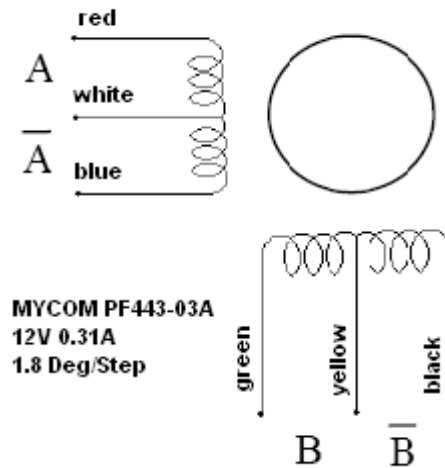


## Stepper Motor Control

A common stepper motor is the four-coil unipolar. They are called unipolar because they require only that their coils be driven on and off. The stepping sequence for a four-coil unipolar steppers is shown below.

| Step | A   | $\bar{A}$ | B   | $\bar{B}$ |
|------|-----|-----------|-----|-----------|
| 0    | On  | Off       | Off | On        |
| 1    | On  | On        | Off | Off       |
| 2    | Off | On        | On  | Off       |
| 3    | Off | Off       | On  | On        |

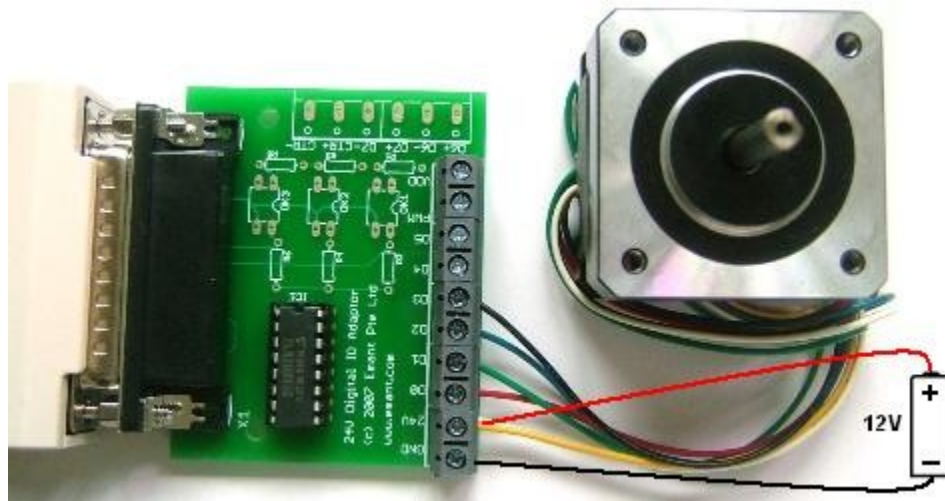
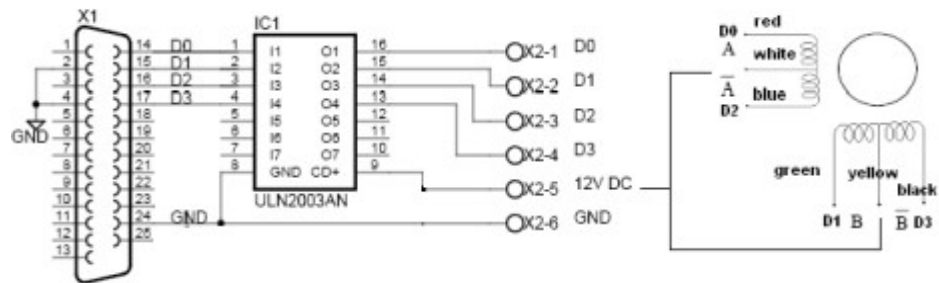


If you run the stepping sequence forward, the stepper rotates clockwise; run it backward, and the stepper rotates counterclockwise. The motor's speed depends on how fast the controller runs through the step sequence.

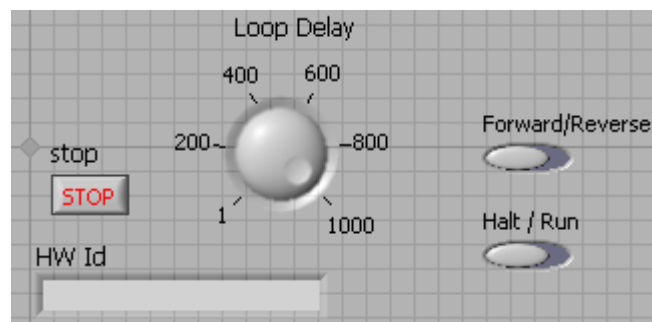
The stepper motor we have used is the PF443-03A from Mycom. It requires a supply voltage of 12V and the coil current is 0.31A. Each step is 1.8 degrees.

The EMANT300 digital output current drive is about 20mA – too low to drive the stepper motor coil. Besides, the Mycom PF443 stepper motor operates from a 12V supply which is higher than the 5V allowed for the EMANT300 digital output. Therefore, one simple solution is to add the ULN2003. The ULN2003 is a high voltage, high current darlington driver comprising seven NPN darlington pairs. All feature integral clamp diodes for switching inductive loads. The ULN2003 has a maximum sustaining output voltage of 50V and maximum output current of 0.5A per channel which easily exceeds the requirements of the Mycom PF443 stepper motor.

## Schematic



## LabVIEW Front Panel



1. Run the LabVIEW program **EMANT300 Example Stepper Motor.VI**
2. Toggle Halt /Run switch to run.
3. Changing the loop delay will change the motor speed
4. Switch between Forward/Reverse makes the stepper to turn clockwise/anticlockwise
5. From the block diagram, the sequence of the digital output bits are  
D3 D2 D1 D0  
1 0 0 1  
1 1 0 0  
0 1 1 0  
0 0 1 1  
repeat
6. Reversing the sequence changes the direction of rotation

## LabVIEW Diagram

