# Required Components

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | OpenAT Switch Latch PCB | QTY 1 | | **2** | Resistor R1, 470k Ω, Yellow-Purple-Brown-Gold | | QTY 1 | | **3** | Resistor R2, 22k Ω, Red-Red-Orange-Gold | | | QTY 1 |
| *Visual bill of materials of PCB and components* | | | | *Visual bill of materials of PCB and components* | | | | | *Visual bill of materials of PCB and components* | | | | |
| **4** | Resistor R3, 10k Ω, Brown-Black-Orange-Gold | QTY 1 | | **5** | Capacitor C1, 0.1 µF, marked “104” | | QTY 1 | | **6** | Capacitor C2, 1 µF, marked “105” | | | QTY 1 |
| *Visual bill of materials of PCB and components* | | | | *Visual bill of materials of PCB and components* | | | | | *Visual bill of materials of PCB and components* | | | | |
| **7** | Switch S1 | QTY 1**19** | | **8** | Switch Jacks, SW1 & SW2 | | | QTY 2 | **9** | | IRLD014PBF Mosfet, Q1 & Q2 | | QTY 2 |
| *Visual bill of materials of PCB and components* | | | | *Visual bill of materials of PCB and componentsVisual bill of materials of PCB and components* | | | | | *Visual bill of materials of PCB and components* | | | | |
| **10** | Texas Instruments CD74HC73E JK Flip-Flop, U1 | | QTY 1 | **11** | LED, 5mm, Green, D1 | QTY 1**19** | | | **12** | | LED Spacer, 3D Printed | QTY 1**19** | |
| *Visual bill of materials of PCB and components* | | | | *Visual bill of materials of PCB and components* | | | | | *Visual bill of materials of PCB and components* | | | | |
| **13** | Battery Holder, BAT1 | | QTY 1 | **14** | Battery, CR2023 | QTY 1 | | | **15** | | Enclosure Top, 3D Printed | QTY 1 | |
| *Visual bill of materials of PCB and components* | | | |  | | | | | *Visual bill of materials of PCB and components* | | | | |
| **16** | Switch Slide, 3D Printed | | QTY 1 | **17** | Enclosure Bottom, 3D Printed | QTY 1 | | | **18** | | Battery Cover, 3D Printed | QTY 1 | |
| *Visual bill of materials of PCB and components* | | | | *Visual bill of materials of PCB and components* | | | | | *Visual bill of materials of PCB and components* | | | | |
| **19** | Screw, #4, 3/8” length, Pan-Head, Sheet metal | | QTY 6 |  | | | | | | | | | |
|  | | | |

# Required Tools

* Screwdriver Medium Phillips
* Needle nose pliers
* Side Cutters
* Soldering Iron
* 60/40 rosin core solder for electronics
* Multimeter
* Assistive Switch with 3.5 mm cable for testing
* Optional: Tape / reusable putty-like adhesive (e.g., BLUE TACK) for helping position components while soldering

# Required Personal Protective Equipment (PPE)

* Safety glasses
* Vinyl gloves (if skin sensitivity to rosin or have dermatitis)

# Assembly Instructions

## Step 1: Identify and Prep Resistor R1

Identify the 470K resistor (Colour code stripes: Yellow, Violet, Yellow). Bend both leads of the resistor straight down, so that it appears like in the photo below.

|  |
| --- |
| Resistor R1 is marked with yellow violet yellow and a tolerance band |

## Step 2: Insert Resistor R1 into PCB

Insert the 470K resistor (Colour code stripes: Yellow, Violet, Yellow) into the holes marked “R1” on the PCB. Ensure the body of the resistor is flat against the circuit board. Bending the wires apart once it’s in position will help keep it in place during soldering.

|  |
| --- |
| Inserting resistor R1 through the corresponding holes in the PCB. |

## Step 3: Solder Resistor R1 leads

Flip over the PCB and solder the two wires of resistor R1 to the circuit board.

|  |
| --- |
| Solder the two leads of resistor R1 |

## Step 4: Trim Resistor R1 leads

When joints are soldered, trim the wire ends with the flat side of side cutters. Trim right on top of the solder peak.

|  |
| --- |
| Use flush cutters to trim leads |

## Step 5: Identify and prep Resistor R2

Identify the 22K resistor (Colour code stripes: Red, Red, Orange). Bend the wire leads straight down, as before, in preparation for soldering.

|  |
| --- |
| Resistor R2 is marked with color stripes red red orange and a tolerance band |

## Step 6: Insert Resistor R2 into PCB

Insert the 22K resistor (Colour code stripes: Red, Red, Orange) into the holes marked “R2” on the PCB. Again, bend the leads after, to keep it in place during soldering.

|  |
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| Resistor R2 inserted into corresponding marked holes in PCB |

## Step 7: Solder and trim Resistor R2 leads

Solder the two wires. When done, trim the wire ends with side cutters, as before.

|  |
| --- |
| Soldering the two resistor R2 leads |

## Step 8: Identify and prep Resistor R3

Identify the 10K resistor (Colour code stripes: Brown, Black, Orange). As with the previous resistors, bend the wires straight down.

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| --- |
| Resistor R3 is marked with brown black orange and a tolerance band |

## Step 9: Insert Resistor R3 Into PCB

Insert the 10K resistor (Colour code stripes: Brown, Black, Orange) into the holes marked “R3” on the PCB. Once again, bend the wires apart.

|  |
| --- |
| Resistor R3 inserted into corresponding marked holes in PCB |

## Step 10: Solder and trim Resistor R3 leads

Solder the two wires. When done, trim the wire ends with side cutters.

|  |
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| Two leads of resistor R3 are soldered |

## Step 11: Identify and insert Capacitor C1 into PCB

Insert 0.1uF capacitor (the smaller capacitor marked “104”) into holes for location C1 on the PCB.

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| Capacitor C1 is marked "104". |

## Step 12: Solder and trim Capacitor C1 leads

Solder the two leads. When done, trim the wire ends with side cutters.

|  |
| --- |
| The two leads of capacitor C1 are soldered |

## Step 13: Identify and insert Capacitor C2 into PCB

Insert 1uF capacitor (the larger capacitor marked “105”) into holes for location C2 on the PCB.

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| Capacitor C2 is marked "105" |

## Step 14: Solder and trim Capacitor C2 leads

Solder the two leads. When done soldering, trim the wire ends using side cutters.

|  |
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| Capacitor C2 has two leads to solder |

## Step 15: Insert Switch S1 into the PCB

Insert the Switch into location S1 on the circuit board. Ensure the switch toggle is facing towards the edge of the board as shown below. To aid in soldering (next step), it may help to use tape or Blue Tack to hold the switch in position.

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| --- |
| Switch S1 is placed with toggle towards edge of board. |

## Step 16: Solder S1 pins

Solder the switch into place by soldering middle terminal first. Confirm the switch is aligned on the component side of the board, and then solder the remaining 4 pins.

|  |
| --- |
| Switch S1 has a total of 5 pins to solder. |

## Step 17: Insert switch Jacks SW1 and SW2 into PCB

Insert both jacks into positions SW1 and SW2 (shown). Jacks should be held in place during soldering (next step).

|  |
| --- |
| Switch jack SW2 inserted into the marked position on the PCB |

## Step 18: Solder SW1 and SW2

Solder one jack pin first. Confirm the jack is properly positioned on the component side of the board, and then solder the remaining pins.

Repeat these steps for the second jack.

|  |
| --- |
| One of the 5 pins of switch jack SW2 being soldered |

## Step 19: Insert MOSFETS Q1 and Q2 into PCB

Insert both MOSFETS into positions marked Q1 and Q2.

**IMPORTANT:** **The MOSFETS are polarized and must be oriented correctly. The tabbed side of the MOSFETS should go in closest to the right edge of the PCB. Note, the pins on the MOSFET may also need to be bent inwards slightly, to fit into the holes of the circuit board.**

|  |
| --- |
| Mosfets Q1 and Q2 inserted into the PCB. |

## Step 20: Solder Q1 and Q2

Solder one MOSFET pin first. **Confirm the MOSFET is properly oriented** on the component side of the board, and then solder the remaining pins.

Repeat these steps for the second MOSFET.

|  |
| --- |
| Each Mosfet has 4 pins to solder. |

## Step 21: Insert IC U1 into the PCB

Insert the IC into position U1. **IMPORTANT:** **The IC polarized and must be oriented correctly.** Pin 1 of the IC should go in closest to the left edge of the PCB. Note the physical U-shaped notch on the IC should go over the U-shaped notch printed on the PCB (see photo below). Note, also, the pins of the IC may need to be bent inwards slightly, to fit into the holes of the circuit board.

|  |
| --- |
| Integrated circuit U1 inserted into the PCB |

## Step 22: Solder U1

Solder one IC pin first. **Confirm the IC is properly oriented** (see previous step). If the IC is positioned correctly, solder the remaining pins. Repeat these steps for the second MOSFET.

|  |
| --- |
| Solder one pin of the IC, confirm the IC is properly oriented, and then solder the rest of the pins. |

## Step 23: Insert LED through LED Spacer and into PCB

Slide the **LED Spacer** onto the LED, and then slide the LED into location D1 on the board.

**Important!** Make sure the 3D printed **LED Spacer** is placed on the LED leads.

**Important!** The longer wire of LED (positive lead) MUST be placed into the hole marked + (as shown in the photo below).

|  |
| --- |
| Insert the LED through the spacer and into the board, ensuring the long lead is in the hole marked with the plus sign. |

## Step 24: Solder and trim LED

Before soldering, hold the LED into position, so that the body of the LED is pressing against the spacer and the circuit board. Solder the LED into place by soldering the longest lead (+) first. Confirm the LED is properly positioned on the component side of the board, and then solder the remaining lead. When soldering is complete, trim off the LED leads with side cutters.

|  |
| --- |
| While holding the LED firm against the board, solder the long lead first, then the second lead. |

## Step 25: Insert Battery into Battery Holder

Insert a 3V lithium coin cell, type CR2032, into the holder. Ensure the positive (+) side of the battery is facing up, and that the battery is fully inserted.

|  |
| --- |
| A CR2032 coin cell being inserted into the battery holder |

## Step 26: Insert Battery Holder into PCB

Insert the battery holder on the **solder side** of the circuit board. Note the rectangular end of the battery holder should match the corresponding outline printed on the circuit board.

|  |
| --- |
| Battery holder being inserted into the bottom of the PCB |

## Step 27: Solder Battery Holder pins

Solder one battery holder pin first. Battery holder should match the corresponding outline printed on the circuit board. Then solder the second battery holder pin.

|  |
| --- |
| Battery Holder pins soldered from the top side of the PCB |

## Step 28: Preliminary Test with Assistive Switch

Insert the 3.5 mm plug end of an assistive switch into the input jack. Turn on the power switch (move switch toggle right). Activate the assistive switch. The LED should turn on (or off), and stay that way, until the next assistive switch activation.

If the LED doesn’t operate as expected, stop and troubleshoot before proceeding to the next step.

|  |
| --- |
| The completed circuit board with an assistive switch attached to the input. |

## Step 29: Insert Switch Slide into Enclosure Top

Position the Enclosure Top with the ‘OpenAT Switch Latch’ logo facing down. Insert the Switch Slide into the groove and slide it into the off position.

|  |
| --- |
| The Switch Slide inserted into the Enclosure Top while it is upside down. |

## Step 30: Secure PCB into Enclosure Top

Flip the PCB so the bottom side is face up and insert into the Enclosure Top, aligning the LED with the hole. Secure with ONE #4-3/8” screw in the hole beside the battery holder.

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| --- |
|  |

## Step 31: Secure Enclosure Bottom to Enclosure Top

Line up the Enclosure Bottom over the Enclosure Top. Fasten with FOUR #4 x 3/8” screws.

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| --- |
| The Enclosure Bottom secured to the Enclosure Top with a Screw in each corner. |

## Step 32: Attach and Secure Battery Cover to Enclosure Bottom

Insert the Battery Cover into the Enclosure Bottom. Secure with ONE #4 x 3/8” screw.

|  |
| --- |
| Inserting the long edge of the Battery Cover into the Enclosure Bottom. Securing the Battery Cover to the Enclosure Bottom with a single screw. |

# Testing

## Final Test

1. Attach an assistive switch to the input jack and an output device to the output jack.
2. Slide the power switch on.
3. Activate the switch. The LED should turn on and remain on and the output device should also activate.
4. Activate the switch again. The LED should turn off and remain off and the output device should turn off.

|  |
| --- |
| Finished OpenAT Switch Latch with an assistive switch attached. |

# Troubleshooting

If the device does not behave as expected, work through the following troubleshooting steps.

1. Ensure that the Power Switch is in the ‘On’ position.

A red box with two buttons

Description automatically generated

1. Check that the battery is charged.
2. Check that the battery is properly inserted into the battery holder.
3. Inspect all solder joints. Ensure each joint has sufficient solder is not bridged to another joint.
4. Ensure the polarized components are installed in the correct orientation:

|  |  |  |
| --- | --- | --- |
| **Component** | **Image** | **Note** |
| Q1 – Mosfet IC | A computer chip with a square black object  Description automatically generated with medium confidence | The two leads that are connected together should be on the opposite side of the dot. |
| Q2 – Mosfet IC | A computer screen shot of a black square with yellow and silver wires  Description automatically generated | The two leads that are connected together should be on the opposite side of the dot. |
| U1 – Flip-flop IC | A screen shot of a phone  Description automatically generated | The U-Shaped notch on the IC should be near the top, close to the “U1” label on the PCB. |
| D1 - LED |  | The slightly flattened side of the LED should be on the same side as the negative label on the PCB. |