Experiment

1

Interfacing the Clock Generator to the CPU

1.1 Background

The 8086 CPU has 16 data lines and 20 address lines. The CPU uses time multiplexing for the Address, data, and some status lines. The Clock Generator and Driver 8284 is a device capable of providing the CPU with Clock, reset logic, and ready logic. For this it uses a crystal oscillator that must be 3 times the frequency of the CPU (15 MHz Crystal).

1.2 Objective

Interfacing the clock generator to the CPU

1.3 Equipment

The instructor should group the students (2 or 3 per group) and assign a group head. The group head will take the following equipment on his responsibility as a loan from COE department. From now on, in every experiment there will be more equipment given. The group will keep the equipment and use them through the following experiments. They should return every thing before reporting the grades.

- Proto board,

- 8086 CPU,

- 8284 Clock generator,

- 15 MHz crystal clock,

- 1 Reset-Switch,

- 3 resistors (l00K, 510, 510),

- 1 Capacitor (10u), and

- Oscilloscope

1.4 Procedure

1. Make a short review of the clock generator 8284 (Appendix II) and identify the three major functions that this device can operate.
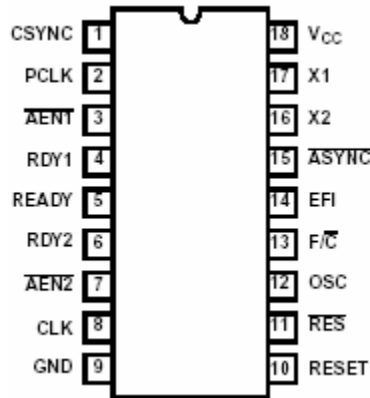

Figure 1.1: Top view of the 8284 clock generator

2. Implement the design shown in Figure 1.2 and check the output signal at CLK, PCLK, and OSC using the oscilloscope. Interface the CLK line to CPU and show your instructor the resulting signals.
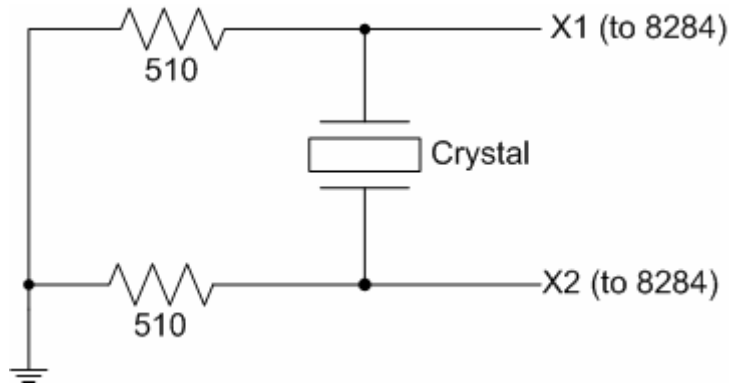

Figure 1.2:Connecting the crystal to the 8284

3. Implement the RESET circuit shown in Figure 1.3, and make sure that any change from 0 to 1 must have duration of at least 50us. Test the reset signal using the oscilloscope and show the resulting signal to your instructor.
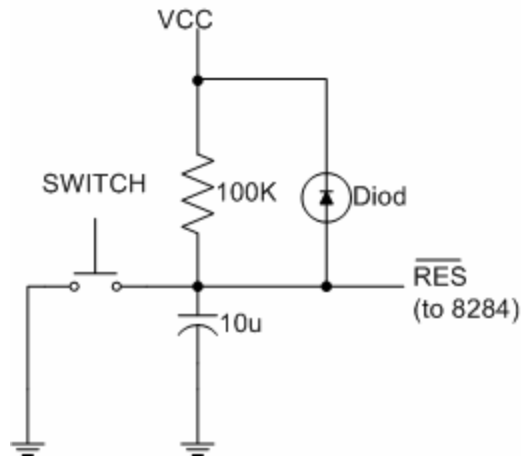
Figure 1.3: Reset Circuit

4. Read pin description of the 8086 microprocessor (Appendix), and determine what should be connected to the following pins (assume minimum mode):

    a. $MN / \overline{MX}$ (pin 33)

    b. HOLD   (pin 31)

    c. $\overline{TEST}$ (pin 23)

    d. READY   (pin 22)

    e. RESET   (pin 21)

    f. CLK   (pin 19)

    g. INTR   (pin 18)

    h. NMI   (pin 17)

5. Connect VCC and GND pins of the 8086 microprocessor and test the ALE signal (pin 25) using the oscilloscope.

Exercises

1.1. What is the relationship between frequencies on the lines CLK, PCLK, and OSC? Do these frequencies match with the description of the 8284?

1.2. Find out the proper values of the needed resistors and capacitors in the RESET circuit such that any change from 0 to 1 must ensure duration of 50us.

1.3. What is the function of the ready signals on the 8284?