Project #2

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1 Explanation

1.1 Music

We know the frequency of the Philips P89LPC932A1 to be 7.373 MHz, with 2 cycles per machine cycle. Therefore,

$$\frac{2 \text{ cycles}}{\text{machine cycle}} \cdot \frac{1 \text{ Period}}{7.373\,\text{MHz}} = 0.271\,26\,{}^{\mu s}/_{\text{mc}} \tag{1}$$

We use this calculation as the base of our music.

E5	$f = 659.255\,\text{Hz} \implies T = 1516\,\mu\text{s}$ $1516\,\mu\text{s} \div 0.271\,26\,{}^{\mu\text{s}}/_{\text{mc}} = 5589\,\text{mc}$ $5589\,\text{mc} \div 4 = 1398\,\text{mc}$ $1398\,\text{mc} \implies$ 699 iterations (with `DJNZ`)
F5	$f = 698.456\,\text{Hz} \implies T = 1431\,\mu\text{s}$ $1431\,\mu\text{s} \div 0.271\,26\,{}^{\mu\text{s}}/_{\text{mc}} = 5275\,\text{mc}$ $5589\,\text{mc} \div 4 = 1318\,\text{mc}$ $1318\,\text{mc} \implies$ 569 iterations (with `DJNZ`)
G5	$f = 783.991\,\text{Hz} \implies T = 1275.5\,\mu\text{s}$ $1275.5\,\mu\text{s} \div 0.271\,26\,{}^{\mu\text{s}}/_{\text{mc}} = 4702\,\text{mc}$ $4702\,\text{mc} \div 4 = 1176\,\text{mc}$ $1176\,\text{mc} \implies$ 588 iterations (with `DJNZ`)
D5	$f = 587.330\,\text{Hz} \implies T = 1702.6\,\mu\text{s}$ $1702.6\,\mu\text{s} \div 0.271\,26\,{}^{\mu\text{s}}/_{\text{mc}} = 6277\,\text{mc}$ $7045\,\text{mc} \div 4 = 1570\,\text{mc}$ $1570\,\text{mc} \implies$ 785 iterations (with `DJNZ`)
C5	$f = 523.251\,\text{Hz} \implies T = 1911.1\,\mu\text{s}$ $1911.1\,\mu\text{s} \div 0.271\,26\,{}^{\mu\text{s}}/_{\text{mc}} = 7045\,\text{mc}$ $7045\,\text{mc} \div 4 = 1760\,\text{mc}$ $1760\,\text{mc} \implies$ 880 iterations (with `DJNZ`)
Flat D5	$f = 554.365\,\text{Hz} \implies T = 1803.8\,\mu\text{s}$ $1803.8\,\mu\text{s} \div 0.271\,26\,{}^{\mu\text{s}}/_{\text{mc}} = 6650\,\text{mc}$ $6650\,\text{mc} \div 4 = 1662\,\text{mc}$ $1662\,\text{mc} \implies$ 831 iterations (with `DJNZ`)

2 Future Work

3 Project Code

4 Work Effort

- Michael Schoen
  - Programmed binary counter.
  - Programmed game logic.
- Osman Abdirahman
  - Programmed initial beep.
  - Programmed song implementation.
- Illya Starikov
  - Programmed initial beep.
  - Programmed Random Number Generator.