

D.I.Y L.E.D CUBE 4X4X4

Level: Intermediate

AK-125

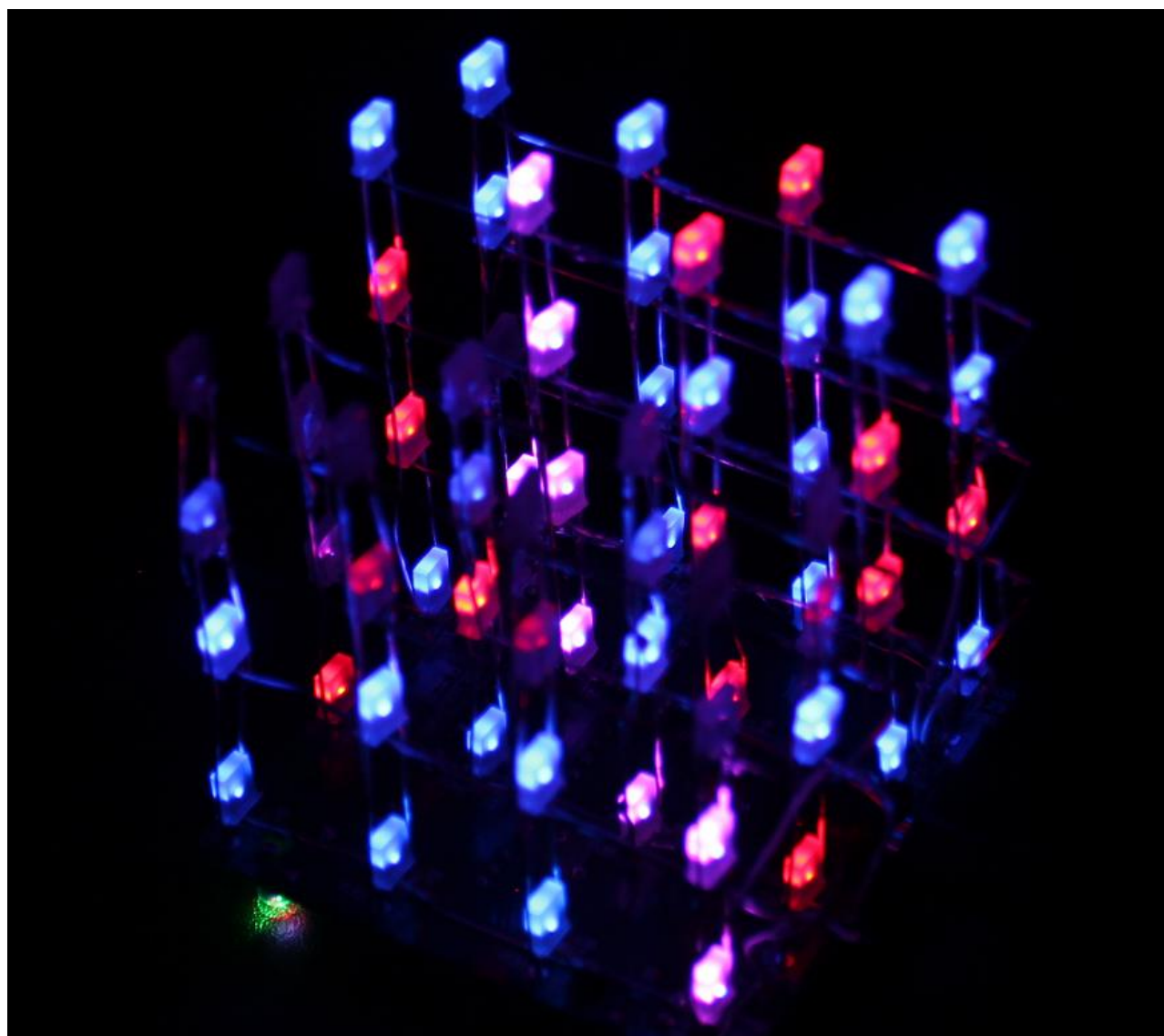


TABLE OF CONTENTS

Parts List.....	2
Soldering Guide (Part A).....	3
Soldering Guide (Part B)	5
Soldering Guide Without Recommend Products.....	8
Appendix.....	9

PARTS LIST

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

Components	PCB Reference Number	Quantity
1k Ω ¼ Watt Resistor	R1, R2, R3, R4	4
Custom P.C.B	N/A	1
Rectangular L.E.D	N/A	~74
STC Micro Controller	U10	1
40 Pin IC Socket	U10	1
3mm RGB L.E.D	D1, D2, D3, D4	4
24-26 AWG Solid Core Wire	J6 (P20, P23, P34) & J7 (P24, P25, P26)	x2 ~30cm
USB to DC 5 Volt Cable	N/A	X1
Ceramic Capacitor Orange Labelled "22"	C2, C3	3
3mm L.E.D Nylon Spacers	D1, D2, D3, D4	5
25v 470 μ F Electrolytic Capacitor	C4	1
Crystal Oscillator	Y1 / 11.0592	1
Screws & Standoffs	N/A	x4 Each
Female DC Barrel Jack	5V	1

RECOMMEND PRODUCTS

Perforated Board 4½" x 6¼"	BRD-110	1
40 Pin Breakable Headers	Included in kit	2
Soldering Iron	SI-9600	1
Solder 60 Tin / 40 Lead	4890-18G	1

SOLDERING GUIDE (PART A)

1. Turn on the soldering iron to 360° F - 370° F (182° C - 188° C) using Tin-Lead 60/40 solder.
2. Flip the board on its bottom side and then place the IC socket on the board where the white rectangle marked U10 can be seen. Make sure the socket's notch faces the correct direction according to the schematic on the board.
Note: It is suggested to use the IC socket since soldering the Microcontroller directly could cause damage it.
3. Insert the pins in the holes and begin the soldering process on the other side of the board. A few pins will not get soldered since there are no attachment pads for those pins.
Note: It is suggested to solder the IC socket first before any other piece or it will become harder to solder it later if the LEDs are soldered first.
4. After having soldered the IC socket, flip the board on its bottom side and place the four resistors found in the kit according to the schematics named "R1 1K", "R2 1K", "R3 1K" and "R4 1K" 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' lead.
6. Now, flip the board on its bottom side and place the four non-rectangular LEDs each on one of the four schematics found on the corners of the board, named "LED D1", "LED D2", "LED D3" and "LED D4".
7. Once again, insert the leads in the holes, bend them to hold the LEDs in the desired position, flip the board, and begin soldering the leads. Once done, cut the unused part of the LED leads.
Note: Before soldering the LEDs you can place over the Plastic Spacers to act as standoffs for the LEDs. (Optional)
8. Now, flip the board, place the crystal oscillator on the schematic named "11.0592", 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 oscillator should be cut after soldering.
9. To solder the first capacitor, flip the board to its bottom side, place the "470 μ F" capacitor on the circular schematic found roughly in the middle of the board and repeat the same instructions as in step 8 for this capacitor (Refer to Appendix for an image).
Note: Make sure you respect the polarity of the capacitor according to the schematic.
10. Next up, solder the two orange ceramic capacitors on the markings ("C2" and "C3") found on either side of the oscillator, again on the bottom side of the board. Repeat the same instructions as in step 8 for these capacitors.
11. Finally, for the last piece to be placed on this side of the board, solder the female barrel connector according to the previous steps after positioning it on the proper schematic which can be found just next to the cylindrical capacitor. Do not cut the leads.

SOLDERING GUIDE (PART B)

There are two methods that can be used to solder the LED Arrays together; The recommended one will be shown as it is an easier way of ensuring a proper arrangement of the LED arrays in a cube shape.

Recommended Method:

1. Begin by placing the female to male headers on the perforated brown board (See Figure 1).
2. Then, start installing the rectangular LEDs in the following way on the perforated brown board in between the headers. Make sure to bend the middle pin of each LED towards the outside of the board.

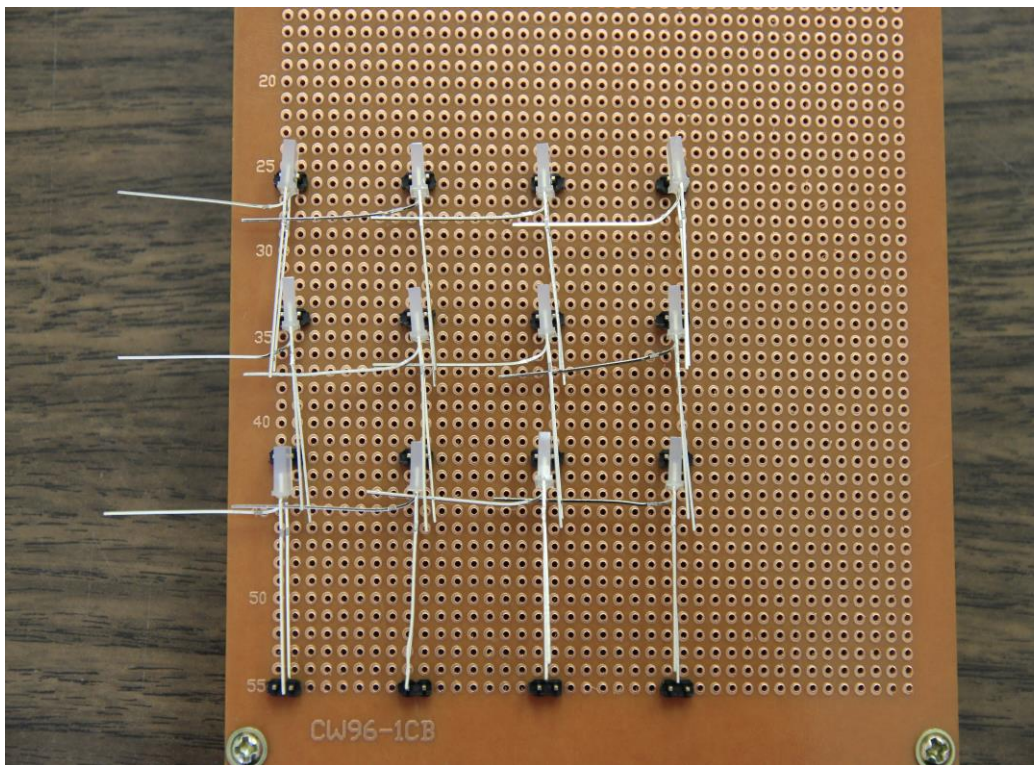


Figure 1: The arrangement of the LEDs on the perforated board

3. Begin by soldering the middle pin of each LED to the middle pin of the LED directly to its left.
4. Continue by soldering the outer pins of each LED to the outer pin of the LED directly below it. Once finished, you should get a somehow solid structure just like the one in Figure 2 on the next page. Notice that the middle pins are connected and that the outer pins on the first side are also soldered together.

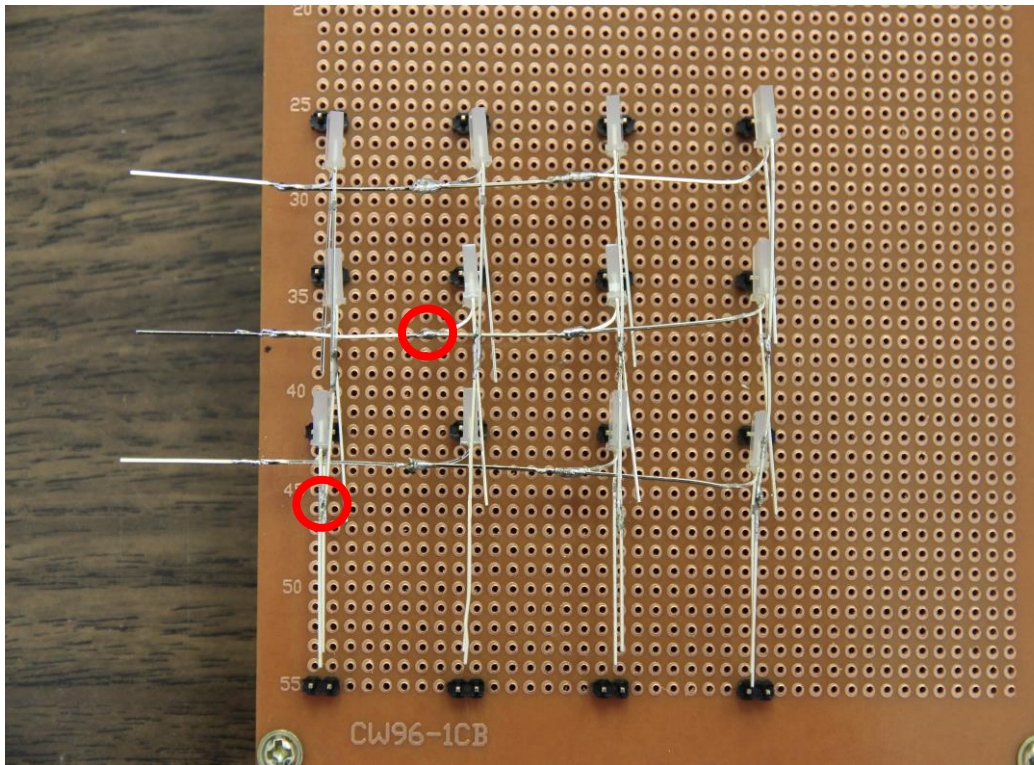


Figure 2: The soldering of the LED pins (middle to middle – outers to outers)

5. Once the outer pins on one side are connected to each other, turn the whole structure to the right and begin soldering the outer pins on the other side. Once finished, you should get a solid structure just like the one in Figure 3.

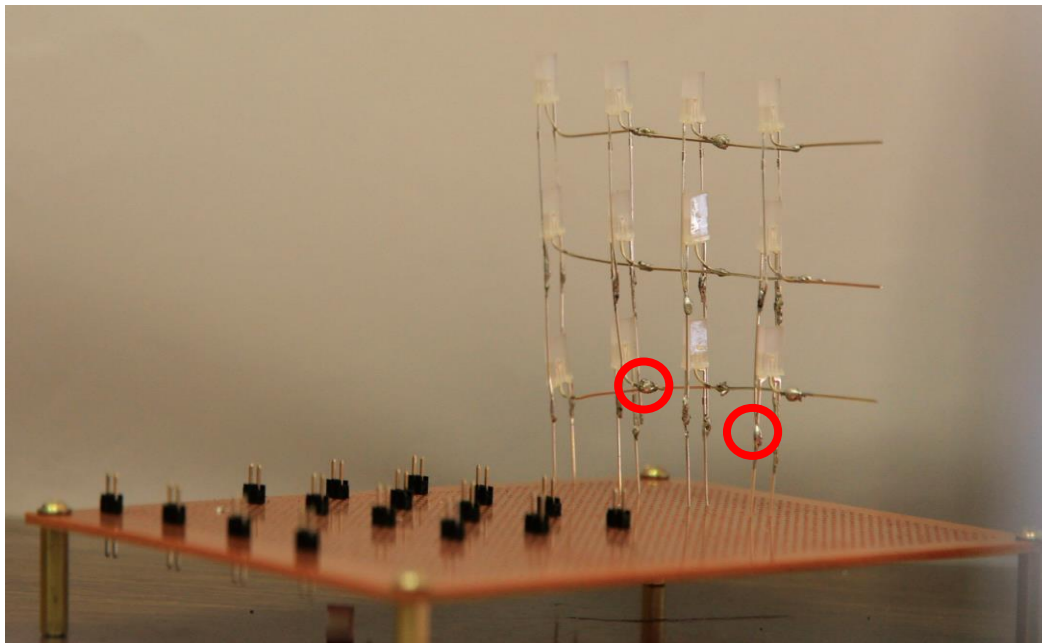


Figure 3: An LED column

6. Repeat the same steps as before in order to create three more columns.
7. Now, begin soldering four rows of LEDs on the PCB where the following reference numbers are printed: (P03, P33), (P07, P37), (P02, P32), (P06, P36), (P01, P31), (P05, P35), (P00, P27, P30), (P04, P27, P34), (P04, P23, P34) and (P00, P23, P30). The leads must be soldered on the other side of the board. The schematics that have three reference numbers just like the ones highlighted above in red are where all three pins of the LEDs can be soldered on the board. The schematics where there are only two reference numbers are where only the two outer pins of the LEDs can be soldered on the board. The middle pins must be soldered to the middle pin of the LED directly to the right, down the row (so, for instance, the middle pin of (P03, P33) will get soldered to the middle of (P02, P32) and so forth down the row – the same thing should be repeated for the three other rows). If done properly, a structure just like the one in Figure 4 must be obtained.

Note: Notice that the schematics with “COM” right next to their reference number are not used for the LEDs as they will later be used to power the latter.

Note: It is suggested not to push down the bottom row LEDs all the way into the board in order to have longer outer leads for later steps.

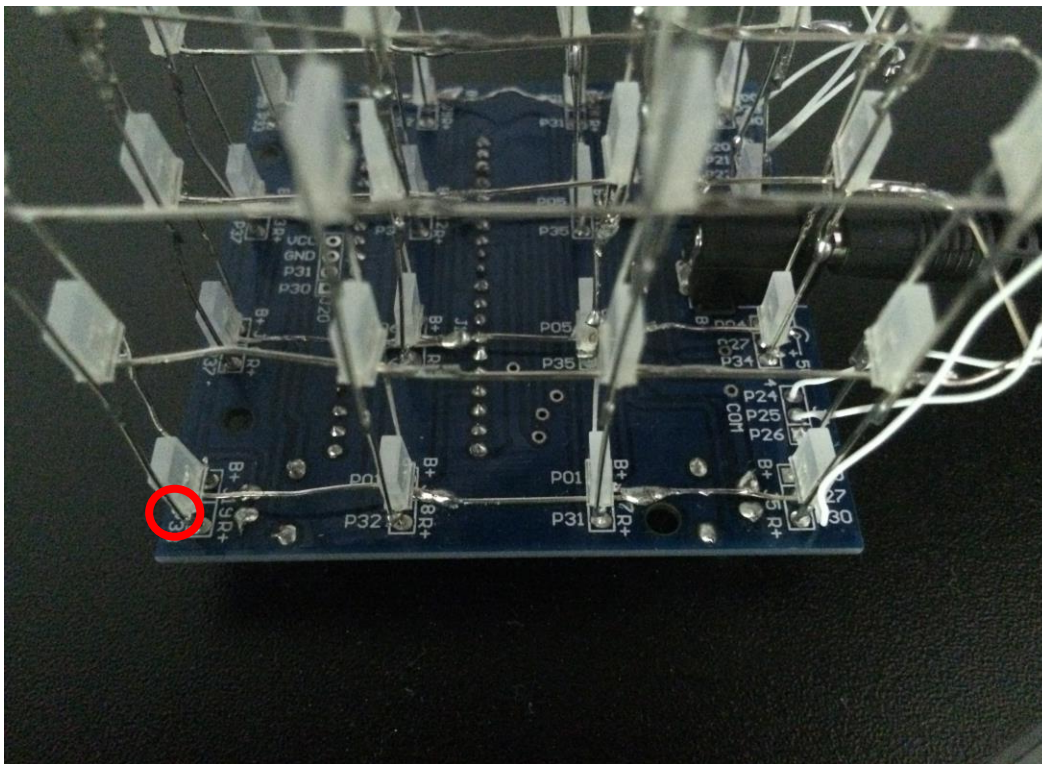


Figure 4: The correct soldering process of the bottom row LEDs

8. Begin by installing each of the four previously made column of LEDs on top of the bottom rows of LEDs as it can be seen above in Figure 4.

9. Now, begin soldering the outer pins of the bottom row of the LED columns to the outer pins of the LEDs that are already soldered on the board.
10. Now, the non-soldered middle pins of each column of LED must be soldered to the non-soldered middle pins of their neighboring column, two by two just like a bridge. This can be seen in the Figure 5.

Note: Notice how the columns are soldered together two by two. The middle two columns are not soldered together in any way.

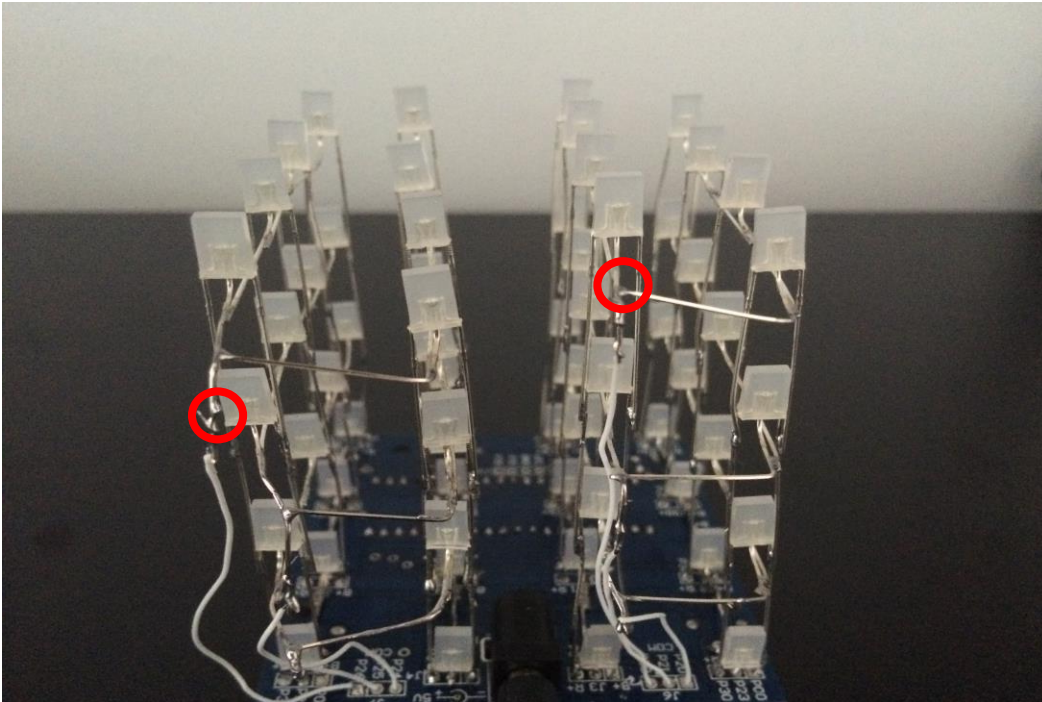


Figure 5: The correct soldering of the outer middle pins

11. Finally, use three sets of wires per two columns. Solder one end of each wire to the board at the schematics marked COM and solder the other end to the middle lead of the matching LED row (for instance, wire attached to COM P24 must be attached to the first row of the first two columns and so forth, and COM P20 must be attached to the first row of the second two columns and so forth). The final outcome of this step can be seen in the Figure 5 above.
12. Now, place the IC on its socket (pay attention to the notch just like before) and connect the USB to DC 5 Volts connector and the cube should light up.

Method w/o the recommended product:

This is a similar method to the recommended one except the first steps where instead of using the perforated brown board, you can arrange the LED columns on a table using the headers or just simply stacking them one by one on top of each other starting from step 7 of the recommended method first. After this, all other steps remain exactly the same as previous method and you can follow them.

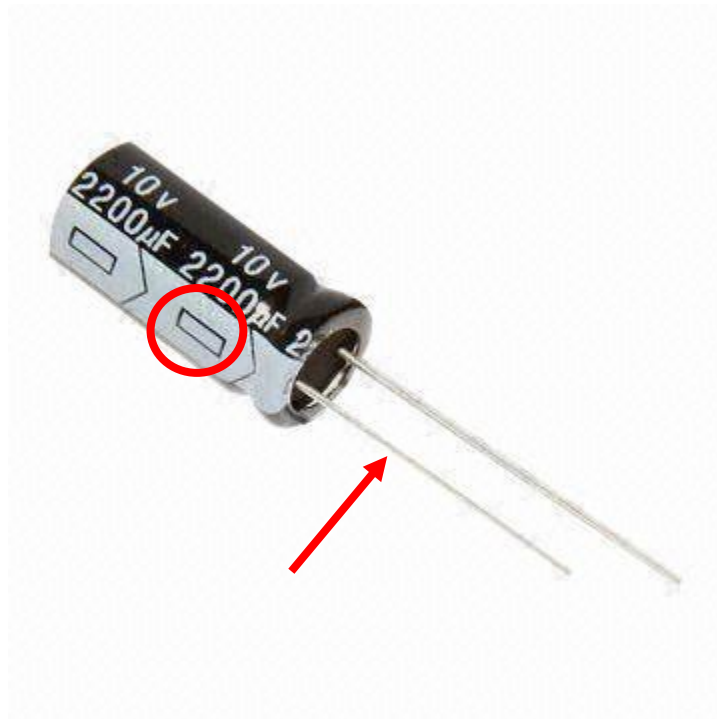
APPENDIX

Resistor Table Values

	Black	Brown	Red	Orange	Yellow	Green	Blue	Purple	Grey	White
As digit	0	1	2	3	4	5	6	7	8	9
As Multiplier	X1	X10	X100	X1k	X10k	X100k	X1M			

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.

Installing the Electrolytic Capacitor according to the Schematic



The lead under the negative sign is the negative lead and it must be inserted in the board with the white shaded region.

You can download the manual from abra-electronics.com and search for AK-125.

Vous pouvez télécharger le Manuel sur abra-electronics.com et cherchez pour AK-125.