Global Specialties®

DC Motor Speed Control
Model GSK-804

This circuit allows the user to vary the speed of a DC motor from a stop position to maximum revolutions per motor specification.

Technical Specifications
■ Power source: 12 VDC
■ Load voltage: 12 VDC, 1.5 A max.
■ Output: controlled DC motor by pulse width modulation
■ PCB dimensions: 1.76 x 1.32 inches

Operating Principles
Integrated circuit oscillates the frequency at 264 Hz relative to resistors 1, 2, and 3, variable resistor 1 and capacitor 1. VR1 provides adjustment of duty. If the plus duty is more than the minus duty the motor will slow down. Frequency will be transmitted through IC to resistor 4 and the base of transistor 1 making TR1 function as adjustment of VR1.
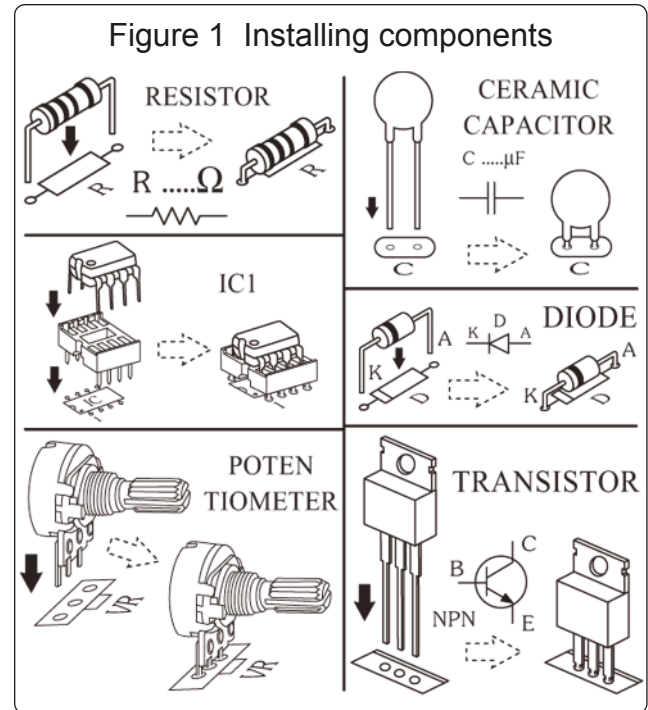
$$\text{Frequency} = \frac{1}{T1+T2}$$

T1 = 0.693 (R1+R2) C1
    = 0.693 (10K+5K) x 0.01
    = 103.95 Hz

T2 = 0.693 (VR1+R3) C1
    = 0.693 (500K+30K) x 0.01
    = 3,762.90 Hz

Frequency = 264.7709 Hz

PCB Assembly
Please refer to Figures 1, 2, and 3 for aid in component placement. It is recommended to start with lower components i.e. diodes, resisters, electrolyte capacitors, and transistors. Be careful to check polarity with Figure 3 before soldering. Take extra precaution to ensure electrolytic capacitors are inserted correctly. If a problem is detected it is best too use a desoldering pump or desoldering braids to remove component. This will minimize potential damage to the printed circuit board.

Figure 1 Installing components

RESISTOR   R .....Ω
CERAMIC CAPACITOR   C .....μF
IC1
DIODE
POTEN TIOMETER
TRANSISTOR   NPN

Testing
Connect 12 VDC motor to the "OUT" terminals of PCB. Connect power source and adjust speed by turning potentiometer counterclockwise to slow motor and clockwise to speed motor up. If load voltage is sustained above 800 mA circuit should be ventilated. Maximum load is 1.5 A.

Troubleshooting
The main cause of problems will come from misplaced components or faulty soldering. Utilize Figures 1, 2 and 3 to ensure proper placement, polarity and then check solder points for connectivity.
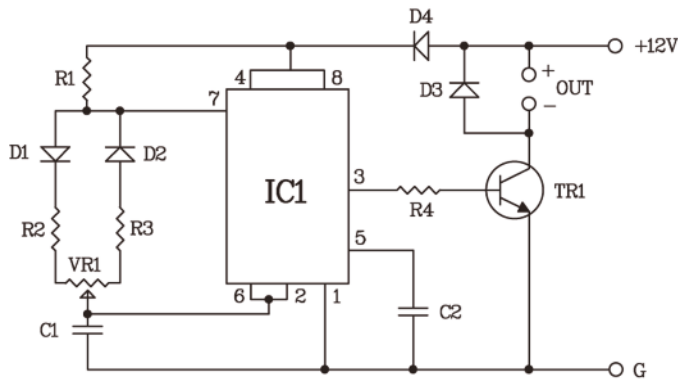
Electronic Kit Set for Hobby & Education

Figure 2 DC motor speed control circuit

SPEED MOTOR

SLOW MOTOR

Figure 3 Connecting Circuits

GSK-804
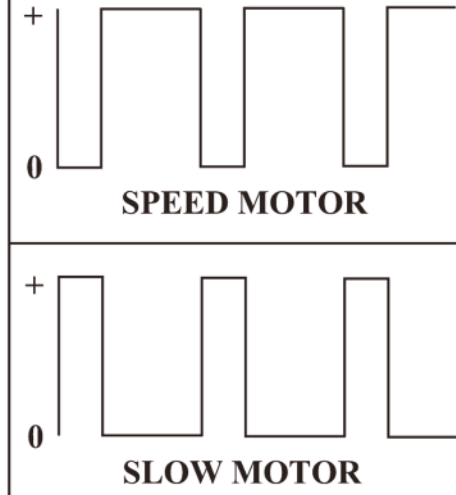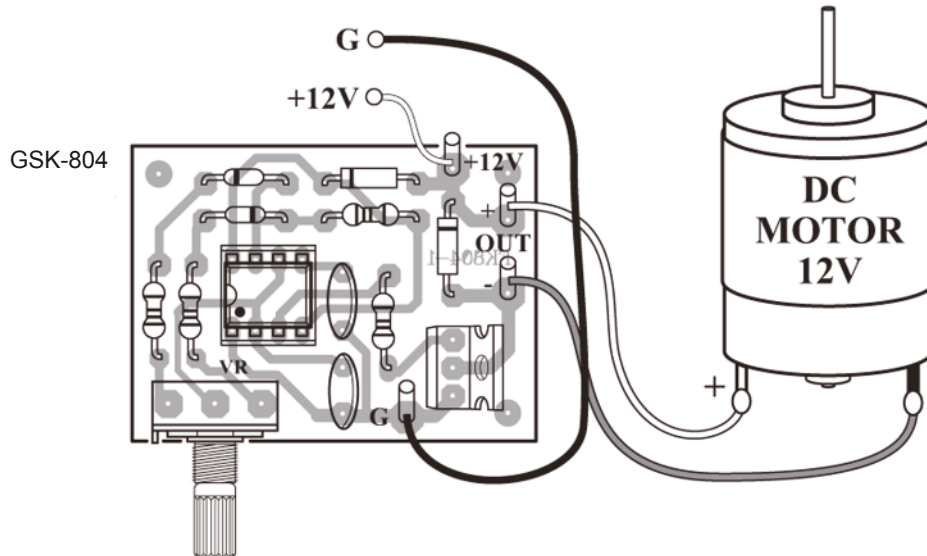
DC MOTOR 12V

Resistors
R1   10 kΩ   brown – black – orange – gold
R2   5 kΩ   green – black – red – gold
R3   30 kΩ   orange – black – orange – gold
R4   300 kΩ   orange - black - brown – gold

Potentiometer
VR1   504 or 500 kΩ

Ceramic Capacitors
C1, C2   103 or 0.01µf

Transistor
TR1   C1061 or D1933

Diodes
D1, D2   1N4148
D3, D4   1N4001

Integrated Circuit
IC1   555