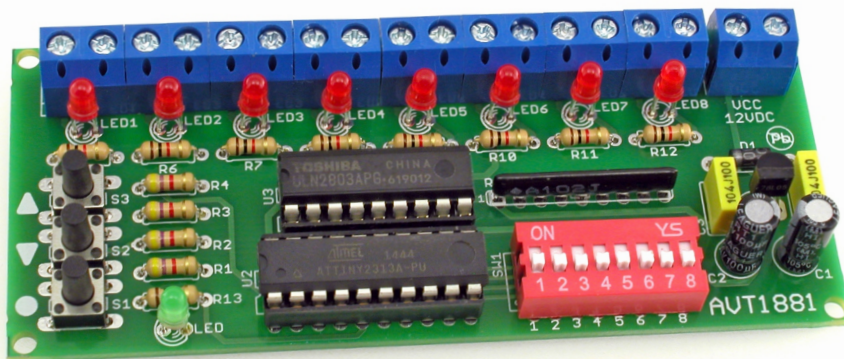




ASSEMBLY DIFFICULTY



The controller is equipped with eight outputs to directly control of light emitting diodes or relays, through which they can then switch on any high-power equipment. The light sequences are not imposed - each user programs them independently. It is possible to program a sequence consisting of 124 steps maximum. This programme is stored in non-volatile EEPROM memory of the microcontroller. It is possible to play a recorded sequence once or to play it in a loop. Playback speed can be adjusted by pressing two buttons in 27 steps from 0.05 second up to 30 seconds/step.

Specifications

- eight outputs to control light sources
- number of programme steps: 124
- very simple programming of lighting effects
- control of various types of output systems, e.g., LEDs or relays
- UP/DOWN keys to adjust the speed of change playback
- operating status indication: LED
- load capacity: 200 mA / channel
- supply: 12 VDC

Circuit description

Electrical diagram of the controller is shown in Figure 1. Operation of the circuit is controlled by a microcontroller ATtiny2313 timed by an internal clock signal. The controller must be supplied with a voltage of 12 V DC connected to the VCC connector. The D1 diode protects the circuit from incorrect polarity of the input voltage. The U1 stabiliser provides the +5 V voltage, while the C1-C4 components filter it. As an output amplifier for the individual controller channels, the ULN2803A chip was used, which contains 8 transistor amplifier stages with protection diodes for direct control of relays. The circuit outputs can be loaded with up to

200 mA / channel. To program the sequence the SW1 switch of the DIP SWITCH type was used. LED indicates recording sequence in programming mode and in operation mode it indicates system activity by blinking. Three buttons S1-S3 are used to operate the module. In normal operation, the S1 button is used to replay the entire sequence, S2 to reduce the playback speed and S3 to increase it. In programming mode, S1 is used to save the step, while S2 and S3 are used to complete the sequence creation procedure and select how to play it back.

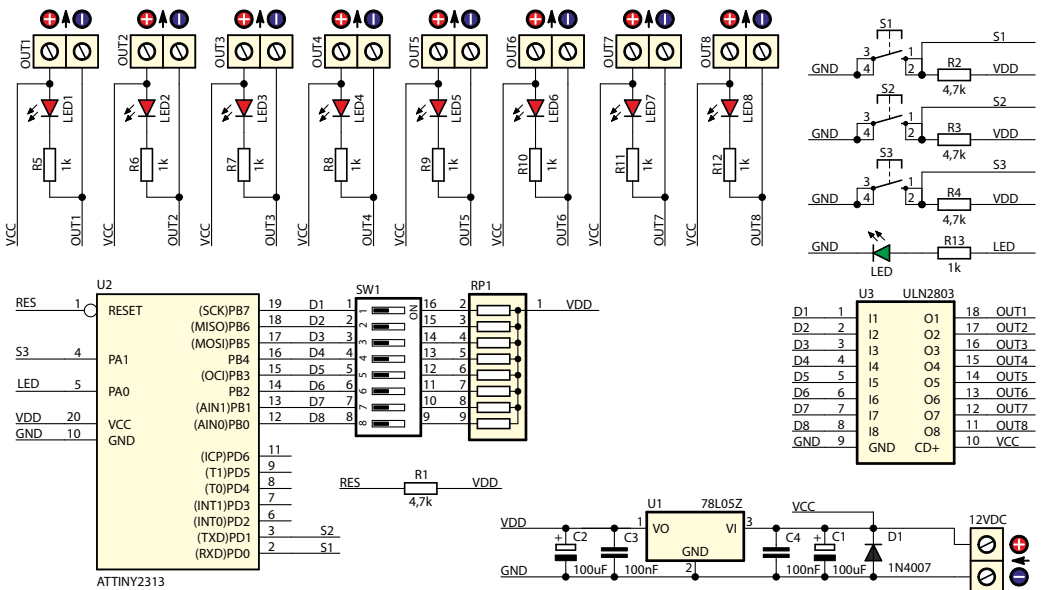


Fig. 1 Schematic diagram

Mounting and start-up

The controller has been mounted on a board with the arrangement of the components as shown in Figure 2. Start mounting according to general principles, first solder the lowest components - resistors, and end with the highest ones - connectors. Once the device is assembled, the ICs must be placed in their sockets and

a 12 V power supply must be connected to the VCC input. The controller itself draws current, in the order of several milliamps, but the current capacity of the power supply should be adjusted to match the current drawn by the ICs.

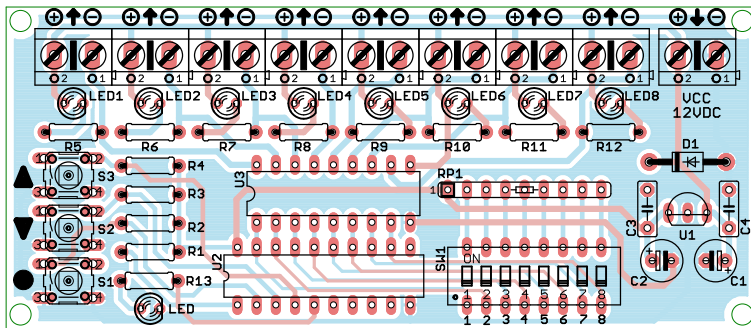


Fig. 2 Mounting diagram

The sequence programming mode is entered by pressing and holding down the S1 button. This state will be signalled by a longer illumination of the LED. The programming itself is carried out by setting the selected combination (on and off outputs) with switch SW1 and confirming it with button S1. Setting the SW1 switch to the "ON" position turns on the respective channel (lights up the diode connected to the output) and in the "OFF" position turns off that channel. When the S1

button is pressed, a brief flashing of the D1 diode signals that the state set by switch SW1 is being stored. Record the next steps in the sequence to be created in the same way. When the microcontroller memory is full of all 124 steps, the circuit will light the LED longer each time the S1 button is pressed. Once you have saved all the required sequences, you need to decide if you want it to be played once or repeated in a loop. Ending the sequence teaching procedure

with the S2 button will cause the sequence to play in an infinite loop, while the S3 button will have the effect of playing it once. During normal operation, when the S1 button is pressed, the sequence will be replayed from the beginning. At any time during the operation of the system, you can change the playback method without changing the sequence. Simply enter teaching mode by holding down the S1 button and then use the S2 (loop) or S3 (single sequence) to exit the programming mode. In both cases, the end of the programming procedure will be signalled by the LED flashing in synch with the

display of the successive steps of the program being played. In this mode, the S2 (decrease) and S3 (increase) buttons can be used to vary the rate of change in 27 steps. All possible durations for a single sequence are listed in Table 1. Once the controller has been correctly assembled and programmed, you can connect signal receivers to the OUT connectors. Figure 3 shows an example of how to connect the LED strip or relay.

Sequence playback speeds

No.	Czas trwania kroku
1	0,05 sec.
2	0,075 sec.
3	0,1 sec.
4	0,125 sec.
5	0,15 sec.
6	0,175 sec.
7	0,2 sec.
8	0,225 sec.
9	0,25 sec.
10	0,3 sec.
11	0,35 sec.
12	0,4 sec.
13	0,45 sec.
14	0,5 sec.
15	0,75 sec.
16	1 sec.
17	1,25 sec.
18	1,5 sec.
19	1,75 sec.
20	2 sec.
21	2,25 sec.
22	2,5 sec.
23	3,75 sec.
24	5 sec.
25	10 sec.
26	20 sec.
27	30 sec.

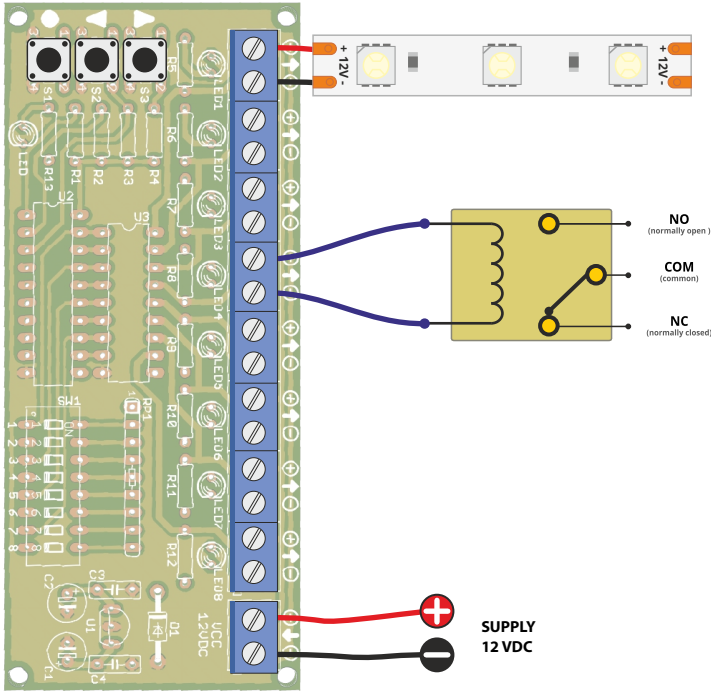


Fig. 3 Example of how to connect the LED strip or relay

List of elements

Resistors:

R1-R4:4,7 kΩ (yellow-purple-red-gold)
R5-R13:1 kΩ (brown-black-red-gold)
RP1:RPACK 8×1 kΩ !

Capacitors:

C1, C2:100 μF / 16 V !
C3, C4:100 nF (can be labelled 104)

Semiconductors:

LED, LED1-LED8:LED 3 mm !
D1:1N4007 !
U1:78L05 !
U2:ATtiny2313 !
U3:ULN2803A !

Other:

OUT1-OUT8, 12VDC:DG301-5,0
S1-S3:microswitch button
SW1:DIP SWITCH 8 sections !



Begin assembly by soldering the components onto the board in order of size from smallest to largest. When mounting components marked with an exclamation mark, pay attention to their polarity. Photographs of the assembled kit may be helpful. To access high-resolution images, download the PDF file.



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