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BUSINESS AUTOMATION

GE Aims at Second In World Market

Putting their 'progress' slogan to good use, General Electric carefully pours technology into one of their favorite products.

GE Aims At Second in World Market

From toasters to turbines, flashbulbs to jet engines, General Electric Co. manufactures over 200,000 products for home, industry and defense. In effect, its large and diversified activities encompass more than 110 separate businesses. As a corporation, it has 5,000 business competitors, yet since 1956, its gross sales have topped $4 billion per year. Its motto—and its guide: "Progress is our *most important* product."

Apart from progress, however, another of GE's most important products is the electronic digital computer—a product with which the company has had a great deal of experience and for which it sees a promising and profitable future.

GE is no Johnny-come-lately in the field of computers. As early as 1920, GE designed the first practical electric computer—a D-C calculating board. During World War II, GE differential analyzers (a type of computer) were used to study radar, rotating machinery and airplane stresses. Computer-controlled GE firing systems protected the Air Force B-29s.

Following the war, other GE computers (differential analyzers) helped to develop trajectory data on the V-2 rocket.

Also a pioneer in the use of computers, GE purchased and installed the world's first electronic digital computer for business data processing—the Univac I, which still operates at GE's Appliance Park in Louisville, Ky. along with three GE 225's doing order processing, inventory control and engineering/scientific applications. With more than 120 computers installed and operating throughout the corporation, GE ranks as the foremost commercial computer user.

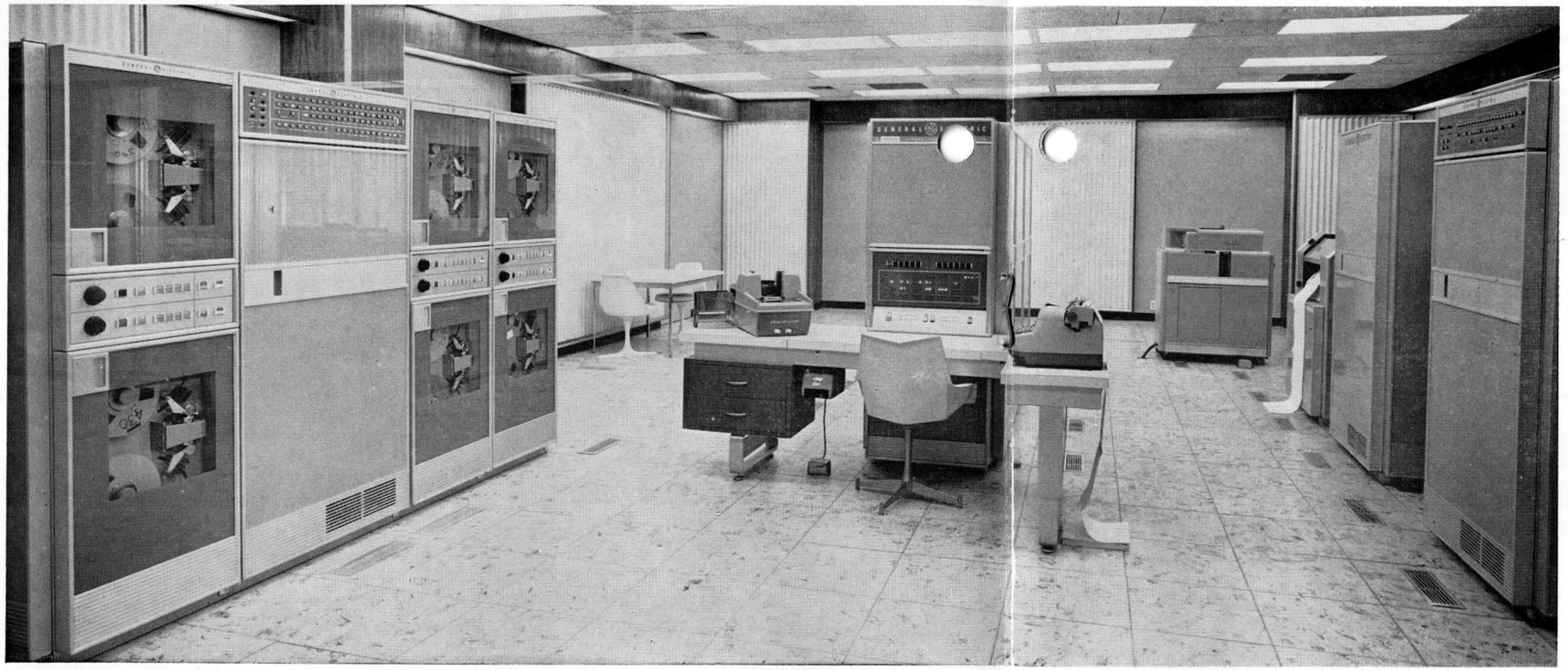
As a producer of computers, GE first began to concentrate all of its computer activities into one department and take a level-headed look at their commercial possibilities late in 1955. The Bank of America and Stanford Research Institute were just completing a five-year program at that time to develop an Electronic Recording Method of Accounting (ERMA). They were looking for a manufacturer to take their bulky prototype machine and refine it for production.

The home of the GE Computer Dept. in Phoenix.

The Stanford Research prototype computer covered 4,100 sq. ft. of area and used 8,200 vacuum tubes, 34,000 diodes and 200 miles of wiring, but it had proved two important things: It was functional and it had established the feasibility of using magnetic ink encodings for the high speed, high volume processing of bank checks.

GE's decision to refine and manufacture the ERMA system was one of the company's biggest financial gambles. The project took over three years of research, development, engineering and production. A new technological development at that time, the transistor, was introduced to help

A GE technician examines a section of computer core memory.



The GE-225 is a heavy competitor in the medium scale field. The smaller 215 and the faster 235 are compatible with the 225 in peripheral equipment and programing packages.

cut down the weight, size and power consumption of the original machine.

The gamble paid off. GE's computer worked, and GE got the contract to supply the equipment for 13 Bank of America data processing sites throughout California. In time, of course, the ERMA principle of magnetic ink character recognition (MICR) received the approval of the American Bankers Assn. and became an industry standard. GE found itself solidly in the forefront of the financial EDP market.

Since then, 32 ERMA systems have been produced, delivered and installed at the Bank of America. An additional 65 GE-210 computer systems, the commercial modification of ERMA, have been installed in other financial institutions across the country. Today, more than 70 percent of the nation's checks are processed by the MICR method. Of the 100 largest banks in the nation, 27 have installed a total of 81 GE computers; 4.8 million demand deposit accounts are being handled each night by GE equipment.

On Jan. 27, 1956, the formation of GE's new Industrial Computer Section at Electronics Park, Syracuse, N.Y., was announced. H. R. Oldfield, Jr., formerly the manager of GE's Microwave Laboratory, was named general manager; Clair C. Lasher, a youthful company veteran from Kittaning, Pa., was appointed manager of marketing. Lasher became general manager two years later.

The $50 million ERMA contract was approved in April, 1956, the Computer Section was elevated to departmental status, and the growing organization began to look for a new headquarters. After screening 187 potential sites, the department settled in Phoenix. On Dec. 2, 1956, 136 personnel moved into temporary, rented quarters and started to work.

With progress comes permanence

Construction of a permanent manufacturing facility was soon started, and late in 1959, the department moved into a new 204,000 sq. ft. building 12 miles north of downtown Phoenix.

In June 1960, GE announced the GE-225 computer, a medium-sized system which is basically binary but uses decimal arithmetic commands (see BUSINESS AUTOMATION, Aug. 1960). Renting for $7,000 a month, the GE-225 has a memory capacity of 8,000 to 16,000 words and features a 900 line per minute printer. It carries a basic purchase price of about $250,000.

Still, the company's total computer activity centered around one headquarters. Then, early in 1961, Harold A. Strickland, vice president and general manager of the Industrial Electronic Div., announced the separation of the Computer Department and the industrial process control computer business "to further improve the company's ability to pinpoint—and serve—our customer's needs." Process control computer operations moved to a 50,000 sq. ft. Peoria Ave. plant about two miles away, and were placed under the direction of the Industry/Control Department.

The Computer Department's facilities served it well until June of last year, when increased business and a need for more manufacturing space caused the company to construct a 190,000 sq. ft., $4 million addition to the building.

During this period, GE has added to its data processing product line at every opportunity. It now makes numerous peripherals, plus several highly functional pieces of data communications equipment. Last February, the company expanded its computer line for the first time in nearly three years with the announcement of the new GE-215 computer system, a smaller version of the GE-225 (see BUSINESS AUTOMATION, March 1963). In May, a larger and speedier version of the same system was introduced as the GE-235 (see BUSINESS AUTOMATION, May 1963). The three systems are compatible in both peripherals and programing packages.

Still another computer system, rumored to be in the prototype stage and ready for announcement by the end of this year, will embody some of the thin film technology developed by the GE Computer Laboratory in Sunnyvale, Calif. The Computer Laboratory, situated 39 miles south of San Francisco, is a $1.5 million, 49,000 sq. ft. facility employing about 100 professional and administrative personnel which opened in January 1962, after moving from rented facilities in nearby Palo Alto.

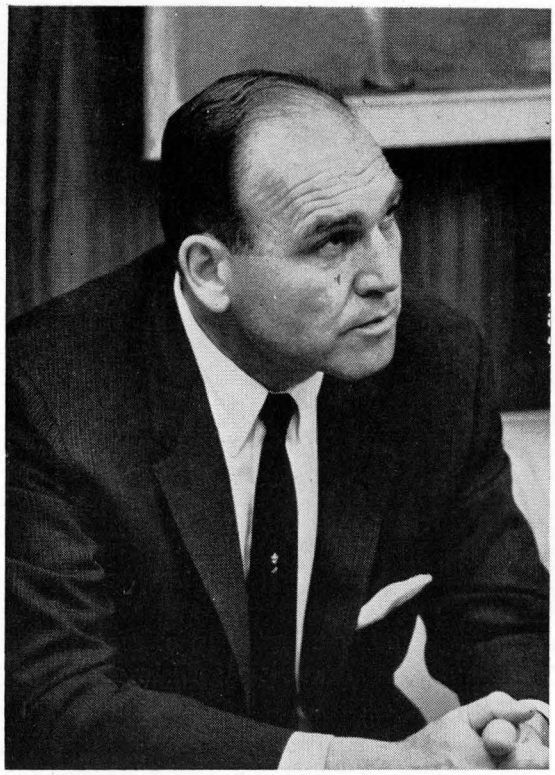
"During our buildup period, the Computer Department has followed a selective market approach, penetrating particular markets we thought we were capable of handling, rather than a broad approach to all markets," says Clair Lasher. Last February Lasher was named to the newly-created post of manager, Computer Offshore Operations, the overseas sales arm of the organization. As general manager of the Computer Department, Lasher was replaced by Harrison Van Aken, formerly general manager of GE's Communication Products Department, Lynchburg, Va.

"About the only product we bypassed because of our limited sales force," Lasher continues, "is the small desk-size electronic calculator."

The profit question

The question of profits in their computer operation is considered a corporate question at GE. General Electric Chairman, Ralph J. Cordiner, stays on the cautious side of the fence with this assertion: "We have not encouraged our associates to set an early target date that they have to maintain on making an annual profit." The possibility of a profit popping into the computer picture is dependent on the rental to sales ratio. The corporate opinion maintains that the faster the lease volume increases, the longer the profitability point is delayed. Nearly 90 percent of the Computer Department products are delivered on a rental basis.

Meanwhile, GE has developed—and marketed—a rather diverse range of equipment, including the Datanet-3100 production control equipment; the Datanet-3101 data collection system for transmitting fixed and variable data from remote input stations to a central accumulation point; Datanet-15, a 15-channel data transmission control which permits the GE-225 computer to receive and transmit information over telephone facilities; Datanet-30, a free-standing data-communications processor which GE an-



The new general manager of GE's Computer Department, Harrison Van Aken (above) replaces Clair Lasher who recently was appointed to head overseas operations. Lacy Goostree (right) is manager of marketing.

nounced June 21 (see p. 42); the Datanet-600, a paper-tape data terminal permitting a person to "dial" and send perforated-tape data over phone lines; and a new dual purpose, 900 line per minute printer with high density tapes, an addressable 1,024-character magnetic core memory and a buffering capacity which permits reading and printing from magnetic tapes packed at 556 characters per inch.

GE's computer hardware is backed up with a wide range of software, including:

ZOOM, a series of generators used to create assembly input with the characteristics of a general compiler, but closely related to an assembly program. ZOOM eliminates much of the detail work associated with programing at the assembly level while retaining the characteristic efficiency of an assembler—a helpful feature in documentation and debugging.

WIZ, a do-it-yourself engineering compiler for the automatic translation of algebraic expressions into computer-oriented languages.

GECOM, a COBOL-oriented compiler.

TABSOL, a decision table system much like DETAB-X.

FORTRAN II, for program compatibility between the GE-225 and the 7090.

Other GE software packages include those for Linear Programing and the Critical Path Method.

"Software is not one of our big problems," points out Clint DeGabrielle, manager of special systems sales. "IBM's SHARE library often is said to be a big advantage in their sales program, but few people realize that a large percentage of the programs in the SHARE library were originated by GE computer users.

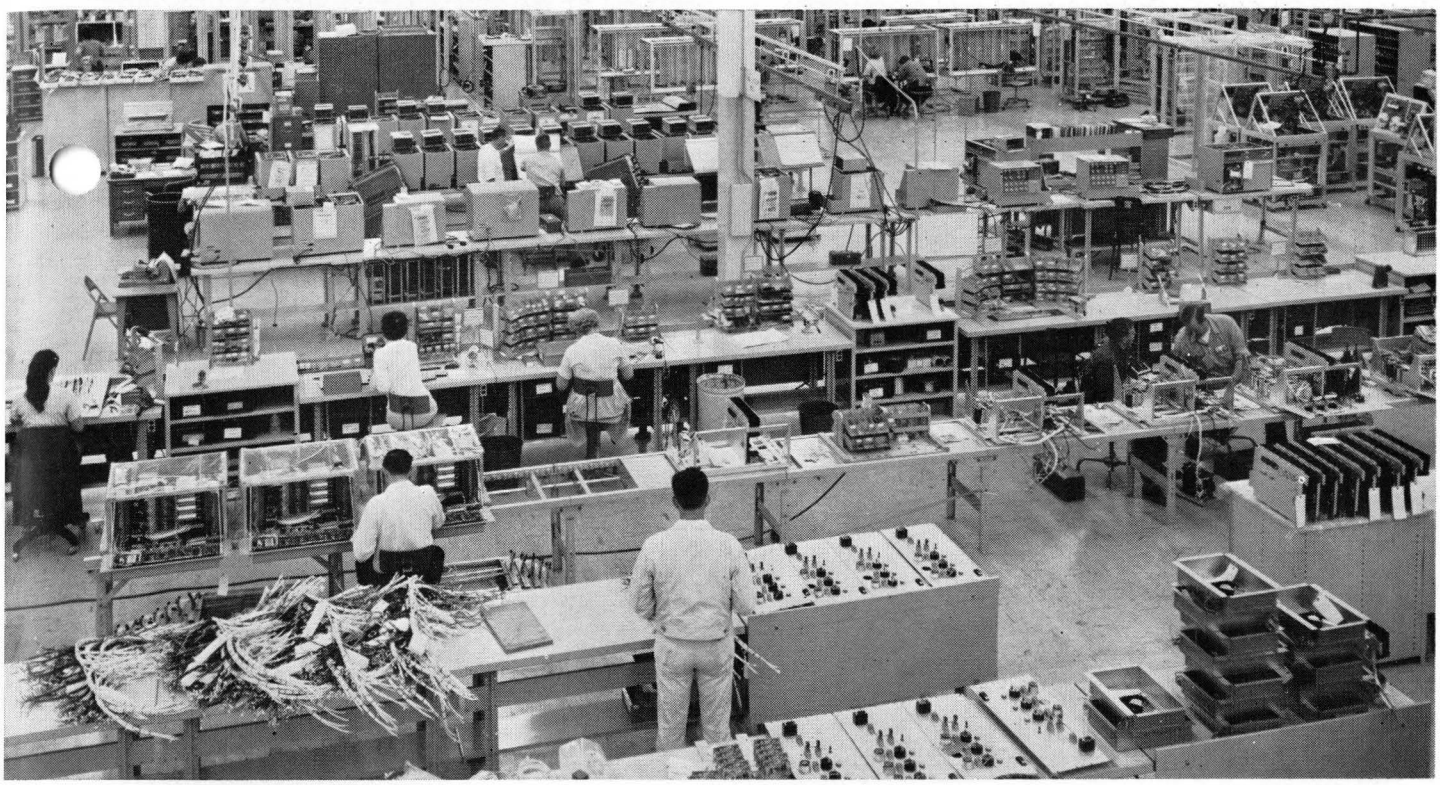
DeGabrielle sees software as a vital factor in computer competition, but he also sees a trend toward greater industry cooperation in programing.

"I think the need for more inter-compatability between computer programs will help to accelerate this trend," says DeGabrielle. "I'm speaking particularly of the need for one company to work with another on such projects as the complete preparation of elaborate Government proposals. There, compatability is a great boon."

Doubling the trouble

DeGabrielle, a shrewd analyst of data processing trends, also feels that the day is near when users will begin to assign a single computer to process control functions during the day and business data processing at night.

"It's a logical extension of the computer's capabilities," says DeGabrielle, "and I think we'll start to see more of these dual purpose computer



The electronics assembly area where computers are assembled and tested before shipment from Phoenix.

applications in the near future."

As GE's product line has grown, so has its sales force. Today, there are more than 200 people in the Computer Department's field sales organization. There are 30 sales offices across the country, and according to forecasts of L. R. Sheeley, manager of domestic marketing, "the size of our sales force will double about every three years for the forseeable future."

"Following several years of single market concentration, in which we captured a good piece of the banking business, GE is beginning to make in-roads into diversified markets," says Lacy W. Goostree, Jr., manager of marketing. With Lasher's recent appointment to spearhead a new offshore sales operation, much of this emphasis is sure to be directed at overseas markets.

"The question as GE sees it," says K. R. Geiser, manager of business planning, "is not who will be Number 2 in the United States, but who will be Number 2 in the world."

At home or abroad, GE's customers have found a multitude of applications for the electronic digital computer. GE computers are being used today for calculating cake mix formulas, for landing aircraft, for billing utility customers, for predicting hurricane paths, for measuring animal reflexes, and for probing the ocean depths.

Additional wonders are performed on GE computers at each of the company's six Information Processing Centers. These centers, under the direction of Dr. Helmut Sassenfeld, are located in Phoenix, Dallas, Schenectady, Chicago, Washington and New York City.

Supporting Uncle Sam

"By 1965," says Sassenfeld, "we believe there will be about 200 service bureaus in the country, selling services in the neighborhood of $450 million a year."

GE also sells support services to the Government. At the George C. Marshall Space Flight Center in Huntsville, Ala., for example, NASA employs about 400 GE programers, operators, mathematicians, engineers and other specialists to aid in the operation of one of the world's largest computer complexes.

In this and in the purchase of equipment, the Government is an important GE customer. Some 14 percent of the Computer Department's manpower is assigned to Government work; about 30 percent of its gross sales come from the

Government. The Military Air Transport Service (MATS) has recently ordered eight computer systems from GE—to date, their biggest single Government order.

The road has not been without its share of bumps. A GE-250 information storage and retrieval system was dropped "Because the market was not ready for it and the technology was too complex for the limited market." An optical scanner likewise was shelved, along with a highly-touted, but never delivered, high speed MICR encoder. An attempt to use a GE-225 to computerize the typesetting of classified ads on a new-born Phoenix newspaper received a great deal of publicity, but was extremely disappointing.

Even the structure of the Computer Department has suffered from "growing pains" during the past several years. Now ranging about $50 million in annual sales and employing about 3,800 people, the department has been undergoing a rapid and almost constant succession of organizational changes during the past several months.

Speculation that the department is about ready for divisional status is voiced throughout the company. Another big question is whether or not this move would result in a reunion with the process control computer operation, now being directed by a separate division.

Another of GE's greatest assets is an excellent internal training program, which has wooed many of the nation's outstanding college graduates to General Electric over the past 45 years. GE president Gerald L. Philippe is a graduate of this program; so are 12 of the 51 top-ranking officers of the corporation.

As an example of the youthful talent GE has been able to attract, Dr. Robert R. Johnson, a 34-year-old genius who has full responsibility for development of advanced products and for bringing them to production status on time, and is one of the outstanding men in the field of computer engineering. Now manager of advanced products operation for the Computer Department Johnson's outstanding patents to date include a new dynamic relationship in sequential logic, which is used to simplify the static Boolean equations used in digital computers; a digital principle for extracting complex roots of high order polynomials; and a new method for controlling machine tools, using numerical data as input.

GE's greatest single asset, however, probably is—as Strickland says—its tremendous background of experience with computers within its own organization. Computer Department experts draw heavily upon that experience in their daily efforts to come up with newer and better equipment, programs and applications. ■