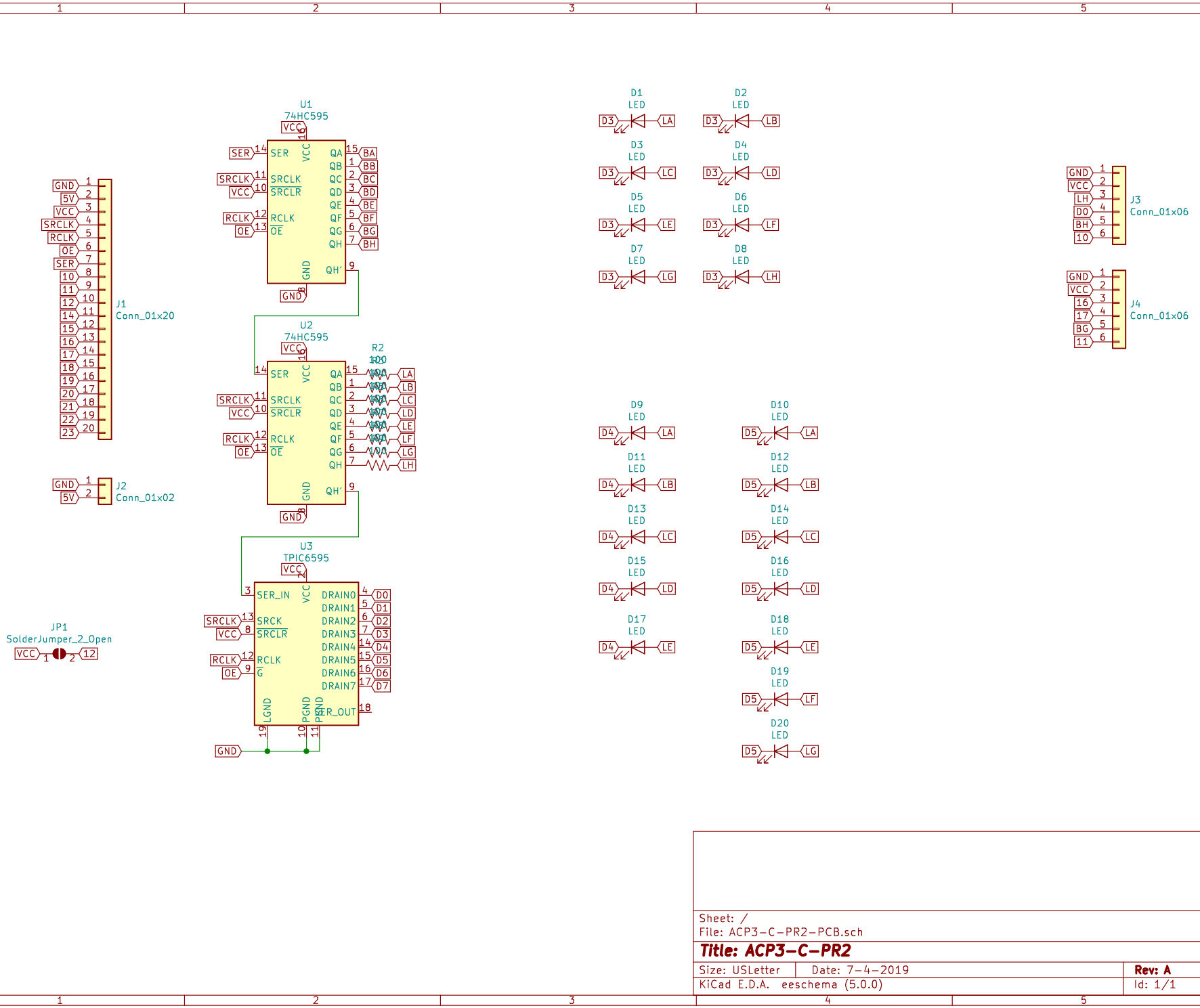
Size: USLetter
Date: 7-4-2019
Rev: A
KiCad E.D.A. eeschema (5.0.0)
Id: 1/1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U2
74HC595
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R2
D1
LED
D2
LED
D3
LED
D4
LED
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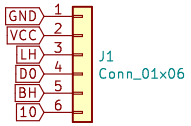

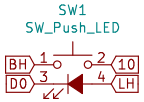

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