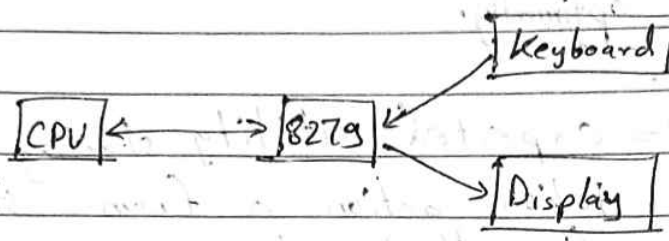
MIT2 - 16/4/25

8279 - Programmable Keyboard/Display Controller.



Features

1) Allow keyboard and display operation
2) Scanned keyboard ~~matrix~~ mode
3) Scanned sensor matrix mode.
4) Display mode
5) 8-character keyboard FIFO RAM
6) 16-character display RAM. (Right and left entry) (like a deque)
7) Programmable ~~scanned~~ timing

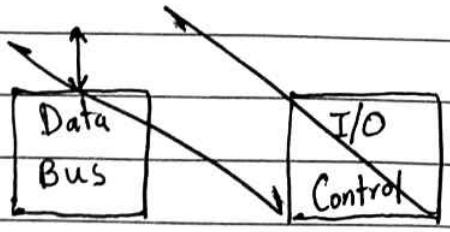
Interfacing

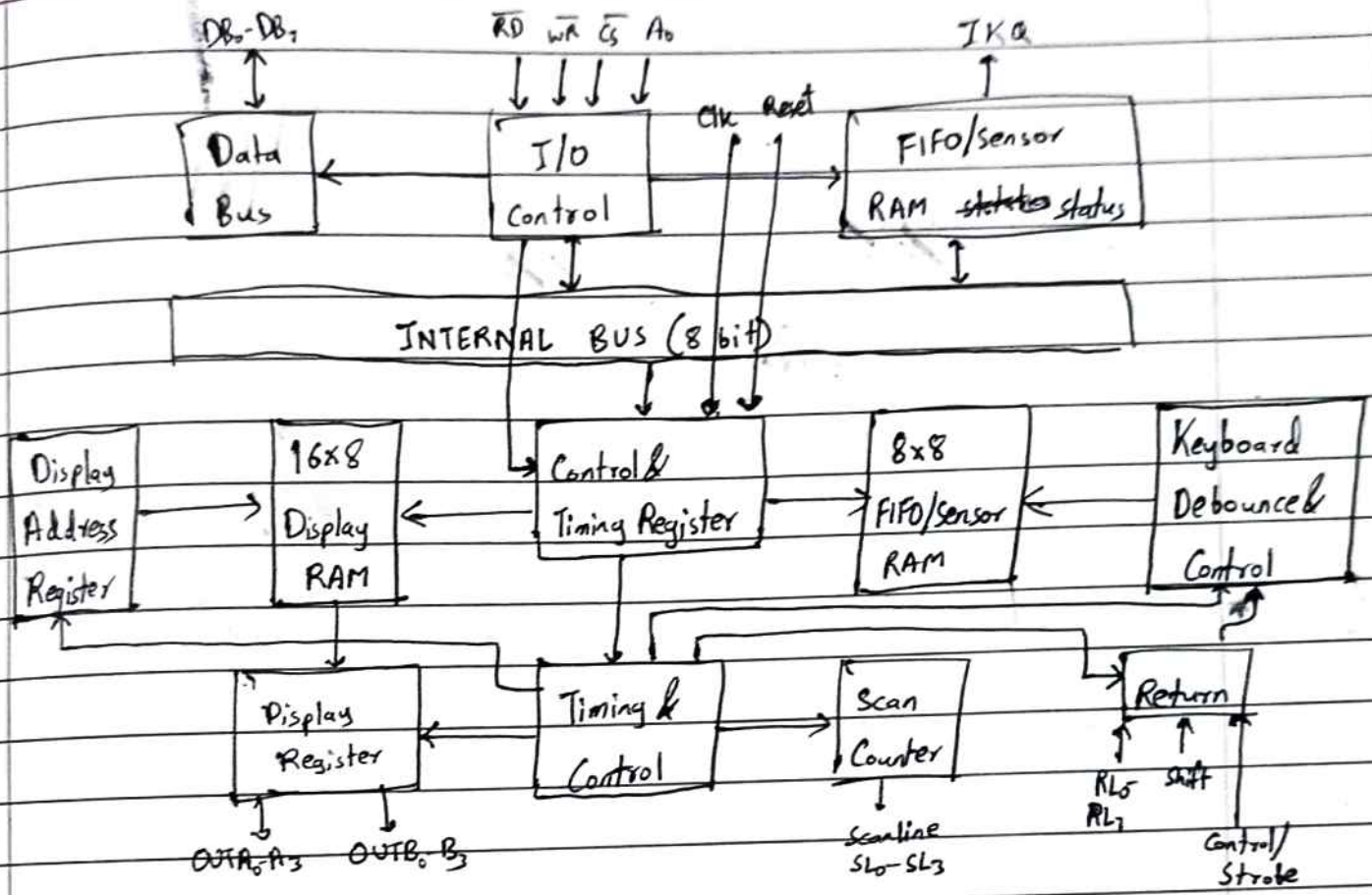
1) Interrupt mode
2) Polled mode

How 8279 works?

→ Status of shift / control

Overrun → when more than 8 characters are to be stored.





→ 2key lockout : only 1st is recognised
N key rollover : all pressed keys recognized

D_7 - status of control key
D_6 status of shift key
D_5-D_3 - Binary value of row of pressed key/switch - 8×8
D_2-D_0 - " " " column " " "

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Command Words of 8279

Modes of operation of 8279
→ Input Mode
⊕ Scan keyboard: 2 key lock out, N keyroll over
⊕ Scan sensor matrix
⊕ Strobed I/P
→ Output Mode

1) Keyboard Display Mode Set

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	A_0
0	0	0	D	D	K	K	S	1

Display mode — Keyboard mode

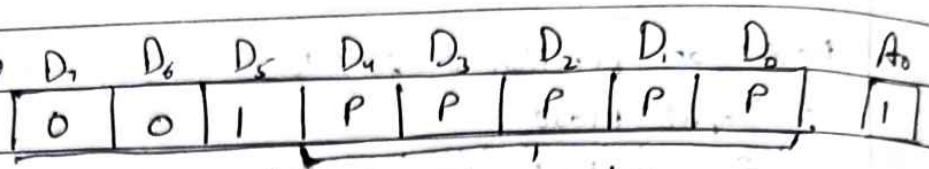
D D	Mode
0 0	Eight 8b character left entry
0 1	Sixteen " " " "
1 0	Eight " " right "
1 1	Sixteen " " " "

K K K	
0 0 0	Encoded scan, 2 key lockout
0 0 1	Decoded scan
0 1 0	
0 1 1	
1 0 0	
1 0 1	
1 1 0	
1 1 1	

K K	
0 0	2 key lockout
0 1	N key rollover
1 0	Sensor matrix
1 1	Strobed I/P

S	
0	Encoded scan
1	Decoded scan

2) Programmable Clock Mode

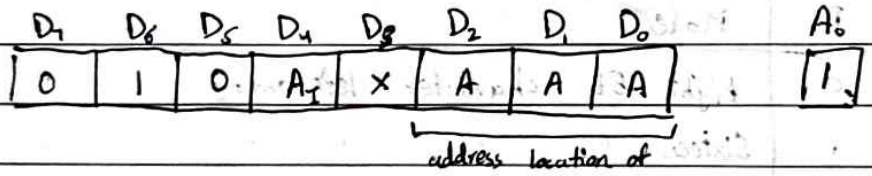


Input clock frequency = 100kHz

$$\text{fSCL} = \frac{\text{External clock frequency}}{\text{Prescalar}}$$

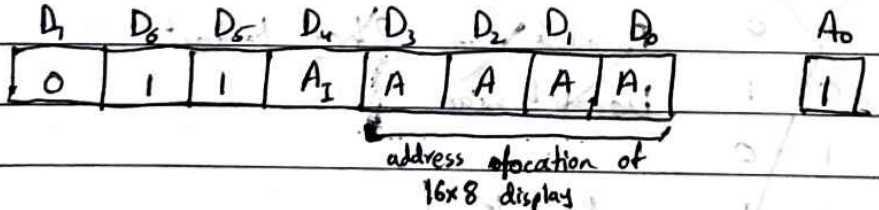
D_4-D_0 : 5b prescalar (binary constant)
Range: (2-31)

3) Read FIFO/Sensor RAM

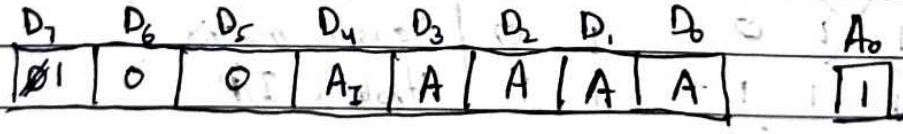


A_I : Auto increment flag

4) Read Display RAM



5) Write Display RAM



6) Display write inhibit / blanking (masking)

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	A_0
1	0	1	x	IW_A	IW_B	BL_A	BL_B	1

IW_A : if $OUTA_0 - A_3$ will be masked
IW_B : if $OUTB_0 - B_3$ " " "
BL_A : if display of $OUTA_0 - A_3$ will be blanked
BL_B : if " " $OUTB_0 - B_3$ " " "

7) Clear Command (??)

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	A_0
1	1	0	CD_2	CD_1	CD_0	CF	CA	1

CD_1	CD_0	
0	X	00H
1	0	20H
1	1	FFH

8) End interrupt / Error mode set (??)

D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	A_0
1	1	1	E	x	x	x	x	1

↳ special error mode

2 3 4 8 9 12 13 18 50 69 44 60
34 42 43 56 58 62 64 66 57 79
31 61 80 51 49 47 48 24 144 67
→ 30

Modes of operation

IP 1) Scanned keyboard mode

Encoded scan : 8×8
Decoded scan : 16×8

→ Scanned keyboard w/
- 2 key lock out
- N key roll over
- Special error mode
  - ↳ when 2 or more keys are pressed simultaneously, this raises error. No. key codes will be stored, but interrupt requests are generated

IP 2) Scanned Sensor Matrix Mode

Encoded : 8×8
Decoded 4×8

IP 3) Strobed I/P

OP 1) Display Entry
- Left Entry (Typewriter mode)
  - ~~Display Address Register~~
  - Display RAM [0000] → leftmost
    [1111] → rightmost
- Right Entry (Calculator mode)

OP 2) Display Scan
- In this mode, 8279 scans display devices and provides 8b/16b characters for a multiplexed display. These characters can be organised as dual 4 bit or mono 8 bit display units.