

## Generating -5 Volts From a 9 Volt Battery

A 555 timer can be used to generate a squarewave to produce a negative voltage relative to the negative battery terminal. When the timer output at pin 3 goes positive, the series 22 uF capacitor charges through the diode (D1) to about 8 volts. When the output switches to ground, the 22 uF cap discharges through the second diode (D2) and charges the 100 uF capacitor to a negative voltage. The negative voltage can rise over several cycles to about -7 volts but is limited by the 5.1 volt zener diode which serves as a regulator. Circuit draws about 6 milliamps from the battery without the zener diode connected and about 18 milliamps connected. Output current available for the load is about 12 milliamps. An additional 5.1 volt zener and 330 ohm resistor could be used to regulate the +9 down to +5 at 12 mA if a symmetrical +/- 5 volt supply is needed. The battery drain would then be around 30 mA.

