Programmable Interval Timer 8253 (PIT)

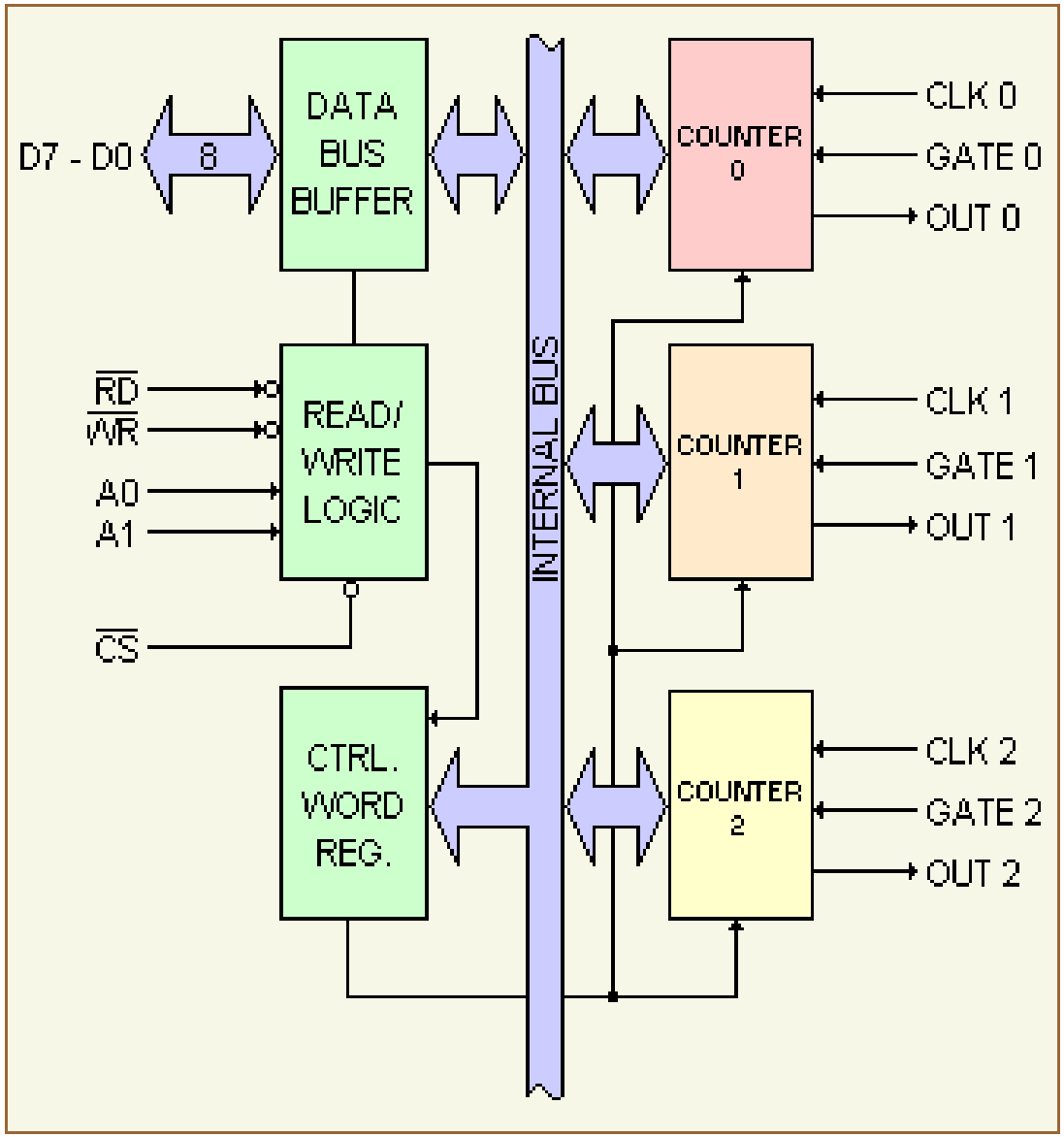
COE305 Lab.

By: Masud-ul-Hasan

What is 8253?

- The Intel 8253 is a programmable counter/ timer chip designed for use as an Intel microcomputer peripheral.
- It is packaged in a 24-pin plastic DIP.
- **Six** programmable timer modes allow the 8253 to be used as an event counter, elapsed time indicator, programmable one-shot, and in many other applications e.g., to create different intervals.
- It has 3 counters:
  - Counters 0, 1, 2

Block Diagram of 8253



- Each counter in the block diagram has 3 lines connected to it. Two of these lines, **clock** and **gate**, are inputs. The third, labeled **OUT** is an output.
- The function of these lines changes and depends on how the device is initialized or programmed.

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Interpretation of the Timer Control Byte

- **Bits 7,6:** Counter Selection (00 to 10)
- **Bits 5,4:** Read/load mode for 2-byte count value:
  - 00 -- latch count for reading
  - 01 -- read/load high byte only
  - 10 -- read/load low byte only
  - 11 -- read/load low byte then high byte
- **Bits 3,2,1:** Count mode selection (000 to 101)
- **Bit 0:** 0/1- Count in binary/BCD

Modes of Operation of 8253

- There are 6 modes of operation of 8253
- Differences in modes are:
  - "OUT" signal in different shapes like low-high or high- low, periodic or non-periodic
  - How to trigger/start the counter
- Mode 0 and 1 are same in shape (non-periodic)
- Mode 4 and 5 are same in shape (non-periodic)
- Mode 2 and 3 are almost same in shape (periodic)

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Modes of Operation of 8253

- **Mode 0: Set Output Bit when timer done.** The *output* will start off zero. The count is loaded and the timer will start to count down. When the count has reached zero the *output* will be set high, and remain high until the next count has been reloaded.
- **Mode 1: Programmable One-Shot.** The *output* will go low following the rising edge of the gate input. The counter will count and the *output* will go high once the counter has reached zero.

Modes of Operation of 8253

- **Mode 2: Rate Generator.** The counter will continually count down, when the count reaches zero, the *output* will pulse low and the counter will be reloaded.

- **Mode 3: Square Wave Generator.** This mode is similar to Mode 2 except the *output* remains low for half of the timer period and high for the other half of the period.

Modes of Operation of 8253

- **Mode 4: Software Triggered Pulse.** The *output* will remain high untill the timer has counted to zero, at which point the *output* will pulse low and then go high again.

- **Mode 5: Hardware Triggered Pulse.** The counter will start counting once the *gate* input goes high, when the counter reaches zero the *output* will pulse low and then go high again.

Modes of Operation of 8253

- If 6 is loaded in the counter then it will start count down from 6→0. After reaching 0, change the OUT signal like from Lo→Hi.
- First 2 MSBs select the counter. Addresses for 3 counters in flight board's 8253 are:

Register	Activity Allowed	Port Address
Counter 0	Read/Write	08H
Counter 1	Read/Write	0AH
Counter 2	Read/Write	0CH
Control Word	Write Only	0EH

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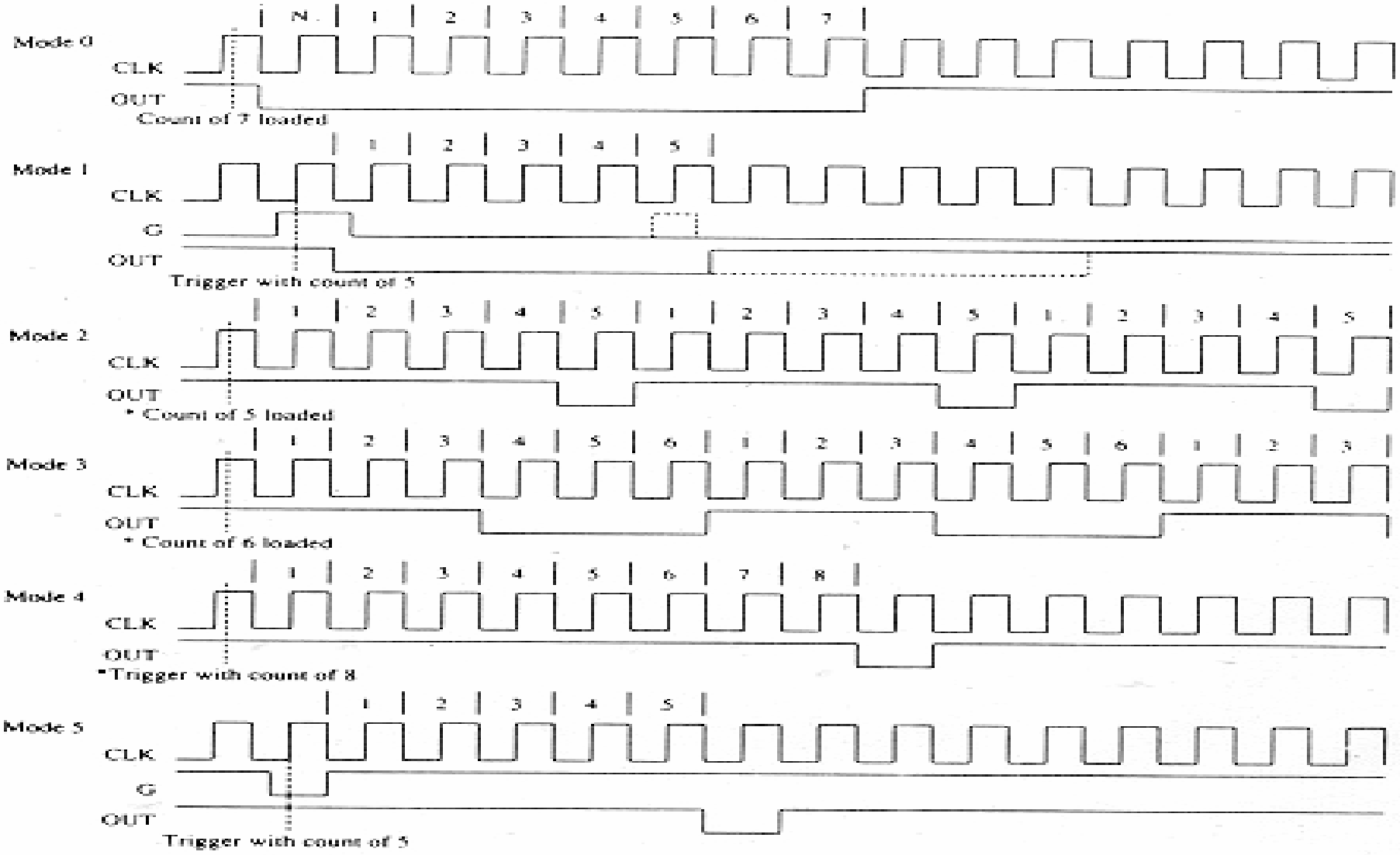

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