Laboratory Exercise : System Clock Interrupt

Problem: You are to write a program in 8088 assembly language to turn on the PC speaker at 500Hz for 10 seconds. The duration should be implemented by interrupting the system clock using INT 1AH.

Disadvantage of software loop. Recall that in the last lab we used a dummy delay loop with a magic number of iterations so as to let the speaker be switched on for certain duration. Magic numbers such as 32768 (for the inner loop) and 500 (for the outer loop) are devised by experiment (that is, by looking at the stop-watch). This method is handy, but if our program is ported to another PC of different processor speed, then the magic numbers have to be redefined in order to get the right duration.

System clock interrupt (hardware delay). Reading the system clock is provided by the BIOS (Basic Input/Output Service) INT 1AH. The corresponding interrupt service routine allows the clock to be set/read. The usage is:

```
mov ah, 2        ; set timer option to read
int 1ah
```

After the interrupt, CH contains hours, CL contains minutes, DH contains seconds, and DL contains an optional Daylight Savings indicator. The contents of these registers are binary coded decimal in which each byte can hold a number between 0 and 99. Each nibble (half-byte) represents a single digit between 0 and 9.

Duration control. The following can be used to control the speaker duration by interrupting the system clock repeatedly.

1. Turn on the speaker.

2. Read and save the current second-of-day.

3. Read the system clock.

4. Compare the second-of-day in DH with the saved value.

5. Go to step (3) if both values in (4) are equal.

6. Otherwise, save new second-of-day.

7. Decrement the number of iteration.

8. Go to (3) if number of iterations is greater than zero.

9. Turn off the speaker and exit.