

Excerpt from

Getting Started as an Electrician

Preview

The following is a sample excerpt from a study unit converted into the Adobe Acrobat format. A sample online exam is available for this excerpt.

The sample text, which is from the Electrician program, explains the different types of work done by electricians.

Electricity plays a part in most of our daily life. Without the efforts of electricians, we wouldn't have access to this common necessity. However, the type of work done by electricians depends on the specific career they select.

After reading through the following material, feel free to take the [sample exam](#) based on this excerpt.

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Getting Started as an Electrician

INTRODUCTION

Electrical Needs

What are our electrical needs? Whether we realize it or not, we're all highly dependent on electricity. Without electricity, many of the things that we take for granted wouldn't be available to us, such as lights, air conditioning, running water, television, computers, and cars. Electricity has revolutionized the way we live our lives. Obviously, the world would be a very different place without electricity. [Figure 1](#) illustrates some of the electrical devices found in a typical residence.

Electricity is a vital part of our lifestyles, and everyone's electrical needs are slightly different. This means that electricity has to be individually tailored for different people. Every person in a residence, on a farm, in a factory or office, from a newborn infant to the president of a corporation, has specific electrical needs.

As a student in this program, you'll learn the skills you need to work as a professional electrician. Electricians are the people who help to satisfy consumer's electrical needs in a multibillion dollar industry. The existing and potential work to be done is so vast that it's beyond easy description.

Electricians are highly skilled professionals—professionals who use their minds as well as their hands. Electricians must be willing to perform physical work and to get dirty when the job requires it. They must also have good organizational skills to plan the order of tasks for any job.

An electrician may also be required to work with dangerous equipment or in hazardous situations. In order to work in these conditions safely, an electrician must be very familiar with safe work practices and the requirements of the *National Electrical Code*. Electricians aren't "daredevils"; they're careful and conscientious professionals. A good attitude and a willingness to recognize limits is essential for success.

The skills that you'll develop as you work through this program are exciting and exacting. When you become a professional electrician, you'll be a very special person who really knows what he or she is doing.

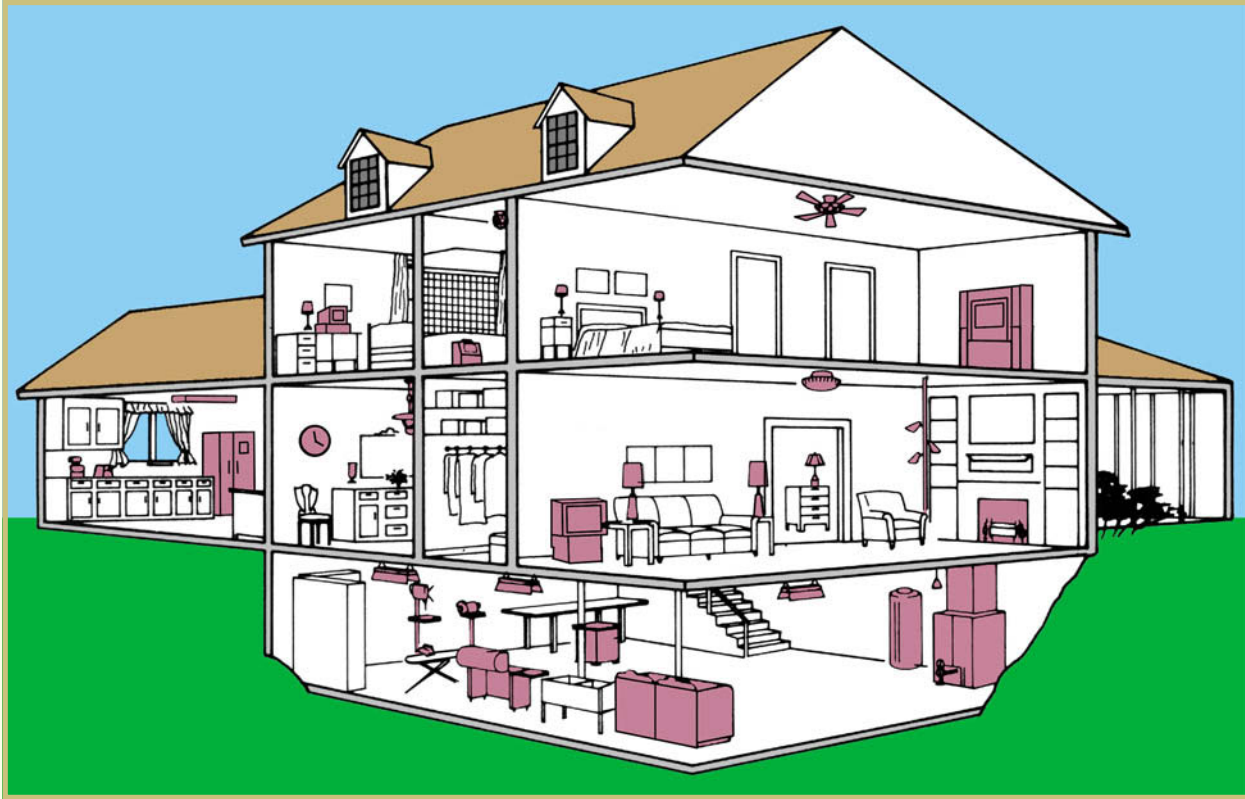


FIGURE 1—Electrical systems are needed in homes to power the many appliances that help make our lives so pleasant. People who can install, maintain, and repair these systems are in great demand.

Areas of Knowledge

In order to be an electrician, you'll need to acquire knowledge in five areas. None of these requirements is difficult, and there's no magic to making them yours. Anyone who acquires these skills can be performing simpler electrical jobs in a very short time.

The five areas of learning are the following:

1. Electrical theory—The way electric current moves in a circuit ([Figure 2](#))
2. Electrical applications—The jobs electrical circuits perform ([Figure 3](#))
3. Electrical testing skills—The use of tools and testing equipment
4. Electrical equipment—The hardware that's used in electrical circuits
5. Electrical safety—The dangers and safety precautions that apply to electrical work

FIGURE 2—When you plug into an outlet, electric pressure (volts) produces a flow of current (amperes) that allows power (watts) to be used.

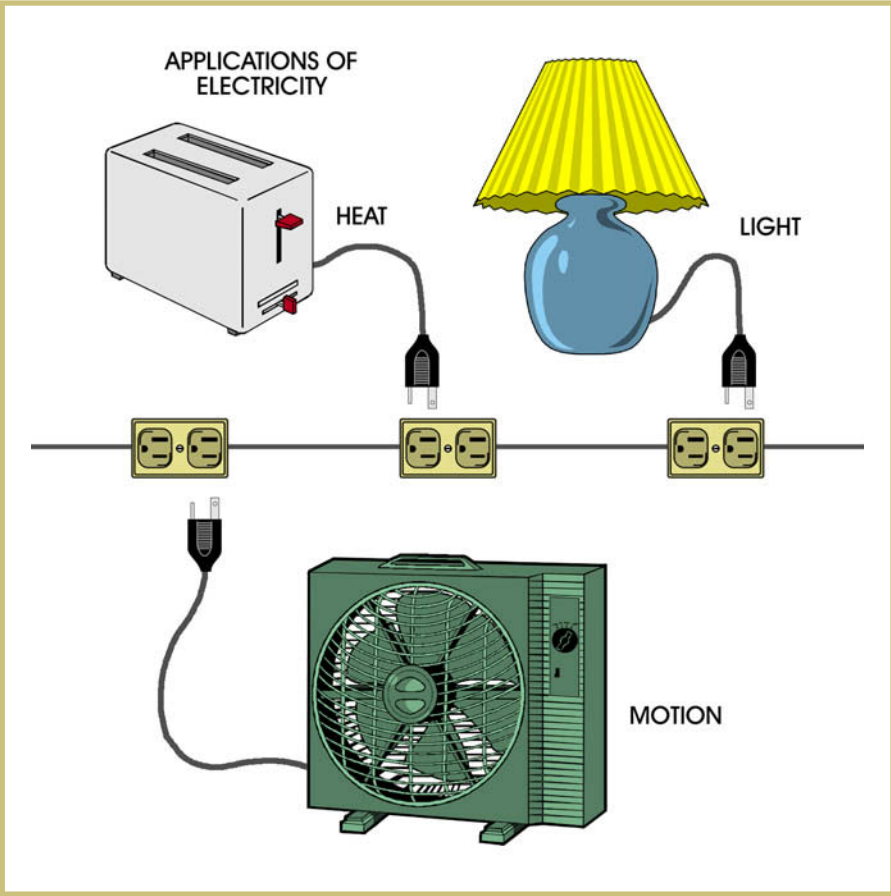
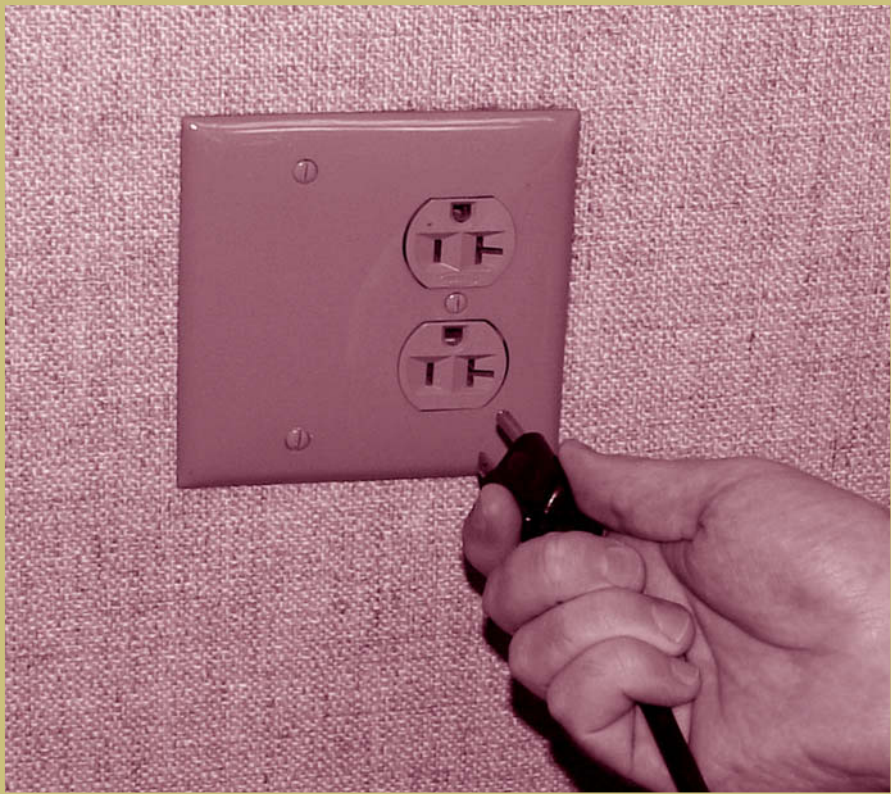


FIGURE 3—Electrical energy is used to produce heat (in a toaster or space heater), to provide mechanical energy or motion (in fans and motors), and to provide light in a home.

Throughout this program, you'll be building up these five areas of knowledge. As you proceed from lesson to lesson you'll first start to become familiar with, then knowledgeable about, the great number of interesting topics concerned with electricity. Eventually, you can become a master at your trade if you wish. Whether you're going to be an electrician or only have an interest in electricity, you'll want to learn about electrical theory, hardware, wiring techniques, and the *National Electrical Code*. None of the subject matter is difficult to understand if you take it step-by-step, even though a lot of material is covered. If you stay with it, you'll acquire a firm foundation of electrical knowledge that you can continue to build on throughout your professional career.

Electrical Specialties

Your program includes detailed information about the following subjects: residential wiring, commercial wiring, tests and measurements, lighting and heating, electrical machinery, electrical distribution, and the practical job of electrical contracting. When you become an electrician, you may choose to specialize in one or more of these subject areas.

Your more advanced lessons on residential wiring will cover lighting, air conditioning, and electric heating branch circuits in detail. Knowledge of these three important types of circuits will pay big dividends. All three of these installations help determine whether or not an area will be comfortable for its human occupants. If you can ensure adequate light and comfortable temperatures in a home, then you've acquired a valuable array of skills.

In your study of commercial wiring, you'll learn about generators, motors, rectifiers, and motor control circuits in some detail. Knowledge in these areas enables you to work anywhere in construction, maintenance, or repair. Electrical machinery runs the world; it has an enormous influence on our lives. Expertise in this field pays handsomely, and you can make a lifetime career in this area.

Lessons that cover the production and distribution of electricity are included in all programs that affect utility electricians. Later in this lesson, you'll take a guided tour of electrical distribution from a residence to the electric company. This tour will discuss some of the basics of the total electric system. Detailed knowledge of these systems will speed you toward your goal of becoming a utility electrician or line worker.

This program also provides lessons on blueprint reading and electrical estimating. These topics will provide you with the skills you need to work as an electrical contractor. Even when you're working for someone else, the ability to read blueprints or make electrical estimates will enable you to move quickly up the ladder of success. In the contracting field, many executive jobs that carry great responsibility are occupied by professional electricians.

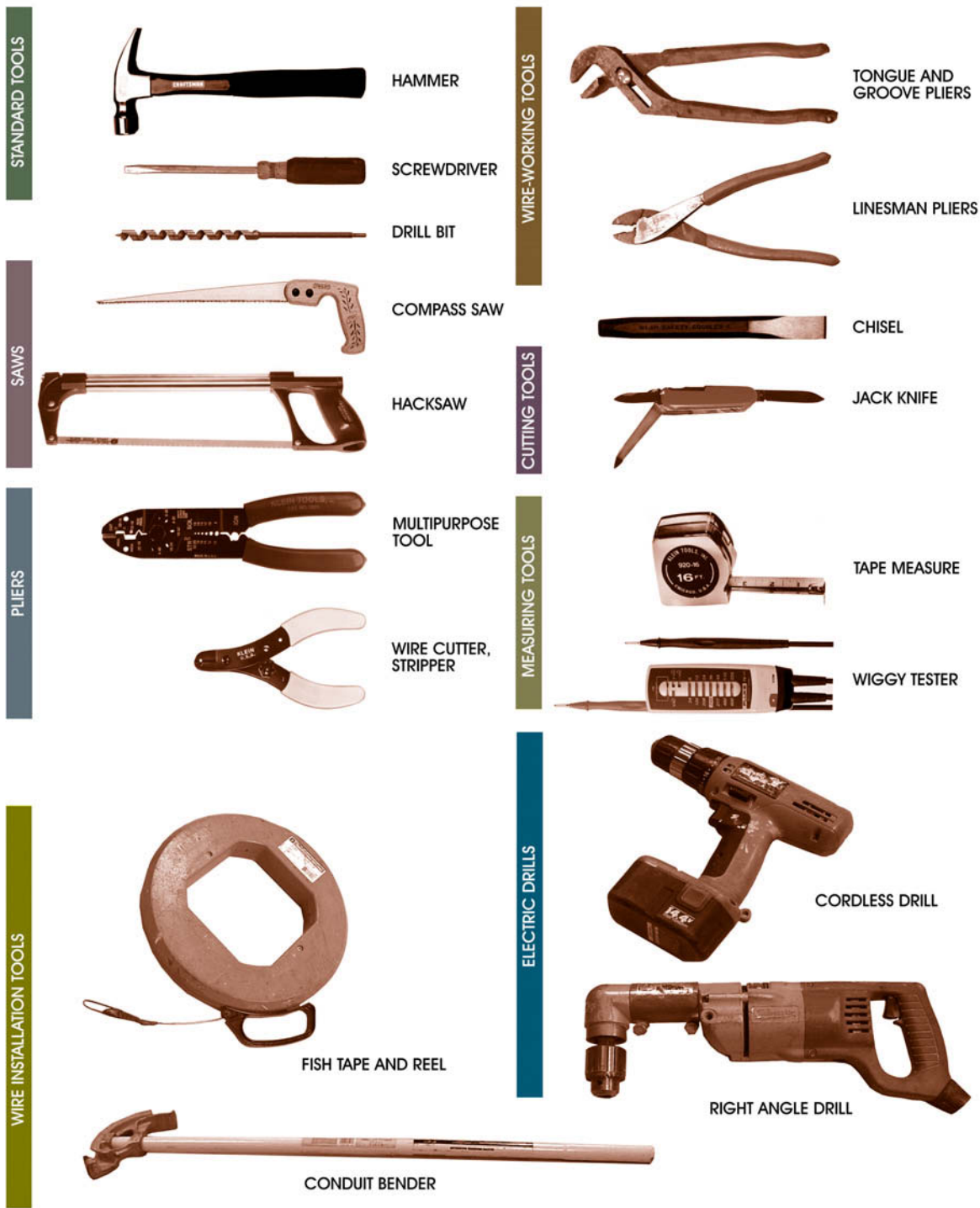


FIGURE 4—These are only a few of the many standard and specialized tools that are used by electricians. Many of them are also available as tools powered electrically, hydraulically, or pneumatically. (Photos of hacksaw, wire cutter-stripper, multipurpose tool, and tape measure courtesy of Klein Tools, Inc.; compass saw photograph courtesy of The Stanley Works, New Britain, CT 06053; hammer photograph courtesy of Sears Craftsman; chisel photograph reprinted with permission from Mayhew "The Quality Difference in Hand Tools!"; voltage tester photograph reproduced with permission of Fluke Corporation.)

Tools

As you proceed through this program, you'll also learn about the importance of tools in the electrician's trade. Knowing what tool to use for a particular task, and using the tool correctly, are very important skills for an electrician to have. [Figure 4](#) shows several of the tools that electricians use every day on the job.

Note that when you're selecting tools, you'll need to consider the increased reliance on power tools and cordless (battery-powered) tools. No electrician's tool list is complete without a significant selection of power tools to choose from.

Remember to always buy the best quality tools that you can afford. Manufacturers such as Klein, Greenlee, and Ideal are three tool manufacturers that produce high quality tools specifically designed for the professional electrician. Sears Craftsman and Stanley are manufacturers of high-quality hand tools. Cheap, "disposable" tools don't last very long with professional use, are sometimes difficult to work with, and can be dangerous.

As you work, you'll learn to reach automatically for the right tool and the right hardware, and you'll use the best possible technique for getting the job done expertly. Besides the fact that you'll be paid well for a well-done job, a well-done job will stand as a permanent piece of work performed by you. If you should encounter the work again at some future time, you'll want to be able to smile with pride at its excellence.

Tests and Measurements

When you work in the electrical field, you'll need to be able to test circuit operation by measuring volts, amps, watts, resistances, inductances, capacitances, and other electrical properties. Most of the time, a simple "go/no-go" type of test will tell you whether a circuit or device is operating. At other times, though, you'll need to make more detailed measurements in order to pinpoint a problem.

Most of these electrical tests are easy to perform when you have the proper tools and training. You'll also develop your own tricks of the trade as you work. In order to understand how to perform these tests and measurements, you must become knowledgeable about test equipment and procedures.

Common electrician's test equipment will include a multimeter, a voltage tester, a circuit-breaker identifier, a neon test lamp, and other easy-to-use instruments.

Safe Work Practices

Whenever you install, maintain, or repair an electrical circuit, you'll be manipulating powerful electrical forces. In this work, therefore, there's always an element of hazard that deserves your attention.

The most important part of your program of study will be learning to work safely. Although you don't need to be afraid of electricity, you *must* respect it. You'll learn to exercise good electrical judgment and avoid electrical shock. It's quite easy to do so, since hundreds of thousands of electricians throughout the world work day in and day out with little danger. Many electricians receive small shocks from time to time, but remember that a powerful shock can kill. You'll learn that a person sometimes receives a shock when he or she completes a circuit, and how to avoid this from occurring.

Working in the Electrical Field

Most electricians work on residential wiring, for the simple reason that electrical systems in homes and apartments outnumber commercial and industrial installations many times over. This study unit will introduce you to the subject of residential wiring. Once you have a firm foundation in residential work, you'll go on to learn about commercial and industrial wiring applications.

Small stores, offices, and similar structures use the same kind of electrical systems that homes do, so most of the wiring jobs that electricians perform in small businesses and homes are similar (if not exactly the same). Industrial plants, on the other hand, generally use higher voltages that are delivered directly from the utility company. The industrial plant will then transform the input voltage for their own particular needs, and they also use specialized, complicated equipment. Should you get a job in an industrial plant, you'll probably receive special training to acquaint you with that company's electrical system and requirements. This program will include lessons on commercial and industrial electricity. Commercial, farm, and industrial wiring are covered, as are special wiring applications.

Trades Within the Trade

While we've been discussing the role of the residential or commercial electrician, these aren't the only careers that you may be able to pursue in the future with the knowledge you'll gain in this program. Of course, most electricians do work on electrical systems in buildings. However, there are many electrical specialties within the field that require the same type of knowledge.

For example, an industrial electrician must not only be familiar with industrial wiring systems, but also with motors and motor controls, refrigeration equipment, and computerized equipment. As technology becomes more advanced, companies have a growing need for people who can maintain and install expensive and complicated electrical equipment.

An *estimator* is an electrician who looks at a job (or blueprints for a job) and determines how much it will cost the company to do the work and how much the customer will be charged.

In larger companies or on larger jobs, a *purchaser* may be assigned to handle the ordering and transportation of electrical materials and equipment that are needed to get a job done.

An *electrical inspector* may work for a city, county, state, province, or private company. An inspector is almost always someone who started out as a working electrician and then moved on to the inspecting field. An inspector must be familiar with all of the electrical codes that apply to a particular installation, as well as safe work procedures and methods. An electrical inspector checks jobs that are in progress to make sure that all the work is being completed according to code regulations.

A *line worker* is an electrician who works for a utility company and who is responsible for electrical distribution lines and cables. The line worker's job is to get electricity from the power company to wherever it's needed.

With advances in technology, even the best electrician would find it difficult to keep up with everything electrical. Technologies such as computers, fiber optic equipment, cellular communications, home automation, and fire/alarm systems must be installed and repaired by professionals with extensive electrical knowledge. Many professional electricians specialize in the installation and repair of these devices.

As you can see, once you gain knowledge and experience from this studies, you'll be able to apply your skills to many different jobs in the electrical field. Your options will be limited only by your ambitions. Keep an open mind and become the best electrician you can be.

Levels of Expertise

There are three different official levels of expertise in the electrical trade: apprentice, journeyman, and master. Every electrician who enters the trade will be expected to work through these three levels to reach the maximum skill level, which is master electrician. Depending on the geographical area in which you live, there may be examinations, certificates, or experience requirements that apply to the various levels. Those who work only as industrial electricians might not formally progress through these titles, but they'll certainly experience the same type of

professional growth. You should strive to perfect your work at each level as you work through it.

A person who enters the trade with little or no experience will be considered an *apprentice*. Most apprentices work at this level for between three and five years, and will gather on-the-job experience supplemented by schooling. During an apprenticeship, you can expect to do just about everything imaginable in the trade. You may be asked to get materials from a supply house, dig trenches for the installation of underground cable, drill holes for the installation of cable or conduit, run piping and wiring under the supervision of another electrician, and connect devices. As you gain more and more experience, your level of responsibility will increase, but an apprentice should always consider his or her time at this level as a learning experience. This is the time to ask questions about even the smallest detail and learn from your experiences.

After the apprentice level, an electrician becomes a *journeyman*. A journeyman is a fully qualified electrician who will be given the responsibility for any and all electrical tasks. In some geographical areas, being a journeyman requires an exam, as well as a certain amount of experience as an apprentice. A journeyman is an important position in the trade. As a journeyman, you might be expected to measure and order material for a job, schedule power transfers or outages with other trades, or take on an apprentice of your own to train. All of this is in addition to doing the regular daily tasks that are required on the job. Journeymen electricians make up the largest part of the work force in the electrical trade.

Once an electrician has several years of experience as a journeyman, he or she can become a *master electrician*. As a master electrician, you would be responsible for all the journeymen and apprentices working under you on the job. In many geographical areas, a master electrician is the only electrical professional who can apply for and receive an electrical permit for a job. It's assumed that once you reach the master level, you'll have a thorough grasp of all the electrical codes and safe work practices needed to produce a safe and professional installation.

While the master level is the highest level of expertise an electrician can reach, it's still possible to advance professionally at that level. For example, a master electrician might move up through the ranks of company management as an electrical foreman or superintendent. These professionals work on-site at a job, acting as liaisons between the job site and the company office. Their role is to make sure everything is as it should be and to solve any problems that might arise.

There are many roles that a good electrician can perform with the right knowledge and experience. Keep in mind that even the highest executive at an electrical company may have started by learning the trade, just as you are now.

Licensing and Regulations

In different geographical areas, different laws, rules, and regulations govern the licensing and inspection of electrical work. Most of the United States follows either the *National Electrical Code (NEC)* or the *BOCA National Codes*. (The BOCA codes are named for their publisher, Building Officials and Code Administrators International, Inc.)

However, some areas may publish their own codes or codebooks. Before starting any job, make sure you're familiar with the codes that govern the area you're working in.

Depending on the particular locality you're working in, you may (or may not) be expected to take professional examinations or be affected by licensing requirements. You should be prepared to meet the requirements of the locality you'll be working in.

In areas where a license is required, getting that license will be like obtaining a passport into the field. Most electrical licensing requirements involve practical and/or educational experience in the electrical field, as well as exams on electrical codes and work methods. This program will guide you through the topics you need to study in order to pass the examinations that are required in the various electrician categories.

The National Electrical Code

The *National Electrical Code* or *NEC* is a book that lists the electrical and mechanical requirements for every imaginable type of electrical installation. These rules and regulations are developed by electrical experts. You won't be expected to memorize every word of the *NEC*, but you must be familiar with its most important contents and you must know how to look up information in the book.

The Canadian counterpart of the *NEC* is the *Canadian Electrical Code (CEC)*. The *NEC* and the *CEC* are very similar in format and content, presenting the rules and regulations that are necessary for safe electrical installations.