Third Class

Real Time System Design

وزارة التعليم العالي والبحث العلمي

كلية المصطفى الجامعة

Al- Mustafa University College

Programmable Interface Devices 8155/8156

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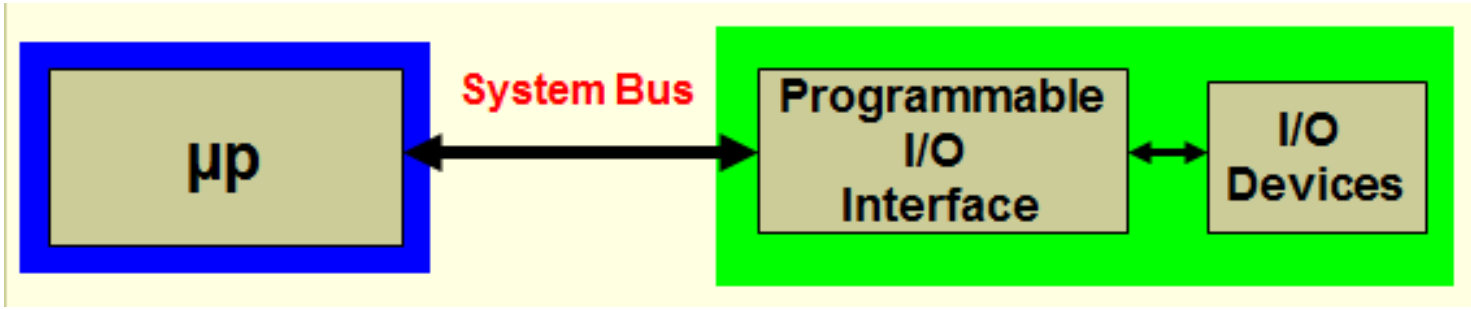
Programmable Interface Devices 8155/8156

Programmable Interface Devices

- Used to interface an I/O device to the microprocessor.
- Can be programmed/configured to perform various I/O functions by writing software instructions.



Programmable Interface Devices 8155/8156

8155/8156 – A Multipurpose Programmable Interface

Its programmable interface device used to interface I/O device to µP, its multifunction device, contain RAM, I/O ports, and timer.

- Designed to be compatible with 8085.
- It includes:
- 256 bytes of Read/Write memory.
- Three I/O ports (programmable I/O):

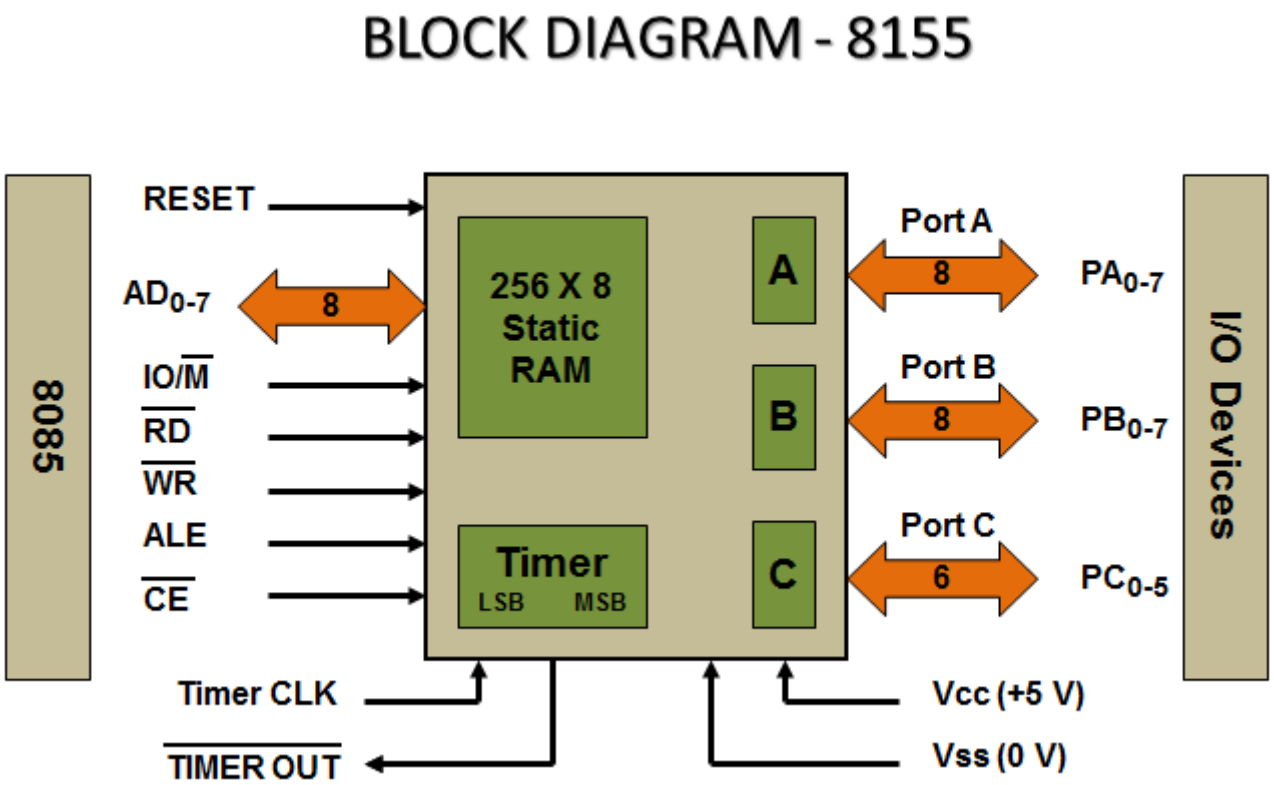
o Port A (8-bit).

o Port B (8-bit).

o Port C (6-bit).

- A 14-bit timer.

Programmable Interface Devices 8155/8156



Programmable Interface Devices 8155/8156

8155 block diagram shows 5 control signals, all except (CE) are input signal directly generated by the processor; the (CE) is input from decoder.

o CE: chip enable, connected to the decoder.

o IO/M: specify whether the memory section is selected, or I/O section (include timer) is selected.

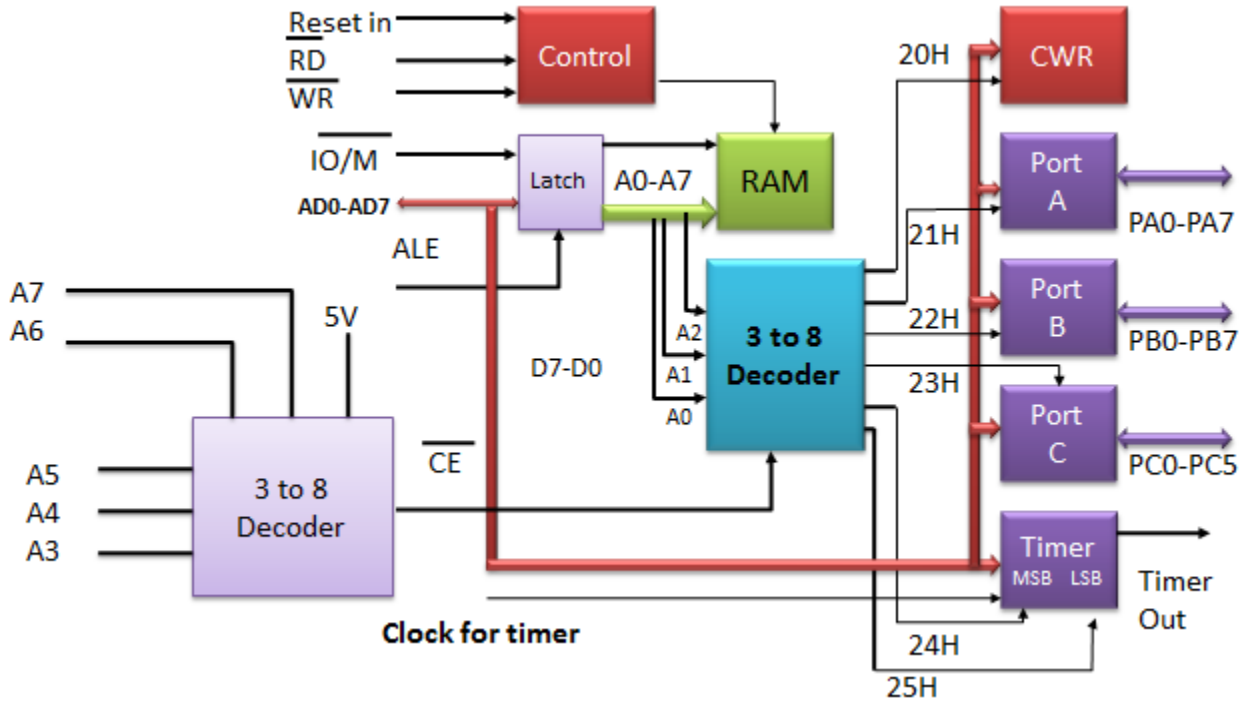
o ALE: address latch enable.

o RD and WR

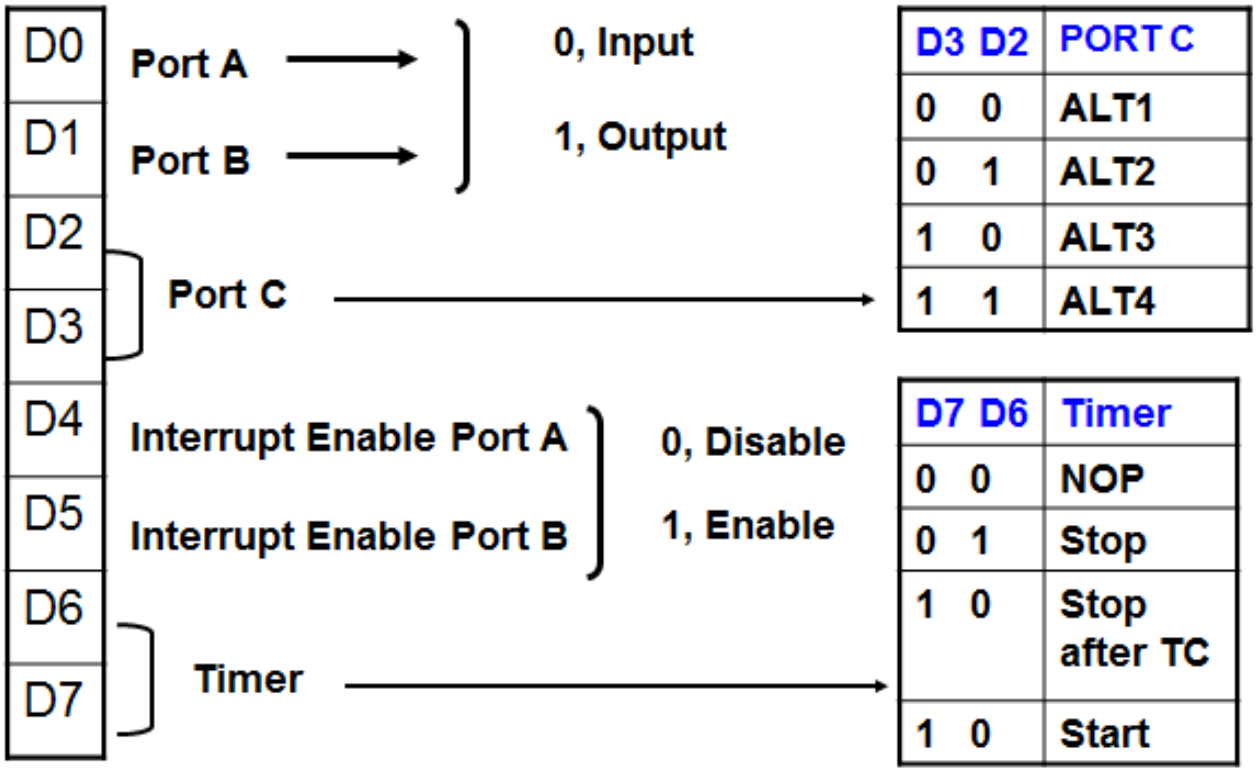
o RESET: connect to the RESET out of processor used to reset the chip and initializes I/O ports as input.

• In 8155 we have control register, 3 I/O ports, and 2 register for timer, so we need 3 address lines to decode there register.

Ex: design (draw) and determine the address of the control/status, I/O ports and timer register of the 8155 if the output of decoder O2?



Control word (command reg) format



D3	D2	PORT C
0	0	ALT1
0	1	ALT2
1	0	ALT3
1	1	ALT4

D7	D6	Timer
0	0	NOP
0	1	Stop
1	0	Stop after TC
1	0	Start

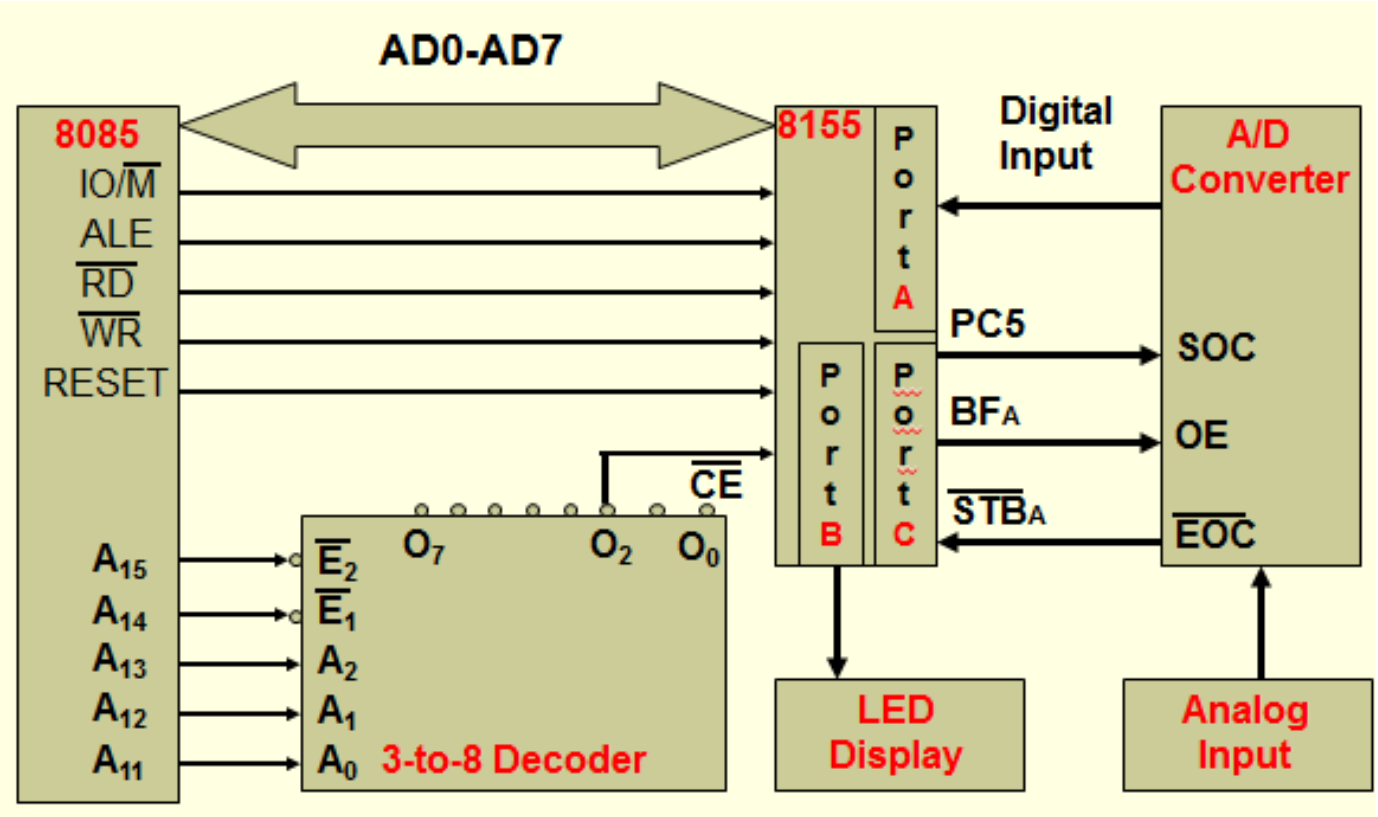
I/O functions of Port C

ALT	D3	D2	PC5	PC4	PC3	PC2	PC1	PC0
ALT1	0	0	I	I	I	I	I	I
ALT2	0	1	O	O	O	O	O	O
ALT3	1	0	O	O	O	$\overline{STB}_A$	BF_A	$INTR_A$
ALT4	1	1	$\overline{STB}_B$	BF_B	$INTR_B$	$\overline{STB}_A$	BF_A	$INTR_A$

I = Input **O = Output**

STB = Strobe **BF = Buffer Full** **INTR = Interrupt Request**

Ex: Design an interfacing circuit to read data from an A/D converter using the 8155A in the peripheral mapped I/O.



Chip Selection

A7 A6 A5 A4 A3

0 0 0 1 0

A2	A1	A0	Port	
0	0	0	Control/Status Register	**= 10H**
0	0	1	Port A	**= 11H**
0	1	0	Port B	**= 12H**
0	1	1	Port C	**= 13H**
1	0	0	LSB Timer	**= 14H**
1	0	1	MSB Timer	**= 15H**