

Peripheral Interface Device 8155 (I/O Interface & Timer)

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Outline

- Programmable Interface device (Introduction)
- Requirement for programmable interface device
- Simple example configurable device
- Programmable Interface device 8155
 - Block diagram
 - Address diagram
 - Interfacing LED using 8155
- 8155 Timer
 - Modes of timer
 - Square wave generation using 8155 interfaced timer
- Next class (8055 Handshake & Interrupt mode)

Programmable Interface Device

- Designed to perform various I/O functions
- Device can be setup to perform specific functions
 - By writing instruction to a internal register
- Can be changed during execution of the program
- Devices are flexible, versatile & economical

Programmable Interface Device

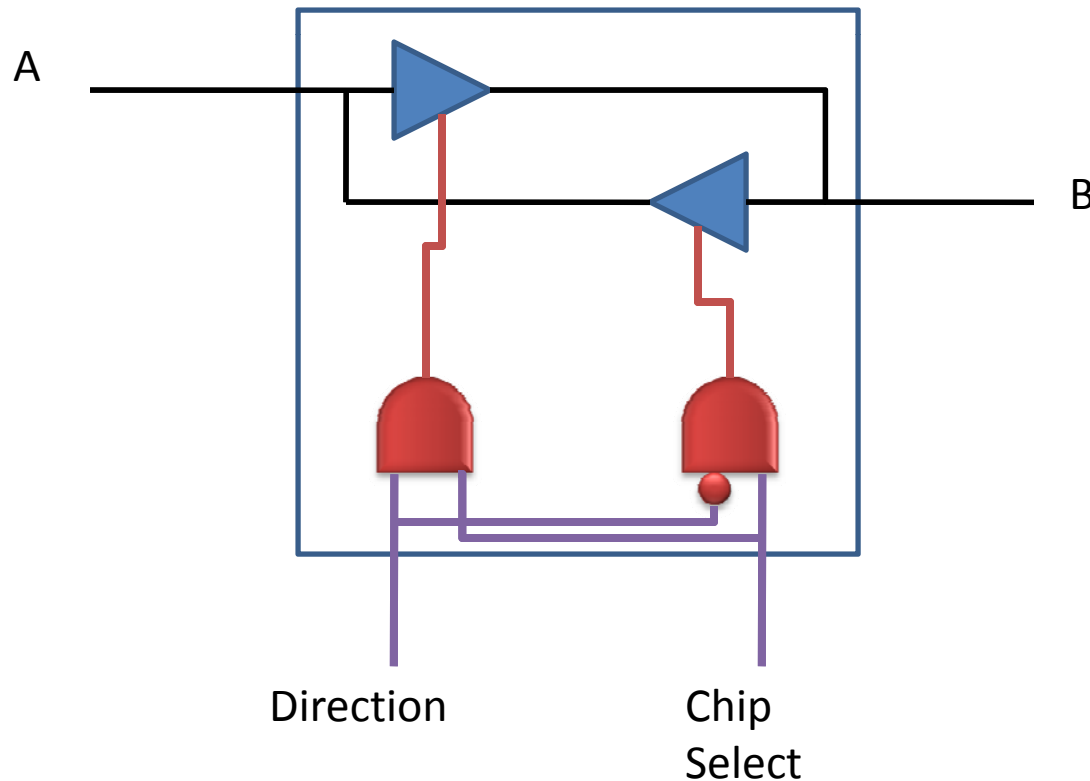
- Functions are determined by software instructions
- Can be viewed as multiple I/O device
- Perform many functions
 - Time delay, counting, interrupts
- Consists of many devices on a chip, interconnect through a common Bus
- Software programmable approach of I/O reduce design time

Requirement for a programmable Interface Device

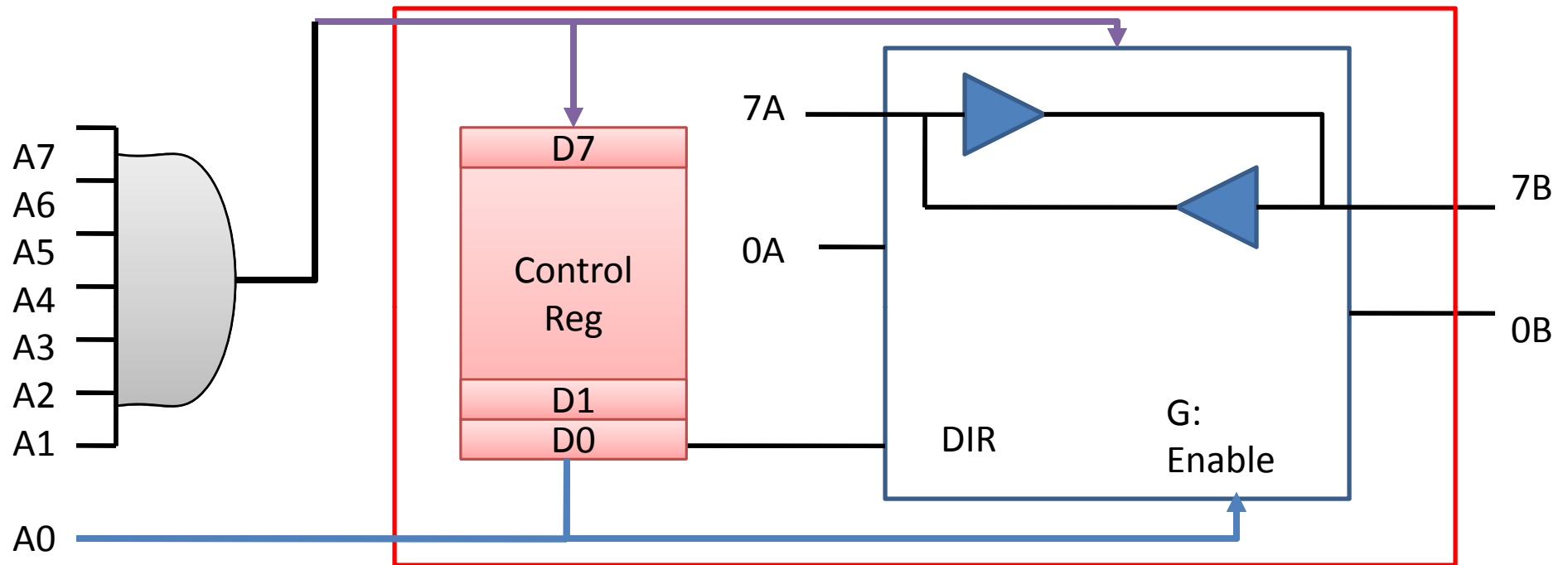
- I/P & O/P Regs: A group of latches to hold data
- Tri-State Buffer
- Capability of Bidirectional data flow
- Handshake & Interrupt signal
- Control Logic
- Chip Select Logic
- Interrupt control logic

Programmable interface Device

- Configurable Device Example
- Latch Direction



Making latches programmable



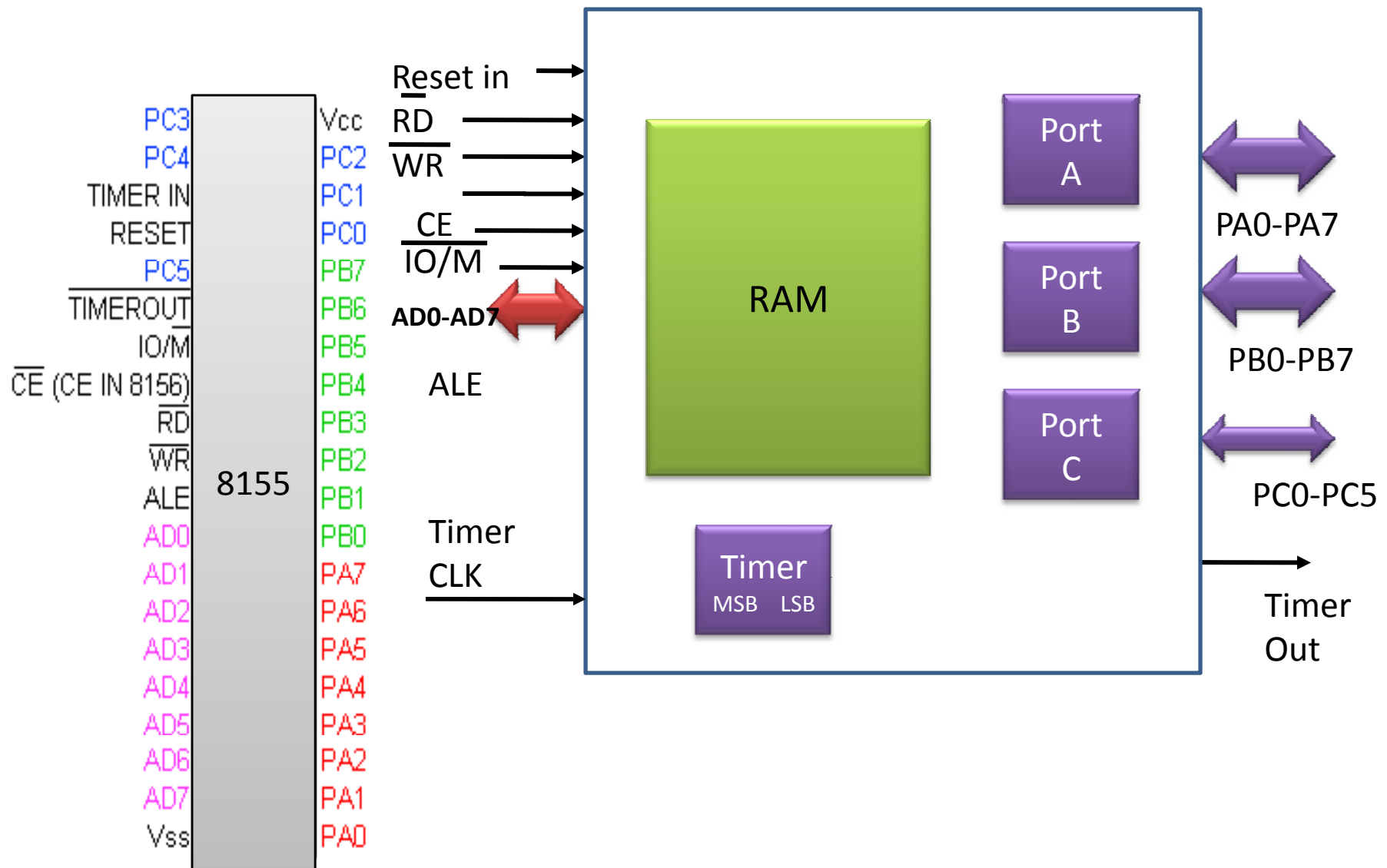
- Program

MVI	A,01 H	; Set Do=1, D1-D7==0
OUT	FFH	;Write in control register
MVI	A,BYTE1	;Load data bye
OUT	FEH	; Send Data out

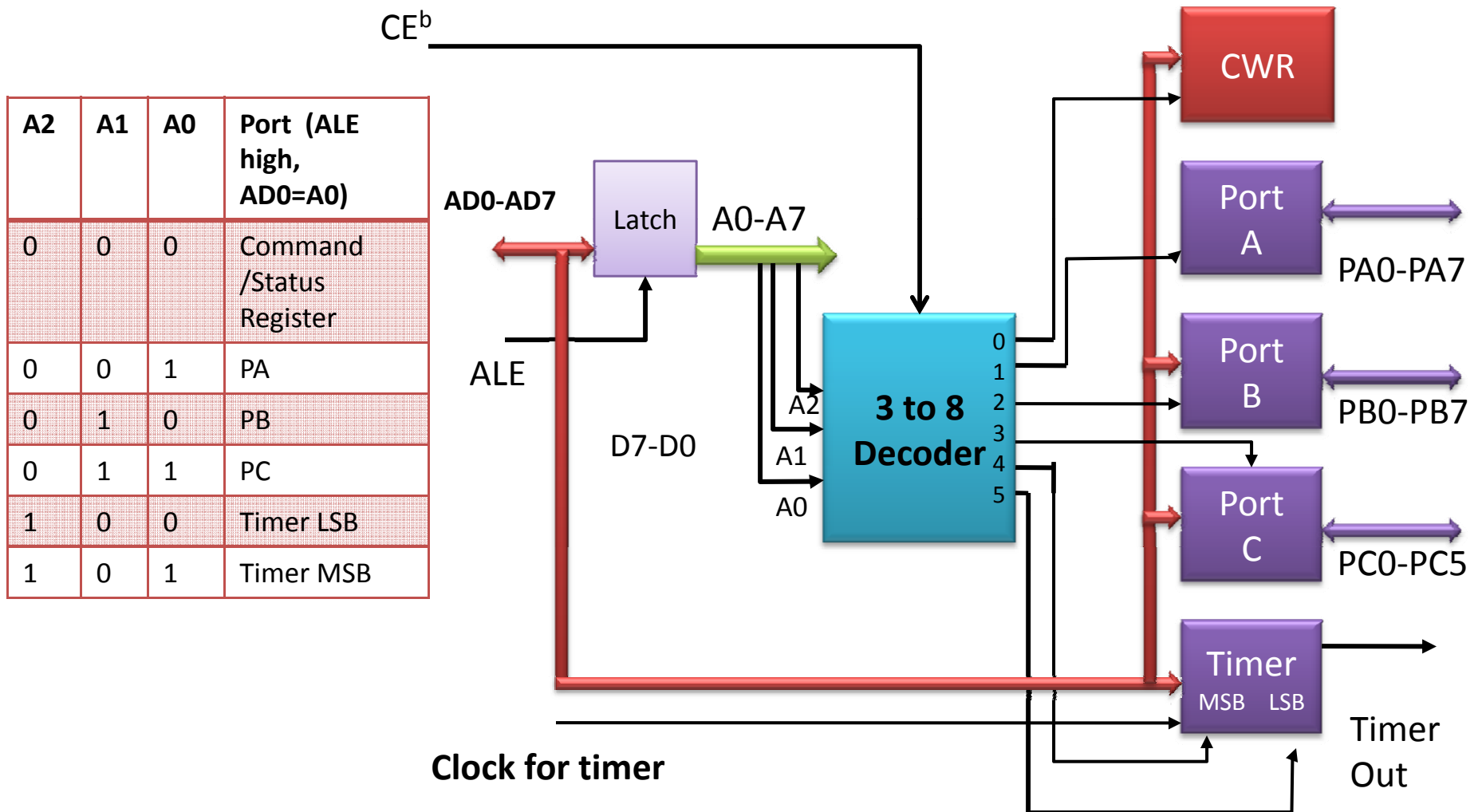
8155 Features

- 2kbits static RAM 256x8
- 2 programmable 8 bit I/O ports
- 1 programmable 6 bit I/O port
- 1 programmable 14 bit binary counter/timer
- Internal address latch to Demux AD0-AD7, using ALE line

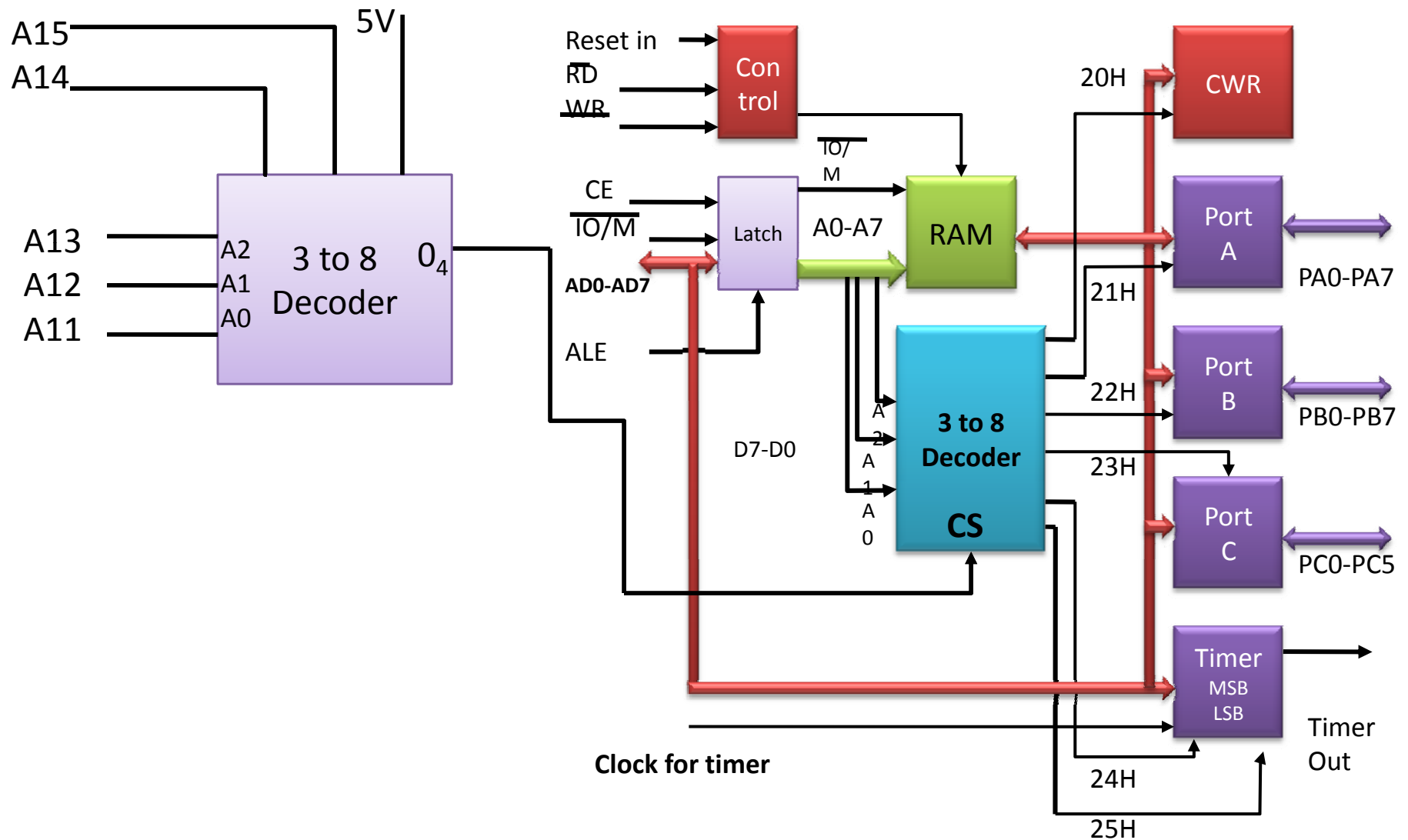
8155 Block Diagram



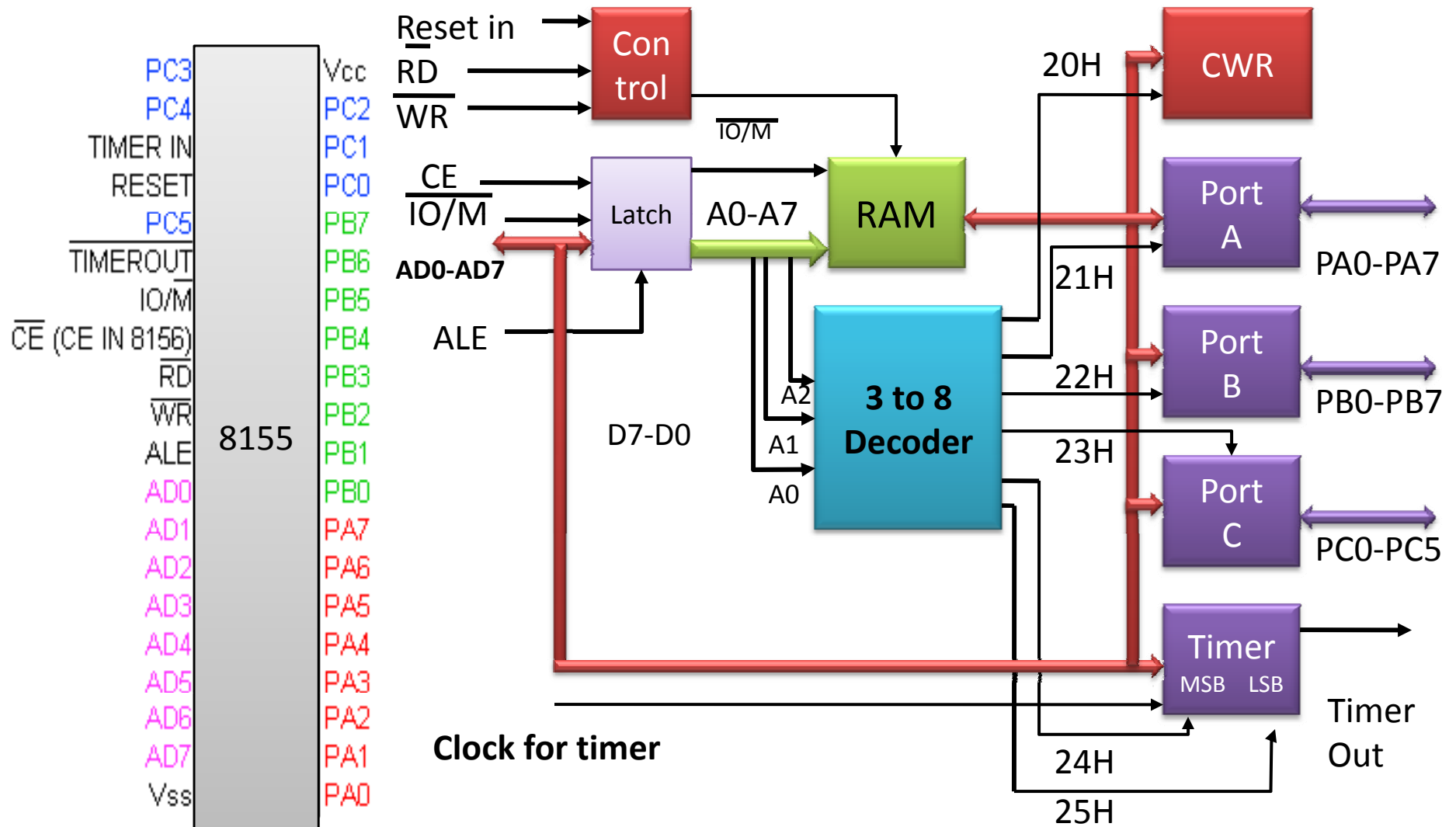
Expanded Block Diagram



Calculate Address of Port of 8155



8155 Block Diagram



Control word (command reg) format

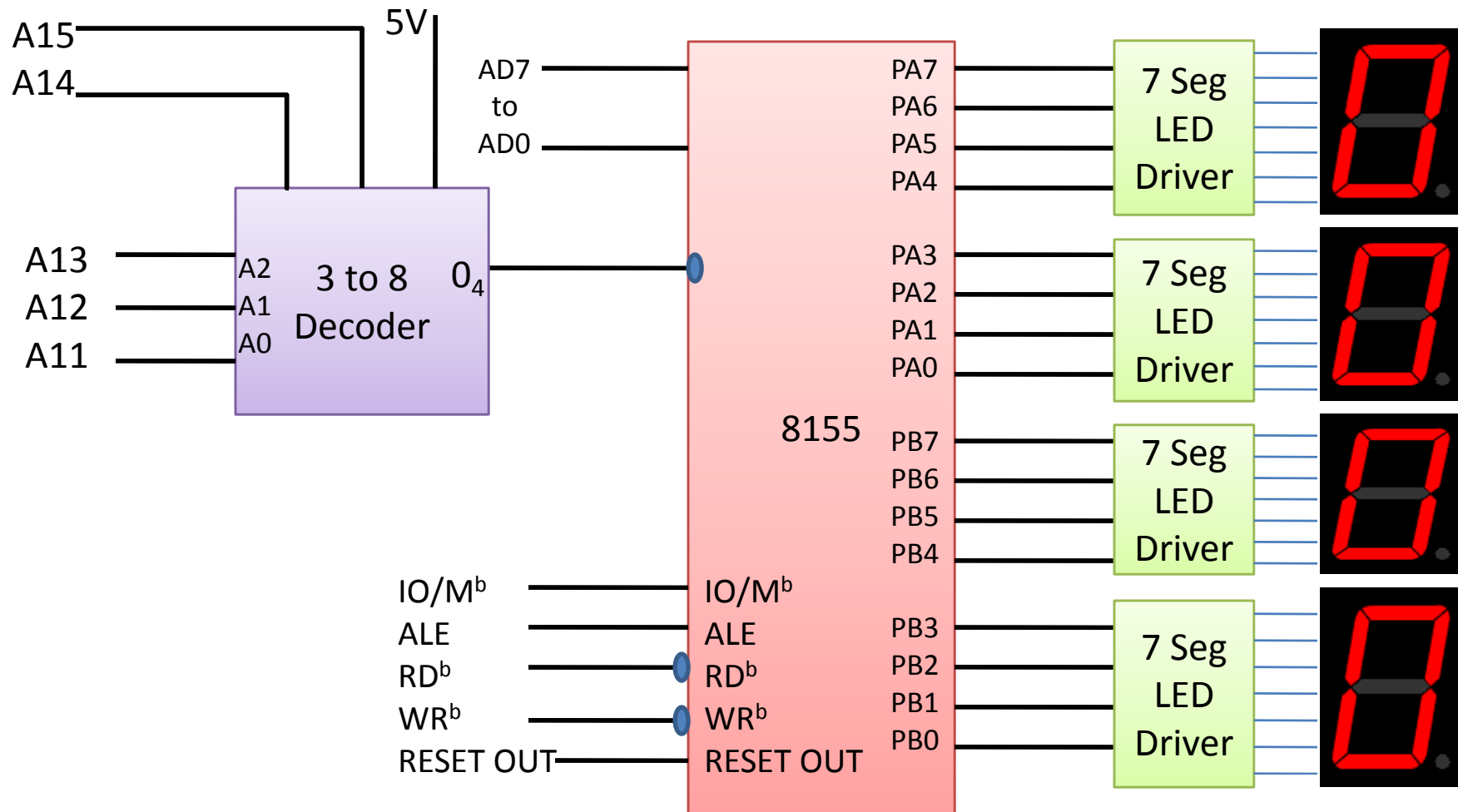
D7	D6	D5	D4	D3	D2	D1	D0
Timer Command		IEB	IEA	PC		PB	PA

- D0, D1: mode for PA and PB, 0=IN, 1=OUT
- D2, D3: mode for PC
- D4, D5: interrupt EN for PA and PB, 0=disable 1=enable
- D6, D7: Timer command:
 - 00: No effect
 - 01: Stop if running else no effect
 - 10: Stop after terminal count (TC) if running, else no effect
 - 11: Start if not running, reload at TC if running.

- Port C bits
(D2, D3)

ALT	D3	D2	PC5	PC4	PC3	PC2	PC1	PC0
1	0	0	IN	IN	IN	IN	IN	IN
2	0	1	OUT	OUT	OUT	OUT	OUT	OUT
3	1	0	OUT	OUT	OUT	STB _A	BF _A	INTR _A
4	1	1	STB _B	BF _B	INTR _B	STB _A	BF _A	INTR _A

Interfacing 7 Segment LEDs to output port using 8155



Interfacing LEDs Cntd..

- Port Address
 - Control Register=20H, Port A= 21H, Port B= 22H
- Control word:

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	0	0	1	1
Timer		Not Applicable		Use for Port C		Port B Output	Port A Output

- Program
 - MVI A,03 ; initialize Port A &B for O/P
 - OUT 20H
 - MVI A, BYTE1 ; Display BYTE1 at port A
 - OUT 21H
 - MVI A, BYTE2 ; Display BYTE2 at port B
 - OUT 22H

Reference

- R S Gaonkar, “Microprocessor Architecture”, Chapter 14

Thanks