

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.

$$\text{Frequency} = \frac{1}{T1+T2}$$

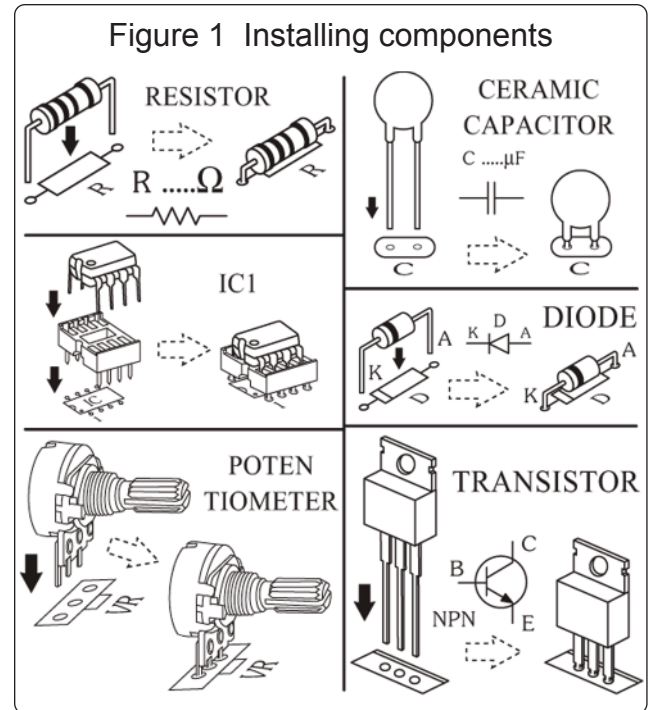
$$\begin{aligned} T1 &= 0.693 (R1+R2) C1 \\ &= 0.693 (10K+5K) \times 0.01 \\ &= 103.95 \text{ Hz} \end{aligned}$$

$$\begin{aligned} T2 &= 0.693 (VR1+R3) C1 \\ &= 0.693 (500K+30K) \times 0.01 \\ &= 3,762.90 \text{ Hz} \end{aligned}$$

$$\text{Frequency} = 264.7709 \text{ Hz}$$

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, resistors, 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 to use a desoldering pump or desoldering braids to remove component. This will minimize potential damage to the printed circuit board.



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.

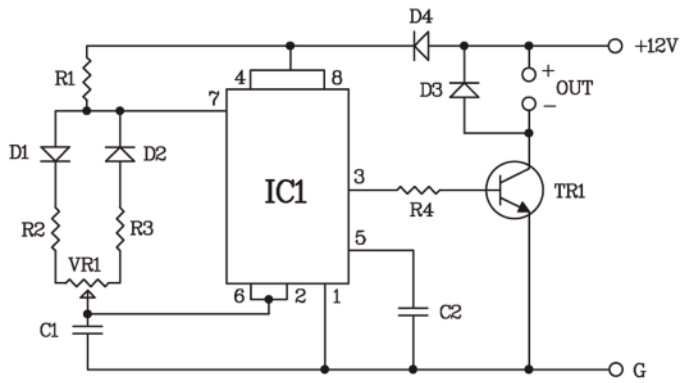


Figure 2 DC motor speed control circuit

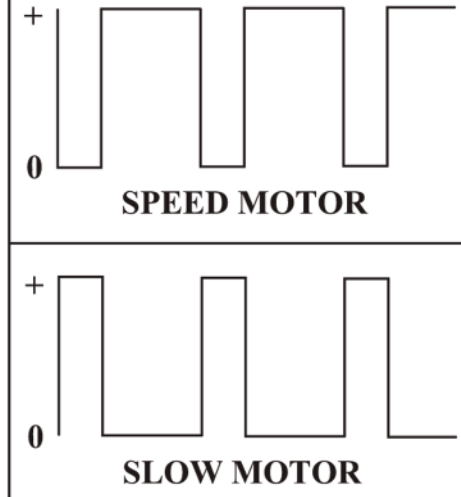
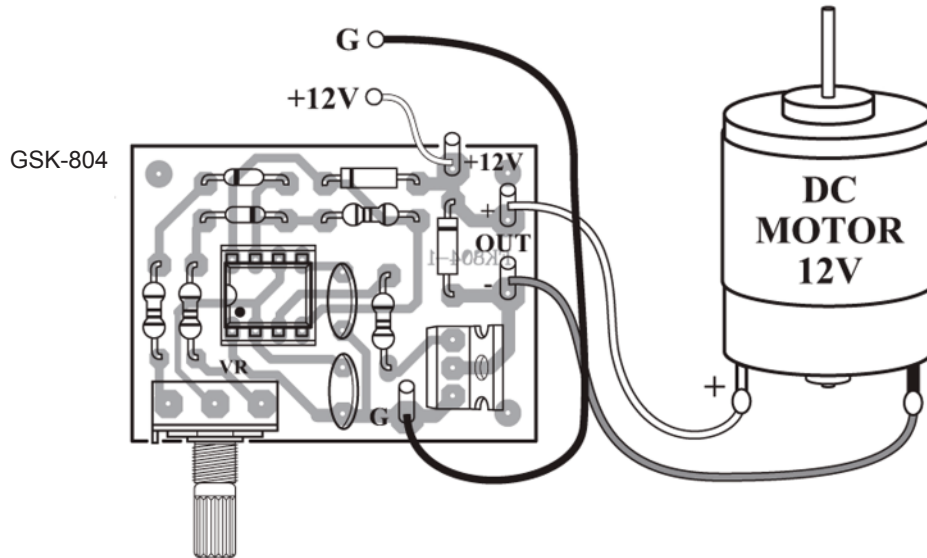


Figure 3 Connecting Circuits



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
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Ceramic Capacitors

C1, C2	103 or 0.01µf
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Transistor

TR1	C1061 or D1933
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Diodes

D1, D2	1N4148
D3, D4	1N4001

Integrated Circuit

IC1	555
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