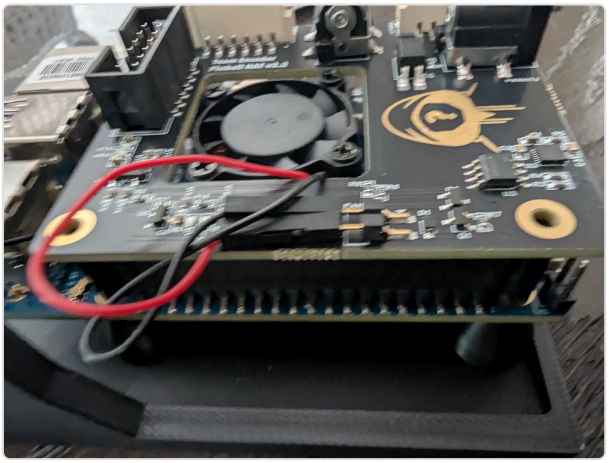
TEAM ENCODER

PinnerOPI Kit

Installation & Assembly Guide
for the Arcade1Up Virtual Pinball Cabinet



⚠ READ THIS BEFORE YOU START

The hardware is straightforward, but three steps can **permanently damage parts** if rushed: the **antenna connector**, the **fan-cable connector**, and the **LVDS red-wire orientation**. Slow down at the warning boxes. All you need is a Phillips-head screwdriver and a little patience.

What's in the Box

All Kits

- Team Encoder PinnerOPI HAT (anti-static bag)
- OrangePi 5 Max 3D-printed case
- 15 mm nylon screws
- 12 mm nylon spacers
- 6 mm silver screws
- SD card (pre-flashed with PinnerOS)

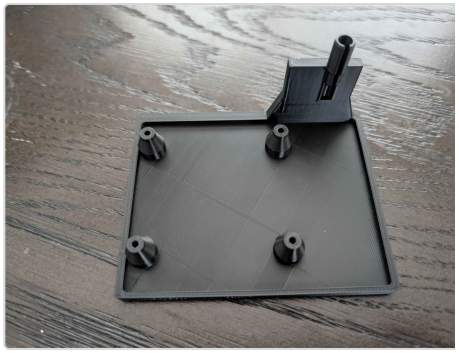
Stock-Screen Kits Only

- LVDS case
- LVDS power cord
- 3 mm screws (LVDS board → LVDS case)

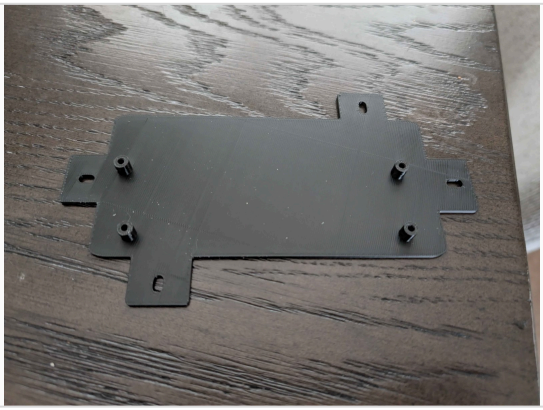
Note: Stock-screen kits do *not* include the LVDS converter board itself — you must already own a compatible LVDS board to use this kit on a stock screen.

All screws & spacers

HAT, SD card, screws



OPi5 Max case



LVDS case (stock)

LVDS power cable (stock)

What You Need (Not Included)

- **Orange Pi 5 Max** — the **MAX** model only. No other Orange Pi model or spec variant is compatible.
- **Cooling kit** — must match the kit pictured. No other cooling solution is compatible.
- **Power adapter** — must meet the OPi5 Max power adapter specifications: **5.1V / 5A USB-C** (pictured). An underpowered adapter will cause boot loops, hardware-validation errors, or self-power-offs after WiFi setup.
- **An extra HDMI cable** (in addition to the existing DMD cable already in your cabinet)

- **LVDS converter board** Stock Screen Only — required for stock-screen installs but *not* included in the kit. The kit provides only the LVDS case, mounting screws, and power cord.
- **Raspberry Pi Zero 2 W** Optional — only needed if you're adding a community-driven backglass display. Skip unless you're doing that build.

Components you supply yourself (aside from the HAT and HDMI cable): Orange Pi 5 Max, cooling kit, LVDS board (stock-screen only), Pi Zero 2 W (optional, backglass only). **Note:** the power adapter shown in this photo is a *Raspberry Pi 5* adapter. It reports 5 A and may well work, but it is *untested with the OPi5 Max* and not guaranteed — pick any adapter that meets the 5.1V / 5A USB-C spec called out below.

Orange Pi 5 Max

Required cooling kit

Power adapter — must read **5.1V / 5A**

Tools required: a Phillips-head screwdriver and patience.

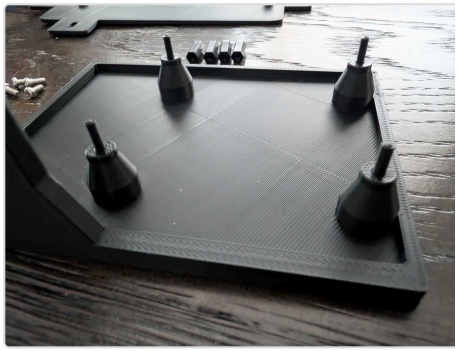
Part 1 — Assembling the OPi5 Max + HAT

1 Insert the 15 mm nylon screws into the case

Push the four **15 mm nylon screws** up through the bottom of the OPi5 Max case so they stick up through the four mounting holes.

The 15 mm screws

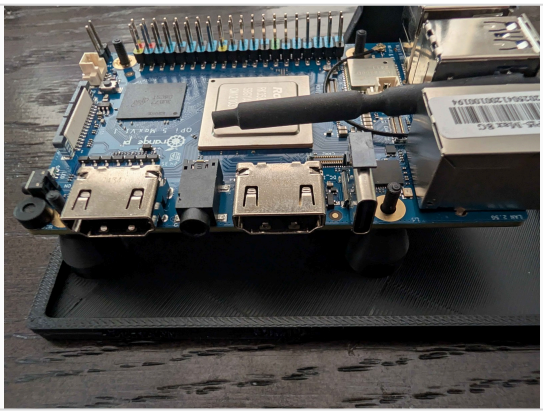
One inserted



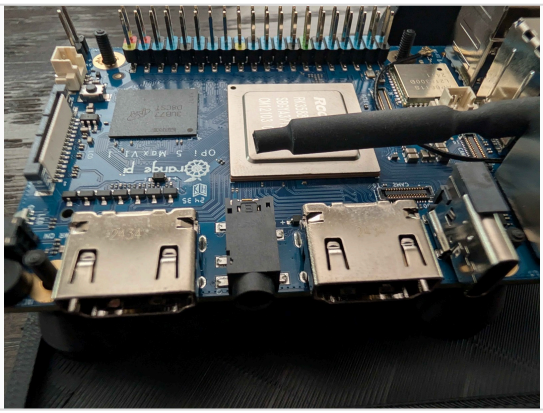
All four inserted

2 Place the Orange Pi 5 Max onto the screws

Lower the Orange Pi 5 Max onto the case so the four nylon screws pass up through the mounting holes on the board.



OPi5 Max on screws

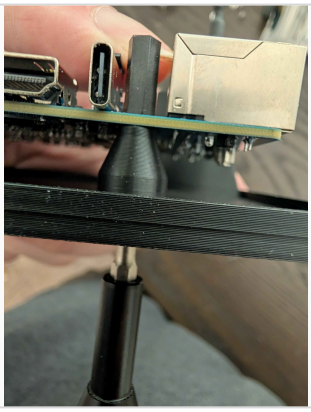


Alternate angle

3 Install the 12 mm nylon spacers

Thread a **12 mm nylon spacer** down onto each screw and tighten with a Phillips-head screwdriver. Together, the screw and spacer clamp the OPi5 Max to the case.

The 12 mm spacers

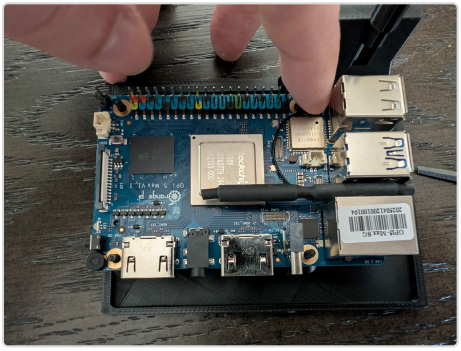


Spacer threaded onto a screw

4 Relocate the antenna — carefully

> **⚠ DO NOT LIFT THE ANTENNA CONNECTOR**
>
> The antenna connector is extremely difficult to reseat if it pops off. **Keep a finger pressed firmly on the connector** while you reposition the antenna. You may *rotate* it slightly to swing it out of a spacer's path — but **do not lift, pull, or tug it**. Damage from a lifted connector is miserable to fix.

With your finger holding the connector down, swing the antenna into its slot near the top of the case.



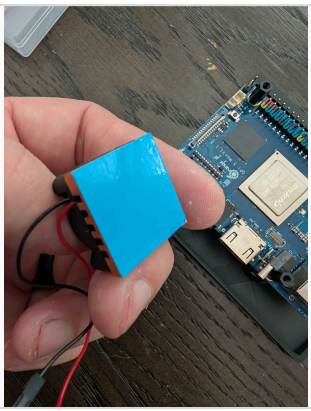
Finger on the connector

Antenna relocated

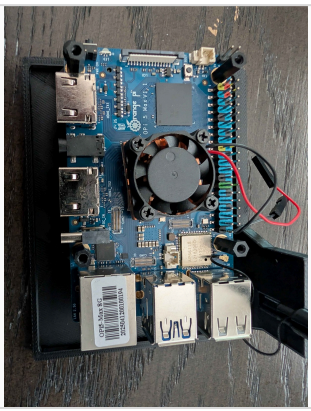
Final position

5 Install the CPU cooler

1. Take the CPU cooler with the fan attached out of the cooling kit.
2. Peel off the **blue adhesive backing** from the bottom of the cooler.
3. Orient the cooler so its **fan wires face the top edge of the case** (the same edge where the antenna sits).
4. Press the cooler down **evenly** onto the RK3588 SoC. Get it centered before it sticks — the adhesive grabs quickly.



Cooler placement



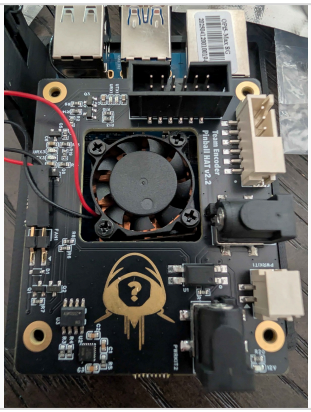
Cooler installed

6 Install the PinnerOPI HAT

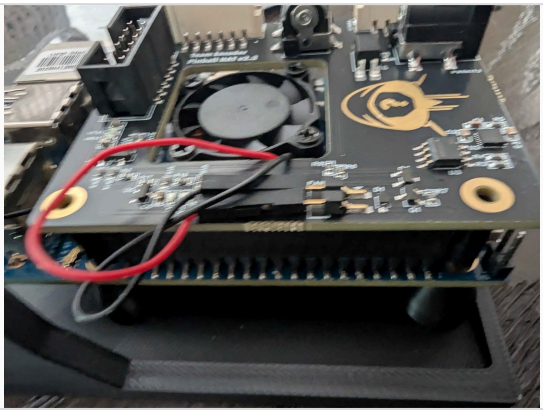
REMOVING THE HAT FROM THE ANTI-STATIC BAG

Be gentle. Do **not** force it out. If it resists, **cut the bag open** rather than tugging on the components. Damage from forcing the HAT out of the anti-static bag is **not covered under warranty**.

Lower the HAT onto the Orange Pi 5 Max so its socket aligns with the **40-pin GPIO header**. Confirm every pin lines up before pressing down. The HAT should fit cleanly around the fan.



HAT seated on header



Side profile

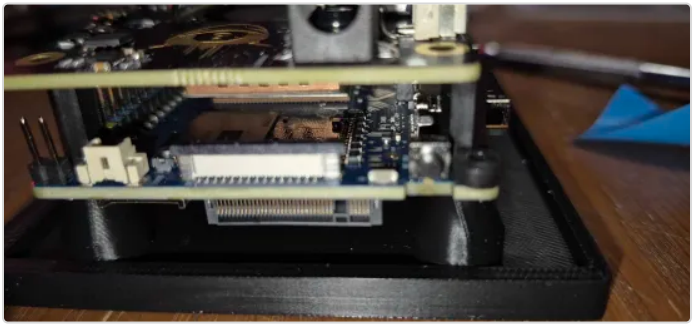
VERIFY 40-PIN ALIGNMENT BEFORE GOING FURTHER

This is the single most common source of "my cabinet boots strangely / shuts itself off / doesn't see controls" problems we've seen. **Inspect the connector from multiple angles** and make sure every pin from the OPi5 Max is fully inside the HAT's socket — not bent, not skipped, not offset by a row.

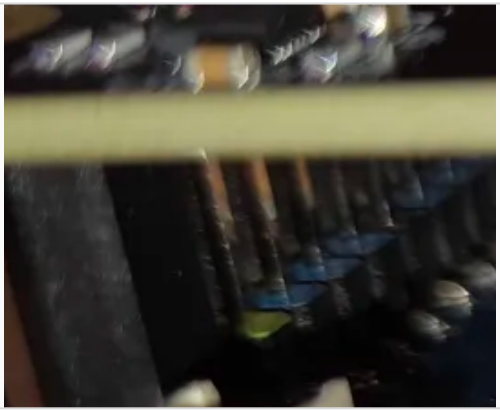
You will recheck this one more time before powering on (Step 20). A misaligned 40-pin connector can damage the HAT, the OPi5 Max, or both the moment power is applied.

WHAT "WRONG" LOOKS LIKE

The photos below are real examples of a HAT that **looks** seated at a glance but is actually shifted by one pin row. Compare against your own install before you move on.



Wrong install — from above



Same install — close up

Highlighted: the offset row of pins

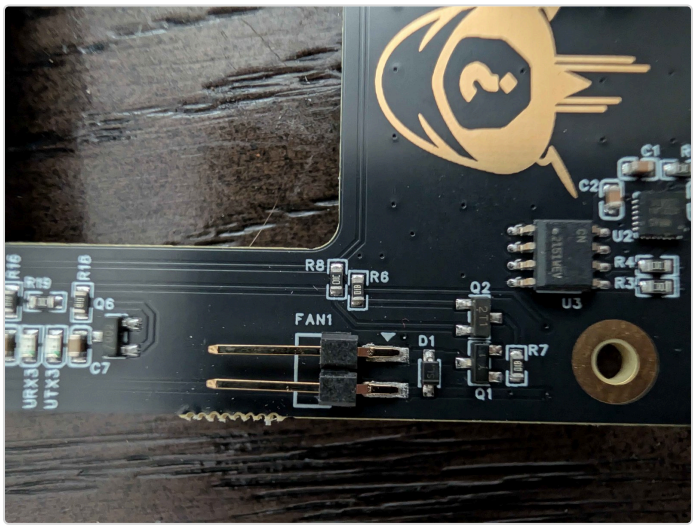
Same shot without highlight — check your install matches

7 Connect the fan to the HAT

Plug the fan's connector into the HAT with this orientation:

- **Red wire** → outside (away from the fan)
- **Black wire** → inside (toward the fan)

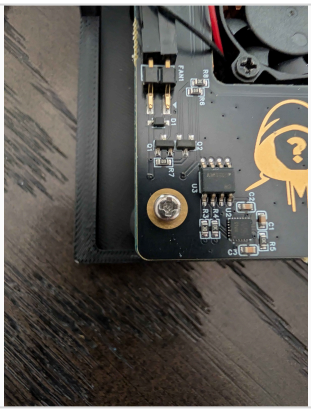
> **⚠ DO NOT OVER-INSERT THE FAN CABLE**
>
> The fan wires only need to seat until they reach the **white line** on the connector. They do **not** need to bottom out against the plastic. Pushing further can **rip a pin off the HAT**, which is user damage and **will not be replaced**. If you don't see a plastic spacer on the connector, simply seat the wires as pictured — do not force them.



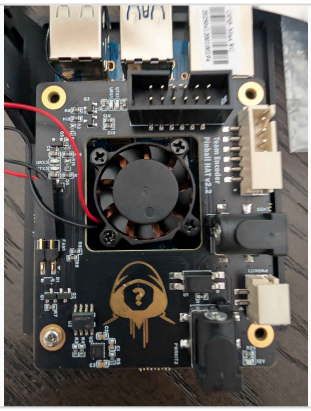
Note the white line where the wires should stop.

8 Secure the HAT with the 6 mm silver screws

Drive the four **6 mm silver screws** down through the HAT's mounting holes and into the tops of the 12 mm spacers below.



6 mm screw — HAT into spacer



Example of one screw seated (repeat for all four)

Reference: Fully Assembled Side View

Note the labels on the side of the case — one HDMI port is labeled **"Screen"** and the other **"DMD"**. You'll use these in Part 3.

"Screen" and "DMD" HDMI labeling

Part 2 — LVDS Board Stock Screen Only

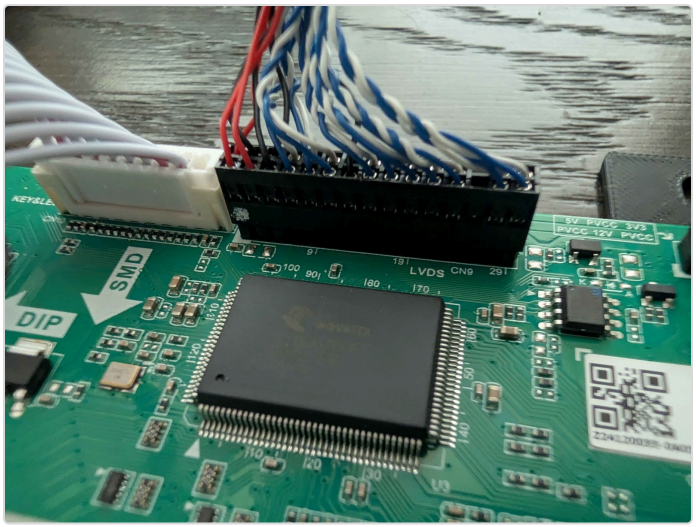
> **AFTERMARKET MONITOR USERS — SKIP THIS PART**
> Aftermarket monitors plug directly into the HAT's **"Screen"** HDMI port. The LVDS board is not used.

9 Note the LVDS connector orientation

CRITICAL — RED-WIRE ORIENTATION

Look at the LVDS connector. There is a **white dot** marking which side the **red wire of the cabinet's screen cable** must face. Installing the cable backwards can **damage the LVDS board AND the screen in your cabinet**.

When the LVDS board is mounted in the cabinet and you view it from the opposite end, the **red wire must face LEFT** — the side marked by the white dot.

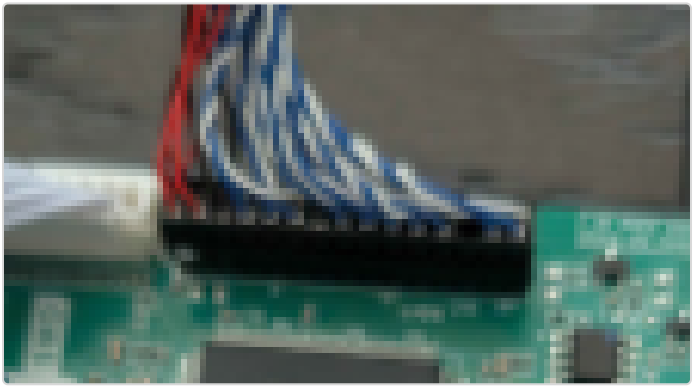


Close-up of the LVDS connector — note the white dot.

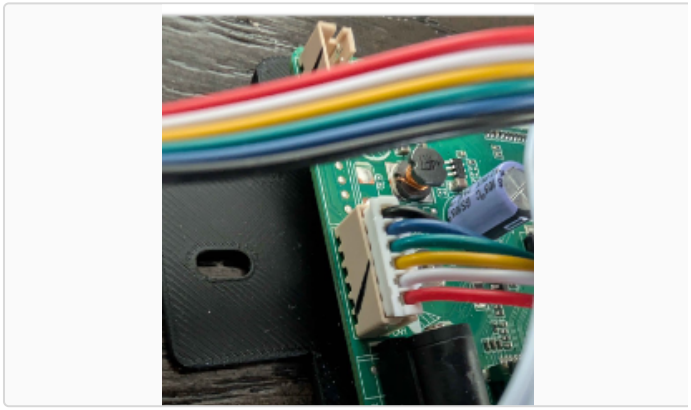
10 Remove the pre-installed LVDS & inverter cables

The LVDS board ships with two cables pre-attached — the **LVDS cable** and the **power-inverter cable**. **Remove both** — your stock screen already has these cables.

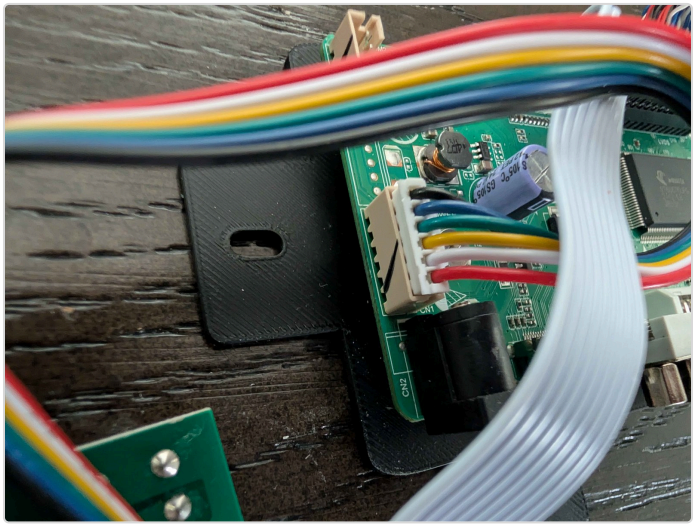
The two are easy to mix up. Use the close-ups below to identify each one before pulling.



LVDS cable — flat ribbon connector with many tiny pins, plugs into the long socket on the LVDS board.



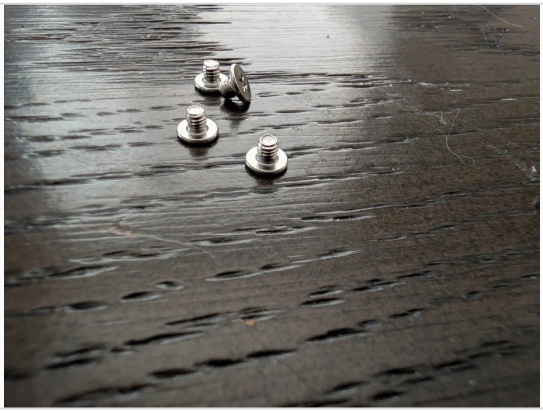
Power-inverter cable — smaller multi-pin connector, plugs into the dedicated inverter header.



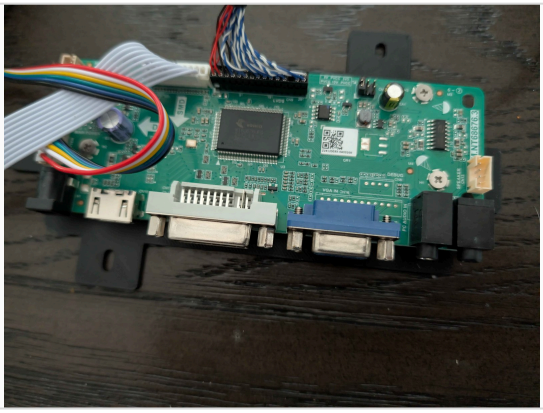
Both cables shown on the board — remove both before mounting.

11 Mount the LVDS board into the LVDS case

Use the included **3 mm screws** to secure the LVDS board into the LVDS case.



3 mm LVDS screws

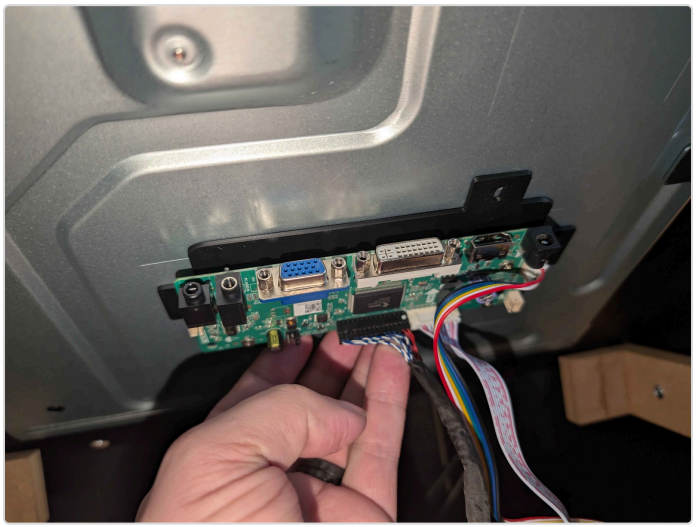


Board mounted in case

Part 3 — Installing into the Cabinet

12 Mount the LVDS case to the cabinet screen Stock

Bring the assembled LVDS case to the cabinet. The LVDS case mounts in the position previously occupied by your stock PCB's metal box — the **same screws** that held the original PCB's metal box now hold the LVDS case to the screen.

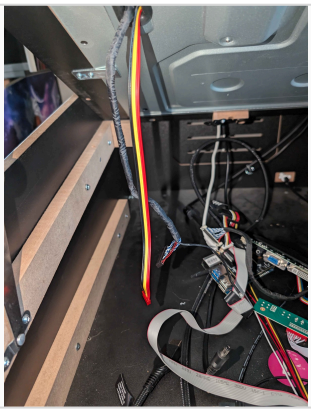


LVDS case mounting location.

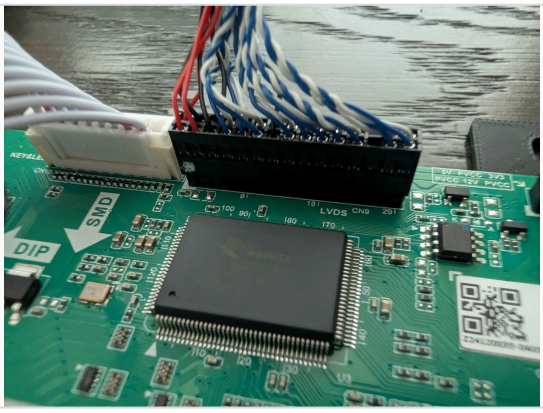
13 Connect the cabinet screen cables to the LVDS board Stock

Reconnect the cabinet's screen cables to the LVDS board in the same orientation they came off in.

> **REMINDER**
> **RED WIRE FACES LEFT** (the side marked by the white dot in Step 9). This is critical and not optional.



The cabinet screen cables hanging from the monitor — these are the cables you'll reconnect to the LVDS board.



Reminder: red wire goes to the side marked by the white dot (left).

14 Place the OPi5 Max assembly in the cabinet

Place the assembled OPi5 Max + HAT into the **back-left of the cabinet**, oriented so:

- The **bottom of the hoodie logo** faces the **right** side of the cabinet.
- The **DMD / Screen HDMI labels** face the **front** of the cabinet.

> **TIP — GYRO SENSITIVITY**
> If the gyro feels unresponsive, try moving the unit closer to the front of the cabinet, or level the cabinet itself.

15 Insert the SD card

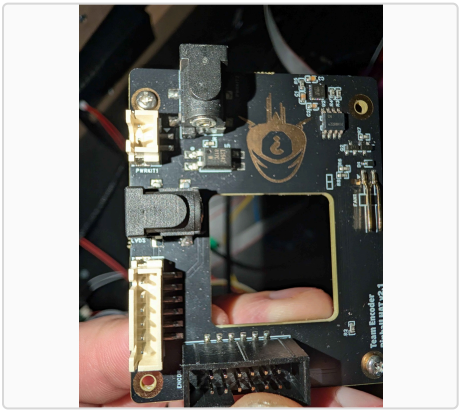
Insert the included SD card into the Orange Pi 5 Max.

16 Run the HDMI cables

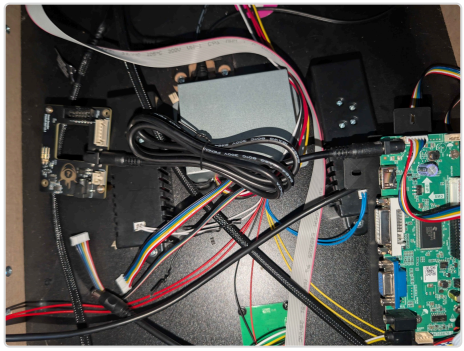
- Run **your extra HDMI cable** from the HAT port labeled **"Screen"** to the LVDS board (or, on aftermarket, to your aftermarket monitor).
- Take the **stock DMD HDMI cable** (you may need to unscrew it from the top of the cabinet for slack) and plug it into the HAT port labeled **"DMD"**.

17 Connect LVDS power Stock

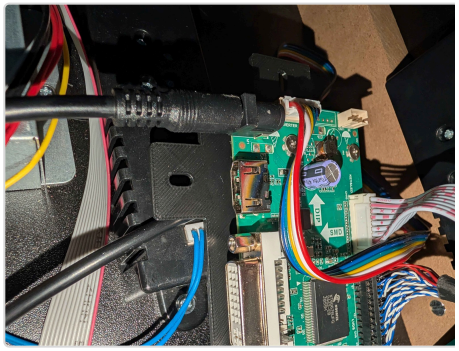
Run the included LVDS power cable from the DC jack labeled **"LVDS"** on the HAT to the LVDS board.



HAT side — the DC jack labeled "LVDS".



Power cable run from HAT to LVDS board.



Cable landed on the LVDS board.

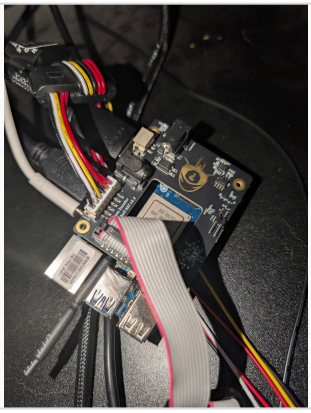
18 Connect the cabinet harness to the HAT

> **🛑 STOP — CONFIRM THE CABINET IS FULLY UNPOWERED**
> Turning the power switch off is **not enough**. The Arcade1Up cabinet must be **fully unplugged from the wall** before making the next connections.

Connect the cabinet's wiring to the HAT:

- **12-pin IDC connector** (grey ribbon cable) → top of the HAT
- **JST cable** → top of the HAT

If you have a **newer cabinet**, your harness may instead be a **DC jack + 2-pin JST connector**. In that case, use the connectors on the HAT labeled **"PWRKIT"**.



Cabinet harness → HAT

Both connectors landed

19 Route the OPi5 Max power cable

Run the OPi5 Max power cable in through the **back of the cabinet**, on the **USB-C side**, and plug it into the Orange Pi 5 Max.

> **⚠ DON'T PLUG INTO THE WALL YET**
> Leave both the OPi5 Max adapter and the cabinet unplugged until Step 20.

Part 4 — First Boot

20 Power everything on

FINAL 40-PIN CHECK BEFORE YOU APPLY POWER

Before plugging anything into the wall, **look at the HAT one more time** from above and from the side. Every OPi5 Max pin must be inside the HAT's socket — not bent over, not skipped, not offset by a row. Compare against the "wrong" reference photos in Step 6 if you're not sure.

A misaligned 40-pin connector at power-on can damage the HAT, the OPi5 Max, or both. **This damage is not covered under warranty.** 30 seconds of inspection here saves a replacement order.

1. Double-check every connection — pins seated (especially the 40-pin), screws tight, harness secure.
2. Plug **both** the OPi5 Max power adapter **and** the Arcade1Up cabinet into the wall.
3. Flip the Arcade1Up cabinet's power switch to **ON**.

FIRST BOOT IS SLOW — THIS IS NORMAL

You'll see **"ERASING"** flash on screen during initial provisioning. After that, the system boots into **PinnerOS** and shows a Wi-Fi setup screen.

21 Follow the on-screen setup

From the Wi-Fi screen forward, just follow the on-screen instructions to finish setting up your cabinet.

You're done. Welcome to PinnerOS.

Tables, Software & More

For instructions on adding tables, configuring software, and using PinnerOS day-to-day, scan the QR code below or visit the URL.

Pinball Software Hub

Tables, software guides, troubleshooting, and updates — all live here.

`https://www.team-encoder.com/pinball_software`

Quick Troubleshooting

Symptom	Try
No boot at all / boot loops	Verify power adapter spec (5.1V / 5A); SD card fully seated; USB-C plugged in; **40-pin connector seated correctly** (see Step 6).
No screen image (stock)	LVDS power cable plugged in; HDMI in **"Screen"** port; screen cables seated correctly on LVDS (red-wire orientation!).
No DMD image	Stock DMD HDMI plugged into the **"DMD"** port (not "Screen").
Gyro insensitive	Move OPi5 Max closer to the front of the cabinet; level the cabinet.
Fan not spinning	Re-check fan connector orientation (red out / black in) — but **do not force it**.
No controls / cabinet powers itself off after WiFi setup	See the dedicated walkthrough below — this is almost always the grey ribbon connector or a bad encoder/plunger from the cabinet, **not** the HAT.

No controls, or the cabinet powers itself off after WiFi setup

If the cabinet boots fine, makes it through WiFi setup, and then either has no working controls or shuts itself off with a hardware-validation error — **do not assume the HAT is bad.** We saw this exact pattern twice during testing; in *both* cases the HAT was fine and the fault was upstream of it.

> 🛑 **ALWAYS POWER OFF COMPLETELY BEFORE TOUCHING CONNECTORS**
>
> Before unplugging or replugging *anything* below, the cabinet must be **fully unplugged from the wall** — not just switched off. Hot-plugging connectors can damage the HAT, the encoder, or the OPi5 Max, and any damage from doing so is **not covered under warranty**.

1. Re-seat the grey ribbon cable With the cabinet fully unplugged from the wall, double-check the **12-pin IDC connector** (grey ribbon) between the HAT and the cabinet's control encoder. A misseated ribbon causes the same "no controls" and self-power-off symptoms as a dead encoder. Unseat it, look for bent or skipped pins, and re-seat it firmly. Plug back in and test.
2. If still failing — isolate the encoder's downstream cables
   If the ribbon is good and the issue persists, the encoder or plunger upstream of the HAT may be the actual fault. With the cabinet **fully unplugged**, disconnect both:
   - The **plunger cable** from the encoder (or from the back of the plunger itself).
   - The **gyro cable** from the encoder (or from the back of the gyro itself).

   These cables are sometimes glued down on the cabinet side — if so, unplug them at the encoder end instead.

   Plug back in and power on.
3. If the cabinet now boots normally — contact Arcade1Up
   If removing those two cables resolves the boot / control / self-power-off behaviour, the fault is in your cabinet's **encoder or plunger**, not the HAT. **Contact Arcade1Up (1up) for a replacement.**

   We saw this twice during testing — both times the symptoms looked like a HAT problem but the actual fault was upstream cabinet hardware.
4. If it still fails with those cables removed Stop here and reach out via the Team Encoder Discord with the symptoms — at that point it's likely not the plunger or gyro, and we can help narrow it down further before

any replacement is needed.

Warranty Reminders

- Damage from forcing the HAT out of the anti-static bag is **not covered**.
- Ripping a pin off the HAT by over-inserting the fan cable is **not covered**.
- Damage from installing the LVDS cable with the red wire on the wrong side is **not covered**.
- Damage from powering the cabinet on with a **misaligned 40-pin connector** is **not covered**.
- Damage from **hot-plugging or unplugging** connectors while the cabinet has power applied is **not covered**.

When in doubt — stop, look at the picture, and confirm before pushing.