

OCTOBER 1992 ISSUE OF THE ROBOT COMPANION

President's Corner

by Mitch Nielsen, President

Free membership This year membership is free because the only reason we charge for membership is to pay for the newsletter. Hence, no newsletter -> no dues.

Help wanted: One secretary duties include coordinating production of monthly newsletters, keeping meeting minutes, etc., Must be willing to work for free!

Meeting Minutes

At the September meeting, I showed a 8051 single board computer that I wire wrapped. It went through a self test and displayed the port 1 contents. The DPRG library was on display. Several members checked out books. A couple people asked about where to find robot plans. So the DPRG Where-to-find-parts list has been reprinted in this issue.

The Project Bulletin Board

If you are searching for some information or have an idea for a project...

Has anyone used a 8051 C compiler that they would recommend? I would like to buy one but there are so many to choose from... Please drop me a line. -Mitch

Where to find inexpensive parts

This list is guaranteed to be incomplete. If a place you know of is missing, please let me add it to the list.

Electronic & Parts Outlet
1750 Alma Suite I00
Richardson, TX 75081
(214) 437-4383

Now open on Sunday 9:30 to 5

Tanner Electronics
1301 W. Beltline Rd. Suite 105
Carrollton, TX 75006
(214) 242-8702
Electronics, kits, books, stepper motors, etc.

Sunrise Electronics
Plano and Arapaho
Carrollton, TX

Dallas Surplus Electronics
2640 Northaven Blvd. #102
Dallas, TX 75229
(214) 484-1611
Stepper motors, gears, electronics, etc.

B.G. Micro
P.O. Box 280298
Dallas, TX 75228
(214) 271-5546
ICs, surplus computer items.

Off The Shelf Components
11441 N. Stemmons Frwy
Dallas, TX
(214) 247-0052

Electrotex
951 Forest Lane
Dallas, TX

Digi-Key Corp.
701 Brooks Ave South
PO Box 677
Thief River Falls, MN 56701-0677
1-800-344-4539
ICs, components, etc.

MCM ELECTRONICS
650 Confess Park Dr
Centerville, OH 45459-4072
(513) 434-0031
Components, test equipment.

MECHANICAL SOURCES
PIC Design
P.O. Box 1004
Middlebury, CT 06762
(203) 758-8272

Small Parts
6891 N.E. Third Ave
Miami, FL 38173
(305) 751-0856

SECS
6981 Homestead Ave
ML Vernon, NY 10550
(914) 667-56t30

Stock Drive Products
2101 Jericho Turnpike
New Hyde Park, NY 11040
(516) 328-0200

Winfred Berg
499 Ocean Ave
East Rockaway, NY 11518

(214) 234-0433

Delta Electronics
205 Bedford Euless Rd.
Hurst, TX 76043
(817) 268-4800

JDR Microdevices
2233 Branham Lane
San Jose, CA 95124
1-800-538-5000
Computers, Prototyping stuff, test equipment

JAMECO
1355 Shoreway Road
Belmont, CA 94002
(415) 592-8097
Computers, ICs, tools, etc.

(516) 599-5010

Nordex
50 Newton Rd
Danbury, CT 06810

Stepper Motors Have Wires

By Roger Arrick

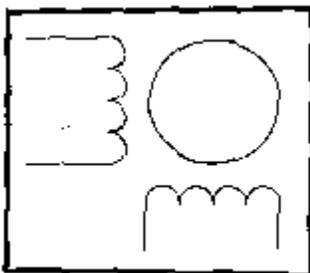
Stepper motors have wires? What kind of title is that!? All of us know they do, but few of us know why some have 4, some have 5, 6 or even 8. In this article we'll discuss the various types of stepper motors, coil configurations, wire arrangements and drive schemes and hopefully help the robot hobbyists make use of these delightful actuators.

Let's start with a brief description of the stepper motor. Attached to the motor's shaft is a special permanent magnet with gear-like teeth. Attached to the case of the motor is a series of coils also known as windings or phases. These coils can be energized through the motor's wires creating an electromagnetic field. This field causes the permanent magnet to move so the fields are aligned. This motion is called a step since the motor's shaft only moves a certain distance and does not simply rotate endlessly like other motors. The sequence in which these coils are energized will determine the direction, step angle and even the available torque.

Stepper motors are great for robots for these reasons:

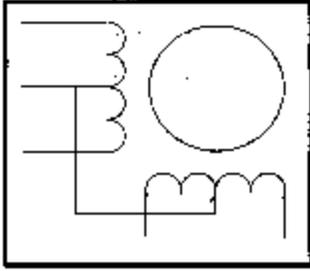
- Easily controlled digitally
- Usable without feedback
- Low maintenance (no brushes)
- Low electrical noise
- Low cost

Now lets get to the wires. The number of wires tells us alot about the coils inside the motor. It doesn't tell us the torque or the step angle but it does tell us the type of drive electronics required to control the motor.



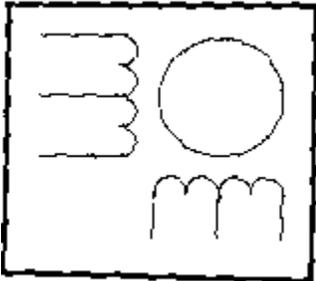
4 Wire Motors-

4 wire motors simply have 2 coils inside which can be easily identified using an ohm meter. This configuration requires a bipolar drive scheme which uses high-side and low-side transistor switches (Hbridges). This is a little more complicated then unipolar drive circuits but not so difficult as to cause worry. Many very small step motors only come in this configuration due to space constraints.



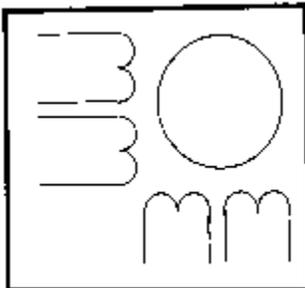
5 Wire Motors-

These motors, like the 4 wire models, have 2 coils but each one has a center-tap which is connected to the other center-tap. An ohm meter can be used to determine which wire is connected to which coil. The 5 wire motor can only be used with a unipolar drive circuit. This type of circuit is popular due to it's simplicity.



6 Wire Motors-

The 6 wire motor has 2 coils and a separate center-tap for each. This arrangement allows for either a bipolar or unipolar drive circuit.



8 Wire Motors-

8 wire motors are like the 6 wire motors but each coil is separated at the center creating 4 total windings. This is the most flexible arrangement allowing unipolar, series-bipolar, and parallel-bipolar circuits. Simply connect the ends of each pair of coils together and create a 6-wire configuration, ignore these connections to create a 4-wire setup or tie to one another to simulate a 5-wire arrangement. 8 wires also allows for the coils to be connected in parallel which decreases the inductance and improves performance when using chopper style drive circuitry.

Now that your brain has turned into stepper motor mush, hop in the car, head over to the surplus dealer, and remember, stepper motors have wires!