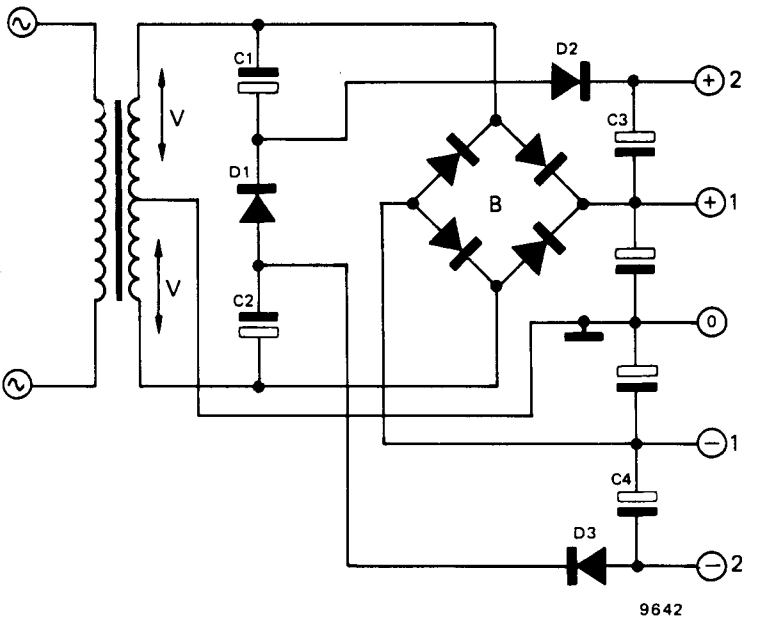
99 Besides the set of symmetrical supply voltages (±1 in the figure), it is often handy to have available a second set of symmetrical supply voltages (±2 in the figure). These voltages are higher than the ±1 voltages, and can supply only a relatively low current. With this circuit it is possible to obtain these auxiliary voltages from the same transformer windings as used for the main voltages.

The circuit operates as a symmetrical voltage doubler. Suppose the secondary of the transformer gives 2 x V volts rms and that the diode threshold voltages are


C1
D1
C2
V
V
D2
B
C3
C4
D3
+2
+1
0
−1
−2
9642

neglected. Then the voltages ±1 are equal to $\pm V \times \sqrt{2}$. Capacitor C3 is charged from C1 via D2 during one half cycle; during the next half cycle C4 is charged from C2 via D3. Consequently the points ±2 carry a voltage of $\pm 2\ V \times \sqrt{2}$ relative to supply common. For the practical circuit IN4000 series diodes can be used for D1, D2 and D3. The values of C1, C2 and C3 are 100 to 470 μF with a maximum voltage rating of at least $V \times \sqrt{2}$ volts.