

Cyclic timer circuit with programmable relay ON time and relay OFF time. It can operate in two modes - seconds and minutes with a setting range of 1 to 99.

## Specifications

- two operating modes: seconds and minutes
- time setting from 1÷99 in 1-step increments
- operating status indicated on two switchable LED displays
- output circuit - relay NC / NO contacts
- supply: 12 VDC
- board size: 95×37 mm

## Circuit description

Electrical diagram of the timer is shown in Figure 1. The device must be supplied with 12 VDC fed to the ZAS connector. This can be any 12 V power supply with a current capacity of not less than 200 mA. The U1 stabiliser provides the +5 V voltage and capacitors C1...C4 ensure its proper filtration. Operation of the device is controlled by an Attiny26 microcontroller timed by an internal clock signal. Status of the unit is shown on a dual seven-segment display with a common anode. The cathodes of the 2-digit multiplexed LED display are connected via current-limiting resistors R5-R12 to ports PA0-PA7. The role of the keys that switch on the power supply to the displays is performed by transistors T1 and T2, controlled from ports PB3 and PB4. The LED ON jumper, or rather the absence of it, allows the displays to be switched off for the duration of the circuit operation. For setting purposes, the system is

equipped with 2 buttons labelled S1 and S2. Signals from the buttons are routed to ports PB0 and PB1 - the active level is logical '0'. Mounting diagram of the timer is shown in Figure 2, it is mounted on a small, double-sided printed circuit board measuring 36 mm×94 mm, using through-hole components. Assembly is typical and should not cause any problems, and a system assembled from working components will work correctly straight away. To program the relay OFF time, press and hold the S1 button for approximately 3 seconds. After a while, the lower segments of the display will start flashing. You can now release the button and using the S1 and S2 buttons, increase or decrease the flashing value shown on the display. Once the required time has been set, press and hold the S1 button again. To set the relay ON time, press and hold the S2 button, this will be signalled by the upper segments of the displays

blinking. Changes are made in the same way as when setting the switch OFF time using the S1 and S2 buttons. Once the correct value has been set, press and hold S2 again to complete the programming process - the parameters will be stored in non-volatile memory. You should still remember to set the time unit with the jumper in the SEK or MIN position. After these steps, the device is ready for operation and the activation of the output is signalled by the lighting of a dot next to the unity digit. The displays can be

switched off for the duration of the unit operation by removing the LED\_ON jumper. It is important to be aware that timekeeping can be subject to a degree of inaccuracy, particularly when working in the minute range.

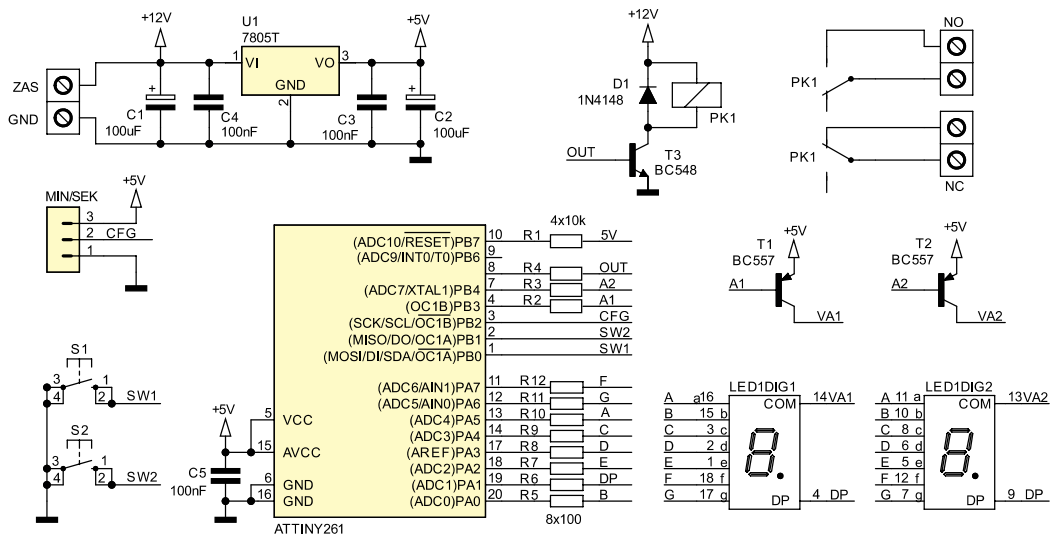


Fig. 1 Schematic diagram

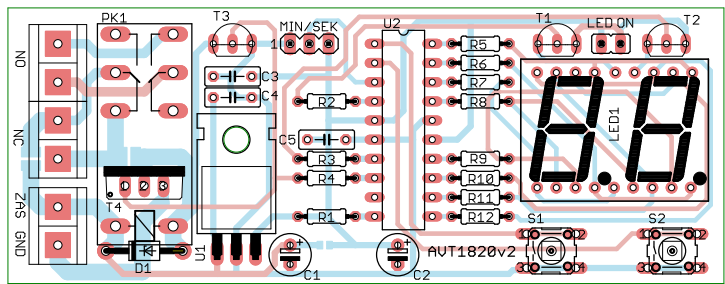


Fig. 2 Mounting diagram

# List of elements

## Resistors:

R1-R4: .....10 k $\Omega$

R5-R12: .....120  $\Omega$

## Capacitors:

C1, C2: .....100  $\mu$ F

C3-C5: .....100 nF

## Semiconductors:

D1: .....1N4148

T1, T2: .....BC557

T3: .....BC547

T4: .....DO NOT MOUNT

U1: .....7805

U2: .....ATtiny261A

LED1: .....dual LED display

## Other:

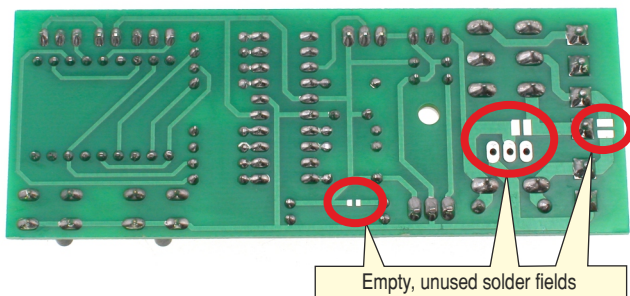
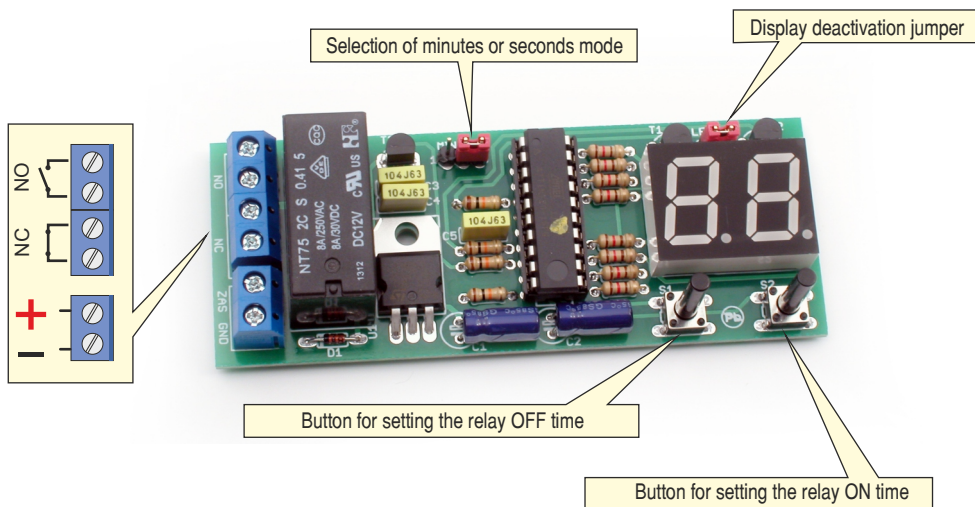
S1, S2: .....microswitch

PK1: .....RM84P12

SEK/MIN: .....goldpin 1 $\times$ 3 + jumper

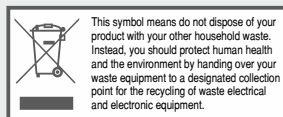
LED\_ON: .....goldpin 1 $\times$ 2 + jumper

ZAS, NC, NO: .....ARK2/500 connector



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## Notes