Objective

* Get a handle for manipulating data using the SDK-85 (Student Development Kit)
* Use Appendix F (8085 Instruction Set), specifically the Arithmetic Group, to perform operations on the registers and memory locations of the SDK-85.

Theory

* The SDK-85 (Student Development Kit) is a single board microcomputer system kit using the 8085 processor. It is made by Intel and is now used to teach students about the concepts of microprocessors. Contains the following
  + **Microprocessor**
  + **Memory Element** – This describes both ROM (Read Only Memory) and RAM (Random Access Memory)
    - ROM (Read Only Memory) – Contains system boot up instructions
    - RAM (Random Access Memory) – Has Read/Write capabilities
  + **I/O Unit** – Handles input from user and provides output
* Microprocessors are computer processors that incorporate the functions of a central processing unit on a single integrated circuit (IC) or at most a few integrated circuits. They contain the following:
  + **Combinational logic Unit** ­– are logic circuits implemented by Boolean (logic gates) circuits, where the output is a pure function of the present input only. Think Half-Adders, Full-Adders, Encoders, and Decoders.
  + **Sequential logic Unit** – this is a type of logic circuit whose output depends on previous inputs as well as on the present inputs.
    - Contains Memory
    - Contains a clock

This lab focuses on **Appendix F (the 8085 Instruction Set)**, specifically the **Subroutines**. This is the set of assembly instructions that performs preset programs that’s stored in ROM

**Part A**

Draw flow chart of the program that will display the course code EE 2262 on the address fields, using the following subroutines.

UPDAD (0363)

UPDAT (036E)

RDKBD (02E7)

DELAY (05F1)

|  |
| --- |
| [SP] ←20C2 |
| A 62 |
| DISPLAY’A’ |
| |DE|←EE22 |
| DE DISPLAY |
| Call RD KBRD |

**Part B**

**Mnemonics OP Address**

|  |  |  |
| --- | --- | --- |
|  | 31  C2  2D | 2000  1  2 |
| MVI A,62 | 3E  62 | 3  4 |
| CD O36E | CD  6E  03 | 5  6  7 |
| LXID, EE22 | 11  22  EE | 8  9  A |
| CD O363 | CD  63  03 | B  C  D |
| CD 62E7 | CD  E7  D2  CF | E  F  10 |

**Part C**

|  |  |  |
| --- | --- | --- |
| ADDRESS | OP CODE | MNEMONICS |
| 2000  1  2  3  4  5  6  7  8  9  10 | 31  C2  20  31  C2  20  3E  62  CD  6E  03 | LXI,SP |
| 11  12  13 | 11  99  F6 | LXI DF699 |
| 14 | 1B | DCX D |
| 15 | 7B | MOV E |
| 16 | B2 | ORX D |
| 17  18  19 | CA  0F  20 | JMP 200F |
| 20  21  22 | 11  22  EE | LXI,D E622 |
| 21  22  23 | CD  63  03 | CD O363 |
|  |  |  |

FLOWCHART

[

A ← [E]

A ← [A] V [D]

NO

I

YES

**Part D**

|  |  |  |
| --- | --- | --- |
| ADDRESS | OP CODES | MNEMONICS |
| 2000  1  2  3 | 31  C2  20 | LXI 20C2 |
| 4  5 | 3E  EF | MVI A, EF |
| 6  7  8 | CD  6E  03 | CD 036E |
| 9  200A  200B | 11  CD  AB | LXID ABCD |
| 200C  200D  200E | CD  63  03 | CD 0363 |
| 200F | 11 | LXID, F699 |
| 2010 | 99 |  |
| 2011 | F6 |  |
| 2012 | 1B | DCX D |
| 2013 | 7B | MOV E |
| 2014 | B2 | ORX D |
| 2015  2016  2017 | CA  12  20 | JZ 2012 |
| 2018 | 11 | LXID, F699 |
| 2019 | 99 |  |
| 201A | F6 |  |
| 201B | 1B | DCX D |
| 201C | 7B | MOV E |
| 201D | B2 | ORX D |
| 201E  201F  2020 | CA  1B  20 | JZ 201 B |
| 2021  2022 | 3E  56 | MVI 56 |
| 2023  2024  2025 | CD  6E  03 | CD 036E |
| 2026  2027  2028 | 11  34  12 | LXID, 1234 |
| 2029  202A  202B | CD  6E  03 | CD 036E |
| 202C | 11 | LXID, F699 |
| 202D | 99 |  |
| 202E | F6 |  |
| 202F | 1B | DCX D |
| 2031 | 7B | MOV E |
| 2032 | B2 | ORX D |
| 2033  2034  2035 | CA  2F  20 | JZ 202F |
| 2036 | 11 | LXID, F699 |
| 2037 | 99 |  |
| 2038 | F6 |  |
| 2039 | 1B | DCX D |
| 203A | 7B | MOV E |
| 203B | B2 | ORX D |
| 203C  203D  203E | CA  28  20 | JZ 2028 |
| 203F | CF | RESTART |

FLOWCHART

SP ← 20C2

A ← EF

DISPLAY “A”

DE ← ABCD

DISPLAY “DE”

DE ← [F699]

DE ← [DE] -1

A ← E

A ←A V D

Is A=00

DE ← [F699]

DE ← [DE] – 1

A ←E

A ← A V D

Is A=00

A ←56

DISPLAY “A”

DE ← 1234

DISPLAY DE

DE ← [F699]

DE ← [DE] – 1

A ←E

A ← A V D

Is A=00

DE ← [F699]

DE ← [DE] – 1

A← E

A ←A V D

Is A= 00

STOP

Conclusion

In conclusion based on the value for the delay time we determined that the values for Part C and D were close enough with just slight variations of the proceeding decimal places as such we put F699 into DE. Using the formula for delay, in part C having an inside of 48 cycles and outside of 45. In the same instance for part D 48 cycles inside the first loop and 70 for outside.