RPI Dev Assembly Instructions

Start Printing

Start by printing out all the 3D printable parts. However, this will take awhile so while you wait for parts to finish you could get a jump start on the PCB assembly and soldering between prints. All prints besides orange parts use Hatchbox matte PLA or polymaker matte PLA. Orange parts use Hatchbox Orange PLA. Print settings:

- 0.2 Layer Height
- 20% infill (80% for monitor arms)
- Supports where needed
- Surface Ironing Enabled on flat parts

Electronics Soldering

I will preface this by saying that even I struggled a bit with the soldering on this project. The FPC connectors are not intended to be hand soldered with how small the pins are. It is possible though with a fine tip. I also used an FPC breakout board to check for shorts or open connections of which there were both. There was a fair amount of “check and adjust”.

PCB1

PCB1 requires the MOSFET, Dipswitch, pushbuttons, FPC connector, Qwiic connector, and x length 18AWG power leads.

PCB2

PCB2 requires the extended header, Qwiic connector, and FPC connector

PCB3

PCB3 requires the 5V barrel jack, Quiic connector, FPC connector, and 90 degree header

PCB4

PCB4 is optional but highly recommended. It just needs the male USB connector soldered on.

Rotary Encoder

I chose to remove the header pins and solder ribbon cable to it directly.

USB Female Breakout to Male USB Breakout

Solder together the female breakout, the ribbon cable (x length), and male usb breakout.

USB Hub

Remove the hub PCB from its case. Desolder the 5V barrel jack and USB 3.0 Jack. Cut the included USB 3.0 cable, leaving enough length to reach the Raspberry Pi and solder directly to the board. Solder the 18 AWG lead wire to the barrel jack pads. These lead wires will solder to PCB1 where marked.

Linear Encoder

Solder the lead wires to the three pins. The other side will connect to the PCF8591 Analog to I2C Board.

Monitor Sub-Assembly

Set the heat set inserts in the rotary mounts.

Tap the center support brace holes for m5 thread, be careful not to go too far and strip the threads.

Use two m5 x 10mm flat head screws to attach the support arm to the two rotary mounts.

If you want you could apply some bearing grease to the roller channels on the rotary mounts and back cases to help with noise but it’s not necessary.

Place ball bearings in the channels.

Use two m5 x 10mm screws to connect the back case to the rotary mount using the center holes.

Place printed buttons in their slots and hold in place with painters tape.

Place the monitor in the front case, tilt at an angle, note the cutout features for the half circles of the monitor pcb, and then let it fall into place. Repeat for the second.

The back case and rotary mount can now be attached to the front case. Apply even pressure along the border and it will click into place.

Attach adapter cover frames and plug in the HDMI and USB 90 degrees adapters.

Tap the monitor arm holes for m3 thread.

Attach the monitor arms using m3 x 10mm screws.

Plug HDMI and USB-C cables into 90 degree adapters through the cable support. Run both cables through the monitor arm leaving enough slack for rotation. Repeat for the second monitor.

Attach the monitor arm covers. It’s best to start at the 90 degree bend. The covers are a bit more fragile so take care while attaching.

Insert 12mm metal dowel pins through both cover and arm.

Base Sub-Assembly

Connect the Left Base, Center Base, and Right base parts together using the 90 degree tab features. If it seems like there is a lot of resistance check to make sure all support material is removed. You may also need to slightly sand the faces that the support material was attached to. It’s meant to be a snug fit but should not require significant force.

Run the usb and HDMI cables through the channels that the arms connect to.

Place the locking tab in its slot and then insert PCB2. Start with a steep angle and then rotate down. It's a tight fit by necessity.

Insert the rotary encoder and tighten the nut. Press the 3D printed rotary knob onto the D shaft.

Place the female USB breakout. Snap the retaining cover in place.

Slide PCB1 into the board spacer mount first and then slide the USB hub into place.

Feed the ribbon cables and lead wires according to the schematic through the access slot and then press into the left base. Note the alignment features on the left and right of the board spacer.

Solder rotary encoder ribbon cables and power leads to solder pads according to the schematic.

With the Main pcb assembly in place it’s easier to measure where to cut the monitor usb cable for the appropriate length. Cut the USB cables and solder them to the USB male power injectors according to the schematic.

Plug in the keyboard usb cable, monitor usb cables, and exterior usb cable.

Plug in the 100mm FPC ribbon cable from PCB1 to PCB2.

Plug in the Qwiic cables from PCB1 to PCB2

Plug in the 500mm fpc cable to PCB1. This could have been done better. The only way I was able to make it fit was by folding it in half the long way.

Feed all wires that go to the right side through the wireway.

Insert the slide switch while holding the switch cap.

Connect HDMI cables to HDMI to Micro HDMI adapters.

Place Eject 1 and Eject 2 sliders into their respective slots.

Place Micro HDMI ends into Eject 1 slider and snap on retaining cover.

Place the USB 3.0 cable end into the Eject 2 slider and snap on the retaining cover.

Press PCB3 onto Raspberry Pi.

Place Raspberry Pi into its location.

Press eject 1 and 2 slider into the Pi.

Connect FPC ribbon cable to PCB3.

Slide the potentiometer into place on the underside of the Right Cover.

Place PFC8591 into the slot in the right base.

Connect Qwiic cable from PFC8591 to PCB3.

Place monitor arms into the base and secure them with m5 x18mm bolts and locknuts.

Tidy up wiring as needed. Secure with small zip ties helps.

Place the right cover onto the right base and press to lock in place.

Place center cover onto the center base and press to lock in place.

Place printed push button caps into their slots and hold with tape then place the left cover onto the left base and press to lock in place.

Insert cover for PiCam cable access port into the right access cover.

Insert left and right access covers.

Insert Expandable IO cover in the rear of the left base.
Insert Micro SD card into the Raspberry Pi via the access slot.

Insert Micro SD card cover.

Apply rubber pads to the underside of the base (optional).

Adjust power supply to approximately 5.3V. Check voltage at PCB3 to verify voltage of 5.1V DC.

Plug in power supply to the 5V barrel jack.

Turn on the power switch and prepare for the first boot up!

System Setup

Install pip
Install packages
Enable I2C (tutorial: https://pimylifeup.com/raspberry-pi-i2c/)
Enable GPIO (tutorial: https://pimylifeup.com/raspberry-pi-gpio/)
Run GUI to verify functionality.