

**Overview**

In this unit your students should:

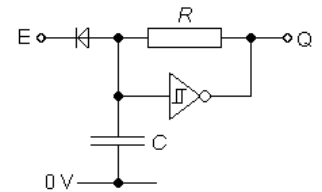
- learn the block diagram of a continuous sequencer
- understand how to analyse continuous sequencers
- know how to represent the behaviour of a continuous sequencer with a timing diagram
- understand how to design continuous sequencers

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

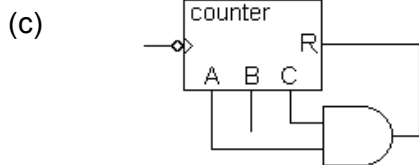
Hour	Suggested Activity
1	<p>Discuss their answers to questions 1 and 2 of the <b>Continuous Sequencers</b> exercises. Then set them on to the <b>Gray code</b> practical.</p> <p>As they finish, let them move straight on to the <b>One, two, three</b> practical. They will have a chance to complete it next session.</p> <p>Ask them to answer question 3 of the <b>Continuous Sequencers</b> exercises before the next session.</p>
2	<p>Discuss their answers to question 3 of the <b>Continuous Sequencers</b> exercises.</p> <p>Let students continue with the <b>One, two, three</b> practical. Step 5 is an extension activity.</p>
3	<p>Students should spend the majority of this session working through questions 1 and 2 from page 118 of the text book. This should consolidate their understanding of continuous sequencers.</p> <p>Introduce the need for a D flip-flop and an enabled oscillator for a one-shot sequencer.</p> <p>Ask students to study <b>7.4</b> and answer question 1 of the <b>One-shot Sequencers</b> exercises before the next session.</p>

**Model Answers**

- 1 (a) One cycle in 2 s, so  $1/2 = 0.5$  Hz.  
 $T = 0.5RC = 0.5$  so  $RC = 1$  s.  
 If  $R = 10 \text{ k}\Omega$  then  $C = 1 / 10 \times 10^3 = 1.0 \times 10^{-4}$  F or  $100 \mu\text{F}$ .

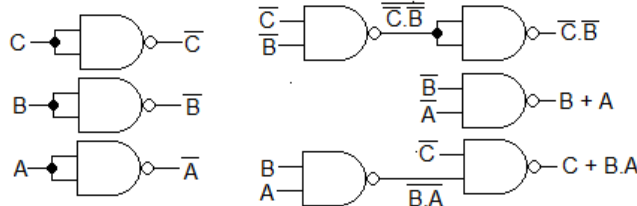


- (b) The system has five different states, and 5 is 101 in binary - a three-bit word.



- (d)  $L = \overline{C}.B.\overline{A} + \overline{C}.B.A = \overline{C}.B$   
 $M = \overline{C}.B.A + \overline{C}.B.\overline{A} + \overline{C}.B.A$   
 $M = B + A$   
 $N = \overline{C}.B.A + C.B.\overline{A} = C + B.A$

state	C	B	A	L	M	N
0	0	0	0	1	0	0
1	0	0	1	1	1	0
2	0	1	0	0	1	0
3	0	1	1	0	1	1
4	1	0	0	0	0	1



- 2 (a)  $T = 0.5RC = 0.5 \times 22 \times 10^3 \times 470 \times 10^{-9} = 5.2 \times 10^{-3}$  s  
 $f = 1/T = 1 / 5.2 \times 10^{-3} = 1.9 \times 10^2$  Hz or 190 Hz

- (b) The AND gate resets the counter on  $CBA = 101$  or 5, so there are five states.  
 Each state lasts for one clock cycle,  $5.2 \times 10^{-3}$  or 5 ms.

- (c)  $Z = \overline{A}.B + \overline{A}.C$   
 $Y = B.C$   
 $X = \overline{B}.C$

state	C	B	A	Z	Y	X
0	0	0	0	1	0	1
1	0	0	1	0	0	1
2	0	1	0	1	1	0
3	0	1	1	0	1	0
4	1	0	0	1	0	0

