LAB 3
Stepper Motor Controller

NAME: POSSIBLE POINTS: 10

NAME:

COURSE DATE & TIME:

OBJECTIVE:

➢ To interface and drive a Stepper Motor

➢ To program the 8051 to use the I/O Port to send out properly timed and pulsed logic signals. These signals will energize the coils inside the stepper motor in the correct order to drive the motor forward and backwards a precise number of degrees.

OPERATION:

       The program will drive the stepper motor 180 degrees clockwise (i.e. forward) and then immediately drive the motor 180 degrees counter-clockwise (i.e. backward). The program will loop this indefinitely. The movement will be strictly timed such that every 180 degrees will take 10 seconds.

       Hint: You will have to calculate how many steps it will take to move from 0 to 180 degrees, including the gear reduction, then divide 10 seconds by the number of steps to determine the delay time you must wait in between each full-step.

ELECTRICAL CONSIDERATIONS:

       You will be energizing 4 coils in the stepper motor, each controlled by one pin. A pin of any MCU including the 8051 is incapable of supplying the necessary current to energize these coils. In order to solve this problem you will have to figure out how to drive the much larger current of the coil in the stepper with the smaller current from the MCU port pin. From previous classes (311) you should be comfortable using a transistor like the 2n2222/3904 operating in the Cut-Off/Saturation mode to achieve this. Other solutions exist which you are welcomed to use such as, Mosfets, Darlington Pair Transistor Arrays (ULN2003), 74HC245 Buffers, etc…. Unlike the LED you **cannot** sink the current through the LED therefore one of the previous mentioned solutions **must** be utilized. The textbook has suggestions as well, look at the motor control chapter.

MATERIALS:

       The stepper motor will be checked out. At the completion of the lab please return the motor. Failure to return the parts will result in a 0 grade being assigned for the lab.