Positive to negative supply converter.



This circuit will produce a low current negative power supply from a positive power supply. The circuit was needed to operate dual supply op-amps from a + 12V power supply.

Circuit diagram.



The 555 timer IC operates as a 1.4kHz astable and produces an output of 12V pulses at pin 3. These pulses pass through C_1 which stops the pulses being referenced to 0V. D_1 clamps the positive peaks of the pulses to 0V, so producing negative pulses. These pulses pass through D_2 and charge C_2 to produce the negative supply.

The various 100nF, 1μ F and 100μ F capacitors are to remove high frequency pulses from both the input and output power supply lines. The 5mH inductor also helps to stop high frequency pulses passing onto the 12V supply line.

With a +12V input, the output voltage is -8.8V unloaded and -7.6V when supplying a current of 40mA. The ripple voltage at this current is 20mV peak to peak.

Experiments at different operating frequencies:-

At 144Hz, the output voltage at 40mA was 8.2V but the ripple voltage was 200mV peak to peak. At 15.25kHz, the output voltage at 40mA was 8.1V, with 20mV peak to peak ripple but there was high frequency oscillation on the ripple voltage.