

Chapter 8

Digital and Analog Interfacing Methods

Lesson 5

8279- Keyboard cum Display Controller

8279 Features

Required Features in Keyboard cum display unit

- Scan lines and encoded scan lines through counter a continuous scan - **8279 Yes**
- Return lines and encoded return lines - **8279 Yes**
- Debouncing - **8279 Yes**

- FIFO for keyed inputs - **8279 Yes**
- N-key rollover and two key lockout - **8279 Yes**
- Hardware interface to parse keys - **8279 Yes**
- LED arrays and Multi digits display and display refresh - **8279 Yes**
- Seven segments - **8279 Yes**

8279 Keys

- Connects up to 64 keys or sensors
- 8 return lines
- Four scan lines direct mode and encoded mode
- Control key/strobe key
- One shift line to effectively give 8 scan rows (H-lines)

8279 FIFO/Sensor Array RAM

- 8 Bytes FIFO buffer for keys or 64 sensors array RAM
- Interrupt driven IO mode on each FIFO entry to enable processor read the FIFO buffer

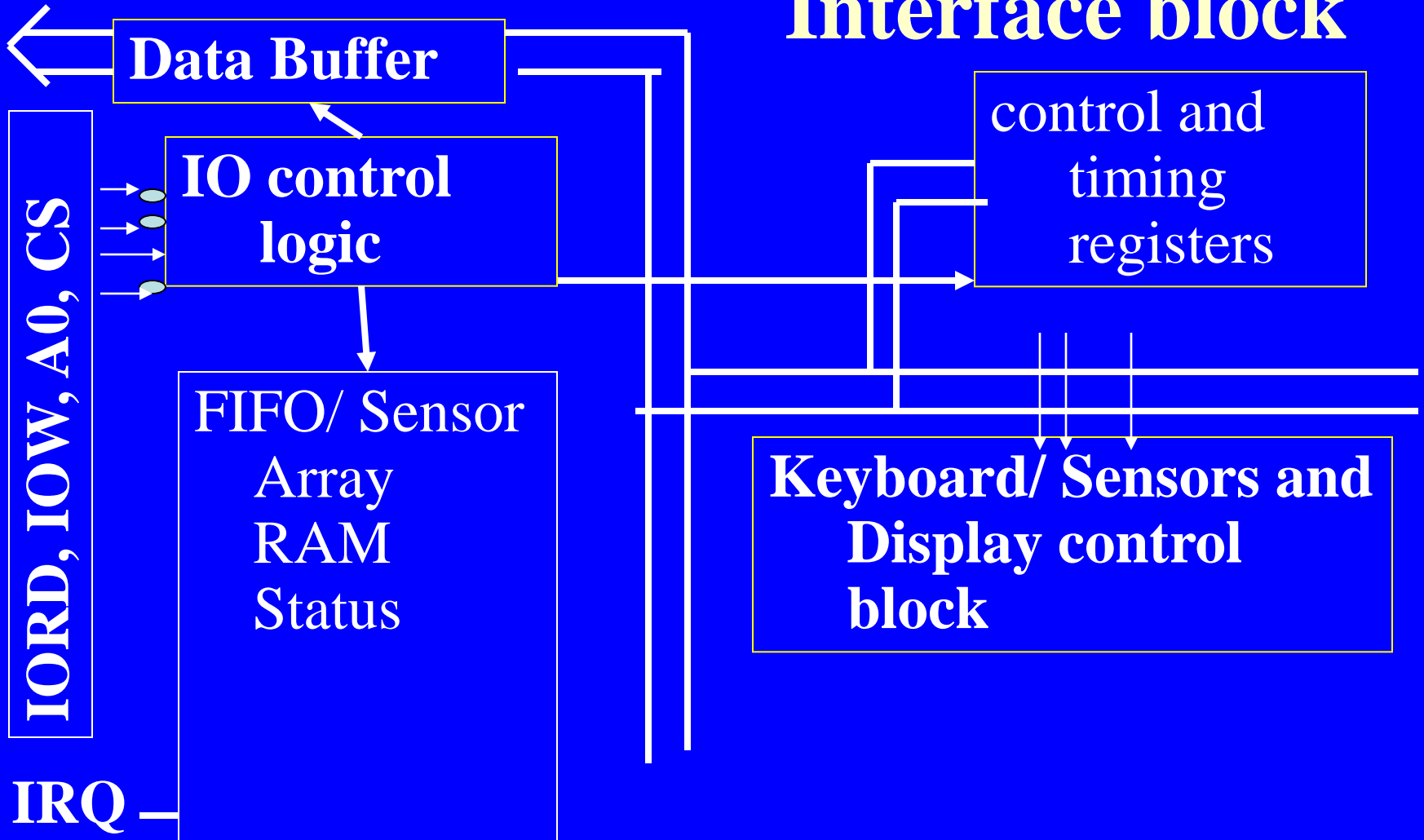
8279 Key parsing

- Two key lockout (default) or N-key rollover mode setting
- Scan and return lines programmable for sensor modes not encoded, encoded in keyboard mode

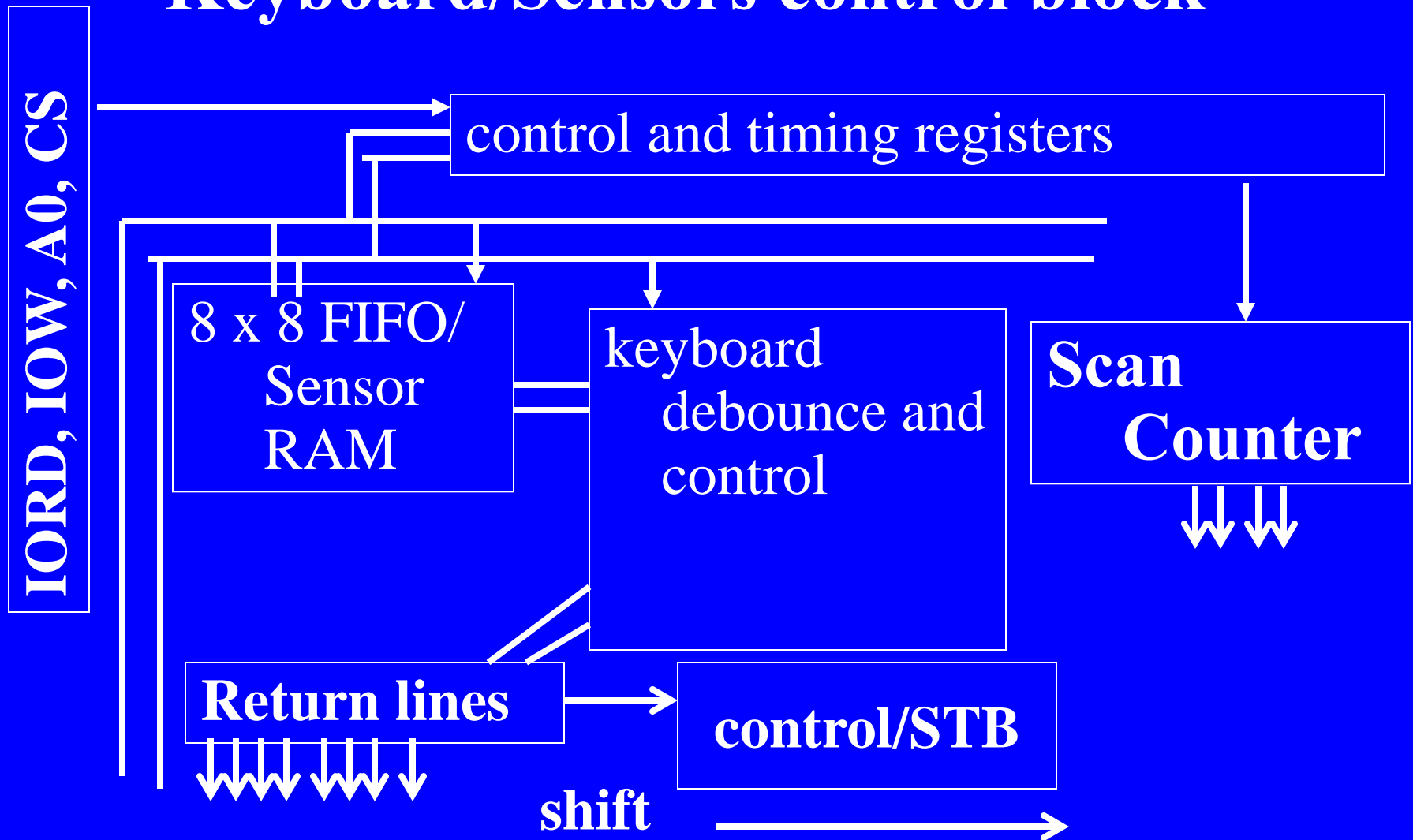
- 16×8 Internal display RAM
- Programmable for refresh eight 16 segment characters display or sixteen eight-segment displays
- Programmable for blinking display and BCD numbers display
- Programmable Right side entry in number entry and left side entry in characters entry

8279 subunit and blocks

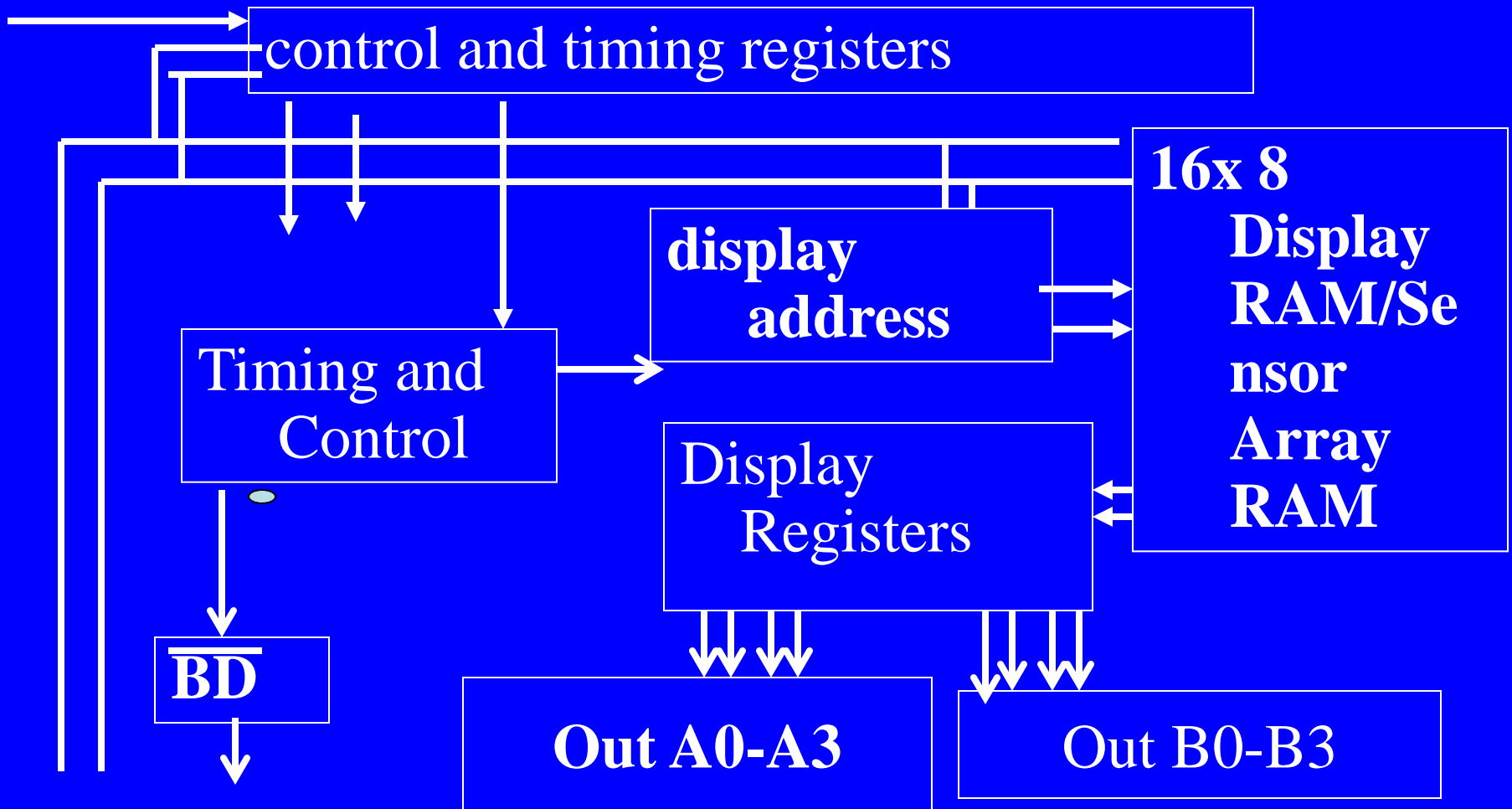
8279 Processor Interface block



Keyboard/Sensors control block



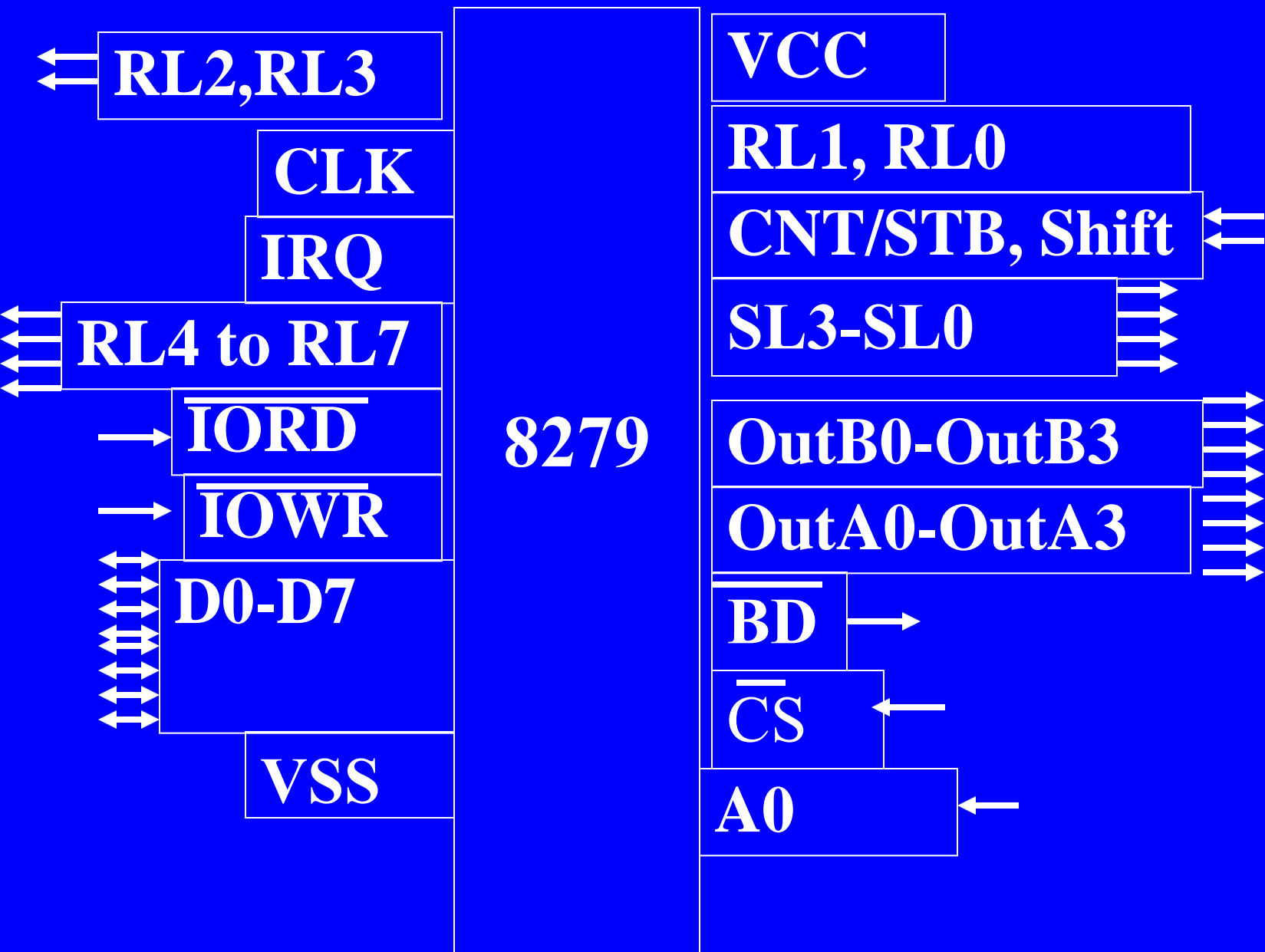
Timing control and Display block



Tables 8.7, 8.8 and 8.9

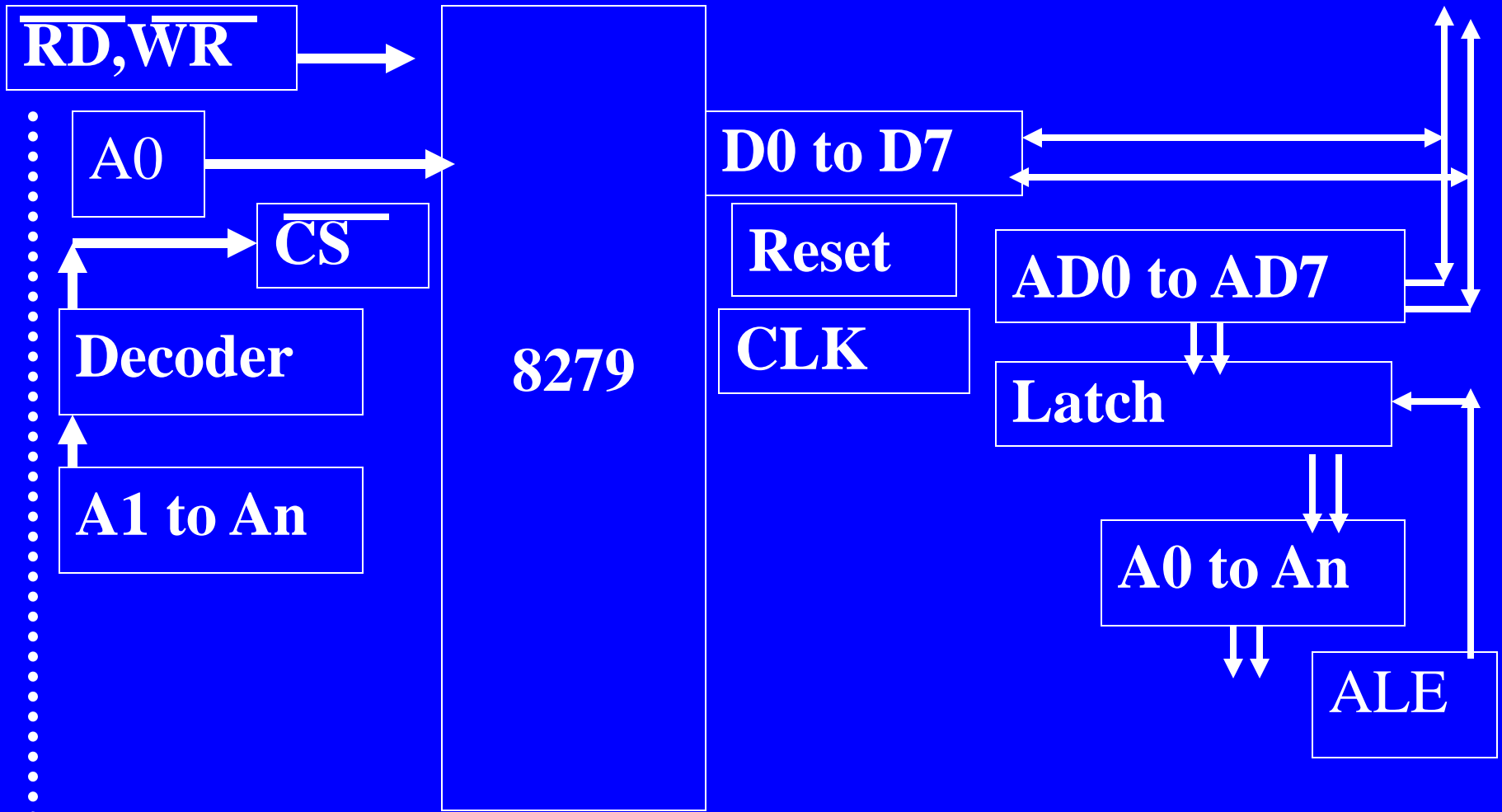
Subunits and Block Functions

8279 Pins

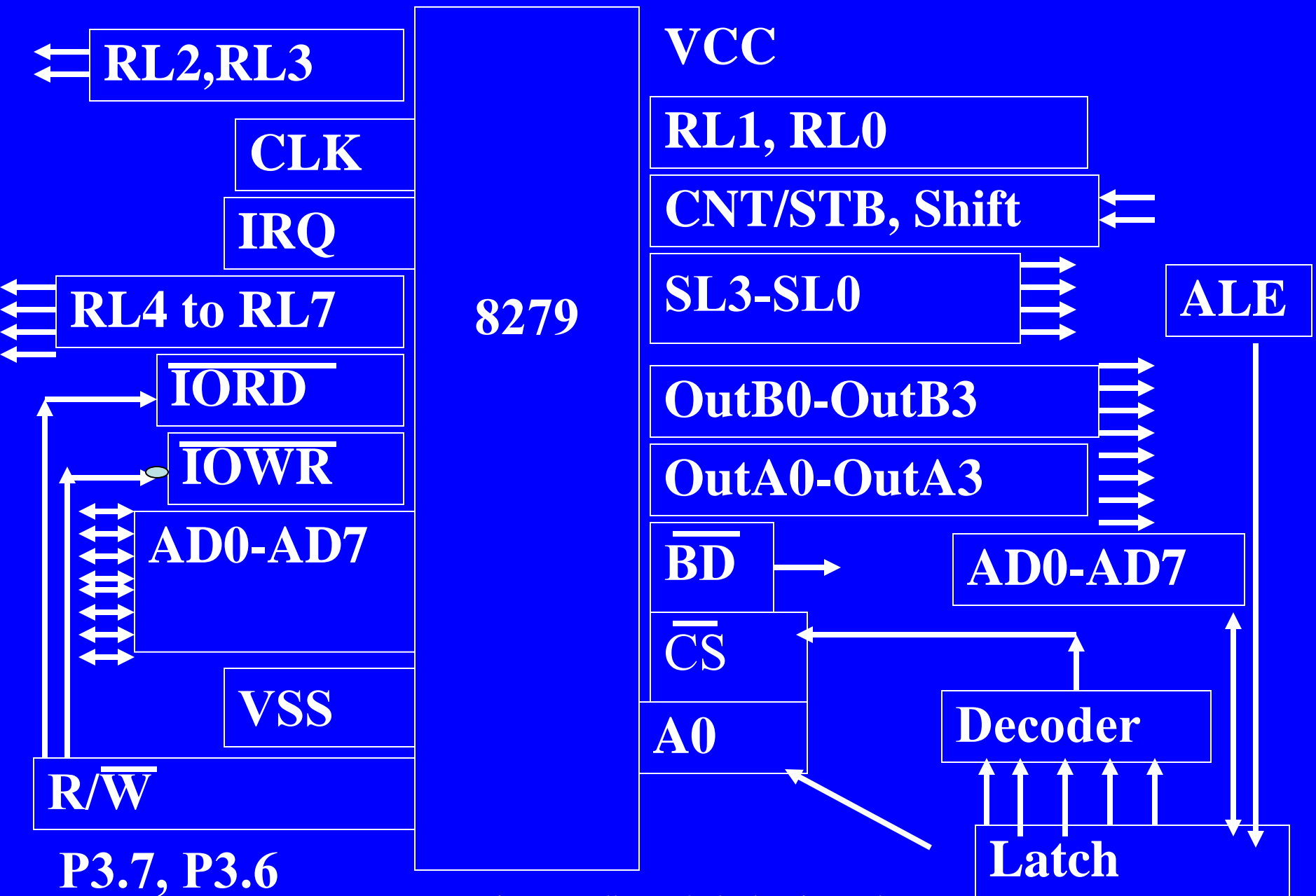


Tables 8.10- Pin signals

8279 Interfacing

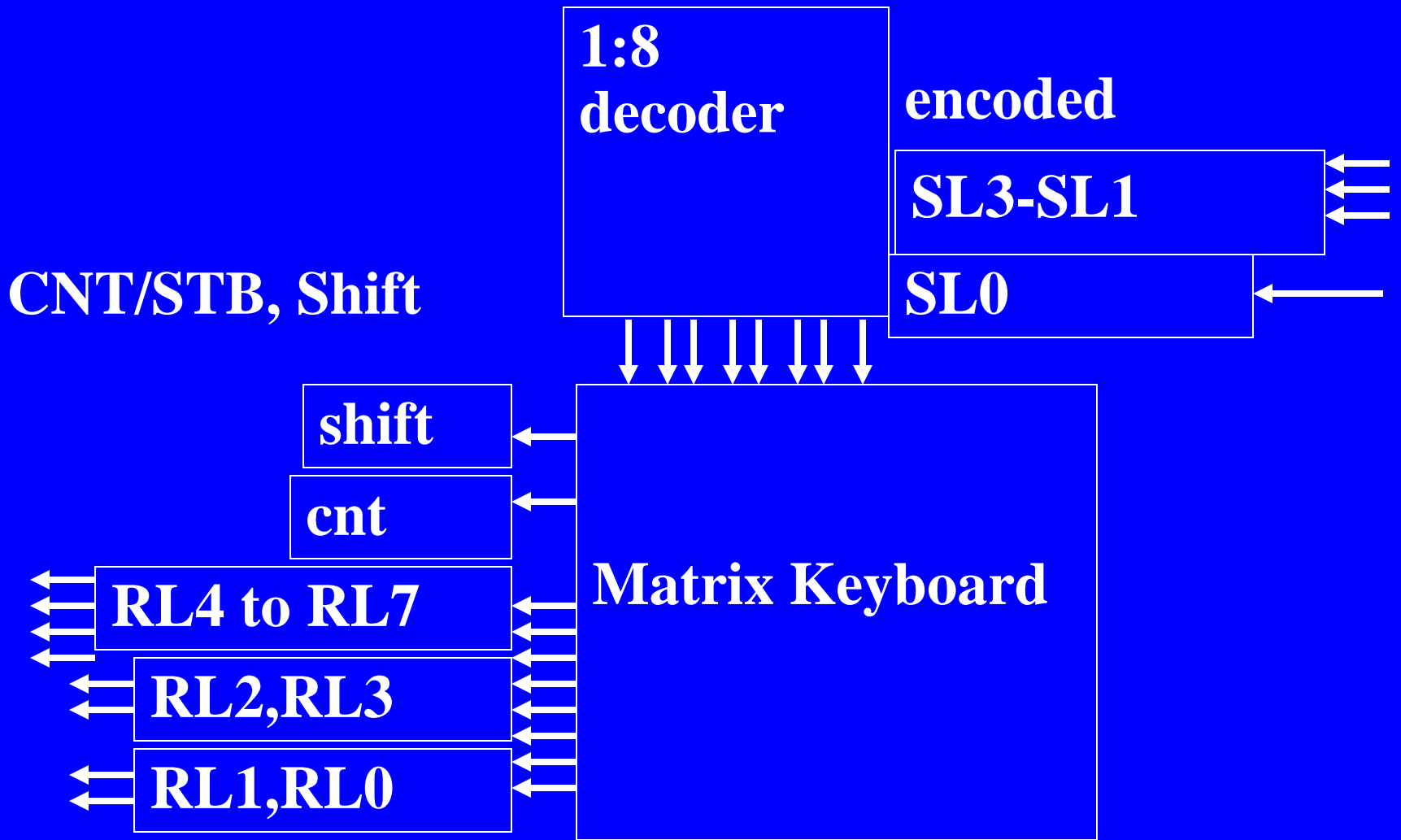


$(\overline{WR}, \overline{IOWR}$ or P3.7) and $(\overline{RD}, \overline{IORD}$ or P3.6) or R/\overline{W} and $\text{NOT}(R/\overline{W})$

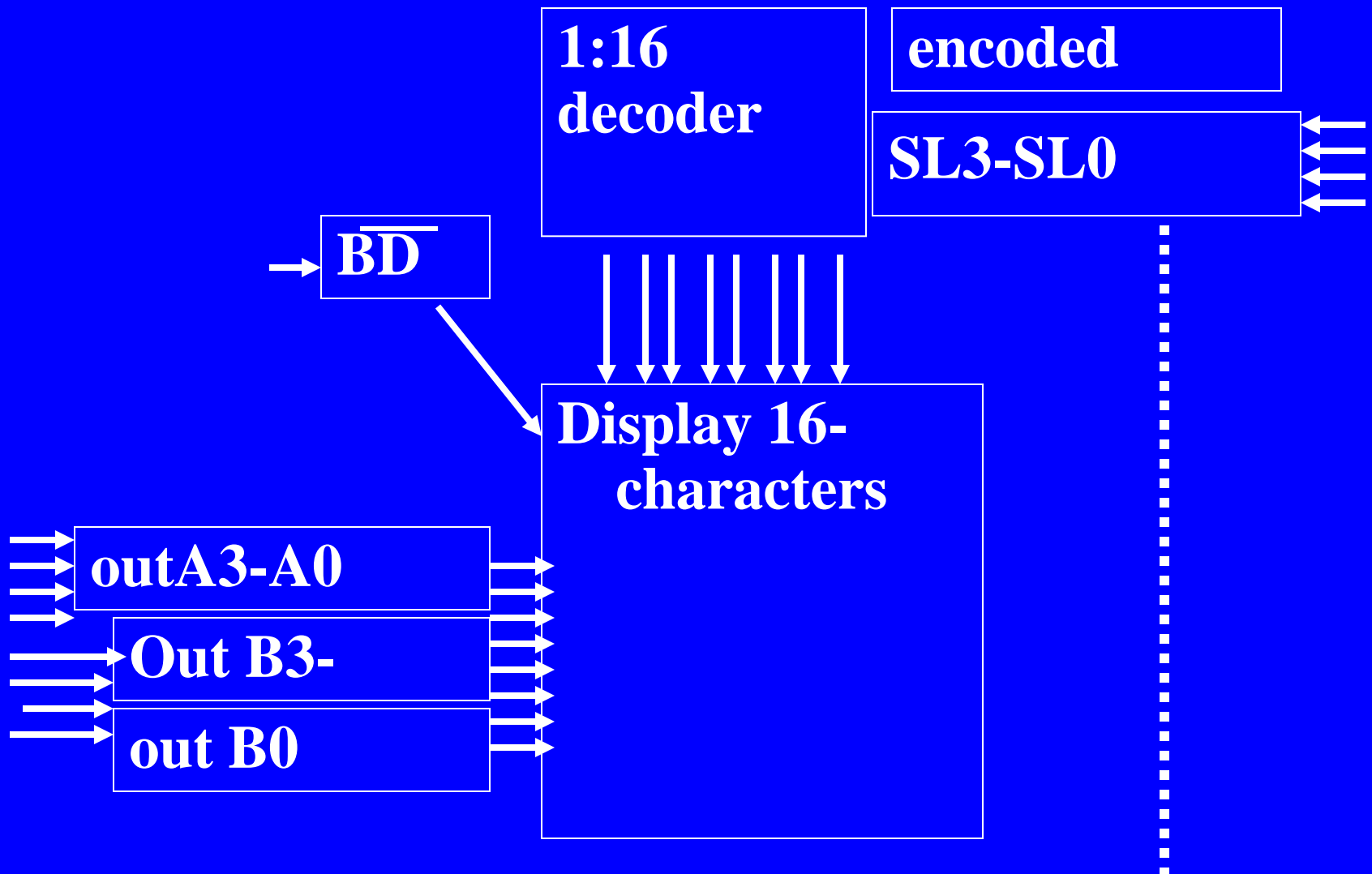


P3.7, P3.6

8279 to keyboard Interfacing



8279 to display system Interfacing



Refresh Registers and thus displayed digits

Table 8.11- Port Addresses for a typical interface circuit



8279 Programming

Programming the 8279 Mode and sending commands to 8279

When $\overline{CS} = 0$, C/\overline{D} (A0)= 1, and $\overline{WR} = 0$ then 8279 gets Command bytes

Bytes after reset

1. Initialisation Command keyboard Instruction
2. Initialisation display Command Instruction
3. Initialisation clock Command Instruction
4. RAM start address

5. Read Instruction

6. Inhibiting and blanking format

Write keyboard/Display mode
instruction b7,b6, b5 = 0

1. b4, b3 = 11 sixteen 8-bit Char display,
right side entry

= 10 eight 8-bit Char display, right side
entry

= 01 sixteen 8-bit Char display left side
entry

= 00 eight 8-bit Char display left side entry

Write keyboard/Display mode
instruction $b7, b6, b5 = 0$

2. $b2, b1, b0 = 111$ strobe input decoded
display

= 110 strobe input encoded display

= 101 decoded scan with 2 key lockout

= 100 eight decoded scan sensor matrix

b2, b1, b0 =

= 011 encoded scan sensor matrix

= 010 encoded scan with N-key rollover

= 001 decoded keyboard scan with 2 key
lockout

= 000 encoded scan keyboard with two key
lockout

Write Program clock mode
instruction $b7, b6 = 00, b5 = 1$

1. $b4-b0$ five bits divisor of clock input

Write Read FIFO/Sensor mode
instruction $b7 = 0$, $b6 = 1$, $b5 = 0$, $b3 =$
 0 or 1

1. $b4 =$ auto increment flag

2. $b2-b0 =$ FIFO/Sensor RAM address

$= 010$ read sensor RAM address 010

$= 100$ read sensor RAM address 100

Reading Display RAM b7,b6, b5 = 0

b4 = 1 means auto address increment

b3-b0 = Display RAM

= 0001 address = 0001

= 000 address = 0000

Write Display write inhibit/blanking mode instruction $b7, b5 = 11$, $b6 = 0$, $b4 = 0$ or 1

1. $b3-b2$ IW-IW A3-A0, B3-B0 refer text

2. $b1-b0 = BL$, $BL = 11$ means both port blanking display

= 10 means A port blanking display

= 01 means B port blanking display, = 00 means none

Programming Examples

Examples 8.9 (i) to (iv)

Summary

We learnt

8279 Features

We learnt

8279- A keyboard cum Display
controller

FIFO

Display RAM

We learnt

8279 Programmability

1. Clock divisor
2. Blanking
3. Display RAM address
4. Left entry/right entry
5. Encoded mode, sensor mode

End of Lesson 5

8279- Keyboard cum Display Controller

THANK YOU