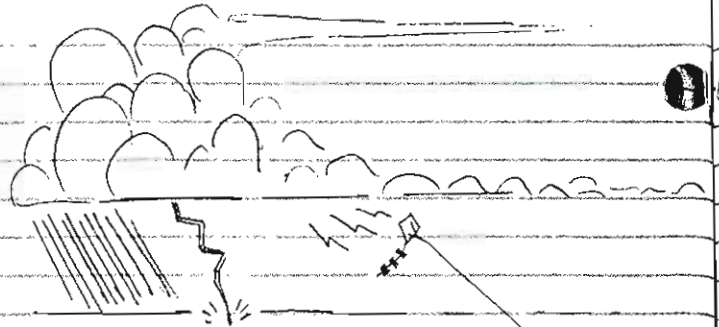
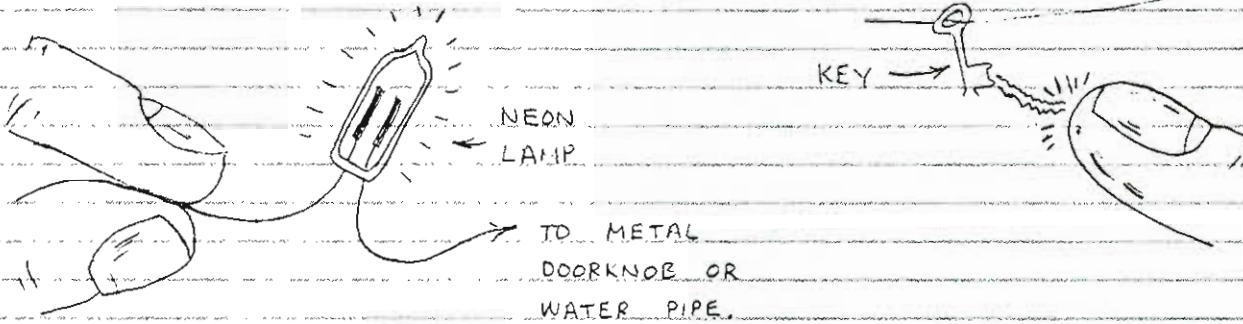


# 1. ELECTRICITY

THE ONLY DIFFERENCE BETWEEN A BOLT OF LIGHTNING AND THE SPARK BETWEEN YOUR FINGER AND A DOOR-KNOB ON A DRY DAY IS QUANTITY, BOTH ARE ELECTRICITY. BENJAMIN FRANKLIN FIRST CONFIRMED THIS WITH HIS FAMOUS KITE EXPERIMENT.

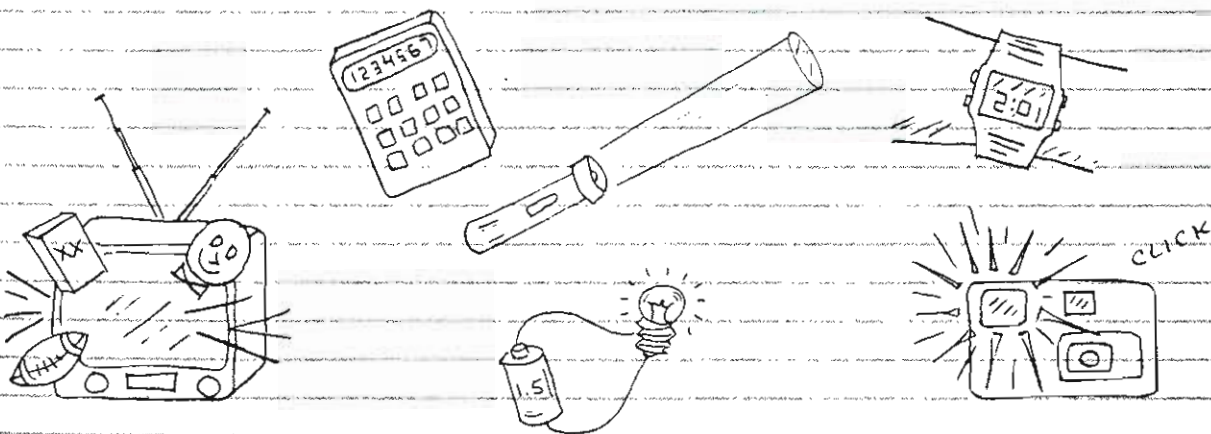


TO THOSE WHO FLY A KITE IN THE RAIN, YOU BETTER SAY "BYE!" 'CAUSE IT'S NOT VERY SAFE.



HERE'S A NEAT WAY TO "SEE" ELECTRICITY WITHOUT BEING ZAPPED: GRASP ONE LEAD FROM A NEON LAMP, WALK ACROSS A CARPET WHILE WEARING HARD SOLED SHOES AND TOUCH THE SECOND LEAD FROM THE LAMP TO A METAL OBJECT. THE LAMP WILL FLASH (UNLESS THE RELATIVE HUMIDITY IS HIGH).

OF COURSE, YOU CANNOT "SEE" ELECTRICITY! YOU SEE ITS EFFECT UPON AIR AND THE NEON IN THE LAMP. THE EFFECTS OF ELECTRICITY WHICH CAN BE SEEN ARE MANY. HERE ARE SOME MORE:

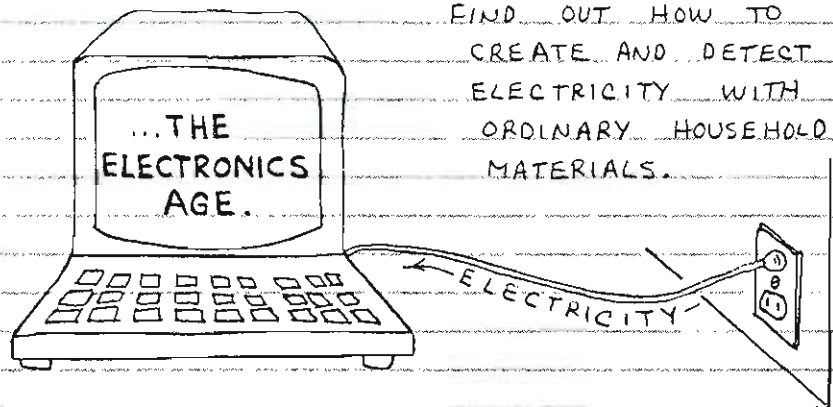
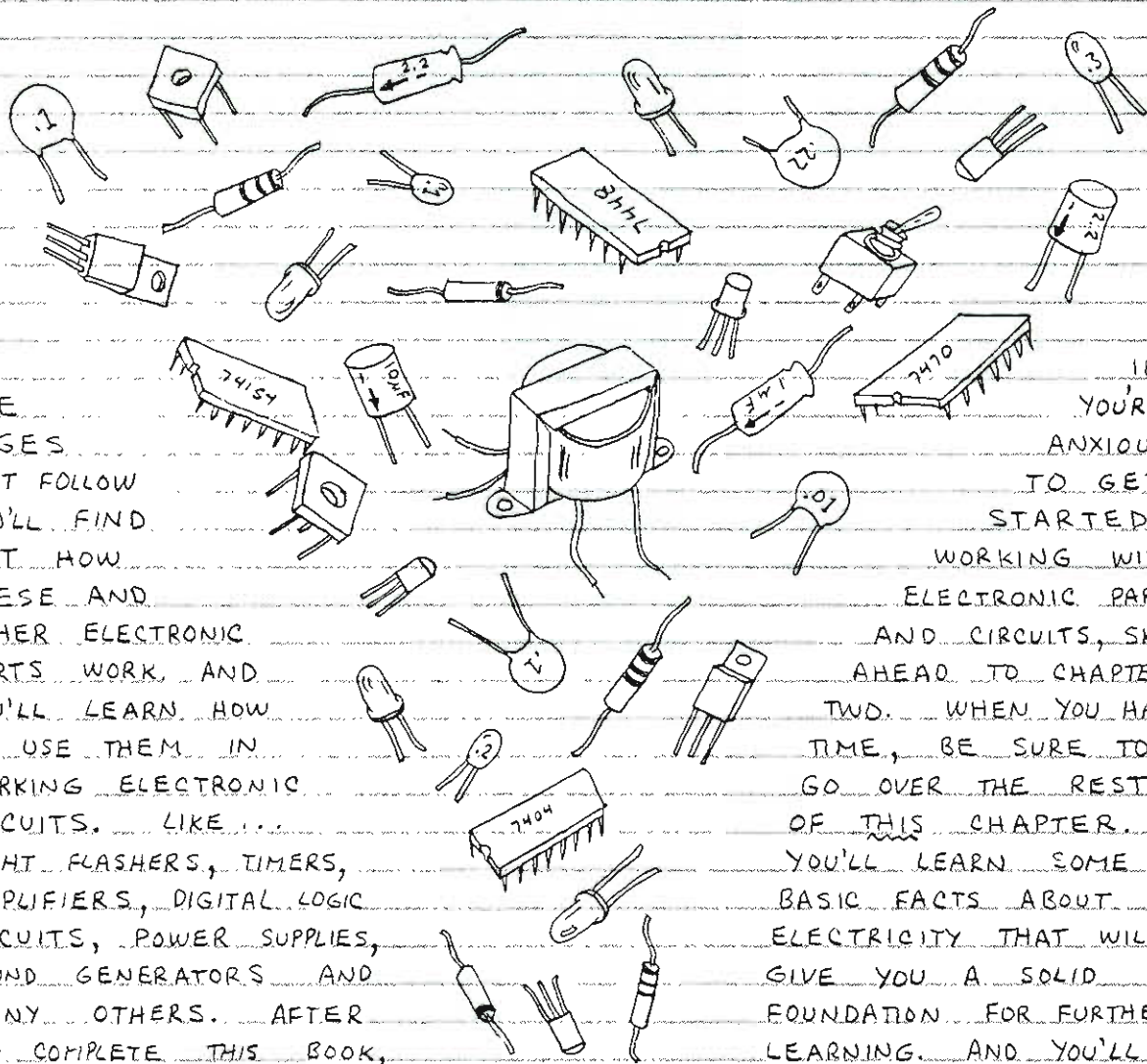


# PUTTING ELECTRICITY TO WORK

ALL MATTER HAS ELECTRICAL PROPERTIES. THAT'S WHY SCIENTISTS OVER THE PAST FEW CENTURIES HAVE BEEN ABLE TO INVENT HUNDREDS OF GADGETS THAT GENERATE, STORE, CONTROL AND SWITCH ELECTRICITY. THESE DEVICES HAVE COMBINED TO CARRY US INTO...

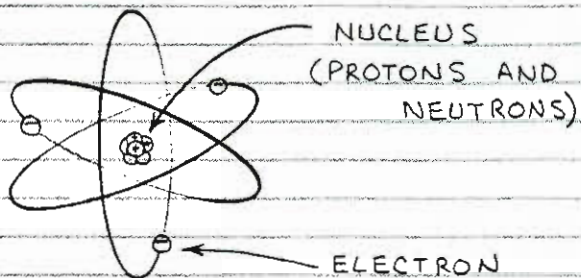
IN THE PAGES THAT FOLLOW YOU'LL FIND OUT HOW THESE AND OTHER ELECTRONIC PARTS WORK, AND YOU'LL LEARN HOW TO USE THEM IN WORKING ELECTRONIC CIRCUITS. LIKE... LIGHT FLASHERS, TIMERS, AMPLIFIERS, DIGITAL LOGIC CIRCUITS, POWER SUPPLIES, SOUND GENERATORS AND MANY OTHERS. AFTER YOU COMPLETE THIS BOOK, YOU'LL BE ABLE TO IDENTIFY AND USE ALL THE COMPONENTS SHOWN ON THIS PAGE! THEY INCLUDE A TRANSFORMER, DIODES, RESISTORS, CAPACITORS, ZENER DIODES, TRANSISTORS, VOLTAGE REGULATORS AND INTEGRATED CIRCUITS.

IF YOU'RE ANXIOUS TO GET STARTED WORKING WITH ELECTRONIC PARTS AND CIRCUITS, SKIP AHEAD TO CHAPTER TWO. WHEN YOU HAVE TIME, BE SURE TO GO OVER THE REST OF THIS CHAPTER. YOU'LL LEARN SOME BASIC FACTS ABOUT ELECTRICITY THAT WILL GIVE YOU A SOLID FOUNDATION FOR FURTHER LEARNING. AND YOU'LL FIND OUT HOW TO CREATE AND DETECT ELECTRICITY WITH ORDINARY HOUSEHOLD MATERIALS.



# BACK TO BASICS

ELECTRICITY IS AN ESSENTIAL INGREDIENT OF MATTER. THE BEST WAY TO UNDERSTAND THE NATURE OF ELECTRICITY IS TO EXAMINE THE SMALLEST COMPONENT OF EVERY ELEMENT, THE ATOM.

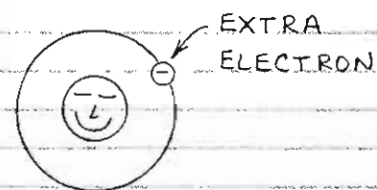


LITHIUM ATOM

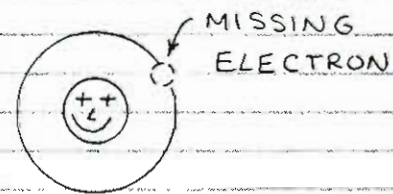
THIS IS A LITHIUM ATOM. THE THIRD SIMPLEST ATOM AFTER HYDROGEN AND HELIUM, LITHIUM ATOMS HAVE 3 ELECTRONS THAT ENCIRCLE A NUCLEUS OF 3 PROTONS AND 4 NEUTRONS.

- ⊖ ELECTRONS HAVE A NEGATIVE ELECTRICAL CHARGE.
- ⊕ PROTONS HAVE A POSITIVE ELECTRICAL CHARGE.
- NEUTRONS HAVE NO ELECTRICAL CHARGE.

□ IONS — NORMALLY AN ATOM HAS AN EQUAL NUMBER OF ELECTRONS AND PROTONS. THE CHARGES CANCEL TO GIVE THE ATOM NO NET ELECTRICAL CHARGE. IT'S POSSIBLE TO DISLodge ONE OR MORE ELECTRONS FROM MOST ATOMS. THIS CAUSES THE ATOM TO HAVE A NET POSITIVE CHARGE. IT'S THEN CALLED A POSITIVE ION. IF A STRAY ELECTRON COMBINES WITH A NORMAL ATOM, THE ATOM HAS A NET NEGATIVE CHARGE AND IS CALLED A NEGATIVE ION.



NEGATIVE ION



POSITIVE ION

□ ELECTRONS — FREE ELECTRONS CAN MOVE AT HIGH SPEED THROUGH METALS, GASES AND A VACUUM. OR THEY CAN REST ON A SURFACE.

