

Increasing Regulator Outputs

It is often necessary to arrange an integrated circuit 3-terminal voltage regulator to give a higher output voltage than that set by the regulator alone. The normal way of doing this is to connect the "common" terminal to the mid-point of a potential divider hung between the regulated output and ground. The regulator voltage now appears across the top divider resistor; hence, if for example equal divider resistors are used, the output voltage is twice that maintained by the regulator between its common terminal and output.

The problem with this method is that most IC regulators (eg the 78-series) have a small quiescent current (approx 10mA) flowing out of the common terminal to ground. The magnitude of this current is not closely controlled, and hence the total output voltage becomes somewhat unpredictable due to this extra current flowing in the bottom half of the divider. Low divider resistor values help, but there are likely

to be the complications of heat dissipation and inefficiency.

The circuit above avoids the problem by using transistor Q1 to generate a low impedance at the regulator common terminal by emitter-follower action, while transferring the voltage derived from a relatively high-resistance divider network. The value of R3 is not critical, but must be low enough to accept the highest likely quiescent current without causing Q1 to turn off.

The circuit shows a practical 24 Volt supply using a 7812 regulator.

