


Integrating microprocessor with interfacing chips

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Interfacing and Data Transfer

Methods of parallel Data Transfer

- Simple I/O
- Simple strobe I/O
- Single-handshake I/O
- Double-handshake I/O

Simple I/O

- I/O device is always ready
- Data is always present
- Data transfer is not time dependent

Simple Strobe I/O

- Valid data present on an external device only at a certain time
- Data transfer is time dependent
- Strobe signal is sent after data is ready
- Read data only after getting strobe signal
  - Polling
  - Interrupt

Simple Strobe I/O

- Works well for low rate data transfer
- No signal to know when it is safe to send the next data byte

Single-handshake I/O

- After reading data, an Acknowledge Signal is sent
- Also called “strobed input”

Double-handshake I/O

- Data is put after receiver is ready
- Double handshake

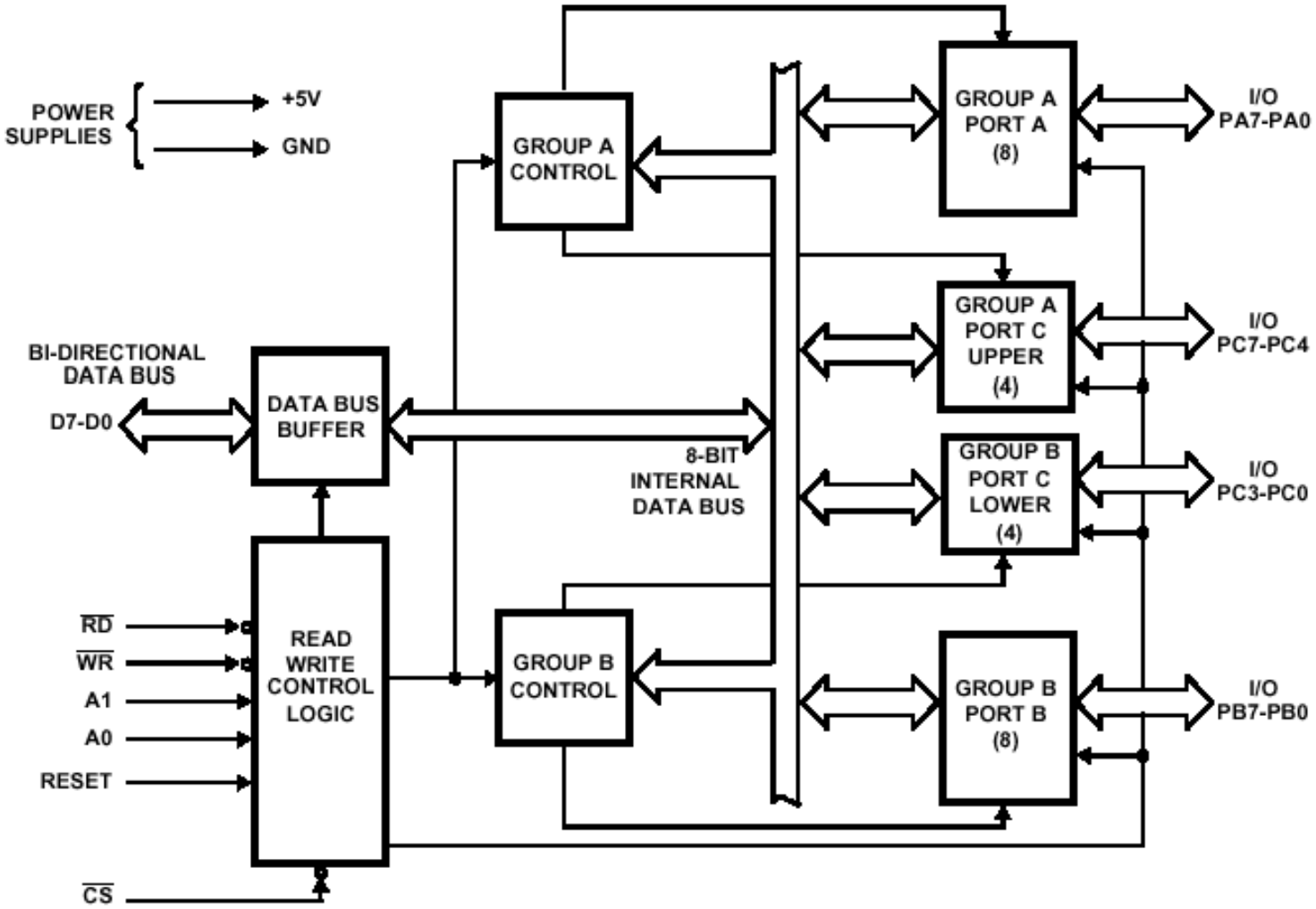
Why Handshake ???

Methods of parallel Data Transfer

- Simple I/O
- Simple strobe I/O
- Single-handshake I/O
- Double-handshake I/O


8255 **Programmable Peripheral** Interface


Intel 8255


POWER SUPPLIES
+5V
GND
BI-DIRECTIONAL DATA BUS
D7-D0
DATA BUS BUFFER
8-BIT INTERNAL DATA BUS
GROUP A CONTROL
GROUP B CONTROL
READ WRITE CONTROL LOGIC
RD
WR
A1
A0
RESET
CS
GROUP A PORT A (8)
GROUP A PORT C UPPER (4)
GROUP B PORT C LOWER (4)
GROUP B PORT B (8)
I/O PA7-PA0
I/O PC7-PC4
I/O PC3-PC0
I/O PB7-PB0

Intel 8255

- 24 input/output pins
  - 3 PORTS: A, B, C
  - Port A, B: I/O
  - Port C: I/O and handshake

- The three ports are further grouped as follows:
  - Group A : port A and upper part of port C
  - Group B : port B and lower part of port C.

Intel 8255

- 3 modes of operation
- MODE 0 – Simple I/O
- MODE 1 – Single-handshake
- MODE 2 – bidirectional handshake I/O

MODE 0

- SIMPLE I/O
- A, B, and C(upper and lower) all can be used as I/O independently
- 16 possible configurations

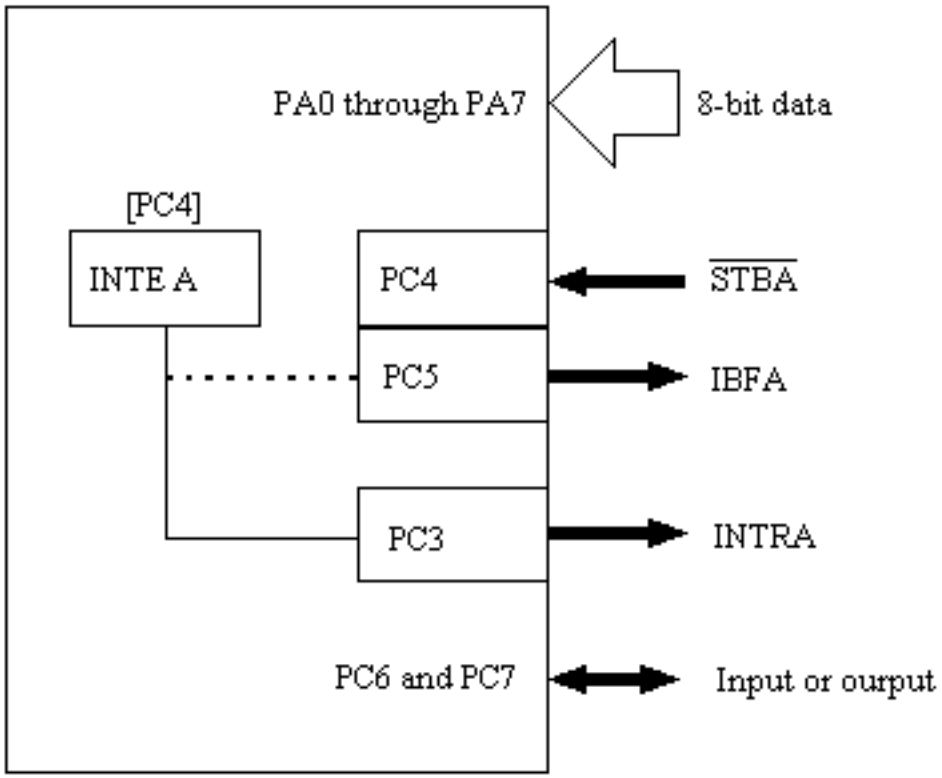
MODE 1

- PORT A, B : I/O
- PORT C Lower
  - Handshake for PORT B
  - PIN PC0 – PC2
- PORT C Upper
  - Handshake for PORT A
  - PIN PC3 – PC5 for input
  - PIN PC3, PC6, PC7 for output

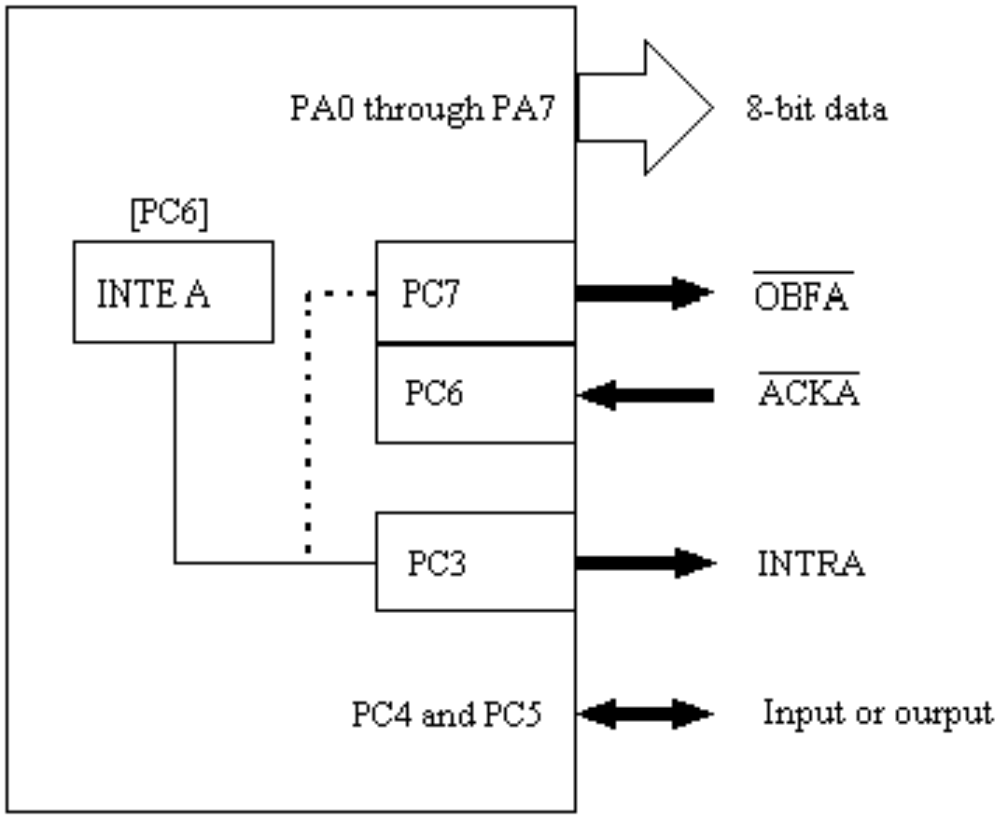
Input Mode 1 on PORT A

1. I/O device sends data to port's data line
2. I/O device sends strobe signal (¬STB 1 -> 0)
3. 8255 raises Input Buffer Full (IBF 0 -> 1) (PC5)
4. ¬STB is high again
5. Interrupt Request Signal is generated (PC3)
6. After data is read IBF goes back to 0 again

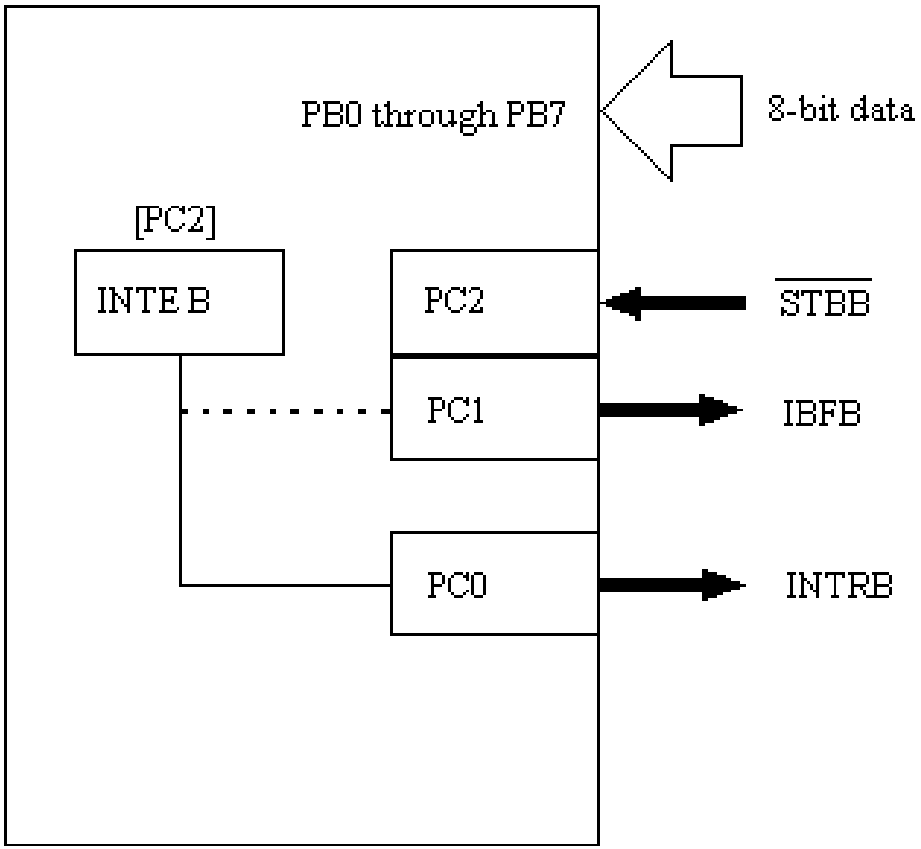
PORT A - Input


PA0 through PA7
8-bit data
[PC4]
INTE A
PC4
STBA
PC5
IBFA
PC3
INTRA
PC6 and PC7
Input or ourput

PORT A - OUTPUT



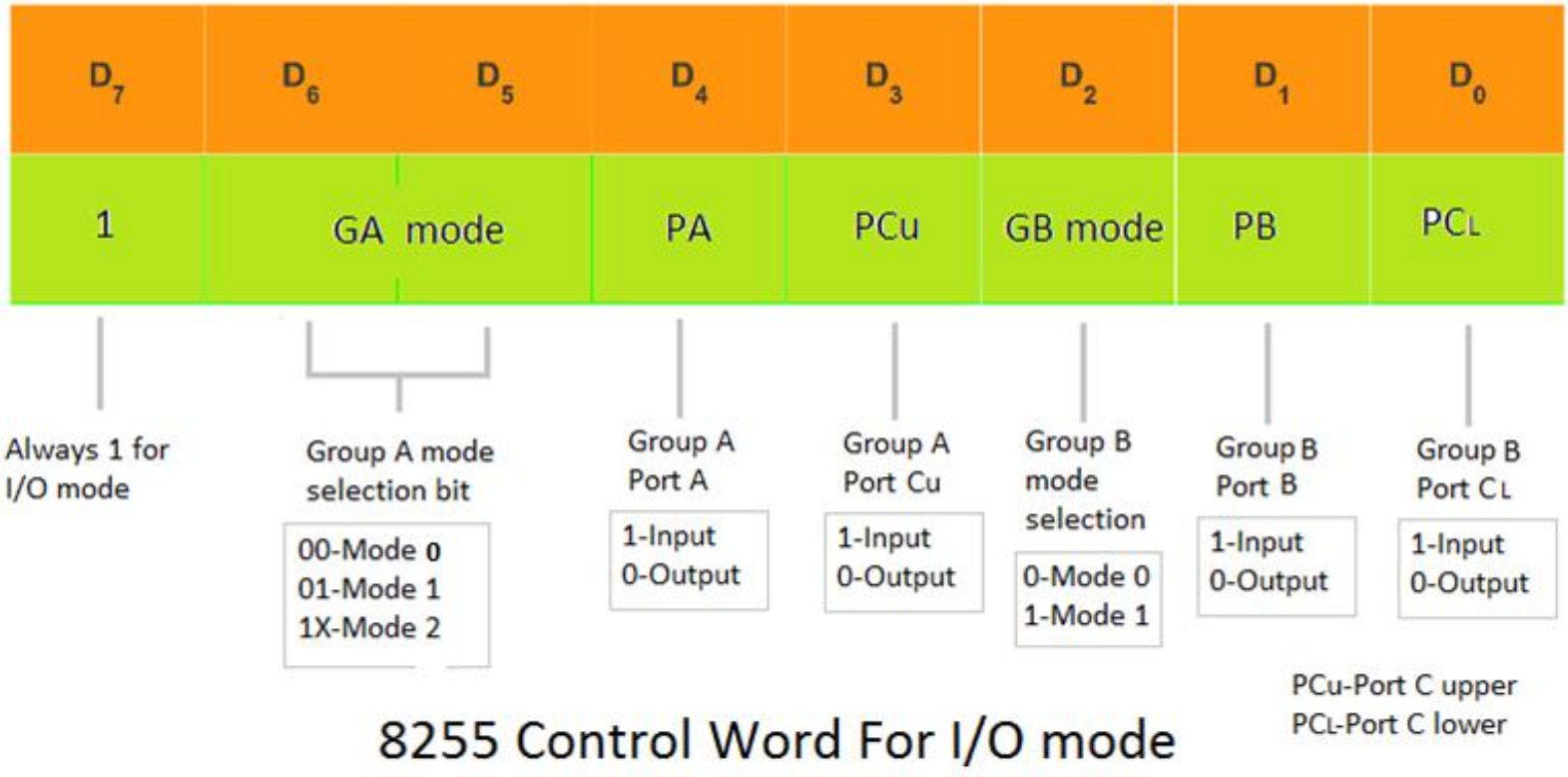
PORT B


PB0 through PB7
8-bit data
[PC2]
INTE B
PC2
STBB
PC1
IBFB
PC0
INTRB

MODE 2

- Only PORT A for I/O
- PIN PC3 to PC7 for handshake

CONTROL WORD



8255 Control Word For I/O mode

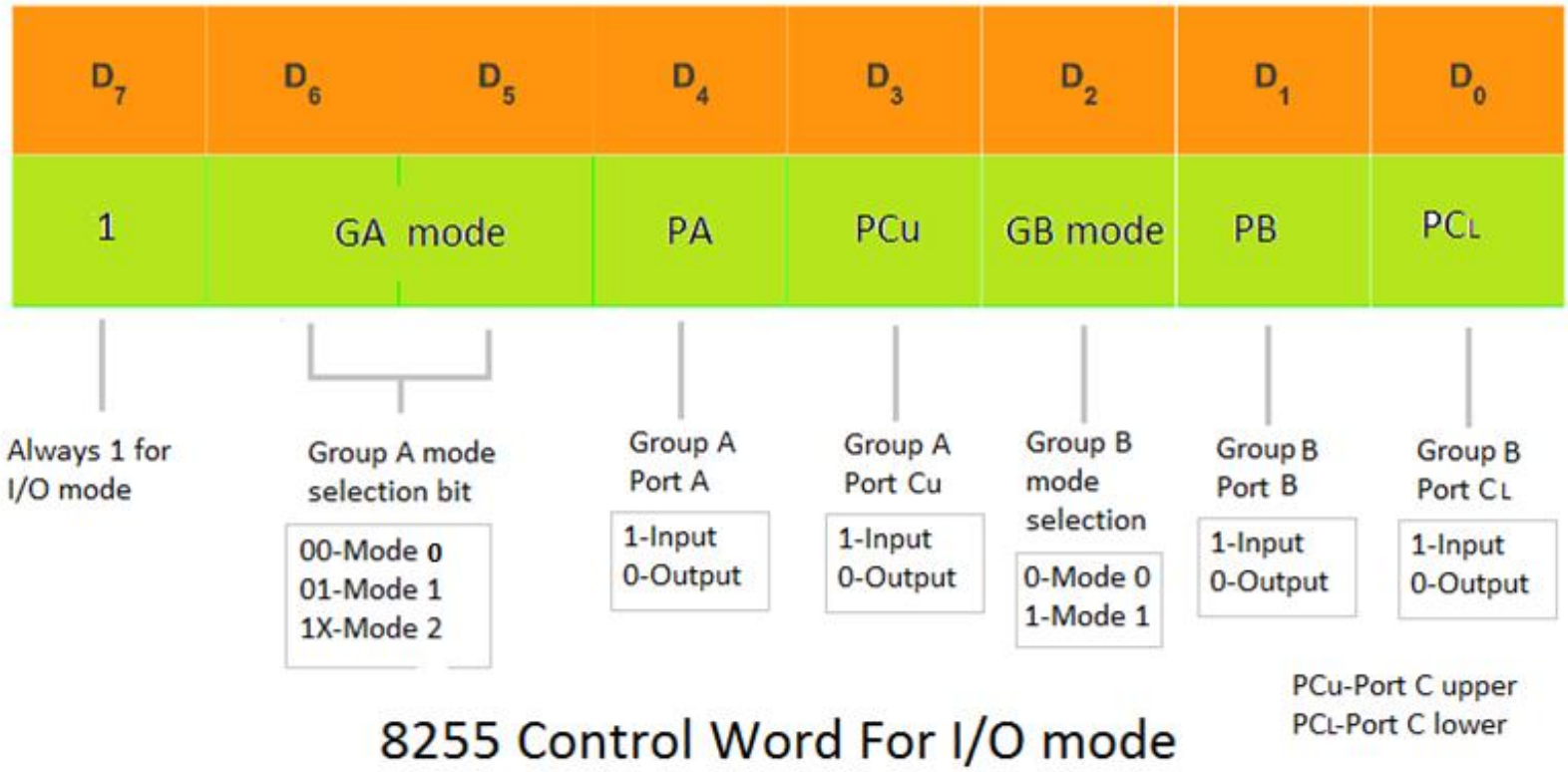
Accessing the ports

- Typically the PPI is connected to the microprocessor at some address
- For MTS- 88.c
  - it is 000100xx b

A1	A0	SELECTED PORT
0	0	A
0	1	B
1	0	C
1	1	Control

What will be the control bit ??

- A – input , B – output and C(lower) input ??



8255 Control Word For I/O mode

Learning Objectives/ Practice

- Write a code for writing 10101010b to PORT B
- Learn timing diagrams for different mode of data transfer
- Write a code to read strobed input in PORT A and write its complement to PORT B
- Constructing the control-byte for different mode of operations
- And other topics covered in class

Resources

- https://en.wikipedia.org/wiki/Intel_8255
- **Microprocessors And Interfacing 2E, Douglas V Hall**