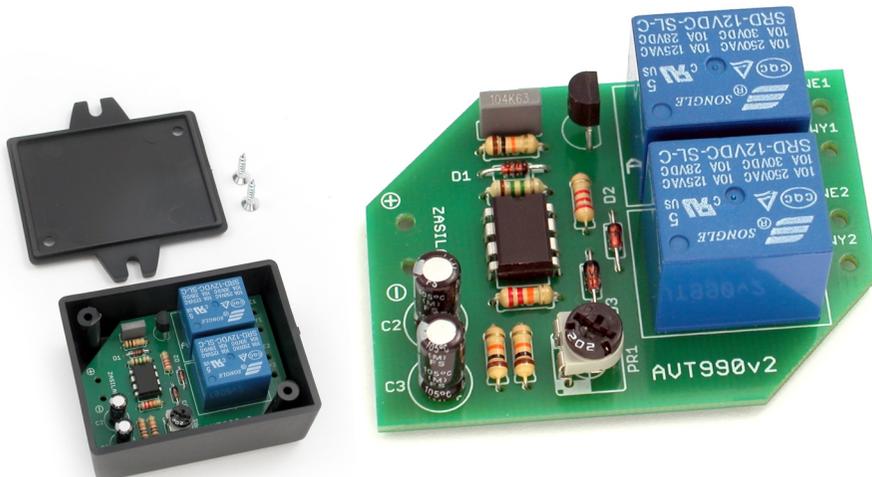




**AVT 990**



ASSEMBLY DIFFICULTY



Device is used to turn on the headlights just after starting the engine and switch them off after shuts off engine of the car.

## Characteristics

- Delayed, automatic turn on headlights, when the engine starts.
- Automatic switch off of headlights after shutting off the ignition
- Two independent output relays, 10 Amps each
- Protection against reverse polarity of supply
- Easy installation, small number of components

## Circuit description

The electrical diagram of the module is shown in Figure 1. The U1A comparator compares the reference voltage from the Zener diode D3 (5, 6 V) with the input voltage from divisor R1, R2, PR1. The PR1 potentiometer is used to set the operating threshold and should be set in the position of voltage range 13.2...13.3 V. R6 resistor between the comparator's output and the inverse input provides positive feedback and sets the hysteresis of the comparator. This allows the relay to be switched off only, if the voltage in the vehicle installation falls below 10.6 V (engine does not work and the installation of the car is powered only from the battery). There is therefore no concern that, in case of heavy electrical load and at low engine speeds, the headlights suddenly will be switched off. This will happen immediately after the ignition is switched off or, in example, at the time of

attempting to start the engine.

R4 resistor and C2 capacitor set delayed turn on time, after the engine starts. For the given values the delay is about 1 second. U1B comparator compares voltage on C2 with reference voltage from the Zener diode D3. Output of the comparator controls the output relay using the transistor. The D2 diode protects the transistor from the surges generated by the coil. The D1 diode protects the module from reverse polarity of the supply. The electrical load rating depends on the relays used. For the proposed kit, it is 10 A.

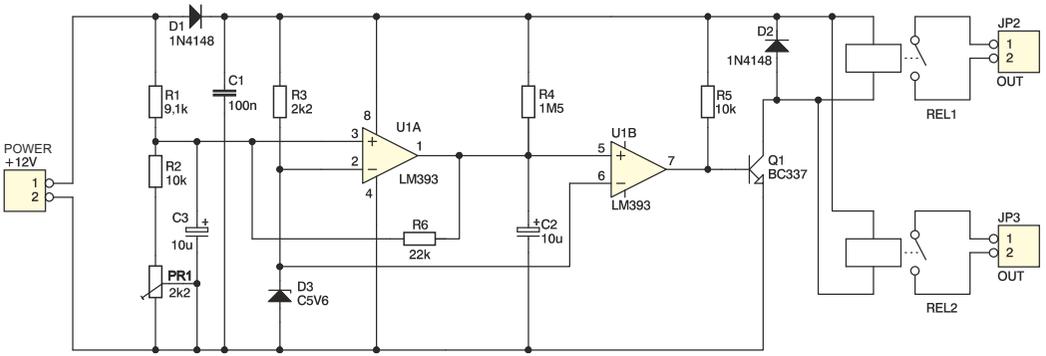


Fig. 1 Schematic diagram

## Assembly and start-up

The system was assembled on a single-sided PCB with dimensions 58 mm×43 mm (Figure 2) that matched the Z-68U housing. Assembly of the module starts with soldering the resistors and other elements with small size and finishes with assembling electrolytic capacitors and relays. Protect the ready and running plate from moisture- covering it with a layer of varnish.

To calibrate the automatic headlights switch you need a power supply of 13.2 V. Turn the potentiometer PR1

into the end left position, then attach the power supply. Slowly rotate the potentiometer slider to the right until we hear the relays switched on. Move the slider slightly back. The correctly adjusted module should activate output relays at a voltage of 13.2...13.4 V.

After adjusting and soldering the output wires, we can mount the PCB in the housing (use the wires with a minimum cross-section of 1 mm<sup>2</sup>).

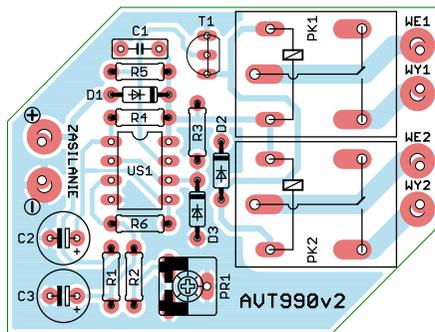


Fig. 2 Assembly diagram

## Connection to car installation

The installation in the vehicle involves connecting 6 wires according to the diagram shown in Figure 3. The easiest way is to connect the module to the headlights switch. We start with the power supply and finding the wire on which the voltage occurs after the ignition is switched on. The voltage should be measured with the engine running it should be within range 13.5... 14.4 V. Connect the "+" wire to the

"+" on the module. Then we find the mass wire or connect the machine "-" supply of the module to the body of the car. The next step is to find the circuits that are powered when switching on the headlights. To these circuits we connect the output circuits of the system. Before mounting, it is good to disconnect the battery or the appropriate fuse to eliminate the possibility of accidental short circuits. A

very important issue is to make the correct additional installation. This requires an adequate insulation of the wires keeping them away from moving parts and fixing them properly.

When the module is connected, turn on the ignition

of the vehicle. Headlights should not be lit. Start the engine. Headlights should turn on after approximately 1 second from the engine start and switch off immediately after the ignition has been switched off.

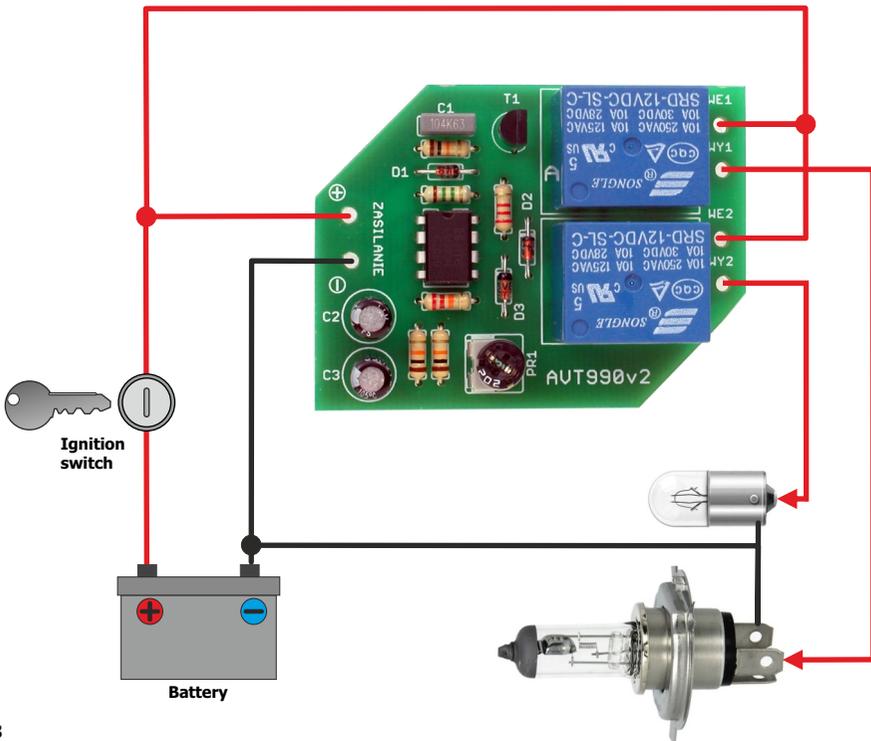


Fig. 3

## List of elements

### Resistors:

R1:.....9,1 kΩ (white-brown-red-gold)  
 R2, R5: .....10 kΩ (brown-black-orange-gold)  
 R3:.....2,2 kΩ (red-red-red-gold)  
 R4:.....1,5 MΩ (brown-green-green-gold)  
 R6:.....22 kΩ (red-red-orange-gold)  
 PR1:.....potentiometer 2 kΩ (202)

### Capacitors:

C1:.....100 nF (may be labeled 104)  
 C2, C3:.....10 uF

### Półprzewodniki:

D1, D2:.....1N4148  
 D3:.....Zener diode 5V6  
 Q1:.....BC337  
 U1:.....LM393

### Other:

REL1, REL2: .....relays 12 VDC  
 Case Z-68U

