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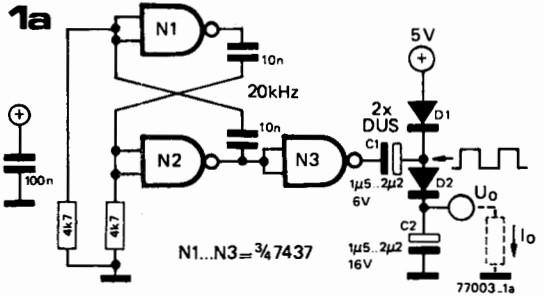
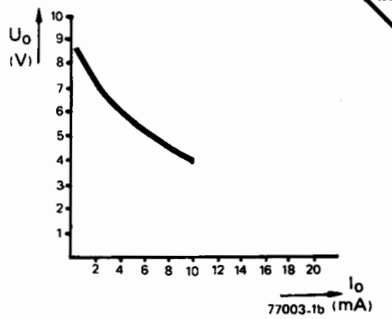
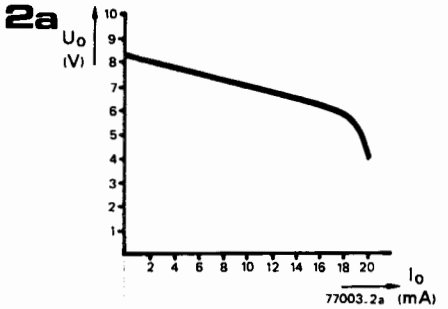
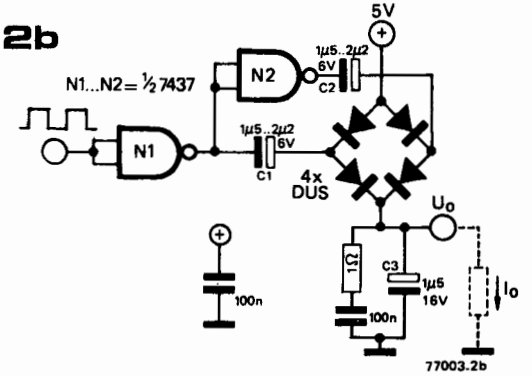
TTL voltage doubler









This voltage doubler can be used in circuits that have only a 5 V supply rail, where a higher voltage is required at a low current.

Figure 1a shows the basic circuit, which uses three of the gates in a 7437 quad two-input NAND buffer IC. N1 and N2 are connected as a 20 kHz astable multivibrator, and the output of N2 drives N3, which acts as a buffer between the astable and the doubler circuit. When the output of N3 is low C1 charges through D1 and N3 to about +4.4 V. When the output of N3 goes high the voltage on the positive end of C1 is about 9 V, so C1 discharges through D2 into C2. If no current is drawn from C2 it will eventually charge to about +8.5 V. However, if any significant current is drawn the output voltage will quickly fall, as shown in figure 1b.

Much better regulation of the output voltage, as shown in figure 2a, can be obtained by using the push-pull circuit of figure 2b. This is driven from an identical astable to that in figure 1b. While the output of N1 is low and C1 is charging, the output of N2 is high and C2 is discharging into C3, and vice versa. Since C3 is being continually charged the regulation of the output voltage is much improved.