Radio and Telecommunications Equipment Installers and Repairers

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Significant Points

- Employment is projected to decline.
- Applicants with electronics training and computer skills should have the best opportunities.
- Weekend and holiday hours are common; repairers may be on call around the clock in case of emergencies.

Nature of the Work

Telephones and radios depend on a variety of equipment to transmit communications signals. Electronic switches route telephone signals to their destinations. Switchboards direct telephone calls within a single location or organization. Radio transmitters and receivers relay signals from wireless phones and radios to their destinations. Newer telecommunications equipment is computerized and can communicate a variety of information, including data, graphics, and video. The workers who set up and maintain this sophisticated equipment are radio and telecommunications equipment installers and repairers.

Central office installers set up switches, cables, and other equipment in central offices. These locations are the hubs of a telecommunications network—they contain the switches and routers that direct packets of information to their destinations. Although most telephone lines connecting houses to central offices and switching stations are still copper, the lines connecting these central hubs are fiber optic. Fiber optic lines have led to a revolution in switching equipment. The greatly increased transmission capacity of each line has allowed a few fiber optic lines to replace many copper lines. Packet switching equipment is evolving rapidly, ever increasing the amount of information that a single fiber optic line can carry. These switches and routers have the ability to transmit, process, amplify, and direct a massive amount of information. Installing and maintaining this equipment requires a high level of technical knowledge.

The increasing reliability of telephone switches and routers has simplified maintenance. New telephone switches are self-monitoring and alert repairers to malfunctions. Some switches allow repairers to diagnose and correct problems from remote locations. When faced with a malfunction, the repairer may refer to manufacturers' manuals that provide maintenance instructions.

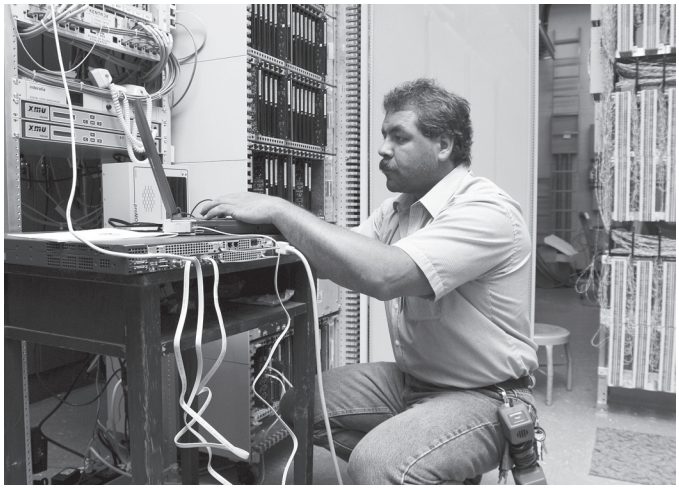
When problems with telecommunications equipment arise, telecommunications equipment repairers diagnose the source of the problem by testing each of the different parts of the equipment, which requires an understanding of how the software and hardware interact. Repairers often use spectrum and/or network analyzers to locate the problem. A network analyzer sends a signal through the equipment to detect any distortion in the signal. The nature of the signal distortion often directs the repairer to the source of the problem. To fix the equipment, repairers may use small handtools, including pliers and screwdrivers, to remove and replace defective components such as circuit boards or wiring. Newer equipment is easier to repair because whole boards and parts are designed to be quickly removed and replaced. Repairers also may install updated software or programs that maintain existing software.

PBX installers and repairers set up private branch exchange (PBX) switchboards, which relay incoming, outgoing, and interoffice calls within a single location or organization. To install switches and switchboards, installers first connect the equipment to power lines and communications cables and install frames and supports. They test the connections to ensure that adequate power is available and that the communication links function. They also install equipment such as power systems, alarms, and telephone sets. New switches and switchboards are computerized; workers install software or program the equipment to provide specific features. For example, as a cost-cutting feature, an installer may program a PBX switchboard to route calls over different lines at different times of the day. However, other workers, such as computer support specialists generally handle complex programming. (The work of computer support specialists is described in the *Handbook* statement on computer support specialists and systems administrators.) Finally, the installer performs tests to verify that the newly installed equipment functions properly. If a problem arises, PBX repairers determine whether it is located within the PBX system or originates in the telephone lines maintained by the local phone company.

Due to rapidly developing technologies, PBX installers must adapt and learn new technologies. Instead of installing PBX systems, many companies are choosing to install voice-over Internet protocol (VoIP) systems. VoIP systems operate like a PBX system, but they use a company's computer wiring to run Internet access, network applications, and telephone communications. Specialized phones have their own Internet protocol (IP) addresses. The phones can be plugged into any port in the system and still use the same number.

Station installers and repairers, telephone—commonly known as *telephone installers and repairers* or *telecommunications service technicians*—install and repair telephone wiring and equipment on customers' premises. They install telephone or digital subscriber line (DSL) service by connecting customers' telephone wires to outside service lines. These lines run on telephone poles or in underground conduits. The installer may climb poles or ladders to make the connections. Once the connection is made, the line is tested. When a maintenance problem occurs, repairers test the customers' lines to determine if the problem is located in the customers' premises or in the outside service lines. When onsite procedures fail to resolve installation or maintenance problems, repairers may request support from their technical service center. Line installers and repairers, covered elsewhere in the *Handbook*, install the wires and cables that connect customers with central offices.

Radio mechanics install and maintain radio transmitting and receiving equipment. This includes stationary equipment mounted



Telecommunications equipment repairers set up, adjust, and maintain central-office switches and routers.

on transmission towers and mobile equipment, such as radio communications systems in service and emergency vehicles. Radio mechanics do not work on cellular communications towers and equipment. Newer radio equipment is self-monitoring and may alert mechanics to potential malfunctions. When malfunctions occur, these mechanics examine equipment for damaged components and loose or broken wires. They use electrical measuring instruments to monitor signal strength, transmission capacity, interference, and signal delay, as well as handtools to replace defective components and parts and to adjust equipment so that it performs within required specifications.

Working Conditions

Radio and telecommunications equipment installers and repairers generally work in clean, well-lighted, air-conditioned surroundings, such as a telephone company's central office, a customer's PBX location, or an electronic repair shop or service center. Telephone installers and repairers work on rooftops, ladders, and telephone poles. Telephone and PBX installers must travel to a customer's location. Radio mechanics may maintain equipment located on the tops of transmissions towers. While working outdoors, these workers are subject to a variety of weather conditions.

Nearly all radio and telecommunications equipment installers and repairers work full time. Many work regular business hours to meet the demand for repair services during the workday. Schedules are more irregular at companies that need repair services 24 hours a day or where installation and maintenance must take place after business hours. At these locations, mechanics work a variety of shifts, including weekend and holiday hours. Repairers may be on call around the clock, in case of emergencies, and may have to work overtime.

The work of most repairers involves lifting, reaching, stooping, crouching, and crawling. Adherence to safety precautions is important in order to guard against work hazards. These hazards include falls, minor burns, electrical shock, and contact with hazardous materials.

Employment

Radio and telecommunications equipment installers and repairers held about 226,000 jobs in 2002. About 219,000 were telecommunications equipment installers and repairers, except line installers, mostly working in the telecommunications industry, and the rest were radio mechanics. Radio mechanics worked in electronic and precision equipment repair and maintenance, telecommunications, electronics and appliance stores, and many other industries.

Training, Other Qualifications, and Advancement

Most employers seek applicants with postsecondary training in electronics and a familiarity with computers. Training sources include 2- and 4-year college programs in electronics or communications, trade schools, and equipment and software manufacturers. Military experience with communications equipment is valued by many employers. Many equipment repairers begin working in telecommunications companies as line-installers or telephone installers, before moving up to the job of central office installer and other more complex work.

Newly hired repairers usually receive some training from their employers. This may include formal classroom training in electronics, communications systems, or software and informal hands-on training assisting an experienced repairer. Large companies may send repairers to outside training sessions to keep them informed about new equipment and service procedures. As networks have become more sophisticated—often including equipment from a variety of companies—the knowledge needed for installation and maintenance also has increased.

Telecommunications equipment companies provide much of the training on specific equipment. With the rapid advances in switches, routers, and other equipment, repairers need to continually take courses and work to obtain manufacturers' certifications on the latest technology.

Repairers must be able to distinguish colors, because wires are color-coded, and they must be able to hear distinctions in the various tones on a telephone system. For positions that require climbing poles and towers, workers must be in good physical shape. Repairers who handle assignments alone at a customer's site must be able to work without close supervision. For workers who frequently contact customers, a pleasant personality, neat appearance, and good communications skills also are important.

Experienced repairers with advanced training may become specialists or troubleshooters who help other repairers diagnose difficult problems, or may work with engineers in designing equipment and developing maintenance procedures. Because of their familiarity with equipment, repairers are particularly well qualified to become manufacturers' sales workers. Workers with leadership ability also may become maintenance supervisors or service managers. Some experienced workers open their own repair services or shops, or become wholesalers or retailers of electronic equipment.

Job Outlook

Employment of radio and telecommunications equipment installers and repairers is expected to decline through 2012. Although the need for installation work will remain as companies seek to upgrade their telecommunications networks, there will be a declining need for maintenance work—performed by telecommunications equipment installers and repairers, except line installers—because of increasingly reliable self-monitoring and self-diagnosing equipment and because installation of higher capacity equipment will reduce the amount of equipment needed. The replacement of two-way radio systems with wireless systems, especially in service vehicles, will eliminate the need in many companies for onsite radio mechanics. The increased reliability of wireless equipment and the use of self-monitoring systems also will continue to lessen the need for radio mechanics. Applicants with electronics training and computer skills should have the best opportunities for radio and telecommunications equipment installer and repairer jobs.

Job opportunities will vary by specialty. For example, opportunities should be available for central office and PBX installers and repairers experienced in current technology, as the growing popularity of VoIP, expanded multimedia offerings such as video on demand, and other telecommunications services continue to place additional demand on telecommunications networks. These new services require high data transfer rates, which can be achieved only by installing new optical switching and routing equipment. Extending high-speed communications from central offices to customers also will require the installation of more advanced switching and routing equipment. Whereas increased reliability and automation of switching equipment will limit opportunities, these effects will be somewhat offset by the demand for installation and upgrading of switching equipment.

Station installers and repairers can expect keen competition. Prewired buildings and the increasing reliability of telephone equipment will reduce the need for installation and maintenance of customers' telephones. Upgrading internal lines in businesses and the wiring of new homes and businesses with fiber optic lines should offset some of these losses. As cellular telephones have increased in popularity, the number of pay phones is declining, which also

will adversely affect employment of station installers and repairers as pay phone installation and maintenance is one of their major functions.

Earnings

In 2002, median hourly earnings of telecommunications equipment installers and repairers, except line installers were $22.78. The middle 50 percent earned between $18.07 and $26.38. The bottom 10 percent earned less than $13.27, whereas the top 10 percent earned more than $29.09. Median hourly earnings in the wired telecommunications carriers (telephone) industry were $24.07 in 2002.

Median hourly earnings of radio mechanics in 2002 were $17.42. The middle 50 percent earned between $13.17 and $22.78. The bottom 10 percent earned less than $10.34, whereas the top 10 percent earned more than $28.38.

Related Occupations

Related occupations that involve work with electronic equipment include broadcast and sound engineering technicians and radio operators; computer, automated teller, and office machine repairers; electronic home entertainment equipment installers and repairers; and electrical and electronics installers and repairers. Line installers and repairers also set up and install telecommunications equipment. Engineering technicians also may repair electronic equipment as part of their duties.

Sources of Additional Information

For information on career and training opportunities, contact:

➤ International Brotherhood of Electrical Workers, Telecommunications Department, 1125 15th St. NW., Room 807, Washington, DC 20005.

➤ Communications Workers of America, 501 3rd St. NW., Washington, DC 20001.

For information on careers and schools, contact:

➤ Electronics Technicians Association International, 5 Depot St., Greencastle, IN 46135.

For information on training and professional certifications for those already employed by cable telecommunications firms, contact:

➤ Society of Cable Telecommunications Engineers, Certification Department, 140 Phillips Rd., Exton, PA 19341-1318. Internet: **http://www.scte.org**