KITS EDUCATIONAL ELECTRONIC

AVT 3143
Kitchen timer

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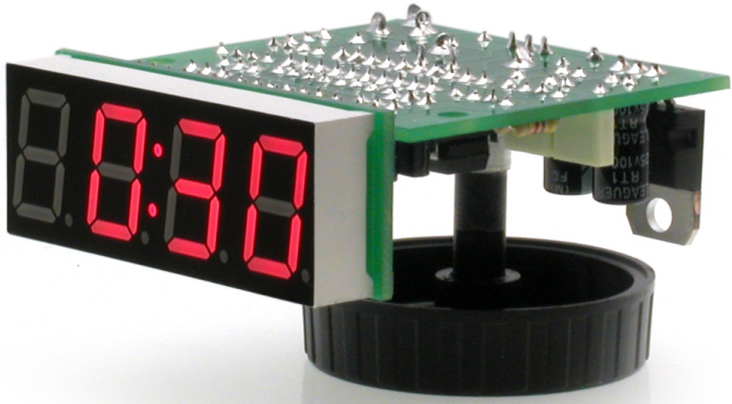

It is a universal timer for kitchen, photography sport, etc. It can count up to 99 minutes and 99 seconds. Shows time in minutes with seconds. Time can be increased and decreased during countdown as in mechanical timers. In addition, user can stop and start the timer.

Specifications

- maximum value of time setting: 99 minutes 99 seconds
- alarm durations: approx. 3 seconds.
- 4-digits LED display
- power supply: 12V DC

Functional description

Schematic of the timed is shown in Figure 1. The timer is powered from a 7-15 V DC power supply with a minimum current capacity of 200 mA. Power supply is applied to connector J1. Input voltage is lowered to 5 V and stabilized by popular integrated circuit 7805.
The heart of the timer is microcontroller ATtiny2313 clocked with an internal 8 MHz RC generator. To display the time is used the 4-digit 7-segment multiplexed LED display with a colon. Port B of the microcontroller supplies the LED display cathode connected by the limiting resistors R3...R10. The anodes are powered by T1...T4 transistors controlled by port D. The encoder with button is used to set the time. The C5 and C6 capacitors eliminate vibration of the encoder contacts. The vibration of encoder pushbutton is eliminated by the software. A buzzer with built-in generator was used to signal the countdown end. The last five minutes of countdown are signaled by short beeps every minute. The last 10 seconds of countdown are signaled by short beeps every second, followed by an alarm for three seconds.

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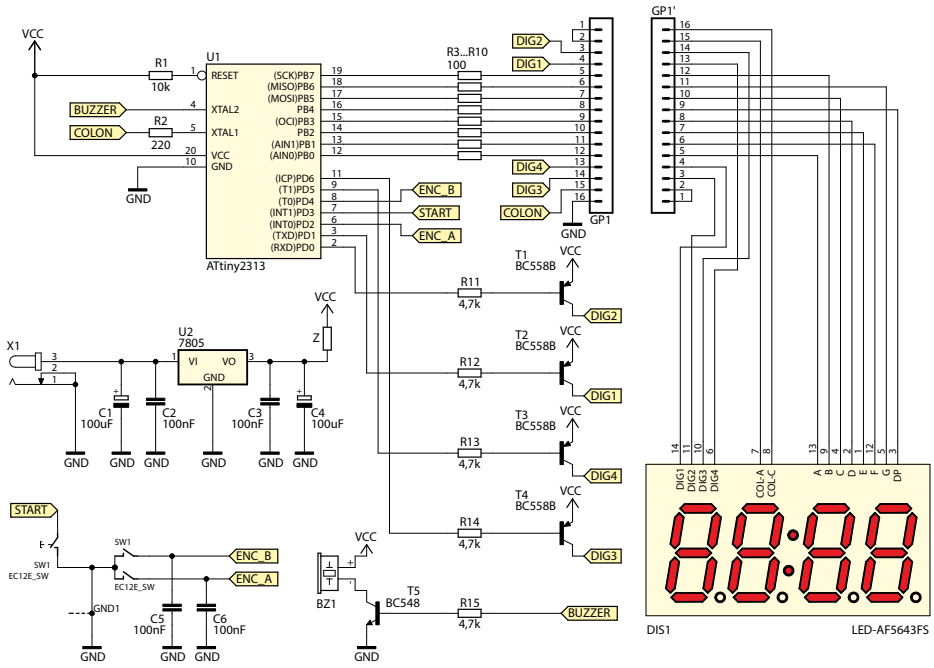
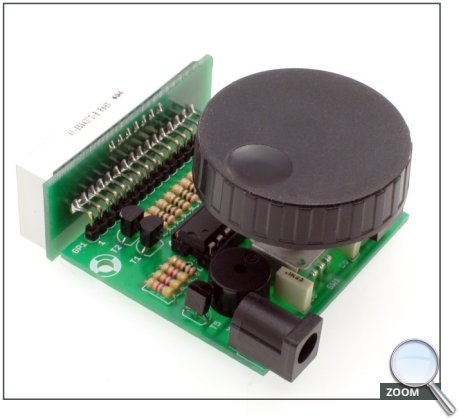
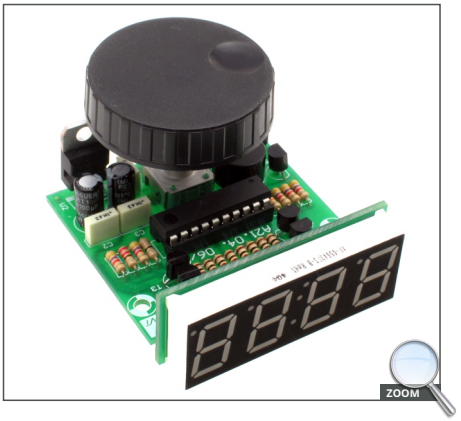


Figure 1. Schematic diagram

Assembly and test

Timer must be assembled on the two plates shown on the photographs. Assembly starts with the smallest components and ends with the largest ones. For a microcontroller, use a stand. After assembling both PCBs connect them with the goldpin angle connector. Note, that the display PCB is mounted in reverse (see photo), and this is because the timer is designed to be mounted under the cabinet.





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Start off by soldering the printed circuit elements in order from smallest to largest. The unit assembled flawlessly, using the supplied components will operate immediately after switching on the power supply.

Component list

Resistors:

R1:.....10kΩ (brown-black-orange-gold)
R2:.....220Ω (red-red-brown-gold)
R3–R10:.....100Ω (brown-black-brown-gold)
R11–R15: .....4.7kΩ (yellow-violet-red-gold)
Z: .....0Ω (black)

Capacitors:

C2, C3, C5, C6: ...100nF (also marked as 104)
C1, C4:.....100µF !

Semiconductors:

T1-T4: .....BC557 (BC558) !
T5:.....BC547 (BC557) !
U1: .....ATtiny2313 with 20-pin IC socket
U2: .....7805 !
DISP: LED-AF5643

Others:

goldpin connector 16pin
BZ1: .....buzzer
SW1:.....encoder
X1:.....DC 2.1/5.5

While assembling the components marked with an exclamation mark attention should be paid to their polarity. Symbols of the components on the PCB as well as photos of assembled sets may come in useful. To access high-resolution images, download the PDF file.

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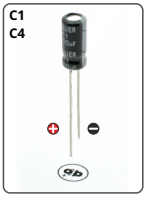
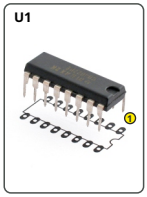
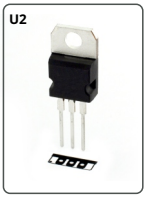


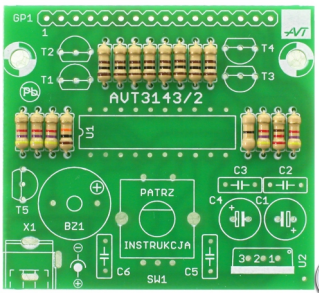




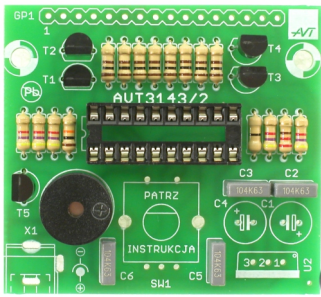
Depending on the needs, the SW1 encoder can be mounted on the side of the components or on the solder side.

Assembly in 4 steps

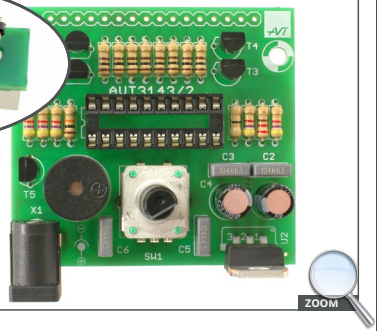
1 Solder resistors R1-R16 and diode D1



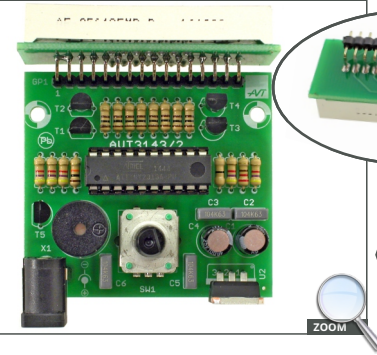
2 Solder capacitors C1, C2 and IC socket



3 Solder transistors T1-T4, PIEZO and connectors. Solder LED display and goldpin connector



4 Solder capacitors C3, C4, U1, and LED display with PCB, insert chip into socket



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