

The Core Memory Project



NCR

FACILITIES SERVING THE WORLD OF BUSINESS

www.thecorememory.com

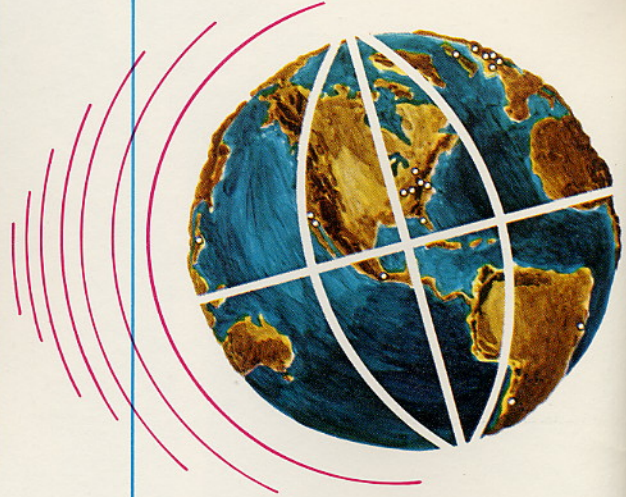


NCR AROUND THE WORLD

NCR manufacturing facilities include 18 plants strategically located throughout the world. The largest factory and world headquarters are at Dayton, Ohio. Other major production facilities in the United States are the Electronics Division plants in Hawthorne and San Diego, California; St. Petersburg, Florida; Cambridge, Ohio; and Millsboro, Delaware. The NCR Adding Machine Division manufacturing facility is in Ithaca, New York. The company's second largest manufacturing facility, at Dundee, Scotland, primarily serves the United Kingdom. The major supplier to continental Europe is the factory at Augsburg, Germany. The plant at Oiso, Japan serves

the Far East market.

Smaller production facilities are located at Puebla, Mexico; Buenos Aires, Argentina; and Sao Paulo, Brazil to serve Latin American countries; Toronto, Canada; Berlin and Giessen, Germany; Massy, France; and Bulach, Switzerland. Worldwide, NCR equipment manufacturing plants provide over 10 million square feet of floor space. NCR also operates eight business forms and supply plants in the United States and a number of similar plants abroad. Sales and service offices are maintained in all principal cities of the free world. These total more than 1,000 outlets, of which, 522 are located in the United States and Canada.



INTRODUCTION

The business equipment industry reflects the economic and social revolution through which most of the world has been passing in the quarter-century since World War II. In the face of mushrooming consumer credit and spiraling personal incomes, business transactions have reached staggering proportions. As a result, the paper handling and data processing requirements of business have grown enormously. These mounting volumes of daily business data must be processed rapidly and accurately.

The constant goal at NCR is the development of products and systems designed to meet the data-processing challenges confronting the world of business. From its inception as purely a cash register company, NCR progressed to become a world leader in mechanized accounting systems and today also offers businesses, large and small, complete electronic data processing systems.

Inscribed on one of the buildings at NCR's Dayton headquarters are the words "We Progress Through Change." The statement pertains



Robert S. Oelman, Chairman

R. Stanley Laing, President

not only to continuous product innovation but also to creativity in basic research areas. To this end, NCR engineers have developed and implemented many firsts in the field of electronics which have materially lowered costs and increased processing efficiency. Although great technological progress has been compressed into relatively few years, NCR has not lost sight of the fact that its production is the work of human beings with emotions and aspirations. Factory employees, scientists, clerical staffs, salesmen, service technicians, systems

analysts, programmers and management personnel—all the people who together comprise NCR—are a dedicated force. No matter where they are located, in the United States or in any of the far-flung countries throughout the free world, NCR people make the company a good citizen of the communities in which it operates—a citizen of the world.

The following pages depict the scope of NCR investments in people, in systems, and in facilities in the United States and Canada dedicated to meeting the needs of the world of business.

MAJOR PRODUCTS

In the volatile business world of today, the business equipment industry must predict and attempt to stay ahead of market trends. At NCR, continuous market research provides the "crystal ball" necessary for effective product planning. The constant goal is the development of practical systems which perform with greater efficiency.

NCR offers the most complete line of products, systems, and software in the industry. From the smallest adding machine to the most complex computer, NCR makes available mechanical, electro-mechanical, and electronic equipment designed for every processing need.

Data Processing Systems

Today, just as with NCR's entry into the electronic data processing field in 1952, emphasis has been on providing the business world with the means to rapidly obtain the information required for successful operation. NCR has pioneered each generation of computer development. Today, NCR computers are answering the needs of thousands of customers throughout the world.

NCR is a leader in the development of rapid information retrieval systems. The NCR 315 with CRAM (Card Random Access Memory) drastically reduced the time

required to search for and report specific stored data. The NCR 315 RMC (Rod Memory Computer) was the first processor commercially available to employ an all thin film memory. Each memory module is constructed of thin film rods which provide a faster switching element when transferring data into and from memory. Basic 315 RMC Systems provide from 40K to 160K characters of memory.

NCR Century Series

The versatile NCR Century Series is an expandable, modular family of computer systems designed for all levels of users—from first time user to the most advanced computer user. Two types of memory are employed by the NCR Century: short rods coated with thin magnetic film providing from 16K to 524K characters, and





The NCR Century 200—middle member of the NCR Century Series

semi-conductor memories with from 131K to 1048K characters. The use of semi-conductor memory is, in effect, the first step toward LSI (Large System Integration).

The powerful NCR Century processing units provide a faster, more powerful computer for the dollar invested. Time sharing of input, output, and processing functions permits more flexible

system design utilizing from three-way to eighteen-way simultaneity. Each base system of the NCR Century Series includes a dual spindle disc to provide data storage and random access capabilities. Since the system software resides on disc packs, all members of the family are truly upward compatible. A complete line of peripheral units provides the series with the expandability and

versatility required of a computer system.

A full complement of compilers, operating systems, applied programs, and utility routines, completely written, tested, and documented, are provided. This extensive operating software means that applications may be implemented faster and that the day-to-day work of the system is simplified.

Data Capturing

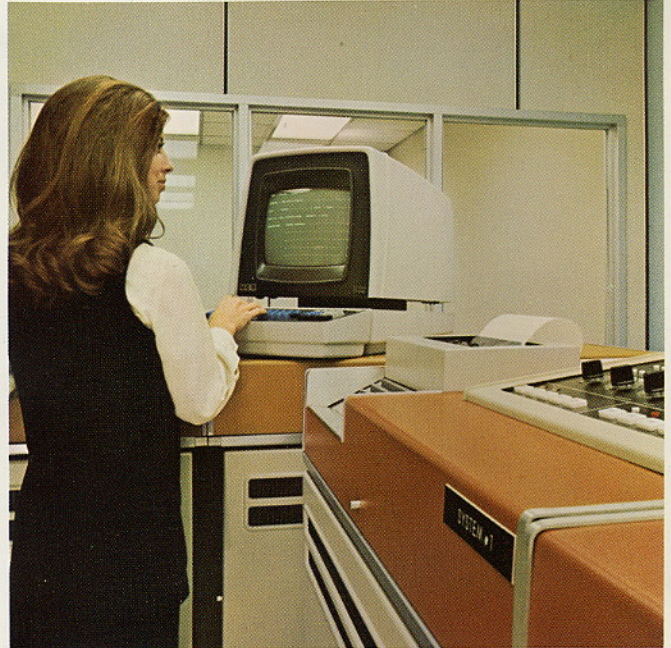
The punched tape, punched cards, MICR documents, and optical journals created by NCR adding machines, sales registers, and accounting machines permit rapid input of business data into a computer for further processing. NCR card readers, tape readers, optical journal readers, and MICR (Magnetic Ink Character Recognition) sorter/readers recognize the stylized characters and punched configurations and transmit them to the computer. This important data, captured without extra effort on the part of the operator, is used in the processing of all types of applications with reports designed to guide the management of a business.

Terminal Communications

NCR terminal equipment provides remote locations with high speed communication with a central computer. The NCR 795 Data Display System permits direct communication with the processor and provides an instantaneous, visual presentation of requested information. More than an entry-retrieval computer device, the 795 also permits correction and updating of computer stored data.

The NCR family of magnetic tape encoders increase computer throughput by making it possible to encode and verify data directly to magnetic tape from any type of source document. The encoded tape is immediately available for rapid computer input. Certain models provide direct conversion of data from punched tape or card to magnetic tape and rapid transmission over telephone lines either to another encoder or directly online to a computer.

NCR 760 Transmitters and 765 Receivers provide rapid transmission and capture of punched tape data, offline or online to a computer, over conventional telephone lines.



NCR 795 Data Display System



NCR 42 Online Teller Terminals



NCR 400 Electronic Accounting Machine is programmed by interchangeable loops of mylar tape

Accounting Machines

NCR markets a complete line of mechanical and electro-mechanical accounting machines designed to reduce recordkeeping requirements to a minimum. Remittance control machines establish predetermined analysis totals and control over money paid on account. Window terminals, offline or online to a computer, provide instant account updating and control. Conventional mechanical accounting machines permit accurate processing of all general and many special accounting applications. The merging of electronics (integrated circuitry, magnetic memories, solid state construction)

with mechanical components has added power to conventional machines and resulted in increased efficiencies. Multiplication and division processes required for invoicing, tax billing, and other computational applications are handled rapidly by the electronic components.

In financial institutions, special units encode the amount, account number, and transaction code in MICR font on documents such as checks, deposit slips and withdrawals for electronic handling. This MICR encoding is accomplished as a byproduct of a necessary bank function—proof of deposit. MICR is a common

machine language used by financial institutions throughout the world. The stylized characters are readable by humans and by machines. MICR encoding and processing has enabled banks to handle a constantly increasing volume of documents in less time, at lower cost, and with greater accuracy. NCR sorter/readers rapidly process these MICR documents offline - or online to a computer. When NCR accounting machines are equipped with optical type font, card punches, or tape recorders, automation media is prepared as a byproduct of a necessary accounting function.



NCR 5 Sales Registers with tape punches control the original entry and create input data for management reports

Sales Registers

NCR point-of-sale cash registers are designed with an effective combination of features which simplify the recording of original entries, yet maintain complete system control. Multiple totals for instant flash reports . . . posting of customer ledgers, saleschecks, and layaway transactions . . . automatic change computation to speed service and eliminate mistakes . . . mechanical addition and subtraction . . . individual salesperson totals and cash drawers . . . multiple activity counters . . . permanent audit

trails . . . each feature has its specific purpose and is designed to insure the accuracy and efficiency of operation.

The use of optical type font or punch tape recorders with NCR sales registers permits the automatic capture of data as a byproduct of transaction recording. The tapes or optical journals may then be processed by computer to provide the retailer with management reports designed to guide his decision-making.



NCR 11 Adding Machines combine compactness with beauty for accurate, easy operation

Calculators/Adding Machines

NCR calculators are the result of modern computer technology. Completely electronic in design, the integrated circuitry and magnetic core memories provide silent operation. Many business, financial, and engineering computational problems are solved at electronic speeds.

General purpose and special purpose NCR adding machines, with either ten or full-amount keyboards, are in use in all types of businesses, large and small. When coupled with punch tape recorders, card punch couplers, or optical type font, these common office machines become efficient devices for the preparation of input for electronic data processing.

Special features added to certain models of adding machines create effective desk model bookkeeping machines which permit even the smallest of businesses to mechanize their accounting. Accounts receivable, accounts payable, payroll, and general ledger applications are easily handled for the low-volume, smaller businesses.



NCR 18 Electronic Calculator

SPECIAL PRODUCTS

The NCR Special Products Division consolidates research, manufacturing, and marketing activities for four types of products: NCR Paper, used in carbonless business forms; other products based on microencapsulation; microform information storage systems; and computer peripherals sold to other equipment manufacturers.

Microencapsulation

Experiments to eliminate inked ribbons in business machines actually launched NCR into the field of encapsulation techniques and uses. Even after the discovery that two stable compounds—one an oil containing a colorless dye, the other a white natural clay—could produce color when permitted to contact each other, it was still necessary to find a way to contain the oil solution on a sheet of paper and keep the two materials apart until ready for color formation.

NCR Paper

The answer was found in early NCR experiments in microencapsulation and the first practical application resulted in NCR Paper. While the sheet resembles ordinary paper, the back is coated with millions of microscopic capsules of the colorless oil solution. The paper remains dry, although holding 90% liquid for color formation with the clay coating on an adjacent sheet. While NCR Paper is in wide use today, the technology of microencapsulation, pioneered by NCR, has become so broad that almost any material can be packaged in tiny capsules. It is currently being used for a variety of applications in such fields as pharmaceuticals, agricultural chemicals, adhesives, food



Capsules of various sizes

products, flavors and fragrances, and pesticides. Recently introduced products based on this technology include timed-release drugs, mentholated facial tissues, an easy-to-handle primer for aircraft rivets, and a menthol-mint cigar. Encapsulation permits the separation of reactive chemicals and the protection of any encapsulated material until it is



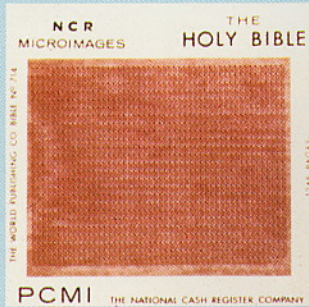
An encapsulated anticorrosion material

used. Unpleasant tastes can be masked, odors eliminated, and flavors preserved. The tiny capsules can contain liquids or solids, or solids dispersed in liquids—each droplet or particle surrounded by a protective wall or covering. Capsule properties can be controlled by a wide choice of wall materials, depending on application and release requirements. Millions of these capsules can form a handful of fine powder which is actually dry to the touch, yet consists of 90% or more liquids. Some of the many uses of encapsulation include:

- Separation of reactive chemicals.
- Reduction of volatility and flammability.
- Reduced toxicity.
- Taste and flavor masking.
- Sustained, delayed, or controlled release of contents.
- Reduced odor.
- Environmental protection.

Some products based on encapsulation technology

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All 773, 746 words of the Scriptures appear in this incredibly small space



Photochromic Micro Image

Another outgrowth of the use of colorless dyes in NCR Paper is the coating of photochrome materials directly on a substrate, much like the emulsion is coated on photographic film. Photochromic film has many unique properties not found in conventional photographic film. No chemical developing or processing is required. Image formation is immediate upon exposure and can be inspected through a special optical system.

The image can be erased and re-exposed in the same area to permit revisions or corrections of errors. The absence of particle grains, found in ordinary photographic film, makes it possible to form images 1/40,000



Special Camera-Recorder used in Microform Process

of the size of the original document.

PCMI* microimage and Microfiche information dissemination and retrieval systems, developed by NCR, are finding wide acceptance. PCMI ultra-microfiche systems permit the storage of up to 3,200 pages of information on a single 4 x 6 inch transparency. Users can quickly locate any page of information and read it on a special viewer. NCR microfiche systems store up to 98 pages on a 4 x 6 inch card and are widely used in schools, libraries, and industrial firms.

A leading automobile manufacturer has adopted PCMI to distribute parts information to 7,500 dealers. Information formerly requiring several bulky catalogues is now available on just seven 4 x 6 inch transparencies. NCR manufactures the transparencies and the readers used with the system.

Industrial Products

The sale of NCR electronic data processing peripherals to other EDP equipment manufacturers is the responsibility of the Industrial Products Division. This division is also responsible for the sale,



Only seven PCMI* transparencies store parts information formerly requiring several bulky catalogues

processing, and manufacture of NCR microform systems and equipment.

Industrial sales offices are located in Hawthorne, California; New York, N.Y.; Waltham, Massachusetts; and Dayton, Ohio. Microform sales offices are in Hawthorne, New York, Dayton, and Bethesda, Maryland.

MILITARY • AEROSPACE



The NCR Military Division and Electronic Communications, Inc. (ECI), an NCR subsidiary located in St. Petersburg, Florida, are engaged in a variety of research, development, and manufacturing projects for the Department of Defense, the National Aeronautics and Space Administration (NASA), and the U.S. Post Office.

Thermal Printing

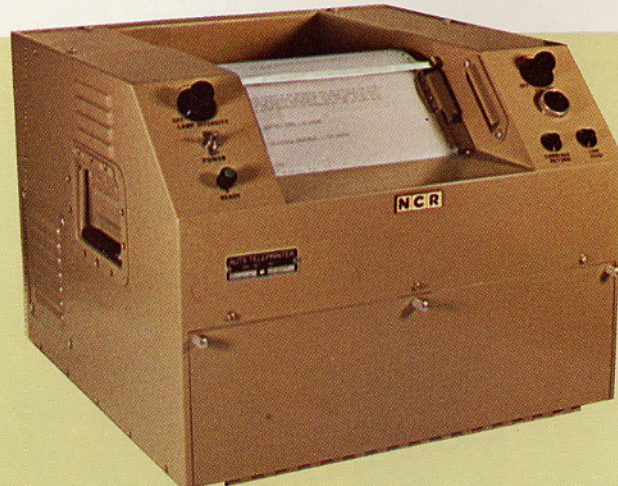
NCR thermal printing technology has resulted in the development of a number of silent, ultra-reliable devices for military communications systems. The Militarized Electro Thermal High Speed Printer is a prototype model developed for the Navy. It has the capability of operating at speeds of from 60 to 2,400 words per minute on either 5-level (CCIT) or 7-level (ANSI) code in serial or parallel mode. A 160-character buffer stores the data during live feed permitting an online operation.

The printer is modular in construction resulting in low mean time to repair (MTTR), with solid-state electronics in place of all mechanical movements with the exception of line feed. This results in a highly reliable printer. One of the printers demonstrated a meantime before failure (MTBF) of 43,000 hours.

Among recent contracts received by NCR is a multi-million dollar award to design and produce electronic keyboards and non-impact thermal printers for use in the U.S. Army TACFIRE program.

SUBJECT: NCR HIGH SPEED PRINTER

THIS PRINTER HAS THE CAPABILITY OF 60 TO 3000 WORDS PER MINUTE, IS FULLY MILITARIZED AND DESIGNED TO MEET FED-STD-222. SOLID STATE CONSTRUCTION IS USED THROUGHOUT, ELIMINATING ALL MOVING PARTS EXCEPT THOSE IN THE PAPER FEED MECHANISM. ALL OTHER PRINTING FUNCTIONS HAVE BEEN IMPLEMENTED THROUGH ELECTRONIC SIGNALS WHICH DO NOT WEAR OUT, REQUIRE ADJUSTMENT OR LUBRICATION, OR PRODUCE AUDIBLE NOISE. THE RESULTING NON-IMPACT PRINTING METHOD GREATLY INCREASES RELIABILITY. THE PRINTER IS AVAILABLE IN ANY STANDARD CODE, SERIAL OR PARALLEL, AT ANY SPEED UP TO 3000 WORDS PER MINUTE, SYNCHRONOUS OR ASYNCHRONOUS.



Electro-Thermal Highspeed Printer

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Rescue Beacon

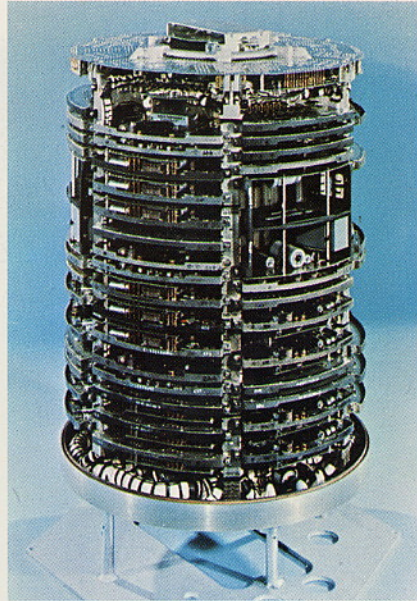


PRT-5 Life Raft Rescue Beacon

NCR has produced over 30,000 pocket-size automatic rescue beacons which it developed for Air Force and Navy use. The PRT-5 Life Raft Rescue Beacon is stored with other survival gear in each aircraft that carries a three or more man life raft.

The beacon transmits a swept-tone audio modulated on both HF (1,000 mile range) and a UHF (150 mile range) frequency. The beacon has an automatically inflated flotation collar for use at sea. Self-contained batteries provide for more than 72 hours of continuous operation.

Flight Control Computer



Flight Control Computer

Another product produced by ECI is the flight control computer which keeps the Saturn rocket on course as it guides the Apollo capsule into lunar trajectory. Since the beginning of the Saturn/Apollo program, this analog computer has functioned flawlessly in an unbroken series of successful Saturn flights.

The computer enables the Saturn rocket to fly along its prescribed path by controlling the positions of the gimbaled engines in the rocket's three stages. During flight, it accepts signals from various sensing devices and shifts the positions of the engines to correct for yaw, pitch, and roll.

The computer has triple redundancy. An input signal can follow any of three separate paths, and outputs from the normal path and second path are continuously compared with each other. If a malfunction occurs in either path, a comparison circuit automatically detects the malfunction and causes switching to the third path. In Saturn V, the computer is housed in the Instrument Unit above the three rocket stages. It controls each stage during the launching sequence.

Airborne Data Transceiver



AN/ARC 124 Transceiver

The microminiaturized AN/ARC-124 Transceiver produced by ECI is one of the most advanced data sets ever manufactured. It weighs only 14 pounds, yet this 20-watt transceiver provides 3500 channels from 225 MHz to 399.95 MHz. It switches channels in milliseconds. Solid-state, modular design, microelectronic circuitry and high reliability components make possible a MTBF (mean time before failure) in excess of 1,000 hours. With all-electronic tuning, the AN/ARC-124 has no moving parts. This is the first airborne UHF data link set with BITE (built-in test equipment) for testing both total system and individual module performance. Even technicians unfamiliar with the equipment can perform the test and make instant field repairs by removing and replacing a faulty module.

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RESEARCH and DEVELOPMENT



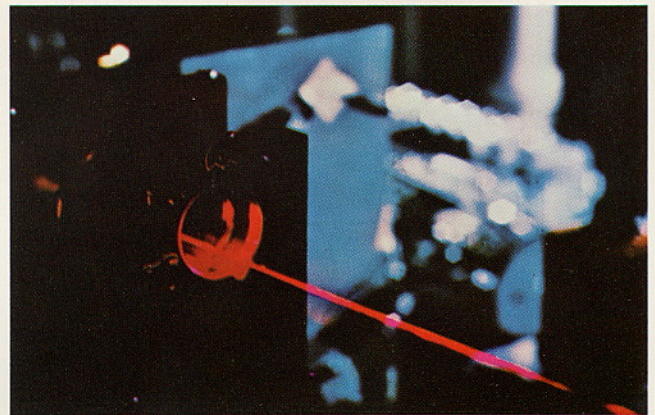
Headquarters,
NCR Central Research
Division

Research at NCR furnishes the base from which product engineers design future business machines and systems. To insure that this experience is available when needed, the NCR research program involves a constant exploration of many and diverse fields of science and technology, including natural and synthetic materials, together with a thorough knowledge of data processing concepts.

Teamwork among scientists, system specialists, and engineers meets new challenges every day from industry and government—and the results are often exciting and eventful. The solution to one problem may lead to solutions to other problems. In this way entirely new and novel ventures are often created. NCR operations research and management science activities are continually engaged in studying the executive decision problems of department stores, banks, and other users of NCR systems. Mathematical models that describe or simulate the consequences of alternative decisions are being developed. All this leads to a better understanding of the operating and strategic information that tomorrow's businesses will need and, in turn, forms a groundwork for designing business systems which can provide needed management information on a least cost basis.

The dynamic nature of research today is illustrated by projects currently under way in the NCR Central Research Division.

Laser Research



Laser being used to record tiny images on thin metallic film

A primary area of endeavor is the exploration of new memory phenomena and their potential application in future systems. The use of laser beams to convert data output of computers into microscopic-size print may lead to important breakthroughs in information storage and retrieval. This high-density optical memory system using laser reading and writing techniques was developed by NCR researchers. Variations of the system may eventually replace traditional magnetic storage devices in certain types of equipment.

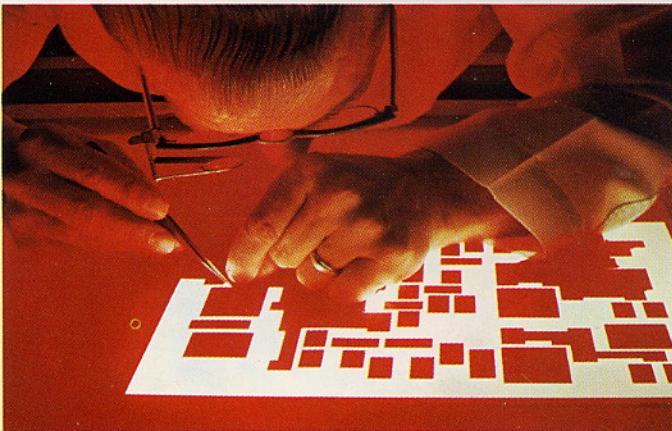
The Core Memory Project

Micro-Circuitry

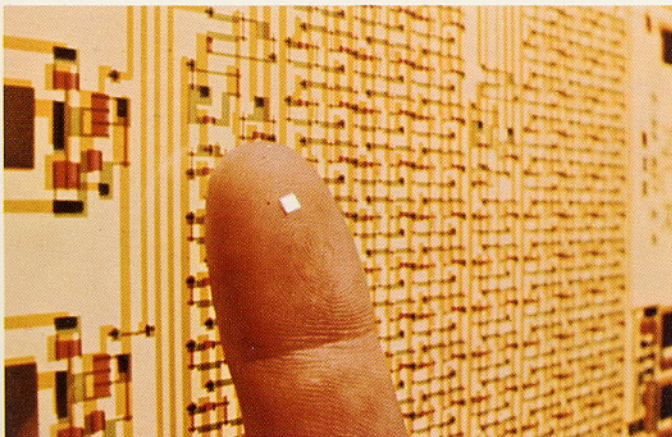
The ability of NCR engineers to design new miniature electronic circuits permits unusual flexibility in the development of experimental units. Primarily designed for assembly in computer modules, these new integrated circuits will also be used in future cash registers and accounting machines.

Conventional circuits include numerous separate capacitors, diodes, transistors, resistors—all carefully mounted and solder-connected on a plug-in circuit board. Using new micro-miniaturization technologies, all the components and connections to assemble as many as 1,000 such conventional circuits can now be fabricated on one thin wafer of silicon about the size of a quarter.

This Large Scale Integrated (LSI) and Metal Oxide Silicon (MOS) semiconductor circuitry will be increasingly applied to data recording and capturing devices as has already occurred in the central processing function.



Integrated circuits begin with engineering designs which are reduced optically to microscopic dimensions



Tiny LSI-MOS chip on fingertip is equivalent of thousands of transistors

Data Terminals



Retail Terminal undergoing field tests

The development of new-generation data terminals is being accelerated by the rapid evolution of LSI and MOS circuitry. The new technologies available today make possible a modular approach in data terminal design based on the functions required of a specific terminal. Logic modules, printer modules, keyboard modules, and data display modules can be combined in almost infinite variety.

In the retail industry, depending upon the specific application, such devices will simply collect data for subsequent transmission to a central processing point after hours. In other cases, clusters of data terminals will capture and forward data to central collection points which in turn will be in direct communication with a central computer. In still other applications, the terminals will be linked directly online to a central processor.

The NCR development effort in this area is dedicated to providing not only the most advanced data terminals but complete systems which will provide the reliability and control features essential to a successful installation.

In the area of data display, NCR scientists are engaged in such projects as the development of a data display screen capable of "remembering" messages or images. Displays of this type can retain images indefinitely without energy input and can be easily switched from one block of data or page of information to another.



MANUFACTURING

The increasing need for improved business systems which has characterized every year since the end of World War II continues unabated. In most areas of the free world, economies have reached new record levels, creating a myriad of business transactions which exceed every previous year.

The development of electronic data processing equipment stimulated the demand for conventional NCR products. Orders for cash registers, accounting machines, and adding machines constantly establish new annual records. Many of these machines serve as input devices for computer systems.

NCR research, development, and manufacturing programs are conducted within the framework of a coordinated worldwide plan. The purpose of this global operational approach is to enhance the company's competitive position in the major markets of the world.

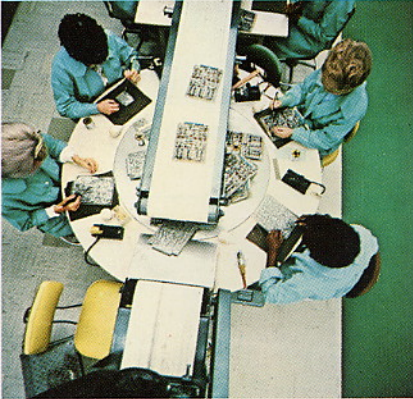
As part of the philosophy, NCR has carried out a far-reaching program of physical expansion, both domestically and abroad. An extensive program to increase manufacturing flexibility has also been followed. Its purpose is to use available plant capacities more efficiently and to permit products to be manufactured at the most advantageous economic and geographic locations.

The Core Memory Project

WORLDWIDE FACILITIES

Out of a total of 95,000 employees, NCR employs over 40,000 people in manufacturing facilities comprising over 10.5 million square feet of floor space at key locations around the world.

Eight manufacturing facilities, employing more than 26,000 people and covering over 7.5 million square feet of floor space, are operational in the United States and Canada.



Carousel assembly speeds production of components used with electronic systems



A wide range of special skills and trades is required for NCR's diverse manufacturing operations



NCR 5 Sales Registers move along assembly line

Ohio

The largest manufacturing plant, and NCR world headquarters, are located in Dayton, Ohio. In addition to the highly skilled artisans who produce versatile NCR Cash Registers, Accounting Machines, and peripherals for NCR

computers, the Dayton facility is the headquarters of the Research and Development Division. Teamwork among systems specialists, scientists, and engineers has developed the powerful tools of modern business and industry. Basic concepts of physics, chemistry, mathematics, electronics, and applied mechanics, along with new materials and processes, are being constantly explored for the development and production of business machines for today and tomorrow.

The Cambridge, Ohio plant manufactures models of the NCR cash register and accounting machine line and produces various printed circuit boards, module headers, and electronic controllers for NCR computers.

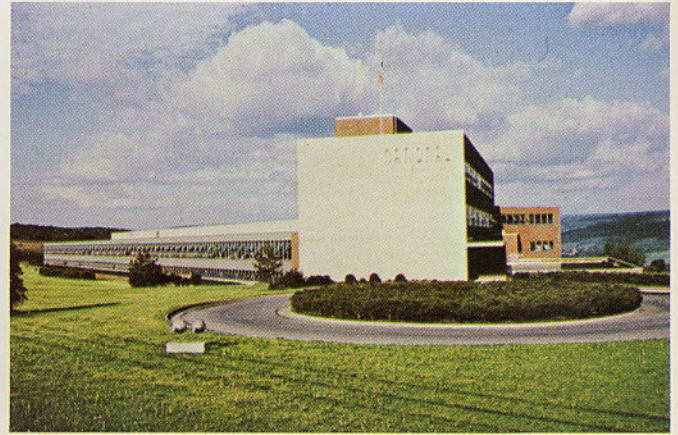
California

The major facility of the NCR Electronics Division is located in Hawthorne, California. This plant and the facility located outside of San Diego, at Rancho Bernardo, produce the central processing units for NCR computers.

The Core Memory Project



NCR Electronics Division, Hawthorne, California



NCR Adding Machine Division, Ithaca, New York

New York

NCR adding machines and desk model bookkeeping machines are produced by the NCR Adding Machine Division at Ithaca, New York. These machines are manufactured with the same engineering precision and skill which has made "NCR" synonymous with quality business equipment for over 85 years.

Delaware

The manufacturing facility located in Millsboro, Delaware is used for the production of various cash register models.

Florida

The facilities at St. Petersburg, Florida house the headquarters and manufacturing plants for Electronic Communications, Inc., an NCR subsidiary. ECI specializes in the development and manufacture of advanced electronic communication systems, and is a major contractor for military and space communication programs.

This facility produces command and control communication systems, high power UHF transmitters and receivers, satellite communication terminals, amplifiers and other electronic and microelectronic equipment, and antennas.

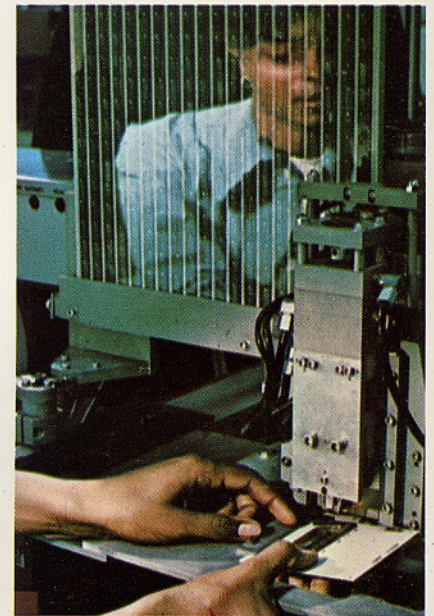
Canada

Toronto is the headquarters for the NCR Co. of Canada, Ltd., and the site of the Canadian factory. This facility produces cash register and accounting machine models to serve the Canadian Provinces.



International Manufacturing Facilities

Ten manufacturing facilities are strategically located in eight foreign countries. These plants are located in Augsburg, Berlin, and Giessen, Germany; Dundee, Scotland; Bulach, Switzerland; Massy, France; Oiso, Japan; Puebla, Mexico; Sao Paulo, Brazil; and Buenos Aires, Argentina.



NCR Century Series circuits are machine-inserted into cards. Another machine automatically solders the hundreds of connections. An automatic tester subjects the completed circuit card to 80 different tests in only 3½ seconds.

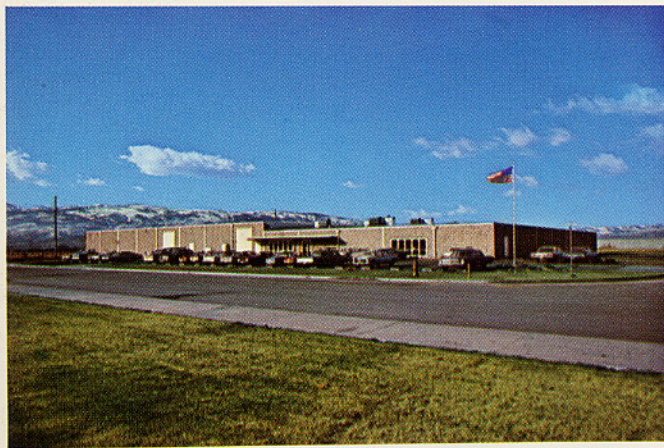
◀ Engineers check performance of NCR Century's unique system disc



Bethlehem, Pennsylvania



Fairborn, Ohio



Sparks, Nevada

RENTAL EQUIPMENT REFURBISHING CENTERS

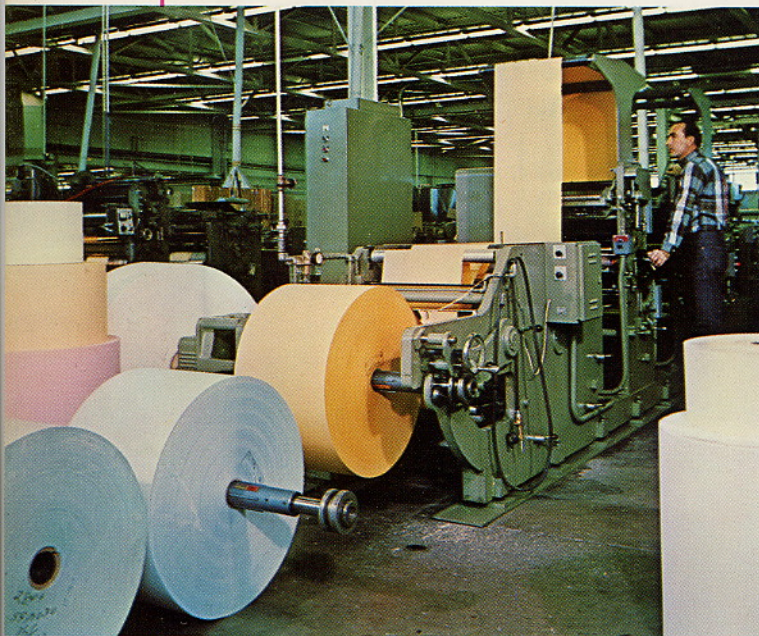
NCR refurbishing centers are strategically located to handle the maintenance and upgrading of the constantly increasing number of products leased by NCR. The general purpose of these centers is to keep the rental pool equipment at the highest level of operational reliability.

Staffed with highly skilled service technicians, each piece of equipment returned to the center is completely inspected, reworked as necessary, upgraded to include the latest features, and thoroughly tested to assure trouble-free operation for the ultimate lessee.

BUSINESS FORMS and SUPPLY



BF & S specialists offer complete forms and supply service



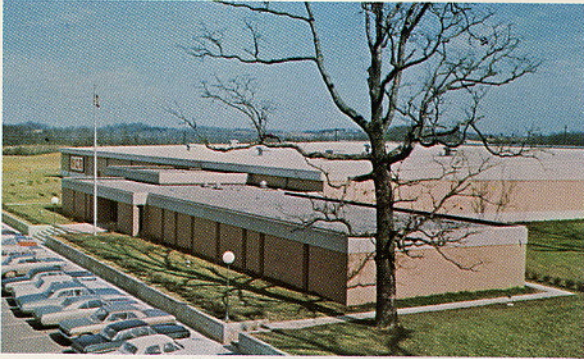
Production of **NCR** *Paper* carbonless business forms

The Business Forms and Supply Division, has, as its primary responsibility, the designing and furnishing of business forms and other items of supply required by NCR systems. Systems-oriented business forms and supplies are an essential part of the complete services available to NCR customers.

NCR BF & S representatives, working closely with NCR equipment salesmen, help provide customers with substantial reductions in their paperwork costs. An efficiently designed forms system, working in conjunction with business equipment, often results in savings in processing and handling time which more than pays for the forms themselves.

NCR has many years of experience in graphic arts, having established its first printing facility in 1887 to produce forms used with the business systems of that day. Today, nine modern BF & S centers with the latest equipment are geographically located to provide better customer service and to consolidate certain types of manufacturing for greater efficiency. The company has developed nearly 5,000 standard forms used with NCR equipment for varied applications and markets a variety of business machine supplies. The latter includes paper rolls, punched paper tape, ink ribbons, magnetic tape, cards and ledgers, porous rubber print inserts, and similar products.

The Core Memory Project



Morristown, Tennessee



Jacksonville, Florida



Arlington, Texas



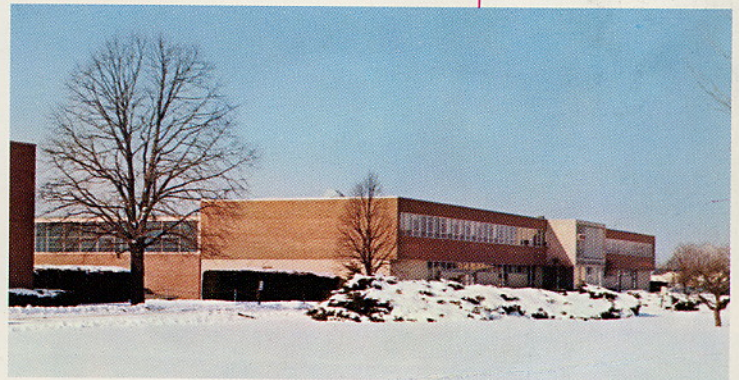
Fullerton, California

... Other B. F. & S. Plant Locations

Los Angeles, California

Toronto, Canada

Viroqua, Wisconsin

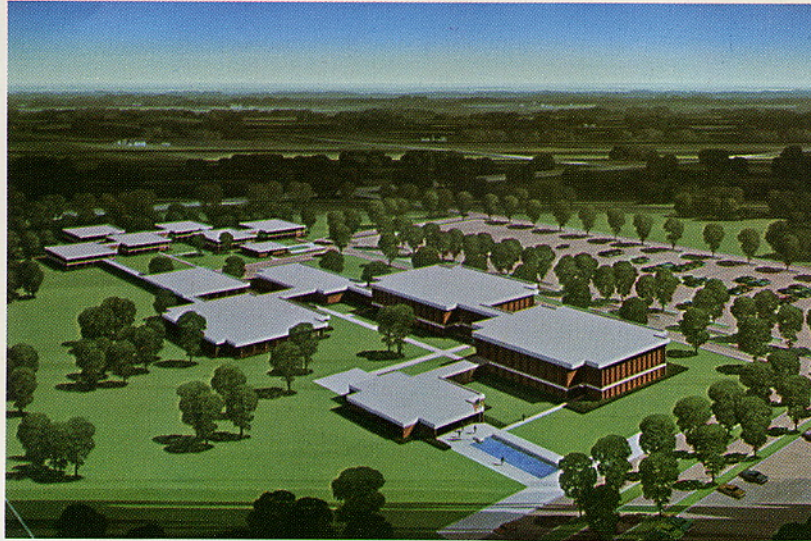


Washington Court House, Ohio



Mt. Joy, Pennsylvania

TECHNICAL EDUCATION CENTERS



Central Technical Education Center, Dayton, Ohio

More than 11,000 technical representatives throughout the United States and Canada insure that NCR systems continue to provide the benefits for which they were originally installed.

Three modern Technical Education Centers provide geographical convenience for the training of new employees and to keep experienced technicians trained in the latest state of the art. Educational courses cover the full range of NCR machines and



Eastern Technical Education Center, Hartford, Connecticut

systems and are from two weeks to six months in duration.

The Central Technical Education Center at Dayton is the largest and most advanced facility of its kind. Typical of the advanced teaching techniques being employed at this "campus-style" service university is a central complex housing all types of NCR computers with a perimeter of classrooms. Students have access to online input devices linked to the computer room so that diagnostic routines can be tested directly from the classroom.

The complex contains 120 classrooms, a large cafeteria, and housing for 424 students, each in a separate room. The center serves the educational needs of the entire United States, Canada, Mexico, and certain international students.

The Eastern Technical Educational Center is located in Hartford, Connecticut. The 28 classrooms in this center accommodate an average student enrollment of from 225 to 250 per week.

In Denver, Colorado the Western Technical Educational Center houses 41 classrooms for the training of approximately 450 students per week.



Classrooms in the Dayton Center have a capacity of 1200 students



Instruction on the NCR Century Systems Disc



The Dayton Center uses 30 NCR Century Systems for training purposes



Circuit-testing of the NCR 745 Remote Printer

To impart maximum knowledge of material that is highly technical in nature requires maintenance of a relaxed and pleasant atmosphere. Each of the centers lend themselves to this purpose and readily available recreational facilities fulfill the leisure time needs of the students. The continuing purpose is to supply NCR customers with the finest service available in the industry.

The Core Memory Project



DATA PROCESSING CENTERS

NCR Data Processing Centers are conveniently located throughout the world to serve all lines of business, industry, government, and the professions. Each day, thousands of data center customers mail or deliver punched tape, punched cards, or optical tape to their center for computer analysis. The miracle of electronic data processing brings a new concept to business management in the form of detailed reports inter-relating each phase of a company's operations. Reports of this nature provide management with all of the facts to meet and solve tomorrow's problems today. Small retailers are offered accounts receivable processing for a fee as low as \$60 a month. This fee

includes sales analyses and salesperson productivity reports.

Banks, credit unions, savings and loan, and other financial institutions are also customers of the data centers. The number of savings and mortgage accounts being processed by the company's time-sharing data centers exceeds 5 million and increases constantly. Approximately one-half million transactions are currently handled daily. Industrial firms, government offices, and service organizations are among the many other types of businesses, large and small, using data center services. Other applications include services for hospitals and schools, medical audits and statistical

The Core Memory Project



Systems are tailored to meet customer needs



Utility Billing is a popular Center service



Punched cards, tape, magnetic tape, optical journals, and MICR encoded documents serve as input media

reports for physicians, billing operations for utility companies, and a complete payroll service. The many services offered by the NCR Data Processing Centers permit businesses to obtain an accurate, current picture of their operations at modest cost. They can take advantage of new trends more quickly, maintain a more balanced inventory, and in the case of manufacturing concerns, gear production closely to changing market needs. The service is as convenient as mailing a letter since the tapes produced by cash registers, accounting machines, and adding machines can be mailed or delivered to a nearby center for processing.

Today, 69 NCR Data Processing Centers are in operation throughout the world. In the United States and Canada, the following centers are operational:

Framingham, Massachusetts
Hawthorne, California
Pittsburgh, Pennsylvania
Baltimore, Maryland
Jamaica, L.I., New York
Dayton, Ohio
Detroit, Michigan
Houston, Texas
Louisville, Kentucky
Miami, Florida
New Orleans, Louisiana
Reno, Nevada
St. Louis, Missouri
Sarasota, Florida
Montreal, Quebec
Rolling Meadows, Illinois

Vancouver, British Columbia
New York, New York
Atlanta, Georgia
Birmingham, Alabama
Cleveland, Ohio
Denver, Colorado
Honolulu, Hawaii
Kansas City, Missouri
Lubbock, Texas
Minneapolis, Minnesota
Norfolk, Virginia
Richmond, Virginia
San Francisco, California
Seattle, Washington
Toronto, Ontario
Winnipeg, Manitoba



REGIONAL SYSTEMS CENTERS

NCR Regional Systems Centers constitute a new type of educational center designed to help simplify the installation of computer systems. They add a new dimension to the traditional customer support which users of NCR equipment obtain from the company's branch offices. Staffed with specialists in the major fields served by the company, the centers provide:

- Training courses for customer personnel.
- Systems on which customers can compile and test their computer programs prior to equipment delivery.
- Regional educational facilities for NCR personnel.



Customer employees learn to use systems and equipment

Over 2000 NCR customer support personnel in the United States and Canada help solve customer problems and assist in the installation of equipment and the training of user employees.

Classes are scheduled on a regular basis to effectively meet the requirements of both NCR branches and customers. Among the courses most frequently scheduled are: Introduction to Programming, which introduces the beginner to computer and data processing concepts; programming courses in NCR NEAT/3 Compiler Language, COBOL, and FORTRAN; more advanced courses such as NCR Century Operating Software and NCR Century Disc File Processing techniques; and specialized seminars and workshops.

These modern facilities, the use of well-written student manuals, and the opportunity to use the computer for compiling and testing problems and for hands-on experience provide a maximum learning opportunity which enables the employee to return to his job effectively and professionally in a short period of time.



Systems Analysts check compiler listings



Advanced programming course for customer personnel



Center visitors see the NCR Century 100 in operation

HOW NCR
CONTRIBUTES TO
THE ECONOMY
OF YOUR STATE



NCR Branch Office, Miami, Florida

The approximate NCR annual payroll investment is indicated by state. Facilities within each state are listed and coded by type.

KEY B . . . Branch Office D . . . Data Center
S . . . Sales & Service R . . . Regional Systems Center
M . . . Manufacturing F . . . Business Forms & Supply
X . . . Refurbishing Center T . . . Training School

ALABAMA \$2,500,000

Birmingham B
Dothan S
Florence S
Gadsden S
Huntsville S
Mobile B
Montgomery B
Tuscaloosa S

ALASKA \$360,000

Anchorage B
Fairbanks S
Juneau S
Kenai S
Ketchikan S

ARIZONA \$1,400,000

Flagstaff S
Phoenix B
Tucson B
Yuma S

ARKANSAS \$1,300,000

El Dorado S
Fayetteville S
Forrest City S
Ft. Smith B
Hot Springs S
Jonesboro B
Little Rock B
Pine Bluff S

CALIFORNIA \$58,400,000

Arcadia S
Bakersfield S
Chico S
El Centro S
Eureka S
Fresno B
Fullerton F
Glendale S

Hawthorne M
Hawthorne D
Los Angeles B
Los Angeles F
Los Angeles R
Long Beach S
Modesto S
Monterey S
Oakland S
Palm Springs S
Pomona S
Redding S
Redwood City S
Sacramento B
San Bernardino B
San Diego B
San Diego M
San Francisco B
San Francisco D
San Francisco R
San Jose B
San Luis Obispo S
San Rafael S
Santa Ana B
Santa Barbara B
Santa Rosa B
Stockton B
Vallejo S
Van Nuys S
Ventura S
Vista S
Yuba City S

COLORADO \$3,000,000

Colorado Springs S
Denver B
Denver D
Denver T
Ft. Collins S
Grand Junction S
Greeley S

Pueblo B

CONNECTICUT \$3,900,000

Bridgeport B
Hartford B
Hartford T
Hartford R
New Haven S
Stamford S
Waterbury B
Waterbury S

DELAWARE \$3,400,000

Wilmington B
Millsboro M

DISTRICT OF

COLUMBIA \$3,500,000

Washington B

FLORIDA \$30,000,000

Clearwater S
Cocoa S
Daytona Beach S
Ft. Lauderdale B
Ft. Myers S
Ft. Pierce S
Ft. Walton Beach S
Gainesville S
Jacksonville B
Jacksonville F
Key West S
Lakeland S
Miami B
Orlando B
Panama City S
Pensacola S
Sarasota B
Sarasota D
St. Petersburg B
St. Petersburg M
Tallahassee B

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Tampa B
West Palm Beach B

GEORGIA \$4,800,000

Albany S
Athens S
Atlanta B
Atlanta D
Atlanta R
Augusta B
Columbus B
Macon B
Rome S
Savannah B
Valdosta S
Waycross S

HAWAII \$1,000,000

Hilo S
Honolulu B
Honolulu D
Maui S
Wailuku S

IDAHO \$600,000

Boise B
Idaho Falls S
Lewiston S
Pocatello S
Twin Falls S

ILLINOIS \$10,700,000

Alton S
Aurora B
Bloomington S
Bradley S
Carbondale B
Centralia S
Chicago B
Chicago D
Chicago R
Danville B
Decatur B
East St. Louis B
Elgin S
Evanston B
Galesburg S
Joliet S
Oak Lawn S
Oak Park S
Peoria B
Rockford B
Springfield B
Waukegan S

INDIANA \$5,900,000

Bloomington S
Columbus S
Elkhart S
Evansville B
Ft. Wayne B
Gary B
Indianapolis B

Kokomo B
Marion S
Michigan City S
Muncie B
Quincey S
Richmond S
South Bend B
Sterling S
Terre Haute B
Vincennes S
West Lafayette S

IOWA \$2,700,000

Burlington B
Cedar Rapids B
Davenport B
Des Moines B
Dubuque S
Ft. Dodge S
Marshalltown S
Mason City S
Ottuma S
Sioux City B
Waterloo B

KANSAS \$1,800,000

Colby S
Emporia S
Garden City S
Great Bend S
Hays S
Hutchinson B
Manhattan S
Parsons S
Pratt S
Salina B
Topeka B
Wichita B

KENTUCKY \$2,300,000

Bowling Green S
Covington S
Elizabethtown S
Hopkinsville B
London S
Lexington B
Louisville B
Owensboro S
Paducah S

LOUISIANA \$2,900,000

Alexandria S
Baton Rouge B
Lafayette S
Lake Charles S
Monroe S
New Orleans B
New Orleans D
Shreveport B

MAINE \$1,000,000

Bangor B
Lewiston S
Portland B

Presque Isle S
Waterville S

MARYLAND \$3,700,000

Baltimore B
Baltimore D
Bethesda D
Cumberland S
Hagerstown S
Salisbury S
Silver Springs S

MASSACHUSETTS \$6,300,000

Boston B
Boston D
Brockton S
Fall River B
Fitchburg S
Framingham S
Greenfield S
Hyannis S
Lynn S
Pittsfield B
Springfield S
Tewksbury S
Worcester B

MICHIGAN \$7,400,000

Alpena S
Ann Arbor S
Battle Creek S
Detroit B
Detroit R
Escanaba B
Flint B
Grand Rapids B
Jackson S
Kalamazoo B
Lansing B
Mt. Clemens S
Mt. Pleasant S
Muskegon S
Pontiac S
Port Huron S
Saginaw S
St. Joseph S
Traverse City B

MINNESOTA \$3,400,000

Duluth B
Hibbing S
Mankato S
Minneapolis B
St. Cloud S
St. Paul B
Rochester B

MISSISSIPPI \$1,000,000

Columbus S
Greenville S
Greenwood B
Gulfport S
Hattiesburg S

The Core Memory Project

Jackson B
Meridian S

MISSOURI \$5,100,000

Jefferson City B
Joplin B
Kansas City B
Sedalia S
Springfield B
St. Joseph S
St. Louis B

MONTANA \$500,000

Billings S
Butte B
Great Falls S
Missoula S

NEBRASKA \$1,500,000

Columbus S
Grand Island B
Lincoln B
North Platte S
Omaha B
Scottsbluff S

NEVADA \$1,800,000

Las Vegas B
Reno B
Sparks X

NEW HAMPSHIRE \$700,000

Claremont S
Dover S
Manchester B

NEW JERSEY \$8,100,000

Asbury Park B
Atlantic City B
Bridgeton S
Camden B
Denville S
Elizabeth B
Fair Lawn S
Jersey City S
Newark B
New Brunswick B
Paterson B
Trenton B

NEW MEXICO \$800,000

Albuquerque B
Gallup S
Las Cruces S
Roswell S
Santa Fe S

NEW YORK \$26,800,000

Albany B
Amsterdam S
Auburn S
Batavia S
Binghamton B
Brooklyn B

Bronx S
Buffalo B

Canadaigua S
Elmira B
Glens Falls B
Hempstead B
Hornell S
Ithaca M
Ithaca S
Jamestown S
Newburgh B
New York B
New York D
Patchogue B
Potsdam S
Poughkeepsie S
Rochester B
Schenectady B
Staten Island S
Syracuse B
Utica B
Watertown S
Westchester B
White Plains B

NORTH CAROLINA \$4,400,000

Asheville B
Charlotte B
Durham S
Fayetteville S
Gastonia S
Greensboro B
Greenville S
Hickory S
Jacksonville S
Raleigh B
Rocky Mount S
Wilmington B
Winston Salem B

NORTH DAKOTA \$600,000

Bismarck S
Fargo B
Grand Forks S
Minot S

OHIO \$228,500,000

Akron B
Ashtabula S
Cambridge M
Canton B
Chillicothe S
Cincinnati B
Cleveland B
Columbus B
Dayton B
Dayton D
Dayton M
Dayton R
Defiance S
Enon X
Hillsboro S
Hamilton B

Lima B
Lorain S

Mansfield B
Portsmouth S
Sandusky S
Springfield S
Steubenville S
Toledo B
Warren S
Washington C H F
Youngstown B
Zanesville B

OKLAHOMA \$1,800,000

Altus S
Bartlesville S
Enid B
Lawton S
Muskogee S
Oklahoma City B
Ponca City S
Tulsa B

OREGON \$2,000,000

Eugene B
Medford S
Portland B
Salem S

PENNSYLVANIA \$14,300,000

Allentown B
Altoona B
Bethlehem B
Bradford S
Chester S
Du Bois S
Easton S
Erie B
Freedom S
Greensburg S
Harrisburg B
Hazleton S
Irwin S
Johnstown B
Lancaster S
Mount Joy F
New Castle S
New Kensington S
Norristown S
Oil City S
Philadelphia B
Pittsburgh B
Pittsburgh D
Pottsville B
Reading B
Scranton S
Uniontown S
Wilkes-Barre B
Williamsport B
York B

RHODE ISLAND \$800,000

Providence B

The Core Memory Project

SOUTH CAROLINA \$1,600,000

Charleston B
Columbia B
Florence S
Greenville B
Spartanburg S

SOUTH DAKOTA \$600,000

Aberdeen B
Rapid City S
Sioux Falls B

TENNESSEE \$5,200,000

Bristol B
Chattanooga B
Jackson S
Knoxville B
Memphis B
Morristown F
Nashville B
Oak Ridge S

TEXAS \$12,200,000

Abilene B
Alice S
Amarillo B
Arlington F
Austin B
Beaumont B
Bryan S
Corpus Christi B
Dallas B
Dallas R
El Paso B
Fort Worth B
Galveston S
Harlingen S
Houston B
Laredo S
Longview S
Lubbock B
Lufkin S
Midland S
Plainview S
San Angelo S
San Antonio B
Sherman S
Texarkana B
Tyler B
Uvalde S
Waco S
Victoria S
Wichita Falls B

UTAH \$800,000

Ogden B
Provo S
Salt Lake City B

VERMONT \$400,000

Burlington B
Rutland S

VIRGINIA \$3,600,000

Charlottesville B
Danville S
Lynchburg B
Newport News S
Norfolk B
Petersburg S
Richmond B
Roanoke B
Staunton S
Wytheville S

WASHINGTON \$3,000,000

Bellingham S
Bremerton S
Everett S
Kennewick S
Olympia S
Seattle B
Spokane B
Tacoma B
Walla Walla S
Wenatchee S
Yakima B

WEST VIRGINIA \$1,800,000

Beckley S
Bluefield S
Charleston B
Clarksburg S
Huntington B
Parkersburg S
Wheeling B

WISCONSIN \$5,400,000

Eau Claire B
Fond Du Lac S
Green Bay B
La Crosse S
Madison B
Milwaukee B
Racine B
Rhineland S
Viroqua F
Waukesha S
Wausau B
West Salem S

WYOMING \$200,000

Casper S
Cheyenne S

How NCR Contributes to The Economy of Your Province

ALBERTA \$1,100,000

Calgary B
Edmonton B
Lethbridge S

BRITISH COLUMBIA \$1,100,000

Kelowna S
Prince George S
Vancouver B

Vancouver D
Victoria S

MANITOBA \$800,000

Brandon S
Winnipeg B

NEW BRUNSWICK \$300,000

Fredericton S
Moncton S
Saint John S

NEWFOUNDLAND \$300,000

St. John's B

NOVA SCOTIA \$450,000

Halifax B
Sydney S

ONTARIO \$10,300,000

Barrie S
Cornwall S
Fort William S
Hamilton B
Kingston S
Kitchener S
London B
North Bay B
Oakville S
Ottawa B
Owen Sound S
Pembroke S
Peterborough S
Sarina S
Sault Ste. Marie S
St. Catharines S
Sudbury S
Timmins S
Toronto B
Toronto D
Toronto M
Windsor S

PRINCE EDWARD ISLAND \$50,000

Charlottetown S

QUEBEC \$3,500,000

Chicoutimi S
Dorval S
Drummondville S
Montreal B
Noranda S
Quebec B
Rimouski S
Sherbrooke S
Trois Rivières B
Ville d'Anjou S

SASKATCHEWAN \$600,000

North Battleford S
Prince Albert S
Regina B
Saskatoon B



SERVING THE WORLD OF BUSINESS

NCR operates in one of the most challenging and constructive of all business fields, for the company's chief effort is directed toward helping other businesses operate more effectively.

All over the world the information processing problem continues to intensify. The preceding pages are an effort to show how this problem is being met and why NCR's historic role — "serving the world of business" — can be expected to take on new meaning with each succeeding year.



THE NATIONAL CASH REGISTER COMPANY

...and so much more!

HARRIS 25x38 Two Color S-F- offset cover

HARRIS 38x50 " " " " Inside



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