The 555 Timer

Text Books

1. Electronic Devices and Circuit Theory

by R Boylestad and L Nashelsky

2. Op-Amps and Linear Integrated Circuits

by Ramakant A. Gayakwad

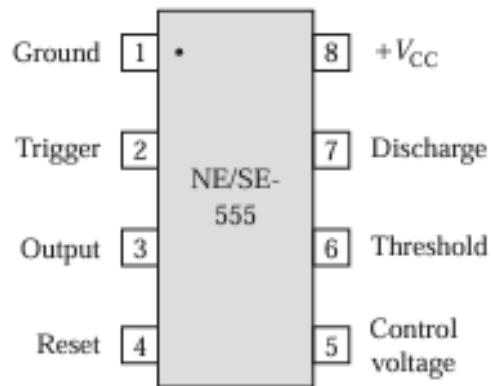**3. Microelectronic Circuits Analysis and Design**

by Muhammad H. Rashid

4. Electronic Principles 7th Edition

by Albert Malvino, David Bates

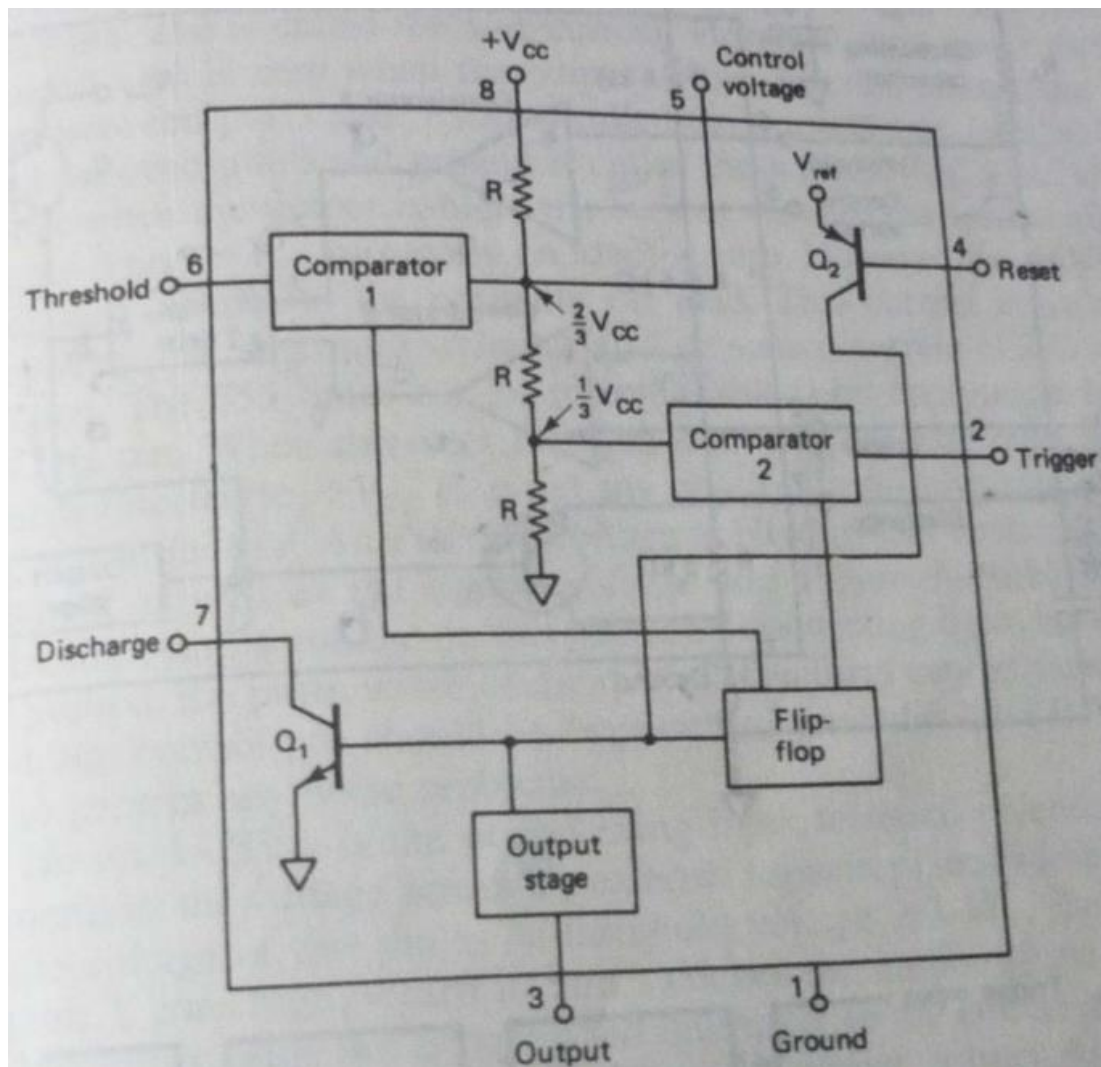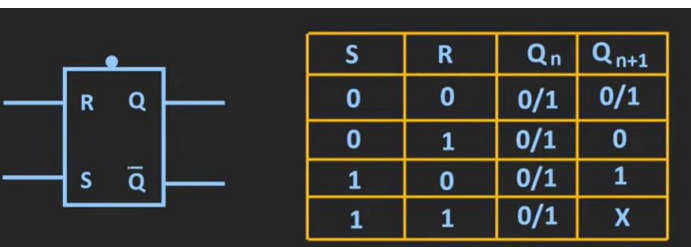**5. Operational Amplifiers & Linear Integrated Circuits: Theory and Application**
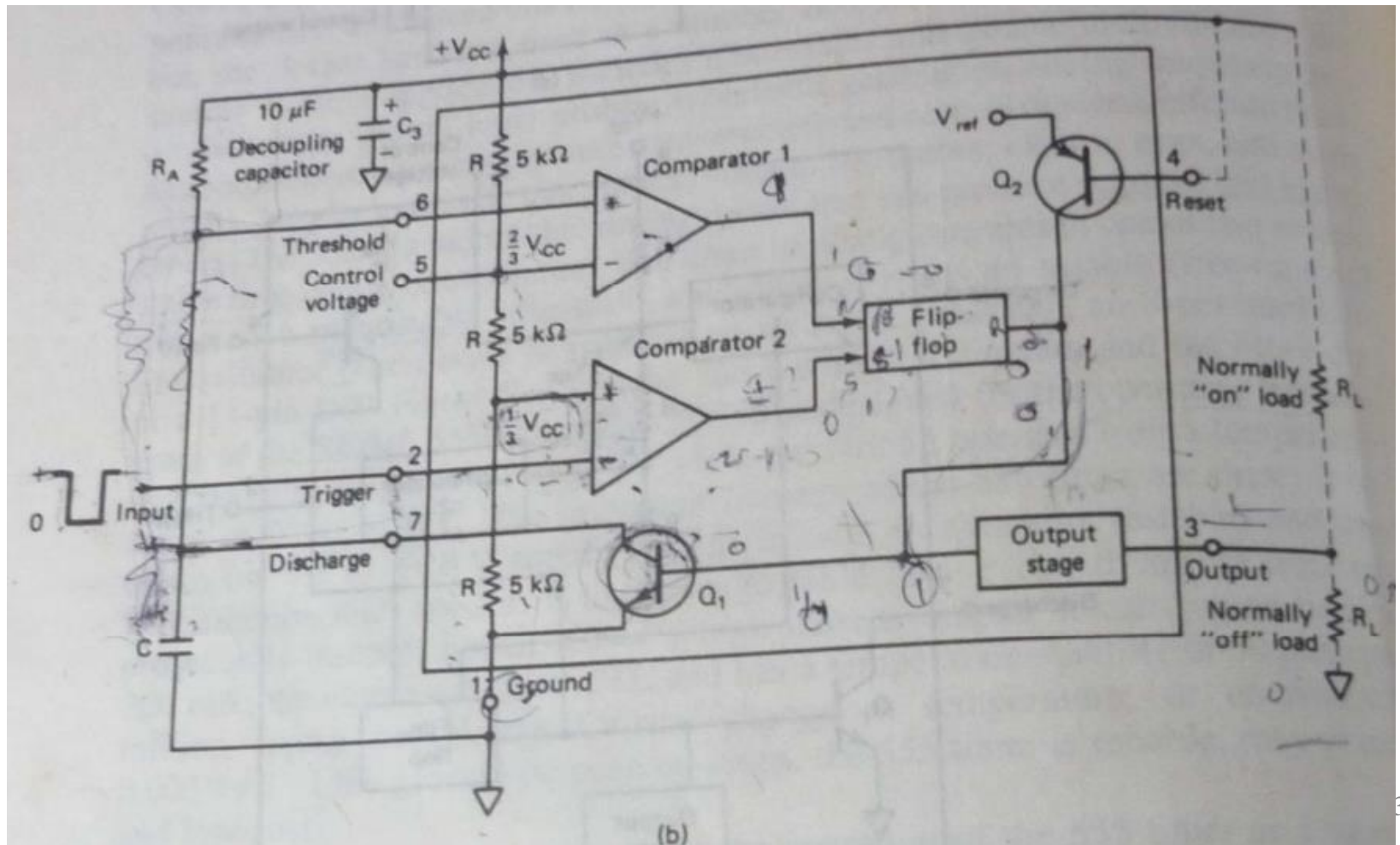
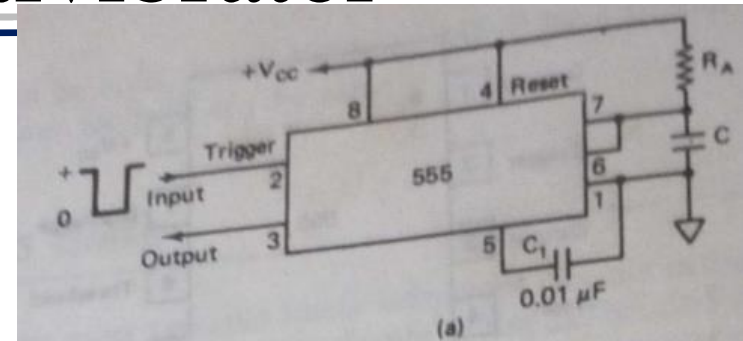*by James M. Fiore*

Functional Block Diagram

(a) Pin diagram
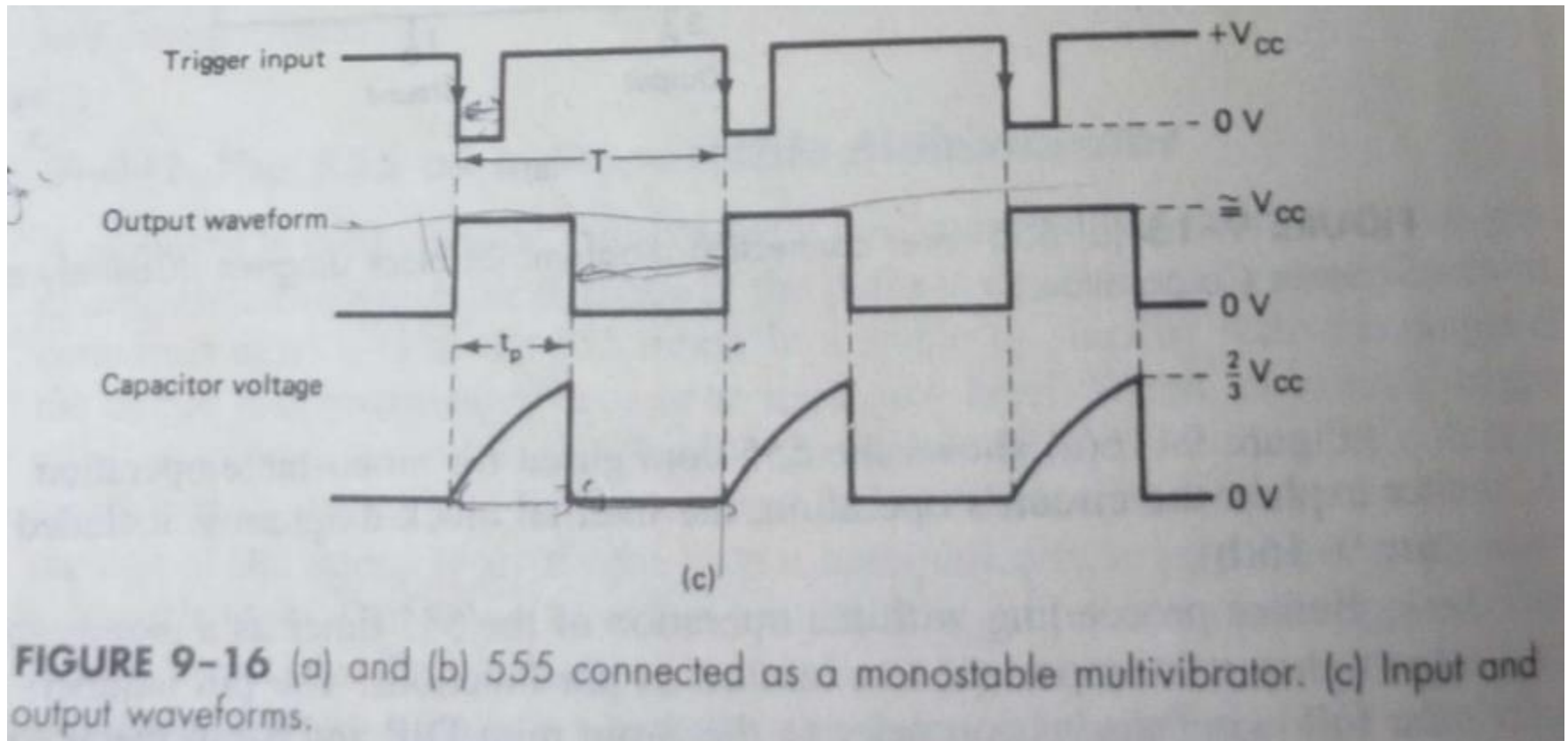
FIGURE 16.44 Functional block

S	R	Q_n	Q_{n+1}
0	0	0/1	0/1
0	1	0/1	0
1	0	0/1	1
1	1	0/1	X

Monostable Multivibrator

(a)

(b)

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Monostable Multivibrator

FIGURE 9-16 (a) and (b) 555 connected as a monostable multivibrator. (c) Input and output waveforms.
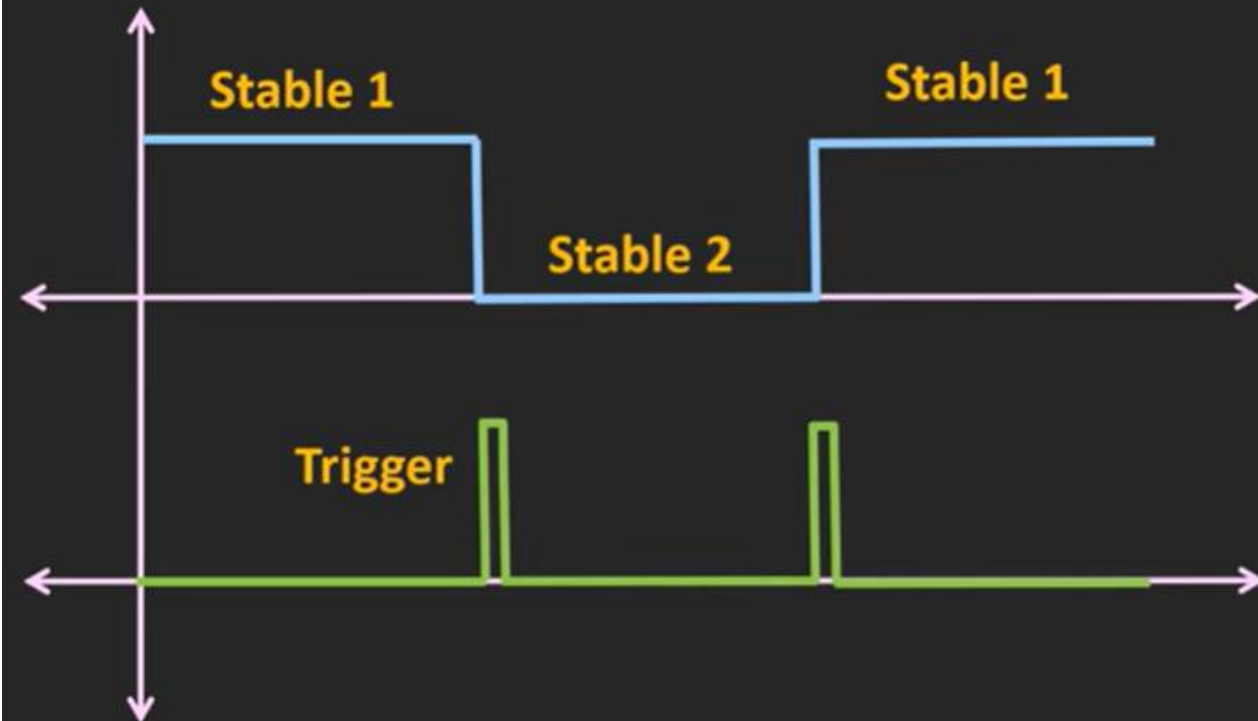
- **Needs external trigger pulse to set output high**
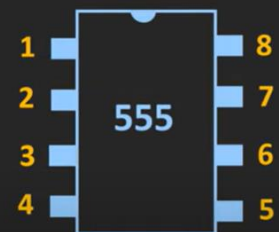- **One stable state (low state)**

Bistable Multivibrator

Why Bistable??

❖ It can operate over the higher voltage like 4.5 V to 15 V

❖ It can sued to drive certain devices like LED because 555 timer can source or sink to 200 nA of current
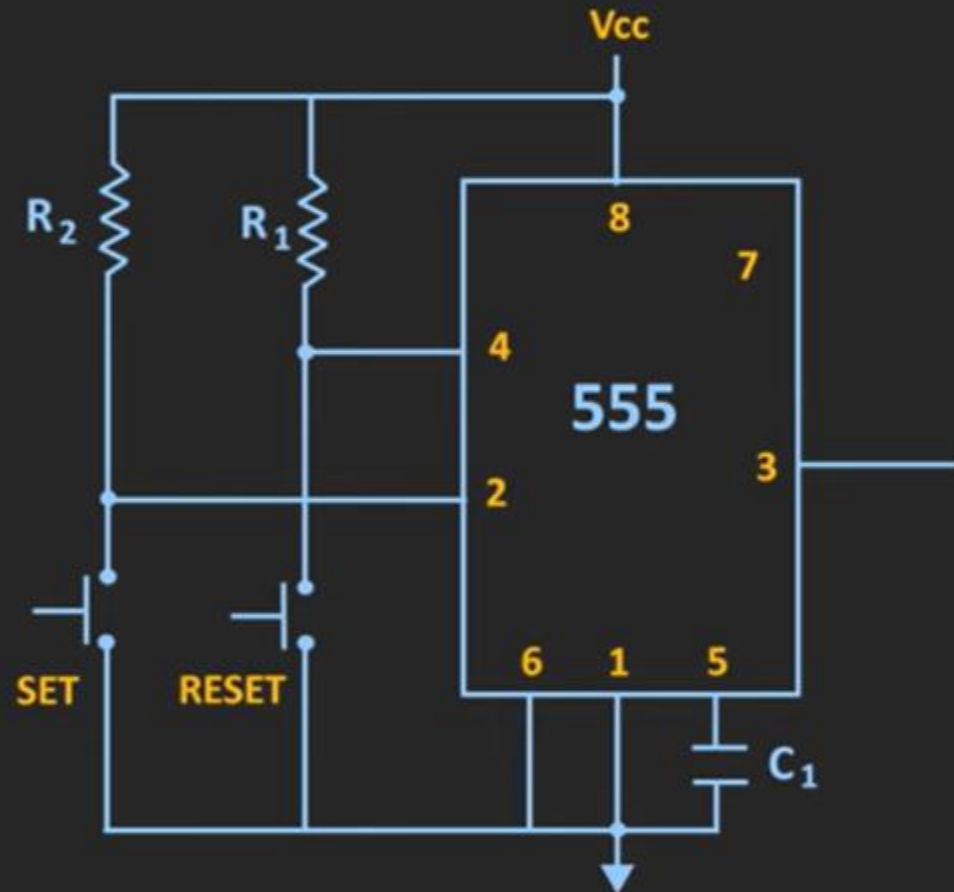
Bistable Multivibrator
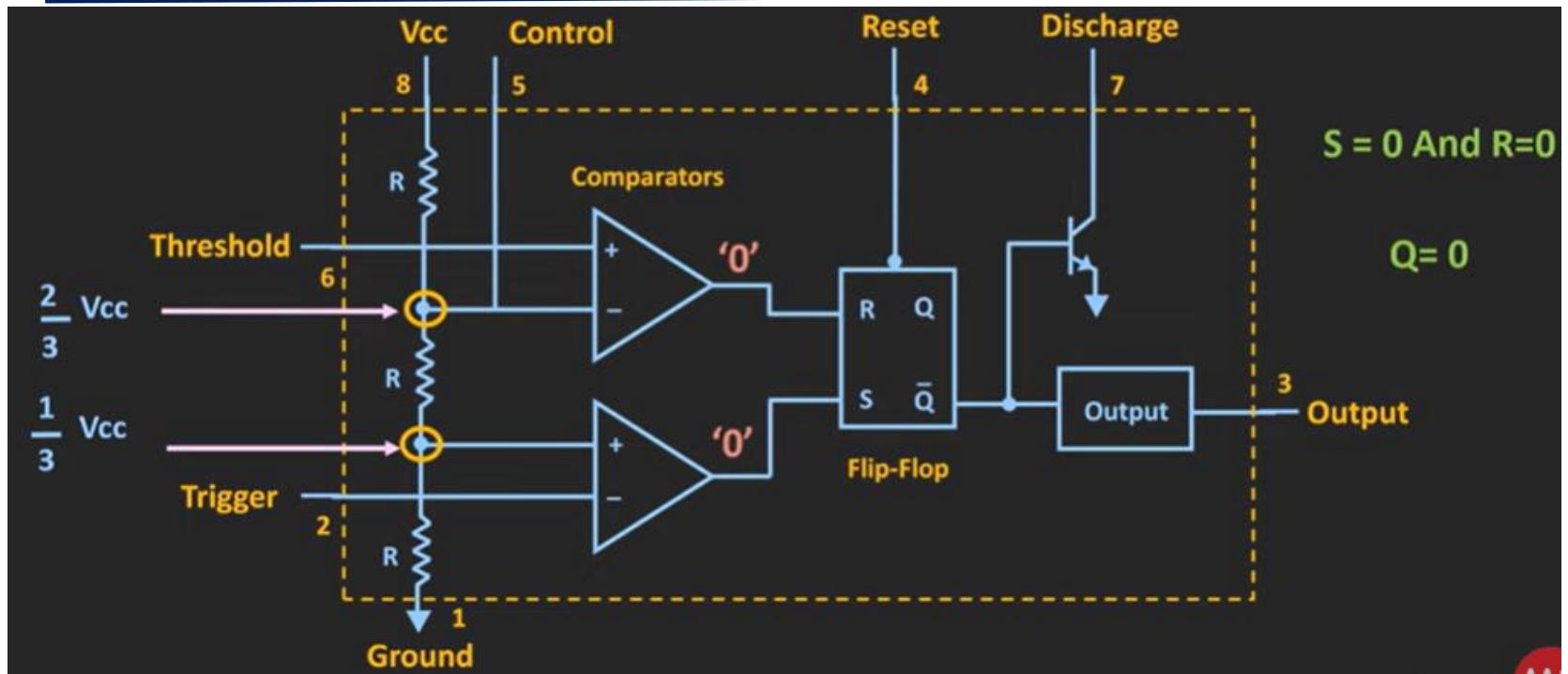

555 Timer as Bistable Multivibrator

1 - Ground
2 - Trigger
3 - Output
4 - Reset
5 - Control
6 - Threshold
7 - Discharge
8 - Vcc

Bistable Multivibrator

https://www.youtube.com/watch?v=mqMAVTO4GfM

(a)

(b)

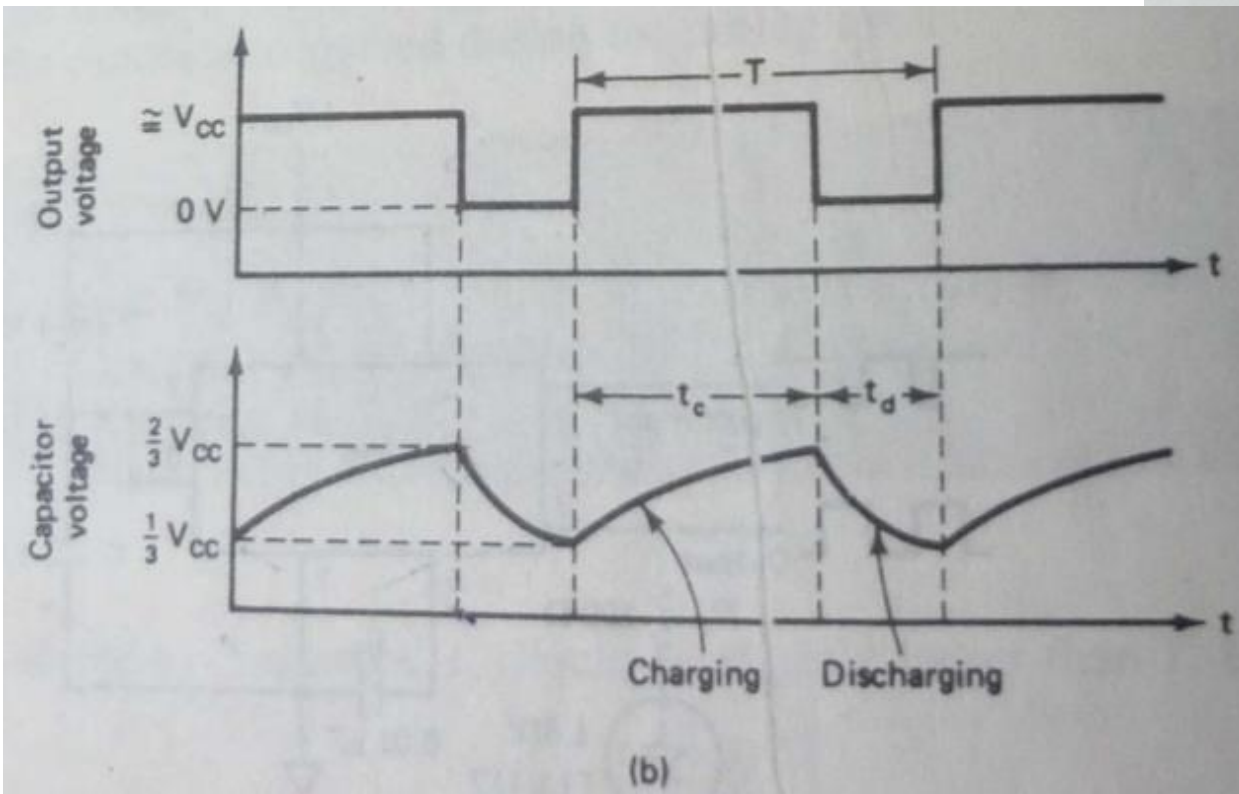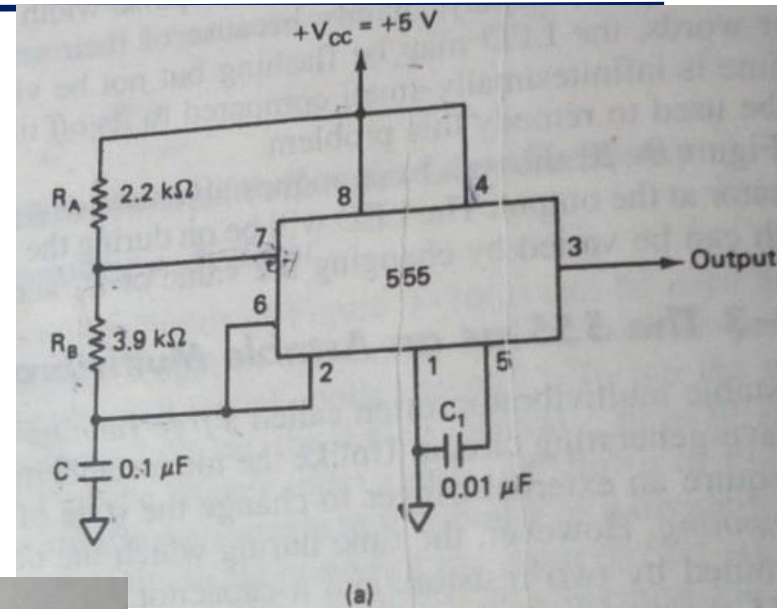Fig. The 555 as an astable multivibrator (a) Circuit (b) Capacitor and output voltage waveform

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Astable Multivibrator

$$\text{Charging time} = t_c = 0.69(R_A + R_B)C$$

$$\text{Discharging time} = t_d = 0.69(R_B)C$$

$$T = t_c + t_d = 0.69(R_A + 2R_B)C$$

$$\text{Duty cycle} = \frac{t_c}{T} \times 100$$

$$= \frac{R_A + R_B}{R_A + 2R_B}(100)$$

Chapter 16, Page 1131, 1132 of **Microelectronic Circuits Analysis and Design** *by Muhammad H. Rashid*

9-4-2 Monostable Multivibrator Applications

9-4-2(a) Frequency divider

The monostable multivibrator of Figure 9–16(a) can be used as a frequency divider by adjusting the length of the timing cycle t_p with respect to the time period T of the trigger input signal applied to pin 2. To use the monostable multivibrator as a divide-by-2 circuit, the timing interval t_p must be slightly larger than the time period T of the trigger input signal, as shown in Figure 9–19. By the same concept, to use the monostable multivibrator as a divide-by-3 circuit, t_p must be slightly larger than twice the period of the input trigger signal, and so on.

The frequenc~~   ~~tion is possible because the monostable multi-
vibrator cannot be
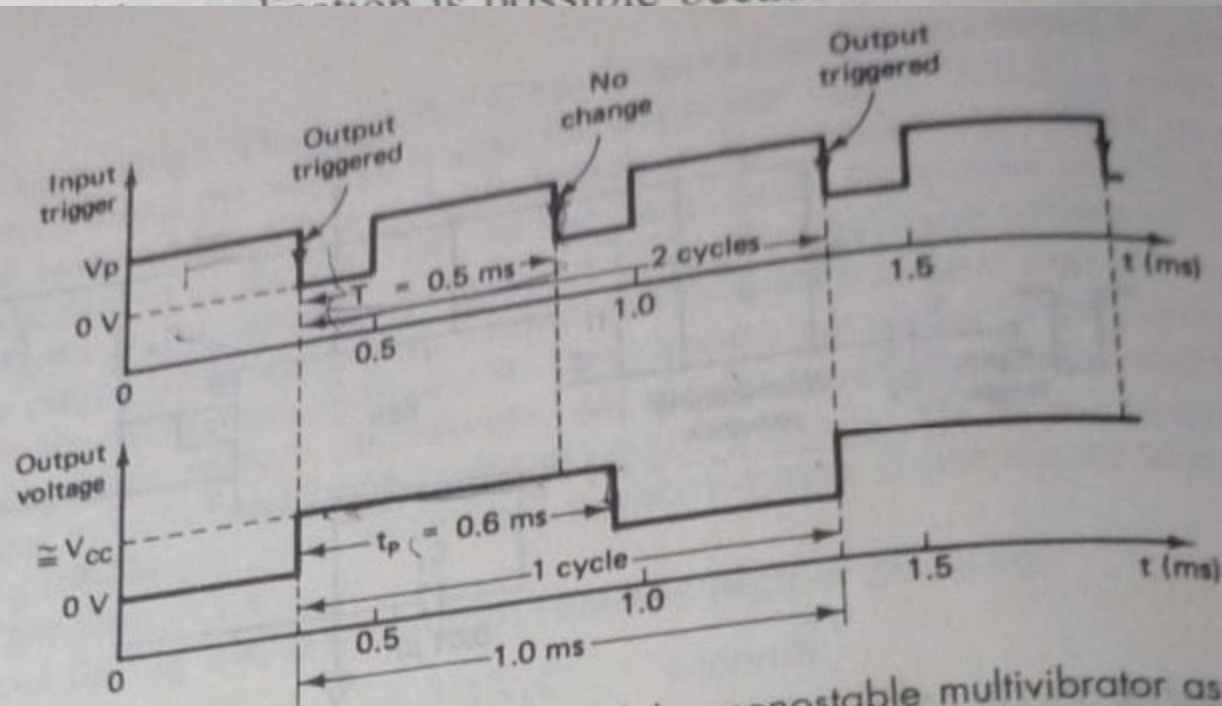
forms of the monostable multivibrator as

Please solve Examples and Exercise problems
of related topics

Practice yourself and send me
your feedback, if any.