Build a Simple Brushless DC Motor from a Kit- 26202

Program: Electrician Technician

Course: EL120 Introduction to Electrical Theory

Objectives: Under the supervision of your instructor, you should be able to do the following:

- Describe the design and operating characteristics of various motors.
- Identify various types of motors and their applications.

Lab Equipment:

- 1 – DC motor kit
- 1 – AA batteries

Required Tools:

- Wire strippers (small wire)

Materials:

- 1 – 2" X 2" piece of sandpaper

Safety (PPE) –

- Safety glasses

Notes to Students:

- Closely follow the instructions provided with the DC motor kit.

Resources: N/A

Required Time: One Day

Shop Maintenance:

- All work will cease 20 minutes prior to the end of class.
- All work areas must be cleaned.

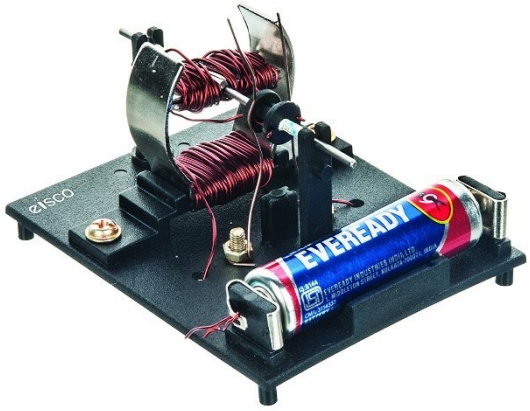
- Tools and equipment must be cleaned and returned to the designated areas (cage, tool room, cabinets etc.)
- Any broken or missing tools must be reported immediately.
- Tools and equipment are students' responsibility.

Instructor Notes:

- Have students read the directions carefully.
- Have trainees change power supply polarity to demonstrate reversing motor rotation.

Procedures: (Eye protection must always be worn)

- Following the detailed directions given in the motor kit, these are the basic steps taken from the directions.



Field Coil

- Unroll the wire coils.
- Cut a 6" piece from one end of one of the coils.
- Using the sandpaper, scrape off 1" of the coating from each end of the coils (4 total).
- Leaving 2" of wire, wrap the wire around the mounting bracket and the field pole. Continue wrapping the coil until there is 6" left.

Armature

- Put the two halves of the armature together with the motor shaft between them.
- Leaving 2" of wire, wrap the wire coil 8 times around one side and then cross over the other side and wrap the coil 8 times that side. {Do not Cut the wire!) Repeat until there is 2" of wire left. (Make sure the windings are all going in the same direction and have equal amounts on both sides)

Commutator

- Cut a 7/16" piece of tubing and slide one end of the motor shaft into the tubing. The tubing must be pushed directly against the armature.
- Place the halves of commutator together and slide the motor shaft through the commutators large middle hole.
- Install the wire from one side through one of the small holes of the commutator and then do the same with the other side wire, then trim wires.
- Cut X'' tubing and slide it on the motor shaft so that the commutator is between the pieces of tubing.
- Cut a second piece of tubing 7/16" and slide onto the opposite end.

Assembling motor

- Fasten the field coil to the plastic base using 2 screws and nuts, making sure the wire ends are pointing toward the middle of the base.
- Place the shaft supports into the rectangular holes closest to the field coil and perpendicular to the base.
- Loop the 6" wire through one of the paper fasteners and twist and slide the fastener through hole #3.
- Scrap the coating off both brushes using sandpaper.
- Bend the looped end of the brush, flip the base over and slide one brush through hole #5, and slide the loop at the end of the brush over the fastener in hole #3. Spread the fastener open.
- Slide the second brush through hole #7 and slide the loop over the paper fastener in hole #4 and spread the fastener open.
- Lay the armature on the two shaft supports and pop into place, the commutator should be touching the brushes.

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- Slide the second brush through hole #7 and slide the loop over the paper fastener in hole #4 and spread the fastener open.
- Lay the armature on the two shaft supports and pop into place, the commutator should be touching the brushes.

Connect motor to battery

- Lace the 2" wire from the field coil into the small hole in one of the battery clips (#3) and snap the battery clip into hole #8.
- Insert Battery into battery clips.
- If the motor does not work after push starting with your finger, go to troubleshooting page in the instructions that came with the kit.

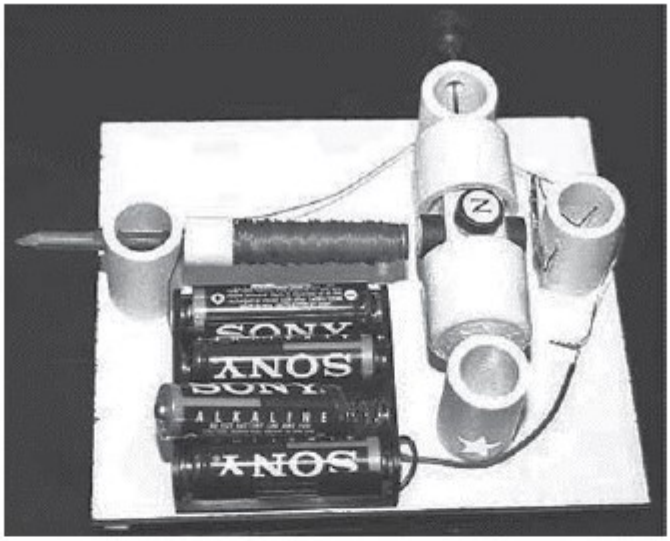

Figure 1 ■ Brushless DC Motor Kit

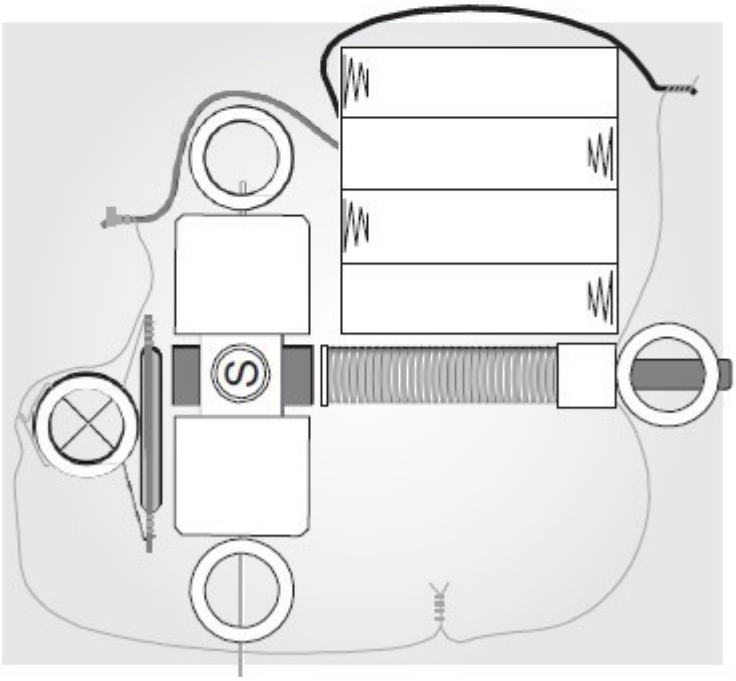

Figure 2 ■ Wiring Diagram