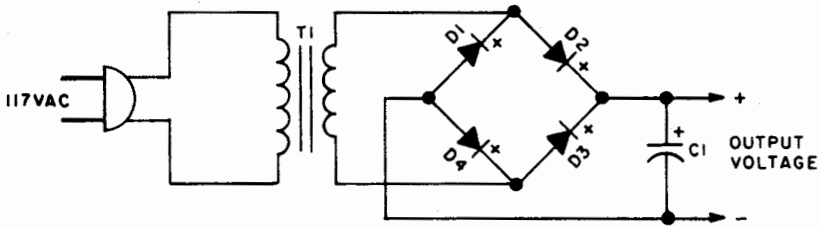
84 Basic Power Supply

☐ Though the transformer isn't center-tapped in this circuit, the bridge rectifier provides full-wave rectification with an easy-to-filter DC output. It forms a handy supply for solid-state projects.

The output voltage is equal to the secondary voltage multiplied by 1.4. Or, working backwards, the secondary voltage must be 0.707 times the desired output voltage.

Silicon rectifiers D1 through D4 must have a PIV rating equal to at least the DC output voltage. Their current rating must at least equal the current requirements of the project being powered by the supply.



PARTS LIST FOR BASIC POWER SUPPLY

C1—2500-uF electrolytic capacitor, voltage rating at least 1.5 times higher than output voltage
D1, D2, D3, D4—1A, 400-PIV silicon rectifier
T1—Transformer; 117-VAC primary, secondary voltage equal to desired output voltage x 0.707

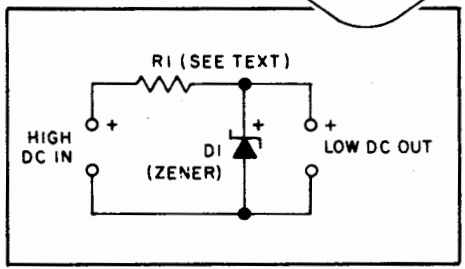
85 Zener Regulator

UPDATED

☐ When the output from an AC power supply is too high for a solid-state project, chop it down to size with a zener diode voltage regulator and keep it on the button.

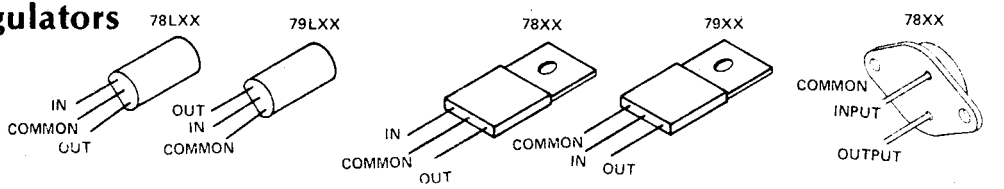
To calculate R, first add the load current and 1/20 of the load current for the zener's idling current. Then use Ohm's Law (R = E/I) to calculate R. The resistor's power rating should be twice the calculated power

The power rating for the zener diode is determined by the voltage across the diode squared, divided by diode's nominal internal resistance. You can calculate the internal resis-



29

Voltage Regulators



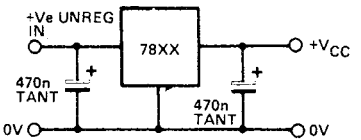
LOW POWER TYPES
TO92 CASE
100mA MAXIMUM

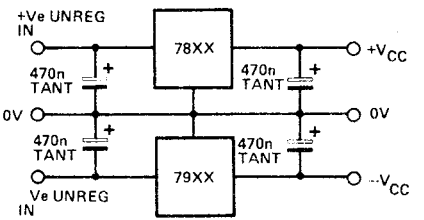
1A TYPES
TO220 CASE

TO3 CASE

Generally Available Output Voltages

78XX series	79XX series
+5V	−5V
+12V	−12V
+15V	−15V
+18V	−18V
+24V	−24V





Refer to manufacturer's information for maximum input voltage. Typically this is 25 V for 5 V devices and 35 V for all others. Regulators need about 2 V difference between the unregulated rail and the output rail. Less than this, and the output rail will collapse. Note that the power dissipated in the regulator
$= I_{OUT}(V_{UNREG} - V_{CC})$.
This can be several watts, and so sufficient heatsinking must be used.