



LIFE·PAC[®]

Science



Alpha Omega Publications[®]

SCIENCE 405

ELECTRICITY AND MAGNETISM

CONTENTS

I. ELECTRICITY	3
From Electrons to Electric Current	4
From Current to Circuit	7
From Circuit to Service	12
II. MAGNETISM	19
Magnetic Materials	20
Electricity and Magnets	24

Author:	Evelyn W. Towler
Editor-in-Chief:	Richard W. Wheeler, M.A.Ed.
Editor:	Janet Monseu
Consulting Editor:	Harold Wengert, Ed.D.
Revision Editor:	Alan Christopherson, M.S.



Alpha Omega Publications®

804 N. 2nd Ave. E., Rock Rapids, IA 51246-1759

© CMXCVI by Alpha Omega Publications, Inc. All rights reserved.
LIFEPAC is a registered trademark of Alpha Omega Publications, Inc.

All trademarks and/or service marks referenced in this material are the property of their respective owners. Alpha Omega Publications, Inc. makes no claim of ownership to any trademarks and/or service marks other than their own and their affiliates', and makes no claim of affiliation to any companies whose trademarks may be listed in this material, other than their own.

ELECTRICITY AND MAGNETISM

Have you ever combed your hair on a cold day and heard the snap of electricity? Your hair may have stood on end! Maybe you discovered that your comb would pick up bits of paper right after you combed your hair. Have you helped your mother take clothes out of the dryer, and seen them cling together? Have you shuffled your feet across a rug, and then taken hold of a doorknob? Did you feel a tingle or a shock? You may have seen a spark. In each case, some things were rubbed together. If an object can attract other objects to itself after it has been rubbed, it is said to be *charged*, or made electric.

In this LIFE PAC® you will study about electricity. You will read about some men and their discoveries. You will also make discoveries of your own. When you have finished the LIFE PAC, you will have learned some amazing things. You will also know how to make use of electrical power.

You use electricity in many ways in your daily life. You are comfortable using it, but you still must respect its power. You know that you must use this gift from God carefully and safely.

OBJECTIVES

Read these objectives. The objectives tell you what you should be able to do when you have completed this LIFE PAC.

When you have finished this LIFE PAC, you should be able to:

1. Explain how objects, atoms, electrons, and electricity relate to each other.
2. Tell what an electrical conductor does.
3. Tell what an insulator does.
4. List three ways in which electricity can be used.
5. List two ways electricity is made safe to use.
6. Tell what a magnet will do.
7. Name two magnetic materials.
8. Describe the way a magnet is made electric.
9. Tell two ways electromagnets are important in our world.

VOCABULARY

Study these words. Learning the meanings of these words is a good study habit and will improve your understanding of this LIFEPAAC.

acid (as' id). Liquid with a sour taste like that of vinegar.

amber (am' bur). Hard yellow or yellowish-brown remains from long-dead trees.

atom (at' um). The smallest part of any object.

attract (u trakt'). To draw toward oneself.

circuit (sér' kit). The track on which electric current flows.

conductor (kun duk' tur). Any material through which electricity will flow.

connect (ku nekt'). To join one thing to another.

crane (krān). A machine with a long part that is used for lifting and moving heavy objects.

current electricity (kér' unt i lek tris' u tē). Electricity that flows without stopping.

electrical (i lek' tru kul). Having to do with electricity.

electromagnet (i lek' trō mag nit). An electric magnet.

electron (i lek' tron). A particle in an atom that can travel out of the atom.

fuse (fyüz). A safeguard to prevent an overload of electricity in a circuit.

galvanometer (gal vu nom' u tur). A machine that will find and measure small amounts of electricity.

generator (jen' u rā tur). A machine that makes electricity.

insulator (in' su lā tur). Any material through which electricity cannot flow.

lodestone (lō d' stō n). A rock that is a natural magnet.

magnetic (mag net' ik). Being like a magnet.

magnetism (mag' nu tiz um). Being able to do what a magnet does.

negative (neg' u tiv). The kind of electricity that is in an object with an extra amount of electrons.

neutral (nü' trul). Having neither a positive nor a negative electrical charge.

neutron (nü' tron). One of three kinds of particles found in atoms.

particle (pär' tu kul). A very tiny bit.

positive (poz' u tiv). Electricity that is made when electrons travel out of an object.

proton (prō' ton). A particle in an atom that does not travel out of the atom.

terminal (tér' mu nul). Connection point on a battery.

Note: All vocabulary words in this LIFE PAC appear in **boldface** print the first time they are used. If you are unsure of the meaning when you are reading, study the definitions given.

Pronunciation Key: hat, āge, cāre, fār; let, ēqual, tērm; it, īce; hot, ōpen, ōrder; oil; out; cup, pūt, rüle; child; long; thin; /TH/ for then; /zh/ for measure; /u/ represents /a/ in about, /e/ in taken, /i/ in pencil, /o/ in lemon, and /u/ in circus.

I. ELECTRICITY

Electricity is no longer a thing of mystery. Scientists have learned that electricity has several forms and many uses. They know how to handle it so that it can be useful and will not be dangerous. Scientists realize, however, that they still do not know everything about electricity. For example, scientists know *how* electricity acts, but they do not always know *why* it acts that way. As you study this section, you will learn some important things about electricity.

Review these objectives. When you have completed this section, you should be able to:

1. Explain how objects, atoms, electrons, and electricity relate to each other.
2. Tell what an electrical conductor does.
3. Tell what an insulator does.
4. List three ways in which electricity can be used.
5. List two ways electricity is made safe to use.

Restudy these words.

acid	electrical	neutral
atom	electron	neutron
attract	fuse	particle
circuit	galvanometer	positive
conductor	insulator	proton
connect	negative	
current electricity		

FROM ELECTRONS TO ELECTRIC CURRENT

Atoms, electrons, and electricity are all related to each other. Many hundreds of years were needed for man to understand how they are related. One of the keys to understanding this relationship was learning to understand lightning. Another key was learning about the atom.

Lightning. When you look at the sky and see the clouds piling up in heaps, what do you expect to happen? You know that it will probably rain. If the clouds are really dark and heavy, you may expect thunder and lightning.

Lightning is one of God's wonders of nature. Lightning has both frightened and puzzled men from the very beginning of time. In the book of Job, lightning is mentioned at least six times. Job always described lightning with great respect. He knew it came from God, but he did not understand it.

Many times, Bible writers used the example of lightning to describe the power of God. God used thunder and lightning—with hail—as one of the troubles He sent to Egypt. You can read that story in Exodus, Chapter 9.

Men have tried for thousands of years to discover the secret of the power of lightning.

Within the storm clouds are stored strong **electrical** charges. When some of these electrical charges

move from cloud to cloud or from a cloud to the ground, we see a spark. We call the spark lightning.

Benjamin Franklin did a famous experiment with lightning. He attached a key to the end of a kite string and succeeded in getting his kite to fly in the rain. The kite soon became charged with electricity. An electrical charge moved down the string to the key. When Franklin held his finger near the key, a spark jumped from the key to his finger.



Do not try Franklin's experiment. It was very dangerous. He was fortunate that he was not killed. If you have ever seen a tree that has