

**Arab American University**

**Faculty of Engineering and IT**

**MICROPROCESSOR LAB**

**(The stepping motor and keypad)**

**Section: 3**

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Introduction:

**Introduction:**

Stepper motors enable accurate positioning with ease. They are used in various types of equipment for accurate rotation angle and speed control using pulse signals. Stepper motors generate high torque with a compact body, and are ideal for quick acceleration and response. Stepper motors also hold their position at stop, due to their mechanical design. Stepper motor solutions consist of a driver (takes pulse signals in and converts them to motor motion) and a stepper motor.

Objective:

In this experiment, we learn the difference between a DC stepper motor and controlling the direction of its winding and the angle at which it starts,

Then how do you use the keyboard to read presses and distinguish between control and keystrokes. The numbers from 0 to the F control give us a frequency and act as a piano.

TASKS:

stm

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; MDA-Win8086 EXPERIMENT PROGRAM \*

; FILENAME : STEPMO.ASM

; PROCESSOR : I8086

; Stepping Motor Test

; -- 1 Phase Magnetization

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CODE SEGMENT

ASSUME CS:CODE,DS:CODE,ES:CODE,SS:CODE

;

PPIC\_C EQU 1FH

PPIC EQU 1DH

PPIB EQU 1BH

PPIA EQU 19H

;

ORG 1000H

;

MOV AX,0

MOV DS,AX

;

MOV AL,10000000B

OUT PPIC\_C,AL

;

MOV AL,11111111B

OUT PPIA,AL

MOV AL,00000000B

OUT PPIC,AL

;

MOV AL,11101110B

L1: OUT PPIB,AL

CALL TIMER

ROL AL,1

JMP L1

;

TIMER: MOV CX,0

TIMER1: NOP

NOP

NOP

NOP

LOOP TIMER1

RET

;

CODE ENDS

END

\_

speaker

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

; MDA-Win8086 EXPERIMENT PROGRAM \*

; FILENAME : SPEAK\_1.ASM

; PROCESSOR : I8086

; SPEAKER TEST

; Press keypad 0 to F

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CODE SEGMENT

ASSUME CS:CODE,DS:CODE,ES:CODE,SS:CODE

;

SPK EQU 17H

KEY EQU 01H

;

ORG 1000H

XOR AX,AX

MOV DS,AX

;

START: MOV SI,OFFSET FREQ

CALL SCAN

;

MOV AL,BYTE PTR K\_BUF

AND AX,000FH

ADD AX,AX

ADD SI,AX

;

MOV DL,30

;

MOV AL,0FFH

;

L4: MOV CX,WORD PTR CS:[SI]

;

L3: OUT SPK,AL

NOP

NOP

NOP

NOP

NOP

NOP

LOOP L3

XOR AL,01H

DEC DL

JNZ L4

;

MOV AL,00H

OUT SPK,AL

JMP START

;

; key board scan, key code = AL

SCAN: IN AL,KEY

TEST AL,10000000B

JNZ SCAN

TEST AL,00010000B

JNZ SCAN

;

AND AL,00001111B

RET

;

;

FREQ: DW 0B2H\*2 ;B

DW 0A8H\*2 ;C

DW 96H\*2 ;D

DW 85H\*2 ; E

DW 7EH\*2 ; F

DW 70H\*2 ; G

DW 64H\*2 ; A

DW 59H\*2 ; B

DW 54H\*2 ; C

DW 4AH\*2 ; D

DW 42H\*2 ; E

DW 3EH\*2 ; F

DW 37H\*2 ; G

DW 31H\*2 ; A

DW 2CH\*2 ; B

DW 29H\*2 ; C

;

K\_BUF: DB 1

CODE ENDS

END

TASK1

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

; MDA-Win8086 EXPERIMENT PROGRAM \*

; FILENAME : STEPMO.ASM

; PROCESSOR : I8086

; Stepping Motor Test

; -- 1 Phase Magnetization

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CODE SEGMENT

ASSUME CS:CODE,DS:CODE,ES:CODE,SS:CODE

;

PPIC\_C EQU 1FH

PPIC EQU 1DH

PPIB EQU 1BH

PPIA EQU 19H

KEY EQU 01H

;

ORG 1000H

;

MOV AX,0

MOV DS,AX

;

MOV AL,10000000B

OUT PPIC\_C,AL

;

MOV AL,11111111B

OUT PPIA,AL

MOV AL,00000000B

OUT PPIC,AL

;

SCAN: IN AL,KEY

TEST AL,10000000B

JNZ SCAN

TEST AL,00010000B

JNZ SCAN

;

AND 00001111BAL,

AND AL,00001111B

MOV BYTE PTR K\_BUF,AL

; key clear

OUT KEY,AL

cmp al,01H

je l2

jmp SCAN

RET

;

l2: MOV AL,11101110B

L1: OUT PPIB,AL

CALL TIMER

ROL AL,1

JMP L1

;

TIMER: MOV CX,0

TIMER1: NOP

NOP

NOP

NOP

LOOP TIMER1

RET

;

K\_BUF: DB 1

CODE ENDS

END

TASK2

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

; MDA-Win8086 EXPERIMENT PROGRAM \*

; FILENAME : STEPMO.ASM

; PROCESSOR : I8086

; Stepping Motor Test

; -- 1 Phase Magnetization

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CODE SEGMENT

ASSUME CS:CODE,DS:CODE,ES:CODE,SS:CODE

;

PPIC\_C EQU 1FH

PPIC EQU 1DH

PPIB EQU 1BH

PPIA EQU 19H

;

KEY EQU 01H

ORG 1000H

;

MOV AX,0

MOV DS,AX

;

MOV AL,10000000B

OUT PPIC\_C,AL

;

MOV AL,11111111B

OUT PPIA,AL

MOV AL,00000000B

OUT PPIC,AL

;

call scan

MOV Ah,11001100B

L1: mov al,ah

OUT PPIB,AL

CALL TIMER

in al,key

TEST AL,10000000B

JnZ SCAN1

cmp al,01h

jne batyekh

SCAN1: Ror Ah,1

JMP L1

;

SCAN: IN AL,KEY

TEST AL,10000000B

JnZ SCAN

TEST AL,00010000B

JnZ SCAN

and al,00001111b

cmp al,02h

jne scan

MOV BYTE PTR K\_BUF,AL

; key clear

OUT KEY,AL

ret

TIMER: MOV CX,0

TIMER1: NOP

NOP

NOP

NOP

LOOP TIMER1

RET

K\_BUF: DB 1

batyekh: int 3

;

CODE ENDS

END

TASK3

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

; MDA-Win8086 EXPERIMENT PROGRAM \*

; FILENAME : STEPMO.ASM

; PROCESSOR : I8086

; Stepping Motor Test

; -- 1 Phase Magnetization

;\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CODE SEGMENT

ASSUME CS:CODE,DS:CODE,ES:CODE,SS:CODE

;

PPIC\_C EQU 1FH

PPIC EQU 1DH

PPIB EQU 1BH

PPIA EQU 19H

KEY EQU 01H

;

ORG 1000H

;

MOV AL,10000000B

OUT PPIC\_C,AL

;

L1: IN AL,KEY

AND AL,00001111B

CMP AL,00000001B

JE L2

CMP AL,00000010B

JE L3

JMP L1

L2: MOV CX,50

MOV AL,11101110B

LL1: OUT PPIB,AL

PUSH CX

CALL TIMER

POP CX

ROR AL,1

LOOP LL1

JMP L1

L3: MOV CX,50

MOV AL,11101110B

LL2: OUT PPIB,AL

PUSH CX

CALL TIMER

POP CX

ROL AL,1

LOOP LL2

JMP L1

TIMER: MOV CX,0FFFH

TIMER1:

NOP

NOP

NOP

LOOP TIMER1

RET

;

CODE ENDS

END

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