

Chapter 7

System Design: Peripheral ICs and Interfacing

Lesson 2

8255- Peripheral Parallel Interface

8255 Port Features

- 24 Programmable IO lines
- 8 Programmable port pins in bit set-reset mode
- Two group of ports programmable in non-handshaking mode (Mode 0) for the peripherals
- Two ports (Port A and B) programmable in handshaking mode for the peripherals
- Support a bi-direction port (Port A) with 5 handshaking lines
- TTL level outputs compatible with Intel processor families

24- Programmable IO lines

Port A PA0-PA7

| | | | | | | |

Port B PB0-PB7

| | | | | | | |

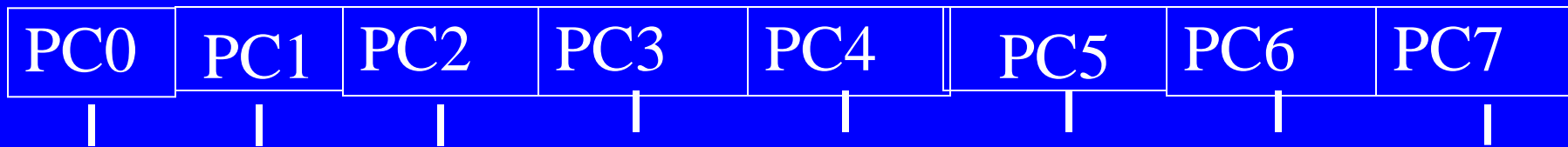
Port C PC0 - PC7

| | | | | | | |

8255 Ports

8255 Port C

Each bit separate set/reset mode



Controls of 8 systems (motors,
loudspeakers, LEDs)

Group A

Port A PA0-PA7

| | | | | | | |

Port CH PC4 - PC7

| | | |

When no handshake signals
used

Group B

Port B PB0-PB7

| | | | | | | |

Port CL PC0 - PC3

| | | |

When no handshake signals
used

8255 Ports

Input or output Port A Input or output Port B

Port A PA0-PA7

| | | | | | | |

Port CH PC4 - PC7

| | | |

Strobe_A IBF_A INTR_A
OBF_A ACK_A

Port B PB0-PB7

| | | | | | | |

Port CL PC0 - PC3

| | | |

Strobe_B IBF_B INTR_B
OBF_B ACK_B

Handshake Mode 1

Handshake Mode 1

Input and output Bidirectional Port A

Port A PA0-PA7

| | | | | | | |

Port CH PC4 - PC7

| | | |

Strobe_A IBF_A

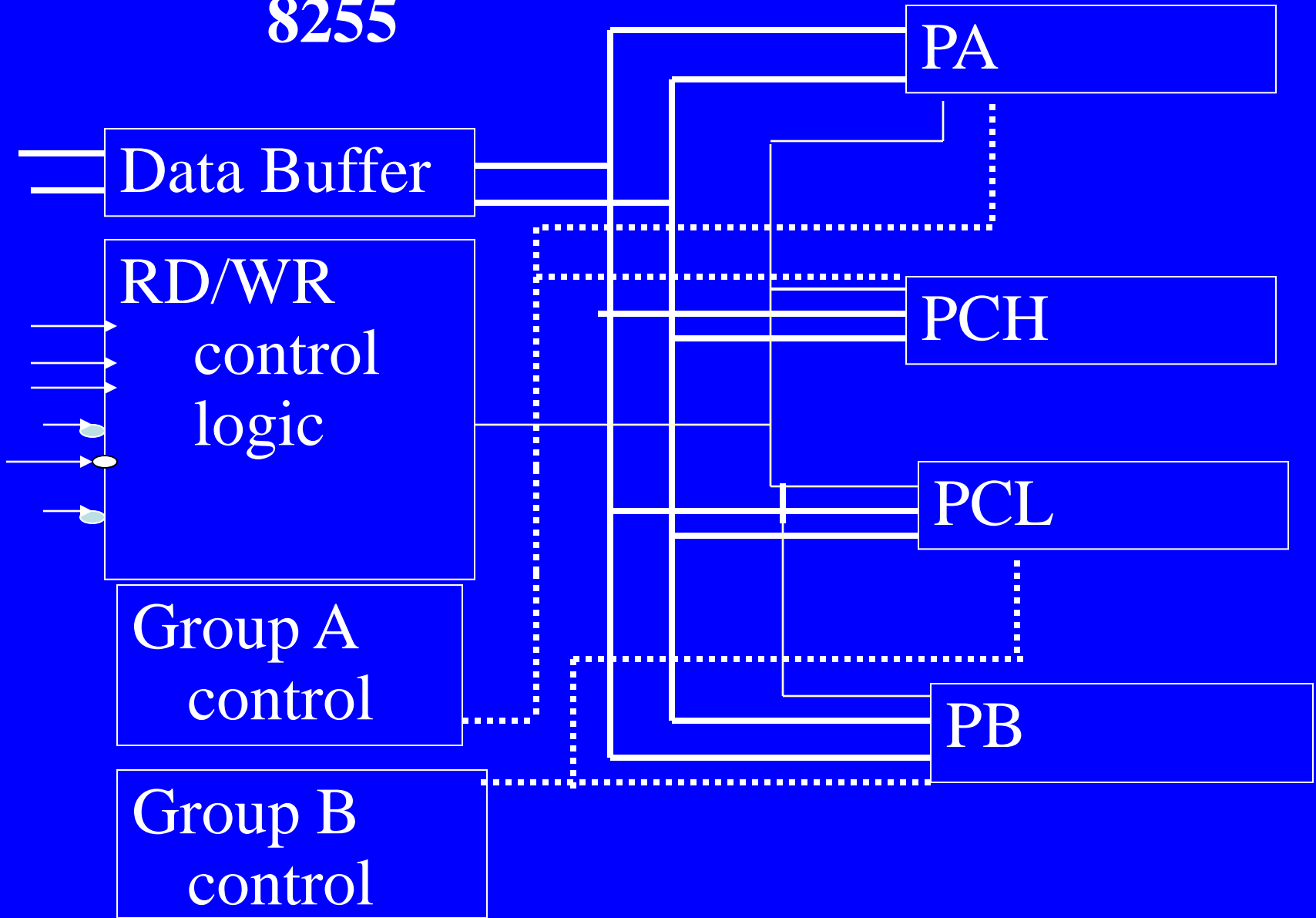
INTR_A

OBF_A ACK_A

Handshake Port A Mode 2

8255 Block Diagram, Pins and Interfacing

8255



PA3-PA0

$\overline{\text{RD}}$

$\overline{\text{CS}}$

GND

A1, A0 →

PC7-PC0

PB0-PB2

8255

VCC

PA4-PA7

$\overline{\text{WR}}$

Reset

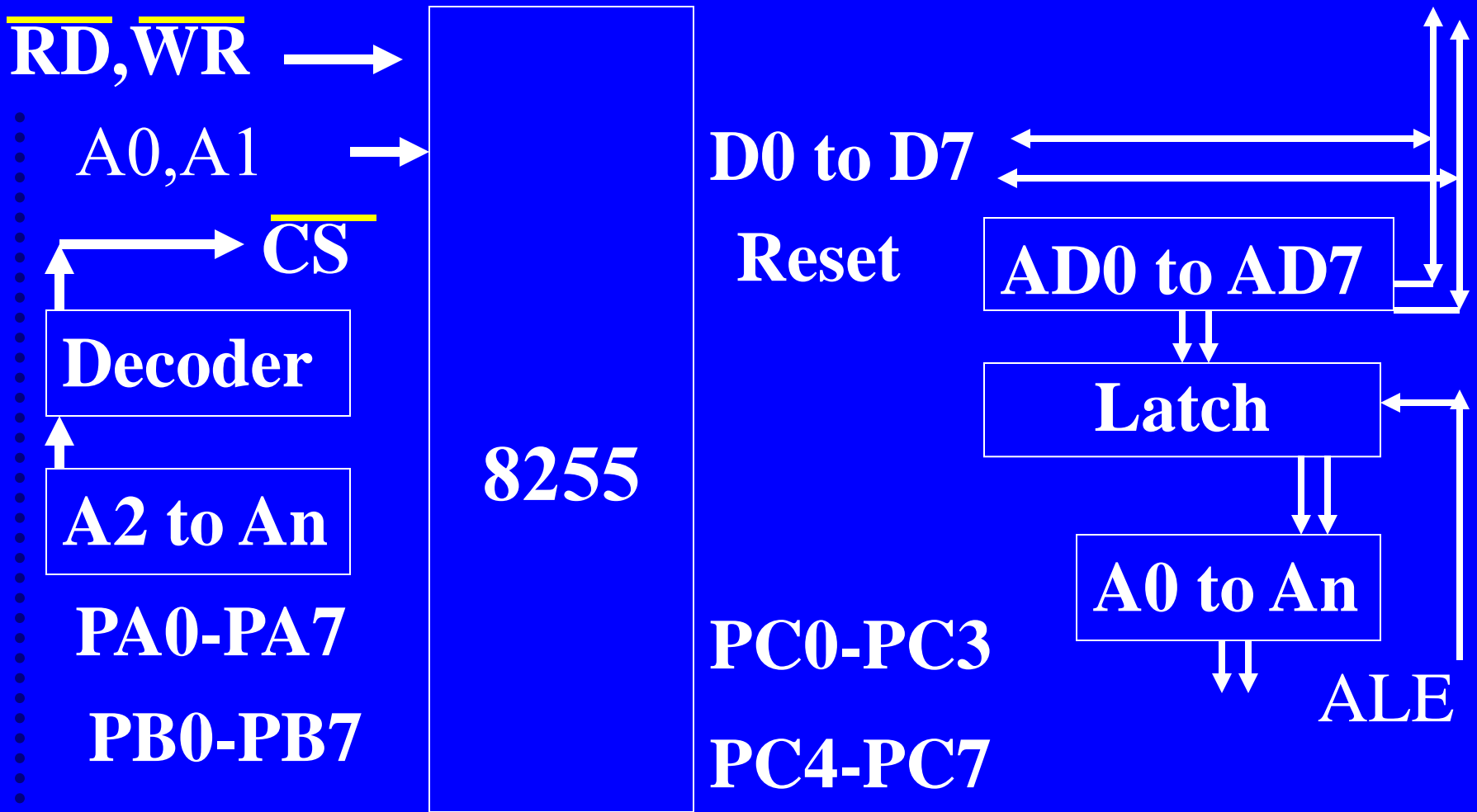
D0-D7

PB7-PB3

Table 7.7 - Block Functions

Table 7.8 - Each Pin signals

Table 7.9- Port Addresses for a typical interface circuit of figure 7.10



**(WR, IOWR or P3.7) and (RD, IORD or P3.6)
or R/W and NOT (R/W)**

8255 Programming

Programming the 8255 Mode and sending commands to 8255

When $\overline{CS} = 0$, $A0-A1 = 11$, and $\overline{WR} = 0$ then 8251 gets Mode/Command byte

Sequential order of Bytes to be written after reset

1. Mode Instruction with A1-A0 address = 11

2. Port A data write or read with A1-A0 address = 00

Port B A1-A0 address = 01

Port C A1-A0 address = 10

Mode Instruction

b7 = 0 bit set-reset mode for Port C bits

b7 = 1 select mode 0,1 and 2 of port(s)

Bit Set-Reset mode instruction (b7= 0)

1. $b_0 = 0$ means reset Port C.n = 0 (reset)

$b_0 = 1$ means set Port C.n = 1 (set)

2. $b_3-b_2-b_1 = 111$ means n is 7, PC.7 set/reset

$b_3-b_2-b_1 = 110$ means n is 6, PC.6 set/reset

$b_3-b_2-b_1 = 101$ means PC.5 set/reset

$b_3-b_2-b_1 = 100$ means PC.4 set/reset

$b_3-b_2-b_1 = 011$ means PC.3 set/reset

Bit Set-Reset mode instruction (b7= 0)

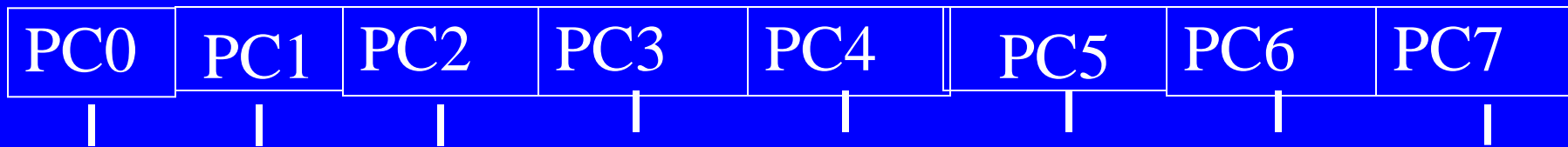
b3-b2-b1= 010 means PC.2 set/reset

b3-b2-b1= 001 means PC.1 set/reset

b3-b2-b1= 000 means PC.0 set/reset

8255 Port C

Each bit separate set/reset mode



Controls of 8 systems (motors,
loudspeakers, LEDs)

Port Mode Select instruction (b7= 1)

1. $b6-b5 = 10$ Group A mode 2

$b6-b5 = 01$ means Group A mode 1

$b6-b5 = 00$ Group A mode 0

2. $b2 = 0$ means Group B mode 0

$b2 = 1$ means Group B mode 1

3. $b4 = 0$ Port A output

$b4 = 1$ Port A input

4. b3 = 1 Port CH available bits input

b3 = 0 Port CH available bits output

5. b1 = 0 Port B output

b1 = 1 means Port B input

6. b0 = 1 means Port CL available bit input

b0 = 0 Port CL available bits output

8255 Ports

Group A

Mode 0	Mode 1	Mode 2
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Group B

Mode0	Mode 1
-------	--------

Group A

Port A PA0-PA7

| | | | | | | |

Port CH PC4 - PC7

| | | |

When no handshake signals
used

Group B

Port B PB0-PB7

| | | | | | | |

Port CL PC0 - PC3

| | | |

When no handshake signals
used

8255 Ports

Input or output Port A Input or output Port B

Port A PA0-PA7

| | | | | | | |

Port CH PC4 - PC7

| | | |

Strobe_A IBF_A INTR_A
OBF_A ACK_A

Port B PB0-PB7

| | | | | | | |

Port CL PC0 - PC3

| | | |

Strobe_B IBF_B INTR_B
OBF_B ACK_B

Handshake Mode 1

Handshake Mode 1

Input and output Bidirectional Port A

Port A PA0-PA7

| | | | | | | |

Port CH PC4 - PC7

| | | |

Strobe_A IBF_A

INTR_A

OBF_A ACK_A

Handshake Port A Mode 2

Programming Examples

- 7.3 for Port A output, Port B input and no handshaking and interrupts
- 7.4 for resetting PC3 and setting PC0

Summary

We learnt
8255 Features

Mode/Commands

Mode instruction after external reset

8255 Programmability

1.Parallel Communication Receiver cum transmitter

2. Ports A,B and C each of 8 bits forming two groups A and B

We learnt

8255 Programming

1. Parallel Communication Receiver cum transmitter

2. Ports A, B and C each of 8 bits forming two groups A and B

We learnt

8255 programming

3. Port C bits can be individually set or reset by writing the mode instruction $b7 = 0$

4. Port A also programmable as bi-directional handshake port.

5. Port A and B programmable with Port C bits as handshake signals