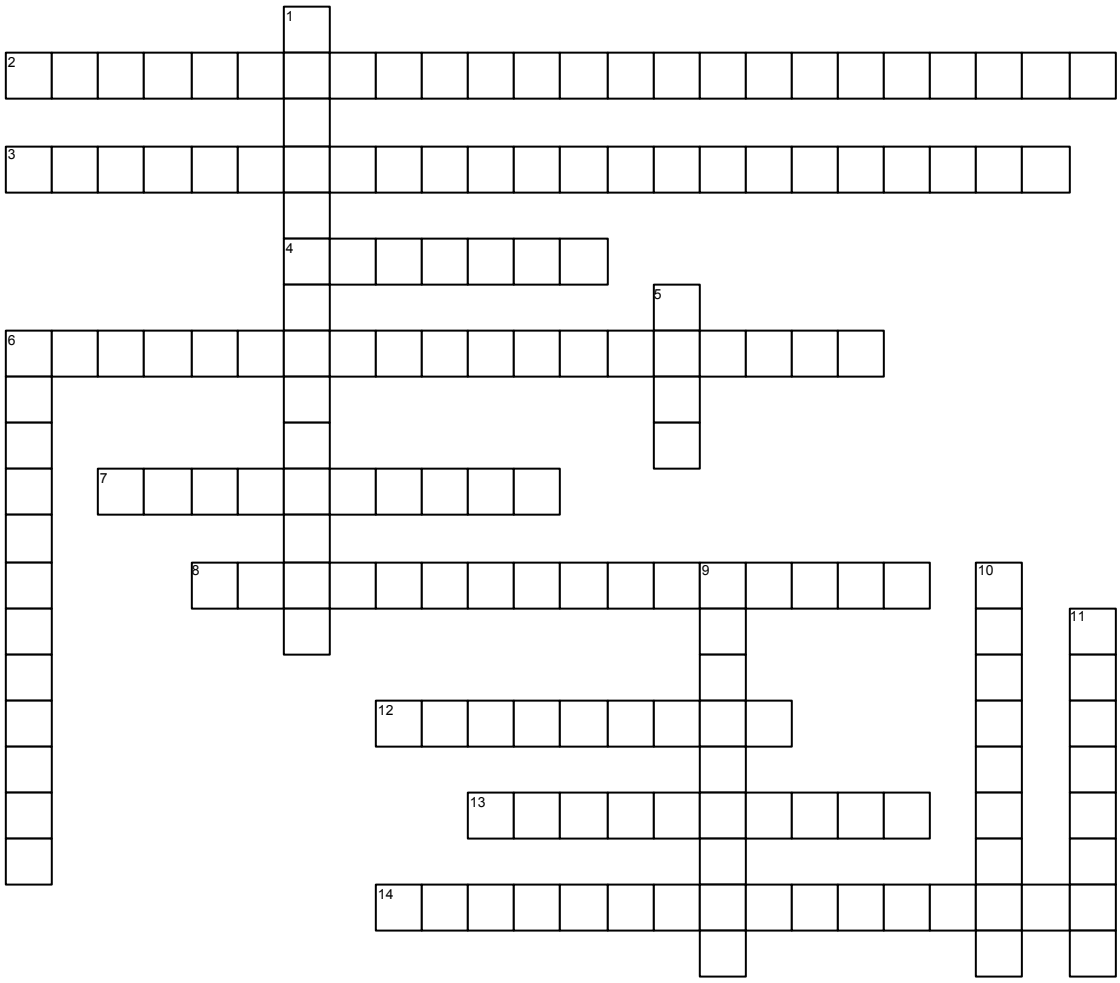
Electric Motors, Generators, and Controls

Chapter 9



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ACROSS

2 When the permanent magnets are housed inside the outer shell of the rotor, they are called _____ _____ _____.

3 In one type, the permanent magnets are mounted on the outside surface of the rotor, these are called _____ _____ _____.

4 The classic __ _____ uses a rotating armature in the form of an electromagnet with two poles.

6 A DC motor is usually controlled by a _____-_____ _____ signal from the motor controller, so it is actually an AC synchronous motor.

7 A rotary switch called a _____ reverses the direction of the electric current twice every cycle, to flow through the armature so that the poles of the electromagnet push and pull against the permanent magnets on the outside of the motor.

8 An __ _____ _____, as is used in the GM parallel hybrid truck, uses electromagnetic induction from the stator to induce a current and therefore creates a magnetic field in the rotor without the need for brushes.

12 A type of iron ore, called _____, exists as a magnet in nature.

13 Air does not allow easy passage, so air has a high _____.

14 Current flows through the phases, acts as a position sensor, and helps the controller to determine when to energize which phase of the stator, this is sometimes called a _____ __ _____ design.

DOWN

1 The MCM is programmed to indicate rotor position, and uses this information to determine which driver circuits in the _____ _____ ____ should be turned on.

5 The magnetic lines of force, also called ____ lines, form a magnetic field.

6 Some materials allow the force to pass through more easily than others, this degree of passage is called _____.

9 _____ is a form of energy that is generated by the motion of electrons and alignment of atoms in some materials.

10 Electric motor power is expressed in _____.

11 As the poles of the _____ electromagnet pass the poles of the permanent magnets, the commutator reverses the polarity.