



## PARTS LIST

*Please make sure that the following pieces are included in your kit*

Components	PCB Reference Number	Quantity
<b>2.2K<math>\Omega</math> 1 Watt Resistor</b>	<b>2K2</b>	<b>1</b>
<b>82<math>\Omega</math> Resistor</b>	<b>82</b>	<b>1</b>
<b>220<math>\Omega</math> Resistor</b>	<b>220</b>	<b>1</b>
<b>4.7K<math>\Omega</math> Resistor</b>	<b>4K7</b>	<b>1</b>
<b>10K<math>\Omega</math> Resistor</b>	<b>10K</b>	<b>5</b>
<b>0.47<math>\Omega</math> 5 Watt Resistor</b>	<b>0.47/5W</b>	<b>1</b>
<b>27K<math>\Omega</math> Resistor</b>	<b>27K</b>	<b>2</b>
<b>2.2K<math>\Omega</math> Resistor</b>	<b>2K2</b>	<b>2</b>
<b>270K<math>\Omega</math> Resistor</b>	<b>270K</b>	<b>1</b>
<b>56K<math>\Omega</math> Resistor</b>	<b>56K</b>	<b>2</b>
<b>1.5K<math>\Omega</math> Resistor</b>	<b>1K5</b>	<b>1</b>
<b>1K<math>\Omega</math> Resistor</b>	<b>1K</b>	<b>2</b>
<b>33<math>\Omega</math> Resistor</b>	<b>33</b>	<b>1</b>
<b>3.9K<math>\Omega</math> Resistor</b>	<b>3K9</b>	<b>1</b>
<b>Custom P.C.B</b>	<b>N/A</b>	<b>1</b>
<b>3300 <math>\mu</math>F/ 50V Electrolytic Capacitor</b>	<b>3300 <math>\mu</math>F/ 50V</b>	<b>1</b>
<b>47 <math>\mu</math>F/ 50V Electrolytic Capacitor</b>	<b>47 <math>\mu</math>F/ 50V</b>	<b>2</b>
<b>TL081 Micro Controller</b>	<b>TL081</b>	<b>3</b>
<b>IN5408 Diode</b>	<b>IN5408</b>	<b>4</b>
<b>4148 Switching Diode</b>	<b>4148</b>	<b>4</b>
<b>5V1 Zener Diode</b>	<b>5V1</b>	<b>2</b>
<b>LED</b>	<b>LED Marking</b>	<b>1</b>
<b>100pF Ceramic Capacitor</b>	<b>100P</b>	<b>2</b>
<b>330pF Ceramic Capacitor</b>	<b>330P</b>	<b>1</b>
<b>0.1 <math>\mu</math>F Ceramic Capacitor</b>	<b>0.1 <math>\mu</math>F</b>	<b>1</b>
<b>0.22 <math>\mu</math>F Ceramic Capacitor</b>	<b>0.22 <math>\mu</math>F</b>	<b>1</b>
<b>Transistor 9015</b>	<b>9015</b>	<b>1</b>
<b>Transistor 9014</b>	<b>9014</b>	<b>1</b>
<b>B103 Potentiometer</b>	<b>A/V 10K Markings</b>	<b>2</b>
<b>3296 Potentiometer</b>	<b>100K</b>	<b>1</b>
<b>AC24V Terminal Block</b>	<b>AC24V</b>	<b>1</b>
<b>Output Terminal Block</b>	<b>-OUT+</b>	<b>1</b>
<b>D1047 Transistor</b>	<b>D1047</b>	<b>1</b>
<b>D882 Transistor</b>	<b>D882</b>	<b>1</b>
<b>7824 Regulator</b>	<b>7824</b>	<b>1</b>
<b>Heat Sink</b>	<b>Next to D882</b>	<b>1</b>

## REQUIRED TOOLS

<b>Soldering Iron</b>	<b>SI-9600</b>	<b>1</b>
<b>Solder 60 Tin / 40 Lead</b>	<b>4890-18G</b>	<b>1</b>

## RELATED PRODUCTS

<b>24V 1A Transformer</b>	<b>TRF-155</b>	<b>1</b>
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## SOLDERING GUIDE

1. Turn on the soldering iron to 360°C - 370°C using Tin-Lead 60/40 solder.
2. Flip the board on the side where all the schematics are shown. Then, place the IC on the board where the white rectangle marked TL-081 can be seen. Make sure the socket's notch faces the correct direction according to the schematic on the board.
3. Insert the pins in the holes and begin the soldering process on the other side of the board.
4. After having soldered the IC socket, place all twelve resistors found in the kit according to their matching schematics mentioned in the Parts List on the board (Refer to Appendix for a guide on reading resistor values).  
**Note:** Polarity is not an issue when placing the resistors on the board.
5. Insert the resistor leads in the holes, bend them in order to hold the resistors in the preferred position, flip the board and then, begin the soldering process for the resistors. Once finished, cut the remaining part of the resistors' leads.
6. Now, flip the board on the side with schematics and place the transistors and the potentiometers according to their schematics in the Parts List.  
**Note:** Pay attention to the schematics for these components to place them in the correct position.
7. Once again, insert the leads in the holes, flip the board, and begin soldering the leads.
8. Now, flip the board, place the regulator on the schematic named "7824", insert the leads in the holes, flip the board again and begin soldering on the top side of the board. The remaining parts of the regulator should be cut after soldering; This should also be done for all other components.
9. To solder the capacitors, flip the board to its bottom side, place these capacitors on the schematics named according to what is mentioned in the Parts List for all capacitors and repeat the same instructions as in step 8 for these components.  
**Note:** Polarity is not an issue when placing the ceramic capacitors. But for the electrolytic capacitors, make sure that the negative lead is inserted into the hole placed on the shaded region.
10. Next up, solder the switching diodes and the Zener diodes where its marked "4148" and "5V1" respectively on the board. Repeat the same instructions as in step 8 afterwards.
11. Then, place the terminal blocks on the board and begin the soldering process just like in step 8.

## WIRING GUIDE

1. First, you will need a transformer with a 24VAC output. Connect the red wires to the plug that you will insert into the outlet (use a heat shrink to cover exposed wires for safety), the black wire to the middle input pin of the AC24V terminal block and the blue wires to the left and the right input pins of the AC24V terminal block.  
**Note:** The circuit must be connected to 24VAC power and not DC under any circumstances.
2. Then, insert the probes of the multimeter in the matching pins of the output terminal block of the board. Turn on the multimeter, adjust the voltage and amperage B103 potentiometers to get the desired voltage and amperage (0V-30V DC Adjustable).
3. It is suggested that you use heat sinks and stick them on the regulator and the transistors to dissipate the heat that is generated. You are also provided with a 24V socket for the fan for the cooling purpose if you wish to use one.
4. **Finally, please make sure that you have not made any mistakes in the connection of the transformer or in the soldering process of the components as the installation of a power supply involves high current and voltage and any errors could result in serious danger.**

## APPENDIX

### Resistor Table Values

The diagram illustrates two types of resistors: a 4-Band-Code resistor and a 5-Band-Code resistor. The 4-Band-Code resistor has a value of 560k  $\Omega$   $\pm$  5%. The 5-Band-Code resistor has a value of 237  $\Omega$   $\pm$  1%. A table below provides the color coding for resistors.

COLOR	1 <sup>ST</sup> BAND	2 <sup>ND</sup> BAND	3 <sup>RD</sup> BAND	MULTIPLIER	TOLERANCE
Black	0	0	0	1 $\Omega$	
Brown	1	1	1	10 $\Omega$	$\pm$ 1% (F)
Red	2	2	2	100 $\Omega$	$\pm$ 2% (G)
Orange	3	3	3	1K $\Omega$	
Yellow	4	4	4	10K $\Omega$	
Green	5	5	5	100K $\Omega$	$\pm$ 0.5% (D)
Blue	6	6	6	1M $\Omega$	$\pm$ 0.25% (C)
Violet	7	7	7	10M $\Omega$	$\pm$ 0.10% (B)
Grey	8	8	8		$\pm$ 0.05%
White	9	9	9		
Gold				0.1 $\Omega$	$\pm$ 5% (J)
Silver				0.01 $\Omega$	$\pm$ 10% (K)

In resistors, there is always the first digit followed by the second digit followed by the third that is called a multiplier. For example, if we have Brown, Black and Red, the value of the resistor will be 10 multiplied by 100 which gives 1k, which is the resistor in our case.

You can download the manual from [abra-electronics.com](http://abra-electronics.com) and search for AK-145.

Vous pouvez télécharger le Manuel sur [abra-electronics.com](http://abra-electronics.com) en cherchant pour AK-145.