125 YEARS OF ELECTRICAL

1901



- Guglielmo Marconi sends the first trans-Atlantic wireless radio signal — the letter "S" — from Poldhu, Cornwall, England to St. Johns, Newfoundland.
- Peter Cooper Hewitt invents the mercury-vapor arc lamp.
- The National Electrical Contractors Association (NECA) is organized July 17, with 31 original members.
- The National Bureau of Standards is established.

1902

- Peter Cooper Hewitt invents the mercury arc rectifier.
- The first telecommunications cable across the Pacific between San Francisco and Honolulu (2,600 miles) is installed by the cable ship Silverton.

1904

- English engineer John Ambrose Fleming invents the diode *(right)*.
- Christian Hulsmeyer patents a "means for reporting distant metallic bodies to an observer by use of electric waves," or as we call it today, radar.

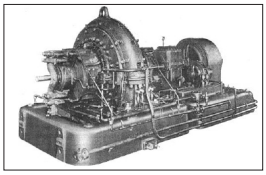


1905

The first trade association in the electrical manufacturing industry is organized. Named the Electrical Manufacturers Alliance, it will later become the Electrical Manufacturers Club.

1906

- Ernest F.W. Alexanderson develops the high-frequency alternator (right).
- Dr. Lee de Forest announces his first three-element vacuum tube (filament and two-plate electrodes).
- The Illuminating Engineering Society is organized.
- R.A. Fessenden produces the first true radio broadcast in the United States from Brant Rock, Mass.



1908

- The National Association of Electrical Distributors (NAED) is formed.
- The first electric-powered washing machine (the Thor) is introduced by the Hurley Machine Co. of Chicago.

1909

- The continuous-filament tungsten lamp is introduced.
- Grand Rapids Power Co. constructs a 50-mi-long 110,000V transmission line between Grand Rapids and the Croton Dam, Mich., marking the birth of the U.S. transmission grid.

1910

George A. Hughes begins manufacturing the first practical electric range.

1912

- Edwin H. Armstrong, Alexander Meissner, Henry Round, and Lee de Forest all separately develop the first regenerative circuits (right).
- Western Union engineers and Western Electric Co. develop the multiplex system for the telegraph.
- The Institute of Radio Engineers (IRE) is formed.



1913

- Edwin H. Armstrong is the first to make use of the three-electrode tube for generating the continuous electric waves that make radio broadcasting possible.
- Irving Langmuir invents the gas-filled incandescent lamp.
- Nela Park (National Electric Lamp Association) is formally launched.
- Niels Bohr visualizes the atom something like this: "Around the nucleus, or center of the atom, are tiny particles which we call electrons, or negative particles of electricity, identified by the minus sign."

1914

- The Panama Canal, the "biggest electrical installation in the world," opens.
- The first completely automatic substation begins operation at Union, Ill.
- Edwin H. Armstrong develops the feedback circuit.

1915

- George S. Claude is granted a patent for his development of the neon tube.
- The first transcontinental telephone line between New York and San Francisco is opened for service.
- The Western Electric Telephone and Telegraph Co. transmits speech by "radio telephone" from Vermont to San Francisco to Hawaii, and across the Atlantic to Paris.

1917



- Bell System engineers demonstrate radio technology between the ground and planes in flight and between two planes.
- The first fully automatic electric range is produced.

1918

- Bell System introduces carrier telephony.
- Edwin H. Armstrong invents the superheterodyne receiver.
- The American National Standards Institute (ANSI) organizes.

1920



- Radio station KDKA opens in Pittsburgh. It is the first radio station to broadcast regularly scheduled programs.
- The first three-color electric traffic signal appears.

1923

The first neon tube advertising sign is installed on the marquee of the Cosmopolitan Theatre in New York.

1901 — 1910 — 1920

ACHIEVEMENTS: 1901-2026

1926

- The National Broadcasting Company (NBC) organizes as a service of RCA to conduct nationwide network broadcasting.
- The National Electrical Manufacturers Association (NEMA) organizes.

1928

- The International Association of Electrical Inspectors (IAEI) is formed.
- E.F.W. Alexanderson makes the first demonstration of home reception of television.

1932

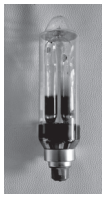
Heat-resistant rubber insulation for 75°C operation is introduced. It provides a method for carrying over one-third more current on a given size conductor.

1934

- The first completely self-protected (CSP) transformer is introduced.
- The National Society of Professional Engineers (NSPE) organizes.

1933

- The first sodium-vapor lamps are installed on Balltown Road, near Schenectady, N.Y., by the New York Power & Light Co. (right).



- Edmund Germer develops the high-pressure mercury-vapor lamp.
- As part of the New Deal, the government creates the Tennessee Valley Authority.
- The National Industrial Service Association (NISA), which will become the Electrical Apparatus Service Association in 1962, organizes.

1939

- RCA demonstrates color television to the Federal Communications Commission (FCC).
- George Stibitz and S.B. Williams build a prototype electromechanical digital computer that uses binary arithmetic.

1927

- The United Independent Broadcasters, Inc. (later known as the Columbia Broadcasting System or CBS) organizes in New York City.
- RCA introduces radio receiving sets and tubes for home use that are designed for complete AC operation.
- The Federal Radio Commission is established.

1941

The FCC authorizes commercial television broadcasting on July 1.



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1942

Enrico Fermi and Leo Szilard construct an atomic pile that sets off the first controlled nuclear chain reaction.

1943

- Polyethylene is introduced.
- Paul Eisler patents a practical means of making printed circuits.

1930 — 1940

1924

Vladimir K. Zworykin (right) develops a complete television system.



1929

- Fritz Kesselring develops the expansion-type circuit breaker.
- Bell Telephone Laboratories develops coaxial cable for the transmission of broadband radio waves for multiplex telephony and national networks.

1936

Production begins on glass fibers sufficiently fine and pliable to be woven into fabrics.

1925

- Marvin Pipkin invents the first commercially successful electric lamp bulb, which is frosted on the inside.
- Bell Telephone Laboratories invents a mechanism for recording sound electrically.



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1935

- Edwin H. Armstrong invents wideband frequency modulation, now known as FM radio.
- A new light wall, concentric-layer-type insulation of purified rubber applied by the dip, or pass, method is introduced, initiating the small diameter trend in modern electric wire.
- The first electric cable insulated with heat-resistant glass fiber is introduced.
- The Rural Electrification Administration (REA) organizes.
- The Public Utility Holding Company Act is developed to regulate the monopolies of the electric utility industry.
- The electric clothes dryer is developed.

1937

- Howard Aiken and Thomas Watson build the Automatic Sequence Controlled Calculator (also known as the Mark I). When finished in 1944, the Mark I was pressed into service to calculate ballistics problems for the U.S. Navy.
- RCA engineers demonstrate the electron projection gun, which projects television pictures on a screen 8 ft x 10 ft.

1931

- Neoprene, the first widely used rubber-like synthetic, is introduced. It soon finds many uses in the electrical manufacturing industry, especially on wires and cables.
- The "selenium dry-disc photoelectric cell" (phototronic) is developed.
- The first self-generating "photoelectric exposure meter" is developed.
- AT&T inaugurates its Typewriter Exchange Service, which provides central switching so subscribers can communicate with each other by Teletype.

125 YEARS OF ELECTRICAL ACHIEVEMENTS: 1901-2026

1944

Underwriters Laboratories (UL) celebrates a half-century of safety service to the public.

1951

A nuclear reactor in Arco, Idaho, produces electricity for the first time.

1960

DEC introduces the first commercial computer with a monitor and keyboard unit.

1965

- The Electrical Generating Systems Association (EGSA) organizes.
- A widespread blackout in the Northeastern U.S. reveals the vulnerability of the nation's electric transmission grid.

1954

Texas Instruments introduces the silicon transistor.

1957

Later known as the Independent Electrical Contractors (IEC), the Associated Independent Electrical Contractors of America forms.

1962



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Telstar, the first communications satellite, is launched.

1945

- John Mauchly and J. Presper Eckert build an Electronic Numerical Integrator and Computer, or ENIAC — the first true digital computer. It weighs 30 tons, consumes 150kW of power, and uses 18,000 vacuum tubes.
- Percy Spencer develops the first microwave oven.

1956

- The world's first atomic power station to generate electricity from nuclear power opens at Calder Hall, England.



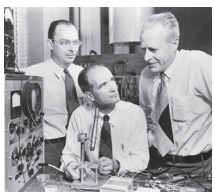
- The first trans-Atlantic telephone cable is installed and connected.

1959

- Xerox introduces the first automatic plain-paper copier.
- Robert Noyce files a patent application for integrated circuit technology on behalf of the Fairchild Semiconductor Corp.

1950 1960 1970

1947



- William Shockley, Walter Brattain, and John Bardeen invent the transistor.
- The magnetic drum memory is introduced.

1948



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- William Shockley invents the junction transistor.
- The first operational stored-program digital computer is introduced.
- The American Society for Testing & Materials (ASTM) celebrates 50 years of service to the industry.

1963

The American Institute of Electrical Engineers (AIEE) and the Institute of Radio Engineers (IRE) merge to become the Institute of Electrical and Electronics Engineers (IEEE).

1964

- Control Data Corp. develops the first commercially successful supercomputer with its CDC6600.
- IBM develops a computer-aided design system.
- Douglas Engelbart introduces the first prototype of the computer mouse.

1969

- The RS-232-C standard is introduced to enable data exchange between computers and peripherals.
- The precursor to today's Internet and World Wide Web, the Advanced Research Projects Agency of the U.S. Department of Defense establishes Arpanet, a data communications network that links four academic institutions.

1949

The first real-time computer is constructed and placed into service. It contains 5,000 vacuum tubes.



1958

- Jack Kilby invents the monolithic integrated circuit.
- Francis Bacon demonstrates a 5kW fuel cell capable of powering a welding machine.
- Bell Telephone introduces the first modem.

1968

- The North American Electric Reliability Council (NERC) is formed as a result of the 1965 Northeast Blackout.
- Burroughs introduces the first computers to use integrated circuits.

125 YEARS OF ELECTRICAL ACHIEVEMENTS: 1901-2026

1970

- The first optical fiber is designed and produced by Robert Maurer, Donald Keck, and Peter Schultz of Corning Glass.
- The daisywheel printer makes its debut.



1973

- The forerunner to the PC is developed. It is based on Smalltalk and employs icons, graphics, and a mouse.
- The initial design of a local-area network is outlined in a memo by Robert Metcalfe.
- The Electric Power Research Institute (EPRI) is founded.

1977

- The Association of Energy Engineers is formed.
- The U.S. Department of Energy is formed.

1981

IBM introduces a personal computer that features an 8-bit Intel 8088 processor, 16 KB of memory, and a floppy-disk drive.

1986

High-temperature superconducting ceramic oxides are discovered.

1990



Tim Berners-Lee and others write the initial prototype software for the World Wide Web.

1991

The International Brotherhood of Electrical Workers (IBEW) celebrates 100 years of service.

1995

The DVD (digital video disk) is introduced.

1992

The government passes the Energy Policy Act (EPAct).

2002

- Autodesk acquires Revit, popularizing Building Information Modeling (BIM) and leading to its widespread adoption in the AEC industry.
- Institute of Electrical and Electronics Engineers releases IEEE Std 1584-2002, Guide for Performing Arc-Flash Hazard Calculations.

2003

Over 50 million people are affected by a blackout in the Northeast, the largest power outage in North American history.

1970 1980 1990 2000

1971

- Intel introduces its 4004 microprocessor, "a computer on a chip."
- The ground-fault circuit interrupter (GFCI) is introduced.
- The U.S. Labor Department forms the Occupational Safety and Health Administration.

1979

Cellular telephones are tested in Japan and Chicago.

1978

The first watt-hour meter to use advanced microprocessor technology is introduced.

1985



The CD-ROM is introduced in Japan.

1998

California is the first state to open its electricity market to competition.

2004

The social media platform known as Facebook launches for Harvard students.

2001



- The California electricity crisis causes rolling blackouts and power outages across the state.
- Researchers from Lawrence Berkeley National Laboratory present their "Shape of the Microgrid" paper at the IEEE Power Engineering Society Winter Meeting, shaping microgrid development by introducing the concept of grouping small distributed generators, storage systems, and loads into semi-autonomous local clusters that interact with the main utility grid as a single, controllable entity.

1982

Commercial e-mail service begins among 25 cities.

1975

IBM produces its first personal computer, the 5100.

1977

Steve Jobs and Steve Wozniak produce the Apple II computer, assembled and completed with its own keyboard and monitor.



1984

- AT&T and the Bell System are dismantled as a regulated monopoly.
- The laser jet printer makes its debut (right).



125 YEARS OF ELECTRICAL ACHIEVEMENTS: 1901-2026

2005



The Energy Policy Act of 2005 passes, mandating the creation of new electric grid reliability standards, tax incentives for renewable energy, and establishes new rules for energy efficiency in federal buildings.

2006

- Google unveils what is considered the first hyperscale data center in The Dalles, Ore.
- Amazon launches Amazon Web Services and Elastic Compute Cloud (EC2), making cloud computing available to the public.

2007

- Netflix launches its streaming service with video on demand available through the Internet.
- Apple unveils the iPhone, which would go on to popularize smartphones.
- National Institute of Building Sciences (NIBS) releases the first version of the United States National Building Information Modeling Standard (NBIMS).

2008

Tesla Motors (now Tesla, Inc.) launches the Tesla Roadster, the first highway legal, serial production, all-electric car to use lithium-ion battery cells. The vehicle has a range of 245 miles on a single charge.

2014

Isamu Akasaki, Hiroshi Amano, and Shuji Nakamura are awarded the Nobel Prize in Physics for inventing the blue light-emitting diode (LED), which is used to generate energy-efficient, long-lasting white light.

2012



The United States achieves 60GW of installed capacity for wind energy with over 45,000 wind turbines installed nationwide.

2015

- Tesla debuts its Powerwall-type residential energy storage battery.
- Global cumulative sales of highway-legal light-duty plug-in electric vehicles reach 1 million units.

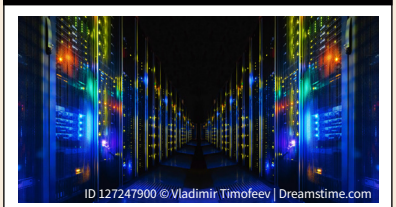
2018

- 5G mobile networks begin rolling out when AT&T launches its network to 12 cities.
- IEEE 1584-2018 is published, updating the guide for calculating arc flash hazards and improving upon the 2002 standard.

2019

John B. Goodenough, M. Stanley Whittingham, and Akira Yoshino are awarded the Nobel Prize in Chemistry for their contributions to the development of the lithium-ion battery.

2025



OpenAI and Oracle open their first data center in Abilene, Texas.

2020

Lockdowns begin for the COVID-19 pandemic, stressing the importance of reliable electrical infrastructure to support data centers, remote work, backup power, distributed energy, and more.

2022

OpenAI releases ChatGPT to the public. The generative artificial intelligence chatbot utilizes large language models (LLMs) to generate text, speech, and images.

2026

The U.S. hits an EV charging infrastructure milestone of 250,000 publicly available charging ports across the country.



2023



- Solar accounts for over 50% of new electrical capacity added to the grid in the United States, with 32.4GW worth of new installations.
- NFPA 70B becomes an enforceable standard after it is approved by the American National Standards Institute (ANSI).
- Vermont becomes the first state to ban the sale of compact fluorescent lamp (CFL) bulbs.

2021

The Infrastructure Investment and Jobs Act (IIJA) passes, dedicating federal funds toward a national EV charging network, electric grid investments, and battery storage development.

2005 2010 2020 2026