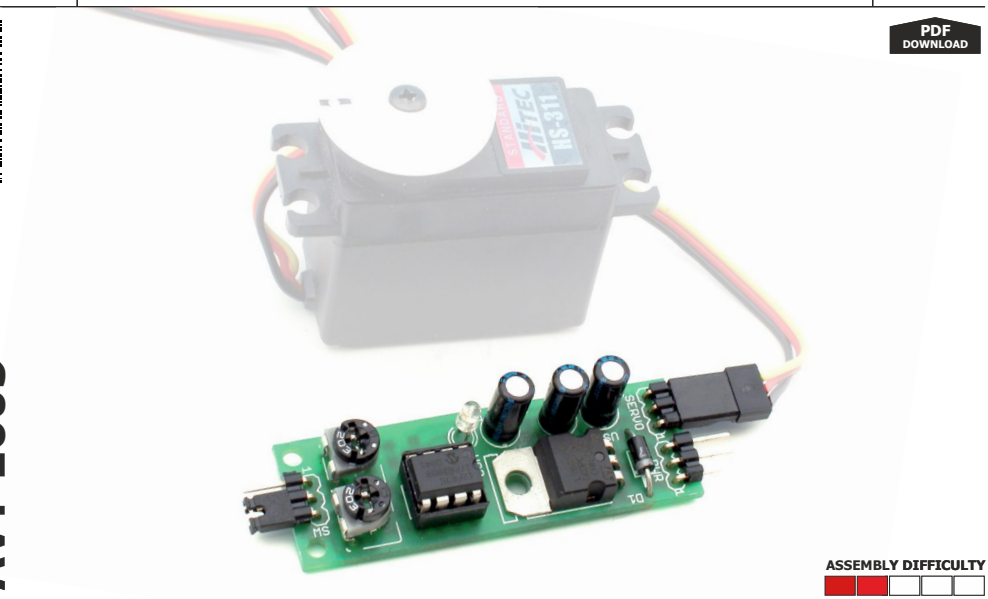
EDUCATIONAL ELECTRONIC KITS

Two-state servo controller

PDF DOWNLOAD

AVT 1605



ASSEMBLY DIFFICULTY

Model servos are ideal for applications other than as intended, such as driving a lock bolt. In such a non-standard application, the most trouble is "forcing" the servo to work, since it requires powering a waveform with certain parameters. The described circuit relieves us of such a problem.

Characteristics

- Hitec standard servo connector
- input for two-state control
- two potentiometers to determine the end positions of the servo arm
- time of full arm rotation: 1 second
- smooth adjustment of the arm position (through each potentiometer)
- status indication – LED
- power supply 8÷18 V DC

Circuit description

The schematic diagram of the controller is shown in Figure 1. It contains only a few elements. The D1 diode protects against the reverse connection of the supply voltage, the US1 stabilizer provides 5 V to power the servo, and through an additional filter with elements R3 and C3 it also powers the US2 microcontroller. The R4 resistor protects the state selection input, R5 protects the control pulse output, R6 forces the active state of the microcontroller, and R7 limits the current of the D2 LED. The R1 and R2 potentiometers are used to set two voltage values, which later control the parameters of the pulses at the output. We connect a supply voltage to the PWR connector from the range of 8...18 V, while to the SERVO connector we connect a servo, according to the markings on the board. 0 V or 5 V is applied to lead 2 of the SW connector, which puts the servo in one of two positions. The operation of the circuit is controlled by a program contained in the microcontroller's memory, its block diagram is shown in Figure 2. The TIMER1 timer circuit is a 16-bit counter that was used to generate interrupts every 20 ms, thus establishing the period of the output waveform. Interruption occurs when the counter overflows. The Timer0 counter is used to determine the duration of the pulse.

Its start is synchronized by an interrupt from Timer1, and its overflow generates a second interrupt that ends the pulse and stops the counter. The time to interrupt, and thus the pulse duration, is determined by changing the initial value of the counter, which is proportional to the result of the A/C conversion. Thus, changing the voltage in the range of 0...5 V at the ADC input, causes

a change in the pulse duration in the range of about 0.5...2.5 ms.
In addition, the state at the SW input determines which potentiometer (R1 or R2) will determine the voltage at the input of the converter. This allows the servo to be controlled in two states via the SW input or full range by changing the position of the potentiometers.

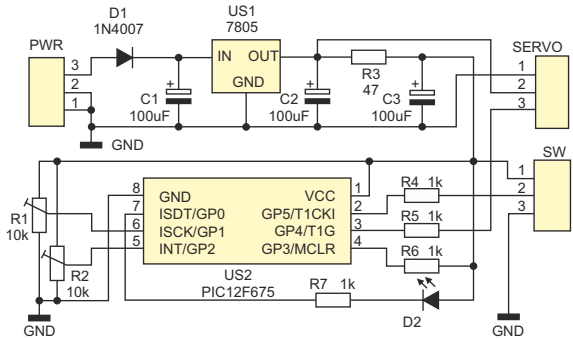


Fig. 1 Schematic diagram

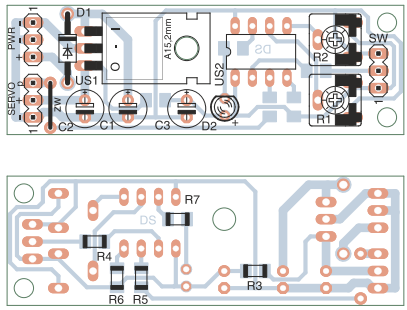


Fig. 2 Installation diagram of the controller

Assembly and start-up

The device was assembled on a printed circuit board, the assembly diagram of which is shown in Figure 2. Assembly does not require more extensive description, however, a little attention should be paid when assembling resistors R3...R7. These are SMD resistors, which are soldered on the other side of the board.

List of elements

Resistors:
R1, R2: .....potentiometer 10÷50 kΩ
R3: .....47 Ω (SMD, 1206)
R4-R7.....1 kΩ (SMD, 1206)
Capacitors:
C1-C3 .....100 uF / 25V
Semiconductors:
D1:.....1M4007
D2: .....LED
US1:.....7805
US2:.....PIC12F675

Other:
ZW:.....jumper
PWR, SERVO:.....goldpin 1×3 angled
SW:.....goldpin 1×3 angle+jumper

EDUCATIONAL ELECTRONIC KITS

AVT SPV Sp. z o.o.

Leszczynowa 11 Street,
03-197 Warsaw, Poland
kity@avt.pl

This symbol means do not dispose of your product with your other household waste. Instead, you should protect human health and the environment by handing over your waste equipment to a designated collection point for the recycling of waste electrical and electronic equipment.