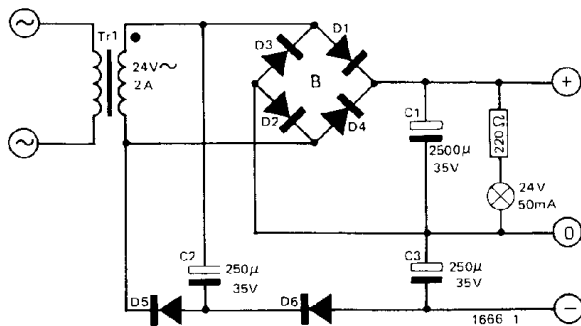


It is often necessary to provide a negative supply in circuits where the main supply voltage is positive. For instance, stabilised power supplies may require a negative reference voltage, so that outputs close to zero volts may be obtained, or it may be necessary to use operational amplifiers requiring + and - supplies in logic systems having a single positive supply rail. For these applications a second transformer winding is an expense that can be avoided using this simple circuit.

The circuit operates on a voltage doubler type of principle. The positive supply is obtained from a conventional bridge rectifier. On the positive half-cycle (with respect to the end of the transformer winding marked with a dot) C1 charges through D1 and D2. C2 charges through D5. During the negative half-cycle C1 charges through D3 and D4.



D5... D6=1N4002

Whilst D3 is conducting, the potential on the positive end of C2 is held at just below zero volts (due to the voltage drop across D3). This means that the negative end of C2 is at minus the supply voltage. C3 therefore charges from the voltage across the transformer secondary and C2 through D4, D6 and C1. To ensure that (almost) equal voltages appear across C1 and C3, D3 must remain in conduction.

This means that the current drawn by the positive supply must be greater than that drawn by the negative supply, so that the difference current will flow back along the zero volt rail, through D3. If the positive and negative supply currents are equal then an indicator lamp may be connected across the positive supply to produce an imbalance. This will also serve as a mains indicator.

**+/-/-  
from  
one  
winding**