

Spooky Pinball Presents: Scooby Doo



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Chapter 1 Game Assembly and Setup

Game Assembly and Setup

Tools Required

You will need the following tools for setup:

- 5/8" socket wrench
- Utility knife
- Wire snips
- Small bubble level (side-to-side and incline)
- Someone to help you

Game Dimensions

- Shipping box (h x w x d) - 66 x 32 x 32 in
- Folded (h x w) - 55 x 29 in
- Setup with topper (h x w x d) - 90 x 29 x 55 in
- Setup without topper (h x w x d) - 75 x 29 x 55 in

Parts List

Qty.	Part (s)
1	Set of coin door keys
1	Tilt plum bob
1	Back box (head) bolt
4	Pinball legs
4	Pinball leg levelers with nut
8	5/8" headed pinball leg bolts
4	Pinballs
1	Power cable (line cord) for your country's electrical system

Rubber Rings

Lower Playfield Rubber Rings	
Qty.	Ring Size
2	2.5 in
1	2 in
3	3/8 OD
2	3/8 OD
1	1 in
2	3/16 in
Upper Playfield Rubber Rings	
Qty.	Ring Size
1	1 in
4	3/8 OD
2	3/16 in

NOTICE

Need to report a code bug in Scooby Doo? You can send an email directly to DJ@spookyinball.com with the subject "Code Bug"

Assemble your game

1. Locate the coin door keys inside the leg box.
All the pinballs, a power cord, legs, leg bolts, and head bolt & washer, are in the same package.
2. Please take a minute to inspect to insure you have all the parts and they are not damaged.
3. Open the flaps to the game box. Make sure you remove the staples from the flaps so you don't get scratched!

WARNING

DO NOT CUT THE PLASTIC STRAP JUST YET!

- A With some assistance, lay the machine flat on the floor on the side that is marked "Truck this side only." Grab the plastic strap and pull the game from the box. After the game has been removed from the box (and with the assistance of a helper), stand the game back upright on its back.
- B Using your utility knife, carefully cut down the sides of the box that are labeled "Truck this side only," making sure that your knife DOES NOT

come in contact with the game cabinet itself. After both sides are cut you will be able to access the pinball cabinet itself.

4. Thread the leg leveler nut onto each of the levelers. After that is complete, thread the leg leveler into the bottom of each of the pinball legs. Begin with all of the levelers adjusted to their lowest positions (threaded all the way in).

Install the legs and back box

1. Using 2 of the 5/8" headed pinball legs bolts per leg, start with either of the front legs. Thread the leg bolts into the corresponding holes on the corners of the front of the cabinet.

Using your ratchet or wrench, tighten to make sure the leg is attached to the machine. With the assistance of a friend or helper, slowly tip the game forward until the two front legs are resting on the floor.

Now, as a team, pick up the rear of the cabinet and attach the back two legs to match the front. You may want to find a stool or other sturdy support system to rest the game on while attempting this. Once the rear legs bolts are inserted and tightened, you can set the game down on its legs.

2. Using your wire cutters, cut the plastic strap that runs the length of the game. **ATTENTION!** Be careful there is some tension on this strap and it may release with force.

After the strap is free, you can lift the back box into position. Be mindful to make sure none of the wiring gets pinched while lifting the back box. Use the clasp on the back box and the cabinet to temporarily hold the back box upright. This should not be used as a permanent fastener.

Using the keys from the parts box, open the coin door and retrieve the back box keys to unlock the back box lock and pivot down the LCD display panel. Now, using the head bolt and washer provided, secure the back box to the base cabinet. At this time, thoroughly check for any loose or disconnected connection(s) in your back box. When you are done, reinstall the back glass and engage the lock. Place the back box key back on the hook in the coin door.

CAUTION

PLEASE USE CAUTION WHEN HANDLING THE PLAYFIELD GLASS!

3. With the coin door open, grasp the lever located at the top right of the door frame and pull it to the left. This will release the mechanism that holds the lock down

bar in place. Set the lock down bar aside to remove the playfield glass. Now, close your coin door to keep it out of the way of the playfield glass. In order to remove the playfield glass, simply slide the glass down the front of the machine. This is tempered glass, please take care not to hit the edges of it on anything as it may shatter. With the glass safely stored off to the side, you are ready to level the machine.

Adjust the pitch and level

1. With your small bubble level you can level the side to side action of your game. Placing the level on the playfield itself will give you the most accurate results.
2. First level the back of the game. With your helper watching the level, crawl under the machine and rotate the leg leveler counterclockwise to make the leveler "longer." Do this until your bubble is between the two lines on your level. Repeat this process for the bottom of the playfield.
3. After that is done, you can use your pitch level to adjust the pitch of the game. The steeper the pitch, the faster the game will play. **Spooky recommends a pitch of 6.5°.** The pitch can be increased by raising the back of the game. This is accomplished by making the leg levelers on the back legs longer.
4. After the proper pitch is established, recheck the level of the playfield.

Install the balls

1. Remove the pinballs from their package. Please take a minute to inspect them for any nicks or scratches. Also, this is a good time to wipe them off before installing them into the game.
2. After you are satisfied that they are acceptable, place them on the lower playfield, and let them naturally fall into the trough. Please install all balls that come with the game.

Install the tilt bob

The tilt plump bob (referred to as tilt bob) is a metal cone, that when it makes contact with the ring it is inside of, will issue a Tilt Warning. After repeated tilts the machine's coils will shut down and the player will lose their current ball.

1. To install the tilt plump bob open the coin door on the front of the game.
2. On the inside left of the base cabinet you will find a long metal rod inside a metal closed hoop. Insert the narrow end of the tilt bob onto the metal rod and then tighten the nut on the side of the tilt bob.

The farther up the metal rod you go, the less movement will be necessary to tilt the machine. After playing a couple of games you can adjust this to your liking.

Power up the game

1. Using the line cord from your supplied parts, plug the female end into the receptacle on the back of the base cabinet, and the male end into your outlet.
2. Turn the switch on (under the bottom of the cabinet, right front side). Please take this moment to check for proper function for the basics of the machine.
3. If the machine does not seem to function properly refer the troubleshooting section in this manual, or contact Service@SpookyPinball.com

CAUTION

YOU ARE WORKING WITH SENSITIVE ELECTRONIC MATERIALS. PLEASE USE CAUTION!

Software Update Instructions

1. Retrieve the latest code package from the link on the Spooky Support page.
2. Load the file onto a USB flash drive (do not place it inside any folders on the drive).
3. Safely eject the drive, and insert into the pinball machine using either the USB port behind the coin door, or plugging directly into the PC in the head.
4. With the game booted and on the attract screen, enter the service menu (green button inside coin door), and navigate to SYSTEM > UPDATE SOFTWARE > (choose your code version). If you do not see your code version there, try unplugging and re-plugging the USB drive, and hit REFRESH in the service menu. When you select the desired version, the game will begin updating, and the play field lights illuminate in yellow. When the update is complete, the play field lights turn green.
5. Power the game off for a moment. When you turn it back on, the game will take a few minutes to make backups and finalize the update. Allow the game to fully boot into attract mode, otherwise the game will revert back to the previous code version the next time it turns on.

Note: You may keep several versions of code on the USB drive and choose in the menu which to install.

Updating the Scooby Doo Base Image

Sometimes things go really bad; your game won't load, and the screen remains black, or displays an error, or you'll see a gray BIOS screen, or another issue. This can be a problem with the mini PC, but it might also just be a problem with the software.

This can be fixed by "re-imaging" your mini-pc, which gets you back to a working state so that you can update to the latest code.

To update the Scooby Doo base image

1. Download the Scooby Doo base image from the link on the Spooky Support page.
2. Unzip the contents of your download and copy to a new, or freshly formatted USB drive.
3. Safely eject the USB drive after the file transfer completes.
4. Plug the USB into your game (direct into mini pc or into coin door USB extension is fine) while it is off and turn it on to start the process. It should automatically start.
5. You'll see "Clonezilla" and it will take a fair while doing things, so please be patient. Finally you'll see a reboot menu with three options (Power off, Reboot, and CMD). Turn your game off, unplug the USB, and turn the game on again.
6. It should load the base image and only the service menu will be accessible. You can then download the latest game software version online, and install the update following the normal update procedure in this manual.

Maintaining Your Pinball Machine

Spooky Pinball recommends that you regularly perform select maintenance routines. These maintenance routines focus on the important areas within your machine.

Routine Maintenance

- Remove the glass to visually inspect the playfield for loose connectors, worn rubbers, cracked plastics, and debris that may have collected.
- Eject the pinballs and inspect for ball damage. Replace pinballs, if necessary. Coil dust at the bottom of the cabinet suggests coil stop damage.
- Examine the inside of the cabinet for bulbs and other loose parts.
- Use a pinball to check all playfield switches.
- Review the game audits.
- Run diagnostics.
- Adjust the tilt bob, if necessary.
- Verify that the latest software version is installed.
- Replace worn or dirty rubber parts.
- Use an ammonia-free glass cleaner to clean the playfield glass.
- Use a non-abrasive cleaner (like NOVUS 1: Clean & Shine) to clean the plastics.

NOTICE

Need to report a code bug in Scooby Doo? You can send an email directly to DJ@spookypinball.com with the subject "Code Bug"

Chapter 2 Game Menu System

Game Menu System

Basic Menu Functions	
<ul style="list-style-type: none"> ● Coils ● Switches/Optos ● Lights ● Servos ● System 	
Coil Test (see Coil Settings table)	
To Test Coils	<ul style="list-style-type: none"> ● Use the flippers to toggle/test each coil
Switch Test	
Note: Use <u>Switch Reports</u> to display statistics on switch activations	
Default Switch Screen	<ul style="list-style-type: none"> ● Individually test switches by finger, or use pinball on playfield. <p style="margin-left: 20px;">Press any switch on cabinet or playfield to trigger switch</p>
Stuck Switch Test	
Default Switch Screen Test	<ul style="list-style-type: none"> ● Indicates which switches are currently activated
Individual LED Test (see Individual LED Test table)	
Servo Test/Adjust (see Servo Settings table)	
To change servo	<ul style="list-style-type: none"> ● Use action button
To move servo to next position	<ul style="list-style-type: none"> ● User flippers to toggle
System Test/Adjust (see Audio, Pricing, and Attract Settings table)	

Table 2-1. Menu Functions

Coil Settings	
User the flippers to toggle/test each coil	
	Value (Range)
Coil Test	n/a
Lower Flippers Hold Power	<ul style="list-style-type: none">● Normal● Boost
Knocker	<ul style="list-style-type: none">● off● on
Shaker	<ul style="list-style-type: none">● off● on
Shake on Spinners	<ul style="list-style-type: none">● yes● no
Shake On Cutler Bash	<ul style="list-style-type: none">● yes● no
Restore Default Settings	n/a

Table 2-2. Coil Settings

Individual LED Test
Refer to the individual LEDs for testing purposes
0 - Mystery Machine Right
1 - Scooby Snack 4
2 - Dog Tag 2
3 - Fingerprint 5
4 - Dog tag 3
5 - Footprint 3
6 - Fingerprint 6
7 - Scooby Snack 5
8 - Velma Tier 3
9 - Velma Tier 2
10 - Velma Tier 1
11 - Middle Sling Top
13 - Right Sling Bottom
14 - Right Sling Top
15 - Green Ghoul Right Inlane
16 - Skull Right Outlane
17 - Right Lane GI
18 - Shoot Again
19 - Trap Door
20 - Left Sling Bottom
21 - Left Sling Top
22 - Left Lane GI
23 - Rear Left Drop Target
24 - Rear Middle Drop Target
25 - Rear Right Drop Target
26 - Forward Left Drop Target
27 - Forward Middle Drop Target
28 - Forward Right Drop Target
29 - Green Ghoul Left Inlane
30 - ROH Left Inner Outlane
31 - RUH Left Outer Outlane
32 - Crystal Ball

Table 2-1. Individual LED Test

Individual LED Test
33 - Space Kook Silhouette
34 - Creeper Silhouette
35 - Black Knight Silhouette
36 - Zombie Silhouette
37 - Velma Silhouette
38 - Shaggy Silhouette
39 - Scooby Silhouette
40 - Fred Silhouette
41 - Daphne Silhouette
42 - Charlie Silhouette
43 - Cutler Silhouette
44 - Minder Silhouette
45 - Daphne Tier 1
46 - Daphne Tier 2
47 - Daphne Tier 3
48 - Scooby Snack 0
49 - Fingerprint 0
50 - Footprint 0
51 - Dog Tag 0
52 - Dog Tag 1
53 - Fingerprint 1
54 - Scooby Snack 1
55 - Mystery Machine Left
56 - Fred Tier 1
57 - Fred Tier 2
58 - Fred Tier 3
59 - Scooby Snack 2
60 - Fingerprint 2
61 - Footprint 1
62 - Left Ramp Target
63 - Fingerprint 3
64 - Scooby Doo Where Are You
65 - Would've Gotten Away With It
66 - Gangs All Here
67 - Right Ramp Target

Table 2-1. Individual LED Test

Individual LED Test
68 - Footprint 2
69 - Fingerprint 4
70 - Scooby Snack 3
71 - Shaggy Tier 3
72 - Shaggy Tier 2
73 - Shaggy Tier 1
74 - Bravery Meter 23
75 - Bravery Meter 22
76 - Bravery Meter 21
77 - Bravery Meter 20
78 - Bravery Meter 19
79 - Bravery Meter 18
80 - Bravery Meter 17
81 - Bravery Meter 16
82 - Bravery Meter 15
83 - Bravery Meter 14
84 - Bravery Meter 13
85 - Bravery Meter 12
86 - Bravery Meter 11
87 - Bravery Meter 10
88 - Bravery Meter 9
89 - Bravery Meter 8
90 - Bravery Meter 7
91 - Bravery Meter 6
92 - Bravery Meter 5
93 - Bravery Meter 4
94 - Bravery Meter 3
95 - Bravery Meter 2
96 - Bravery Meter 1
97 - Bravery Meter 0
98 - Right Apron
99 - Left Apron
100 - Upper Footprint 3
101 - Upper Footprint 2
102 - Upper Cutler Arrow

Table 2-1. Individual LED Test

Individual LED Test
103 - Upper Multiball
104 - Upper Footprint 1
105 - Upper Cutler Helmet
106 - Upper Footprint 0
107 - Upper Left Outlane Top
108 - Upper Left Outlane Middle
109 - Upper Left Outlane Bottom
110 - Upper Scooby Tier 3
111 - Upper Scooby Tier 2
112 - Upper Scooby Tier 1
113 - Upper Passive Sling
114 - Upper Black Knight Lane
115 - Upper Miner Lane
116 - Upper Space Kook Lane
117 - Right Headlight
Turn Off All LEDs
Turn on Upper Spotlights
Turn on Lower Spotlights

Table 2-1. Individual LED Test

Servo Settings	
To change servo	<ul style="list-style-type: none"> ● Use action button
To move servo to next position	<ul style="list-style-type: none"> ● User flippers to toggle
Servo	Value (Range)
Extend Left Apron Lock	n/a
Extend Right Apron Lock	n/a
Scooby To Up Position	n/a
Scooby To Service Position	n/a
Left Apron Servo Adjust	<ul style="list-style-type: none"> ● Range: -5 to 5
Right Apron Servo Adjust	<ul style="list-style-type: none"> ● Range: -5 to 5
Barrel Scooby Servo Adjust	<ul style="list-style-type: none"> ● Range: -5 to 5

Table 2-2. Servo Settings

System (Audio) Settings	
	Value (Range)
Play Test Sound	n/a
Master Volume	<ul style="list-style-type: none"> ● Range: 0-11
Music Volume	<ul style="list-style-type: none"> ● Range: 0-11
Voice Volume	<ul style="list-style-type: none"> ● Range: 0-11
SFX Volume	<ul style="list-style-type: none"> ● Range: 0-11
Video Clip Volume	<ul style="list-style-type: none"> ● Range: 0-11
Test Menu Sounds	<ul style="list-style-type: none"> ● off ● on
Attract Mode SFX	<ul style="list-style-type: none"> ● off ● on
Cutler MB Track – Surf’N Scoob / Monster Song	n/a

Table 2-3. System (Audio) Settings

Pricing Settings	
	Value (Range)
Free Play	<ul style="list-style-type: none"> ● off ● on
Value Per Credit	<ul style="list-style-type: none"> ● Range: 1-12
Left Coin Value	<ul style="list-style-type: none"> ● Range: 1-12
Right Coin Value	<ul style="list-style-type: none"> ● Range: 1-12
Add Credit	n/a

Table 2-4. Pricing Settings

Attract Settings	
	Value (Range)
Attract Mode Live Effects	<ul style="list-style-type: none"> ● off ● on
Attract Mode SFX	<ul style="list-style-type: none"> ● off ● on
Autolaunch	<ul style="list-style-type: none"> ● off ● on
Autolaunch Delay (s)	<ul style="list-style-type: none"> ● 10 to 300
Difficulty	<ul style="list-style-type: none"> ● Easy ● Medium ● Zoinks!
Chance to Match	<ul style="list-style-type: none"> ● 0 to 100
Trap Door Ballsave	<ul style="list-style-type: none"> ● off ● on
Balls Per Game	<ul style="list-style-type: none"> ● 1 to 5
Tilt Warnings	<ul style="list-style-type: none"> ● 0 to 10
Tilt Cooldown	<ul style="list-style-type: none"> ● 1 to 10
Ball Save Timer	<ul style="list-style-type: none"> ● 0 to 20
Upper Flipper Activation	<ul style="list-style-type: none"> ● Selective ● Always
Reset High Scores	n/a
Audits	<ul style="list-style-type: none"> ● Switch Activation – Lists all switch activations ● Clear All Switch Audits ● Clear Below Audits – resets all games played (clears everything)

Table 2-5. Attract Settings

Attract Settings	
Adult Mode	<ul style="list-style-type: none"> ● off ● on
Write Logs To USB	n/a
Update Light Kit	n/a
Update Software	Refresh – Use this to scan USB drive for Scooby Code Files

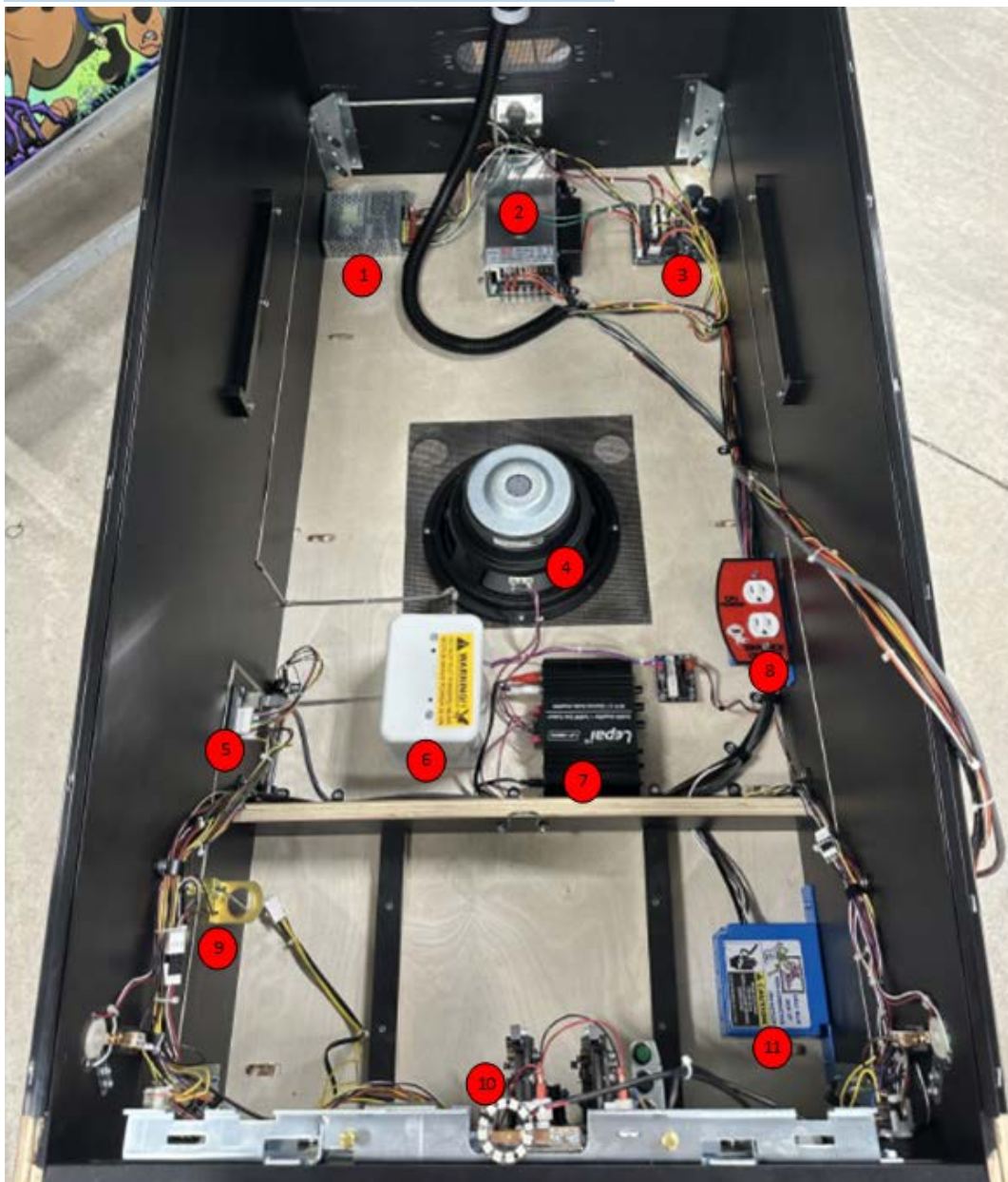
Table 2-5. Attract Settings

NOTICE

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Chapter 3 Layouts and Schematics

1 Cabinet Components

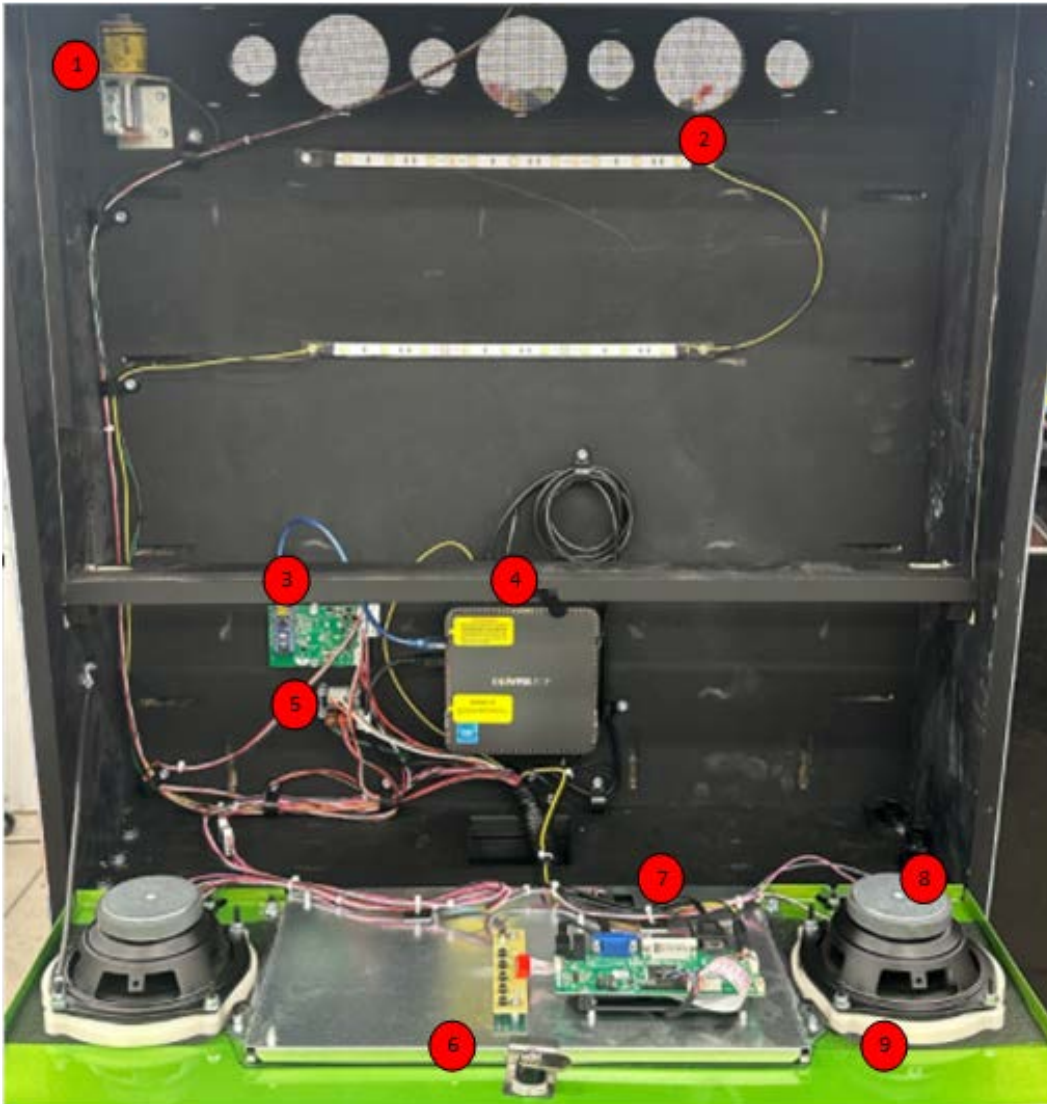


1	Small Power Supply
2	Large Power Supply
3	Power Splitter Board
4	Subwoofer

5	Cabinet Switch Expander
6	Shaker Motor
7	Amplifier
8	Service Outlet
9	Tilt Bob

10	Action Button/Light
11	Power Switch/Fuse Cover

2 Head Breakdown



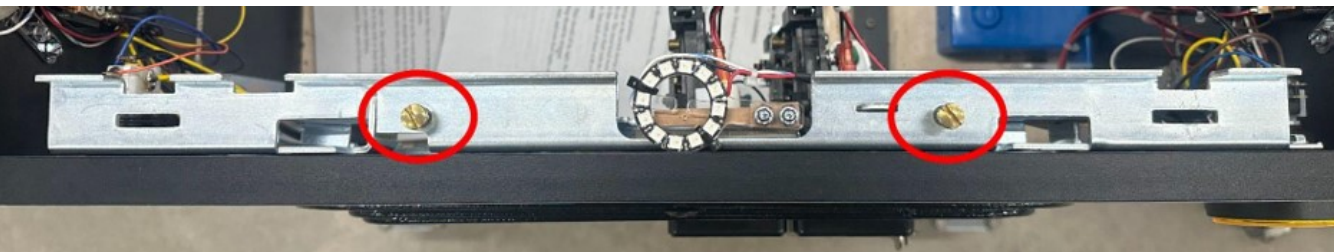
1	Knocker
2	Back Box Lights
3	Topper /Speaker/Flipper LED Driver Board
4	Computer
5	Knocker/Shaker Expansion Board

6	Display
7	Display Driver Board
8	Speaker
9	Speaker LED Kit

3 Apron

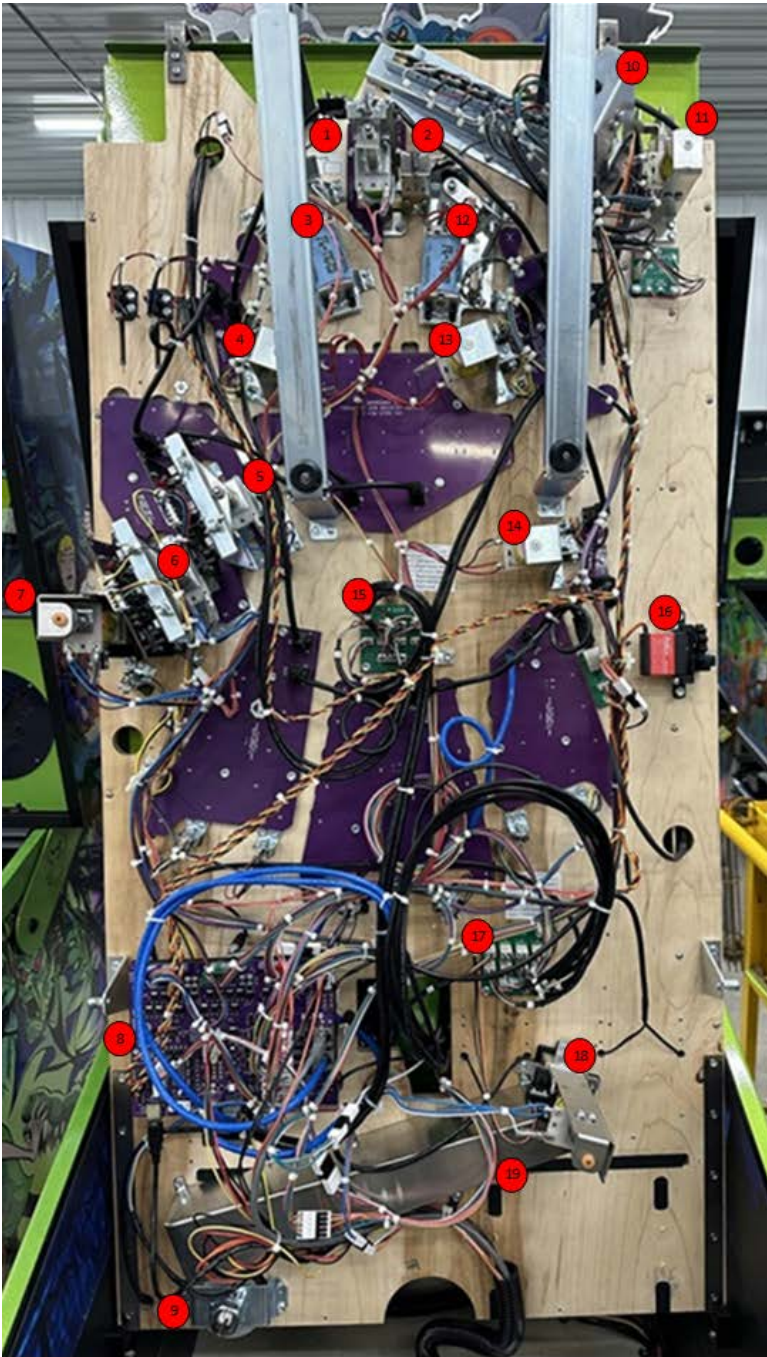


4 Lockbar Receiver



Screw the brass screws in to tighten the lockbar; unscrew to loosen.

5 Playfield Underside



1	Trap Door Reset
2	Trap door Knock
3	Left Flipper
4	Left Sling
5	Front Triple Drop

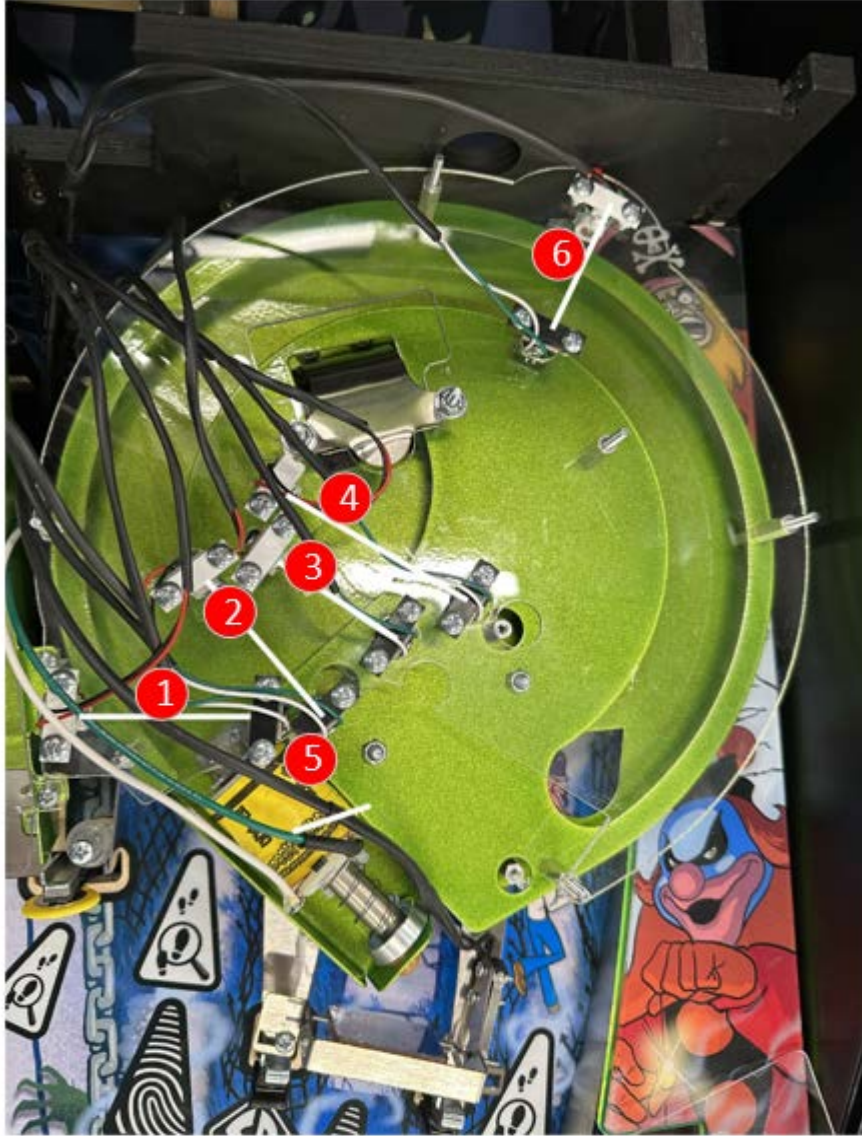
6	Back Triple Drop
7	Left VUK
8	Warden Assembly
9	Magnet
10	Trough
11	Auto Launcher

12	Right Flipper
13	Right Sling
14	Right Upper Sling
15	Opto Board A
16	Scooby Barrel Servo
17	Opto Board B
18	Right VUK
19	Subway

6 Coin Door Inside

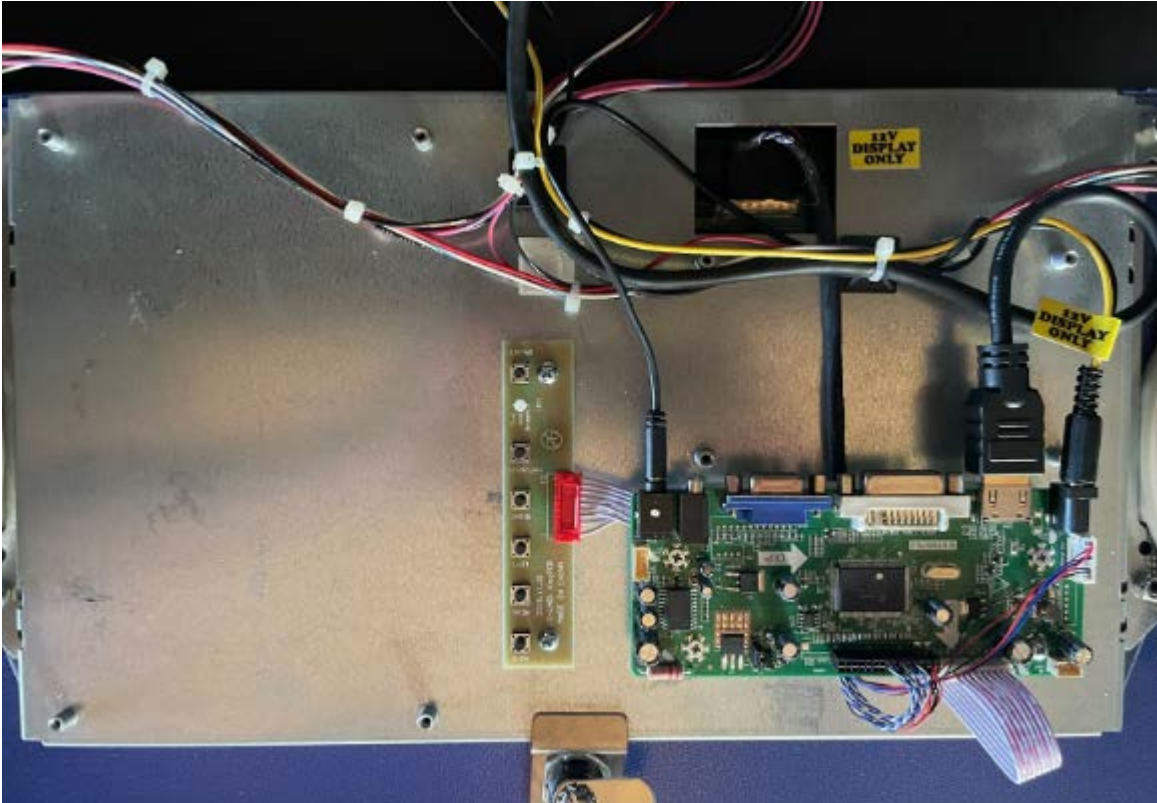


7 Mystery Machine (MM) Mechanism



1	MM Opto 1
2	MM Opto 2
3	MM Opto 3
4	MM Opto 4
5	Eject Coil
6	MM Exit

8 LCD Display



LCD Display Recommended Settings:
(Access using Display Adjustment Panel board to the left of the display's driver board)

Brightness - 40%

Contrast - 80%

Gamma - On

Note: Audio jack plugged into left port for UP Board Mini PC)

Screen Size: 27 Inches

Display Resolution Maximum: 1920 x 1080

DisplayBrand: VSDISPLAY

Connectivity Technology: VGA, DVI, HDMI

Display Type: LCD

About This Item:

Compatible With: 27inch 1920x1080: TPM27oWF1-MWN1
HDMI DVI VGA AUDIO LCD Board for LVDS Interface LCD
Screen

Video Input: HDMI DVI VGA

Audio Input: HDMI

Audio Output: Speaker Connector

Recommend Power Adapter Spec.

Input Power Adapter: 12Vdc More than 2A.

(VSDISPLAY Power Adapter, AC 100-240V Input to 12V DC, 2A
Output, Power Supply, US Plug, Fit SC24W-1202000U jhd-
ap024u-120200ba-a, Fit for All Types of VSDISPLAY LCD
Controller Board)

Goes into Standby Mode When No Input Signal Standby Mode
power usage <1W.

Display Packing List:

1x HD-MI VGA DVI LCD Controller Board M.NT68676.3 (new version)

1x Inverter Board

1x LVDS Signal Cable

1x Keyboard With Cable

Note: There is No Power Adapter in the Display Packing List.

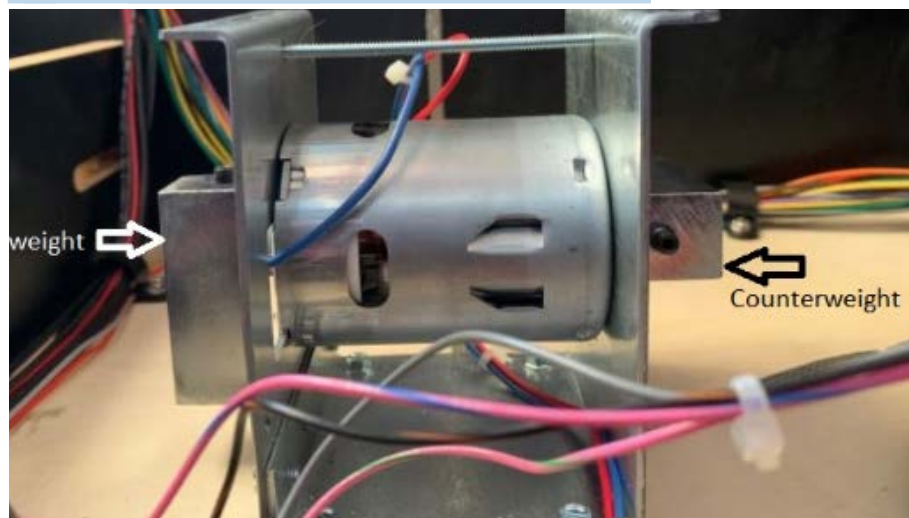
9 Large Power Supply



10 Small Power Supply



11 Shaker Motor



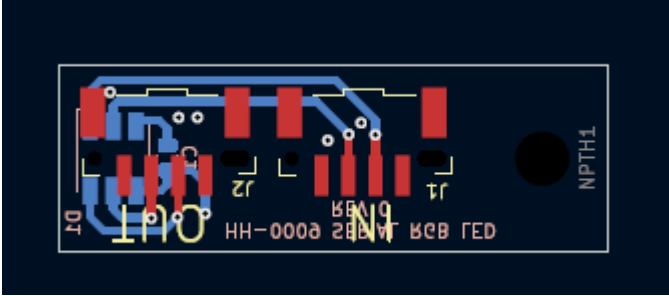
To Adjust Shaker Motor Vibration

1. With the shaker motor cover removed, locate the two counterweights on each side held in place with a hex screw.
2. Loosen the hex screw. You will be able to rotate the counterweight.

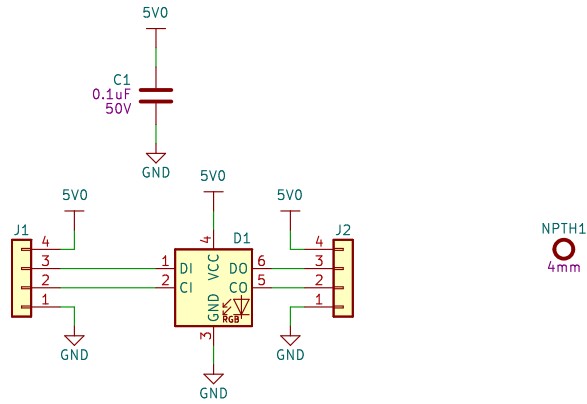
Shaker Motor Settings:

- Both weights in same direction = Strong Shake
 - One weight at a 90 degree angle as shown in photo = Medium Shake
 - One weight at 180 degree angle from the other counterweight = Low Shake
3. After you have made the adjustments, ensure the hex screws are good and tight.
 4. Replace the protective cover.

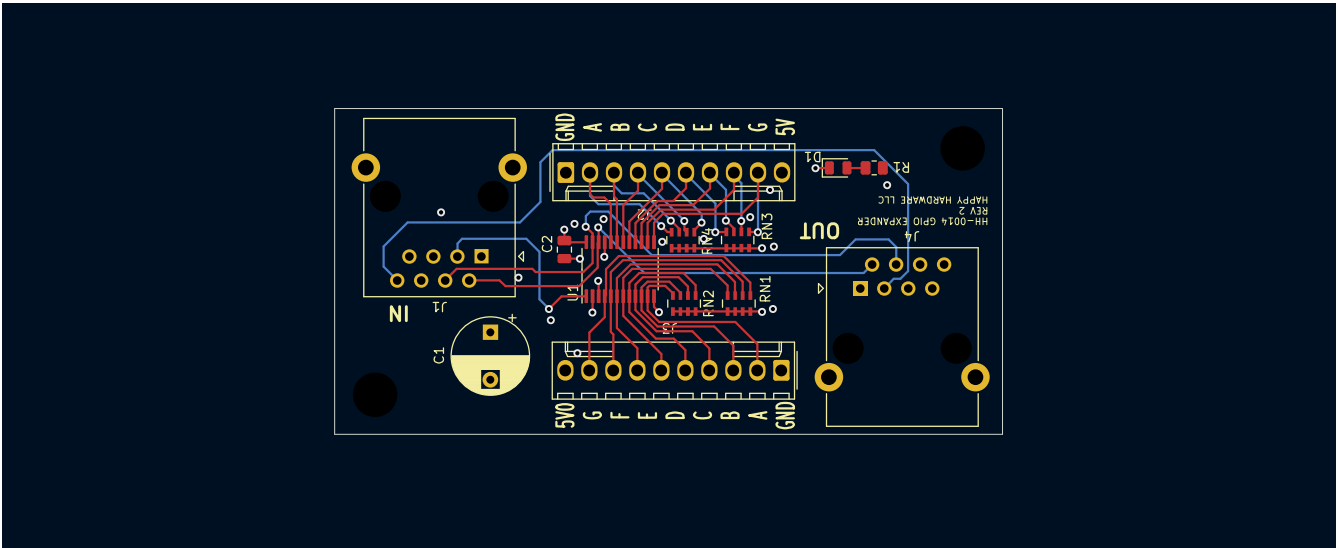
12 HH-000g Serial RGB LED Layout



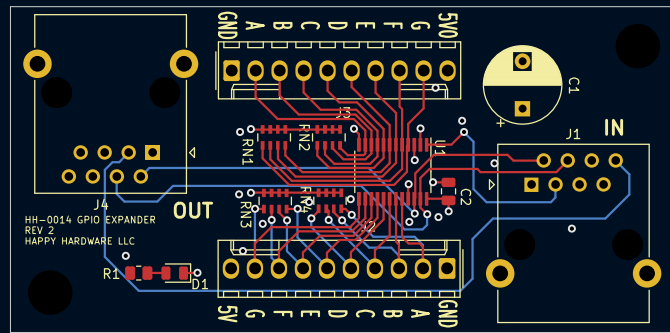
13 HH-000g Serial RGB LED Schematic



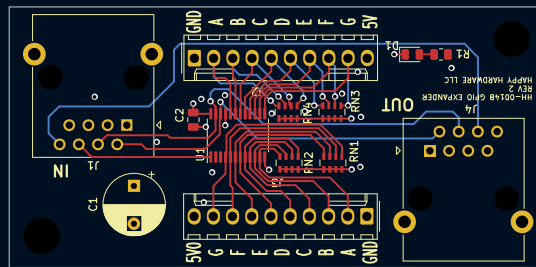
14 HH-0014 GPIO Expander Layout



15 HH-0014 GPIO Expander Schematic

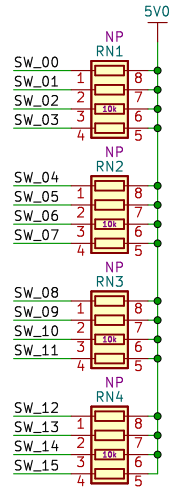
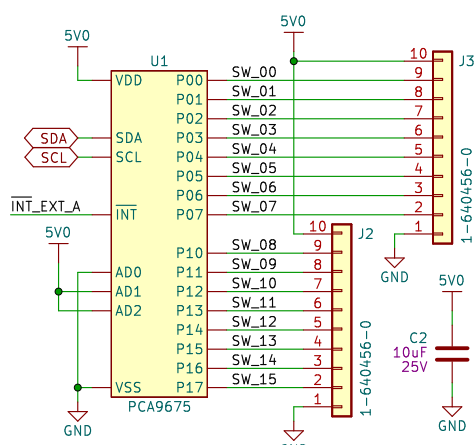
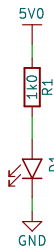
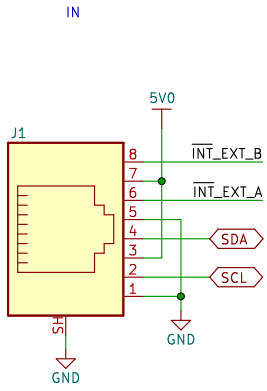


16 HH-0014B GPIO Expander Layout

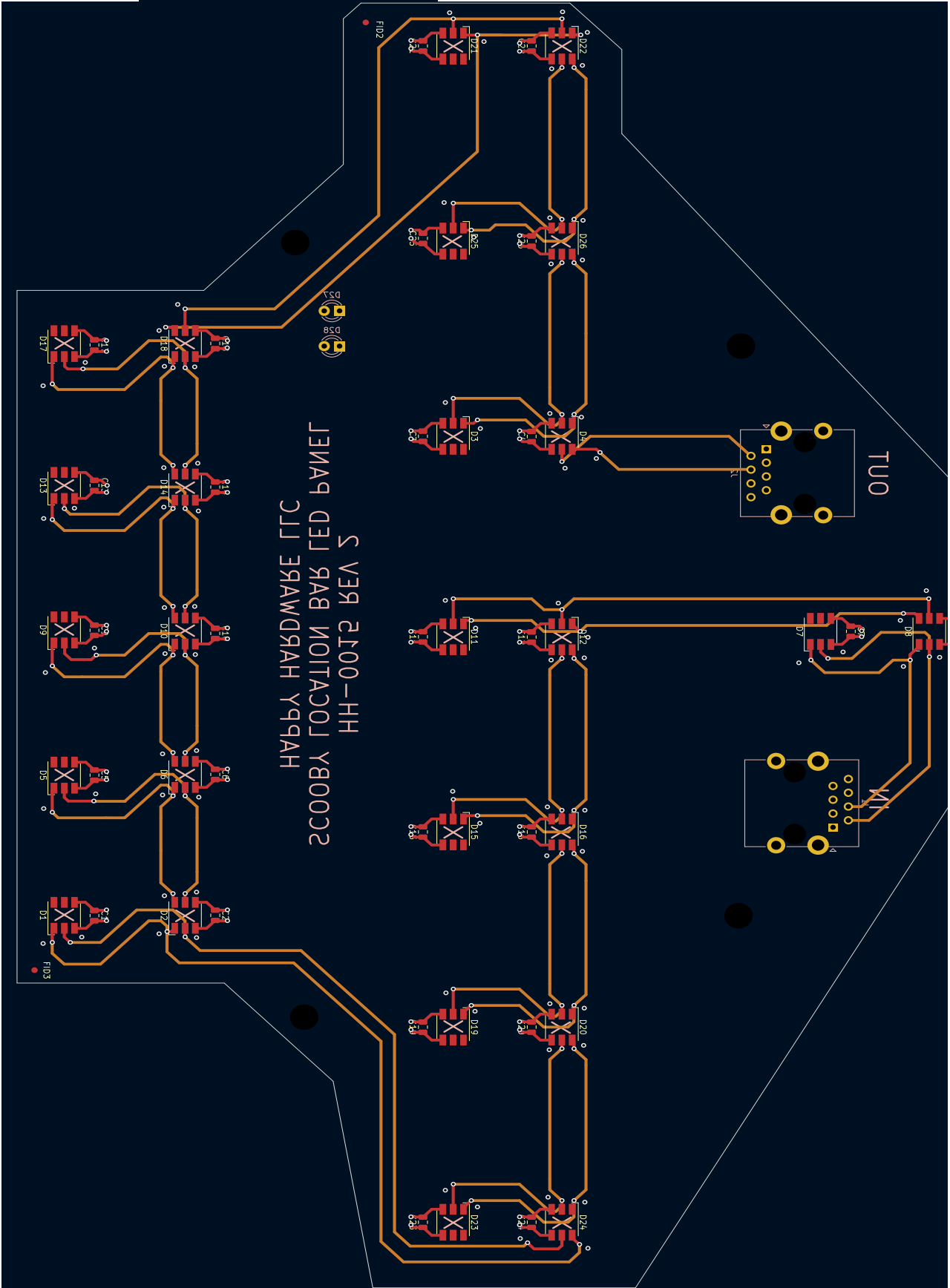


17 HH-0014B GPIO Expander Schematic

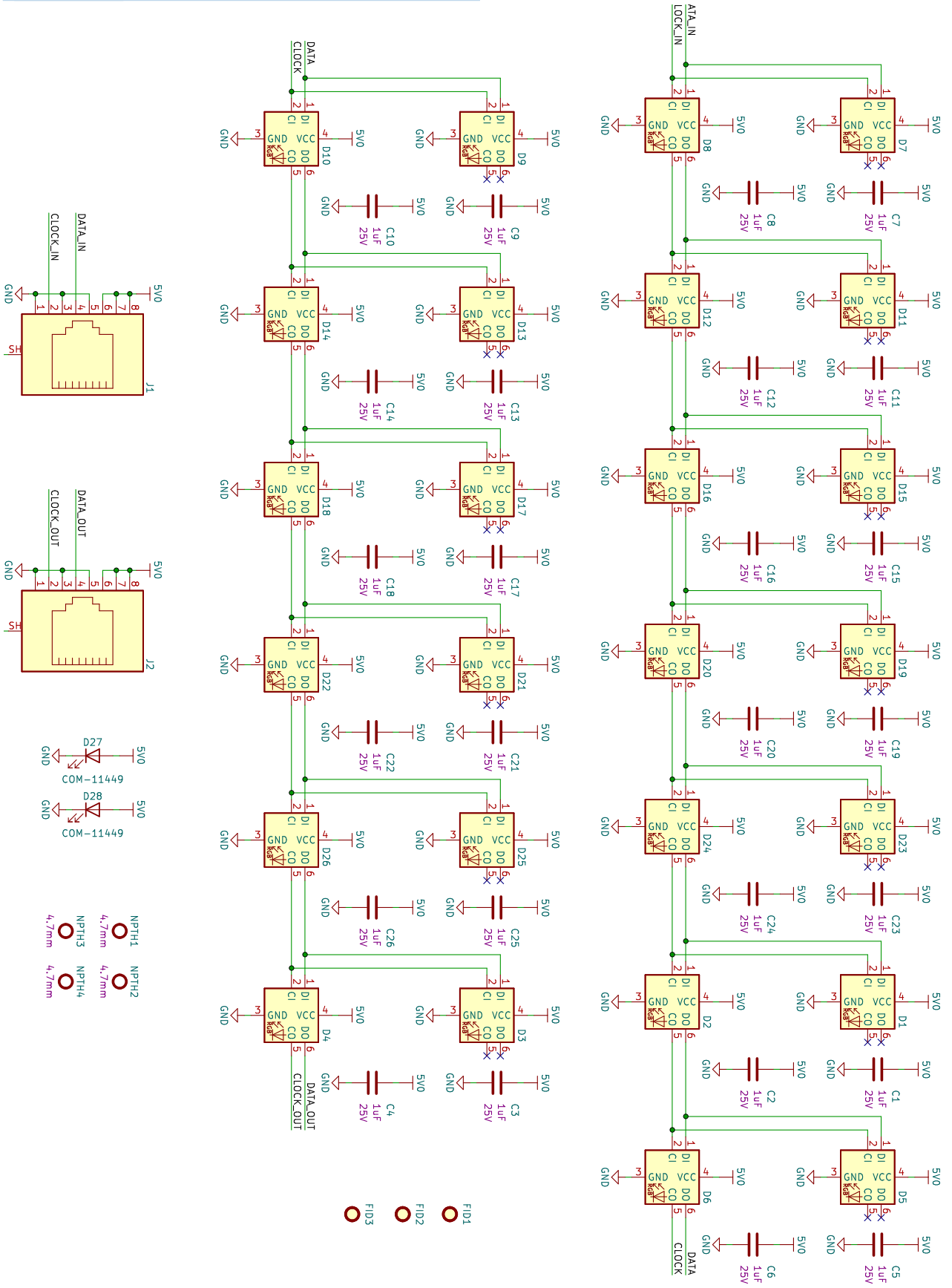
NPTH1 NPTH2



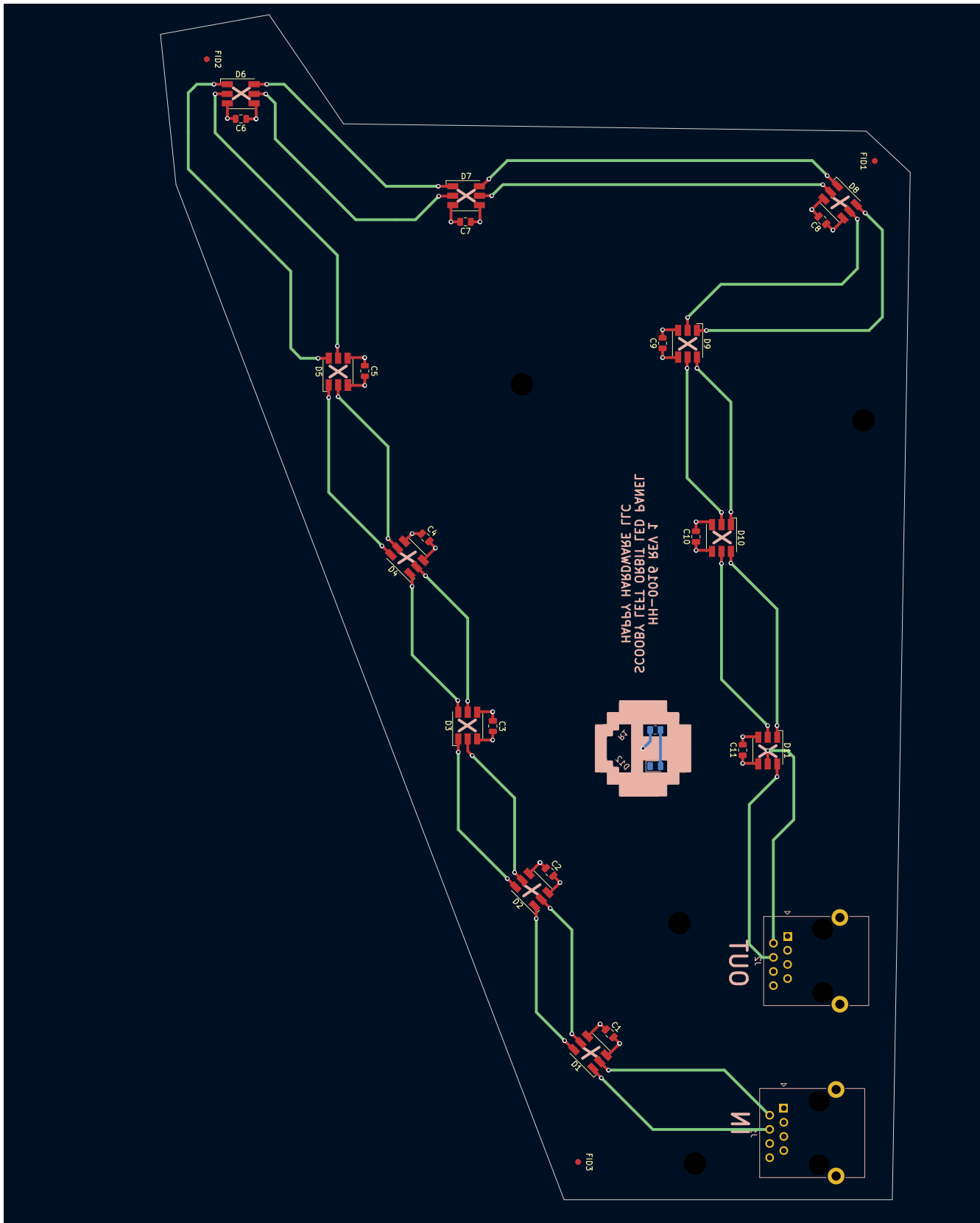
18 HH-0015 Scooby Location Bar Layout



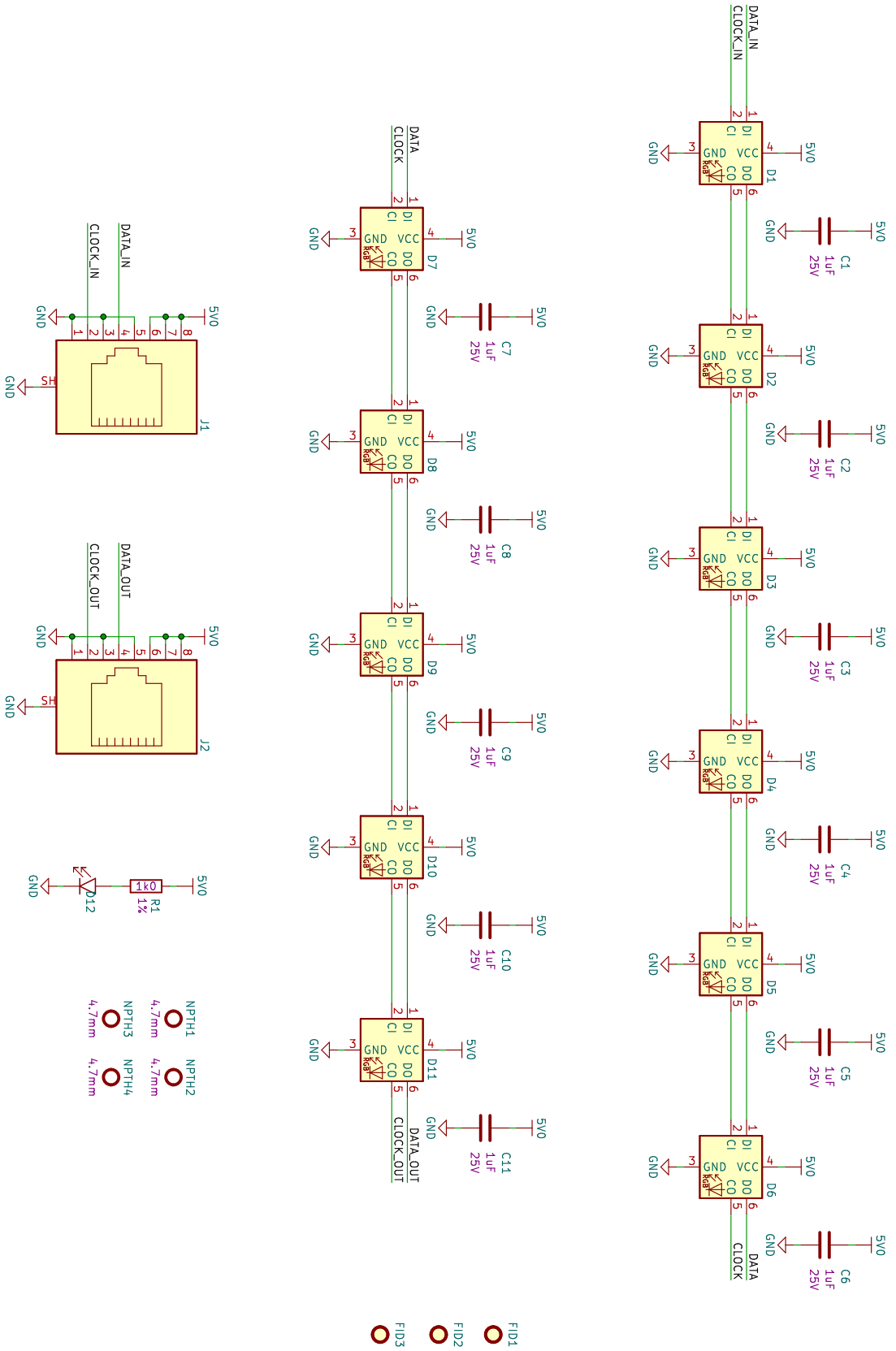
19 HH-0015 Scooby Location Bar Schematic



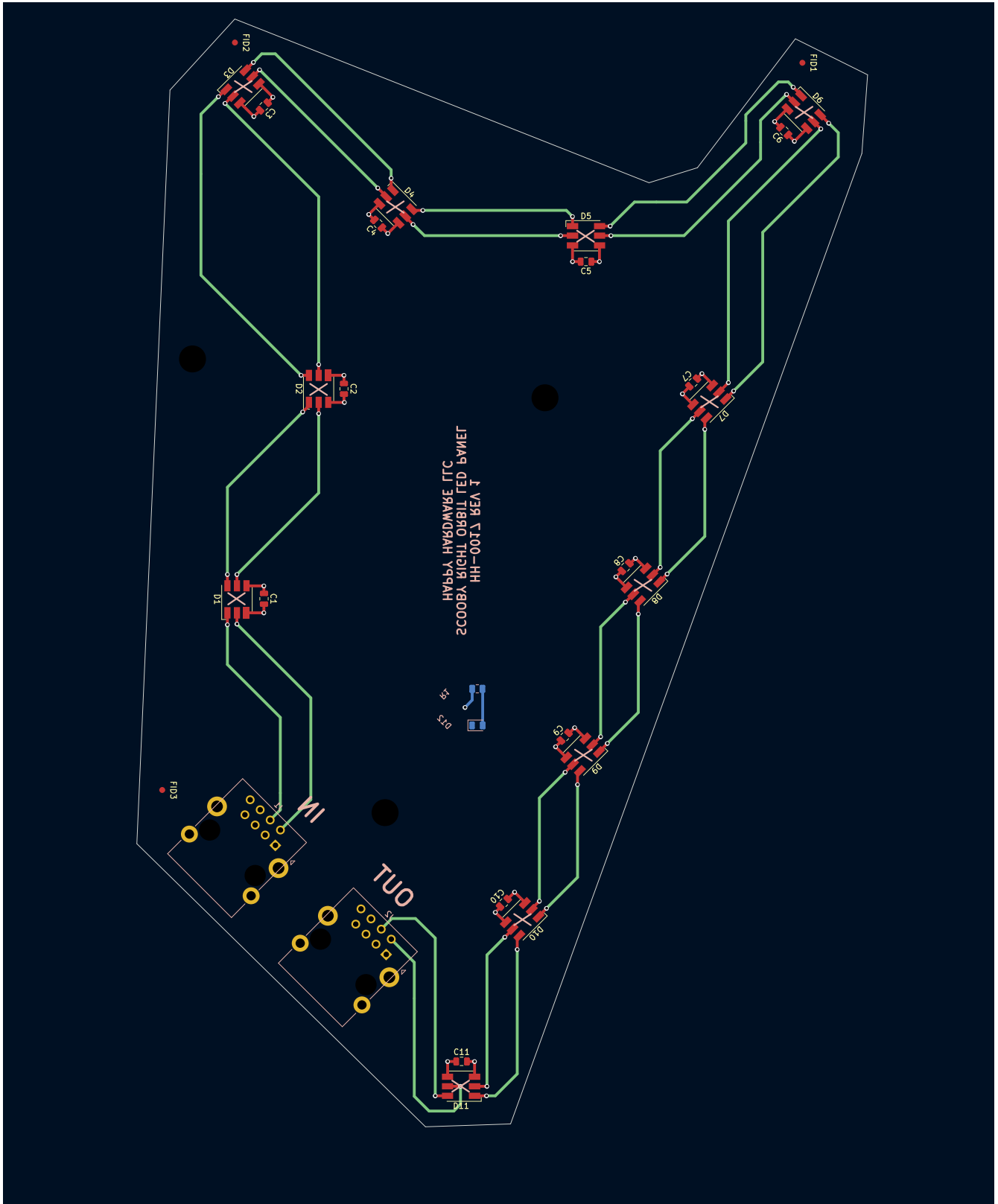
20 HH-0016 Scooby Left Orbit Layout



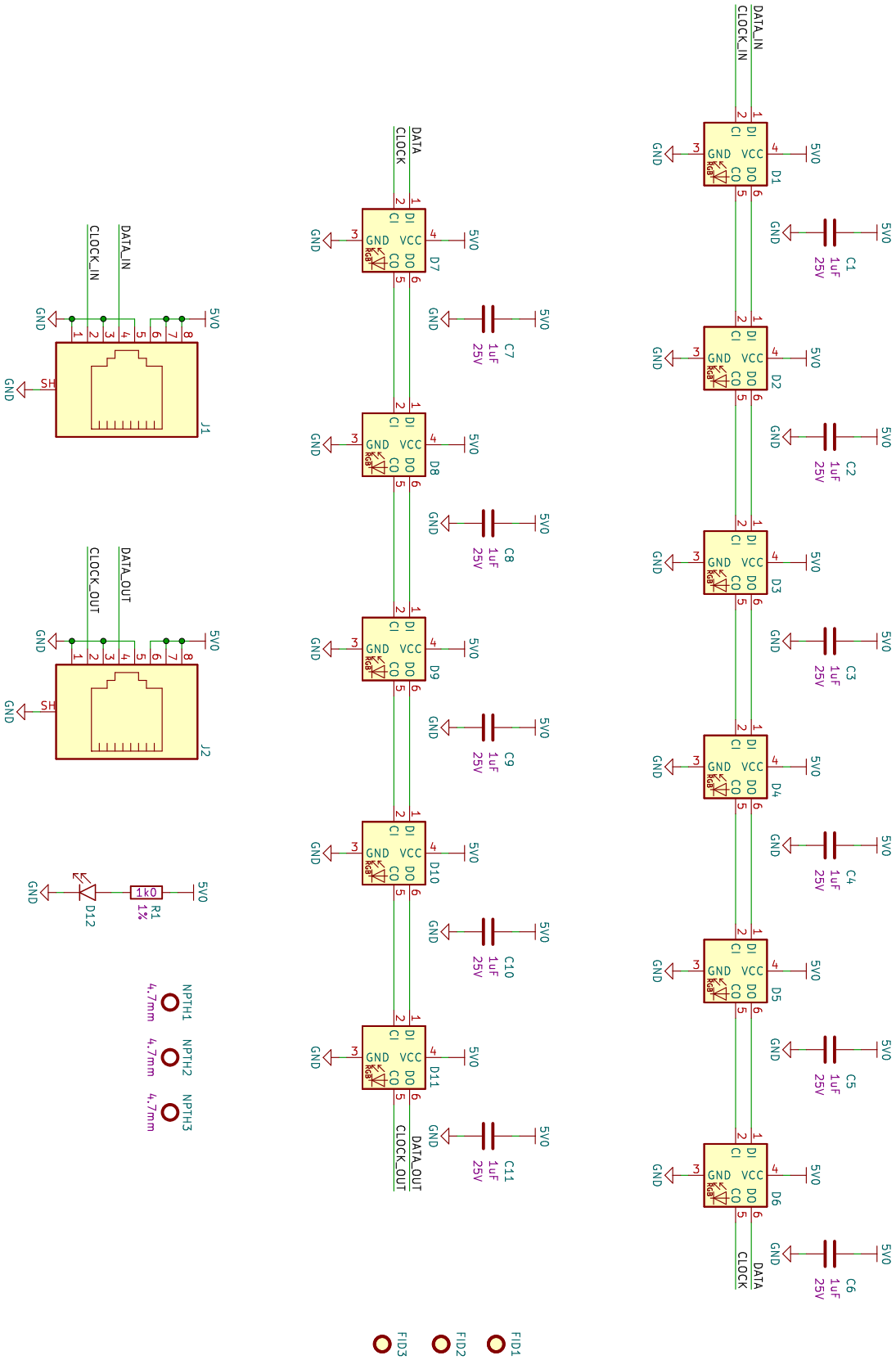
21 HH-0016 Scooby Left Orbit Schematic



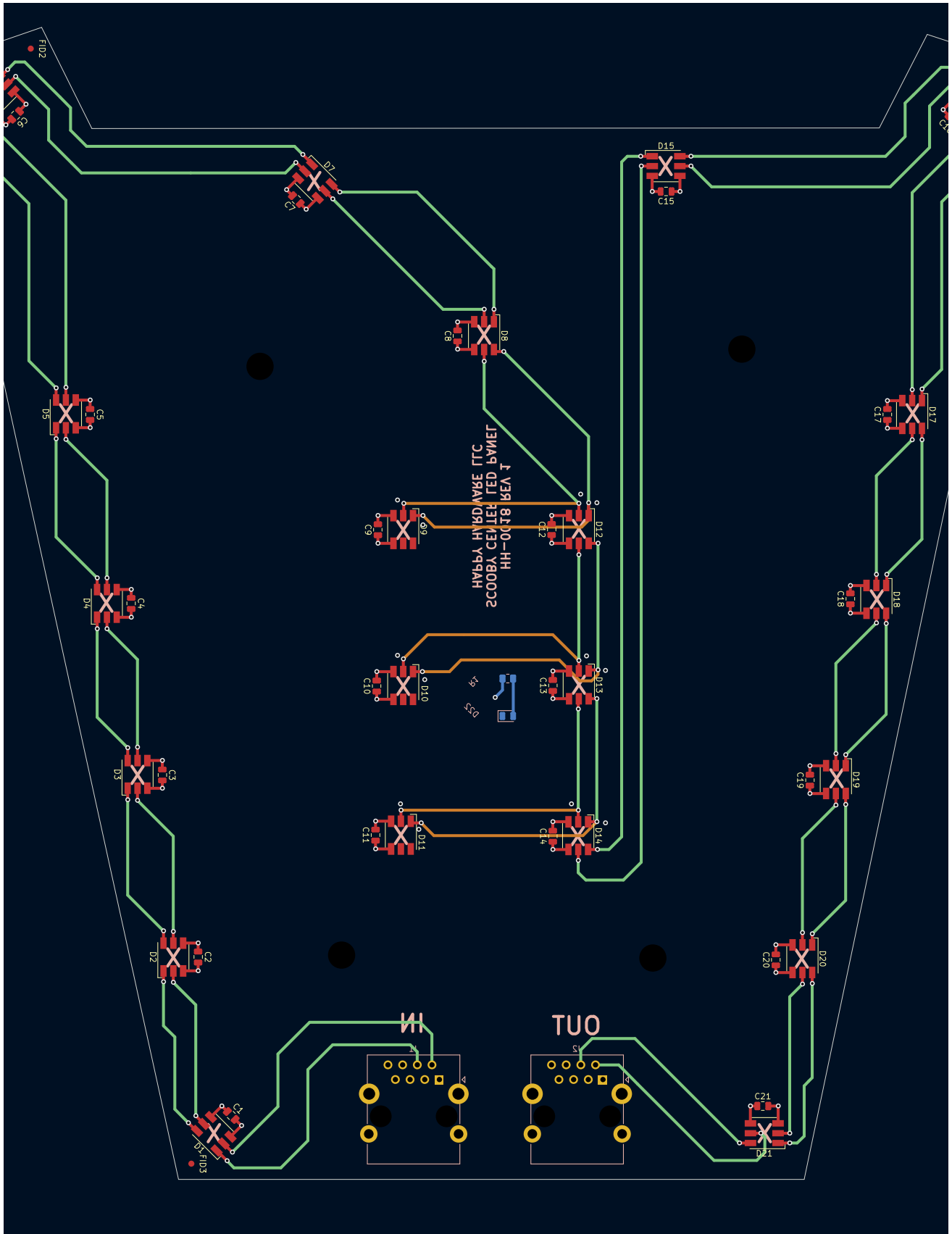
22 HH-0017 Scooby Right Orbit Layout



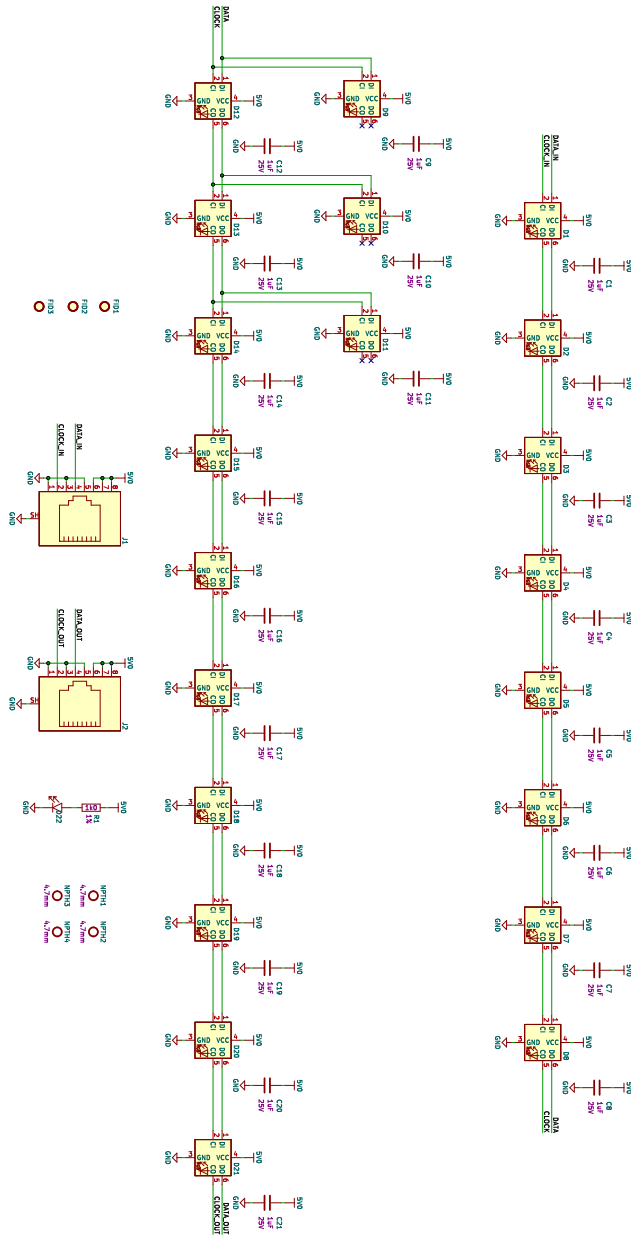
23 HH-0017 Scooby Right Orbit Schematic



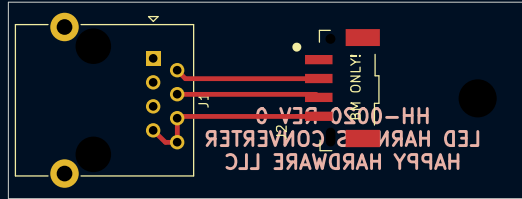
24 HH-0018 Scooby Center LED Panel Layout



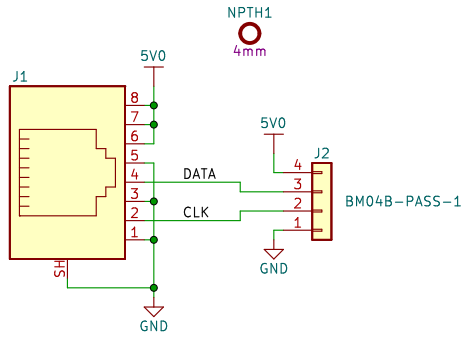
25 HH-0018 Scooby Center LED Panel Schematic



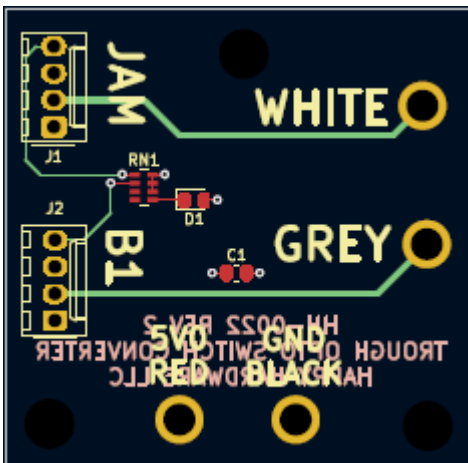
26 HH-0020 LED Harness Converter Layout



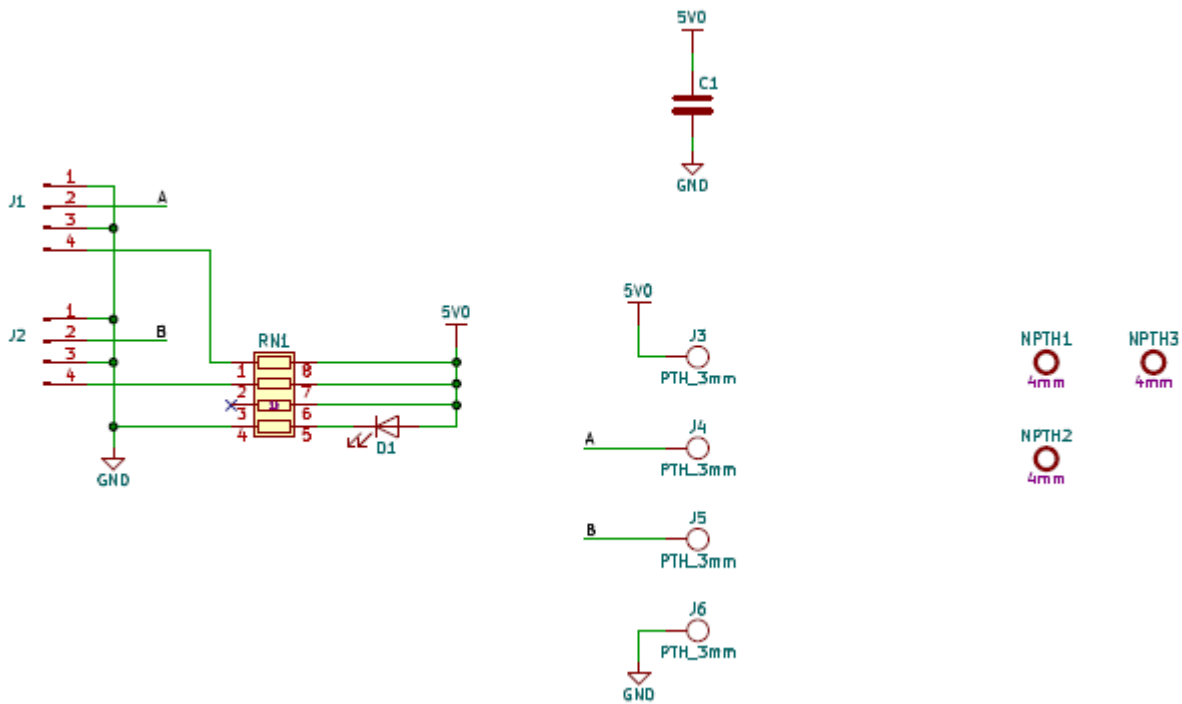
27 HH-0020 LED Harness Converter Schematic



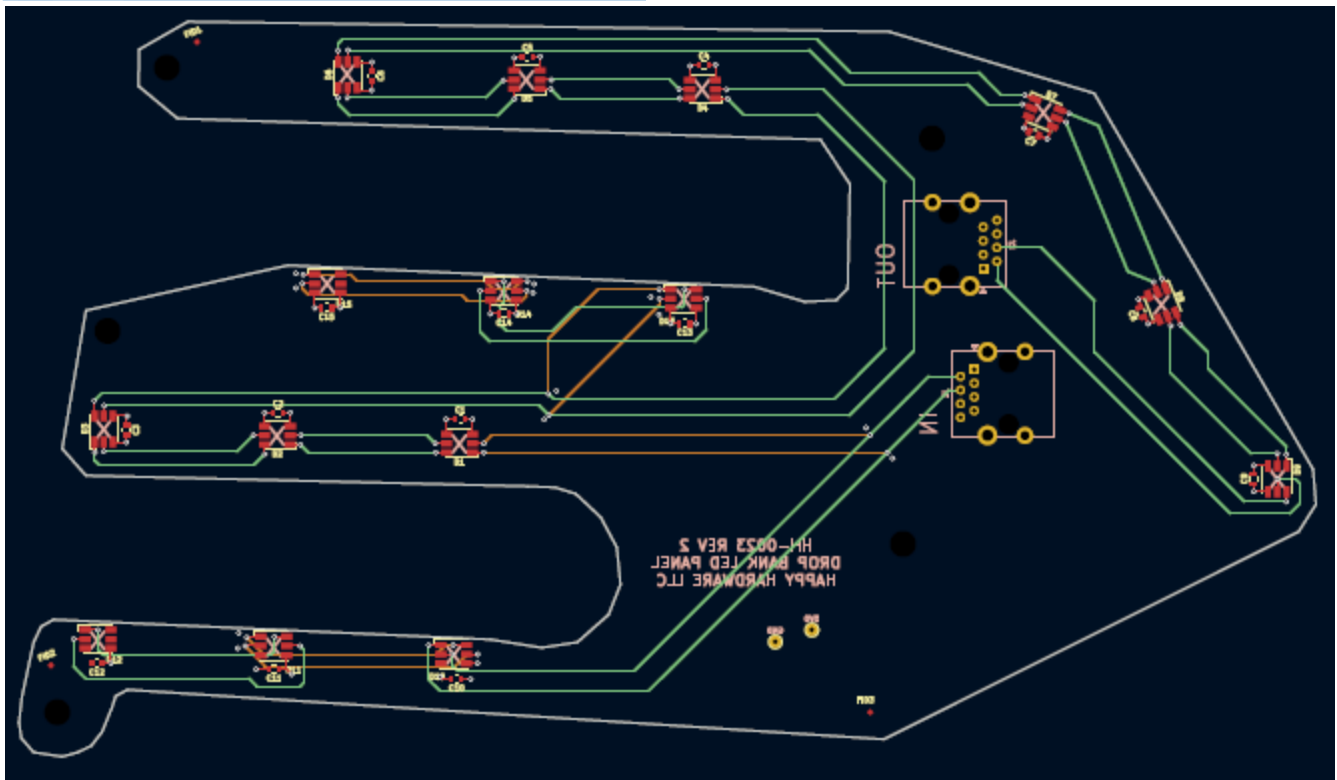
28 HH-0022 Trough Opto-To-Switch Converter Layout



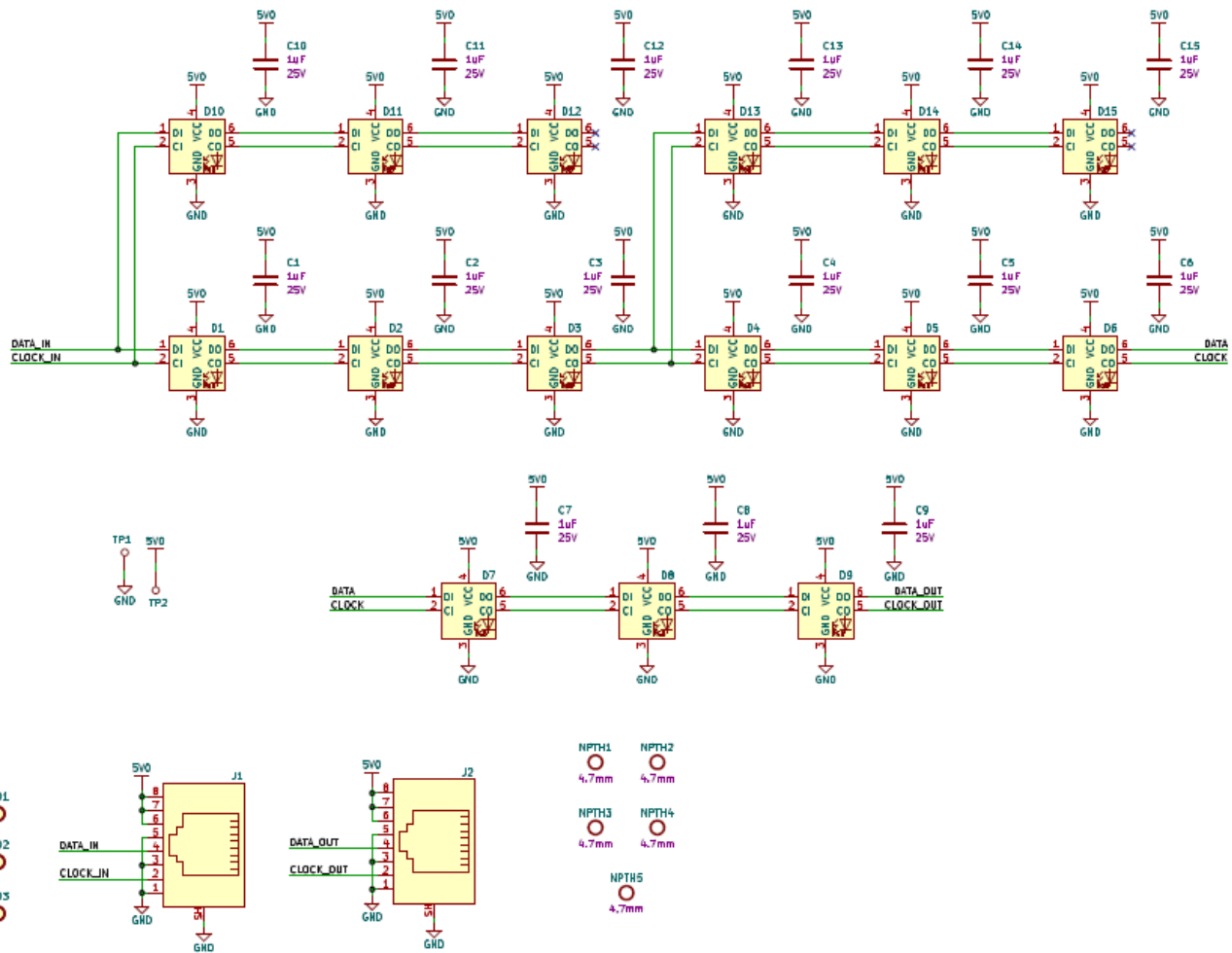
29 HH-0022 Trough Opto-To-Switch Converter Schematic



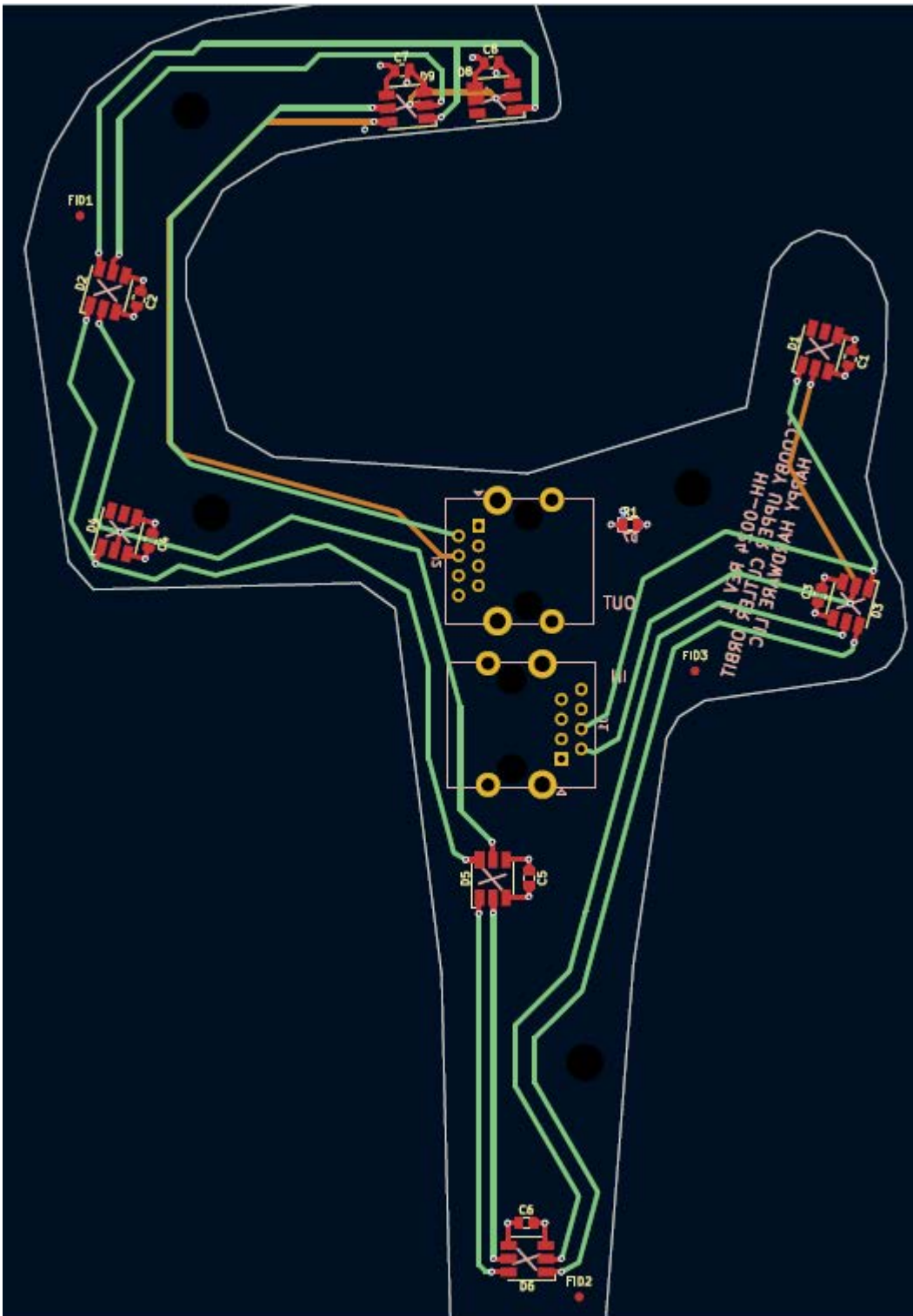
30 HH-0023 Drop Bank LED Panel Layout



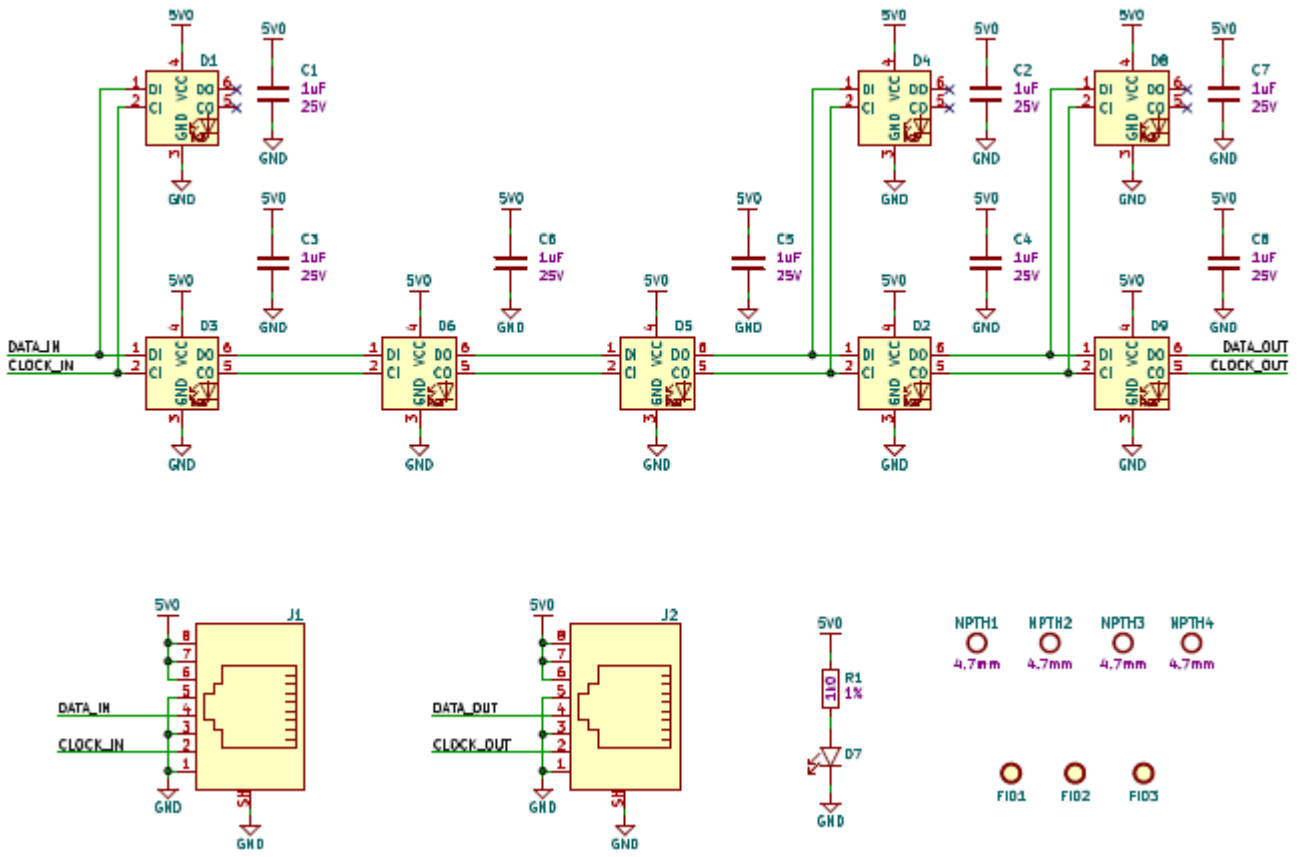
31 HH-0023 Drop Bank LED Panel Schematic



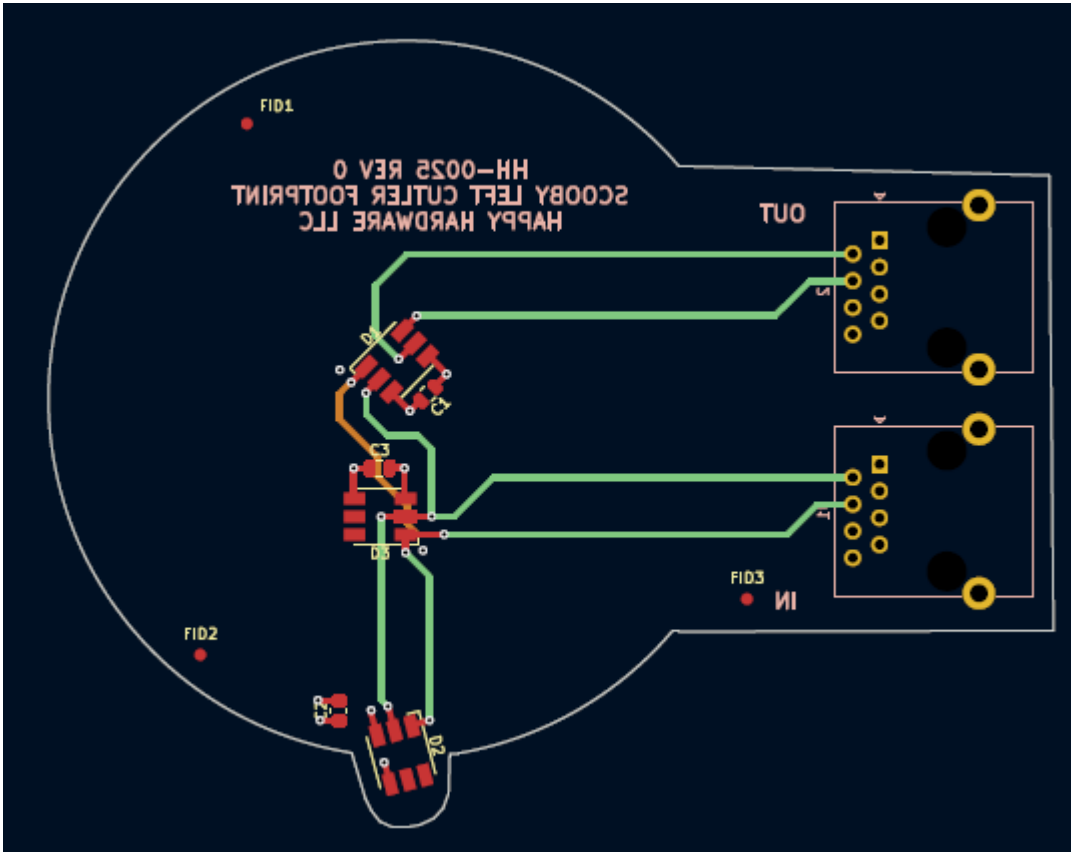
32 HH-0024 Scooby Upper Middle LED Panel Layout



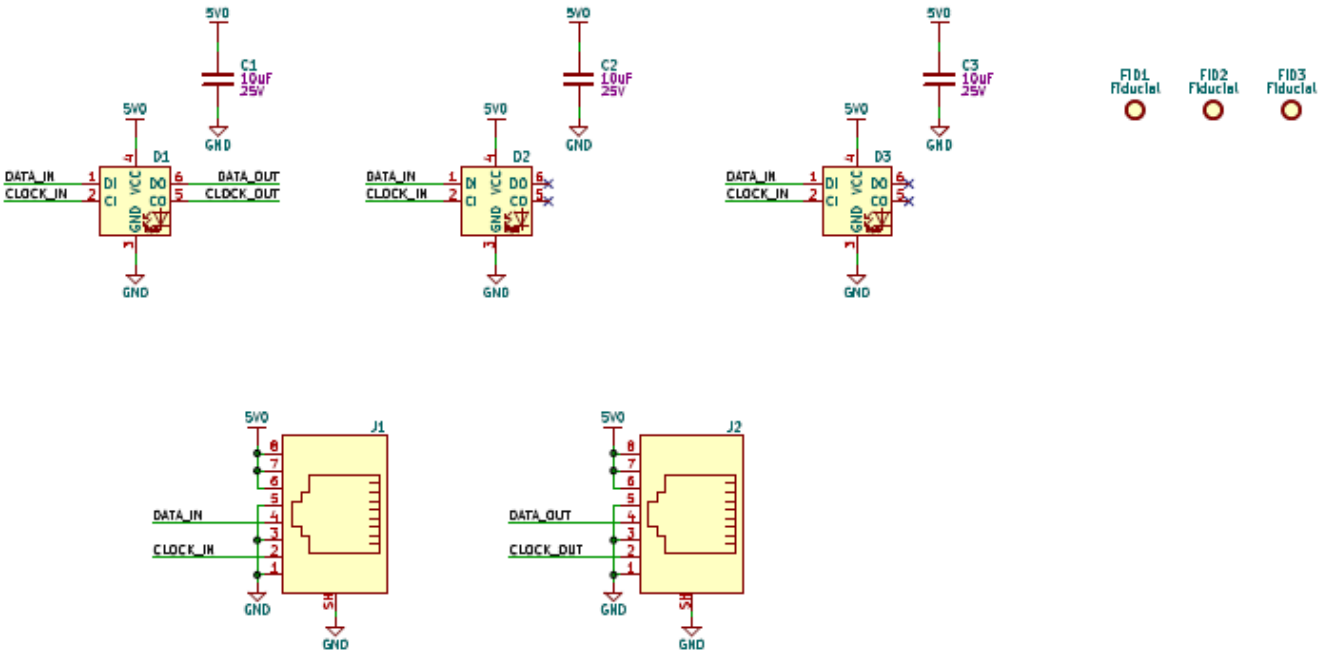
33 HH-0024 Scooby Upper Middle LED Panel Schematic



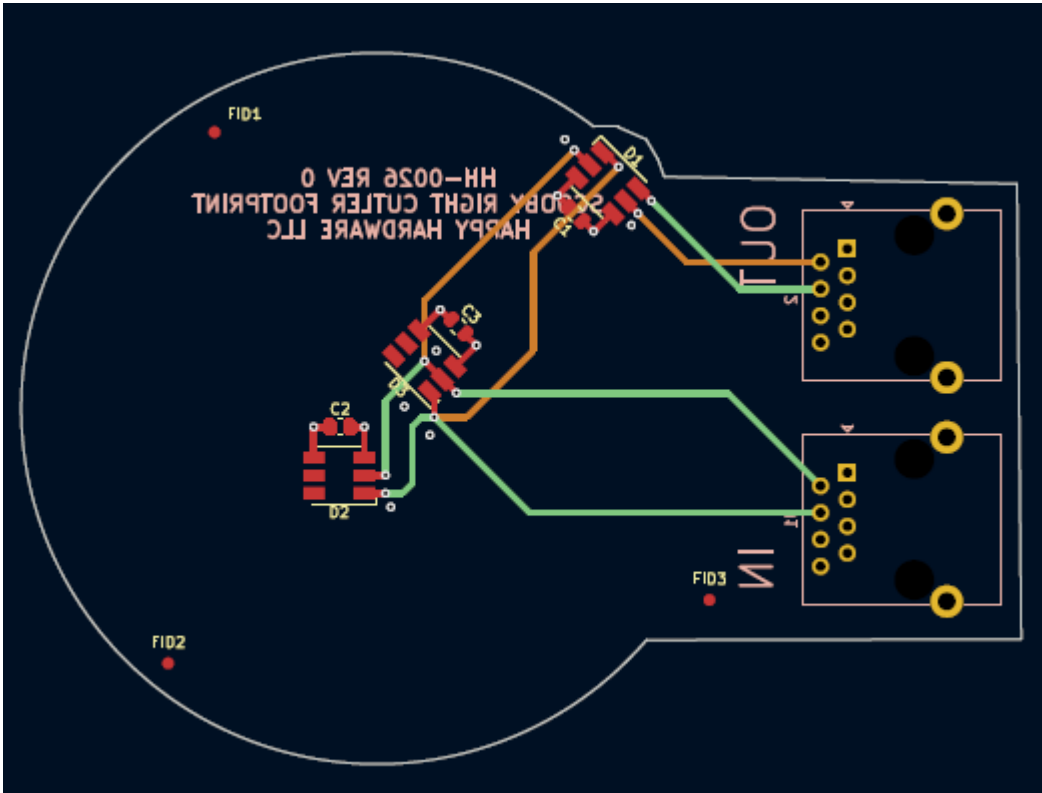
34 HH-0025 Scooby Left Cutler Footprint Layout



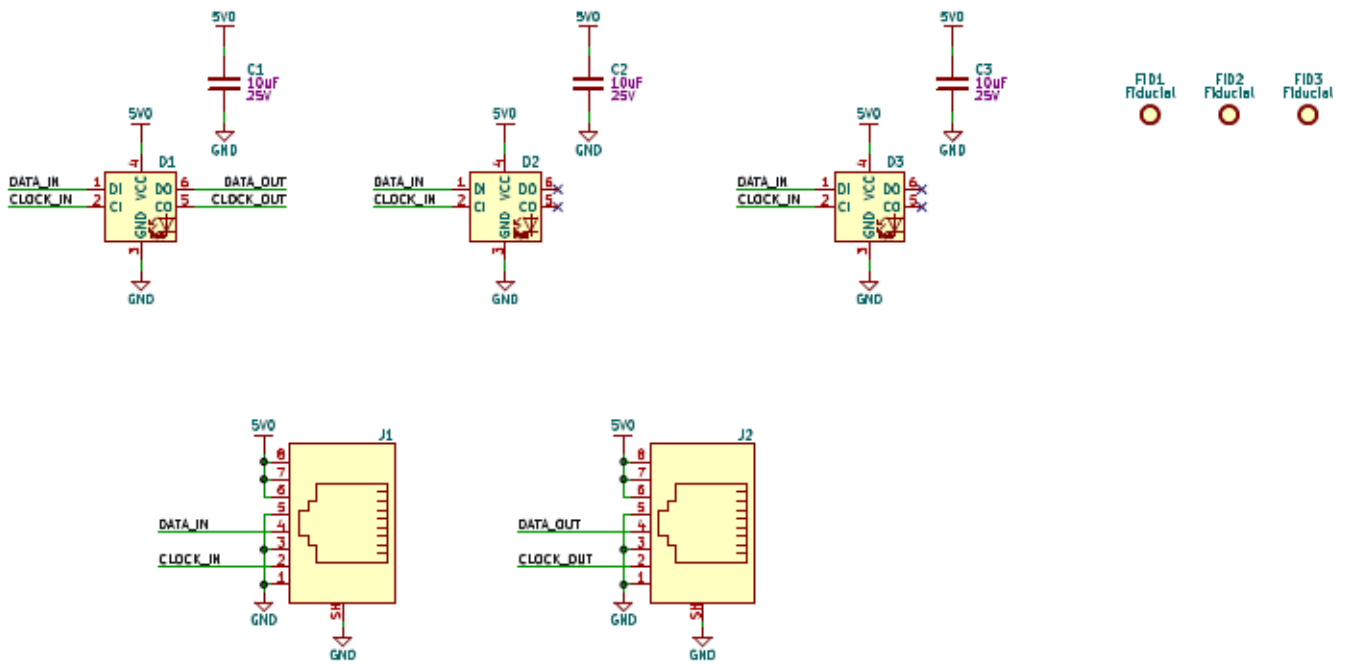
35 HH-0025 Scooby Left Cutler Footprint Schematic



36 HH-0026 Scooby Right Cutler Footprint Layout



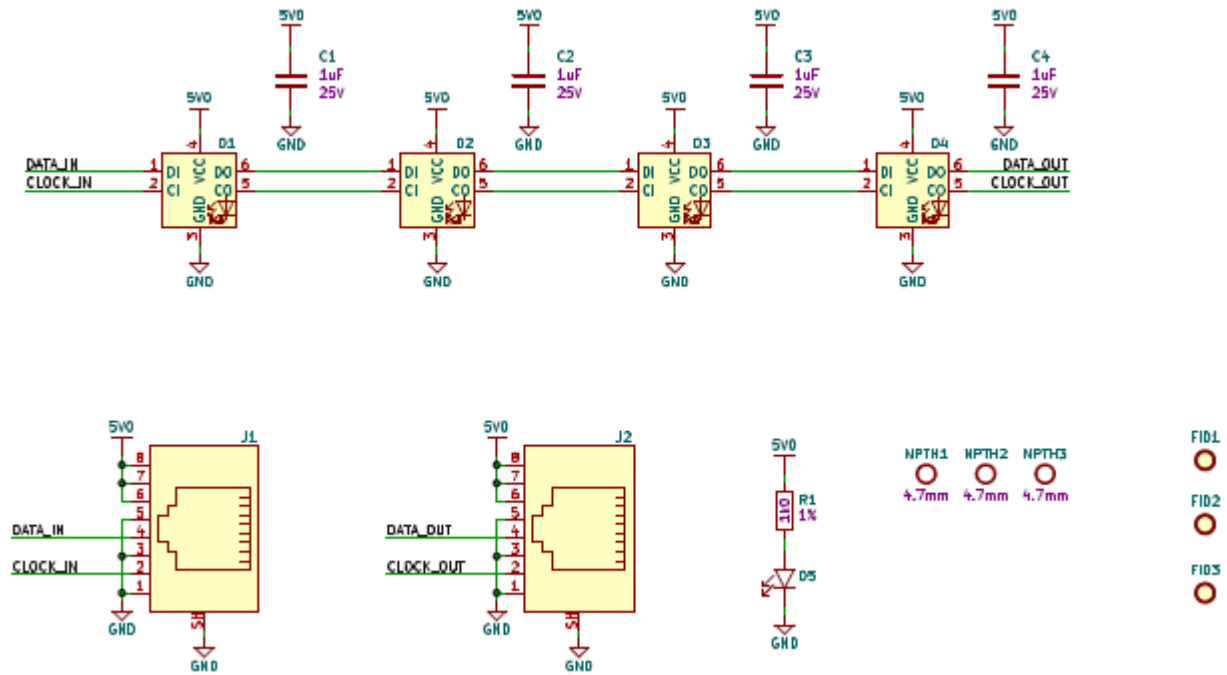
37 HH-0026 Scooby Right Cutler Footprint Schematic



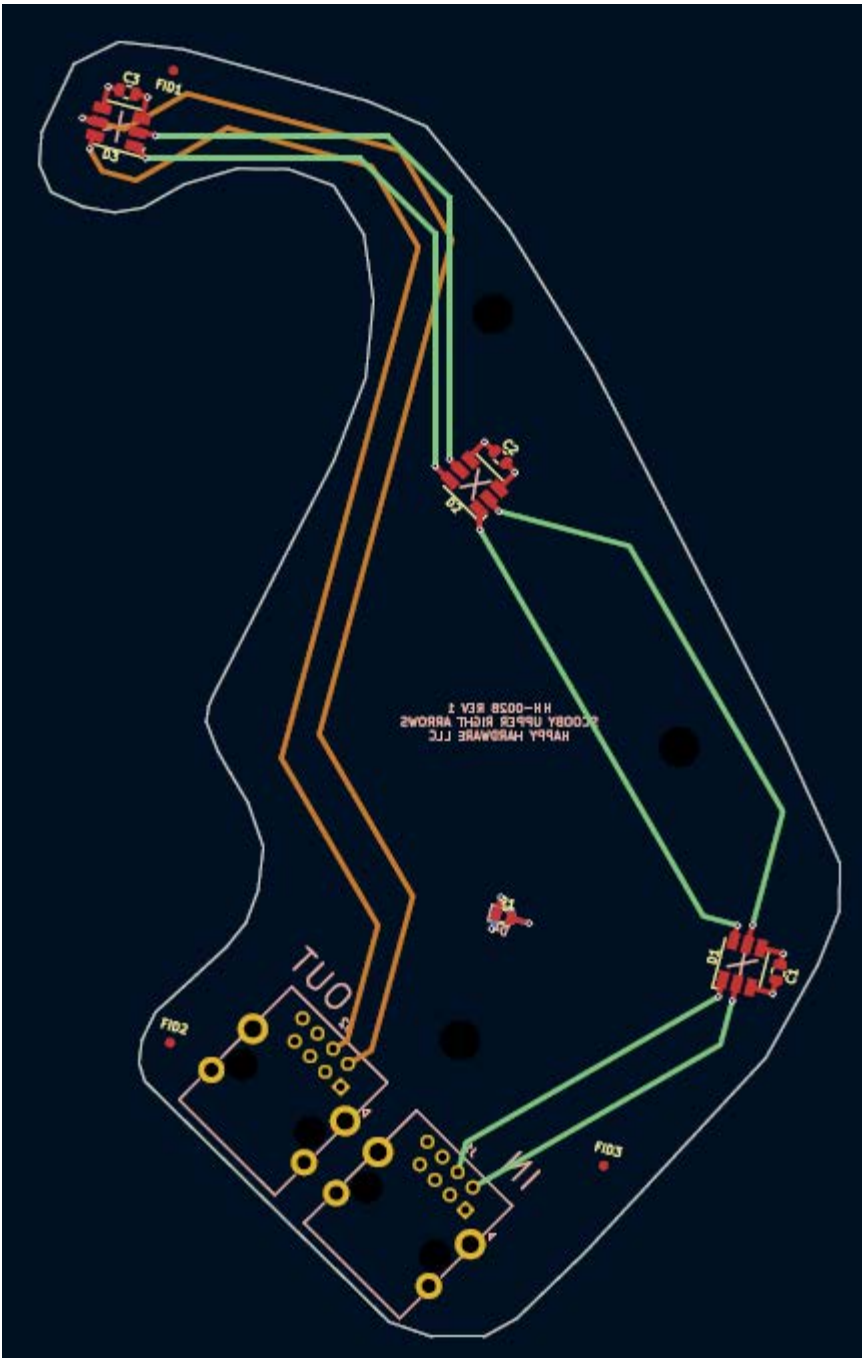
38 HH-0027 Scooby Upper Center LED Panel Layout



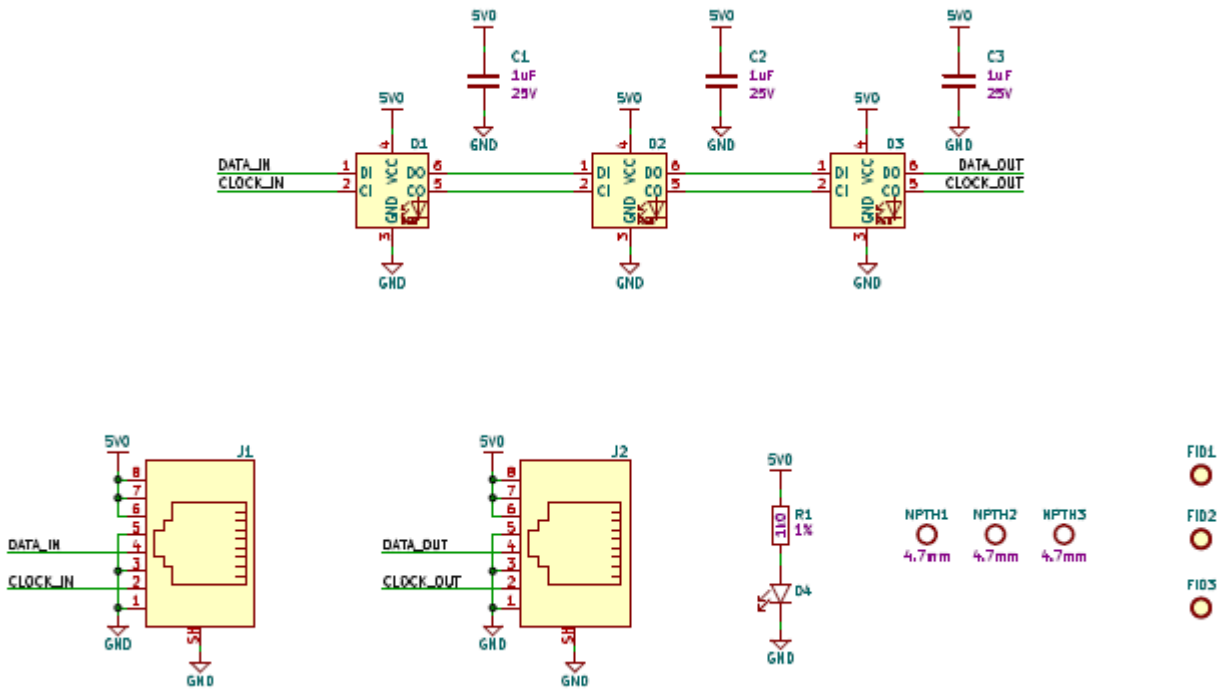
39 HH-0027 Scooby Upper Center LED Panel Schematic



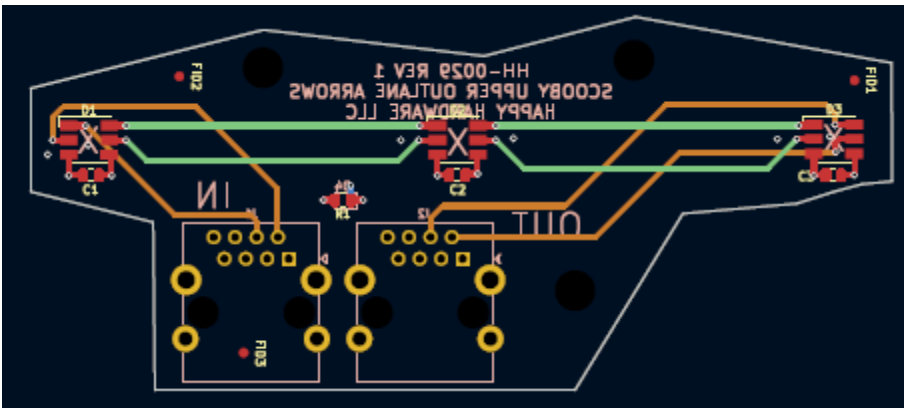
40 HH-0028 Scooby Upper Right Arrows Layout



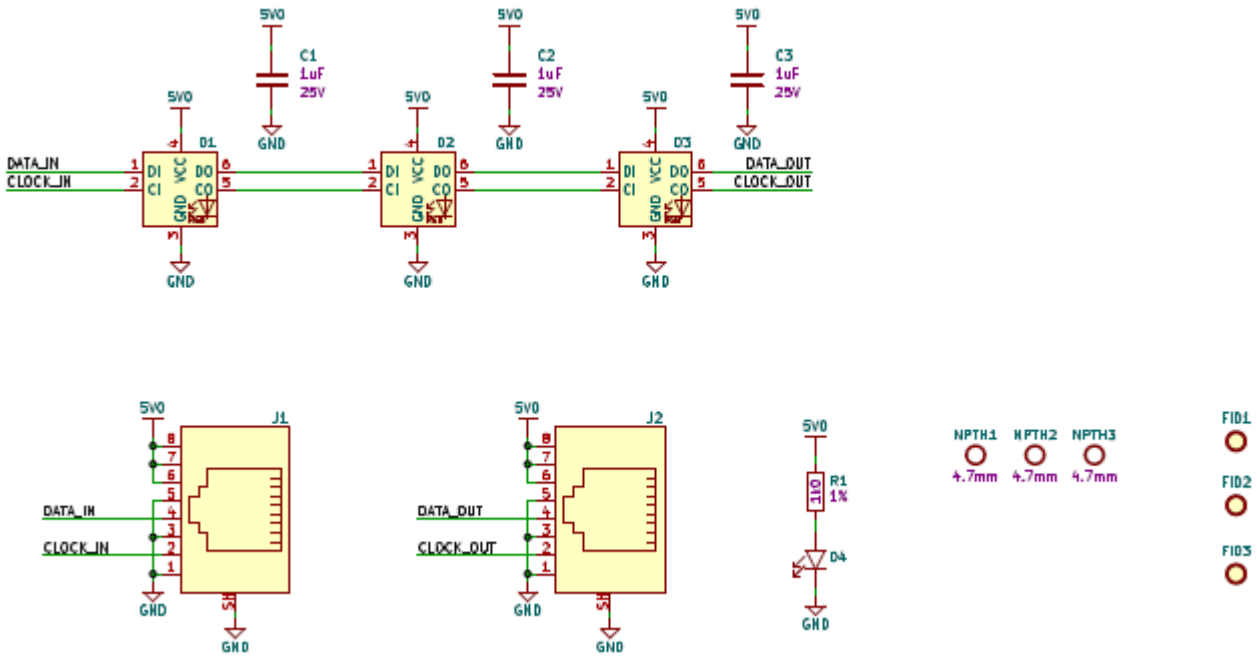
41 HH-0028 Scooby Upper Right Arrows Schematic



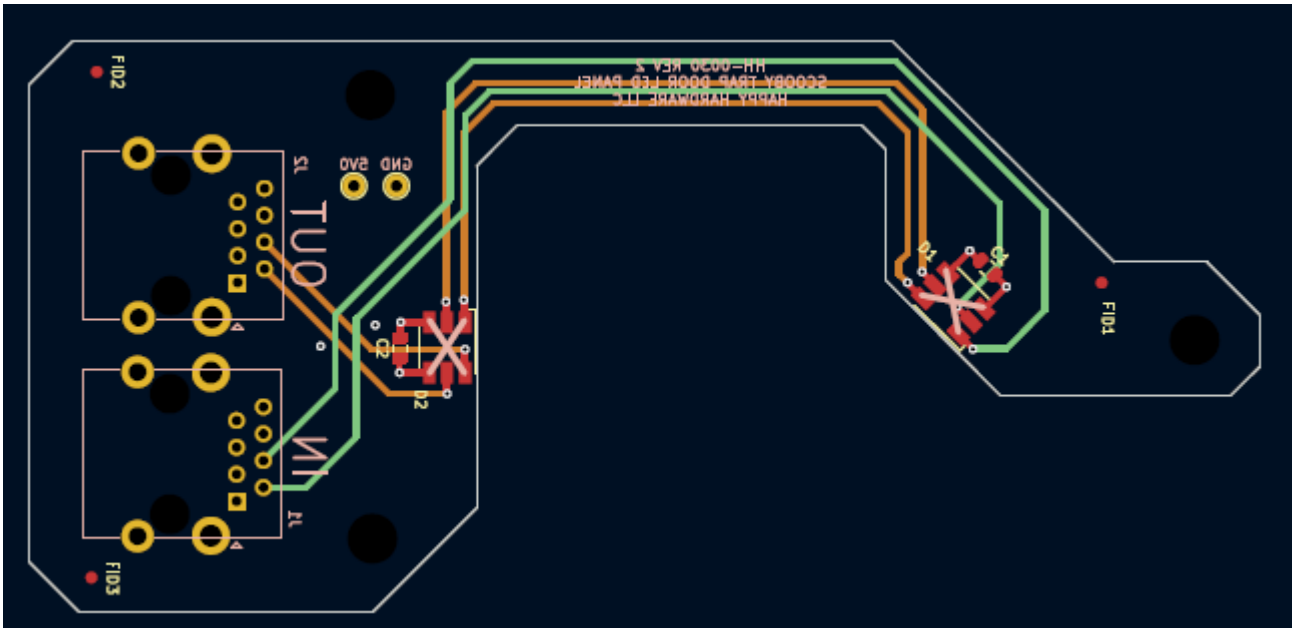
42 HH-0029 Upper Outline Arrows Layout



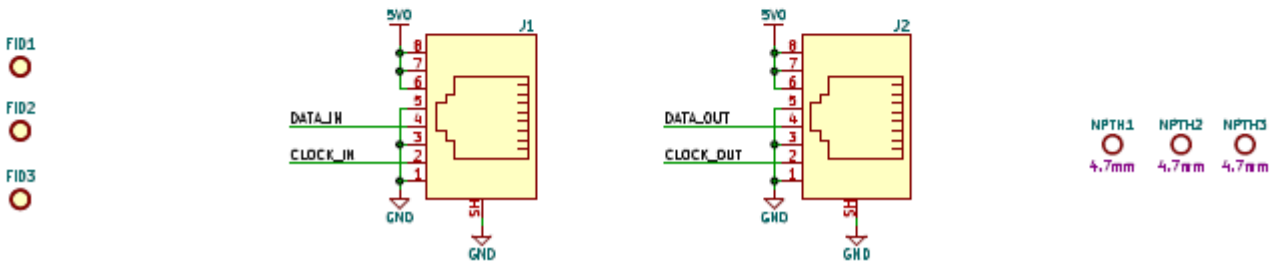
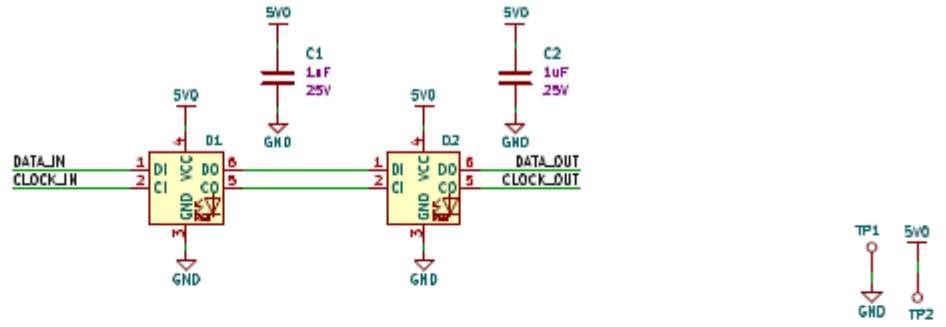
43 HH-0029 Upper Outlane Arrows Schematic



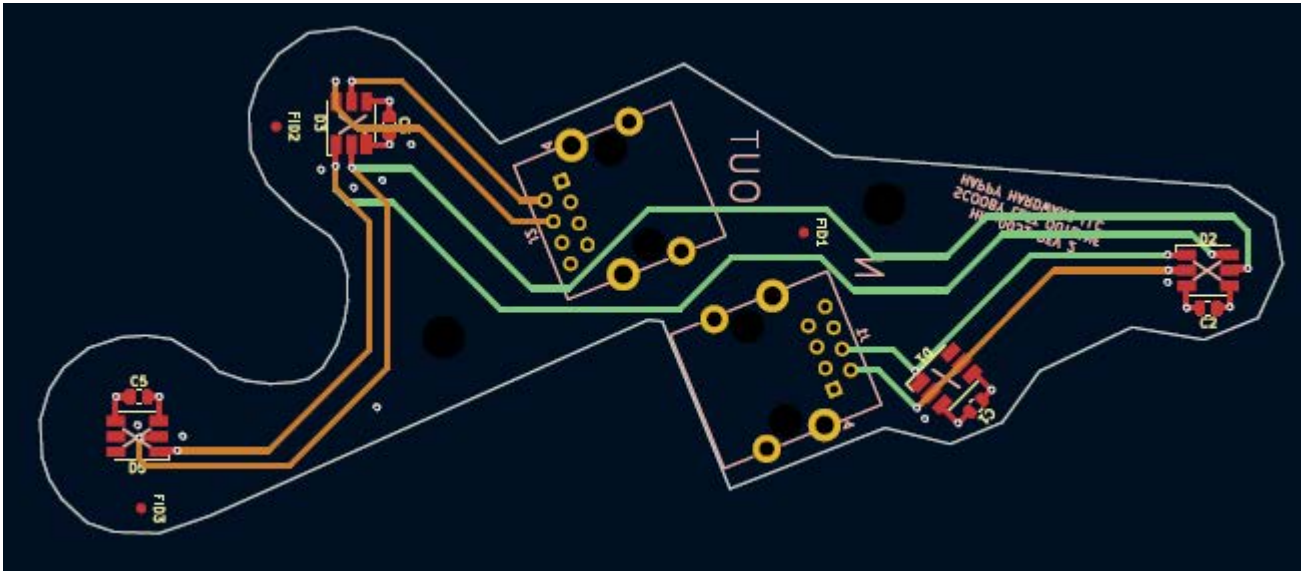
44 HH-0030 Scooby Trap Door Layout



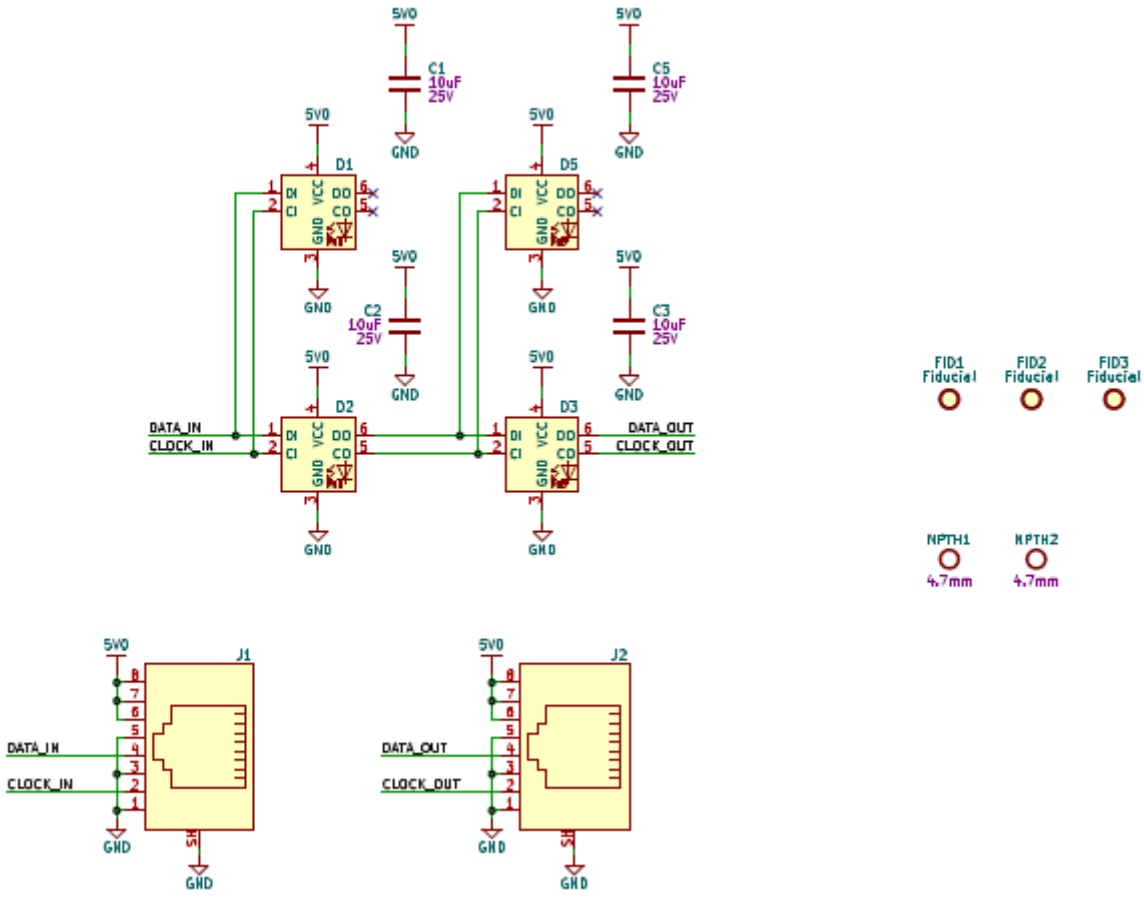
45 HH-0030 Scooby Trap Door Schematic



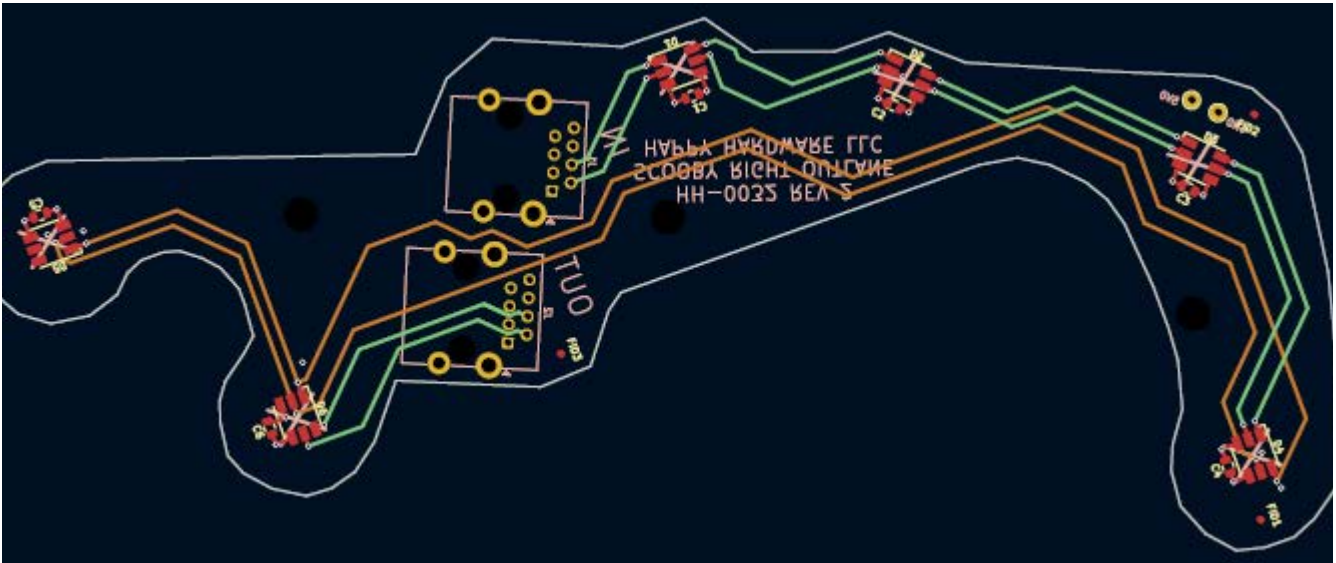
46 HH-0031 Scooby Left Outlane Layout



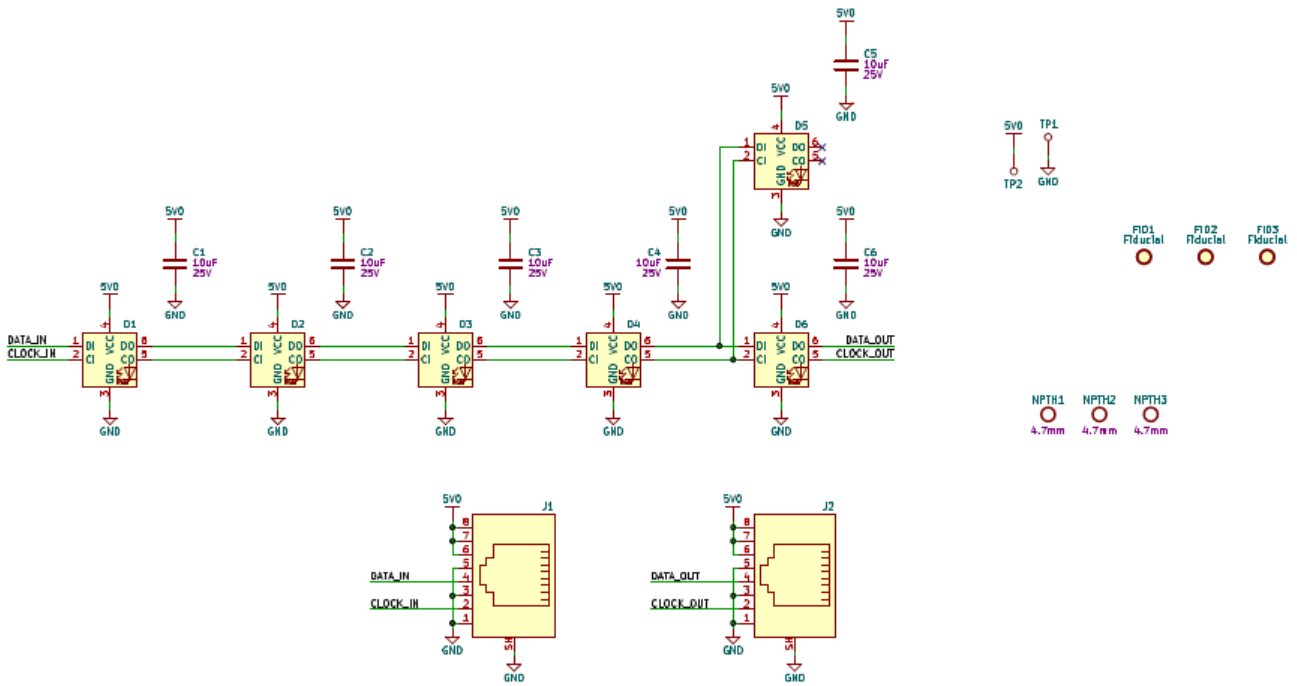
47 HH-0031 Scooby Left Outlane Schematic



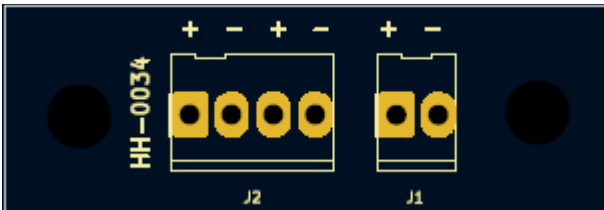
48 HH-0032 Scooby Right Outlane Layout



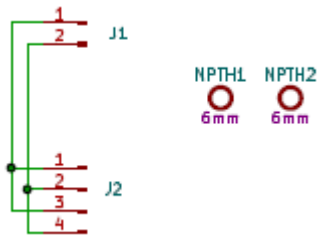
49 HH-0032 Scooby Right Outlane Schematic



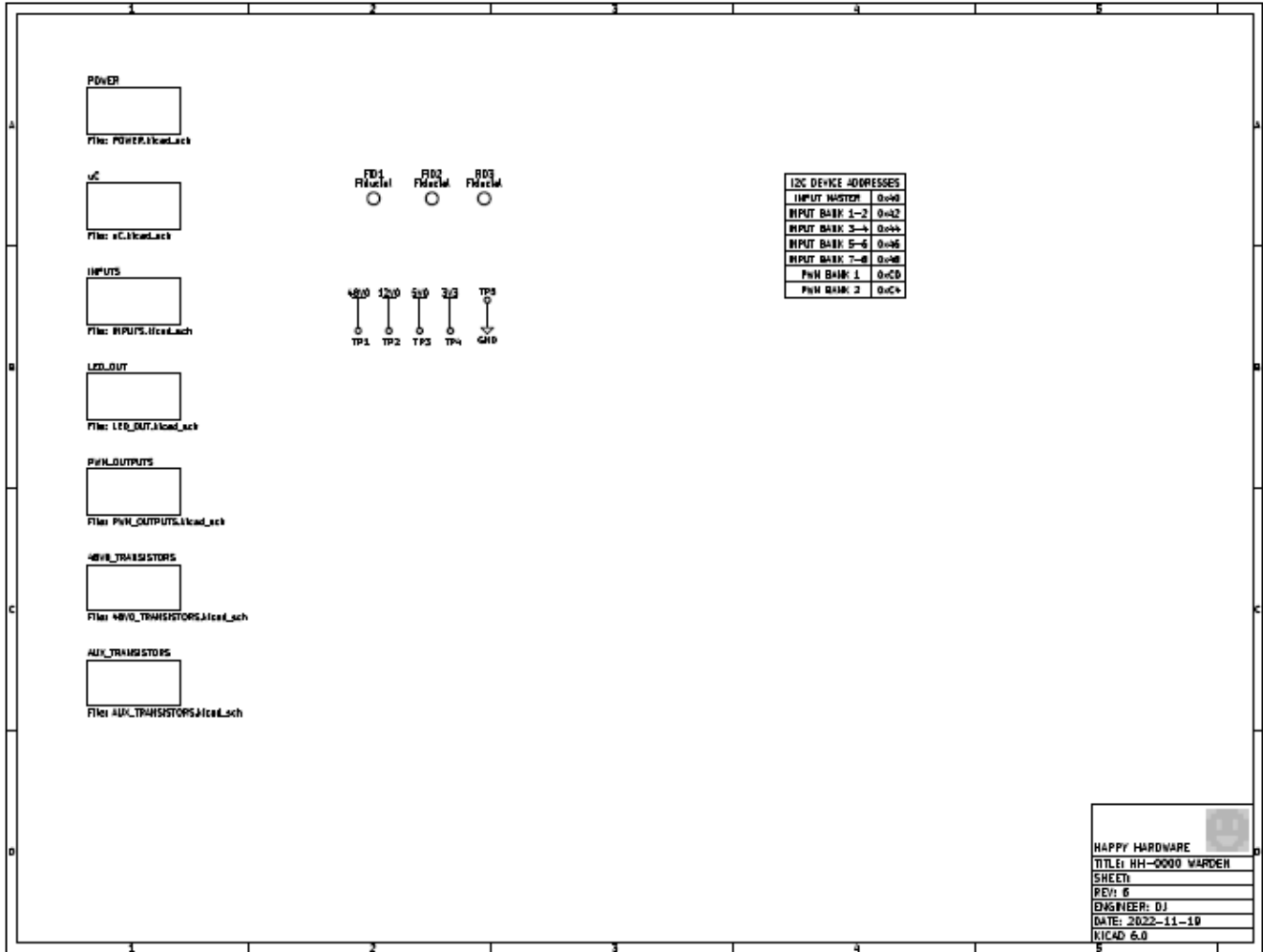
50 HH-0034 Drop Bank Power Splitter Layout



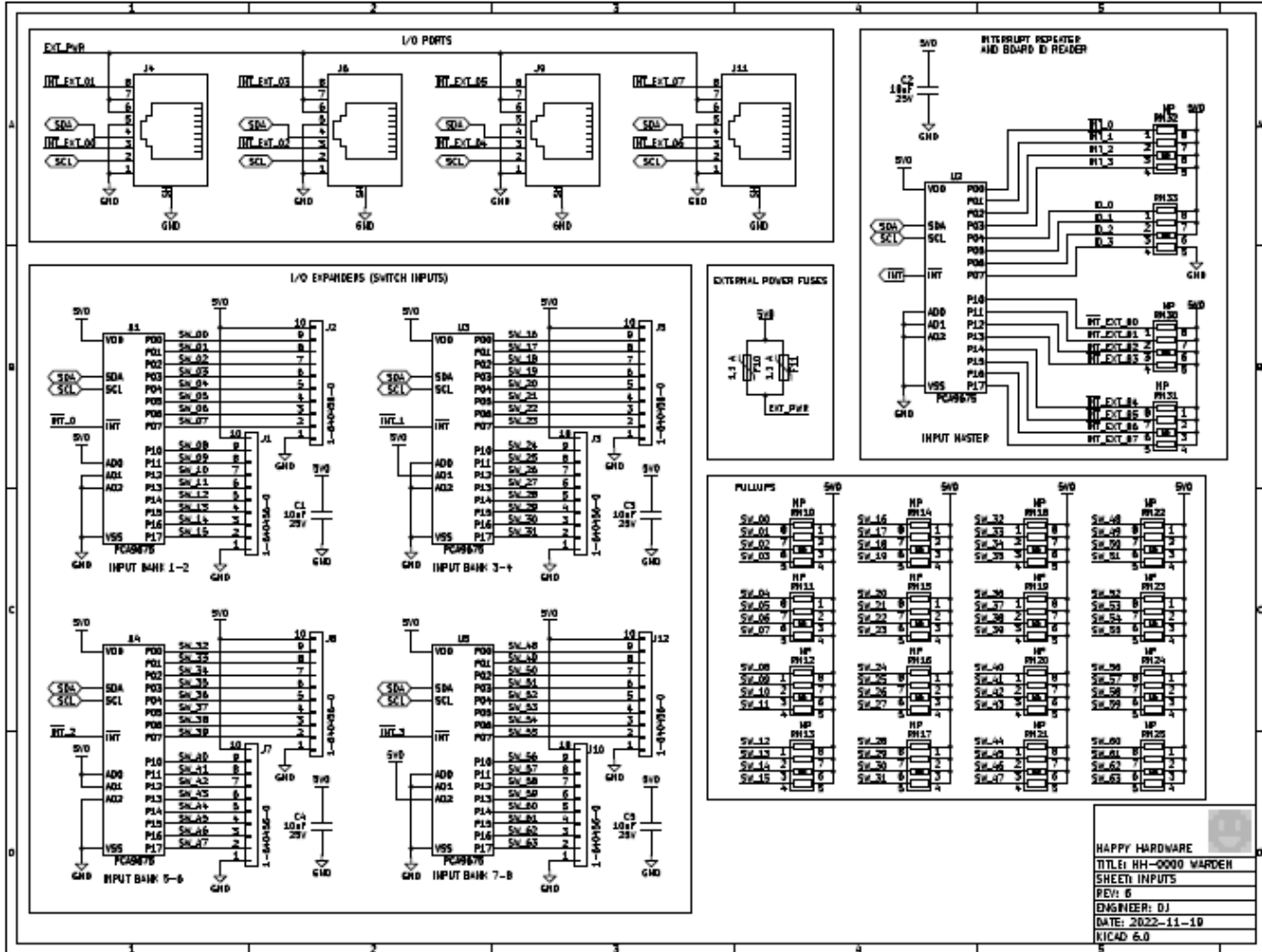
51 HH-0034 Drop Bank Power Splitter Schematic



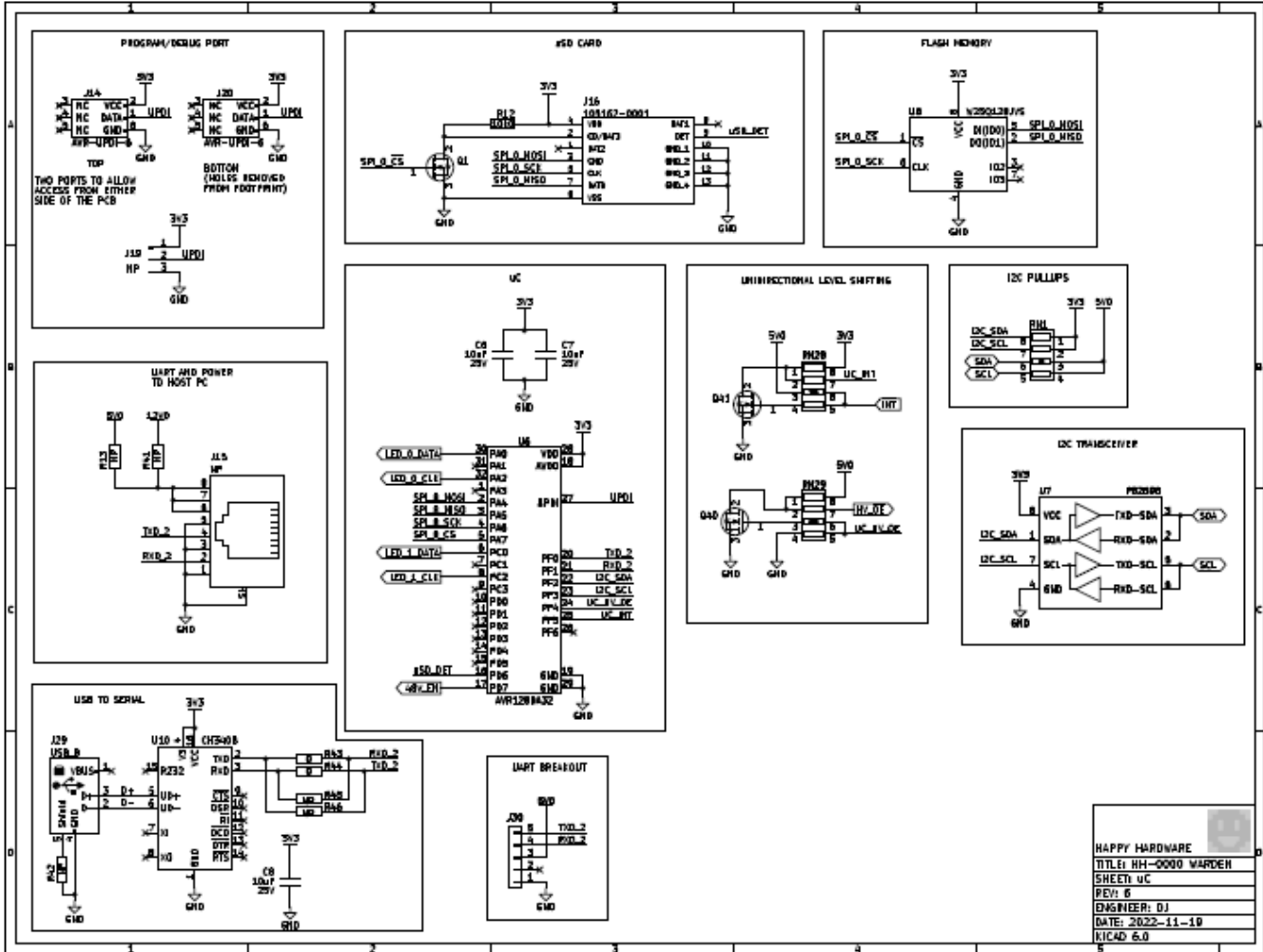
52 HH-0000 Warden Root



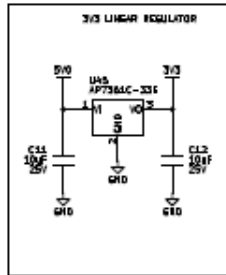
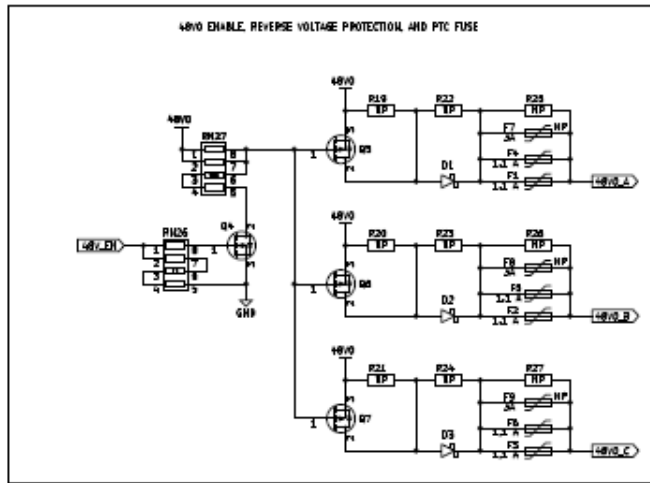
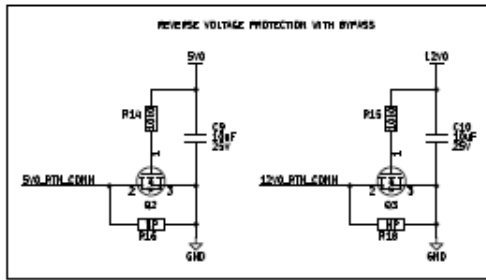
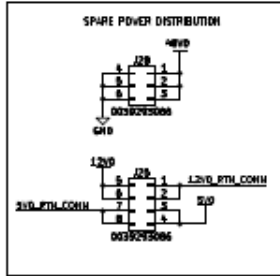
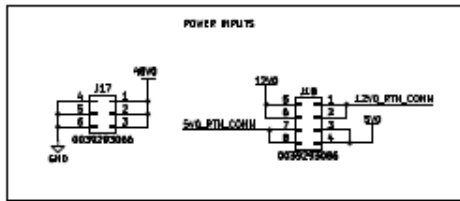
53 HH-0000 Warden Inputs



54 HH-0000 Warden uC

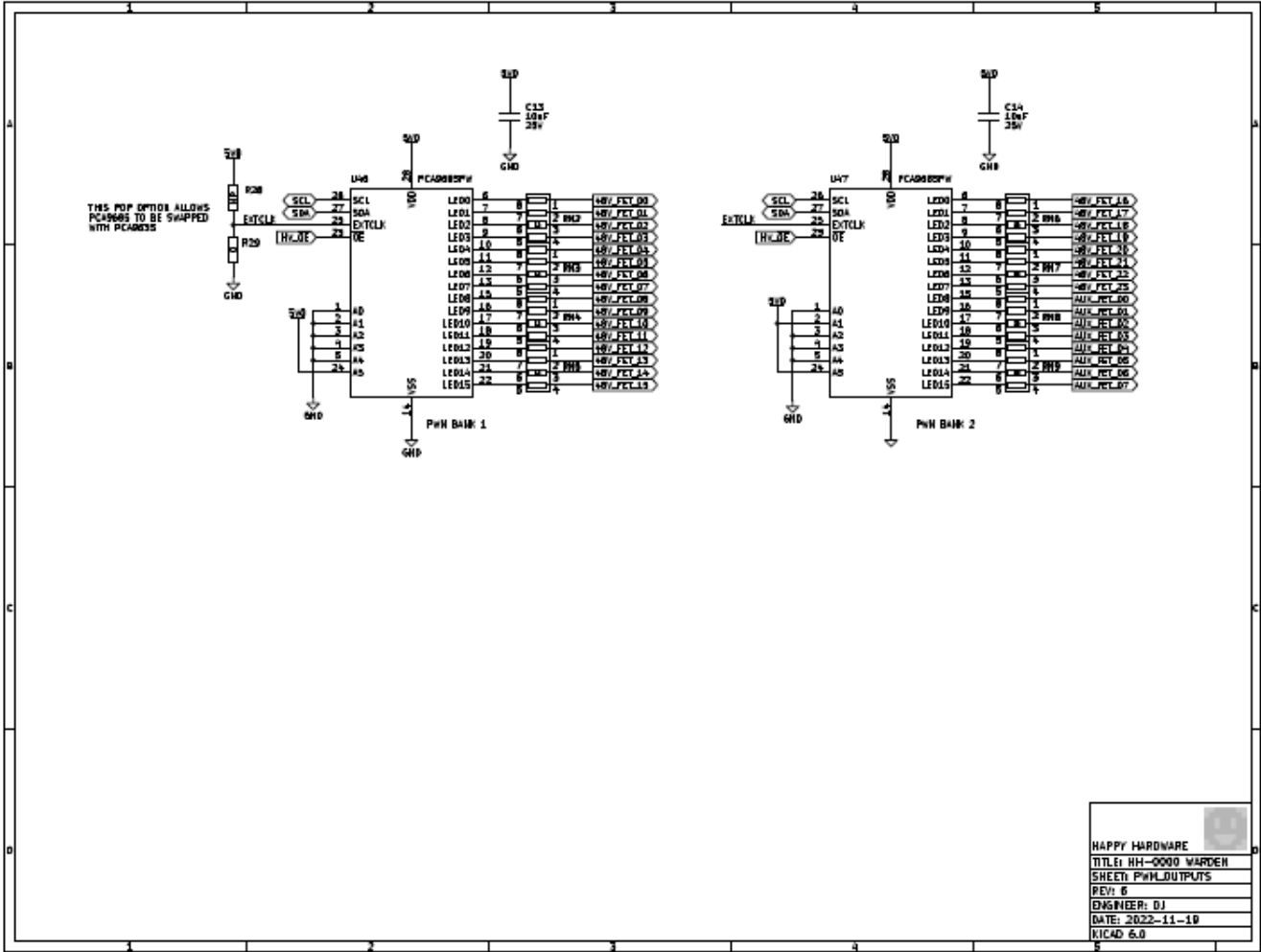


55 HH-0000 Warden Power



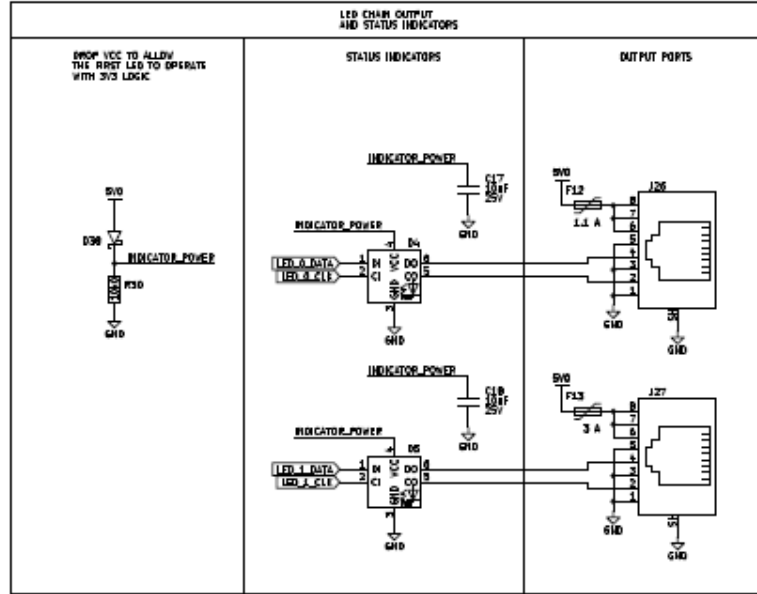
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SHEET: POWER
REV: 6
ENGINEER: DJ
DATE: 2022-11-10
KICAD 6.0

56 HH-0000 Warden PWM Outputs



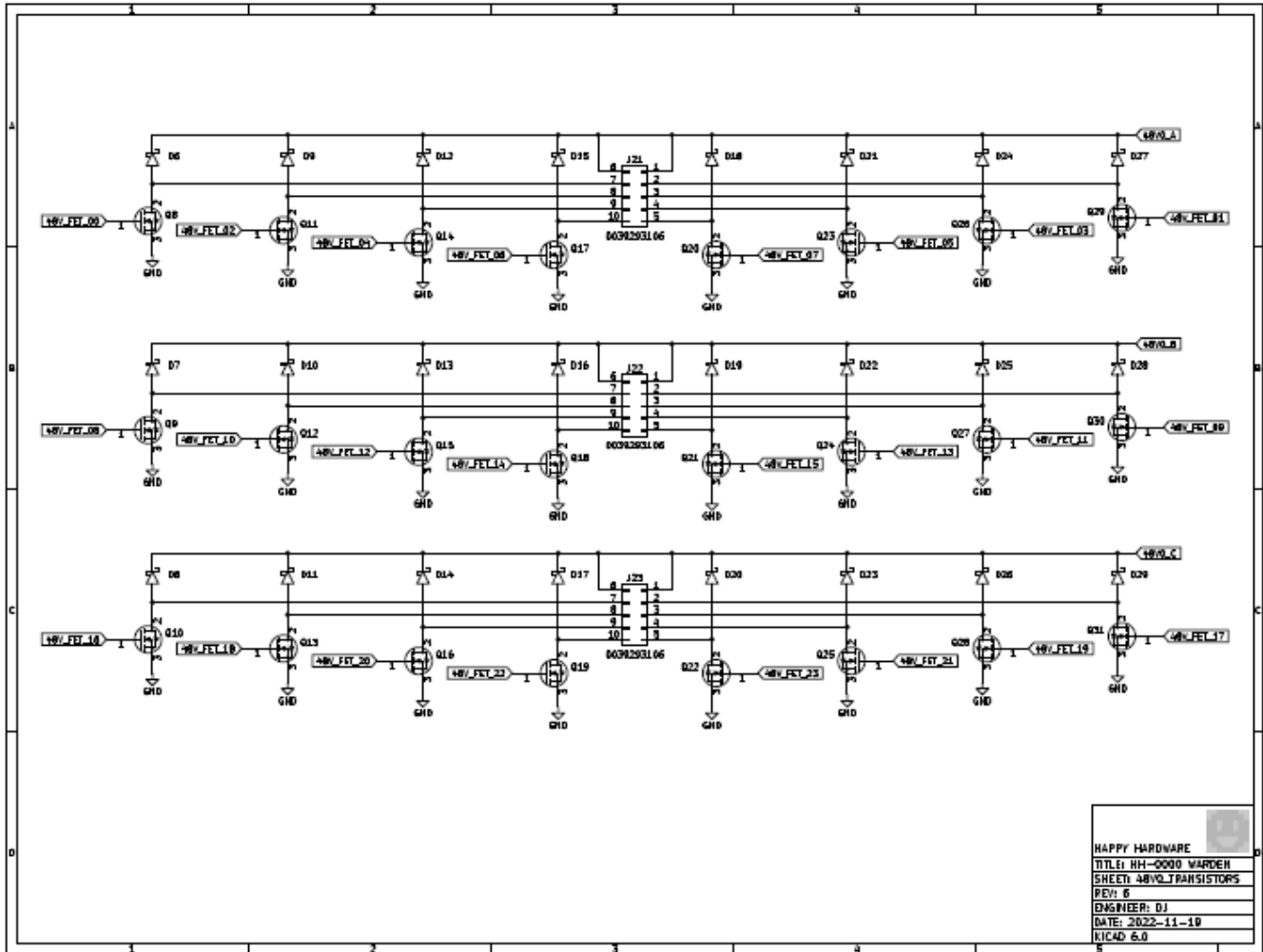
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 SHEET: PwN_OUTPUTS
 REV: 6
 ENGINEER: DJ
 DATE: 2022-11-10
 NICAD 6.0

57 HH-0000 Warden LED Out

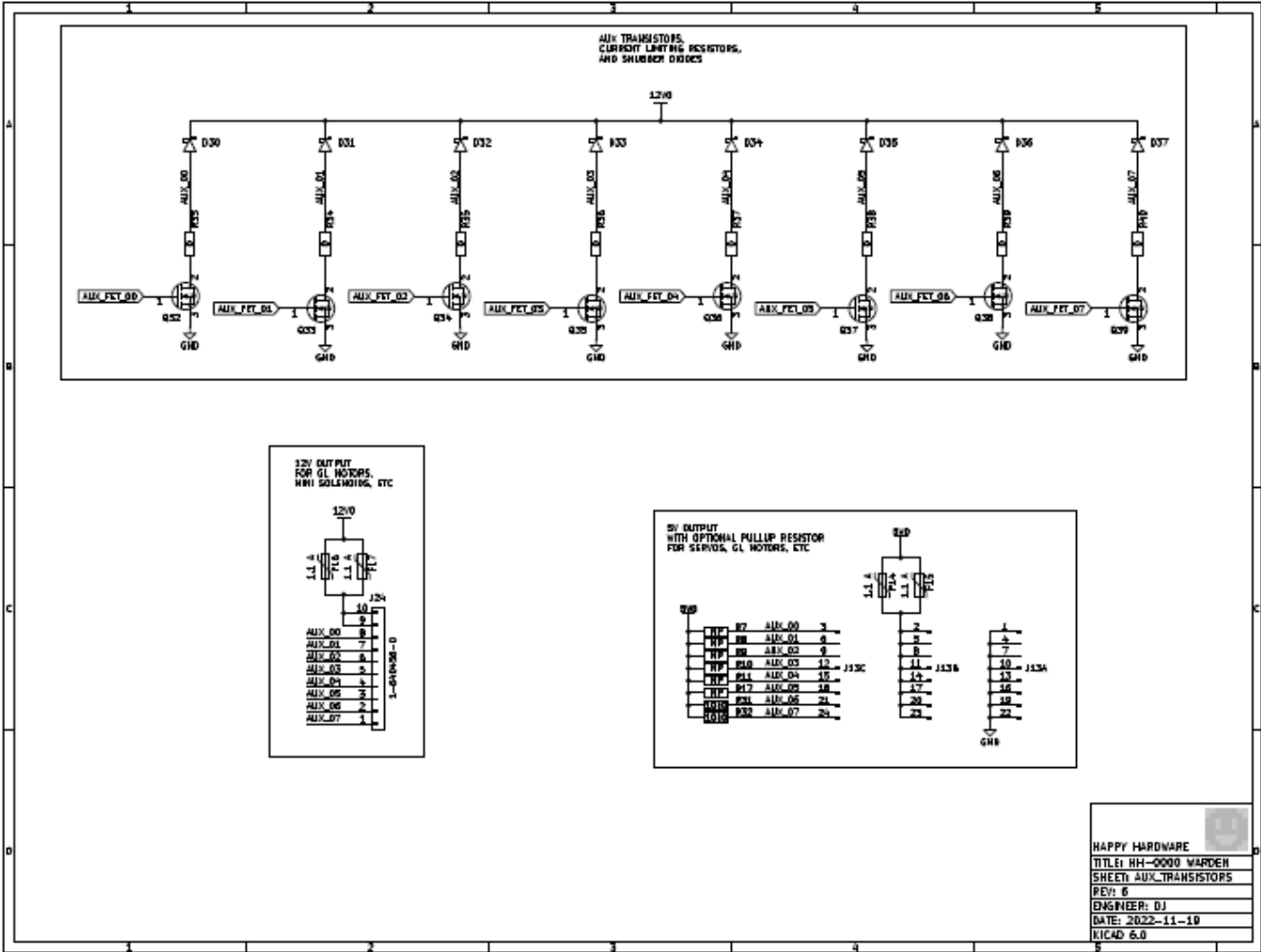


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REV: 6
ENGINEER: DJ
DATE: 2022-11-10
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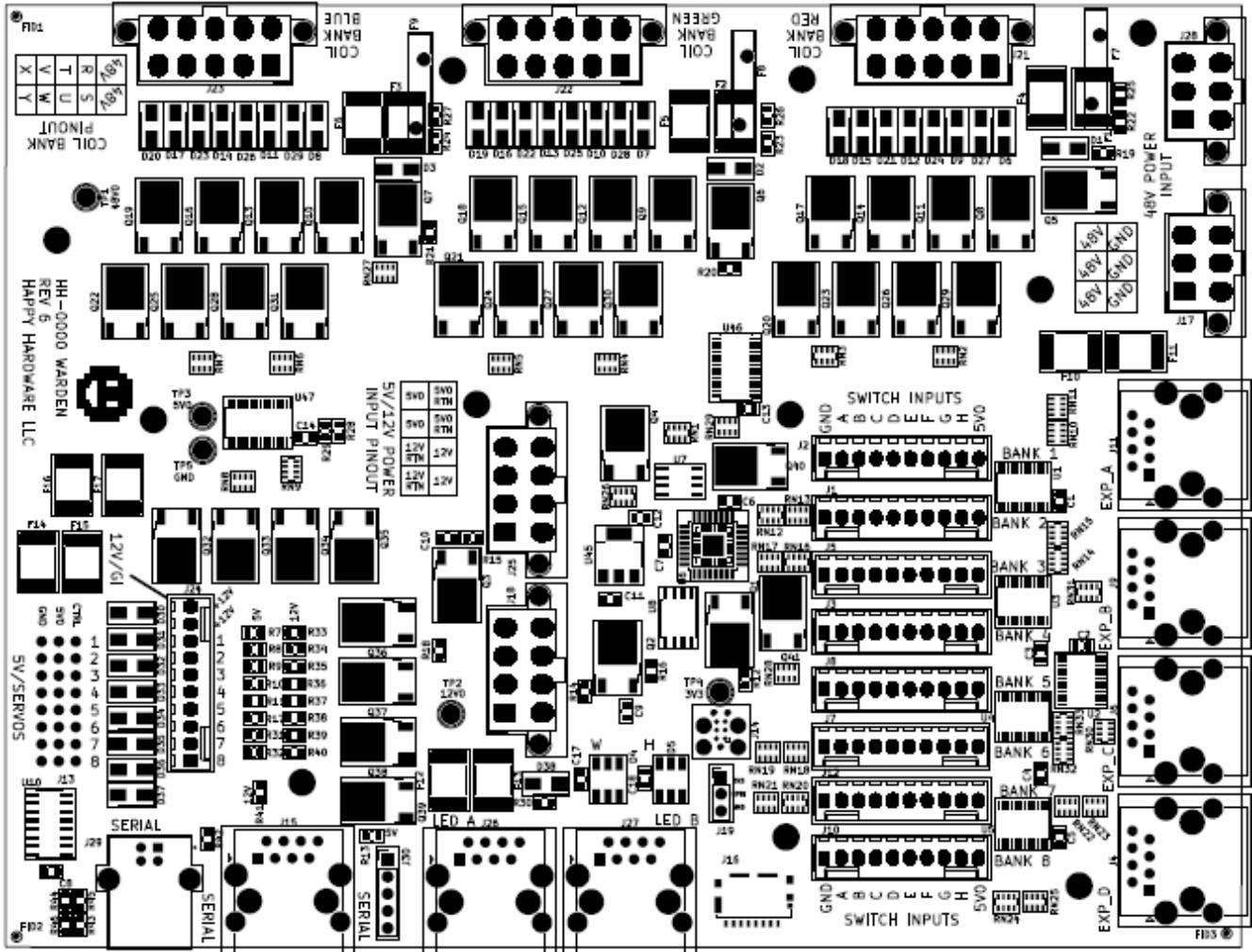
58 HH-0000 Warden 48Vo Transistors



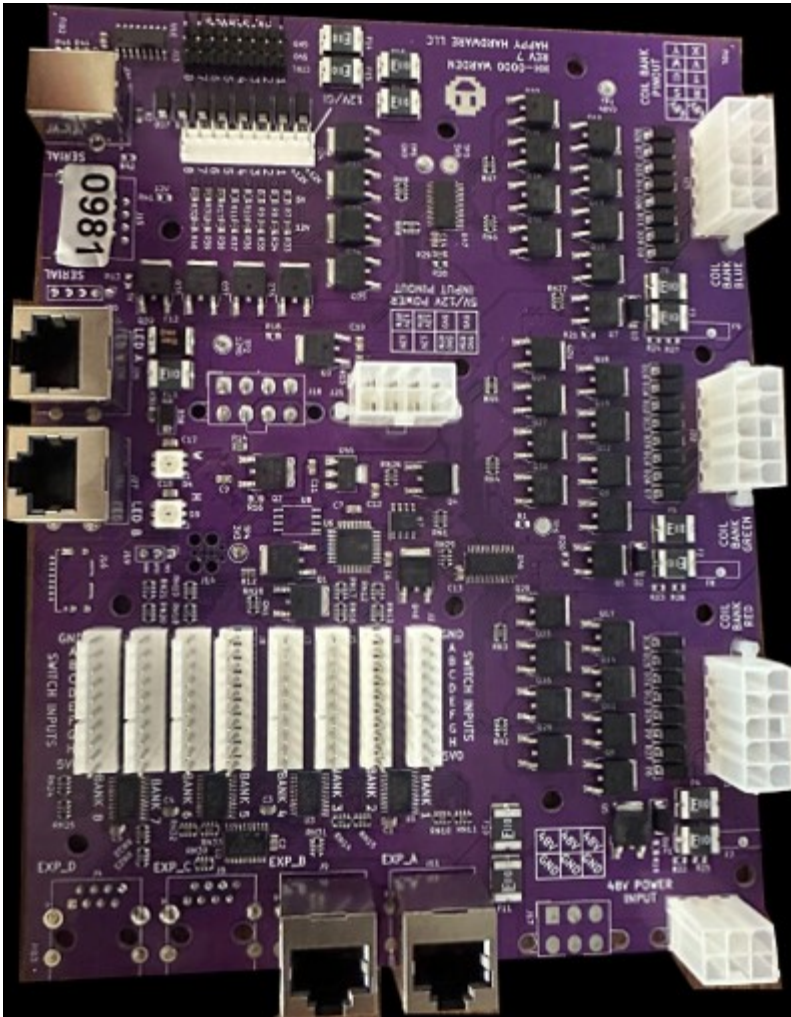
59 HH-0000 Warden AUX Transistors



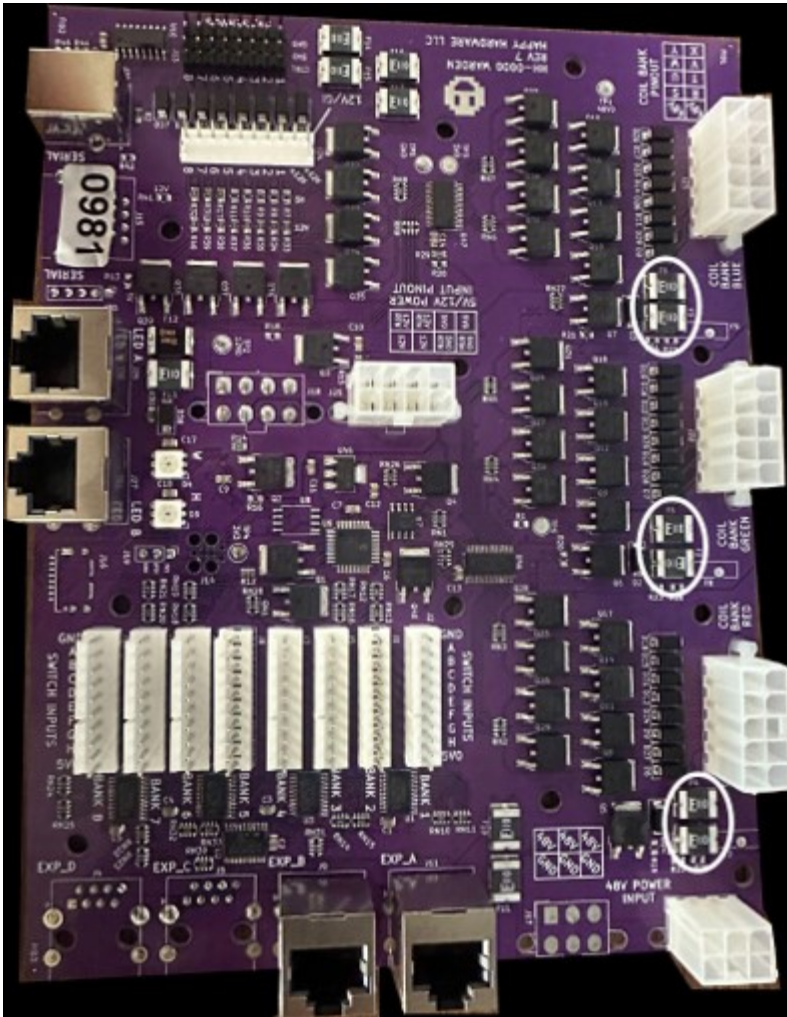
60 HH-0000 Warden Rev 6 Diagram



61 Populated Warden Board



62 Warden Board Fuse Locations



NOTICE

Need to report a code bug in Scooby Doo? You can send an email directly to DJ@spookypinball.com with the subject "Code Bug"

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Chapter 4

Diagnose a Bad MOSFET on the Warden Board

Tools Required

The materials you will need to diagnose a bad MOSFET on Scooby Doo's Warden Board:

- Multimeter with an ohms setting (preferably set to 20k)
- Scooby Doo Chart for reference (see table near end of document)
- Wire snips
- Insulating tape

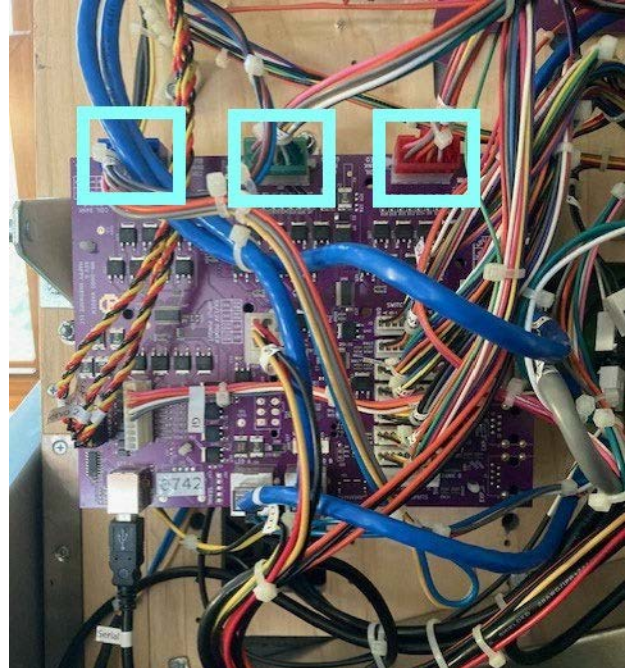
CAUTION

YOU ARE WORKING WITH SENSITIVE ELECTRONIC MATERIALS. PLEASE USE CAUTION!

To diagnose a bad MOSFET

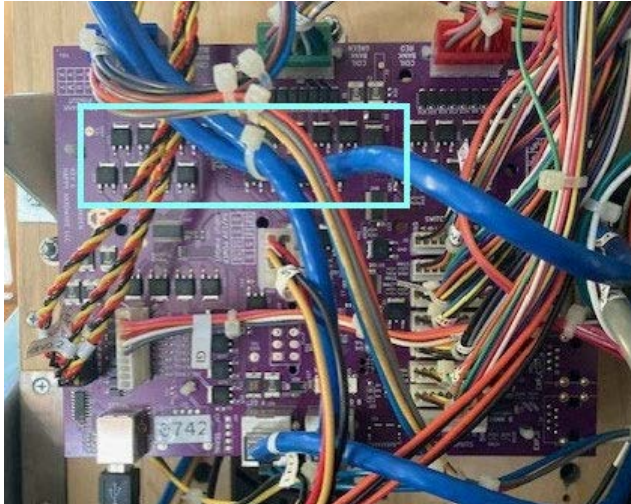
1. Set the multimeter to 20k ohms. If 20k ohms is not available, use the closest available ohms setting.
2. Power off and unplug the machine. Carefully unplug all of the coil chains from the main Warden board (Blue, Green, and Red connectors). The connectors are located:
 - underneath the playfield
 - below the drop target mechanism
 - on the left hand side of the playfield

Figure 4-1. Main Warden Board Connectors



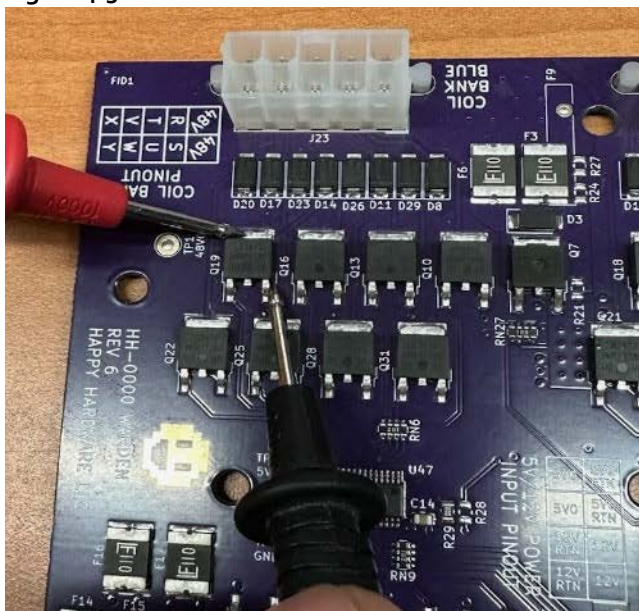
3. To test the MOSFETs, identify the Q8-Q30 MOSFETs on the main Warden board.

Figure 4-2. Main Warden Board - Q8-Q30 MOSFETS



- a Place the red prong of the multimeter on the top bar of each MOSFET (Q8-Q30) and the black prong on the bottom right foot.

Figure 4-3. Main Warden Board with Multimeter



- b A functioning MOSFET should display no resistance reading. If there is any reading, it indicates a faulty component. Test all MOSFETs (Q8-Q30) and note the ones that produce a reading.

4. To identify the coil, use the supplied coil chart to identify the faulty MOSFET to its corresponding coil.
5. To isolate the faulty coil, move the coil plunger that is associated with the bad MOSFET by hand to ensure it has full motion. If the plunger is restricted, the coil is bad, too. Check all coils associated with tested bad MOSFETs.

Note: ONLY continue if you have determined that there is a bad/restricted movement coil from Step 5.

⚠ WARNING

If a bad MOSFET is associated with any of the other coils in the machine, **stop here**.

Email: service@spookyinball.com and advise which MOSFETs are bad on your Warden Board causing certain coils not to function.

Please let support know if you have restricted movement coils since you'll need those parts.

- a Take good pictures of the associated coil wire connections before cutting wires in Step 5c.
- b Cut the return wire connected to the identified faulty restricted coil associated with the bad MOSFET.

Be careful to cut the return wire only and not the serial power daisy chain wire (Blue, Green, or Red) connecting other coils.

- c Immediately tape over the cut wire to prevent accidental short circuiting.
6. To test the device, power on the machine. It should now function properly, except for the cutout coil that caused the issue.
7. Locate any remaining faulty MOSFETs.

8. If the machine continues not to function correctly, you may have overlooked one faulty MOSFET.
9. Repeat Steps 3 thru 5 for any remaining MOSFETs to identify and isolate the problematic coil.

Spooky Support for Parts
 Option #1: Email service@spookypinball.com
 Option #2: If you don't receive a reply within 2 business days, call Spooky Support (815-541-4940) to get the parts you need.

Scooby Doo Coil Chart

Red Chain			Green Chain			Blue Chain		
Wire	Coil	MOSFET #	Wire	Coil	MOSFET #	Wire	Coil	MOSFET #
0 Purple	Middle Sling	Q8	8 Purple	Launch	Q9	16 Purple	Left VUK	Q10
1 White	Left Flipper Hold	Q29	9 White	Mystery Machine	Q30	17 White	Right VUK	Q31
2 Black	Right Sling	Q11	10 Black	Ball Trough	Q12	18 Black	Rear Drop Reset	Q13
3 Yellow	Left Flipper High	Q26	11 Yellow	Upper Left Magnet	Q27	19 Yellow	Magnet	Q28
4 Brown	Left Sling	Q14	12 Brown	Trap Door Knockdown	Q15	20 Brown	Front Drop Reset	Q16
5 Orange	Right Flipper Hold	Q23	13 Orange	Upper Right Magnet	Q24	21 Orange	Knocker	Q25
6 Pink	Trap Door Reset	Q17	14 Pink	Upper Right High	Q18	22 Pink	None	Q19
7 Grey	Right Flipper High	Q20	15 Grey	Upper Left High	Q21	23 Grey	Shaker	Q22

Note: Ensure safety precautions are taken, and the machine is disconnected from power during this process. Seek professional assistance if you are not comfortable or experienced in working with electronic components.

Upper Playfield Removal

Please follow these steps to remove the playfield

To remove the upper playfield

1. With playfield lifted, disconnect the 2 blue network cables from the main board and the white 5 pin and white 4 pin plugs (solenoid power) from the z-connectors. Label the blue network cables if they are not already - one is for switches, the other LEDs.
2. Clip any wire ties that would prevent the disconnected wires from feeding into the lower playfield cutout.
3. Lower the playfield.
4. Remove stone wall from front of upper playfield (2 wood screws).
5. Remove mystery machine (2 wood screws) and disconnect network cable from inside van.
6. Remove orange wireform (1 screw).

7. Remove UPPER purple wireform (1-11/32in nut).
8. Remove blue wireform (1-11/32in nut).
9. Remove the large upper playfield plastic (3 5/16 nuts).
10. Remove 2 square head wood screws on right side of upper playfield now exposed by removing large plastic.
11. Unplug and remove left spotlight (1 screw and 1 hexpost).
12. Remove leftmost plastic (3-5/16in nuts) to allow for easier removal of screws in next step.
13. Remove 2 ¼ wood screws from left woodrail on lower playfield (frees the bracket holding up the left side of upper playfield).
14. Remove topmost plastic and cut zip tie (3 machine screws).
15. Remove entrance gate (1-5/16in nut) and plastic post (1-¼in post screw). This will allow the guide rail to flex backwards in order to clear the entrance ramp when removing.
16. Remove 2 Phillips head wood screws out of the ramp entrance.
17. Carefully lift front of upper playfield slightly to separate, then gently pull forward to clear the entrance ramp.
18. Feed disconnected wires up through lower playfield cutout and you should be free!

NOTICE

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Chapter 5

Switch and Coil Charts

Scooby Doo Switch Chart

Switch Banks								
Switch Bank 1			Switch Bank 2			Switch Bank 3		
0	Left Spinner	Grey	8	NONE	Grey	16	Trough 1	Grey
1	Right Spinner	White	9	Trap Door	White	17	Jam	White
2	Front Left Drop	Red	10	Left Outer Outlane	Red	18	NONE	NONE
3	Front Middle Drop	Purple	11	Left Inner Outlane	Purple	19	Right Outlane	Purple
4	Front Right Drop	Blue	12	Left Inlane	Blue	20	Right Inlane	Blue
5	Left Spinner	Grey	13	Left EOS	Grey	21	Right EOS	Green
6	Rear Middle Drop	Yellow	14	Left Sling	Yellow	22	Right Sling	Yellow
7	Rear Left Drop	Orange	16	Left VUK	Orange	23	Middle Sling	Orange
Ground	Ground	Black	Ground	Ground	Black	Ground	Ground	Black
GI Bank 1								
			24	NONE	NONE	32	Target 1	Grey
7	Lower GI	White	25	Trough 7	White	33	Target 2	White
6	Left Cutler Hand	Red	26	Trough 6	Red	34	Target 3	Red
5	Right Cutler Hand	White	27	Trough 5	Purple	35	Target 4	Purple
4	Upper GI	Grey	28	Trough 4	Blue	36	Target 5	Blue
3	NONE	NONE	29	Trough 3	Green	37	Target 6	Green
2	NONE	NONE	30	Trough 2	Yellow	38	Target 7	Yellow
1	NONE	NONE	31	Shooter Lane	Orange	39	Right VUK	Orange
Power	Power	Pink	Ground	Ground	Black	Ground	Ground	Black
Switch Bank 6			Switch Bank 7					
H	Right Lock	Grey	H	Subway Entry	Grey			
G	Right Lock Jam	White	G	Left Ramp Make	White			
F	Right Inner Orbit	Red	F	Center Ramp Entry	Red			
E	Left Inner Orbit	Purple	E	Mystery Machine 3	Purple			
D	Right Outer Orbit	Blue	D	Mystery Machine 1	Blue			
C	Left Lock Jam	Green	C	Mystery Machine 4	Green			

Switch Banks								
Switch Bank 1			Switch Bank 2			Switch Bank 3		
B	Left Outer Orbit	Yellow	B	Mystery Machine 2	Yellow			
A	Left Lock	Orange	A	Mystery Machine Exit	Orange			
Ground	Ground	Black	Ground	Ground	Black			
Cabinet								
Cabinet								
64	NONE	NONE						
65	Right Flipper	Grey						
66	Left Flipper	White						
67	Right Upper Flipper	Red						
68	Left Upper Flipper	Purple						
69	Tilt	Green						
70	Launch	Launch						
71	Action Button	Pink						
72	Start	Orange						
Ground	Ground	Black						
Upper Playfield								
Upper Playfield J2			Upper Playfield J3			Upper Playfield GI		
83	Right Flipper EOS	Purple	88	Left Flipper EOS	Grey	26	Left Cutler Arm	Red
84	Passive Sling	Blue	89	Middle Drain	White	25	Right Cutler Arm	White
85	Airport Lane	Green	90	Upper Left Drain	Red	24	Upper Spotlights	Grey
86	Miner Lane	Yellow	91	Cutler Hand Left	Purple			
87	Castle Lane	Orange	92	Cutler Orbit	Green			
			93	Center Ramp	Blue			
			9	Cutler Helmet	Yellow			
			95	Cutler Right Hand	Orange			

Scooby Doo Coil Chart

Red Chain			Green Chain			Blue Chain		
Wire	Coil	MOSFET #	Wire	Coil	MOSFET #	Wire	Coil	MOSFET #
0 Purple	Middle Sling	Q8	8 Purple	Launch	Q9	16 Purple	Left VUK	Q10
1 White	Left Flipper Hold	Q29	9 White	Mystery Machine	Q30	17 White	Right VUK	Q31
2 Black	Right Sling	Q11	10 Black	Ball Trough	Q12	18 Black	Rear Drop Reset	Q13
3 Yellow	Left Flipper High	Q26	11 Yellow	Upper Left Magnet	Q27	19 Yellow	Magnet	Q28
4 Brown	Left Sling	Q14	12 Brown	Trap Door Knockdown	Q15	20 Brown	Front Drop Reset	Q16
5 Orange	Right Flipper Hold	Q23	13 Orange	Upper Right Magnet	Q24	21 Orange	Knocker	Q25
6 Pink	Trap Door Reset	Q17	14 Pink	Upper Right High	Q18	22 Pink	None	Q19
7 Grey	Right Flipper High	Q20	15 Grey	Upper Left High	Q21	23 Grey	Shaker	Q22

Note: Ensure safety precautions are taken, and the machine is disconnected from power during this process. Seek professional assistance if you are not comfortable or experienced in working with electronic components.

NOTICE

Need to report a code bug in Scooby Doo? You can send an email directly to DJ@spookypinball.com with the subject "Code Bug"