5V supply derives power from 3-wire RS-232 port

The circuit of **Figure 1** produces a semi-regulated 5V output from an RS-232 port. Unlike a PC-mouse supply or comparable circuits that rely on the modem-control signals DTR and RTS, this one operates with a 3-wire port (GND, Rx, and Tx), and obtains power only from the Tx line. (Except at high duty cycles, the Tx line, RCV-232, remains operational while supplying power.) The output current—about 8mA—is sufficient for CMOS microcontrollers and other low-power circuits.

IC1 is a switched-capacitor, charge-pump voltage converter that can either invert an input voltage or double it. The connections shown provide a doubler configuration in which the normal input-voltage polarity is reversed: a positive input voltage normally connects between GND and OUT, but this circuit connects a negative input between OUT and GND. The IC then doubles the negative V_{IN} in the positive direction, producing a positive output (at V_{DD}) equal to $|V_{IN}|$.

The zener diode D1 acts as a shunt regulator that "semi-regulates" V_{IN} to -5V (actually to -4.7V). The 33µF capacitor values shown are larger than normal, to support the output voltage during worst-case (all-zero) patterns of transmission. At 9600 baud, for example, an all-zeros character causes an output droop of about 0.2V. For lower baud rates, substitute a proportionally higher value for C1.

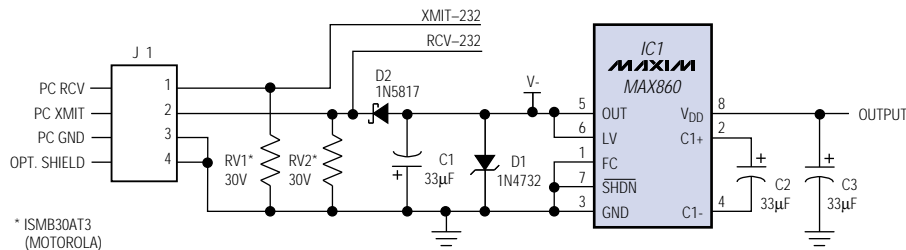*A related idea appeared in the 10/26/95 issue of EDN.*

(Circle 5)

Figure 1. Operating in voltage-doubler mode on a reversed-polarity input voltage, this switched-capacitor voltage converter produces a semi-regulated 5V at 8mA from the Tx line of an RS-232 port.