

Job Outlook

Job opportunities should be best for applicants with a thorough knowledge of electrical equipment and electronics, as well as repair experience. Overall employment of electrical and electronics installers and repairers is expected to grow more slowly than the average for all occupations over the 2000-10 period, but varies by occupational specialty. In addition to employment growth, many job openings should result from the need to replace workers who transfer to other occupations or leave the labor force.

Average employment growth is projected for electrical and electronics installers and repairers of transportation equipment. Commercial and industrial electronic equipment will become more sophisticated and used more frequently, as businesses strive to lower costs by increasing and improving automation. Companies will install electronic controls, robots, sensors, and other equipment to automate processes such as assembly and testing. As prices decline, applications will be found across a number of industries, including services, utilities, and construction, as well as manufacturing. Improved equipment reliability should not constrain employment growth, however; companies increasingly will rely on repairers, because any malfunction that idles commercial and industrial equipment is costly.

Employment of electronics installers and repairers of motor vehicles also is expected to grow about as fast as average. Motor vehicle manufacturers will install more and better sound, security, entertainment, and navigation systems in new vehicles, limiting employment growth for after-market electronic equipment installers. However, repairing the new electronic systems should help drive employment growth.

On the other hand, employment of electric motor, power tool, and related repairers is expected to grow more slowly than average. Improvements in electrical and electronic equipment design should limit job growth by simplifying repair tasks. More parts are being designed to be easily disposable, further reducing employment growth.

Employment of electrical and electronics installers and repairers, powerhouse, substation, and relay is expected to decline slightly. Consolidation and privatization in utilities industries should improve productivity, reducing employment. Newer equipment will be more reliable and easier to repair, further limiting employment.

Earnings

Median hourly earnings of electrical and electronics repairers, commercial and industrial equipment were \$17.75 in 2000. The middle 50 percent earned between \$13.92 and \$21.32. The lowest 10 percent earned less than \$10.90, and the highest 10 percent earned more than \$25.78.

Median hourly earnings of electric motor, power tool, and related repairers were \$15.80 in 2000. The middle 50 percent earned between \$11.91 and \$20.04. The lowest 10 percent earned less than \$9.13, and the highest 10 percent earned more than \$25.17.

Median hourly earnings of electrical and electronics repairers, powerhouse, substation, and relay were \$23.34 in 2000. The middle 50 percent earned between \$19.07 and \$26.21. The lowest 10 percent earned less than \$14.79, and the highest 10 percent earned more than \$29.00.

Median hourly earnings of electrical and electronics repairers, transportation equipment were \$16.93 in 2000. The middle 50 percent earned between \$12.25 and \$21.54. The lowest 10 percent earned less than \$9.60, and the highest 10 percent earned more than \$25.76.

Median hourly earnings of electronics installers and repairers, motor vehicles were \$12.06 in 2000. The middle 50 percent earned between \$9.60 and \$15.25. The lowest 10 percent earned less than \$7.98, and the highest 10 percent earned more than \$18.69.

Related Occupations

Workers in other occupations who install and repair electronic equipment include broadcast and sound technicians and radio operators; computer, automated teller, and office machine repairers; electronic home entertainment equipment installers and repairers; and radio and telecommunications equipment installers and repairers. Industrial machinery installation, repair, and maintenance workers also install, maintain, and repair industrial machinery.

Sources of Additional Information

For information on careers and certification, contact:

- ▶ International Society of Certified Electronics Technicians, 3608 Pershing Ave., Fort Worth, TX 76107-4527. Internet: <http://www.iscet.org>
- ▶ Electronics Technicians Association, 502 North Jackson, Greencastle, IN 46135. Internet: <http://www.eta-sda.com>

Electronic Home Entertainment Equipment Installers and Repairers

(O*NET 49-2097.00)

Significant Points

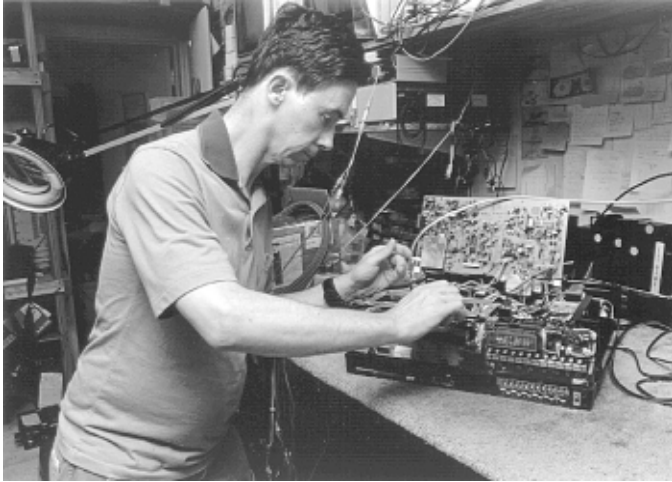
- Employment is expected to decline because it often is cheaper to replace than to repair equipment.
- Job opportunities will be best for applicants with knowledge of electronics and related hands-on experience.

Nature of the Work

Electronic home entertainment equipment installers and repairers, also called *service technicians*, repair a variety of equipment, including televisions and radios, stereo components, video and audio disc players, video cameras, and videocassette recorders. They also repair home security systems, intercom equipment, and home theater equipment, which consist of large-screen televisions and sophisticated, surround-sound systems.

Customers usually bring small, portable equipment to repair shops for servicing. Repairers at these locations, known as *bench technicians*, are equipped with a full array of electronic tools and parts. When larger, less mobile equipment breaks down, customers may pay repairers to come to their homes. These repairers, known as *field technicians*, travel with a limited set of tools and parts, and attempt to complete the repair at the customer's location. If the repair is complex, technicians may bring defective components back to the repair shop for a thorough diagnosis and repair.

When equipment breaks down, repairers check for common causes of trouble, such as dirty or defective components. Many repairs consist of simply cleaning and lubricating equipment. For example, cleaning the tape heads on a videocassette recorder will prevent tapes from sticking to the equipment. If routine checks do not locate the trouble, repairers may refer to schematics and manufacturers' specifications that provide instructions on how to locate problems. Repairers use a variety of test equipment to diagnose and identify malfunctions. They use multimeters to detect short circuits, failed capacitors, and blown fuses by measuring the voltage, current, and resistance. They use color bar and dot generators to provide onscreen test patterns, signal generators to test signals, and oscilloscopes and digital storage scopes to measure complex waveforms produced by electronic equipment. Repairs may involve removing and replacing a failed capacitor, transistor, or fuse. Repairers use handtools such as pliers, screwdrivers, soldering irons,



Electronic home entertainment equipment repairers clean and lubricate mechanical components of VCRs.

and wrenches to replace faulty parts. They also make adjustments to equipment, such as focusing and converging the picture of a television set or balancing the audio on a surround-sound system.

Improvements in technology have miniaturized and digitized many audio and video recording devices. Miniaturization has made repairwork significantly more difficult, as both the components and acceptable tolerances are smaller. For example, an analog video camera operates at 1800 revolutions per minute (rpm), while a digital video camera may operate at 9000 rpm. Components now are mounted on the surface of circuit boards, instead of plugged into slots, requiring more precise soldering when a new part is installed. Improved technologies also have lowered the price of electronic home entertainment equipment. As a result, customers often replace broken equipment instead of repairing it.

Working Conditions

Most repairers work in well-lighted electrical repair shops. Field technicians, however, spend much time traveling in service vehicles and working in customers' residences.

Repairers may have to work in a variety of positions and carry heavy equipment. Although the work of repairers is comparatively safe, they must take precautions against minor burns and electric shock. Because television monitors carry high voltage even when turned off, repairers need to discharge the voltage before servicing such equipment.

Employment

Electronic home entertainment equipment installers and repairers held about 37,000 jobs in 2000. Most repairers work in stores that sell and service electronic home entertainment products, or in electrical repair shops and service centers. About 1 in 6 electronic home entertainment equipment installers and repairers is self-employed.

Training, Other Qualifications, and Advancement

Employers prefer applicants who have basic knowledge and skills in electronics. Applicants should be familiar with schematics and have some hands-on experience repairing electronic equipment. Many applicants gain these skills at vocational training programs and community colleges. Training programs should include both a hands-on and theoretical education in digital consumer electronics. Entry-level repairers may work closely with more experienced technicians, who provide technical guidance.

Field technicians work closely with customers and must have good communications skills and a neat appearance. Employers also may require that field technicians have a driver's license.

The International Society of Certified Electronics Technicians (ISCET) and the Electronics Technicians Association (ETA) administer certification programs for electronics technicians. Repairers may specialize in a variety of skill areas, including consumer electronics. To receive certification, repairers must pass qualifying exams corresponding to their level of training and experience. Both programs offer associate certifications to entry-level repairers.

Experienced repairers with advanced training may become specialists or troubleshooters, who help other repairers diagnose difficult problems. Workers with leadership ability may become supervisors of other repairers. Some experienced workers open their own repair shops.

Job Outlook

Employment of electronic home entertainment equipment installers and repairers is expected to decline through 2010, due to decreased demand for repair work. Some job openings will occur, however, as repairers retire or gain higher paying jobs in other occupations requiring electronics experience. Opportunities will be best for applicants with hands-on experience and knowledge of electronics.

The need for repairers is declining because home entertainment equipment is less expensive than in the past. As technological developments have lowered equipment prices and improved reliability, the demand for repair services has decreased. When malfunctions do occur, it often is cheaper for consumers to replace equipment rather than to pay for repairs.

Employment of repairers will continue to decline despite the introduction of sophisticated digital equipment, such as DVDs, digital televisions, and digital camcorders. So long as the price of such equipment remains high, purchasers will be willing to hire repairers when malfunctions occur. However, the need for repairers to maintain this costly equipment will not be great enough to offset the overall decline in demand for their services.

Earnings

Median hourly earnings of electronic home entertainment equipment installers and repairers were \$12.72 in 2000. The middle 50 percent earned between \$9.90 and \$16.63. The lowest 10 percent earned less than \$7.84, and the highest 10 percent earned more than \$20.72. Median hourly earnings in the industries employing the largest numbers of electronic home entertainment equipment repairers in 2000 are shown below:

Electrical repair shops	\$12.30
Radio, television, and computer stores	11.67

Related Occupations

Other workers who repair and maintain electronic equipment include broadcast and sound engineering technicians and radio operators; computer, automated teller, and office machine repairers; electrical and electronics installers and repairers; and radio and telecommunications equipment installers and repairers.

Sources of Additional Information

For information on careers and certification, contact:

► The International Society of Certified Electronics Technicians, 3608 Pershing Ave., Fort Worth, TX 76107. Internet: <http://www.iscet.org>

► Electronics Technicians Association, 502 North Jackson, Greencastle, IN 46135. Internet: <http://www.eta-sda.com>