Contact FOR CONTROL DATA PEOPLE

With articles on the origins of Control Data, photos of people and places and portrayals of people's activities and accomplishments, this issue of CONTACT makes several statements about the forces that brought Control Data together, who we are and what we care about.

While we look at ourselves and the humble beginnings of the company we work for, we also have an opportunity to think about the economic environment we function in. Whether you are a U.S. employee or owe your first allegiance to a subsidiary abroad, there is benefit to understanding more about the U.S. economic system. For most CONTACT readers, it is the system you deal with daily; for all of you, it is the system in which your employer functions.

On pages 17-19 is a quiz, not designed as much to test your smarts as to help you to determine how much you understand about economics and provide you with some basic information about the U.S. system. Try it and let us know how you fared. Maybe CONTACT can fill in some of the gaps in knowledge in future issues.

* * *

Our thanks for News and People items this month to Shirley Robinson, Commercial Credit, Baltimore, Md.; Sallye Carpenter, West Lake Village, Calif.; and Bonnie Drecktrah, Normandale, Minn. ■

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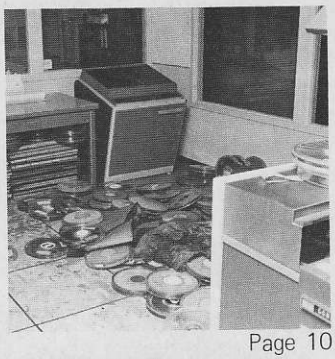

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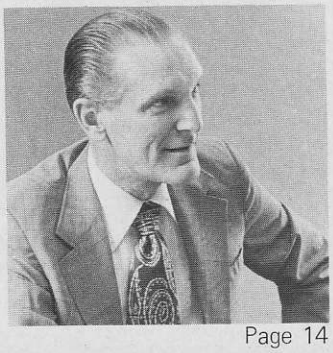

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CONTROL DATA CORPORATION
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ERA: Control Data's Forerunner In the Gloomy Glider Factory

Below: William C. Norris, Control Data chairman and chief executive.

by Joe Delmont
Business Editor
St. Paul (Minn.) Dispatch and Pioneer Press (Reprinted by permission.)

William C. Norris leaned back, smoothed his graying hair and surveyed the countryside spreading out 14 floors below his expansive office.

But the low-key executive who helped found a billion-dollar computer and financial services company that's now called Control Data wasn't seeing the rich bottom-land that falls away from the shimmering complex on I-494 in Bloomington.

He was seeing a cavernous warehouse facility on Minnehaha Avenue in St. Paul's Midway district that housed a World War II glider factory.

As history would have it, that hodgepodge of buildings was to witness more than the birth of aircraft. Following the war it was to become the incubator for one of the world's most important industries.

Best estimates indicate the U.S. computer industry now generates $50 billion in annual sales and employs 650,000 persons.

While worldwide figures are difficult to obtain, industry sources estimate that the U.S. market makes up only about half of the total international market.

The industry currently accounts for nearly four percent of the nation's total output of goods and services and is expected eventually to become the largest single component in the Gross National Product.

That's not too bad for a fledgling industry barely into its third decade.

If the airline industry had progressed as quickly, says one industry proponent,

Top: Inside the ERA facility in St. Paul, Minn., circa 1952. Photo courtesy of the **St. Paul Dispatch and Pioneer Press. Bottom:** The ERA special-purpose logistics computer built for the Navy in the early 50's. Much of ERA's work was for classified government contracts, and its computers were often shipped — by rail — under armed guard.

"we would be able to fly from New York to California in 10 minutes at the cost of $1."

The electronic computer is an outgrowth of development work done during World War II. The military urgently needed calculating devices to process large amounts of data for artillery firing tables and cryptographic work.

As the end of the war approached, it became obvious that much of the work already done could be applied to commercial uses. A group of Naval officers led by William Norris began casting about for a means to do this.

"This very talented group that had built up a large amount of experience in these advanced techniques was just going to dissipate," Norris recalls, "because everyone would just go off and do something else. We thought it was important for the Defense Department to have some of their capabilities preserved, so we proposed to start a company which would continue to do the same sort of work for the military, but which also would commercialize the technology.

"This was attractive to the military because they also were interested in seeing this experience preserved and used more broadly. At the same time, they recognized that commercialization would advance the art and the military would benefit from it."

With government funding assured, Norris and the others began looking for a place to establish the new company. Basically, they had to obtain financing and, if possible, ready-made facilities easily converted to their purposes.

National Cash Register Co. had the first opportunity to get in on the ground floor of the new industry but declined. NCR had been instrumental in much of the early war-time work for the Navy at its Dayton, Ohio, facility. But as the war wound down it wanted to get out of computers and back into cash registers.

"NCR always regretted the decision," says Norris. Many years later, NCR was to join Norris and his Control Data Corp. in a joint venture to develop sophisticated computer equipment.

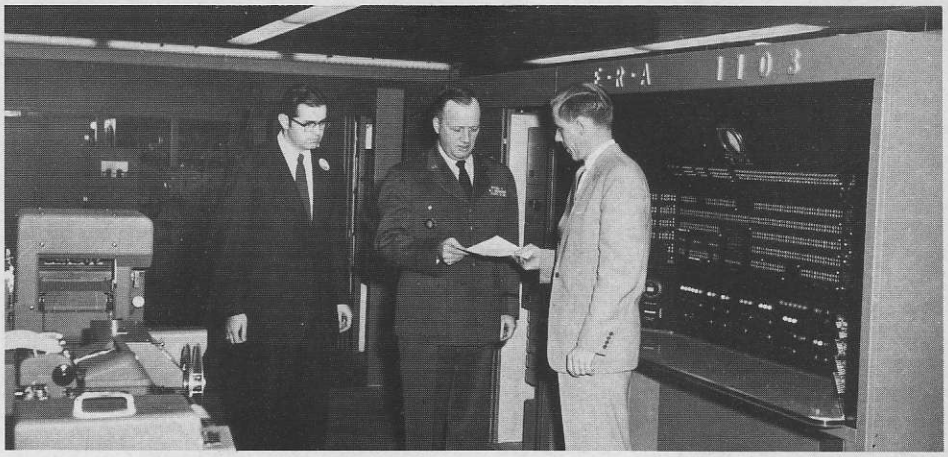
Finally, the Norris group met a St. Paul entrepreneur, one John E. Parker, who headed Northwest Aeronautical Corp. NAC had manufactured gliders during the war and was eager to convert to a peacetime business.

"There wasn't a hellava big market for troop gliders in peacetime," Norris noted.

NAC had the financing and the facilities; Norris' group had the technology. A new company, Engineering Research Associates (ERA), was formed in 1946 and immediately moved into the Minnehaha Avenue facility.

NAC had another advantage to offer: its track record with the government. "In order to do business with the government, you had to have ***done*** business with the government," recalls Russell Headley, a former ERA employee now with Univac. "It doesn't make an awful lot of sense, but that's the way it

Below: A magnetic drum memory device, with storage capacity of 125,000 bits, manufactured by ERA in the early 50's. **Bottom:** ERA contract representative Dick Clover (r), with Gen. Bowers (center) of the Air Force and Edward Allmon, director of the computer center at Eglin Air Force Base, upon acceptance of an ERA 1103 computer at Eglin in 1954. Clover is now Control Data's vice president, GSA and master contracts. **Right:** A **Minneapolis Tribune** reporter in 1957 clowning at the console of the Univac Scientific computer, an advanced version of the ERA 1103. Photo courtesy of the **Minneapolis Tribune.**



was. NAC had been doing a lot of business with the Navy, and that's one of the reasons why we located here."

ERA at that time was basically a research and development operation with little actual production. At the same time that some ERA employees were working on electronics, others – from the original NAC – were working on such elegant "carry-over" projects as airplane refueling equipment and machines for making candy bars.

Headley recalls that in those days ERA was a small company and its few dozen employees worked in an informal, yet stimulating and pleasant environment.

"The official hours were 8 a.m. to 4:30 p.m.," says Headley, "but because of the nature of the work much was done in off-hours.

"I became involved in the proposal side of the business, and the typical hours were involved running out to Wold Chamberlain Field to get a postmark on a proposal before midnight."

Thanks largely to Norris, all ERA employees had an opportunity to own part of the company. Ownership was split 50-50 between management and the engineers, with John E. Parker owning 45 percent of the company. Shares of stock were offered to the employees at 10 cents a share so that everyone could participate.

"I thought it was important not to have the company dominated by either side," says Norris.

ERA began constructing scientific computers, machines that could take a few pieces of information, perform a vast number of calculations and then spit out a relatively simply answer.

Halfway across the country, in Philadelphia, another group of computer experts was building their own machines.

Two scientists, J. Presper Eckert and John W. Mauchly, had produced the world's first all-electronic calculator in 1945. Dubbed ENIAC, the machine weighed 30 tons, covered 15,000 square feet of floor space and required 18,000 vacuum tubes.

It was to be more than a dozen years before Univac brought out the first completely transistorized computer.

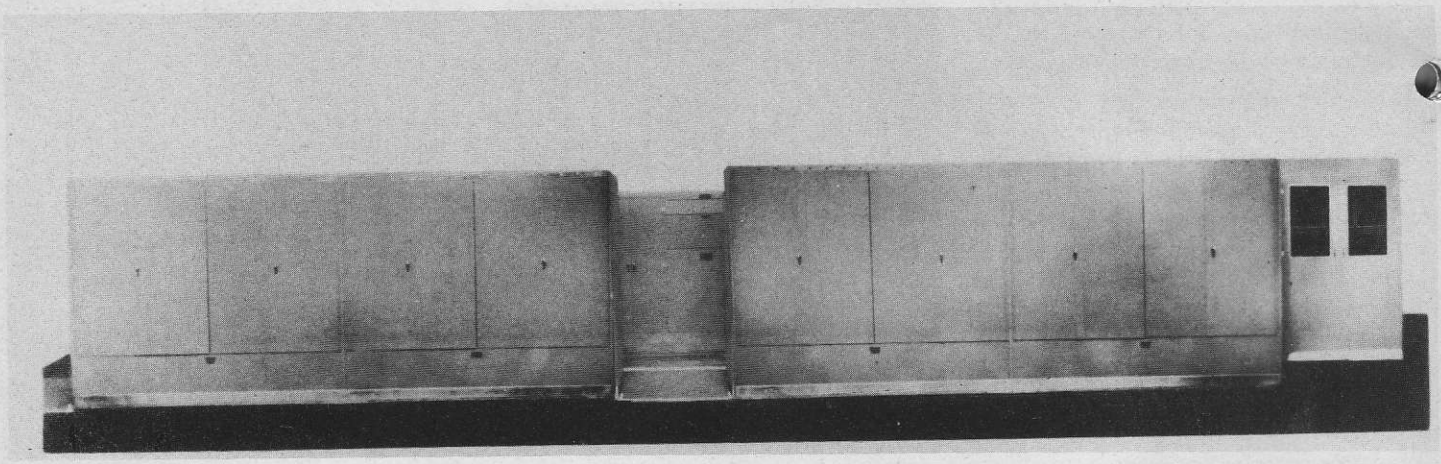
It's hard to imagine the problems involved in dealing with that many vacuum tubes, but listen to what Russell Headley recalls of those days:

"It was very difficult to control the quality of the tubes. You had to test each one individually to match for the proper characteristics. You had to really ride herd on the manufacturers and even then you had to reject a very high number of the tubes.

"Then all connections were hand-soldered. And each tube had eight connections. It was a real feat in itself to get the machines running."

Actually, ENIAC broke down only about an hour every other day, a remarkable record.

Below: A rather primitive-looking photo of an ERA 1101, one of the earliest large-scale computers. The photo, taken by the **St. Paul Dispatch and Pioneer Press** for a story on ERA that appeared in 1952, was given this caption: "ERA 1101 computer is typical of its 'electronic brains' equipment. It is more than 50 feet long with nearly 3000 vacuum tubes."



Eckert and Mauchly eventually formed their own company, the Eckert-Mauchly Computer Corp., which was acquired by Remington Rand in 1950. The computer industry as we now know it was beginning to take shape.

Two years later Remington Rand acquired ERA. With that move it controlled the two most significant development firms in the emerging computer industry.

ERA was building scientific computers that performed large numbers of calculations on a small amount of data, while E-M was building business-oriented machines that could run relatively simple calculations on massive amounts of data.

The next three years were crucial for the industry. If Remington Rand had been able to integrate the two development camps – St. Paul and Philadelphia – it probably could have controlled the industry.

But this problem took years to resolve and Remington Rand eventually merged with Sperry Gyroscope in 1955 to form the Sperry Rand Corp.

About this time IBM entered the computer market with a fury, anxious to make up time and ground lost to Remington Rand. The loss of two floors of IBM tabulating equipment to a Univac computer system at Metropolitan Life Insurance Co. is said to have sparked the effort.

"Had Remington Rand moved forward aggressively with further development work," maintains Norris, "and really consolidated their position and incorporated their experience from Metropolitan Life, the whole ballgame in the computer industry would have been very different.

"But Jim Rand (Remington Rand chief executive officer) didn't want to put the money in," says Norris. "He started marking time, and then Sperry came in and there was a big confusion for a couple of years."

Robert E. McDonald, Sperry Rand president and chief executive officer, recalls the situation somewhat differently.

"In the early days, each camp had very strong ideas about which approach should be taken (business vs. scientific) and each felt his approach was the only one with any viability for making money. That meant that those of us in management who weren't familiar with the deep technical knowledge had to decide which one to put our money on.

"On the other hand, IBM has tremendous financial resources. It had a strong hold on the punched card market (about 85 percent), where it rented its equipment. This meant that if we wanted to compete, we had to rent our equipment too."

This situation placed terrific financial pressure on companies like Remington Rand which was paying dearly for research and development while it was getting only minimal returns immediately from a series of small rental payments.

Norris suggests, however, that Remington Rand could have competed if it had had the will to do so.

Across the river, Minneapolis Honeywell Regulator Co. also was joining the chase for computer gold.

The computer industry has grown drastically in three decades, but most industry observers agree that the husky youth that was nurtured in that gloomy old glider factory on Minnehaha Avenue has not reached anywhere near his full potential. ■

Move Up to A Paper Warehouse

The people and ideas of ERA spawned many companies. Here is the story of one.

"Have several former Univac people resigned from the St. Paul Sperry Rand branch to form a firm called Control Data that will deal in electronic research?"

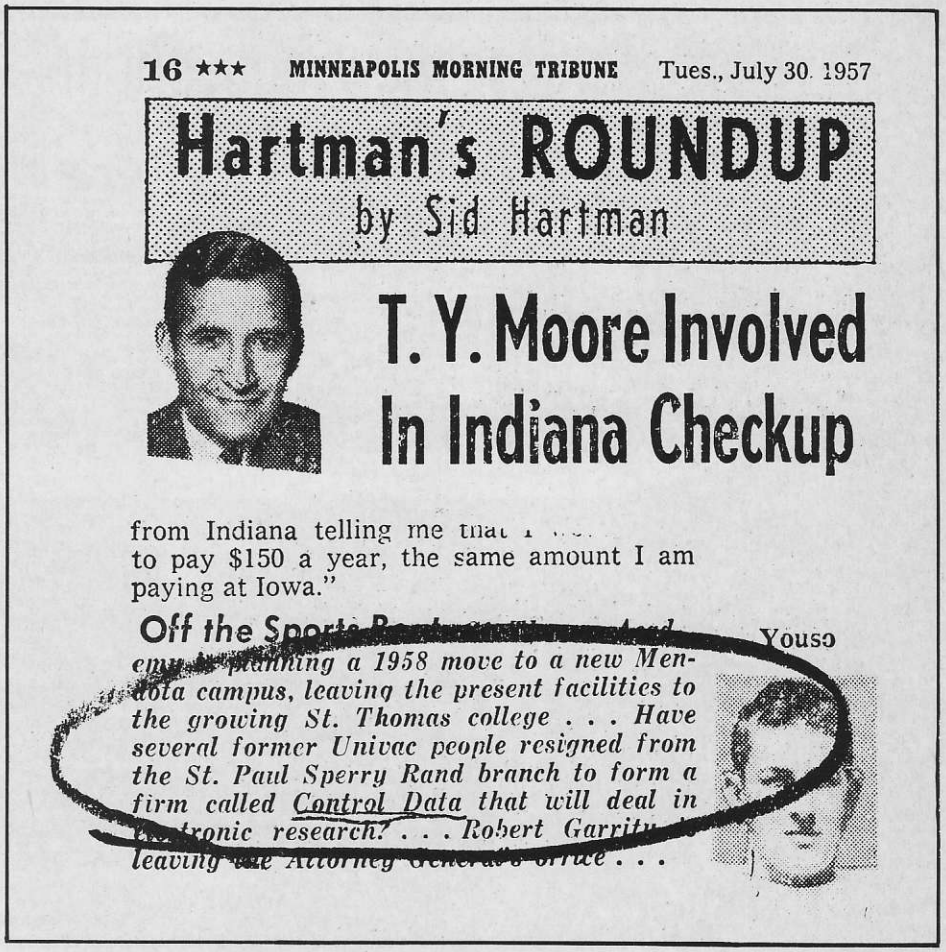
That question, posed on July 30, 1957 by a **Minneapolis Tribune** sports columnist with a penchant for dropping business tidbits onto the sports page, prompted a flurry of press calls to Sperry Rand's Univac division and its former vice president and general manager William C. Norris. Norris had no comment. He was too busy putting together the pieces of a new firm called Control Data.

By mid-August Control Data, with Norris at the helm, was formally announced, by mid-September it was starting production at its first plant, by mid-October it began development of its first large-scale computer and by the end of November it completed the first of what would be a long string of acquisitions. Control Data rapidly became the glamour child of the computer business and by May 1963 chairman W. C. Norris was smiling his wry smile on the cover of **Business Week** magazine.

Control Data's overnight rise to business fame and **Fortune 500** began at a **Minneapolis Tribune** newsprint warehouse in downtown Minneapolis, site of the company's first headquarters. Norris, once described by **Business Week** as ".....a man who combined the precise planning of a Navy officer with the steady hand of a tough engineer," started the company in July 1957 and immediately began attracting talented engineering and technical people from Univac, most of whom had worked for him and developed a deep loyalty to him during the ERA years.

One of the first to leave was Frank Mullaney, chief engineer of the Univac military division who joined Control Data in August as director of engineering. "I was scared witless," he recalls. "We really didn't have anything to do but line up people to work for us, which was a helluva lot easier than lining up contracts. During that first year things could have been pretty rough, but I think Norris can be credited with holding it all together. His outstanding characteristic was absolute confidence that we'd make it, and that confidence spread to everyone. Even though we had to make our money stretch by going on half salary — Norris called it 'puckering up tight', — the people were absolutely terrific."

Below: The story of Control Data's formation first broke in this **Minneapolis Tribune** sports column on July 30, 1957. It was the first mention of Control Data's name in print and the last time the company ever made the sports page.



16 ★★★ MINNEAPOLIS MORNING TRIBUNE Tues., July 30, 1957

Hartman's ROUNDUP

by Sid Hartman

T. Y. Moore Involved In Indiana Checkup

from Indiana telling me that I ...
to pay $150 a year, the same amount I am paying at Iowa."

Off the Sports ... And ...

... planning a 1958 move to a new Minneapolis campus, leaving the present facilities to the growing St. Thomas college . . . Have several former Univac people resigned from the St. Paul Sperry Rand branch to form a firm called Control Data that will deal in ... research? . . . Robert Garrity ... leaving the Attorney General's office . . .

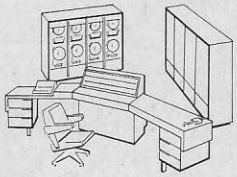
Youso

Although Control Data was formed to build specialized computers and peripheral products, it didn't take the company long to branch out into a different area. "We didn't have that much to do," recalls Mullaney, "so Seymour (Cray, former ERA/Univac computer design expert) began to build a computer that in retrospect ran counter to our original strategy." Cray — described by Norris as one "who always knows exactly what he wants to do" — began work in October on what was to become the 1604, the largest computer of its time and the first fully transistorized machine ever manufactured.

Below: Control Data's first advertisement for its 1604 computer appeared in the **Wall Street Journal** in 1959.

Now, a startling new concept in computer pricing!

This is Control Data Corporation's new **Model 1604** Solid-State General-Purpose Digital Computer



Facts for management

No other computer costing hundreds of thousands more can match the computing capacity, high speed, and performance of the new 1604 Computer.

You can see this *fully operating* computer in our plant. You can also see being built into other 1604's the skill and craftsmanship that insure quality and make delivery extremely short.

The exciting 1604 Computer, employing the very latest advances in computer design, has been created by the country's most experienced computer engineers . . . to give you the accuracy and reliability that count when performing your large-volume data processing and solving your large-scale scientific problems.

There are reasons why Control Data, and only Control Data, can give you so much at such a low cost. See for yourself before you invest much, much more than you need to. Write for free literature today.

Facts for the technical staff

HIGH CAPACITY INPUT-OUTPUT (standard equipment): 3 buffer input and 3 buffer output channels. 1 high-speed 48-bit input transfer channel. 1 high-speed 48-bit output transfer channel. As fast as 4.8 μs average per 48-bit word.

SOLID-STATE CONSTRUCTION: Diode Logic. Transistor Amplifiers. Magnetic Core Storage.

MAGNETIC CORE STORAGE: 32,768 48-bit words. Store data or 2 instructions at any address. 2.2 μs read access time. 6.4 μs cycle time. 4.8 μs effective cycle time.

VERSATILE INSTRUCTION LIST: 62 main instructions expand into many sub-instructions. Provides for: Floating Point. Multiple Precision. Masking. Program Interrupt. Indirect Addressing. Buffered Input-Output. Breakpoint.

OPERATING MODE: Parallel-Binary. Programmable to alpha-numeric, binary-coded decimal.

TYPE OF LOGIC: Single Address, 2 instructions per word.

REAL-TIME CLOCK: For on-line applications.

PROGRAM INTERRUPT: For input-output equipment and fault indications.

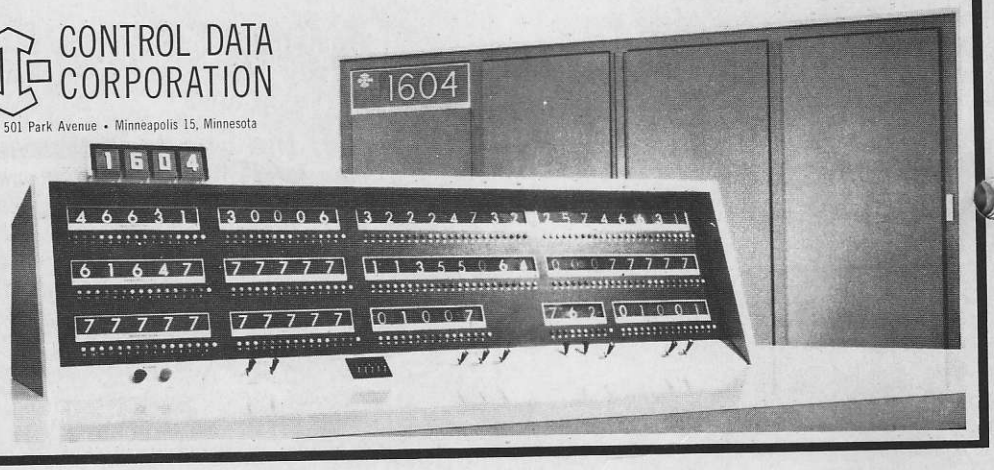
INDIRECT ADDRESSING: Provides advanced data processing ability.

COMPATIBILITY: With majority of other manufacturers' peripheral equipment.

MODEL 1607 MAGNETIC TAPE SYSTEM: Four 30KC tape handlers per system. 48-bit assembly-disassembly registers. Simultaneous read-write. Parity check. Binary and Alpha-numeric recording. 4 to 24 tape handlers per Model 1604.

CONTROL DATA CORPORATION

501 Park Avenue • Minneapolis 15, Minnesota



The "tight" operating budget, however, made sales promotion a bit primitive. Recalls Hank Forrest, now vice president, government relations, "I was Control Data's Washington representative back then, and my job was to sell — anything. We only had $600,000 from our original stock issue, so we really couldn't afford to produce a good working model of the 1604. We had no clear way of showing how the machine would work and we couldn't offer any guarantee that it would work. In fact, we managed to sell the first two on our personal word of honor. That's kind of amazing, considering that we didn't carry that much weight in Washington compared to some of the other companies. Our office was my house and my wife was the unpaid secretary. After I ran up a $50 phone bill one month Norris told me I couldn't make any more phone calls to Minneapolis, we could only communicate by mail."

Jim Thornton (ERA class of '50) jumped the Univac ship in early 1958, because, he said, "The people I most respected, Norris, Cray and Mullaney, were gone." Thornton began work under Cray on the 1604, and although life was a bit spartan ("We worked a lot of long hours and it seemed we were always dodging fork lifts carrying rolls of paper,") he described the 1604 project as "surprisingly smooth. The company may have been struggling financially but Norris never pressured the people who were on the work bench wiring up the damn thing. Except for a minor problem with a tape system that Chuck Hawley (former Univac/ERA employee, now with Control Data's research and advanced design laboratory in Arden Hills, Minn.) rebuilt in just three months,

Top left: The McGill Building at 501 Park Ave. in Minneapolis, site of Control Data's first headquarters/manufacturing plant. **Top right:** Control Data employees Hank Forrest (l) and Ed Voyles in front of the company's Washington, D. C. "office" in late 1957. Forrest, who no longer shares his home with Control Data, is now vice president, government relations. **Bottom:** At the shipment of the first Control Data 1604 computer in January 1960 are (l to r) William C. Norris, then president and board chairman, Frank Mullaney, vice president and board member, George S. Hanson, director of sales and contracts, and Bill Hyland, a representative from North American Van Lines.

everything came together and we were ready to ship the first 1604 by the end of 1959."

Shipment of that first machine to the Navy's post-graduate school at Monterey, Calif., solidified Control Data's position in the large computer market, spawning other orders from government agencies and contractors. From first year sales of $786,000, thanks in part to acquisition of Cedar Engineering Company in November 1957, the 1604 pushed Control Data's sales near the $10 million mark by the end of fiscal year 1960 and near $20 million by the close of fiscal year 1961.

The subsequent history of Control Data is almost common knowledge in American business circles — the string of massive new computers plus rapid growth in peripherals, data and financial services. In growing to its current multi-national proportions — 42,000 employees strong — Control Data has taken a few lumps. But a stubborn confidence, instilled by the early years in a glider factory and a warehouse and instilled by the character of its chief executive, each year makes Control Data stronger and more capable, while many companies, including some of the largest, are nowhere to be seen in the business.■