DATA TRANSFER MODES OF 8255

❖ Mode 0 (Simple Bi-directional I/O)

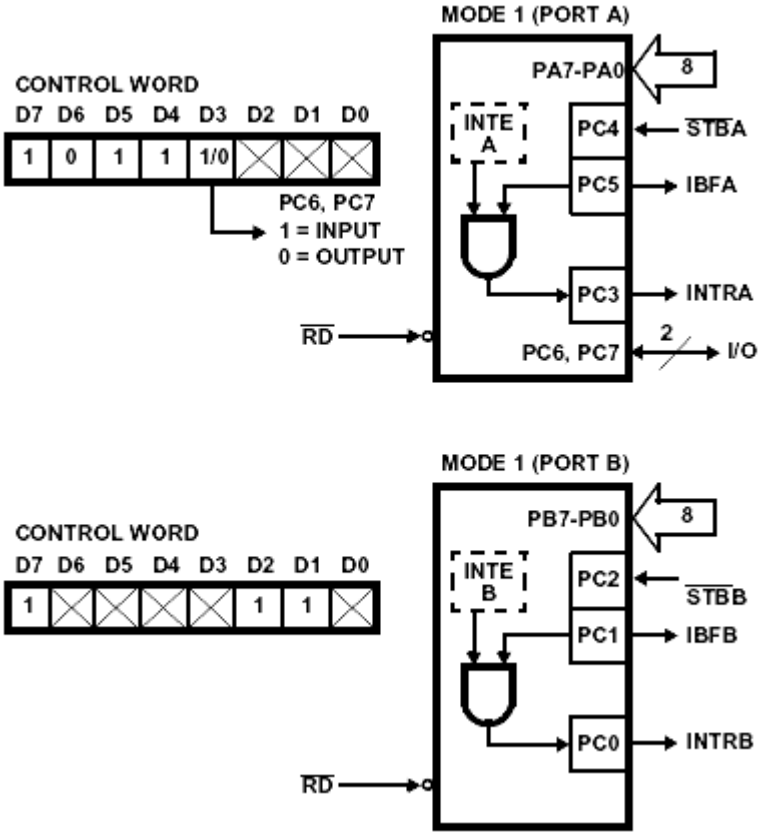
- Port A and Port B used as 2 Simple 8-bit I/O Ports.
- Port C is used as 2 simple 4-bit I/O Ports.
- Each port can be programmed as input or output individually.
- Ports do not have handshake or interrupting capability.
- Hence, **slower** devices cannot be interfaced.

❖ Mode 1 (Handshake I/O)

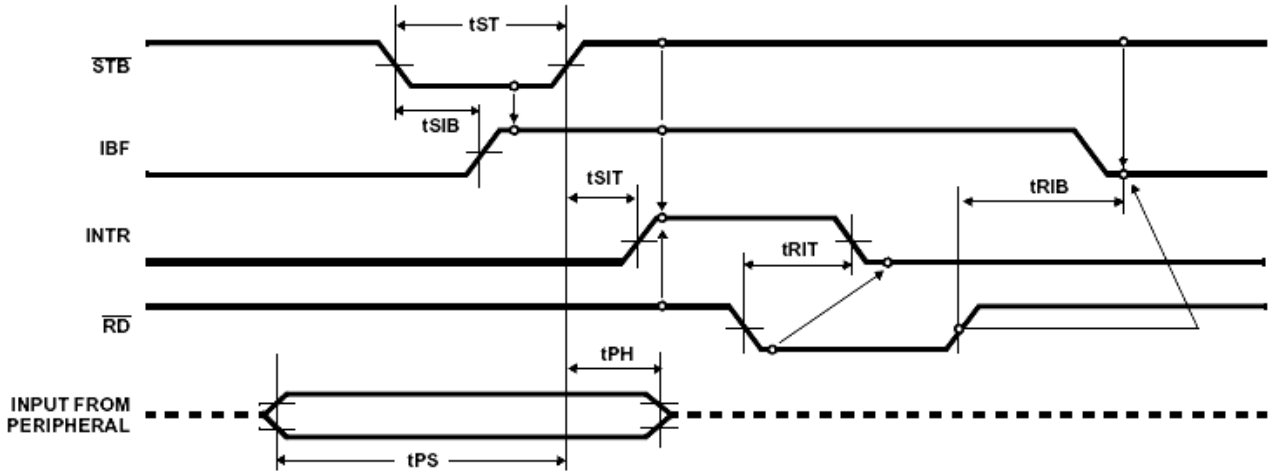
- In Mode 1, handshake signals are exchanged between the devices before the data transfer takes place.
- Port A and Port B used as 2 8-bit I/O Ports that can programmed in Input OR in output mode.
- Each Port uses 3 lines from Port C for handshake. The remaining lines of Port C can be used for simple IO.
- **Interrupt driven** data transfer and **Status driven** data transfer possible.
- Hence, **slower** devices can be interfaced.

The handshake signals are different for input and output modes.
#Please refer Bharat Sir's Lecture Notes for this ...

♦ Mode 1 (Input Handshaking)



Timing Diagram for Mode 1 Input Transfer



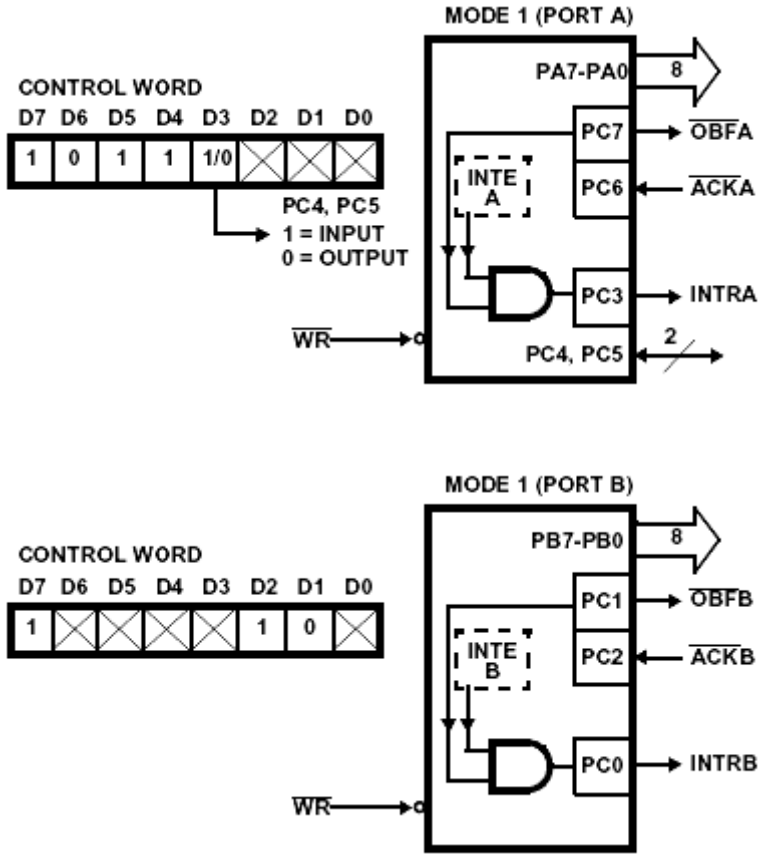
Working:

- **Each port** uses **3 lines** of **Port C** for the following signals:
  STB (Strobe), **IBF** (Input Buffer Full) ➔ Handhsake signals
  INTR (interrupt) ➔ Interrupt signal
- Additionally the **RD** signal of 8255 is also used.

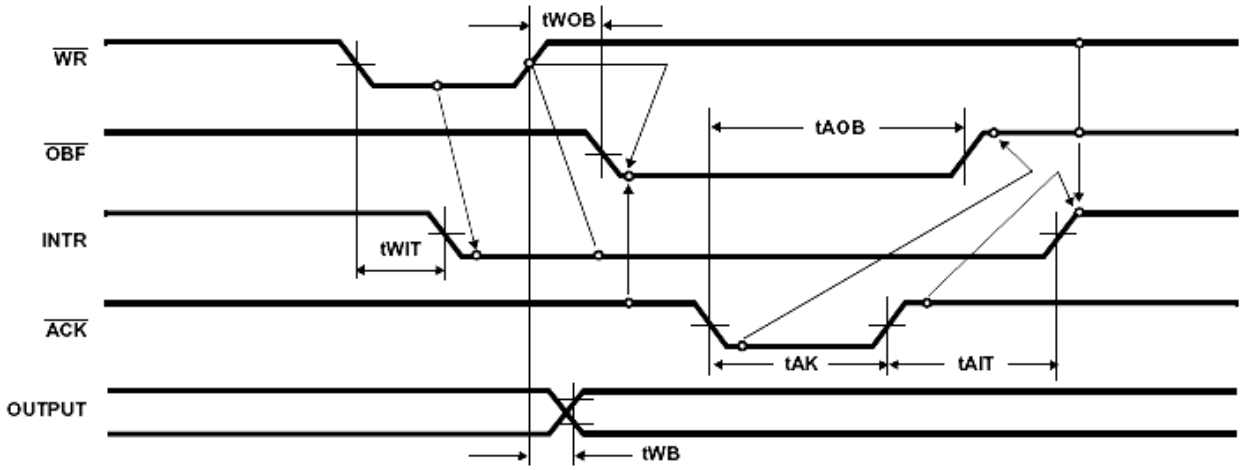
Handshaking takes place in the following manner:

1) The **peripheral** device **places data** on the Port **bus** and informs the Port by **making STB low**.
2) The **input Port accepts** the **data** and informs the peripheral to wait by making **IBF high**. This **prevents** the peripheral from **sending more data** to the 8255 and **hence data loss** is prevented. ☺ In case of doubts, contact Bharat Sir: - 98204 08217.
3) **8255 interrupts** the **µP** through the **INTR** line provided the INTE flip-flop is set.
4) **In response** to the Interrupt, the **µP issues** the **RD** signal and **reads** the **data**. The **data byte** is **thus transferred** to the **µP**.
5) Now, the **IBF** signal **goes low** and the peripheral can **send more data** in the above sequence.

♦ Mode 1 (Output Handshaking)



Timing Diagram for Mode 1 Output Transfer



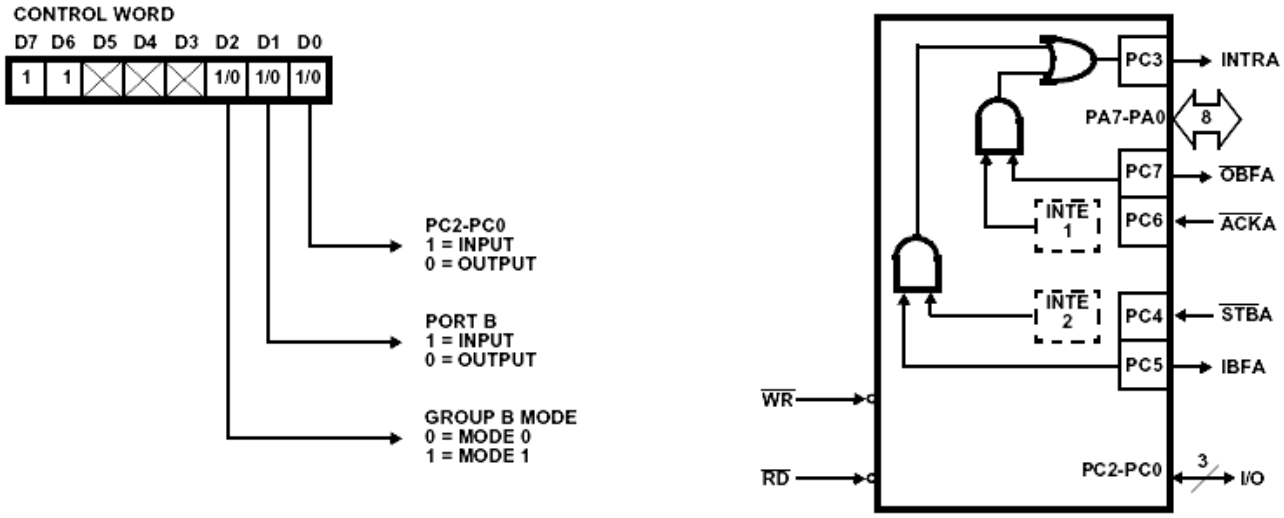
Working

- **Each port** uses **3 lines** of **Port C** for the following signals:
  OBF (Output Buffer Full), **ACK** (Acknowledgement) ➔ Handhsake signals
  INTR (interrupt) ➔ Interrupt signal
- Additionally the **WR** signal of 8255 is also used.

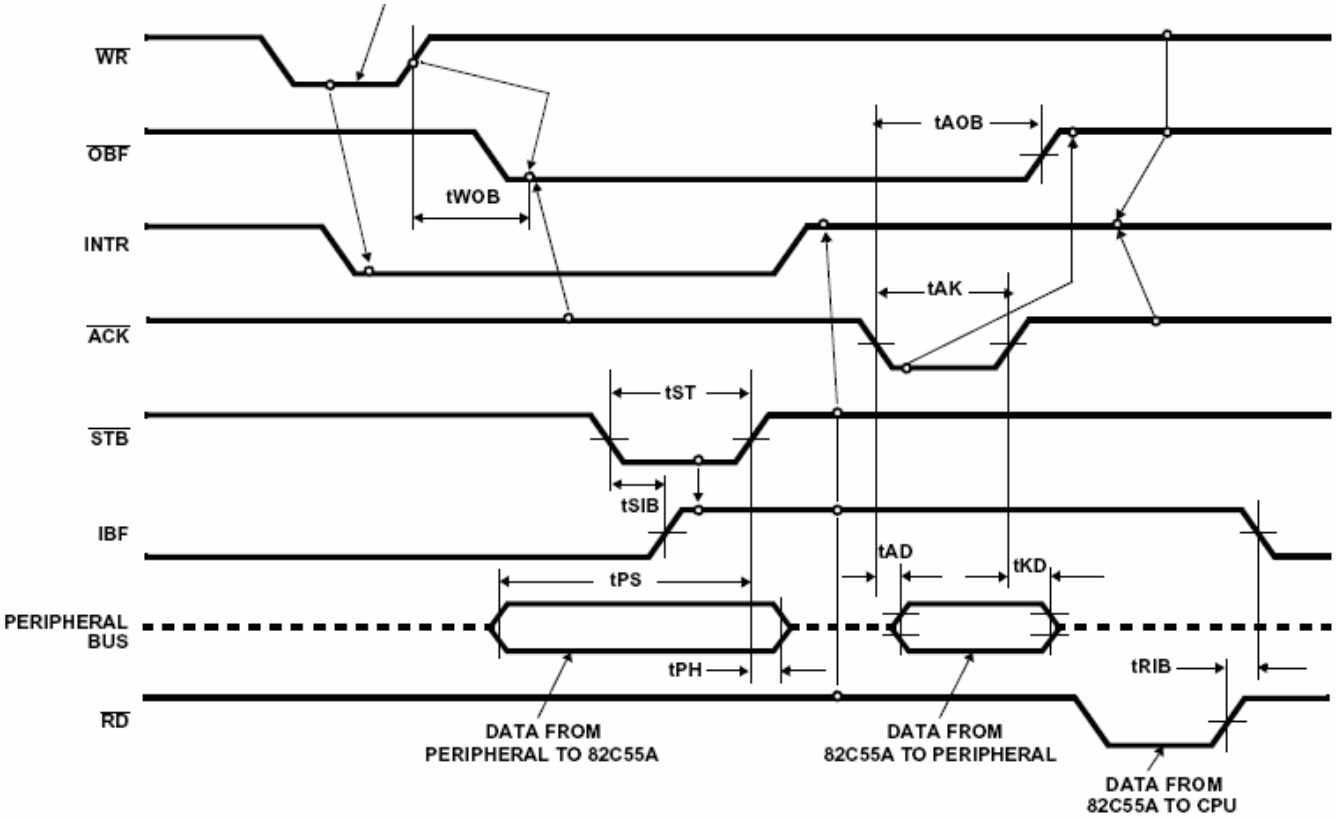
Handshaking takes place in the following manner:

1) When the output port is empty (indicated by a high on the INTR line), the **µP writes data** on the output port by giving the **WR** signal.
2) As soon as the WR operation is complete, the **8255 makes the INTR low**, indicating that the µP should **wait**.
   This **prevents** the µP from **sending more data** to the 8255 and **hence data loss** is prevented.
3) **8255** also **makes** the **OBF low** to indicate to the output peripheral that **data** is **available** on the data bus.
4) The **peripheral accepts** the **data** and sends an acknowledgement by making the **ACK low**.
   The **data byte** is **thus transferred** to the peripheral.
5) Now, the **OBF** and **ACK** lines **go high**.
6) The **INTR** line **becomes high** to **inform** the **µP** that **another byte** can be **sent.** i.e. the output port is empty.
   This process is repeated for further bytes.

❖ Mode 2 (Bi-directional Handshake I/O)



Timing Diagram for Mode 2 Bi-Directional Transfer



Working:

- In this mode, **Port A** is **used** as an **8-bit bi-directional Handshake I/O Port**.
- **Port A** requires **5 signals from Port C** for doing Bi-directional handshake.
- **Port B** has the following **options**:
  1) **Use** the **remaining 3 lines** of **Port C** for handshaking so that **Port B is in Mode 1**.
     Here **Port C** lines will be **completely used for handshaking** (5 by Port A and 3 by Port B).
     OR
  2) **Port B** works in **Mode 0** as simple I/O.
     In this case the **remaining 3 lines** of **Port C** can be used for **data transfer**.

- Port A can be used for data transfer between two computers as shown.
- The high-speed computer is known as the master and the dedicated computer is known as the slave.
- Handshaking process is similar to Mode 1.
- For **Input**:
  - **STB** and **IBF** → handshaking signals
  - **INTR** → Interrupt signal.
- For **Output**:
  - **OBF** and **ACK** → handshaking signals
  - **INTR** → Interrupt signal.
- Thus the 5 signals used from Port C are:
  STB, IBF, INTR, OBF and **ACK**.