MPF-I AS A FREQUENCY COUNTER

An Application Example of Z80-CTC.
Purpose: Use CTC to design a frequency counter

Required Equipment: MPF-1 (included CTC)

Experiment Explanation:

1. CTC has four channels CH0 - CH3 is mapping to 40H, 41H, 42H, 43H. In this program, we use CH0 & CH1. The function is shown below.

   **CH1:** used for timer interrupt, triggered by the internal clock of MPF-1 (1789772 Hz), we set CH0 to
   Mode: timer
   Range: 256
   Time constant: 233 (0E9H)
   So after interrupt 30 (01EH) times, it will be approximately 1 sec. 256*233*30=0FE9H*0E9H*01EH=
   1789440. It has error (1789772-1789440)/1789772= 0.00185%

   **CH0:** used for counter interrupt, triggered by user signal
   Mode: counter
   And set 'down counter'=100. Each time interrupts happen, we can add frequency counter by 1. We can get signal frequency when one sec is up.

2. LED display is in decimal format (six digit). So the largest value is 999999. When frequency is over this it will get some warning message, eg., display 'over' message, and tone 2K

3. Special care should be exerted when using the CTC. To avoid burning out the CTC, you should first refer to the Z80 Handbook, Z80-CTC Technical Manual, section 8.1 D.C. Characteristics. User signal used to trigger the CTC should comply with the following characteristics:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT LOW VOLTAGE</td>
<td>-0.3V -- 0.8V</td>
</tr>
<tr>
<td>INPUT HIGH VOLTAGE</td>
<td>2.0V -- Vcc.</td>
</tr>
<tr>
<td>OUTPUT LOW VOLTAGE</td>
<td>0.4V</td>
</tr>
<tr>
<td>OUTPUT HIGH VOLTAGE</td>
<td>2.4V</td>
</tr>
<tr>
<td>INPUT LEAKAGE CURRENT</td>
<td>1.0 uA</td>
</tr>
</tbody>
</table>

4. After 1 sec, program is finished and result will display at LED. If user want to count again, you can pressed key 'GO' then it will count again. Otherwise, it will continue to display data.