A HISTORY OF SPERRY RAND CORPORATION

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York, bank cashier named James H. Rand, Sr., concluded that, if American business were to match the country's progress in other directions, it would have to be supplied with devices to speed its operations and make them more efficient. Out of this conviction, Mr. Rand developed the first visible index equipment and organized Rand Ledger Company to promote and sell his product. Constant improvement resulted in a visible record system that combined the best features of the loose-leaf ledger and the card-in-the-box record.

In 1915, after an apprenticeship with his father's company, James H. Rand, Jr., organized the American Kardex Company to manufacture his own invention, KARDEX® visible record control system, which brought "facts at a glance" to the business office. The Rands, father and son, joined forces in 1925 to form the Rand Kardex Corporation. By 1913, E. Remington & Sons had become the Remington Typewriter Company, and in 1927, Remington Rand Inc. was formed by combining the Remington Typewriter Company and the Rand Kardex Corporation. Two achievements of the old Remington Typewriter Company call for special mention. One was the production of the world's first noiseless typewriter in 1909; the second was the production of America's first electric typewriter in 1925.

Well before the organization of Remington Rand Inc., however, the younger Mr. Rand had set out to create one organization, able to supply every need of business administration. He first combined the

American Kardex Corporation, the Rand Ledger Company, and Index Visible, Inc., and later added the long-established Library Bureau (originators in 1882 of the first vertical filing system), and the Safe-Cabinet Company (originators in 1905 of fire-resistant record-keeping equipment).

During its first year, Remington Rand Inc., took over the Dalton Adding Machine Company (originators in 1903 of the first 10-key adding machine), the Powers Accounting Machine Company (inventors and developers in 1911 of mechanical tabulating machines), the Baker-Vawter Company (introducers in 1886 of the first loose-leaf ledger), and the Kalamazoo Loose-Leaf Binder Company, organized in 1906.

In the decade following its organization, Remington Rand Inc. prospered as a manufacturer of business machines and systems.

In 1929, it purchased a majority interest in Recording and Statistical Corporation, a firm that had developed out of the statistical business of Library Bureau. In 1962, Sperry Rand acquired the minority interest in Recording and Statistical Corporation; and in 1963, this company became a division of Sperry Rand, operating as Recording and Statistical Division, with two main divisions. The Recording Division has printing plants in Boston; Danville, Illinois; Des Moines, Iowa; and Toronto. The Statistical Division, with regional centers in Boston, Chicago, New York, San Francisco, Montreal, and Toronto, offers complete data-processing services, including specialized ones, to the insurance com-

panies and agencies in the United States and Canada.

World War II added a different kind of chapter to Remington Rand's history. Skills of peace-time production were turned to the manufacture of war essentials and to the stepped-up production of office machines needed by government and industry. The company returned to the manufacture of its familiar line of typewriters and business machines following the war, and in 1946, introduced the first electro-mechanical visible records unit, which brought automation to office records retrieval systems.

In 1960, Sperry Rand purchased the Adding Machine and Cash Register Division of Clary Corporation. The products thus acquired are manufactured and sold by the Office Machines Division of Remington Rand.

Growing public awareness of the convenience of the electric shaver led Remington Rand to enter this field in 1937. In 1939, it produced the first multiple-head shaver to be put on the market. In 1960, Remington entered what at that time was the new field of cordless appliances by introducing the first American cordless rechargeable electric shaver. To date over 60 million REMINGTON electric shavers have been sold.

Entry into a new area of the consumers' market came in 1965, when a carving knife was added to the line of cordless electric products.

ELECTRONIC DATA-PROCESSING SYSTEMS

In 1951, Remington Rand delivered the first UNIVAC® data-processing system to the United States Bureau of the

Census. This was the first stored-program computer to be supplied to a non-military user.

In the first century of census taking, the principal tool used was the pencil. With it, a good clerk could record two items per minute. The first punched-card tabulator, used in the Census of 1890, tabulated 200 items per minute. By 1950, this had been speeded up to 6,800 items per minute. The UNIVAC I computer raised these tabulating speeds to 30,000 per minute. In 1963, this computer—after 12½ years of virtually continuous use 24 hours a day, seven days a week—was judged of sufficient historical interest to be placed on exhibition at the Smithsonian Institution. It has been replaced at the Bureau of the Census by two UNIVAC 1107 computers—each 1107 can handle about 3,000,000 items per minute —and a powerful UNIVAC 1108 multiprocessor computer.

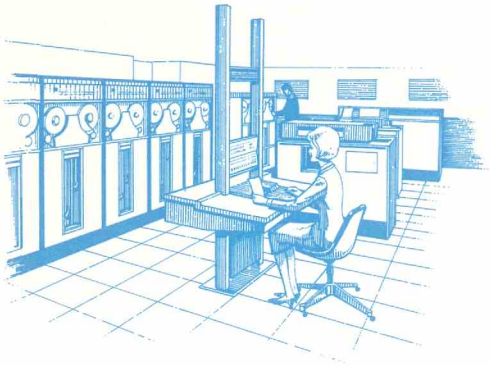
The story of the UNIVAC computers began in 1947, when two scientists at the University of Pennsylvania, J. Presper Eckert and John W. Mauchly, developed for Army Ordnance the first all-electric computer, which they called *Eniac* (Electronic Numerical Integrator and Calculator), and formed the Eckert-Mauchly Computer Corporation. *Eniac's* first job was to find the answer to a knotty problem in ballistics at the Aberdeen Proving Ground. Although new and better methods of solving problems electronically were being developed, the *Eniac* served well at Aberdeen until 1955, when it was added to the exhibits at the Smithsonian Institution. In 1964, Sperry

Rand was issued a patent covering *Eniac*. This patent is considered of basic importance in the field of computers.

In 1950, Eckert-Mauchly produced a second computer. This computer was called *Binac*. Faster and less expensive than *Eniac*, it was the first to use the principle of complete internal self-checking. In the same year, Remington Rand Inc., acquired Eckert-Mauchly Computer Corporation.

Following closely upon the development of *Binac*, Eckert-Mauchly had under construction a completely different computing system. Named the UNIVAC computer, this machine was the first data processor that handled both numbers and descriptive material equally well. It was also the first to divorce the complex problems of input and output from the actual computational facility. These characteristics made the commercial use of electronic computers economically attractive; and in 1954, the first UNIVAC computer was delivered to a business concern. Prior to this, Remington Rand had further strengthened its position in the electronic data-processing equipment field by acquiring, in 1952, Engineering Research Associates of St. Paul, Minnesota, a young firm that had developed the first UNIVAC scientific computer.

Since the development of *Eniac*, *Binac*, and the first UNIVAC computer, progress in electronic data-processing has continued without letup. Newer memory systems and newer types of components are the principal features differentiating one system from the other.



After several years of intensive research, Sperry Rand scientists perfected thin magnetic film memory. In this kind of memory, information is stored in the form of magnetism imposed on extremely thin dots of a special material. Prior to this development, the shortest interval required to retrieve information from memories had been rated in terms of millionths of a second. Magnetic thin-film made possible speeds of billionths of a second, or nanoseconds.

The first commercial computer to employ thin-film memory was the UNIVAC 1107, produced in 1962. More than five times faster than the 1107, the UNIVAC 1108 System, employing integrated circuits in its control memory, has been a part of the Univac Division's line since 1965. Also during 1965, a patent was granted to this division for an internally programmed digital computer operating with pure fluid (gas or liquid) amplifiers. This was another Univac "first."

The UNIVAC 490 real-time system, introduced in 1960, was the first commercial data-processing and communications system supplying facts and results virtually without loss of time.

Prior to the 490, electronic computers were "historic," i.e., they needed time to obtain results after data had been fed into them. The 490 can obtain results in "real-time," or almost simultaneously with the feeding in of data. Additionally, this system can process hundreds of events occurring over a wide geographical area. The first commercial applications of this concept of data-processing were an Airlines Reserva-

tions System and the Federal Aviation Agency Traffic Control System.

The UNIVAC 9000 Series, a new family of computers that eventually will span the small-, medium-, and large-scale data-processing markets, was announced in mid-1966. The 9000 series features advanced technology in the form of a new, exclusively Univac's plated-wire internal memory and monolithic integrated circuits. These are complete circuits etched on unusually small silicon wafers.

The Univac Federal Systems Division brings a full range of resources and capabilities to bear on major challenges in areas of the national defense. Fundamental developments that have evolved from basic breakthroughs in microelectronic logic and thin-film memories have been carried forward in programs for the Armed Forces, for NASA, the FAA, and the AEC; and for various government security agencies. The division also has made contributions to major developments in several NATO nations.

Of special significance among military applications of real-time equipment is the Naval Tactical Data System (NTDS). This system, which enables all the fighting and maneuvering of a task force to be co-ordinated from the bridge of one ship, utilizes electronic gear that gathers information from many sources. It performs such functions as detection, location, tracking speed, and identification of enemy and friendly ships, aircraft, and missiles. It then recommends a course of action. The heart of the system is a UNIVAC AN/USQ-20 (1206) computer.

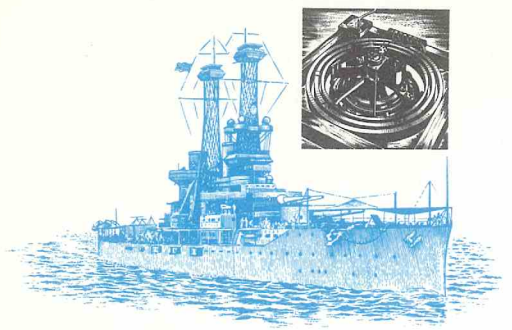
In 1961, Sperry Rand acquired National Data Processing Corp. This company was founded in 1958 at Dallas, Texas, to develop and manufacture magnetic ink character recognition equipment for automatically processing checks and other documents. Its product line was incorporated into that of Univac Division.

Also in 1961, a Univac Engineering Center was opened near Philadelphia. This facility has been enlarged and now houses the headquarters of Univac Division.

To provide a more manageable structure, Sperry Rand decentralized the operations of Remington Rand's organization. In 1961, the Remington Electric Shaver Division was established; in 1962, Univac was made a separate division; and in 1963, the remaining units of the old organization became the Remington Office Equipment Division. In 1967, this was renamed the Remington Rand Division.

THE SPERRY CORPORATION

The Sperry Corporation was created as a management and holding company for investments in aviation enterprises, pursuant to a plan under which North American Aviation, Inc., transferred to The Sperry Corporation, in exchange for all Sperry's capital stock, 100 per cent of the stock of Sperry Gyroscope Company, Inc.; The Sperry Gyroscope Company, Ltd., of London, England; Ford Instrument Company, Inc.; and holdings in other companies that have since been disposed of. The stock of The Sperry Corporation was then distributed, in the form of Voting Trust Certificates, to the stockholders of North American Aviation, Inc.



The Sperry Corporation began operations on April 13, 1933, a time when the economic climate of the country was hardly conducive to starting a business. The nation was entering the fourth year of depression, Congress had just given the President power to control money, and subsequently he had declared a "bank holiday."

Oldest and largest of The Sperry Corporation's founding companies was Sperry Gyroscope Company. Elmer Ambrose Sperry, an established American inventor, started this company in 1910 with but one product, a gyro-compass for ships. This equipment had been developed for the U. S. Navy, which had been seeking a stable reference that would make possible more precise gunfire control. The first naval installation was made in the dreadnought, USS DELAWARE, in 1911. Made up of over 2,000 precision parts, the new gyro-compass was considered something of a complicated super-gadget. It proved, however, to be the solution to the Navy's problem; and with sales bolstered by the compass needs of our World War I Allies, the new company was well on its way.

These were also pioneering days in aviation; and almost from its beginning, the Sperry company was identified with aircraft instrumentation. Lawrence Sperry, son of the founder, developed with his father an automatic pilot, or "airplane stabilizer" as it was called in 1912, that utilized the special characteristics of the gyroscope to hold an airplane stable during flight. Sperry was also experimenting with the application of the gyroscope to a device

that would eliminate the rolling motion of a ship in rough water.

But World War I proved a harsh selector of the essential from the non-essential. Both the aeronautical and the marine stabilizers were put aside. Sperry went through the war years with all of its energy and output devoted to national defense.

During the 1920s, it developed that further advancement in air transportation would depend on better blind-flying instrumentation. Sperry research engineers went to work on an artificial horizon. In the early autumn of 1929, James H. Doolittle, then a lieutenant in the U. S. Army, climbed into his plane at Mitchel Field, Long Island, drew a hood down over the cockpit, and took off on what was to be the first successful all-blind flight, from take-off to landing. Assisting him were a Sperry Gyro Horizon and a Sperry Directional Gyro. As a result of this demonstration, the Army adopted these instruments for all military planes. Today, greatly improved, they remain standard flying equipment on many military and commercial planes the world over.

Long-range passenger travel during the 1930s brought with it a demand for the safety and precision of more automation. Sperry returned to its earlier interest in the automatic pilot and produced the world's first successful instrument of this type. An early trial, because of the dramatic circumstances under which it took place, captured the public's imagination. On his solo flight around the world in 1933, Wiley Post, remembered as the famous American aviator

with the patch over one eye, employed the prototype model of the GYROPILOT® automatic steering system in his plane, the *Winnie Mae*. Both plane and autopilot are in the Smithsonian.

It became evident during World War II that it was growing more and more difficult to solve, by the use of a single instrument, most of the problems resulting from demands for more effective military equipment. Design engineers began to conceive of instrument *systems,* combinations of components and sub-systems that must operate together to fulfill an overall requirement. Today, systems capability requires the integration into a reliably functioning unit of many specialties and disciplines. It has special significance in aerospace equipment.

Shortly after World War II, studies of the German V2 rockets—which employed inertial navigation systems—aroused great interest in inertial guidance as a method of controlling the missiles for which our country was beginning to make plans. Engineers and scientists at Sperry and Ford Instrument, because of their long experience with gyroscopics and navigation systems, were in the vanguard of these early investigators.

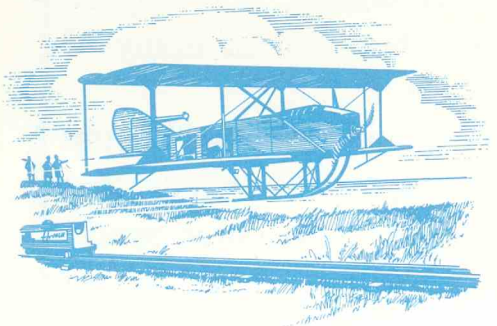
Today, the most advanced types of automatic aircraft guidance systems are of the inertial class. Nerve-center of these systems is a "gyro platform" that serves as a fixed space reference that enables other sensors and computers to provide automatic directional control without reference to outside sources. Inertial systems have the advantage of being immune to enemy jamming and of

giving off no tell-tale radiation to warn the enemy of an attack. The Armed Forces employ these systems widely, not only in aircraft and missiles, but also in many of the Navy's submarines.

Ford Instrument provided the inertial system used in the *Jupiter* C vehicle that carried our first satellite into outer space, and Sperry developed SINS (Ships Inertial Navigation System). Although SINS originally was for use in the Navy's *Polaris* missile-carrying submarines, the equipment is now on many of the U. S. Navy's fighting ships, including aircraft carriers. Of historical significance is the SINS that continuously provided information essential to the ship's navigation when, in 1960, the USS TRITON was the first submarine to travel completely around the world without surfacing. More recently, Sperry inertial equipment was a key element in the guidance, control, and stabilization of Lunar Orbiters on their photographic missions around the moon.

In the summer of 1960, descriptions of the first laser—industry's name for *light amplification by stimulated emission of radiation*—were made public. An ordinary light bulb produces a diffusion of light that actually is made up of many different colors, or wave lengths. The laser produces a bright, narrow beam of only one color, or wave length.

By early 1961, Sperry had begun experiments with laser applications, concentrating its efforts in the military and space fields. Other areas of study eventually may include flow measurement, metallurgy, and surveying.



The term "guided missile" has become commonplace only within recent years; yet Sperry engaged in a project for the U. S. Navy during 1915-18, that was described as ". . . an automatic aerial torpedo, a passengerless aeroplane, capable of flying a desired distance on a course, true and predetermined, except for deviations due to direction of wind, and of descending to earth and exploding a heavy charge upon impact with the ground." This device is recognized as the antecedent of the guided missile, a field to which Sperry Rand has made and continues to make many contributions. The Sperry Division's *Sparrow* I is a good example.

From the inception of the *Sparrow* program in 1947, prime responsibility for the complete weapon system was assigned by the Navy to Sperry. *Sparrow* I was the nation's first air-to-air guided missile to be put in operational use. This was in 1954.

Present Sperry Rand contributions to the nation's missile program range from the manufacture of super-radar guidance systems for the Navy's *Terrier* and *Talos* missiles to UNIVAC 1218 digital computers for the *Talos* fire control system and a variety of Vickers hydraulic power units.

When Sperry Gyroscope's interest in ship stabilization again became active after being put aside during World War I, the company participated in an important experiment to see what could be done to reduce the roll, pitch, and yaw of a large passenger ship. A gyro-stabilizer was installed in the Italian Line's CONTE DI SAVOIA. It functioned perfectly and

produced gratifying results; but, the economic depression from which the world continued to suffer during the 1930s, caused shipping companies to lose interest.

Today, Sperry again is involved in ship stabilizing equipment. A type, utilizing stabilizing fins, is employed in the GYROFIN® ship stabilizer, installations of which are on both naval and passenger vessels.

During the 1950s, Sperry Rand initiated a program of decentralization within the Sperry divisions. The move was prompted not only by an increasing demand for Sperry products, but also by the wish to combine the administrative efficiency of small plants with the economic strength and specialization inherent in a large organization. Additional incentive was the desire to comply with the wish of the Armed Forces for the dispersal of plants in the interest of national defense.

As part of this program, plant facilities were established in Gainesville and Clearwater, Florida; Charlottesville, Virginia; Norwalk, Connecticut; Phoenix, Arizona; Salt Lake City, Utah; and Bristol, Tennessee.

The activities at the Sperry Rand Research Center, established in 1961 at Sudbury, Massachusetts, are particularly important to the technological advancement of Sperry Rand divisions. Work being done at the Center concerns those scientific disciplines that reflect the entire range of Company interest. These disciplines include solid-state physics, plasma physics, chemistry, applied mechanics, and atmosphere physics. In addition to working on Company-sponsored projects to add to Sperry

Rand's technical know-how, the research staff contracts for research work for government agencies.

Elmer Sperry's chief engineer during the development of the gyro-compass was Hannibal Ford. In 1915, he formed his own company, Ford Instrument Company, Inc., with the aim of utilizing his inventive abilities to help the U. S. Navy solve its gunfire control problems.

In 1917, Ford's Range Keeper Mark I, the first automatic naval gunfire control computer, was introduced into the plotting rooms of U. S. battleships. From this equipment developed the complete fire-control mechanisms of our present-day naval vessels.

In the mid-twenties, the Navy began installing antiaircraft guns aboard its ships; to aim these guns at a diving airplane called for answers to new problems. The first antiaircraft gun director for naval vessels was the Mark 19. It was developed by Ford Instrument and installed aboard the USS MARYLAND in 1926.

During World War II, most of Ford Instrument's production was of shipboard fire-control equipment and antiaircraft gun directors. Since the war, it has continued to devote itself to the solution of naval fire-control problems; and as the weapons aboard our fighting ships have changed from guns to rockets and missiles, Ford has kept pace in its development of computers to meet the new requirements. Meanwhile, it has diversified its activities to include the development of guidance and control systems for missiles; navigation systems for military aircraft; and safing, arming, and

fuzing systems for warheads. The rapidity of technological change in today's defense posture has also led Ford Instrument to participate in the new fields of energy conversion, nuclear detection and effects, sensing and detection instruments for use in defense against bacterial/chemical warfare, photointerpretation, and miss-distance indication systems.

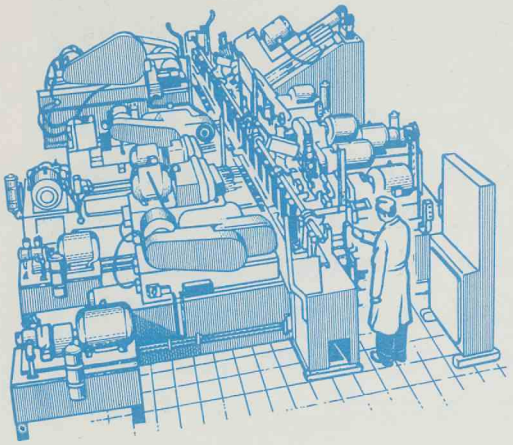
ENTRY INTO HYDRAULICS

At the time that the computers and gun control mechanisms built by Ford Instrument were adopted as key units in naval gunfire control systems, Ford's own hydraulic transmissions were used, but frequently those manufactured by Waterbury Tool Company also were employed.

Waterbury Tool Company, founded in Waterbury, Connecticut, in 1898, produced the first workable hydraulic power transmission in 1903. The first installation of this new equipment was made in 1906 and was used to train and elevate the guns on the USS VIRGINIA.

Hydraulics is a major branch of the mechanical arts. It uses liquid to transmit and control power or modify motion. The Sperry Corporation entered this field in 1935 with the purchase of Waterbury Tool Company. The products of this firm, so long identified principally with their use in naval vessels, were by this time finding increasing application in paper mills, chemical processing plants, and the metal and wire industries.

In 1937, The Sperry Corporation extended its activity in the field of hydraulics by acquiring Vickers Incorporated of Detroit, Michigan. When Sperry Rand was formed in 1955, Vickers became a wholly owned



subsidiary; it was made a division of the Corporation in 1963.

Vickers, one of the largest producers of hydraulic devices in the world, has the world's largest and most complete hydraulics laboratory at its Administration and Engineering Center in suburban Detroit. It operates 12 major manufacturing plants; six are within the United States and six are in foreign countries.

Vickers pumps, valves, adjustable speed drives, and control mechanisms are used in a variety of industries. Key commercial areas in which they are used are aeronautical equipment; automated high-production machine tools; construction machinery; and materials-handling machinery. On defense equipment, they have application on ground weapons, missiles, aircraft, and vessels of the Navy, including all nuclear-powered submarines. Vickers products also are represented in many space programs.

From 1921, when Vickers started operation in a modest California shop, the company has made many contributions to the progress of hydraulics. For example, in 1925, Harry F. Vickers developed the high-pressure, balanced vane type pump that bears his name. It provided the machine-tool builder for the first time with an efficient and reasonably priced device for powering hydraulic control systems. Hundreds of thousands of these hydraulic pumps are in use today.

Also in 1925, Mr. Vickers developed a hydraulic power-steering device for automobiles. Detroit, with its growing automo-

tive industry, was quick to recognize the potential in this development, and in 1929, Vickers Incorporated moved to that city.

In 1941, Waterbury Tool Company was merged with Vickers Incorporated to consolidate the hydraulics activities of The Sperry Corporation. In 1966, the work being done in this plant was transferred to more modern Vickers facilities located throughout the United States, and operations at Waterbury were discontinued.

The years of World War II brought almost explosive expansion to all the divisions of The Sperry Corporation. There is not room here to tell the story of their many contributions to the final victory. What follows recalls merely a few highlights. Transports and convoys observing radio silence were able to reach their destinations through the guidance of gyro-compasses. Compact gyro-compasses on LSMs and LCIs made possible the pin-point landings of successful invasions. Thousands of Sperry automatically computing gunsights and gun directors were used on ships of the American and British navies and merchant marine. Pioneer work in the application of radar and other electronic techniques resulted in the increased effectiveness of all-weather, day-or-night bombing, antisubmarine warfare, and antiaircraft gunfire control on land, sea, and in the air. Precision bombing became commonplace when the automatic pilot took over flight control during the final, crucial seconds of the bombing run.

Upon the termination of hostilities, The Sperry Corporation was faced

with a two-sided problem. On the one hand, there was the necessity for cutting back a war-expanded organization to a level consistent with the business available. On the other hand, new fields of activity had to be found to make use of greatly increased physical and financial resources. Moreover, new markets had to be found for old products. The klystron tube provides an example of success in this area.

Sponsored by Sperry in 1938, when this product was considered a major advance in radio, the klystron tube became an essential factor in the development of radar, one of the most closely guarded secrets of World War II. Since the distance at which radar can track small, fast-moving targets depends upon the amount of energy that can be put into the radar's beam, klystrons are the primary source of the higher radar power needed in missile-guidance and anti-missile systems. Today, Sperry Rand produces more than 100 types of klystron and traveling wave tubes.

POST-WAR DIVERSIFICATION PROGRAM

The purchase in 1943 of The Wheeler Insulated Wire Company of Bridgeport, Connecticut—now located in Waterbury—was The Sperry Corporation's first step in its post-war product-diversification program.

Founded in 1909, Wheeler was a well-established fabricator of insulated copper wire used in electric coil winding. Wheeler gave up the manufacture of insulated wire, but it continues to produce other electrical and electronic equipment.

Further diversification came with the acquisition, in 1945, of Wright's Automatic

Machinery Company, manufacturers of automatic packaging machinery in Durham, North Carolina, since 1893. Wright's product line was later expanded to include weighing and labeling machinery and precision electric motors. With the exception of precision electric motors, all of Wright's manufacturing business and the company name were sold in August 1967. Sperry Rand retained the plant in Durham, and continues to produce precision electric motors there.

In 1946, the Tulsa Winch Manufacturing Corporation of Tulsa, Oklahoma, was purchased by The Sperry Corporation and made a division of Vickers Incorporated. Since 1933, the Tulsa firm had been manufacturing winches for mounting on trucks and tractors. Today, known as Vickers Tulsa Products Division, it continues to produce winches for many types of application and has added speed reducers, power take-off equipment, and mechanical transmissions to its products.

The Electric Products Division of Vickers Incorporated, St. Louis, Missouri, was formed in 1947 by the merger of two smaller subsidiaries previously acquired by The Sperry Corporation. These were the Selenium Corporation of America, a company organized in El Segundo, California, in 1941 and acquired in 1945; and Benwood-Linze Company of St. Louis, Missouri, organized in 1924 and acquired in 1946.

Vickers Electric Products Division, as it is known today, is a leading producer for the Navy of degaussing systems. These systems create "magnetic invisibility" around

naval vessels to protect them from magnetic mines, etc. The division also is active in the fields of magnetics and electrical controls in general.

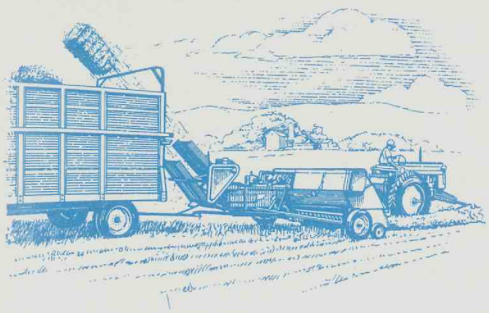
ENTRY INTO FARM MACHINERY

In 1947, The Sperry Corporation took a major step in its diversification program by acquiring the New Holland Machine Company of New Holland, Pennsylvania, and its associate, Hertzler & Zook Company located in Belleville, Pennsylvania.

New Holland, which had been serving the eastern farm market since it was founded in 1895, was at a low ebb during the late 1930s, but prospects brightened when, in 1940, the company reorganized to produce a revolutionary, locally invented farm machine. This was the world's first one-man pick-up baler, a machine that picked up hay from a windrow and tied it automatically into firm, square bales. Instead of needing two men to "tie off" the wire ties as was the case on older balers, the new baler had an automatic knotter, and it used twine. To do a job of baling, only the tractor driver was needed. The earlier machines required a crew of three men.

When materials became available after World War II, mass production of the new baler resulted in an abrupt rise in the popularity of hay baling. Today, automatic balers may be seen on farms throughout the world. Overseas, the biggest markets for them are in Europe and Australia.

New Holland's line of grassland farm equipment was expanded in 1948 through The Sperry Corporation's acquisition of Dellinger Manufacturing Company of Lan-



caster, Pennsylvania, manufacturers of forage harvesting equipment.

Subsequently, New Holland entered the new and fast-growing area of Farmstead Mechanization—materials-handling in and around the barn by machines. Acquisition by Sperry Rand in 1958 of Smoker Farm Elevators, Inc., with a plant near New Holland, added farm elevators and conveyors to the company's line of equipment. The following year, the company introduced silo unloaders and became the first major farm equipment firm to offer a coordinated line of Farmstead Mechanization equipment. New Holland Farmec is now a division of Sperry Rand.

In 1962, purchase of the Haro-Bed Company of Fowler, California, brought automatic bale wagons into the New Holland line. This equipment, along with balers and windrowers, provides the large-scale haymakers of the western United States and Canada with their first completely mechanized haymaking system.

By late 1965, the first of the New Holland self-propelled combines for the North American market were coming off a production line that had been set up in a plant then under construction in Grand Island, Nebraska. The combines are the first domestic versions of machines manufactured in Zedelgem, Belgium, by the firm of Werkhuizen Leon Claeys, a company in which Sperry Rand acquired a major interest in 1964. Completed and ready for full production in the fall of 1966, the midwestern plant is turning out forage harvesters and other types of forage equipment in addition

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to the self-propelled combines.

The name, New Holland Machine Company Division, was changed to New Holland Division, effective September 1, 1966. Products manufactured by this division are now sold in 70 countries.

In addition to those in the United States, Sperry Rand has 40 plants in 16 other countries. Total employment in them amounts to more than 34,000. With each of the six major operating divisions of the Company responsible for its own product line on a world-wide basis, these operations account for approximately 25 per cent of Sperry Rand's total revenues.

The chronicle of international growth again begins with the REMINGTON typewriter. Typewriters manufactured by E. Remington & Sons were marketed in Germany in 1883. The first sales office was opened in London in 1886, and by 1890 distribution of typewriters had been accomplished in all of Europe. Expansion into other parts of the world followed. The REMINGTON typewriter today can be supplied in approximately 100 different language keyboards.

In each country, as offices were opened, schools were established to train typists and teach shorthand. For example, since 1891, the Chartres, Ltd., business college in Sydney, Australia, has been training typists and other business machines operators to use REMINGTON equipment. The college is known as "Remington House."

After the end of World War II, Remington Rand Inc., tackled the problem of the rehabilitation and expansion

of facilities, especially in Western Europe.

In Saarbrucken, Germany, a plant built in 1926 and demolished during the war, was rebuilt. It now produces KARDEX visible record equipment and filing cabinets, as well as other business equipment.

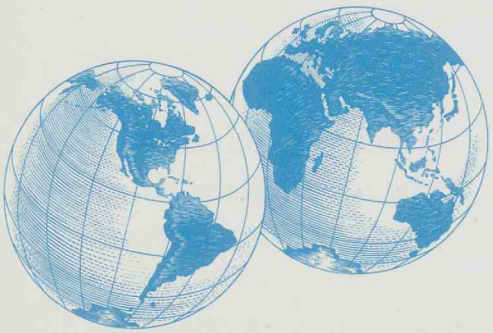
In France, where the company has done business since its typewriter was first displayed and demonstrated at the Paris World Exhibition of 1889, a factory was opened at Lyons in 1950, but 12 years later, the growing strength of the European Common Market and consequent lowering of trade barriers between member countries made it economically advantageous to close this plant.

A plant for manufacturing business machines was opened in Naples, Italy, in 1955.

In Holland, the 's-Hertogenbosch typewriter plant, manned entirely by Dutch employees, was established in 1952 and substantially expanded in 1960.

In the United Kingdom, business machines and systems are manufactured at two plants: one at Plymouth, England, (established 1963) and one at Hillington, Scotland, (established 1948). These plants make typewriters and other business machines and systems that are distributed in the United Kingdom and exported to Sterling Area countries.

A plant established in 1951 in Stockholm, Sweden, manufactures and distributes office systems equipment and supplies.



On the opposite side of the globe, the typewriter assembly plant in operation since 1934 in Calcutta, India,

served equally well in war as in peace. When the production of typewriters ceased during World War II, this plant immediately switched to the manufacture of munitions. Today, it is back in the typewriter business, utilizing native employees. A second and larger plant was opened in Calcutta in 1960.

In Latin America, business machines and systems are manufactured in plants at Buenos Aires, Argentina; Rio de Janeiro, Brazil; Santiago, Chile; and Bogota, Colombia.

In addition to the output of the overseas plants mentioned, office equipment is exported from plants in the United States to dealers and branch offices in many countries where sales surveys do not indicate sufficiently large markets to justify manufacturing facilities.

The international expansion of the electric shaver business paralleled that of office equipment. Shaver plants were established at Saarbrucken, Germany, (1952); Lidcombe, Australia, (1953); Glasgow, Scotland, (1956); Buenos Aires, Argentina, (1956); and Bas-Rhin, France, (1959).

In the field of electronic data-processing equipment, Sperry Rand is represented in all important international market areas.

The Univac International Division has headquarters in suburban Philadelphia that serve as the hub for its world-wide operations. Manufacturing and assembly plants are in Tokyo, Japan, and Rodelheim/Frankfurt, Germany; the division is represented in 33 countries with 90 field offices.

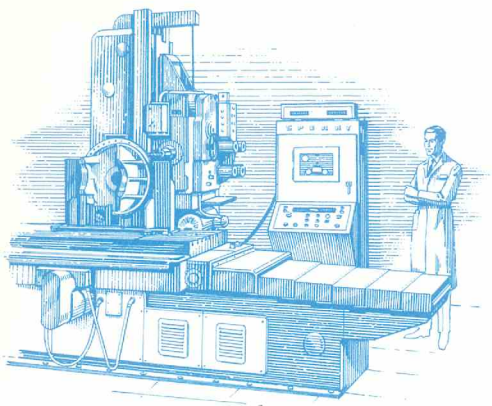
Sperry navigation equipment sails the seas on 75 per cent of the Free World's ships and flies aboard a large majority of the Free World's airlines and military aircraft.

Prior to consolidating with Remington Rand Inc., The Sperry Corporation had subsidiary companies in England, Canada, and Australia.

The Sperry Gyroscope Company, Ltd., of London, England, was established in 1915. That country was at war with Germany, and one of the vital elements in this struggle was naval supremacy. The early activity of the new company was devoted to supplying the needs of the Royal and Allied navies with gyro-compasses.

During the years immediately following World War I, the English company produced the same types of equipment as did Sperry in the United States. Starting in the early 1930s, however, the growing threat of revived German militarism provided the impetus for increasing research and production for rearmament. On the continent, particularly in France, where the manufacture of Sperry equipment by French firms under license agreements with the English company had been going on for several years, the threat of a second World War also greatly stimulated production.

After World War II, to assist many of the Sperry divisions to maintain close contact with distributors and customers in Europe, Sperry Europe Continental, with headquarters in Paris, was formed in 1961; and Sperry Kreiseltechnik G.m.b.H., with headquarters located in



Munich, Germany, was formed in 1964.

Expansion into Canada began late in 1950, when Sperry Gyroscope Company of Canada, Ltd., was formed. In 1951, the Ottawa firm of Ontario Hughes-Owens Company, Ltd., was purchased and joined the corporate family under the name of Sperry Gyroscope Ottawa, Ltd.

Sperry Rand Canada Limited was formed as a wholly owned subsidiary in 1966. This company, the result of an amalgamation of six former Sperry Rand subsidiaries, has seven divisions: New Holland Division, Recording and Statistical Division, Remington Electric Shaver Division, Remington Rand Division, Sperry Gyroscope Division, Univac Division, and Vickers Division.

Another aspect of The Sperry Corporation's diversification program was an arrangement made in 1954 for the manufacture of New Holland farm machinery by the New Holland Machine Company, Ltd., in the United Kingdom; and in the same year, New Holland (Australasia) Pty., Ltd., was organized to manufacture and sell New Holland farm machinery in Australia.

In 1959, New Holland established a manufacturing facility in Lyons, France, in order to take advantage of expanding opportunities in the European Common Market countries and in North Africa. In 1964, these facilities were replaced by a new factory in Longvic.

In 1964, Sperry Rand acquired a majority interest in Werkhuizen Leon Claeys of Zedelgem, Belgium, and made this com-

pany a part of the New Holland operating group. Now known as Clayson N.V., the company manufactures a well-established line of self-propelled combines.

In 1955, just prior to the formation of Sperry Rand Corporation, Vickers Incorporated acquired partial ownership of Vickers-Detroit Hydraulics, Pty., Ltd., of Melbourne, Australia. This company had been formed to manufacture and distribute hydraulic equipment in Australia and New Zealand. One hundred per cent ownership was acquired in 1966. In England, Vickers Division, Sperry Rand Limited, manufactures and sells Vickers hydraulic equipment. The headquarters of Vickers' European Division also is located in England. The Vickers Division, Sperry Rand Canada Limited, in Toronto, handles the sales, service, and manufacture of hydraulic equipment in Canada.

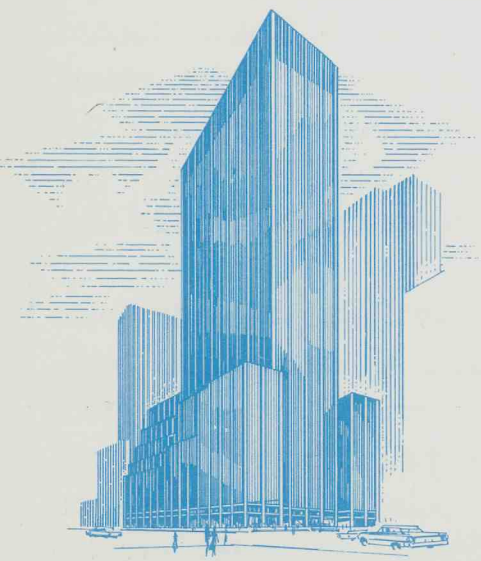
In 1956, Vickers Incorporated established Vickers G.m.b.H., with a factory at Bad Homburg, Germany. Another major hydraulics manufacturing operation is located at an associated company, Tokyo Keiki Seizosho Co., Ltd., in Tokyo, Japan.

In addition to the five major plants mentioned, Vickers has established 10 smaller manufacturing facilities outside the United States and representation in 28 foreign countries.

Today, Sperry Rand owns or holds an interest in nearly 100 companies outside the United States. In certain countries, these companies have been or are in the process of being amalgamated and will be made divisions of newly created

entities in their respective countries. This pattern of organization was established in 1966 at the time of the amalgamation of the Canadian companies into divisions of Sperry Rand Canada Limited, a move which was mentioned earlier.

The primary objective of such amalgamations is the formation within the countries selected of organizations that can assure the most effective, economical, and flexible use of Sperry Rand's resources and provide the monitoring necessary to oversee the pursuit of these objectives. A secondary objective is the establishment of an integrated Sperry Rand image in each selected country. At the time this updating of the *History of Sperry Rand* was under preparation, the following subsidiaries, in addition to Sperry Rand Canada Limited, had been established: Sperry Rand Danmark A/S; Sperry Rand Limited (England); Sperry Rand France; Sperry Rand Holland N.V.; Sperry Rand Italia S.p.A.; Sperry Rand Norge A/S (Norway); and Sperry Rand A.G. (Switzerland).



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SPERRY

UNIVAC

REMINGTON

REMINGTON RAND

NEW HOLLAND

VICKERS