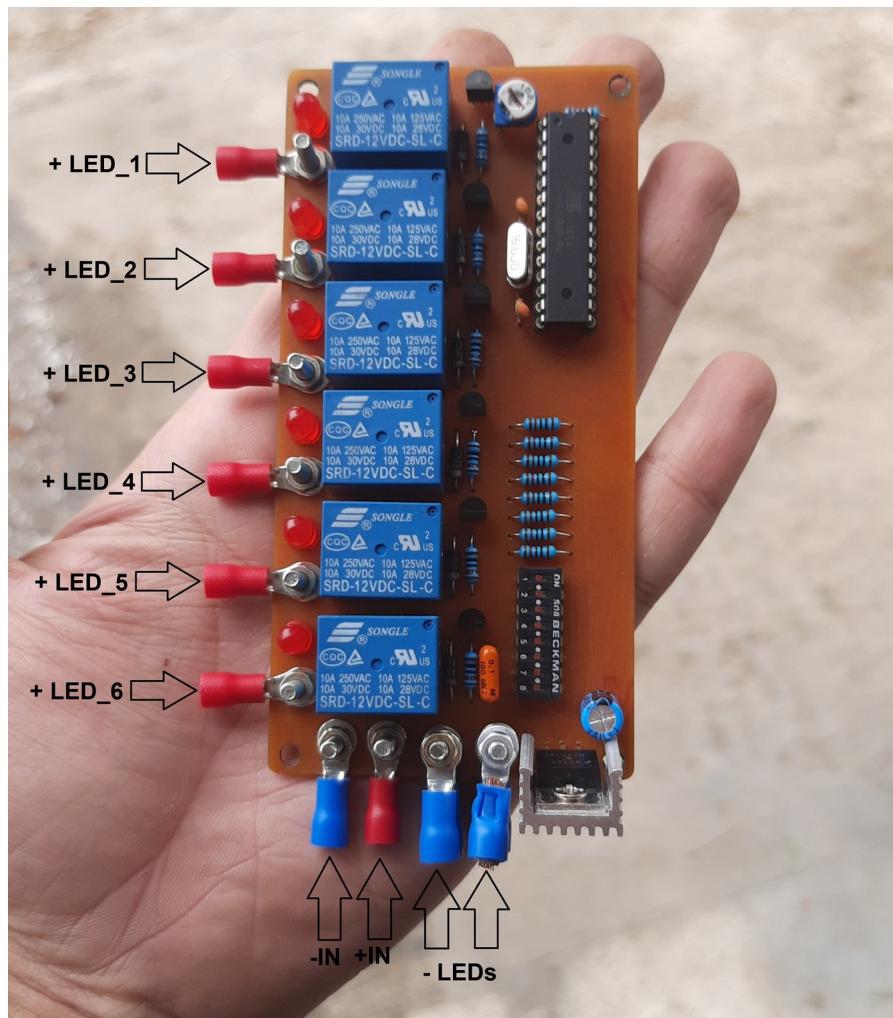


# User Guide (Rev 1.0)

## 6-Pins Circuit Description:

The **6-Pin Illuminated Signs control board** is a compact circuit designed to control up to **6 LED digits** using relays and predefined lighting patterns. It features **4 switches** for selecting the number of active LEDs, **2 switches** for choosing different light effects (Sequential Lighting, Wave effect, Reverse wave effect, and Random LED Lighting), and a potentiometer for adjusting the delay time between transitions (ranging from 100ms to 1000ms). The controller **operates on 12V or 24V**, depending on the relay configuration, and provides smooth, **dynamic lighting** effects for shop signs and decorative displays.

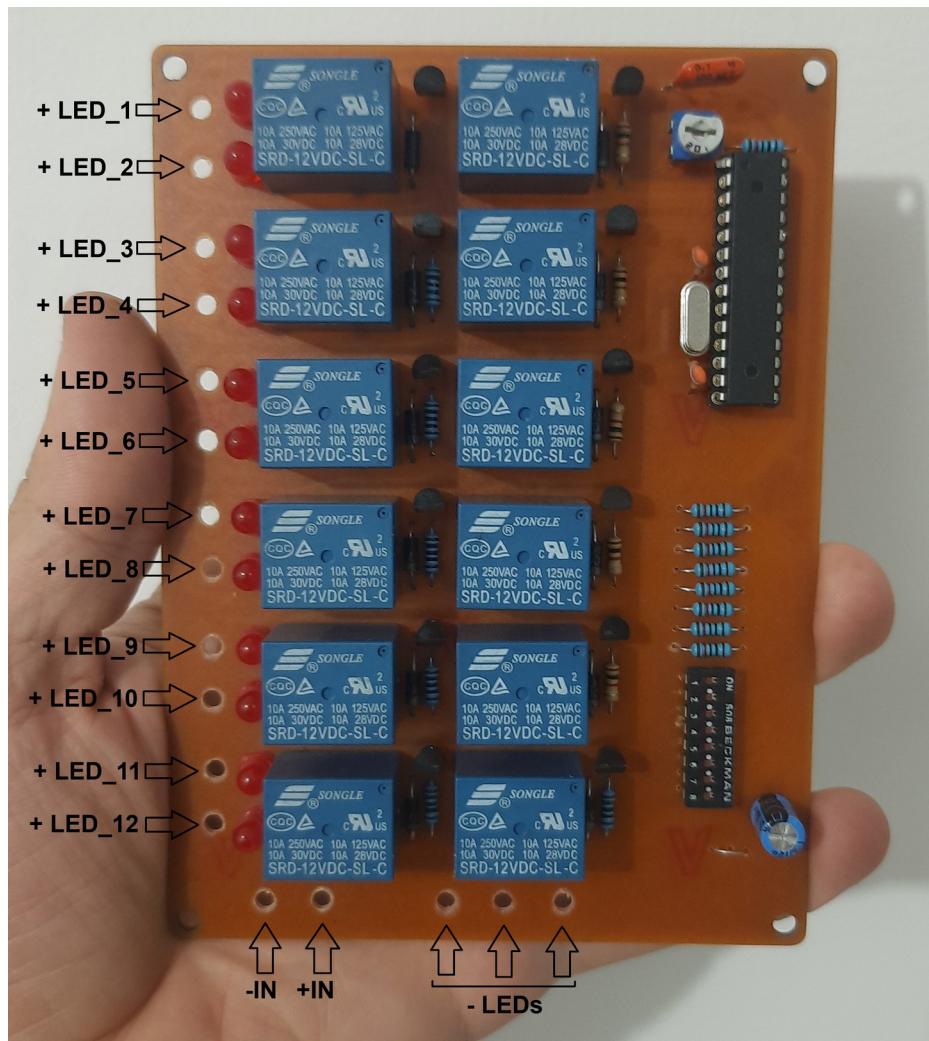
## 6-Pins Circuit Pin-out:



## 12-Pins Circuit Description:

The **12-Pin Illuminated Signs control board** is an advanced circuit designed to control up to **12 LED digits** using relays and multiple dynamic lighting patterns. It includes **4 switches** to set the number of active LEDs, **2 switches** to select from **4 operation modes** (Sequential Lighting, Blinking All LEDs, Alternate Pairs Lighting, and Random LED Lighting), and a potentiometer for adjusting the delay time between transitions (ranging from 100ms to 1000ms). The circuit supports **12V or 24V operation**, allowing flexibility based on relay configuration. With an easy-to-assemble **single-layer PCB**, it provides a straightforward solution for converting static LED signs into **dynamic, eye-catching displays**.

## 6-Pins Circuit Pin-out:



**Number of active LEDs table:**

<b>Button_1</b>	<b>Button_2</b>	<b>Button_3</b>	<b>Button_4</b>	<b># of active LEDs</b>
LOW	HIGH	HIGH	HIGH	1
HIGH	LOW	HIGH	HIGH	2
LOW	LOW	HIGH	HIGH	3
HIGH	HIGH	LOW	HIGH	4
LOW	HIGH	LOW	HIGH	5
HIGH	LOW	LOW	HIGH	6
LOW	LOW	LOW	HIGH	7
HIGH	HIGH	HIGH	LOW	8
LOW	HIGH	HIGH	LOW	9
HIGH	LOW	HIGH	LOW	10
LOW	LOW	HIGH	LOW	11
HIGH	HIGH	LOW	LOW	12

**Mode Selection table:**

<b>Button_5</b>	<b>Button_6</b>	<b>Mode</b>
LOW	LOW	1
LOW	HIGH	2
HIGH	LOW	3
HIGH	HIGH	4

**Note:**

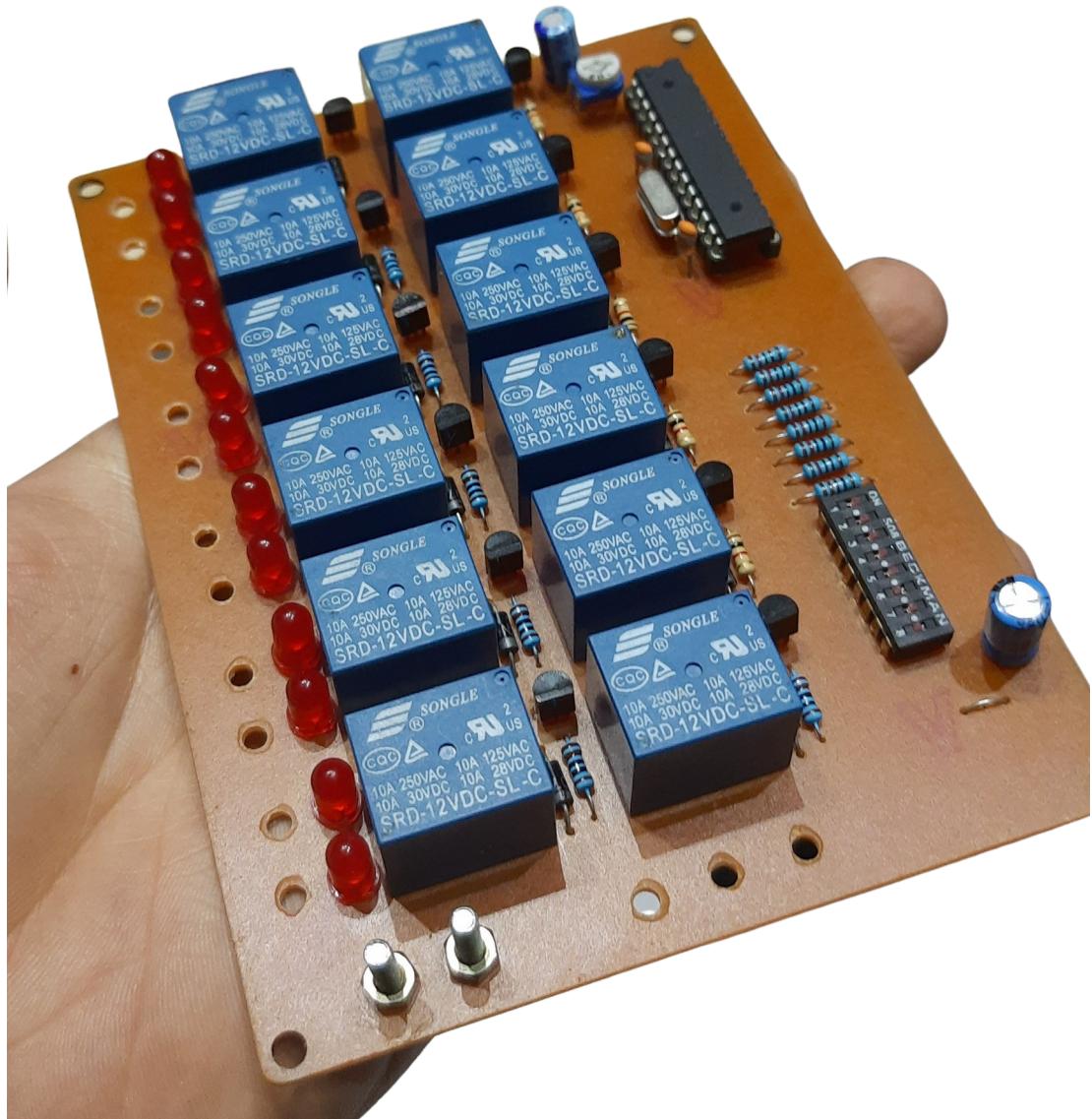
To change the delay time, the circuits uses a potentiometer for analog change in the delay, there exists 2 extra switches that you can use to change the delay (this can be done by a simple modification in the circuit and the firmware).

## For soldering:

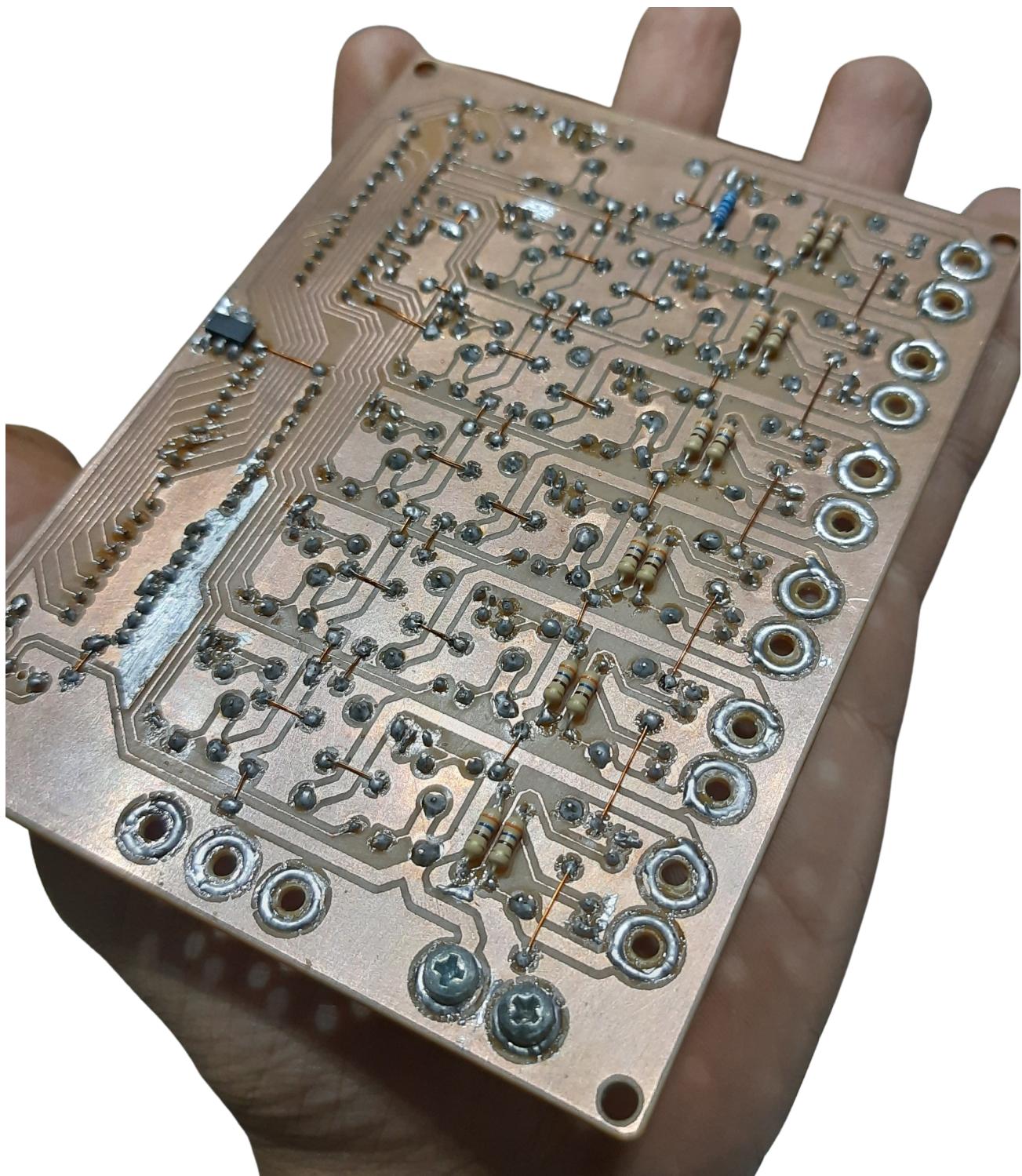
The 12-Pin and 6-Pin Illuminated Signs control boards are designed for easy assembly with through-hole components, making soldering straightforward. Begin by soldering the smallest components first (resistors, diodes), followed by the IC socket, capacitors, and relays. Some jump lines are soldered using SMD components, so ensure proper placement. If using 24V operation, install the 12V voltage regulator; otherwise, short its connections for direct 12V operation. Double-check all solder joints for strong connections and ensure there are no short circuits before powering the board.

Those circuits photos can be used to help in soldering:

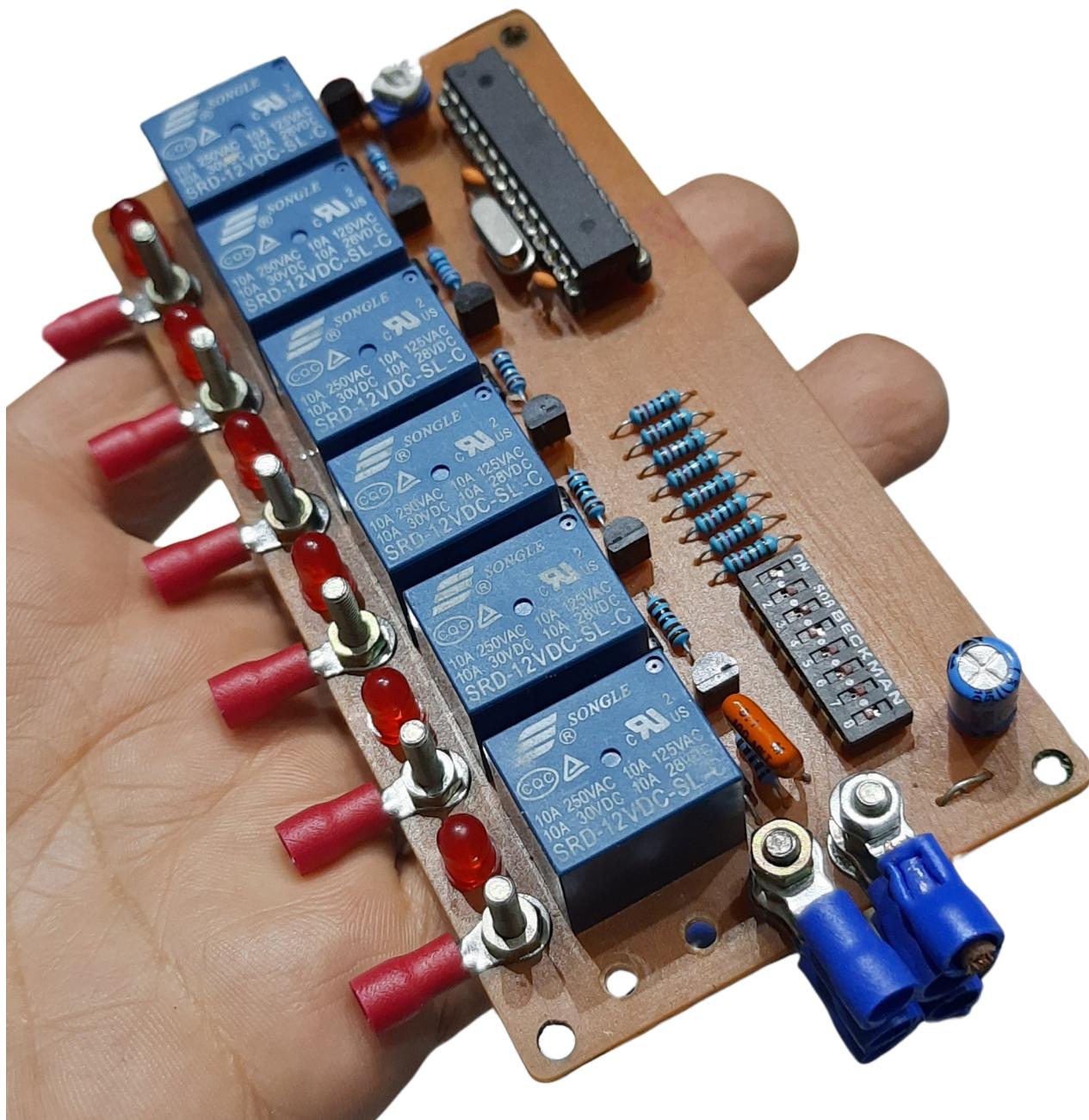
## 12-Pin Circuit Front view:



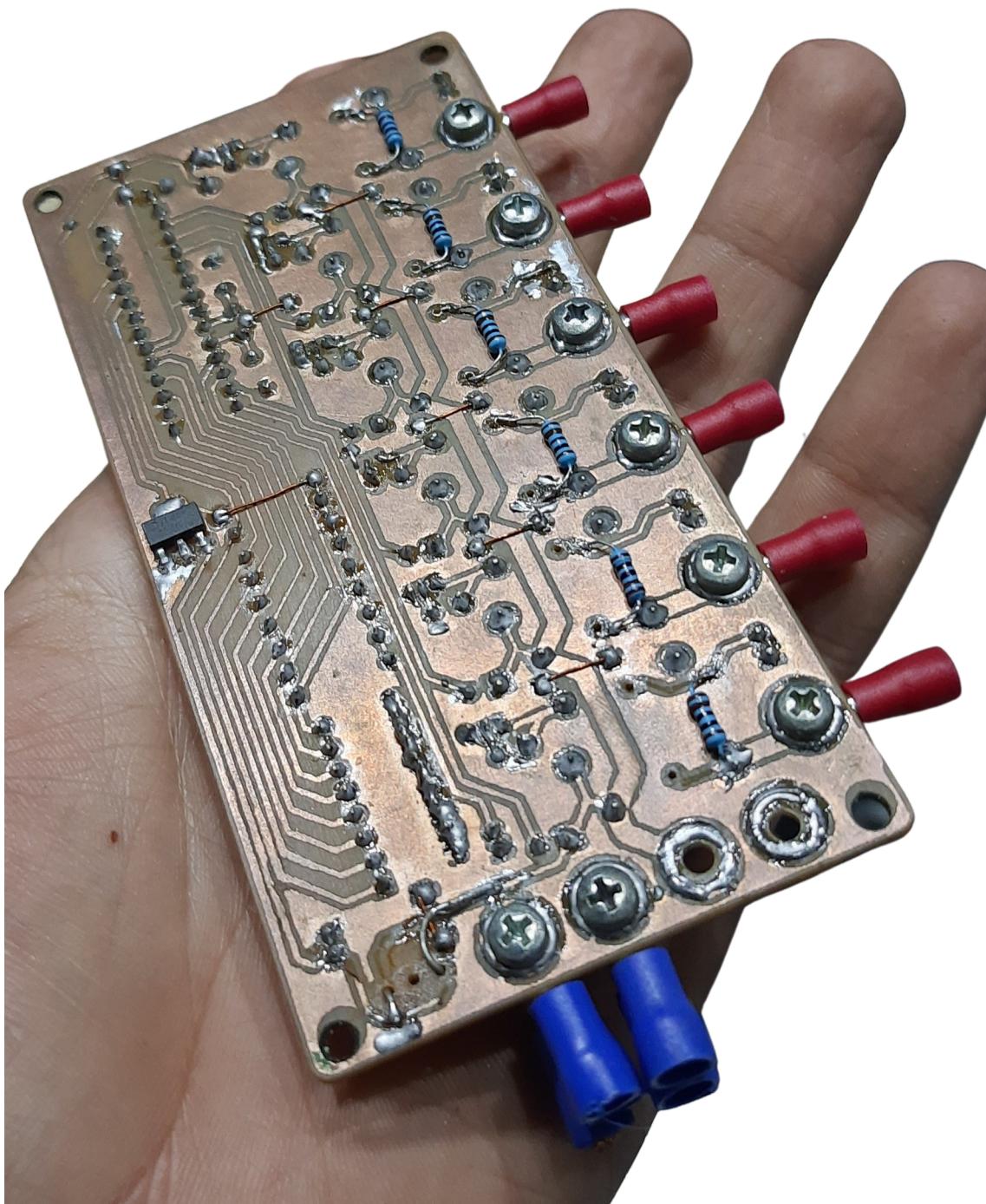
**12-Pin Circuit Back view:**



## 6-Pin Circuit Front view:



**6-Pin Circuit Back view:**



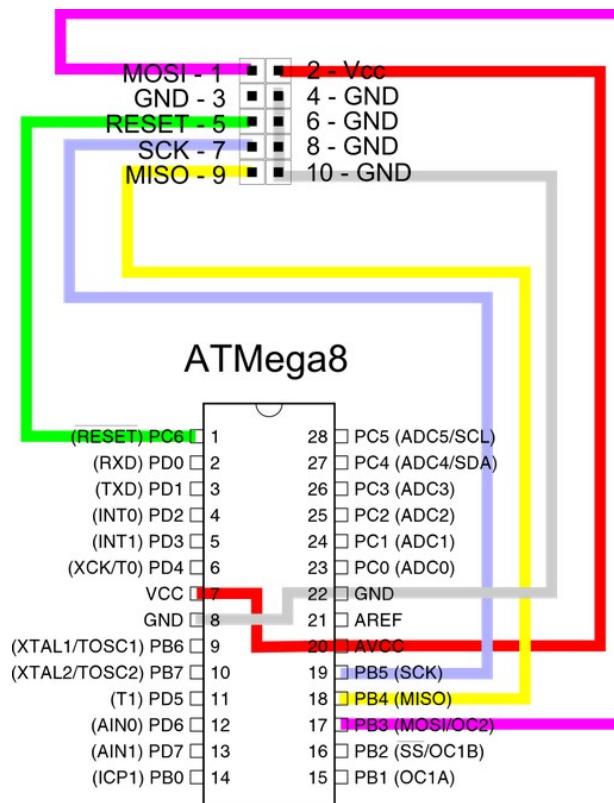
## 12V/24V Configuration:

To use the circuits with **24V LED digits**, solder the **LM7812 voltage regulator** and install **24V relays**. For **12V LED digits**, bypass the regulator by **shorting its input and output together** and use **12V relays** instead.

## Burning Bootloader:

Before uploading the code you need burn the **bootloader** onto the **ATmega328P**, use a **USBasp programmer**. Connect the **USBasp** to the circuit via the **ICSP header**, then open the **Arduino IDE**. Select "**ATmega328P (Old Bootloader)**" as the board, choose "**USBasp**" as the programmer, and click "**Burn Bootloader**". This step prepares the microcontroller to accept firmware uploads via the **Arduino IDE**.

If you prefer to use a different application, I provide the **HEX file** of the bootloader for manual flashing.



## Uploading the Code:

To upload the firmware to the **ATmega328P**, use an **FTDI adapter**. Connect the **FTDI module** to the circuit as follows:

- VCC → 5V
- GND → GND
- TX → RX
- RX → TX
- DTR → RESET (through a 100nF capacitor)

Open the **Arduino IDE**, select "**ATmega328P (Old Bootloader)**" as the board, and choose the correct **COM port**. Then, compile and upload the code. The **DTR pin** ensures the ATmega328P resets automatically for a smooth upload process.

