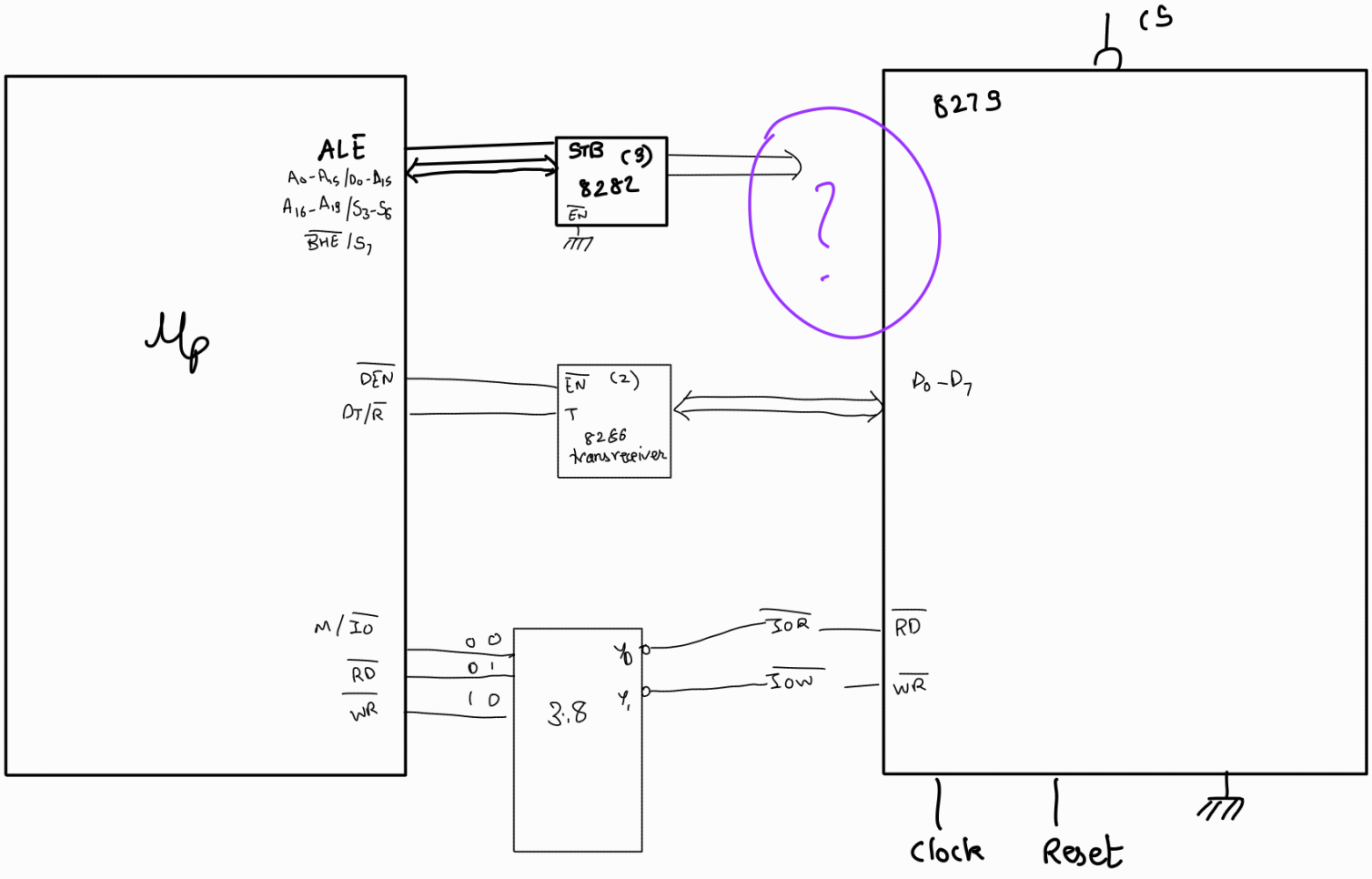
8279 → Programmable keyboard and Display Interface

Q. Interface 8279 to 8086

↳ Synchronous device

↓

requires Clock & Reset



"Only reset pin makes software join hands with hardware."

— Rivankar Sir

16:40:50, May 15th

Reset pin resets the processor

8279 ⟶ Can have 16 max 7-segment display

Scanned keyboard → 8×8 matrix
(key matrix)

Strobed keyboard → does the calculation of scanning which key was produced is done within the keyboard hardware itself.

8279 can have both scanned and strobed keyboards.
↳ it is possible to 64 sensors in a 8×8 matrix

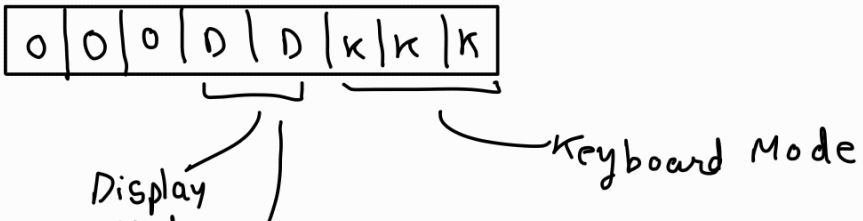
2 Modes: Encoded and Decoded scan

Encoded:
- 16 displays
- 64 Key matrix/ sensors

Decoded scan:
- No of keys in key matrix are limited to 4×8 = 32.
- No of displays limited to 4
- Sensor matrix limited to 4×8 = 32.

- 1 Address Line
- ∴ 2 ports possible.

1) Keyboard Display Mode Set



00 → 8 displays
01 → 16 displays
10 – 8 displays
11 – 16 displays

Right Entry - Calculator Mode

Left Entry - Displays will entry from left.

KKK

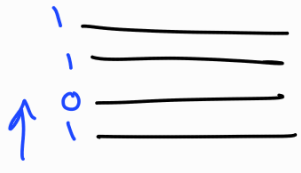
↳ 000 → Encoded Scan Keyboard.

- 3 scan lines used, given to 3:8 decoder, to generate 8 scan lines (0 sent on them) for keyboard matrix.
- when in this mode the 4 scan lines used in '4:16' decoder.

Decoded Scan: ⟶ we can display only 4 displays in decoded scan

- $SL_0 - SL_4$

  One by one 0 traverses between 4 lines. Causing limitation of key matrix having us only 4 by 8 keyboard.



↳ 0 moves up, 1 comes back again.

2 key lock out - IF two keys pressed last key released will be sensed/considered.

KKK

- 001 - Decoded scan keyboard - 2 key lockout.
- 010 - Encoded scan keyboard - N-key roll over.
  - Error overrun flag set in FIFO status word when more than 8 lines try to go inside 8279.

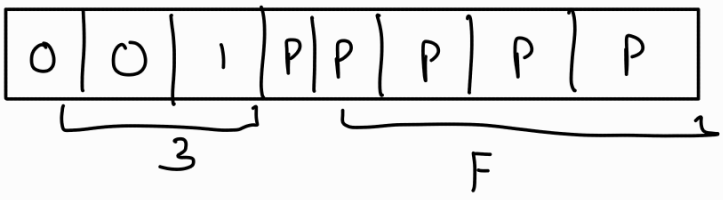
100 - Encoded Scan Sensor Matrix

101 - Decoded

110 - } Strobed Keyboard [Encoded - 110 | decoded - 111]

111 - }

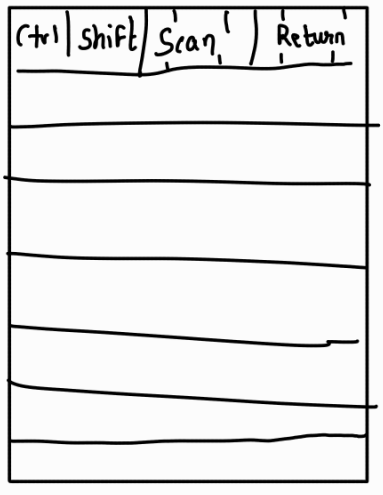
Program Clock




```
MOV AL,00
OUT 82H,AL
MOV AL,3F
OUT 82H,AL
MOV AL,70
OUT 82H,AL
MOV BX,3000
MOV CL,0F
BACK:
MOV AL,[BX]
OUT 80,AL
CALL DELAY   ; optional
INC BX
DEC CX
JNZ BACK
```

Keyboard types:
1) Scanned key matrix keyboard
2) Strobed keyboard
3)

(pg 222)



↓

above calls NMI instruction using IRQ pin (?)

↓

NMI Subroutine: (to read from keyboard)

```
IN AL,30
MOV [BX],AL
IRET.
```

8259 - Universal serial transmitter.
(Simple serial communication).

WAP to configure 8279 for Scanned key matrix. Assume that clock out of 8086 is 2MHz. Base address is 80H. write the program to read the code of the key press and store the keycodes sequentially from memory location having effective address 3000.

Assume, 8279's ($\overline{IRQ}$?) line is connected to $\overline{NMI}$ of 8086 in an interrupt driven data transfer scheme.

an encoded code

n key rollover keyboard.

```
MOV   AX, 3000
MOV   DS, AX
MOV   BX, AX
MOV   AL, 02H      ← Setting
OUT   82H, AL

MOV   AL, 34H      ← Setting clock.
OUT   82H, AL

MOV   AL, 50H
OUT   82H, AL

HERE: JUMP HERE
```

00000010
0 2 H

2MHz ÷ 100KHz = 20

00110100
3 4H

01010000
5 0 H

```
NMISUB:
        IN  AL,80
        MOV [BX],AL
        INC BX
        IRET
```