

**Overview**

In this unit your students should:

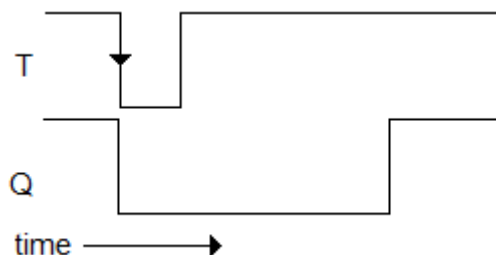
- know how to use an RC network as a spike generator
- be able to use clamp diodes to suppress spikes
- be able to draw timing diagrams for a NAND gate monostable
- design monostables to produce pulses of a given duration

This should not require more than 3 hours of class time.

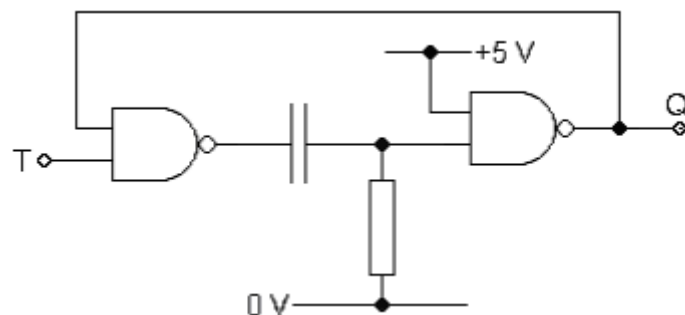
Hour	Suggested Activity
1	<p>Launch students straight into the <b>Making a monostable</b> practical. Not all students will manage all ten steps in the time, but all of them should get to step 8.</p> <p>Ask them to study <b>3.1</b> from the text book and answer questions 1 and 2 of the <b>Single Spikes</b> exercises.</p>
2	<p>Discuss their answers to questions 1 and 2 before getting them to work through the rest of the questions of the <b>Single Spikes</b> exercises.</p> <p>As they finish, they could do the first three steps of the <b>Multiple monostables</b> practical.</p> <p>Ask them to answer questions 1 and 2 on page 47 of the text book before the next session. You may need to remind them how to calculate the period of a waveform from its frequency.</p>
3	<p>Students who have successfully answered the questions from the text book could finish off the <b>Multiple monostables</b> practical.</p> <p>Students who need to have another go at the questions should consult <b>3.1</b> from the text book.</p> <p>Ask them to study <b>3.2</b> from the text book before the next session.</p>

**Model Answers**

1 (a)



(b)

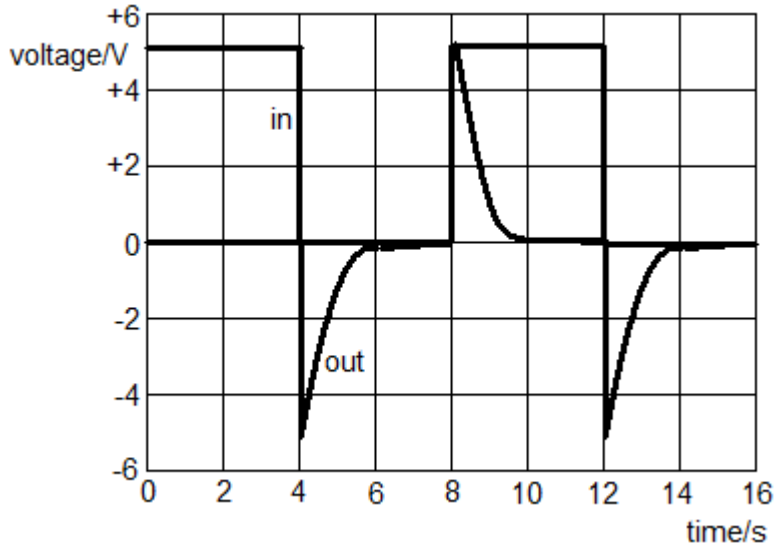


(c)  $T = 0.7RC = 50 \times 10^{-3}$  so  $RC = 50 \times 10^{-3} / 0.7 = 7.1 \times 10^{-2}$  s  
 If  $R = 71 \text{ k}\Omega$ , then  $C = 7.1 \times 10^{-2} / 71 \times 10^3 = 1.0 \times 10^{-6}$  F or  $1 \mu\text{F}$

2

(a)  $T = 1/f = 1/0.125 = 8.0$  s  
 (b)  $\tau = RC = 27 \times 10^3 \times 33 \times 10^{-6} = 0.89$  s

(c)  
 (d)



(e) When the output is forced below  $-0.7$  V, the diode becomes forward biased. Its resistance drops to a low value, allowing the capacitor to discharge rapidly.

