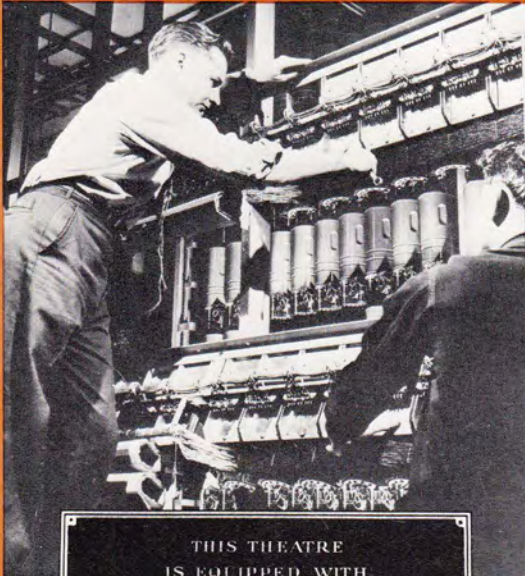


WE

September-October 1981

SPECIAL ISSUE:

100 Years in the
Bell System



THIS THEATRE
IS EQUIPPED WITH

Western Electric
SOUND THE VOICE OF ACTION SYSTEM

Talking Pictures at their Best!



SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

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NEW YORK, SEPTEMBER 20, 1884.

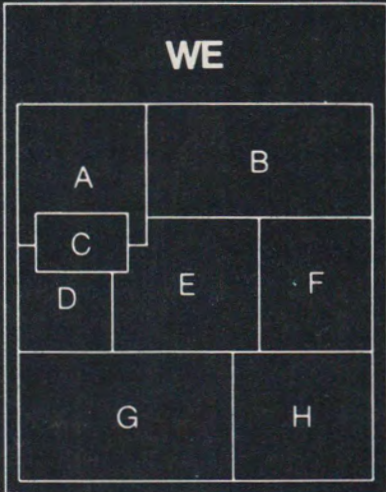
\$3.00 per Annum.
[POSTAGE PREPAID.]



ILLUSTRATIONS OF THE AMERICAN BELL TELEPHONE. — [See page 180.]

ON THE COVER

We have put together this anniversary issue in the style of a family album. We begin on the cover with glimpses of a dynamic enterprise. **A** — In the late 1940's, the Bell System pulled out all stops to increase capacity of the switched network. Here WE installers are at work on a step-by-step dial conversion in Minneapolis. **B**—The file in which we found these very attractive young women just said "Office—early 1900's" which probably meant Clinton Street, Chi-



cago. Dress code was strict, but desks were messy. **C**—Anyone who remembers the early 1930's remembers this sign in theater lobbies. By the end of 1929, we had equipped about 4,000 theaters in this country and 1,200 abroad with sound equipment made at Hawthorne, and the numbers were rising by the hundreds every month. **D** — The Kinzie Street Shop in Chicago shortly before we joined the Bell System. Gen. Stager put up the building on speculation following the famous Chicago fire in 1871, and it became our first owned property in 1877. **E** — The Point Breeze (Baltimore) cord shop in 1943 when 83 percent of our sales were to the U.S. Government. **F**—Representing the present is Dennis Merkel, planning engineer at Reading. He is examining a wafer containing magnetic bubble material. **G** — Spring floods caused havoc in the midwest in 1913 and Western rushed in supplies from all over the country. This truckload is on the way to the railroad yard from our New York City warehouse. **H** — Posing like a ball team, these young men were cable formers at Hawthorne about 1910.

Rear cover — August 27, 1942 — Thousands of Hawthorne Works employees gather to receive an Army-Navy "E" for the excellence of their contribution to the war effort.

100 YEARS IN THE BELL SYSTEM

As a Company, we celebrated our 100th birthday more than a decade ago—in 1969. What we were commemorating then was the formation of Gray and Barton, the foremost of the pre-Western Electric firms.

This year, we are celebrating the 100th anniversary of our entry into the Bell System and our merger with some other predecessor firms. The date of that joining is a little fuzzy, because the consolidation of what had been competitive forces did not happen overnight.

It was on June 30, 1881 that the money changed hands. That was when American Bell General Manager Theodore Vail gave \$150,000 cash to Dr. Norvin Green, president of Western Union, and received in return 1,000 shares of Western Electric Manufacturing Company stock. The new company, merging Western Electric with Gilliland Electric and Charles Williams, Jr., was not incorporated until November 26, 1881. And the manufacturing contract, giving Western Electric exclusive rights to make and sell telephone equipment to the Bell operating companies, was not signed until February 6, 1882.

In this special issue, we try to tell the story of the past 100 years in pictures from our archives. It is, of course, impossible to include everything. It is difficult even to hit all the high spots. In selecting the photos, we've concentrated on people. From the early years, most of the photos that have survived are of groups—and they are a remarkably proud-looking assemblage. Although fashions have changed through the years, WE people have generally looked all spiffed up for the camera, and their work areas remarkably clean. Supervisors then as now probably did a lot of complaining about photographers not giving them enough time to tidy up, but it comes through loud and clear that down through the years "The Western is a good place to work."

FRONTISPIECE — opposite page

The manufacturing scenes on this magazine cover, reproduced with permission of *Scientific American*, show our Boston shop—originally the plant of Charles Williams, Jr. It was in the attic of this building that Alexander Graham Bell carried on his experiments with the aid of Thomas Watson. Williams was one of three firms that merged to form Western Electric in 1881, and Mr. Williams remained on the WE Board of Directors until his death in 1908.

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Western Electric

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General Stager's Legacy...



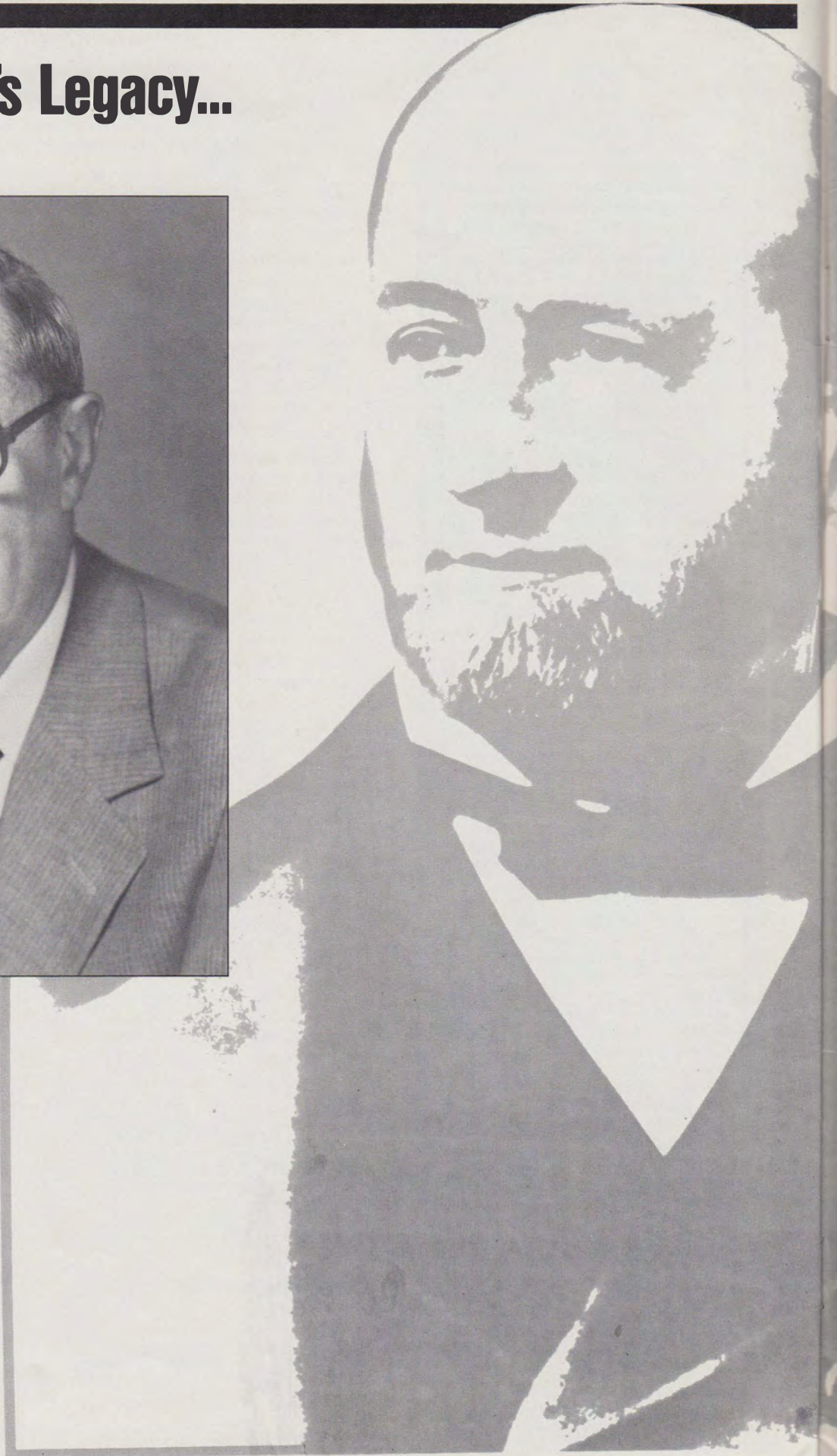
Donald Eugene Procknow
November 1971 — Present

Major contributions to the business include new marketing thrust via Product Planning and Account Management, re-entry into international markets, VLSI and light-guide development programs, new plants at New River Valley and Orlando, established headquarters administrative center at Greensboro and operating divisions at Morristown.

Anson Stager

December 1881 — January 1885

Engineered entry of Western Electric into the Bell System — Consolidated Gilliland and Williams plants — Pushed power and light business.



One hundred years separate the men on the opposite page. Western Electric and the Bell System draw them together. Anson Stager, the company's first president, is the man who in conjunction with Theodore Vail brought Western into the Bell System fold. Don Procknow is chief executive officer as we enter our second century with the Bell System.

Between their terms of service, the Bell System changed enormously. Regulation. Competition. Technology. Magnitude — or the tyranny of numbers. All of these topics are worthy of a special issue by themselves and far beyond the scope of this introduction. A good way of summarizing our 100 years, however, is to review the accomplishments and highlights of the men who led the company during the past century.

Stager was born in Chapinville, N. Y. in 1825. That was the year the Erie Canal was completed. John Quincy Adams was president. The

Union had 23 states and a population of 11 million. The federal budget for the year was \$19 million.

Don Procknow was born in Madison, South Dakota on May 27, 1923. That was the year Red Grange scored four touchdowns for Illinois in 12 minutes. Warren Harding, our 29th president, died on August 2 and was succeeded by silent Calvin Coolidge. There were 48 states and a total population of 114 million. Federal expenditures for the year were up to \$3 billion.

Stager grew up at a time when slavery was still prevalent in large parts of the country, when Indian raids were occurring on the frontier, and, when someone "called," they paid a visit in person. Procknow grew up during the Great Depression of the 30s when all the basic principles upon which the nation was built were severely tested.

War came along a lot earlier in Procknow's career than it did in Stager's. Procknow served in the Navy during World War II, including a year and a half as engineering officer aboard landing craft in the Pacific Theater. Stager served as head of Military Telegraphs during the Civil War and upon discharge was brevetted a Brigadier General.

The technological ambience of his era tends to shape a man. Stager, who grew up at a time when most of America was devoted to family farms, was very much a part of the technological forces directing the country toward industrialization. He was very closely associated all of his life with railroads and, of course, telegraphy, in which he played a vital role. In his later years, he was similarly involved with organizing telephone companies and introducing electric power and light in the midwest.

As we move through the years and look at the other men who have held the office of president of Western Electric (see following spread), the quickening pace of technological change becomes very apparent. As the company grows and the Bell System expands, decision-making becomes more and more complex. Where a big factory for the day cost \$50,000 to \$100,000 in the 19th century, today an Orlando can represent an outlay of hundreds of mil-

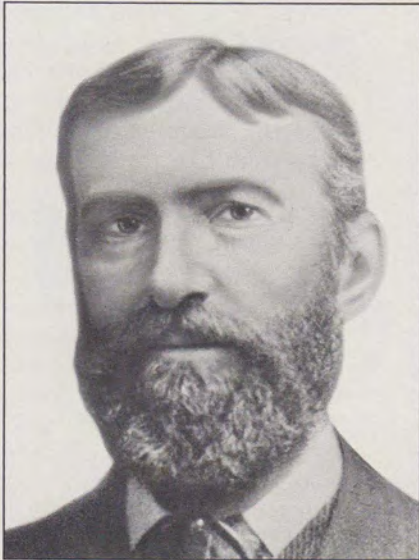
lions. Research which, in Stager's time, was pretty much one man tinkering in an attic, today means a team of hundreds and an outlay of millions of dollars. Making decisions in a period of rapid technological change, which is a main function of a company's chief executive can be extremely difficult. And the complexity of the president's job has grown from man to man.

Curiously, the men who filled that job had little in common. Except for the fact that they were all men of their times, and all were able to supply the kind of leadership needed at the moment, they were a very heterogeneous group. They averaged 55½ years of age at the time of their election. The youngest was William Smoot—just two months shy of his 40th birthday. The eldest was Harvey Mehlhouse at 62 years 9 months.

The first seven of the presidents of a company bearing the Western name were from the East—three from New York State and one each from Virginia, Vermont, New Jersey and Pennsylvania. The second seven all came from the Midwest—two from Minnesota, and one each from Nebraska, Illinois, Wisconsin, Missouri and South Dakota. Twelve of the 14 came from small towns, but there were two big-city boys as well—DuBois from New York and Goetze from Chicago.

The presidents served an average term of seven years and nine months, if you extend Stager's presidency back to the formation of Western Electric Manufacturing Company, prior to our entry into the Bell System. He was the only president of that firm during its almost 10 years of existence. The shortest term was Mr. Smoot's. He died of typhoid fever after only one year and 26 days on the job. Mr. Goetze, who also died while serving as president, put in just short of two and a half years. Five of the men—Barton, Thayer, DuBois, Bracken and Mehlhouse—continued to serve the company as chairman of the WE board of directors after relinquishing the presidency. Thayer, Kappel and Romnes moved on to serve as president and/or chairman of AT&T. WE

Twelve Presidents



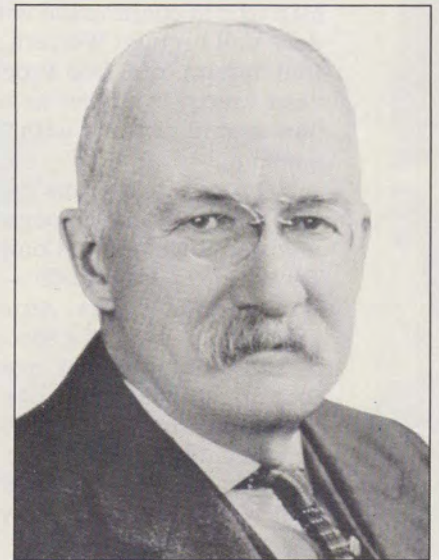
William Algernon Sydney Smoot
January 1885 — February 1886

Closed out Boston shop of Charles Williams and moved it to New York—Brought mass production expertise from Remington Arms, his former employer.



Enos Melancthon Barton
October 1886 — October 1908

Founding partner—Set standards for quality and service—Started foreign operations, supply business and built Hawthorne—Remained as chairman until 1916.



Harry Bates Thayer
October 1908 — July 1919

Negotiated supply contracts with the telephone companies, set up chain of retail outlets — Moved on to become president of AT&T.



Stanley Bracken
October 1947 — December 1953

Continued postwar buildup and start of the Nike program—Built plants at Indianapolis and Laureldale (Reading)—Started transistor production.



Frederick Russell Kappel
January 1954 — September 1956

Started plant at Montgomery—Built works at Merrimack Valley and Omaha—DEW Line. Antitrust suit ended with Consent Decree—Moved on to become president and then chairman of AT&T.



Arthur Burton Goetze
September 1956 — March 1959

Continued expansion of facilities with works at Columbus and Oklahoma City — Began the Engineering Research Center — Graduate Engineering Training.



Charles Gilbert DuBois
July 1919 — August 1926

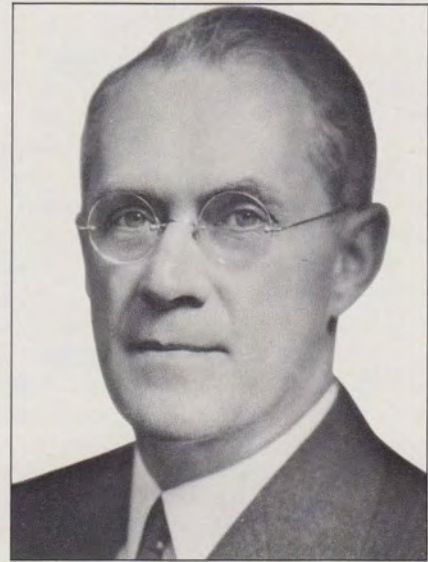
Author of the Pension and Benefit plans—Reorganized the company for machine switching — Spun off BTL, Graybar, International plants—Built Kearny Works.



Edgar Selden Bloom

August 1926—December 1939

Acquired Teletype, Nassau Smelting, and Queensboro Shop — Built Point Breeze (Baltimore) — Steered the Company through the Great Depression.



Clarence Griffith Stoll

January 1940 — September 1947

Production genius who converted the company to defense production and then back to telephony after WWII— Built first postwar plant at Allentown.



Haakon Ingolf Romnes

March 1959 — December 1963

Reorganized company with Service Region concept—Built works at Kansas City—Signed first Plan for Progress—went on to become president and later chairman of AT&T.



Paul Albert Gorman

January 1964 — November 1969

Introduced ESS, new directions following FCC competitive order — Opened CEC — Built Shreveport and Phoenix Works — Started construction at Dallas, Denver and Atlanta— Started company's second century.



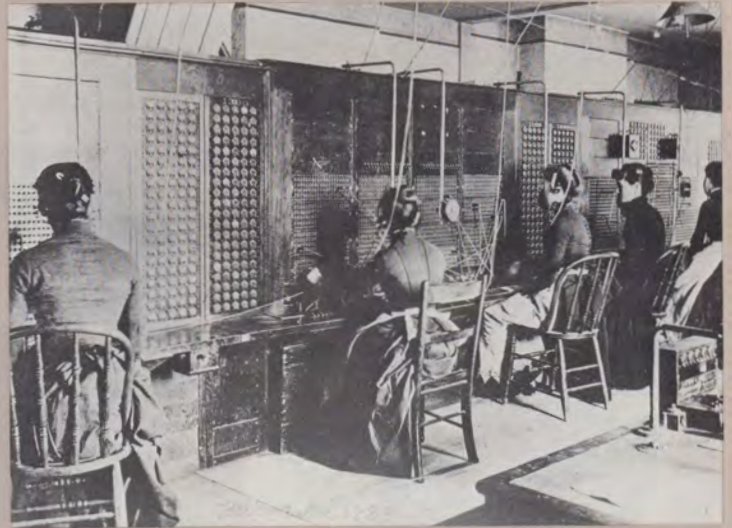
Harvey George Mehthouse

December 1969 — October 1971

Continued construction programs — Further expansion at Richmond and Lisle—Guilford Center—All-out effort to relieve service crunch—Remained as chairman until 1972.

THE 1880s

Following consolidation of Bell and Western Union exchanges during 1880, there were slightly more than 71,000 telephones in use in the United States. The newly formed Western Electric Company with 355 employees was the major supplier of equipment to the franchised telephone companies. Western's sales for 1981 topped \$1 million for the first time. By the end of the 80s, sales were up to \$2.7 million and the workforce had grown to 1,400. In the early years of the decade there were five manufacturing locations: Chicago, New York, Boston, Indianapolis and Antwerp, Belgium. By the end of the decade only the Antwerp location was at the same address. Headquarters in Chicago had moved to a new building on Clinton Street. The New York shop had moved two blocks to a new building on Greenwich Street. Boston and Indianapolis were closed. Abroad, the company had acquired a substantial financial interest in electrical plants in England and Germany. Although telephone equipment was the main product line, we ran a large business in electrical supplies for the power and lighting industries.



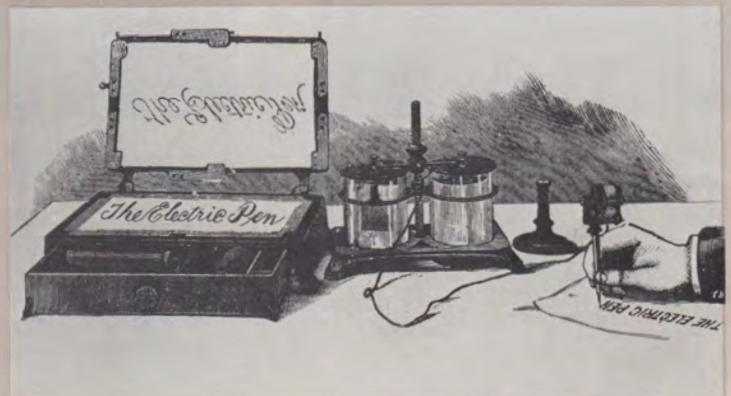
Multiple switchboards, with many operators, were becoming essential in major cities. Western Electric held basic patents in this area, set the world standard.



Our first foreign manufacturing plant was established in Antwerp, Belgium, in 1882. By 1922 we had facilities in 22 countries.



This is 1883 when the front office moved to new quarters at 220 Clinton St., Chicago. Enos Barton is at far right in third row.





Staff of the New York branch the year we entered the Bell System. We rented the building from Western Union, American Stock Exchange and NYU Business School now occupy the block.

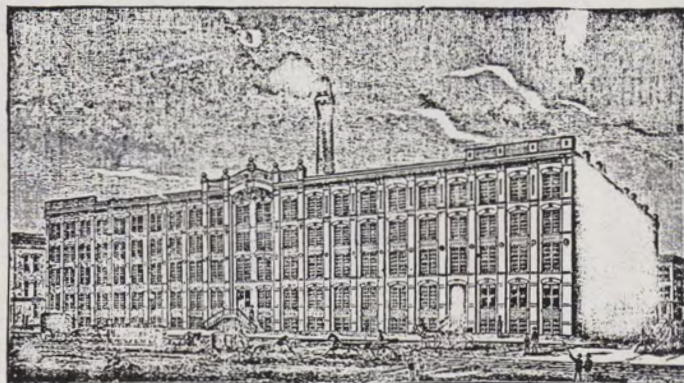


All the women employed by the company in 1883 posed on front steps at Clinton Street following move to expanded quarters. Out front is shop superintendent Frank Duplain and next to him forelady Kitty Gilday.

The electric pen, a Thomas Edison invention, was one of the specialty items we carried.

Re-enactment, 50 years later, of the way cable was drawn through lead pipe in the 80s. Contemporary photos do not exist.

Western Electric Company.



(Chicago Factory, 227 to 251 South Clinton Street.)

MANUFACTURERS OF

TELEGRAPH and TELEPHONE APPARATUS

AND SUPPLIES OF EVERY DESCRIPTION.

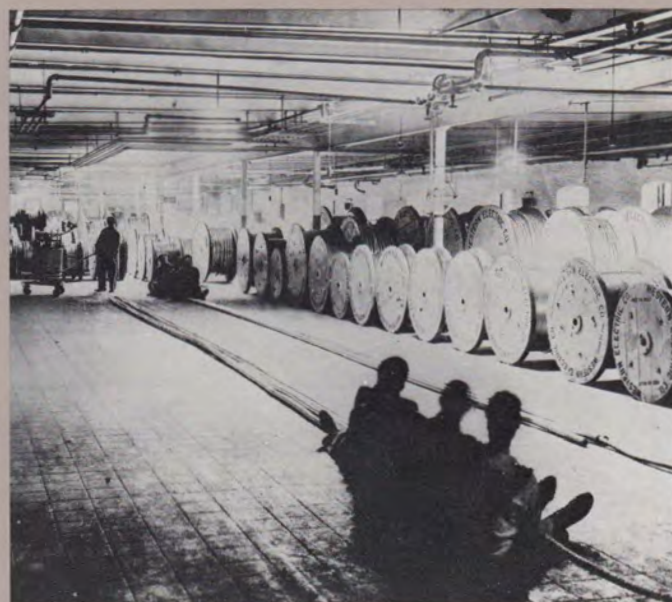
Hotel and House Annunciators, Burglar Alarms and Call Bells,
Electro-Mercurial Fire Alarm, Electric Gas-Lighting Apparatus,
Magneto Call Bells, Telephone Exchange Switch Boards, etc.

UNDERGROUND AND AERIAL CABLES.

Correspondence Solicited.

CHICAGO, BOSTON, NEW YORK.

Ad from the *Journal of the Telegraph* in 1884 lists just about all of our major products.

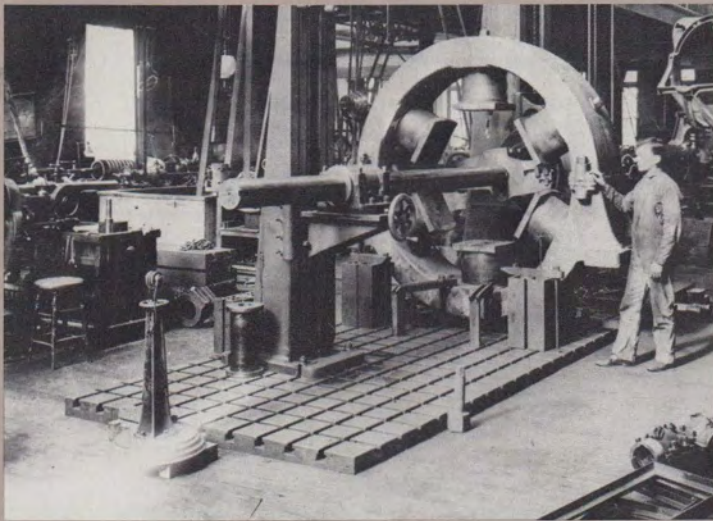


THE Gay Nineties

The original Bell patents ran out in 1893 and 1894, which brought about some profound changes in the business. Independent telephone companies sprang up all across the country and many competitors entered the supply business. Western Electric was growing rapidly both at home and abroad. By the end of the decade, the employee body was over 8,000, annual sales topped \$16 million and there were some 633,918 Bell telephones in use in the United States. A new plant had been started on West Street in New York City, and we had acquired an interest in plants in Russia, Germany and Japan. Vacations with pay and semi-annual pay reviews were first introduced during the 90s. The sale of electrical supplies for the home, including light fixtures and electric fans, had made us the nation's largest electrical jobber. We had been working through agents in the sale of products in many parts of the country, but during the 90s we began to acquire distribution outlets—primarily for sale of supplies.



This is the front office at our New York factory at Thames and Greenwich Streets about 1893. Left to Right, A. L. Salt, later president of Graybar; C. E. Scribner, later chief engineer; H. B. Thayer, later president of Western Electric and AT&T; and H. M. Sage, assistant manager and later manager at Clinton Street in Chicago.



In the 90s we were still very big in the power and light business. This is the power apparatus machine shop at Clinton St. (Chicago) about 1894.

A WE baseball team in August 1891. The tall man with the mustache, 10th from the left, is George Hopf, one of our first installers and one of the very few company employees to live past 100 years.





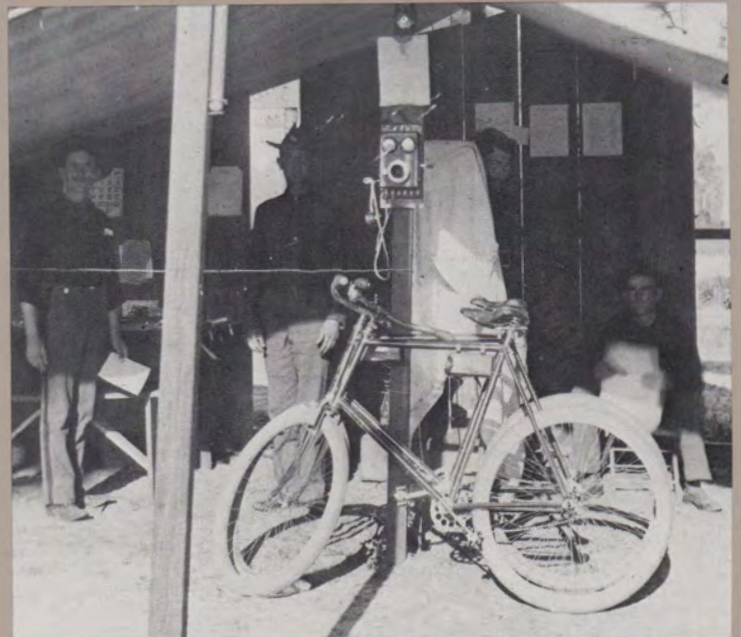
Group photos were taken for every event it seems. This is the installation crew that replaced the switchboard at Louisville after a fire in 1897.



Toolmaking has always been an important aspect of the business. This is the punch and die gang of the tool department at Clinton St. (Chicago) in 1897.



This was the telephone exchange in Kansas City, Mo. in 1895, when WE installers were putting in a new exchange. All wires still came in over the rooftops.



The Spanish-American War of 1898 was the first major conflict in which telephone communications played a role. This is the Signal Corps Telephone and Telegraph message center at Jacksonville, Fla.

THE New Century

AT&T became the holding company for the Bell System on January 1, 1900, replacing American Bell. The number of Bell telephones in use passed one million in 1901 and by the end of 1909 had reached 3½ million. Western's work force was doubling every 10 years and sales were going up even faster, despite the Panic of 1907, one of the worst depressions in the country's history. Supply contracts were signed with the telephone companies, starting with Philadelphia in 1901, and a nationwide chain of distribution and repair centers was set up. Land was acquired on the outskirts of Chicago for a plant—Hawthorne—where all manufacturing was eventually concentrated. Pensions were introduced for long service employees in 1906 along with one of the nation's first benefit plans. Theodore Vail began to reorganize the Bell system, emphasizing universal service. As part of consolidation, Western took over all development work. Apprentice training and a special program for recently hired college graduates were inaugurated. In 1909, we sold off the power apparatus business to General Electric, the first of many divestitures over the years.



Pants pressing while you wait—in a barrel. This 1911 ad for our American Beauty iron raises more questions than it answers. Why would he want pressed pants at a construction site? How long was the iron's cord?

We don't have an exact date on this delivery vehicle, but it is sometime after 1904. That was the year we moved into the building at 11th and York. Philadelphia was the place where distribution began with the signing of the first Supply Contract in 1901.



Yes, Virginia, we did operate retail stores in the old days, though most of our customers were electrical contractors. We sold light fixtures, on display over the counter, electrical fans, and all manner of supplies. This is Bethune Street, New York City.





At the annual sales conference in the spring of 1912, award winners went outside into the court at Hawthorne to show off prizes they won. They don't look overjoyed with the sports gear.



A 1909 brochure called Hawthorne "The Electrical Capital of America." This scene from the booklet shows the telephone-cord testing department.



Our affiliated plant in Petrograd, Russia. Sign reads "N.C. Heisler and Co." The plant, built in 1897, had over 1,200 people on the payroll when it was taken over by the Soviets during the 1917 Revolution.



This is the company conference in January 1907. Annually, top management got together to discuss plans and policies. The above group included several WE luminaries, including Charles G. DuBois, Enos M. Barton, Harry B. Thayer, Charles E. Scribner, Henry F. Albright and Gerard Swope.

This is the Hawthorne cable plant as it appeared in the *WE News* of September 1914. The scene looks so contemporary, it is hard to imagine that these women would have to be in their 80s now.



THE Great War

Long before America entered "The war to end all wars," WE's predecessor *The WE News* was filled with stories about employees in our foreign plants joining up. During the war our plants in Belgium, England and France were all badly damaged. We had sold off our interest in the one in Berlin before the fighting started. And we lost the one in Russia to the Bolsheviks who shot the manager on the front steps. WE engineers invented the public address system, which got its first workouts at war bond rallies. Hawthorne switched over almost entirely to manufacturing communications gear for the armed forces. Two companies of Signal Corpsmen were recruited from among our employees. It was a very patriotic time and many among the company's top brass had special government assignments. Government sales had peaked in 1918 at \$22 million. During the war, a new Western Electric was incorporated in New York, which had less restrictive laws about operating nationwide than had Illinois. The electrical business was growing rapidly and retail outlets, which sold primarily to building contractors, were now operating in 50 or more cities.



Trenches and World War I go together. This one near Ausauville, France, was for telephone cable. Like many during the war it was dug under continuous German battery gun fire. The date on this is 1918.



In France during World War I, vital messages were switched over this WE "Camp" switchboard, one of many special products we made for the armed services.

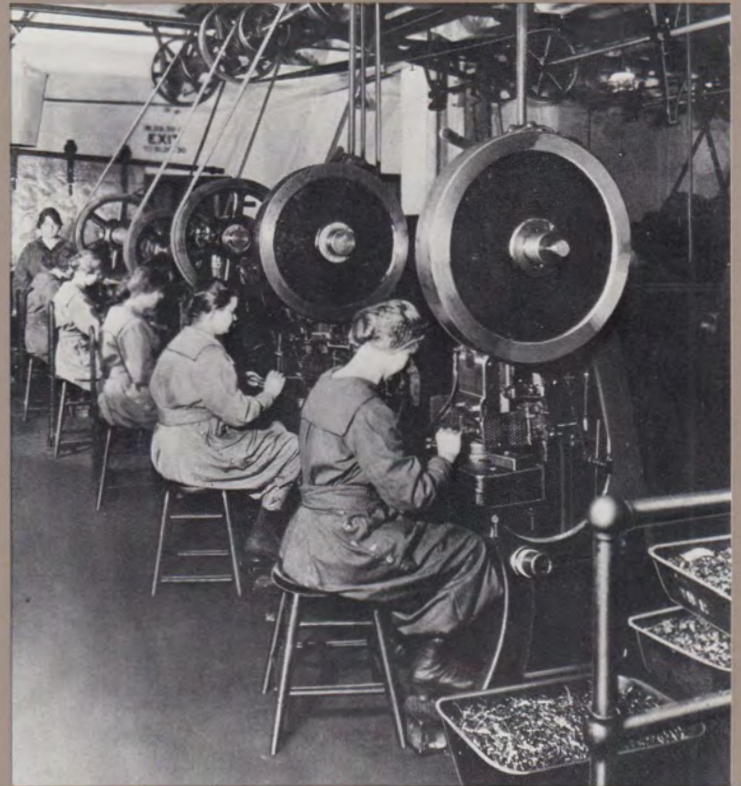


Early air-ground radio experiments conducted by Western Electric during World War I. Prior to the invention of the microphone, a passenger needed strong lungs to communicate with the pilot. Those are fabric patches, not bullet holes that are visible on the fuselage.

The entertainment committee at Hawthorne in December 1915. Tall man in the center, N.M. Argo, was the chairman. Young boy out front, Lawrence Kramer, worked in the checkroom. Hats obviously came with the job.



Before Bell Laboratories was incorporated, Western Electric operated a lab at West Street in New York City which later served as BTL headquarters. This was 1918.



During World War I, women entered many new job fields at Hawthorne Works, such as punch press operator, which had traditionally been considered a "man's" job.



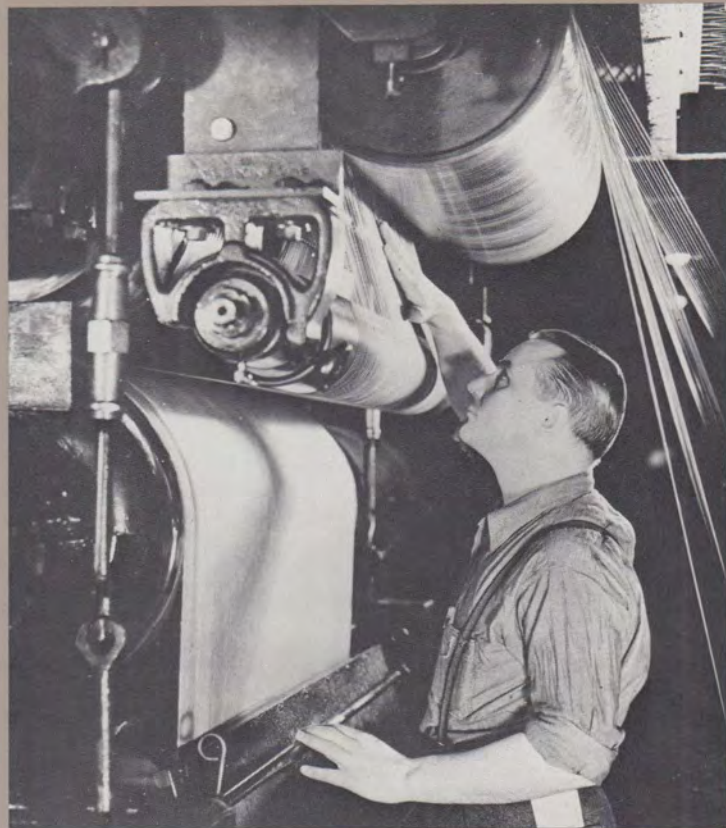
Installers go outside for a breath of air during a break, while working at the Crocker Office in San Francisco. The time is April 1916. Hats, obviously, were "in."

June 17, 1914: The final pole of the first transcontinental telephone line is put into place on the Nevada-Utah border. A great push was made to complete the line in time for the opening of the Panama-Pacific Exposition, only to have the opening postponed a year.



THE Roaring Twenties

The twenties were a period of fantastic growth for Western Electric despite the splitting off of large portions of the business. Telephones in use doubled during the decade to 15 million. Western's workforce grew from 28,000 in 1919 to 85,000 by the end of 1929. Sales rose from \$135 million to \$411 million for the same period. But during that time, foreign plants and offices were sold to IT&T with the exception of Nippon Electric, which became a separate company, and Northern Electric, which remained an affiliate. The supply business was sold to employees and became Graybar Electric. Our engineering department became Bell Laboratories. We helped give the movies a voice and outfitted theaters from coast to coast with sound systems. We also were involved in commercial radio broadcasting and got involved in some lengthy lawsuits with RCA and General Electric over our basic patents, which were upheld. Another WE plant began to take shape in the New Jersey marshes—Kearny. The famous Hawthorne Studies were begun, and the equally famous Ten Commandments were drafted by the General Personnel Committee.

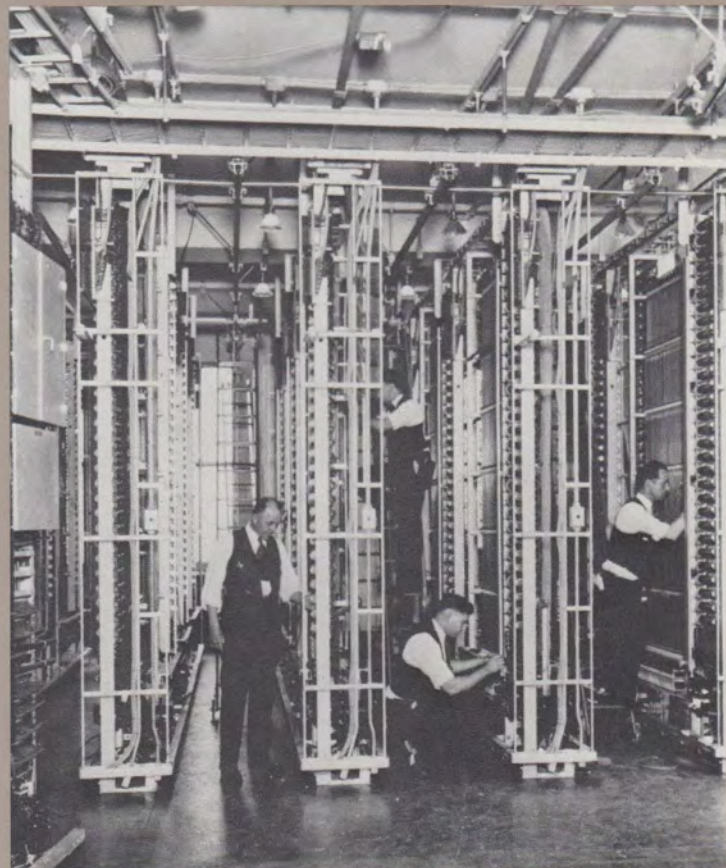


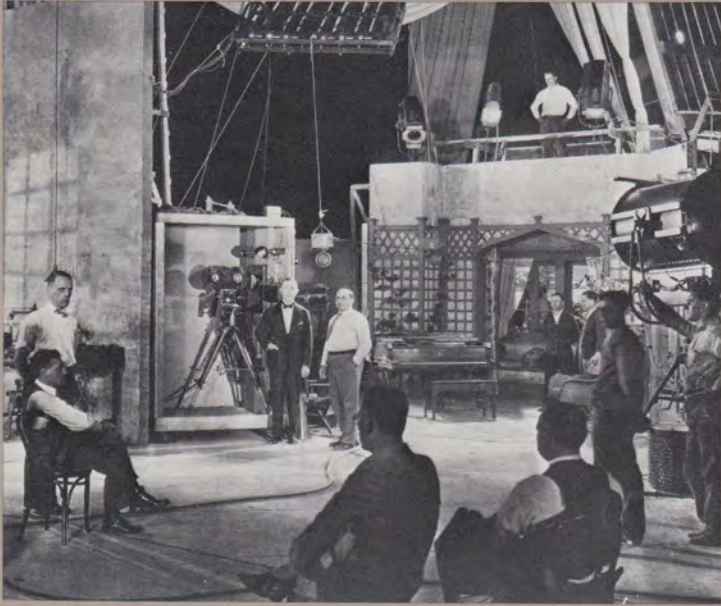
One of the major production advances during the 20s was the introduction of pulp insulation on cable. This photo is from the then brand new Kearny Works.



Herbert Hoover, then Secretary of Commerce, as he participated in a 1927 television trial between Washington and Bell Laboratories in New York City.

The introduction of switching machines in large cities was one of the major milestones of the decade. This is panel equipment in a New York City exchange.





Two of the men responsible for giving movies a voice: Western's E.B. Craft (black tie) and Hollywood's Sam Warner (white shirt). This is a recording session for a Vitaphone short.



Western Electric's engineering department spawned Bell Labs in 1925. Tall building in the center became the new company's home.

The Democratic National Convention was held in New York City in 1924 and our public address systems helped candidates make their positions clear on the issues.



Pay day. No checks in those days. Everyone was paid in cash. Why the paymaster wore a cap is a mystery.



The Hawthorne Studies, which grew from tests in this relay assembly area, changed a lot of thinking about what workers worked for. It wasn't only money.



THE Great Depression

The stock market crashed on October 29, 1929 but Western Electric did not feel the impact of the depression immediately. The year 1929 set a record for sales—up 43 percent over 1928; 1930 was down from the peak but still the second best in history to that time. Then the bottom fell out. Sales plummeted to \$70 million in 1933. The company operated at a loss of \$13 million in 1932, \$14 million in 1933 and \$8 million in 1934. Employment dropped from 85,000 at the end of 1929 to 18,000 at the end of 1933. But even that sounds better than it was. The 18,000 on roll were working only a few days a week at reduced pay and often on non-telephonic products. The one busy spot was ERPI (Electric Research Products, Inc.) the corporation we formed to install sound systems in theaters. Everyone was going to the movies to forget their troubles. Important additions were made to the business in the early 30s, namely the building of Point Breeze Works (Baltimore), the acquisition of Teletype and the acquisition of Nassau Smelting and Refining.



Teletype Corporation, headquartered in this building on Wrightwood Ave., Chicago, became our largest subsidiary, following purchase in 1931.

10 in a row

...for Western Electric recorded Sound!

1930—Metro-Goldwyn-Mayer	1936
1931—Paramount	1937
1932—Paramount	
1933—Paramount	
1934—Columbia	1938
1935—Metro-Goldwyn-Mayer	1939
1936—Metro-Goldwyn-Mayer	
1937—United Artists	
1938—United Artists	
1939—Universal	

It is significant that throughout its 10 year history, the sound recording award of the Academy of Motion Picture Arts and Sciences has been made every year to ERPI licensees using Western Electric equipment. Congratulations to the individuals and Sound Departments who have won the awards!

Electrical Research Products Inc.
195 BROADWAY, NEW YORK, N. Y.
SUBSIDIARY OF
Western Electric Company



Above—Hollywood supe star Norma Sheare and her equally famous soundman brother, Douglas, examine some WE equipment. Left—Our movie subsidiary, ERPI, took this ad in the trade press in 1939 to salute the users of our sound recording systems. Western and ERPI won many Oscars for technical achievements.

War and Postwar

Well before Pearl Harbor, December 7, 1941, Western had converted to the production of war material, including development of supersecret radar. During the next few years, WE produced more than half of all radar used by the Allies. Employment rose from 32,602 at the end of 1939 to 72,086 by the end of 1949. During the peak war production years, more than 50 percent of the workforce was female. Sales to the government peaked at \$789 million in 1944. The postwar building boom and some delayed demand from the war years helped push WE sales over \$1 billion for the first time in 1948. The new postwar look in factories first showed up at Allentown—low, air conditioned, surrounded by parking lots on the outskirts of the city. The transistor was invented at Bell Labs and changed the future of electronics. Television caught the public's fancy and generated pressure to expand the long distance network as rapidly as possible to handle network shows. The war had done much to change the public's attitude toward telephoning. Ma Bell was becoming a household byword. The number of Bell phones in use increased from 17 million at the end of 1939 to more than 34 million by the end of the decade.



The armed forces needed all kinds of sophisticated communications equipment. This is a carrier telegraphy system, capable of transmitting 12 teletype messages simultaneously, being built for the Signal Corps at Kearny Works.



Every minute counted during the war; employees were frequently reminded. These people at Hawthorne are packing radios for shipment to the Signal Corps.

A handshake marks the site of the last link of buried cable spanning the nation in 1943. It was close to the site of the 1914 pole-line linkup.





The war was finally over in Europe. Germany surrenders. This was taken at Radio Division headquarters, 120 Broadway in New York City, but it could have been anywhere in the United States on V-E day. V-J day was still four months away.

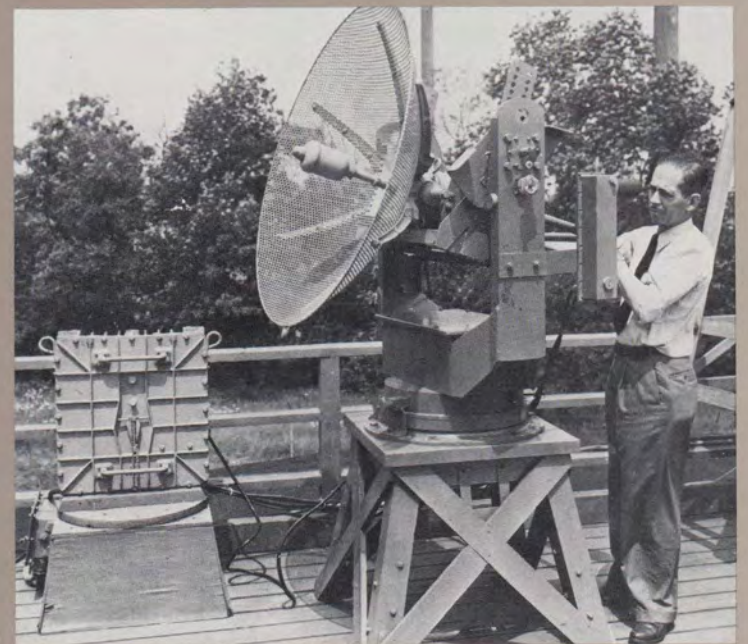
Teletypewriters, which we tend to think of as part of headquarters way behind the lines, also were adapted for use under field conditions in combat zones.



One of the very first microwave radio repeater stations on the route between New York and Boston. This photo is dated November 13, 1947. Very quickly microwave became the backbone of the long distance telecommunications network.

The Western Electric M-10 electrical gun director, which continuously and automatically set fuses on shells and aimed this 120 mm anti-aircraft gun.

Radar was one of the most hush-hush developments of World War II, and our Radar School at Whippany, N.J., was the place where technicians learned about operations and maintenance.



THE Fifties

Bell telephones in use increased from 34 million in 1949 to almost 60 million by the end of 1959. WE employment increased from 72,000 to 135,000 for the same period and sales rose to \$2.3 billion. Throughout the decade, the company was deeply involved in various cold-war communications projects — Distant Early Warning Line, SAGE, White Alice, underwater sound and Nike missiles. Command guidance suggested by a Bell Labs scientist kept us involved with all sorts of missile system testings for years. And the country launched its first space satellites made possible by the Labs transistor and solar battery inventions. The transistor was offered to industry generally in a symposium at Allentown—and soon the whole world was listening to pocket radios. Telephones were no longer available only in black; they were now available in a variety of decorator colors. The Bell System had been charged with anti-trust violations and the lengthy suit was concluded with a Final Judgment that required the spinoff of some non-telecommunications activities and the liberal licensing of Bell technology.



This ship, *H.M.T.S. Monarch*, laid the first trans-Atlantic telephone cable. The first telegraph cable had been laid by the *Great Eastern* in 1866 and radio-telephony had been commercial since 1927, but the first telephone cable came in 1956. Many others followed. Our newest will be lightguide.



Telephones came in one color—black—prior to the time this promotional shot was made in 1954. Most housings were now made of plastic and more and more came with dials. The arrival of color was a major milestone and a boon to decorators.



Edward R. Murrow was one of the people who changed television into a national institution in the early 50s. The man on the small screen is Harry S. Truman. Below—It was called a police action—not a war. This was Korea and the equipment, an SCR-610 WE radio for combat communications.





Above—Cover of Volume 1, Number 1 of WE Magazine featured lipstick-size vacuum tube made at the new plant in Allentown. Things changed quickly because of the invention of the transistor in the same time frame. Below—one of the truly great logistical feats of all time, our building of the DEW Line across the previously trackless wilderness in the Arctic.



Above—The beautiful quartz crystal standing in the rear is one grown at our Merrimack Valley Works. The pieces in the foreground are nature's handiwork. Both types are used to provide material for electrical filters. Below—President Eisenhower gets nation's 50-millionth telephone from AT&T's Cleo F. Craig.



THE Sixties

Two principal thrusts during the decade were civil rights and the journey to the moon. Western was one of the first companies to sign The Plan for Progress, guaranteeing equal employment opportunity. We established with AT&T a new subsidiary, Bellcomm, which did systems planning for the first moon flight. The network of communications and tracking stations that we built for NASA's Project Mercury was augmented for the continuing space and satellite efforts. On the ground, we were constructing new plants at Denver, Dallas, Phoenix and Atlanta. Productivity was rising at a much faster rate than industry in general and our prices were coming down, while our sales were going up. By the end of the decade our workforce topped 200,000 and we were approaching annual sales of \$5 billion to bring us up into the top 10 manufacturing companies in the United States. The big new product was electronic switching systems. The first ESS was cut over at Succassunna, N. J. The Bell System had invested some \$400 million in research and development on the project, an all-time record.



Bird's eye view of the first installation of T-1 Carrier, a digital or pulse-code modulation system for transmitting signals on inter-office trunks largely in urban areas.

Right—A group of students on their way to attend class at the Corporate Education Center in Princeton. Dedicated in the summer of 1969, the CEC consolidated engineering training previously carried on at three locations and management training.



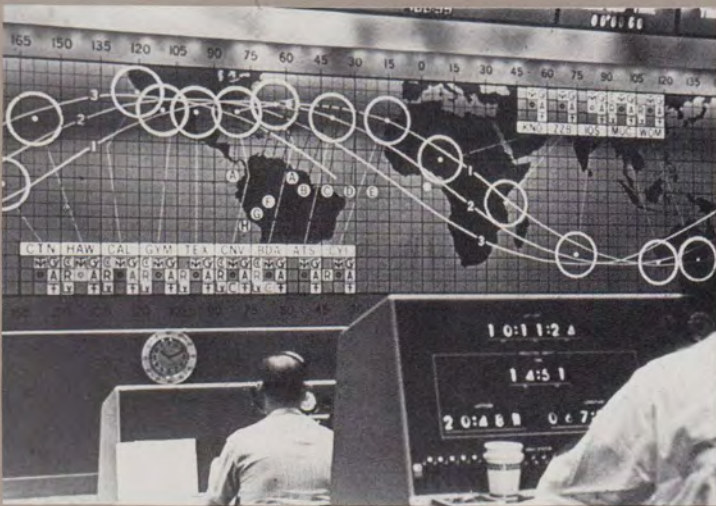
Above—The Trimline® telephone and Touch-Tone® calling, two of the major innovations in station equipment during the 1960s are combined in this photo of the final test operation at Indianapolis.





Left—Telstar, the Bell Labs designed communications satellite, stirred the world's imagination and underscored the possibility of communications with places difficult to reach by land lines or submarine cable.

Below—Hawthorne Works was one of the movers and shakers in getting a national program started to help minority businesses attract the attention of big business buyers. This is the first Suppliers Opportunity Fair with the WE team out front.

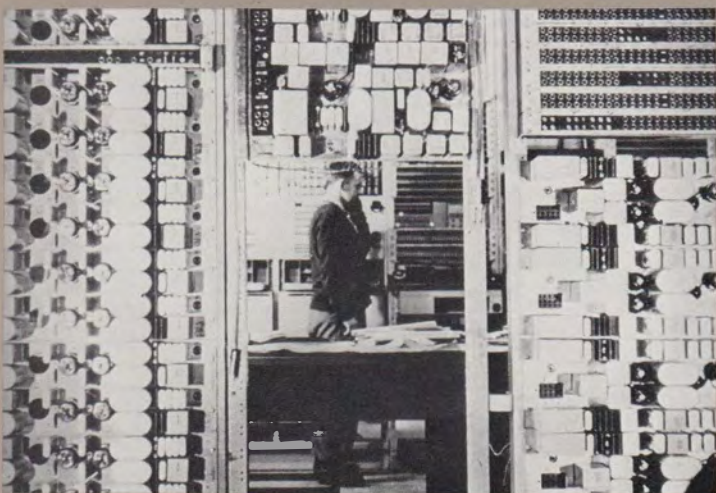


Above—Circles on map in the control room at Cape Canaveral mark sites of stations built by Western for communication with men in space.



Below—One of the biggest R and D programs of all time was mounted by the Bell System for the introduction of electronic switching into the network. This is the console of the first ESS, Succasunna, N.J. in the spring of 1965.

Below—First TASI for increasing capacity of undersea cables doubled the number of calls.



1970 to Date

A series of decisions by the FCC changed the structure of the telecommunications industry. Competition was the buzz word. A new marketing thrust took shape throughout the Bell System and many new products and services were offered. A whole series of Design Line* decorator telephones made their appearance and were offered to the public at PhoneCenter Stores in shopping malls. Integrated circuits were increasing the capabilities of our products and reducing their size. The dividing line between telecommunications and computer services was becoming less and less distinct; and software was becoming an integral part of manufacturing and maintenance, to say nothing of sales. Another major government antitrust suit seeking to split up the Bell System was underway in Washington, not to mention a number of significant private antitrust lawsuits. The future structure of the telecommunications industry was the subject of a number of bills in Congress. ESS had just about taken over the switching of calls in this country, and there was a growing clamor for digital transmission and switching systems, which Western was working on at top priority. Women and minorities were moving upward in the professional and management hierarchies, as social change continued everpresent in the headlines.

*Trademark of AT&T Co.

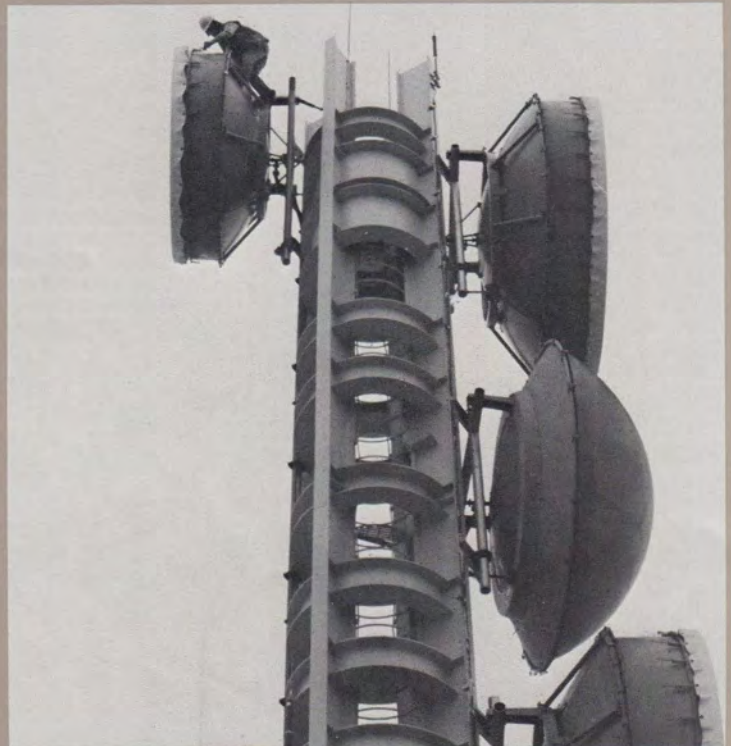


Western's electronic switching system for long distance calls, the #4 ESS, was our first digital switcher. The first installation was in Chicago. Rapidly, the 4E began to replace the #4 crossbar offices nationwide.

Below—Digital transmission systems were an increasingly important part of the network in the 70s. This unusual tower in Eugene, Oregon, was part of the first DR-6 digital system.



Design Line* telephones came in a wide variety of shapes and colors. While many of the housings were made by outside suppliers, Western continued through the 70s to supply all the inner workings.

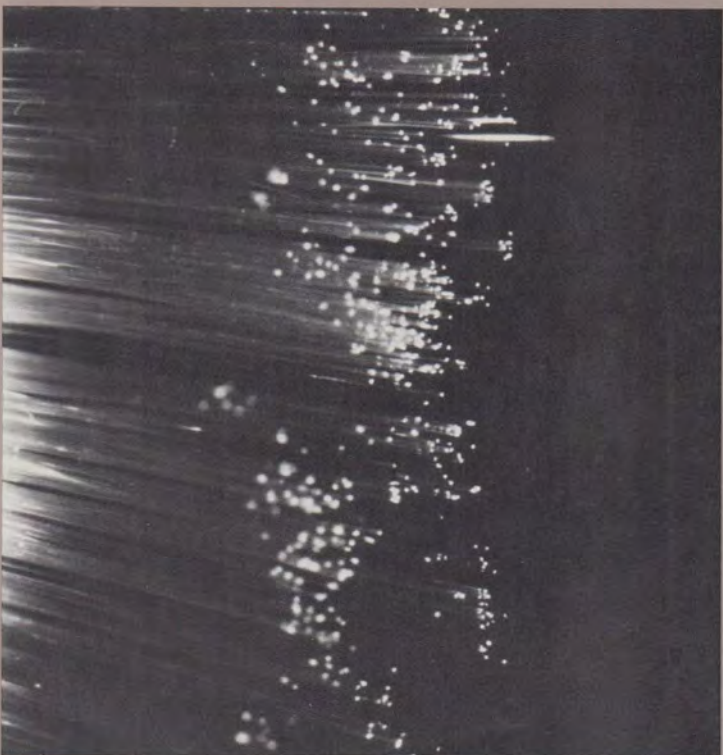




Left—The incorporation of integrated circuits in many of our switching and transmission products necessitated the building of clean rooms in our factories—facilities often cleaner than the operating room of a hospital. This one is at the Allentown Works.



Be w—Seven superwarehouses—one in each Service Region—were built to stock service centers, distribution centers and installation jobs. This one is located in Martinsville, W. Va.



Left—What looks like a skyrocket burst on the Fourth of July is actually a handful of lightguide. The glass fibers—thin as fine hairs—were made in a special factory within a factory at Atlanta Works.



In this shot posed in a Long Lines office at the end of the decade, the pace of technological change is dramatically displayed. The tiny chip, from a 3B Processor, contains the equivalent memory of the large units indicated by the man's outstretched hands.

Disasters

Western Electric's record of putting things back together again after fires, floods, hurricanes, tornadoes, blizzards and earthquakes would fill several thick volumes. Beginning with the historic Chicago fire of 1871, our fledgling company learned that swift action in emergencies is part and parcel of the business and working year. As the manufacturing and supply organization of the Bell System, WE shares the telephone companies' tradition that all that is humanly possible must be done at all times to keep communications open. When disaster strikes, WE's manufacturing, distribution, installation, traffic, purchasing and other organiza-

tions quickly swing into coordinated action, working around the clock to help the telephone companies restore communications. At times, we have shipped more material into disaster-stricken areas in days than is required for the entire Bell System in an average month. In a story covering our response to explosions that knocked out three key installations in the Bell System coast-to-coast network, the September 17, 1961 issue of the *New York Journal American* said, "Western Electric equipment was marshalled as if by magic and flown to damaged areas by plane and helicopter." Well, there was no magic to it. As always, it was the result of a lot of hard work, planning and experience. We have, after all, been dealing with disasters for over a century—and there have been plenty.



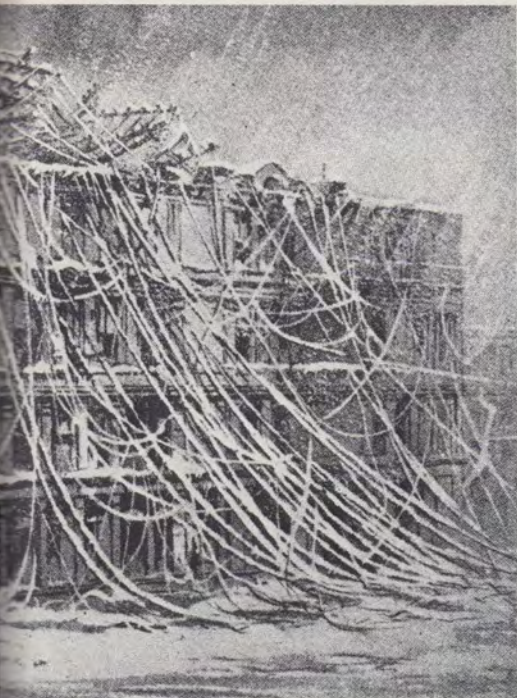
The year we joined the Bell System got off to a frigid and calamitous start with the Blizzard of 1881. The spaghetti swallowing the Boston central office above had to be reconverted into working telephone lines. The inset shows underground cables which "have no fear of ice."



The year was 1913, and a lot of Pennsylvania was under water. This WE cable being loaded in Pittsburgh helped restore communications. So did the two-horsepower wagon.



Floods again. This time, the scene is New England, where a hurricane swept central offices away in towns like Ware, Mass., above, and halted service for some 515,000 telephones. Repair crews from as far away as Southwestern Bell territory were mobilized to deal with the emergency and get things back to normal. The year was 1938.



We played a vital role in putting things back together again after the San Francisco earthquake in 1906. Our employees fought fires in this WE distributing house all day long and saved the building and its contents—which were priceless assets in bringing the city back to life. The Panama Canal hadn't opened yet, so bringing in bulky supplies from the East would have taken months.



The year is 1964. Hurricane Cleo and, later, her equally destructive sisters Dora and Hilda played havoc with people, property and telephone systems. The Miami Distributing House (left) was just one of the many WE facilities that stayed open around the clock to ship equipment to disaster areas.

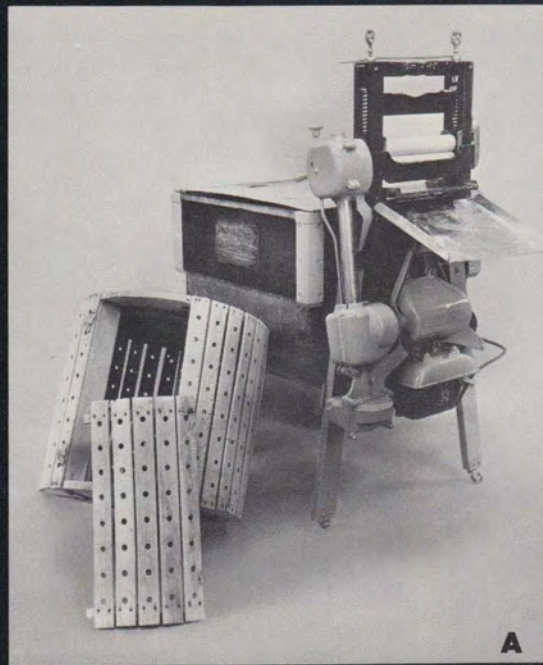


The raging fire in the New York Telephone building on Second Avenue in 1975 knocked out 170,000 telephones in the Big Apple. WE supplies and installers from all over the country were flown into the big city to help. All service was restored in three frantic weeks and New York Mayor Abe Beame called it, "The miracle on Second Avenue."



A familiar scene when disaster strikes anywhere in the country: WE supplies being airlifted to the places that need them from the places that have them.

- A** It may have been hard on delicate lingerie, but this rugged washing machine was built to last, and last, and last.
- B** Believe it or not, this is a camera—vintage 1886. You carried it under your coat and poked the lens out of your buttonhole. It took circular pictures and sold for an enormous (for then) \$25.00.
- C** With a lot of patience and care, a woman could do wonders for her straight hair with this WE curling iron.
- D** You can still see some of these classics around. Long, hot summers were made a little more bearable by fans like these. WE's first home appliances, electric fans, were introduced before the turn of the century.
- E** It didn't have steam jets, different settings or non-stick coatings, but this 1908 iron did the job. The wear marks on the wooden handle show it must have pressed a lot of shirts and other clothes in its time.
- F** Screw them in, and these 1904 WE light bulbs will still work. The filaments are about eight inches long. The standing bulb is actually lit, although its wires are hidden.
- G** The fabric bag on this 1918 vacuum cleaner could hold a year's worth of dirt, but was no joy to clean when it came time to empty it.



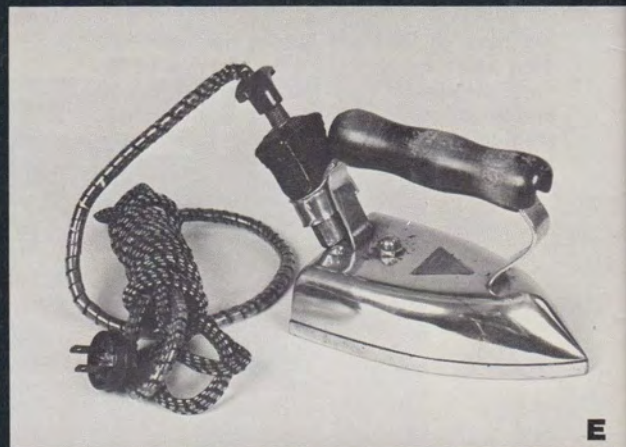
In the hundred years we have been with the Bell System, our company has made a staggering variety of products, ranging from telephones to—well, to things like the ones on these pages. If you find some of them surprising for the Bell System's manufacturing and supply unit, it's probably because you are not up on Western Electric history.

Did you know, for example, that during the Great Depression, we began making all kinds of home furnishings just to keep our employees on the payroll? Did you know we were one of the top manufacturers of electrical motors and other power equipment? Did you know that we developed the first high-fidelity and movie sound systems? And that one of our subsidiaries even ran a movie studio?

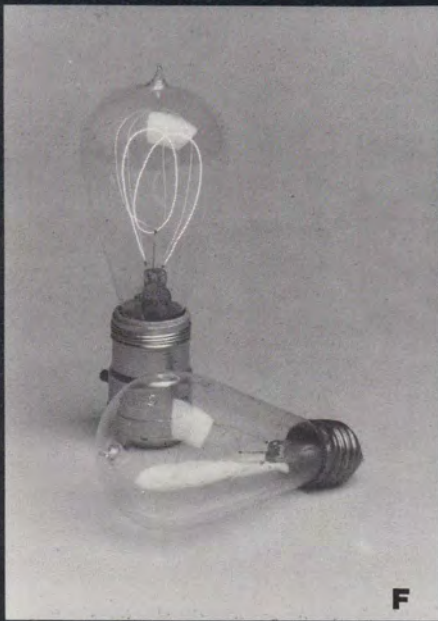
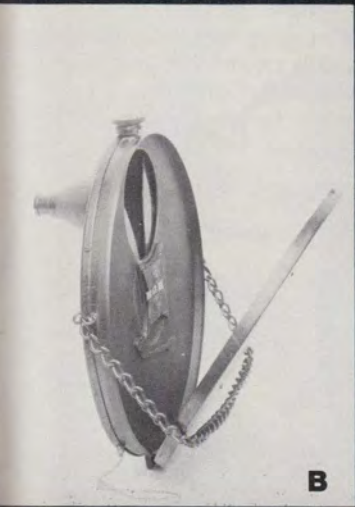
All of this may sound like the very stuff of "trivia" games and bar bets, but it's a colorful part of our rich and varied history. From the beginning, we have been, and continue to be, an evolving company. Would anybody care to guess what kinds of products we'll be making one hundred years from now?

- H** Even the oven worked on this little 1916 electric stove. It came with its own utensils and a cookbook for mother's little helper.
- J** We personally hefted this early electric drill, and it weighed a ton. But it still works!
- K** No FM, no stereo and certainly no hi-fi, but this early AM radio provided entertainment for many people.
- L** In its time, WE has even made medical supplies. This 1923 beauty is a battery-operated electronic stethoscope.
- M** This attractive wrought-iron tile-top table was the most popular "make-work" product of the depression years. It came in three sizes.

Did We Really Make That?

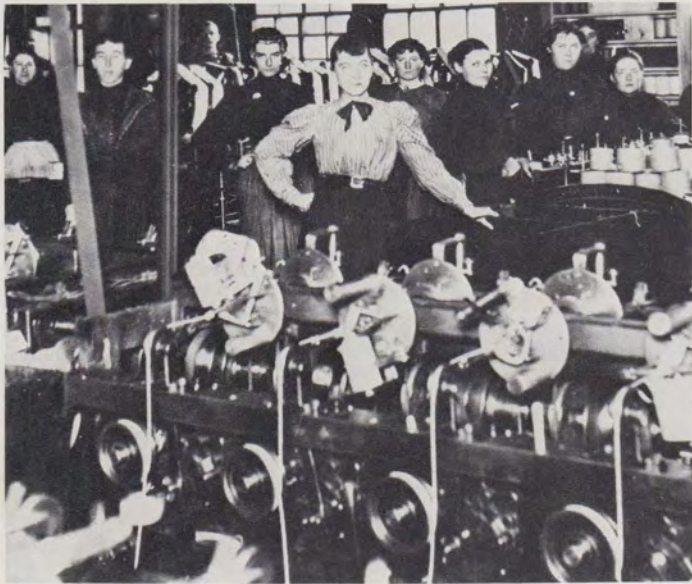


100 YEARS IN THE BELL SYSTEM



What Year Was That?

There is a saying: the more things change, the more they stay the same. When people say it, they're usually talking about fashions — the clothing, hair styles and makeup — the *ambience* that often serves to define and identify an age, decade or even a single year. Can you identify the times captured in these photos? How about the woman with the Mona Lisa smile in the photo to the right? What year was that?



It shouldn't be any problem to figure out which one of these women was the supervisor. The group was photographed in the cotton binding unit of the Polk Street (Chicago) cable department. The year? 1890.

If the smile looks a little strained, it's probably because the wrench was heavy. Irene Kramer of the Hawthorne Works donned an oversized pair of coveralls and engineer's cap and posed in front of a Manufacturer's Junction Railway engine. The year? 1931.

The outfit this young lady (right) is wearing is misleading. Although it looks like something right out of a Millet painting (1814-1875), her garb was the latest thing in shop wear in 1918. Our limited information tells us she was drilling fanning strips at the Emeryville, California shop. Just don't ask us what fanning strips are.



Butch Cassidy could easily have blended in with this "gang." Actually, it's the group that installed the switchboard that converted Lincoln, Nebraska's old magneto system to a system using a battery. The year? 1904.





This was the winning relay team at Hawthorne's Annual Track and Field Meet. WE News of November 1925 tells us that seven records were smashed at the meet, but we don't know if these women did any of the smashing.



That's a vacuum tube she's working on, which should help you narrow down the time frame. We have no precise year for the photo, but we do know it was taken sometime during WWII at one of Western's two tube shops.



This one wasn't easy — at least not for your editors, who were off by more than a decade. The original caption said she's soldering terminals on the base of the *new* 500 set which should give you a hint. The place is the Indianapolis Works. The year? 1951.

Changing Technology

As the photos on these pages can only suggest, technology has changed a great deal over the past century. What has changed the most are the *rate* and *scope* of that change. WE engineers of 1881 were in little danger of future shock. In fact, they saw less change in their entire working lives than today's engineers see in 10 years or less. New products and systems are introduced at an astonishing rate and so are the processes and equipment used to make them. Where a good 1881 engineer could probably have mastered the whole of WE's technology, his peer of 1981 must be much more of a specialist. The speed, complexity and sheer volume of changing technology keep shortening the amount of technological "look-ahead" that can be done with any degree of certainty. There is no way, for example, that a WWII engineer could have foreseen an entire programmable computer etched (a hundred at a time) on a chip of silicon no larger than his fingernail. The idea of a programmable computer of any size was still fairly new. And imagine his skepticism if anybody had tried telling him that, in a few decades, tiny lasers would be blinking the equivalent of thousands of telephone conversations over hair-thin fibers of glass. "What," he would have wanted to know, "is a laser?"



1895—WE products were produced manually by skilled craftsmen. Probably, no two were exactly alike. This photo was taken in the plant on Clinton Street, Chicago—our major U.S. manufacturing site prior to the building of Hawthorne Works. After the move to Hawthorne, the building served as the Chicago Distributing House for many years.



WWII—This tank radio, like many WE products of the time, embodied a host of technological concepts that were, at best, only dimly perceived in the previous world war.



1950s—The transistor went into production, and this new solid-state technology spawned a host of remarkable developments, such as electronic switching systems.



1905—The term “mass production” hadn’t taken on meaning yet. These workers are assembling telephone transmitters. The workers in the 1895 photo (left) would have experienced no future shock in this shop.

The early 30s—These women are testing sheets of mica that will be used to make capacitors. They were called condensers then. Electronic technology was well under way.



Today—This picture incorporates three new technologies that have had an enormous impact on WE manufacture. The system above uses a *computer* to control a *laser* that is trimming a *VLSI* (very large scale integration) chip.

The late 1970s—saw the introduction of light-wave communications and demanded radically different manufacturing techniques. The sheaf of lightguide held by this Atlanta engineer is scrap, but the reels of “angel hair” in front of him are probably already carrying Bell System communications of all kinds.



Hawthorne Works—August 27, 1942. See Contents page for details.

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