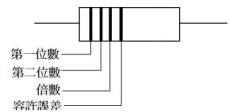
認識電阻



黑	棕	紅	橙	黃	綠	藍	紫	灰	白	金	銀
0	1	2	3	4	5	6	7	8	9	±5%	±10%

範例：

棕黑紅=> 10x10^2=1000 ohm

紅紅棕=> 22x10 =220 ohm

認識電容

陶瓷電容(無極性)

101：**10x10^1 pF**

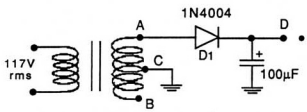
102：**10x10^2 pF**

103：**10x10^3 pF**

電解電容(有極性)

長腳正極、短腳負極

E1.2 Half-Wave Rectifier with Capacitive Filter



(a) Connect the circuit as shown in Fig. 5.3, and measure the voltages at *A* and *D* using your DVM on both its ac and dc ranges.

• Now, with your oscilloscope whose channel gains and zero levels are equalized, measure nodes *A* and *D*.

(b) Connect a 1 kΩ load from node *D* to ground and observe the voltages on nodes *A* and *D* with your "normalized" scope. Examine the ripple in some detail, with particular attention to the interval of diode conduction.

• While carefully examining the conduction interval, shunt the load by another 1 kΩ resistor intermittently. With a DVM connected to node *D*, note the small change in dc voltage which results.

* • Now, with the original 1 kΩ still connected, shunt the output by a 1000 μF capacitor. Note: depending on its brand, type, age, and frequency of use, this large capacitor might exhibit considerable leakage (which may reduce if it is left connected for some time). Observe nodes *A* and *D* with your oscilloscope, and node *D* with your DVM set for dc measurement, while intermittently connecting an additional 1 kΩ load.

Consider the benefit of a large filter capacitor in reducing ripple amplitude and rising the output voltage. Compare your results with those implied by Eq. 3.36 in the Text.

E2.1 Full-Wave Operation Using a Center-Tapped Transformer

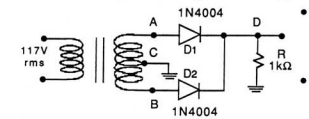


Figure 5.6 A Full-Wave Rectifier with Center-Tapped Transformer

• Assemble the circuit shown in Fig. 5.6, measuring nodes *A* and *B*, then nodes *A* and *D*, with the oscilloscope line-triggered and "normalized". Measure also the ac and dc voltages at node *D* using your DVM.

• While examining the waveform at *A* and *D* in some detail, connect a 100 Ω resistor intermittently from *A* to *D*. Note: be careful, it will get quite hot!

Consider the fact that both half cycles of the input sine wave are now employed. Verify the peak, average and RMS values of the voltage at *D* in comparison with that at *A* and/or *B*.

E3.1 A Full-Wave Bridge Without Filter

For purposes of comparison with previous experiments, we shall continue to use half the total available winding, as shown in Fig. 5.7.

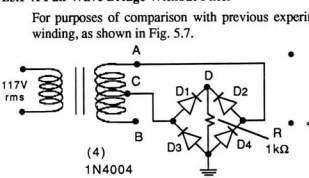


Figure 5.7 A Full-Wave Bridge with Resistor Load

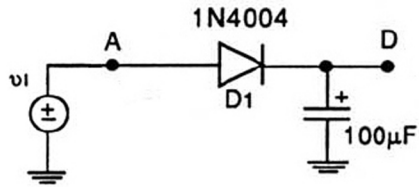
• Connect the circuit as shown in Fig. 5.7, using your DVM to measure the ac and dc voltages between *A* and *C*, and between *D* and ground. Display the waveform at *D* on your oscilloscope.

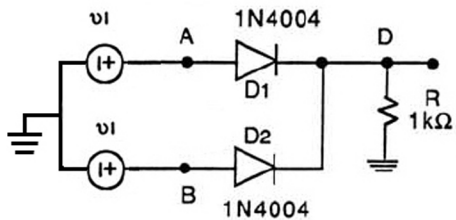
* • Repeat the measurements above with a 100 Ω resistor. Shunting *R* intermittently. *Be aware* that the power dissipation in the 100 Ω resistor in this situation is quite high. *Do not hold its body* in your fingers.

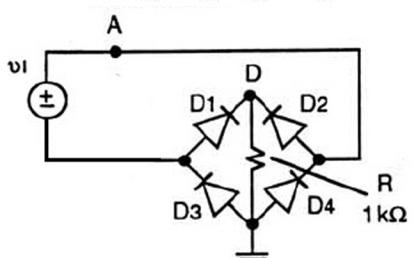
Consider these measurements in comparison to those for the centre-tapped full-wave scheme in exploration 2.1 above, noting the effect of extra diode drops. Use your DVM data to deduce the average diode drop that applies.

** • Repeat the previous explorations with the circuit of Fig. 5.7, *but* using transformer connections *A* and *B*. Be *very careful* with load heating.

Consider the relative reduction in importance of diode drops in your results.


1N4004
A
D
vI
D1
+
100μF


vI
1N4004
A
D
D1
R
1kΩ
vI
D2
B
1N4004


A
vI
D
D1
D2
R
1kΩ
D3
D4