16.312 (Formal Report)

LM-555

Project

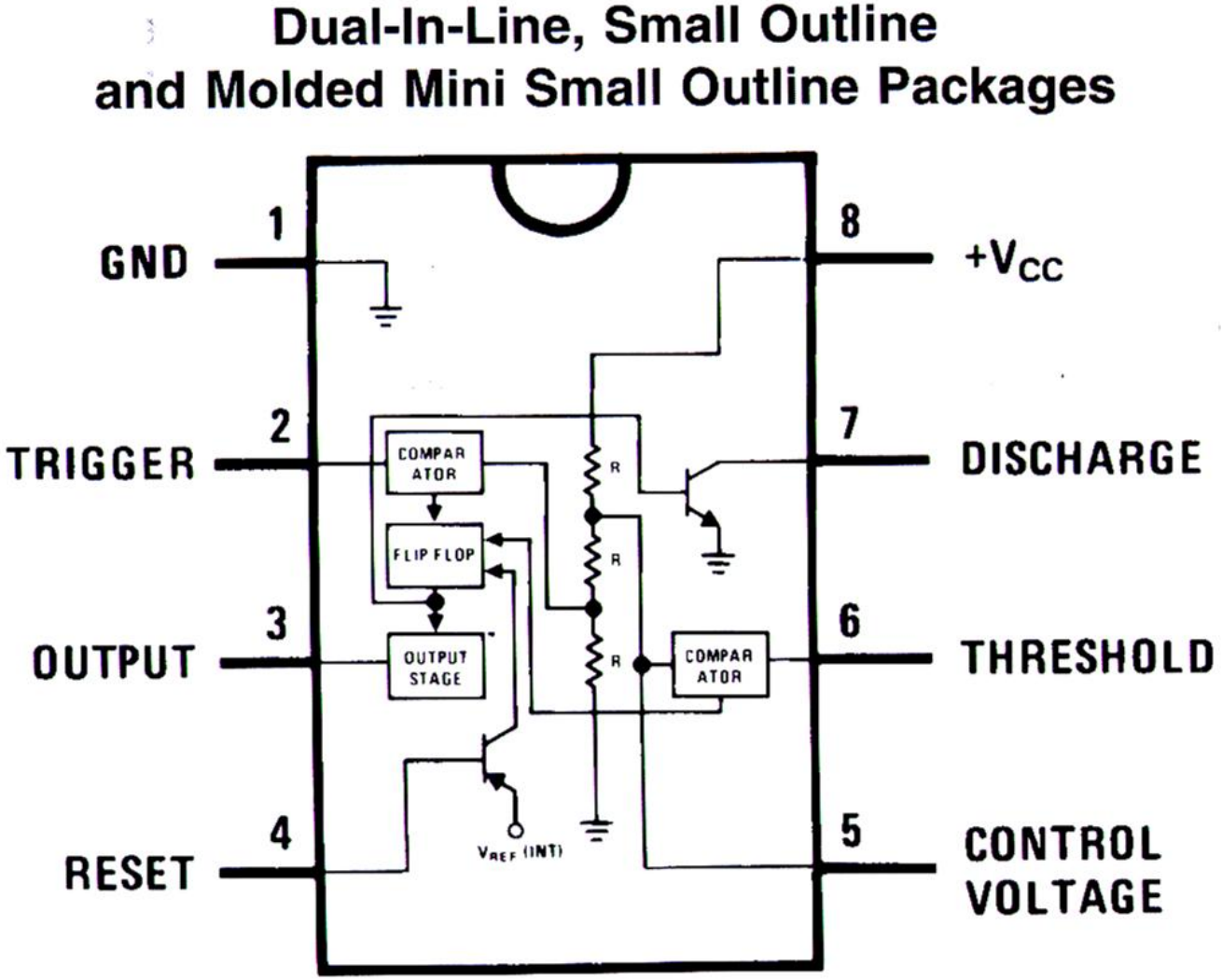
- Design a 50% Duty Cycle Oscillator at a frequency of 1 KHz.

Solderless Prototyping Board
top half for LM555 **devices**
bottom half for **trigger source**
jacks for power connections

LM555
Timer

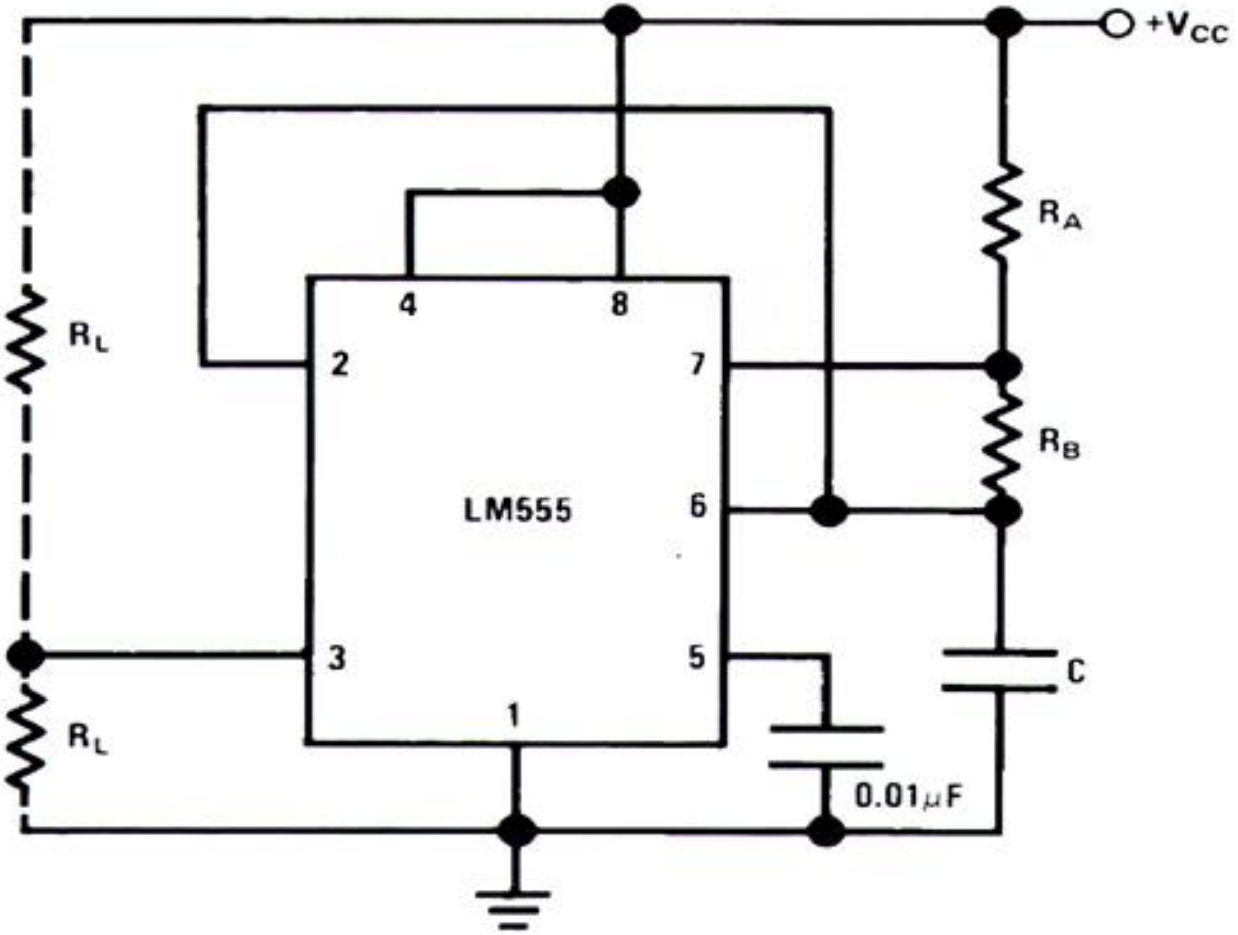
The LM555 is a highly stable device for generating accurate time delays or oscillation. Additional terminals are provided for triggering or resetting if desired.

LM 555 Timer


Dual-In-Line, Small Outline
and Molded Mini Small Outline Packages
GND
1
TRIGGER
2
OUTPUT
3
RESET
4
8
+Vcc
7
DISCHARGE
6
THRESHOLD
5
CONTROL
VOLTAGE
COMPAR
ATOR
FLIP FLOP
OUTPUT
STAGE
R
R
R
COMPAR
ATOR
VREF (INT)

Astable operation

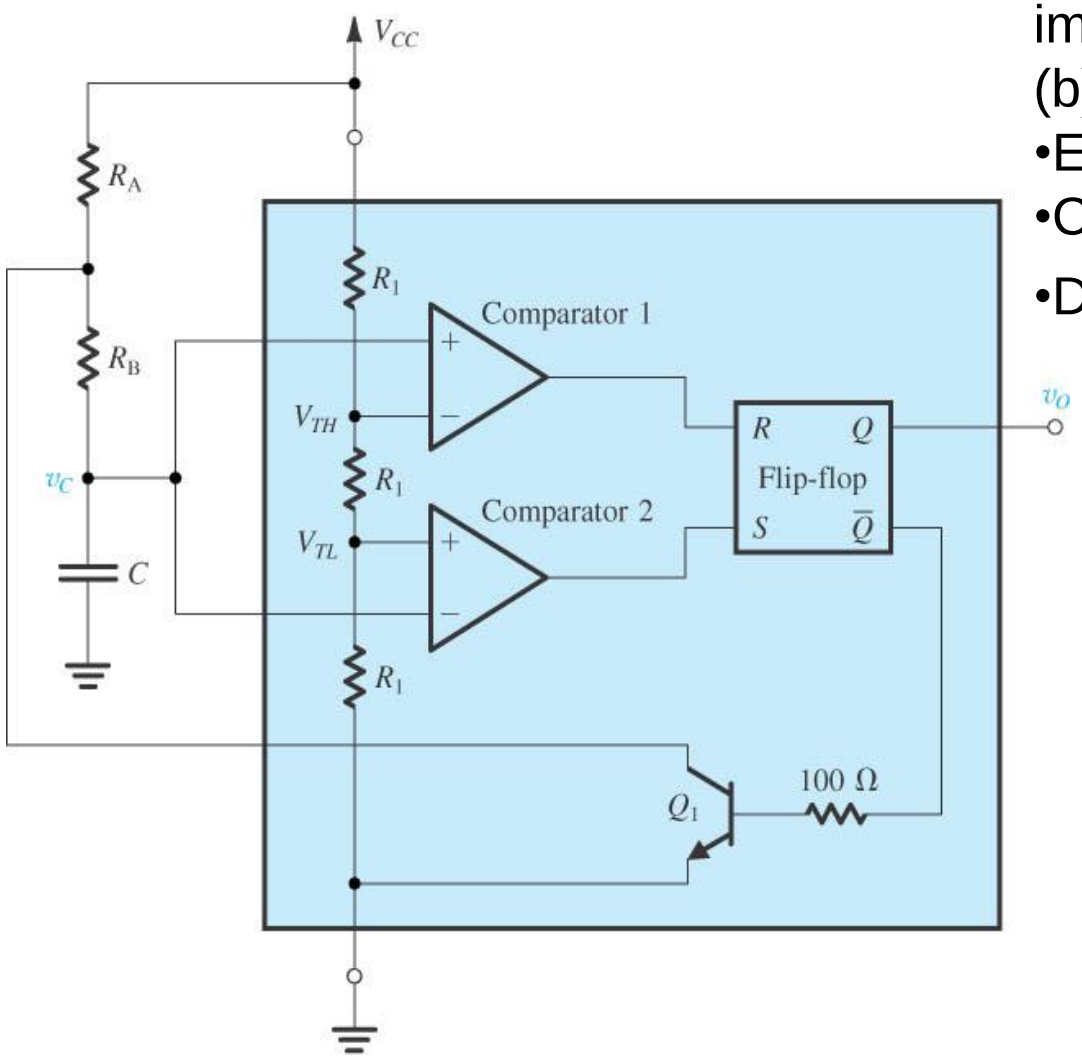
- Pins 2 & 6 connected
- Trigger itself and free run as a multivibrator



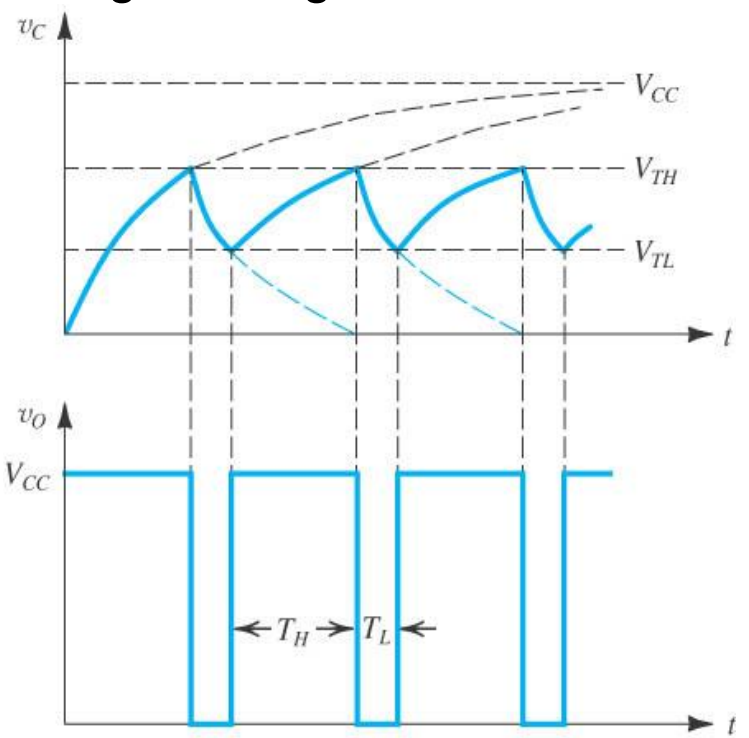
Astable operation

(a) The 555 timer connected to implement an astable multivibrator.
(b) Waveforms of the circuit in (a).

- External capacitor
- Charges through Ra + Rb
- Discharge through Rb.

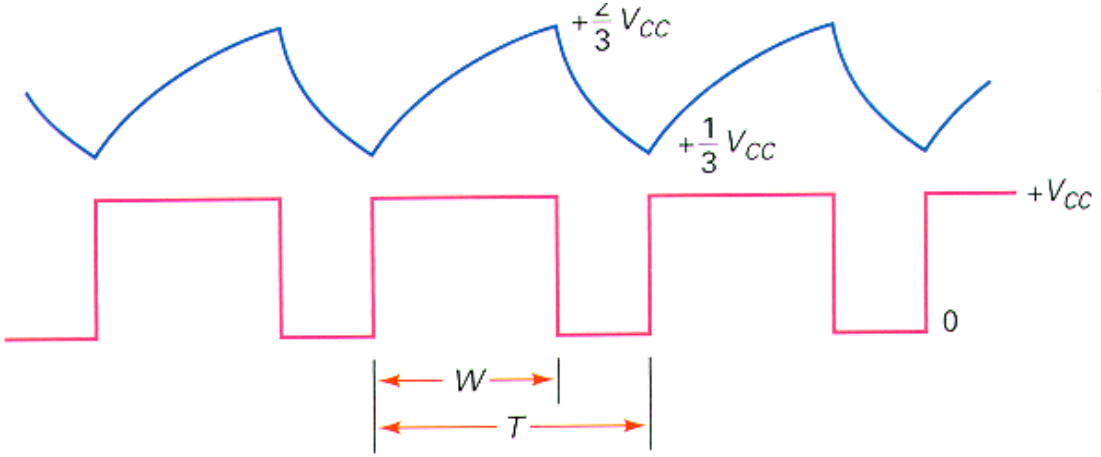


(a)



(b)

Astable Operation



Charge time (output high):

t1 = 0.693 (Ra + Rb) C

Discharge time (output low):

t2 = 0.693 (Rb) C

Total period:

T = t1 + t2 = 0.693 (Ra + 2Rb) C

Duty cycle:

D = W/T = t1/T = (Ra+Rb)/(Ra + 2Rb)

Grading

- Preparation:
  - circuit design schematic diagram: 30%

- Final design schematics: 10%
- Circuit description (how it works): 15%
- Neat circuit wiring on board: 10%
- Scope pictures: 10%
- Bench quiz: 15%

- Clean up the space: 10%

Being late?

- **Please be on time to your lab session. This will be good for you to finish your experiment on time.**
- **As a penalty, you will lose 5% of that experiment if you are >15 minutes late; lose 10% if you are 30 minutes late.**

Leave early?

- **Bad attitude:**
  - **Leave early without finishing the experiment;**
  - **and do not report to the TA with a reasonable excuse;**
  - **As a penalty, you will lose 5% of that experiment if you leave >15 minutes earlier; lose 10% if you leave >30 minutes earlier.**
- **The TA will need to allocate additional time to help you with the make-up session.**

Penalty for Plagiarism

- **Don't copy others in reports. Plagiarism**
- **= Failure in reports**
- **= F in this class!**