

Group No: 5 (A2)

Course No: 316

Course Name: Microprocessors and Microcontrollers Sessional



Bangladesh University of Engineering and Technology

Experiment No: 04

Experiment Name: Microprocessor based DC motor controlling using I/O board - 07 .

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Objectives:

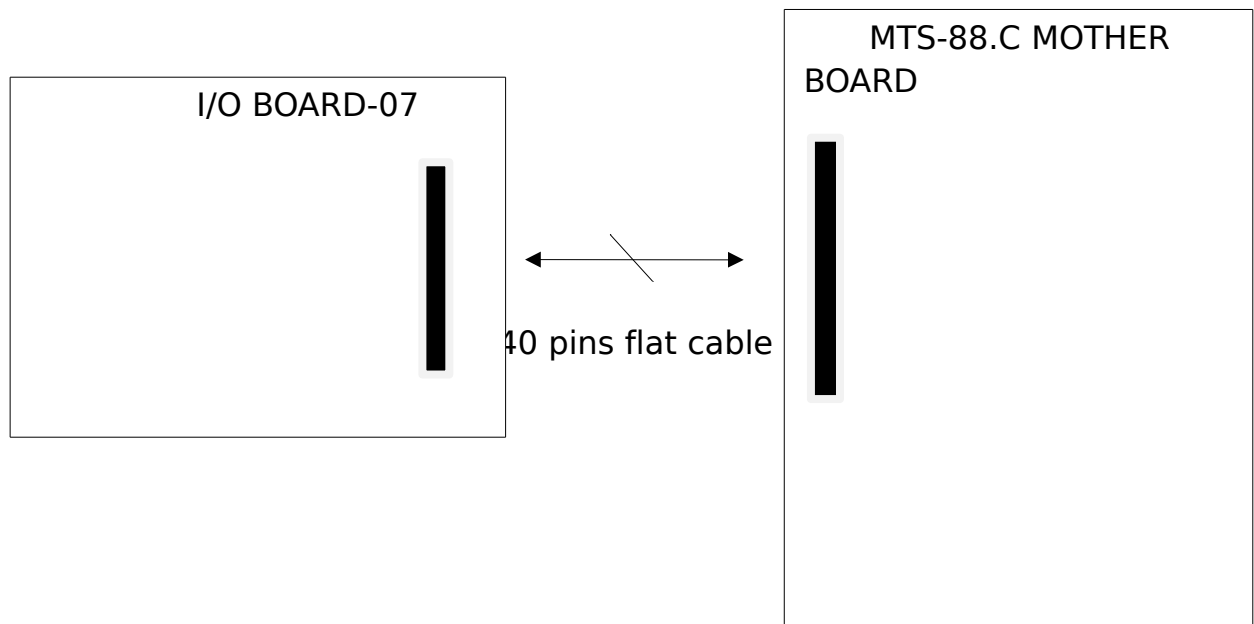
This experiment emphasizes and delineates the control of a DC motor through 8255 PPI using I/O board - 07 .

Equipments:

- MTS - 88.C(Intel 8088 CPU)
- I/O Board - 07
- 40 pins flat cable
- Power supply Adapter
- DC motor
- Trainer board
- Connecting cable

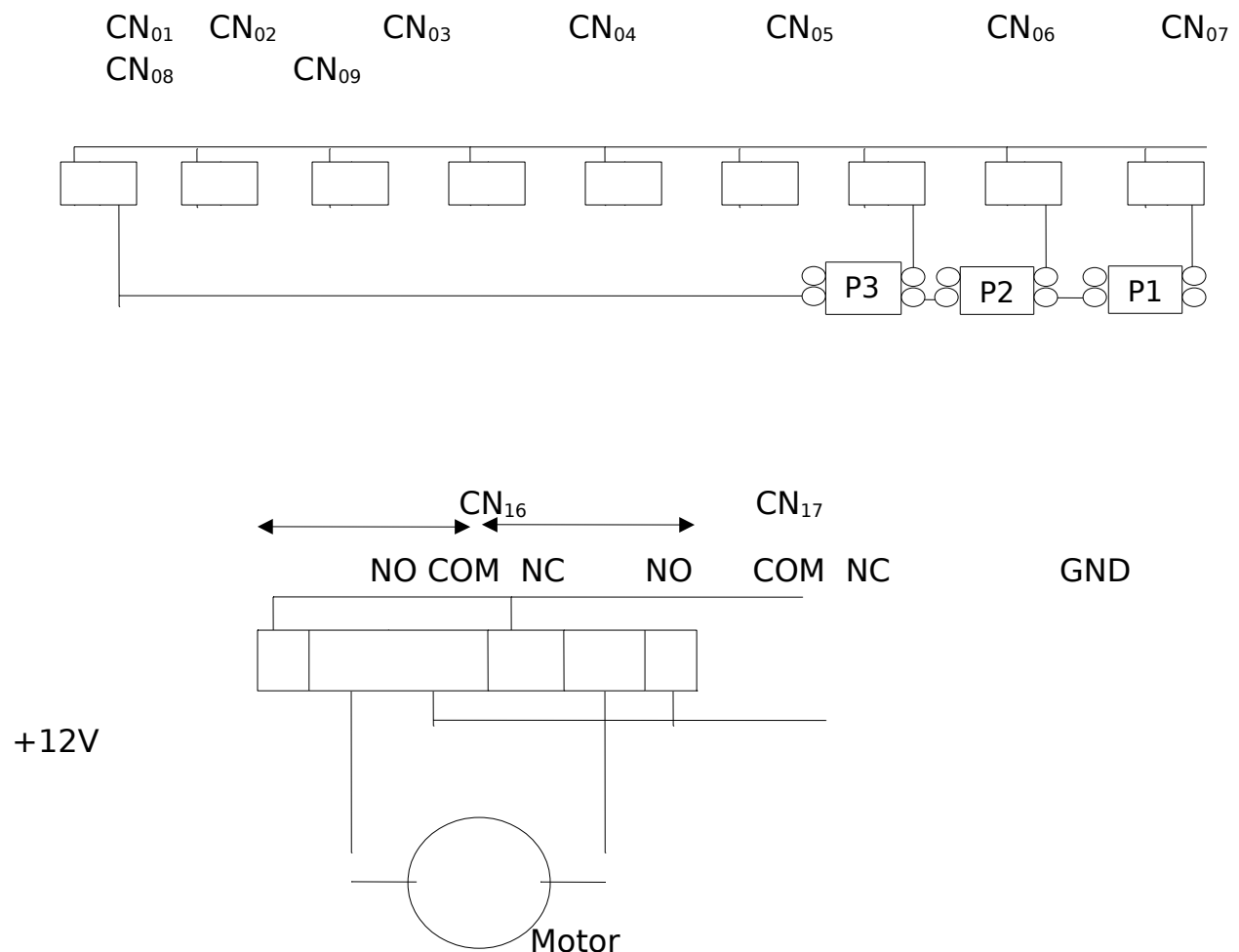
Block Diagram:

The Block Diagram is provided below:



Working Procedure:

1. MTS - 88.C system board was connected with I/O Board - 07 through a 40 pins flat connecting cable.
2. MTS - 88.C system board has an 8255 (PPI) connected with a microprocessor 8088 at the address 0001 00xx.
3. In 8255(PPI) port A was set as Mode 0 Input and port B as Mode 0 Output.
4. Top portion of I/O board - 07 includes CN₀₁ - CN₀₉ , negative terminal of CN₀₁ - CN₀₉ was directly connected to GND.
5. Positive terminal of CN₀₁ was connected to +12V power supply.
6. Three push buttons P1, P2 and P3 were connected serially with CN₀₁ as the circuit.



7. Another terminal of P1, P2 and P3 were connected with CN₀₉, CN₀₈ and CN₀₇ respectively.
8. CN₁₆ and CN₁₇ has three connecting terminal NO, COM and NC. NO was connected to GND NC to +12V.
9. COM was connected with output terminal which gives Stepper motor that needs +12V power supply.
10. An 8088 assembly program was written that would control the rotational direction of DC motor based on key press of push buttons.
11. The experiment results were noted.
12. 8255 was configured as follows:

D7	D6	D5	D4	D3	D2	D1	D0
Mode set bit 1	Group A Mode selection 00 = Mode 0 01 = Mode 1 1x = Mode 2		Port A 1 = input 0 = output	Port C (Upper) 1 = input 0 = output	Group B Mode selection 0 = Mode 0 1 = Mode 1	Port B 1 = input 0 = output	Port C (Lower) 1 = input 0 = output

So our command byte was 1001 0000 or 90(hex).

Assembly Code with Address and Machine Code:

Address	Assembly Code	Machine Code	Comment
0000 : 0400	MOV AL,90	B090	Set A as mode 0 input and B as mode 0 output
0000 : 0402	OUT 13,AL	E613	Set Control word
0000 : 0404	MOV AL,0	B000	
0000 : 0406	OUT 11,AL	E611	Port B outputs 0
0000 : 0408	IN AL,10	E410	Take input from port A
0000 : 040A	CMP AL,FE	3CFE	Compare if it is the left button
0000 : 040C	JNE 0418	750A	If No, jump to compare with another
0000 : 040E	CALL 0430	E81F00	If Yes, stop the motor
0000 : 0411	MOV AL,1	B001	
0000 : 0413	OUT 11,AL	E611	Rotate clockwise
0000 : 0415	JMP 0435	E91D00	Wait some time(Delay)
0000 : 0418	CMP AL,FD	3CFD	Compare if it is the middle button
0000 : 041A	JNE 0426	750A	If No, jump to compare with another
0000 : 041C	CALL 0430	E81100	If Yes, stop the motor
0000 : 041F	MOV AL,2	B002	
0000 : 0421	OUT 11,AL	E611	Rotate anti-clockwise
0000 : 0423	JMP 0435	E90F00	Wait some time(Delay)
0000 : 0426	CMP AL,FB	3CFB	Compare if it is the right button
0000 : 0428	JNE 0408	75DE	If No, jump to take another input
0000 : 042A	CALL 0430	E80300	If Yes, Stop
0000 : 042D	JMP 0435	E90F00	Wait some time(Delay)
0000 : 0430	MOV AL,0	B000	Function to stop the motor
0000 : 0432	OUT 11,AL	E611	
0000 : 0434	RET	C3	

0000 : 0435	MOV CX,000F	B90F00	Delay
0000 : 0438	NOP	90	
0000 : 0439	LOOP 0438	E2FD	
0000 : 043B	JMP 0408	E9CAFF	Jump to take another input

Problems and Findings:

1. The LEDs were not glowing as we pushed the buttons, it seemed like there were some internal short circuit.
Solution : The push buttons were very loose to fit in the bread board. We changed the buttons and the problem was solved.
2. When we pushed any button first time after running the code the corresponding LED glowed , but after that no other LEDs glowed . We checked the circuit and repeated our experiment but could not find any solution at first.
Solution : Then our teacher showed us that there was an infinite loop in our code in Delay, then we solved the problem and connected the motor and experimented the rotation of the motor.
