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Subject : Microprocessor and its applications

Class : Final Year Electronics

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The 8255A Programmable Peripheral Interface

The 8255A is a widely used programmable, parallel I/O Device. It can be programmed to transfer data under various conditions. It is flexible, versatile and economical but somewhat complex. It is an important general purpose I/O device that can be used with almost any microprocessor.

The 8255A has 24 I/O pins that can be grouped primarily in two 8 bit parallel ports: A and B, with the remaining eight bits as port C. the eight bits of port C can be used as individual bits or be grouped in two 4 bit ports: C_{upper} (C_U) and C_{lower} (C_L) as in figure A. the function of these ports are defined by writing a control word in the control register.

Fig B shows all the functions of the 8255A, classified according to the two modes: the Bit Set/Reset (BSR) mode and the I/O mode. The BSR mode is used to set or reset the bits in port C. The I/O mode is further devided into three modes: Mode 0, Mode 1 and Mode 2. In mode 0, all ports function as simple I/O ports. Mode 1 is a handshake mode in which ports A and/or B use bits from port C as handshake signals. In mode 2, port A can be set up for bidirectional data transfer using handshake signals from port C, and port B can be set up either in Mode 0 or Mode1.

CONTROL LOGIC

The control section of 8255A has six lines.Their functions and connections are as follows-

Read $\overline{RD}$: This control signals enables the read operation. When this signal is low, the microprocessor reads data from a selected I/O port of the 8255A.

Write $\overline{WR}$: This control signal enables the write operation. When this signal is low, the microprocessor writes data into a selected I/O port of the 8255A.

RESET : This is an active high signal. It clears the control register and sets all the ports in the input mode.

$\overline{CS}$, A_0 and A_1 : These are device select signals.

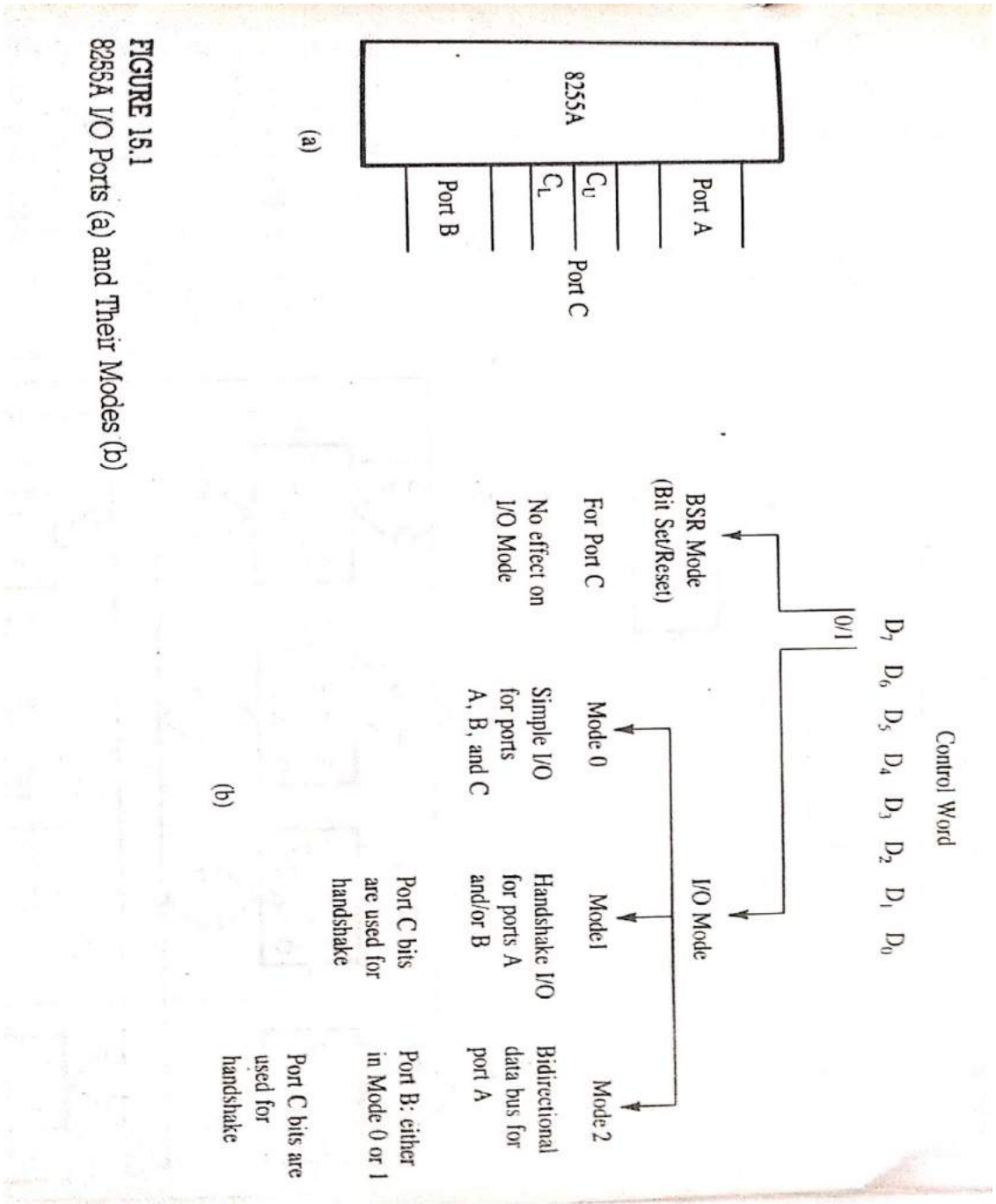
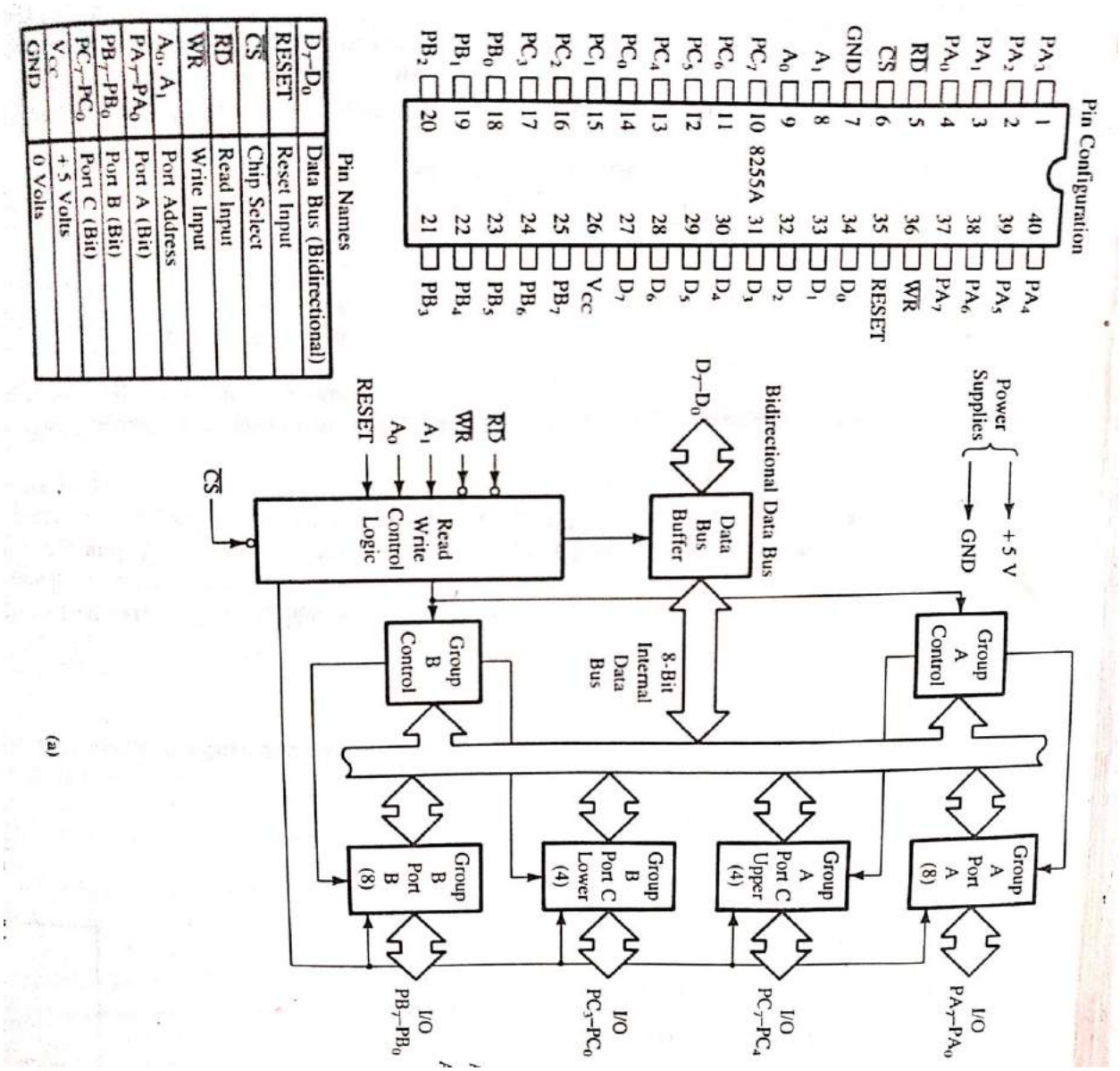


FIGURE 15.1
8255A I/O Ports (a) and Their Modes (b)



The $\overline{CS}$ signal is the master chip select and A_0 and A_1 specify one of the I/O ports as given below-

$\overline{CS}$	A_0	A_1	Selection
0	0	0	Port A
0	0	1	Port B
0	1	0	Port C
0	1	1	Control register
1	X	X	8255A is not selected

The chip works in many modes. In Mode 0, port A and B are used as two simple 8 bit I/O ports and port C as two 4 bit ports. Each port can be programmed to function as simply an input port or an output port. In Mode 1, handshake signals are exchanged between the MPU and peripheral prior to data transfer. In mode 2,port A can be configured as the bidirectional port and port B either in Mode 0 or Mode 1. Mode 2is generally used in applications such as data transfer between two computers.

The BSR (Bit Set/Reset) Mode is concerned only eight bits of port C, which can be set or reset by writing an appropriate control word in control register.