

# THE SOUL OF A NEW MACHINE

*Tracy Kidder*

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# 1

## HOW TO MAKE A LOT OF MONEY

FOR A TIME after the first pieces of Route 495 were laid down across central Massachusetts, in the middle 1960s, the main hazard to drivers was deer. About fifteen years later, although traffic went by in processions, stretches of the highway's banks still looked lonesome. Driving down 495, you passed some modern buildings, but they quickly disappeared and then for a while there would be little to see except the odd farmhouse and acres of trees. The highway traverses some of the ghost country of rural Massachusetts. Like Troy, this region contains evidence of successive sackings: in the pine and hardwood forests, which now comprise two-thirds of the state, many cellar holes and overgrown stone walls that farmers left behind when they went west; riverside textile mills, still the largest buildings in many little towns, but their windows broken now, their machinery crumbling to rust and the business gone to Asia and down south. However, on many of the roads that lead back behind the highway's scenery stand not woods and relics, but brand-new neighborhoods, apartment houses, and shopping centers. The roads around them fill up with cars before nine and after five. They are going to and from commercial buildings that wear on their doors and walls descriptions of new enterprise. Digital Equipment, Data General—there on

the edge of the woods, those names seemed like prophecies to me, before I realized that the new order they implied had arrived already.

A few miles north of the junction of Route 495 and the Massachusetts Turnpike, off an access road, sits a two-story brick building, surrounded by parking lots. A sign warns against leaving a car there without authority. The building itself looks like a fort. It has narrow windows, an American flag on a pole out front, a dish antenna on a latticed tower. Mounted on several corners of the roofs, and slowly turning, are little TV cameras.

This is Building 14A/B — 14B was fastened seamlessly to 14A. Some employees call the place "Webo," but most refer to it as "Westborough," after the name of the town inside whose borders the building happens to exist. "Westborough" is worldwide headquarters of the Data General Corporation. Driving up to the building one day with one of the company's public relations men, I asked, "Who was the architect?"

"We didn't have one!" cried the beaming press agent.

Company engineers helped to design Westborough, and they made it functional and cheap. One contractor who did some work for Data General was quoted in *Fortune* as saying, "What they call tough auditing, we call thievery." However they accomplished it, Westborough cost only about nineteen dollars a square foot at a time when the average commercial building in Massachusetts was going for something like thirty-four dollars a foot. But looks do matter here. The company designed Westborough not just for the sake of thriftiness, but also to make plain to investors and financial analysts that Data General really is a thrifty outfit. "There's no reason in our business to have an ostentatious display," a company analyst for investor relations explained. "In fact, it's detrimental."

The TV cameras on the roofs, the first defense against unscrupulous competitors and other sorts of spies and thieves, must comfort those who have a stake in what goes on inside. As for me, I imagined that somewhere in the building men in uniforms were

watching me arrive, and I felt discouraged from walking on the grass.

The only door that opens for outsiders leads to the front lobby. A receptionist asks you to sign a logbook, which inquires if you are an American citizen, wants your license plate number, and so on. Still you cannot pass the desk and enter the hallways beyond—not until the employee you want to see comes out and gives you escort. When I inquired, the cheerful young receptionist said that once in a great while some outsider would try to break the rules and try to slip inside.

The lobby could belong to a motor inn. It has orange carpeting and some chairs and a sofa upholstered in vinyl, on which salesmen and would-be employees languish, awaiting appointments. Now and then, a visitor will stand and gaze into a plastic case. It contains the bare bones of a story that will feed the dreams of any ambitious businessman. THE FIRST NOVA, reads a legend on the case. Inside sits a small computer, about the size of a suitcase, with a cathode-ray tube — a thing like a television screen—beside it. A swatch of prose on the back wall, inside the case, explains that this was the first computer that Data General ever sold. But the animal in there isn't stuffed; the computer is functioning, lights on it softly blinking as it produces on the screen beside it a series of graphs — ten years' worth of annual reports, a precis of Data General Corporation's financial history.

Left to their own devices, the engineers who worked in the basement of Building 14A/B could surely have produced a flashier display, but a visitor from Wall Street who had never paid attention to this company before might have felt faint before the thing. The TV screen was blue. The graphs, etched in white, appeared in rotating sequence, and each one bore a name. "Cumulative Computers Shipped Since Our Founding" started with 100 in 1969 and went right up to 70,700 in 1979. The image vanished. "Net Sales" appeared, to show that revenues had ascended without a hitch from nothing in 1968 to \$507.5 million in 1979. That graph went away and in its place came one describing profit margins. These

hardly varied. The profits just rolled in, year after year, along a nearly straight line, at about 20 percent (before taxes) of those burgeoning net sales.

Someone unaccustomed to reading financial reports might have missed the full import of the numbers on the screen, the glee and madness in them. But anyone could see that they started small and got big fast. Mechanically, monotonously, the computer in the case was telling an old familiar story — the international, materialistic fairy tale come true.

The first modern computers arrived in the late 1940s, and although many more or less single-handed contributions fostered the technology, they did so mainly in the shade of a familiar association in America among the military, universities and corporations. On the commercial side, IBM quickly established worldwide hegemony; it brought to computers the world's best sales force, all dressed in white shirts and blue suits. For some years the computer industry consisted almost exclusively of IBM and several smaller companies — "IBM and the seven dwarfs," business writers liked to say. Then in the 1960s IBM produced a family of new computers, called the 360 line. It was a daring corporate undertaking. "We're betting the company," one IBM executive remarked. Indeed, the project cost somewhat more than the development of the atom bomb, but it paid off handsomely. It guaranteed for a long time to come IBM's continued preeminence in the making of computers for profit. Meanwhile, though, new parts of the business were growing up, and out from under IBM.

In the early days, computers inspired widespread awe and the popular press dubbed them giant brains. In fact, the computer's power resembled that of a bulldozer; it did not harness subtlety, though subtlety went into its design. It did mainly bookkeeping and math, by rote procedures, and it did them far more quickly than they had ever been done before. But computers were relatively scarce, and they were large and very expensive. Typically,

one big machine served an entire organization. Often it lay behind a plate glass window, people in white gowns attending it, and those who wished to use it did so through intermediaries. Users were like supplicants. The process could be annoying.

Scientists and engineers, it seems, were the first to express a desire for a relatively inexpensive computer that they could operate themselves. The result was a machine called a minicomputer. In time, the demand for such a machine turned out to be enormous. Probably IBM could not have controlled this new market, the way it did the one for large computers. As it happened, IBM ignored it, and so the field was left open for aspiring entrepreneurs — often, in this case, young computer engineers who left corporate armies with dreams of building corporate armies of their own.

For many years sociologists and others have written of a computer revolution, impending or in progress. Some enthusiasts have declared that the small inexpensive computer inaugurated a new phase of this upheaval, which would make computers instruments of egalitarianism. By the late seventies, practically every organization in America had come to rely upon computers, and ordinary citizens were buying them for their homes. Within some organizations small bands of professionals had exercised absolute authority over computing, and the proliferation of small computers did weaken their positions. But in the main, computers altered techniques and not intentions and in many cases served to increase the power of executives on top and to prop up venerable institutions. A more likely place to look for radical change was inside the industry actually producing computers. Generally, that industry grew very big and lively, largely because of a single invention.

Shortly after World War II, decades of investigation into the internal workings of the solids yielded a new piece of electronic hardware called a transistor (for its actual invention, three scientists at Bell Laboratories won the Nobel Prize). Transistors, a family of devices, alter and control the flow of electricity in circuits; one standard rough analogy compares their action to that of fau-

cets controlling the flow of water in pipes. Other devices then in existence could do the same work, but transistors are superior. They are solid. They have no cogs and wheels, no separate pieces to be soldered together; it is as if they are stones performing useful work. They are durable, take almost no time to start working, and don't consume much power. Moreover, as physicists and engineers discovered, they could be made very small, indeed microscopic, and they could be produced cheaply in large quantities.

The second crucial stage in the development of the new electronics came when techniques were developed to hook many transistors together into complicated circuits — into little packets called integrated circuits, or chips (imagine the wiring diagram of an office building, inscribed on the nail of your little toe). The semiconductor industry, which is named for the class of solids out of which transistors are made, grew up around these devices and began producing chips in huge quantities. Chips made spaceships and pocket calculators possible. They became the basic building blocks of TVs, radios, stereos, watches, and they made computers ubiquitous and varied. They did not Eliminate the sizable, expensive computer; they made it possible for the likes of IBM to produce machines of increased speed and capability and still make handsome profits without raising prices much. At the same time, the development of chips fostered an immense and rapid growth of other kinds of computing machines.

After mainframes, as the big computers were known, came the cheaper and less powerful minicomputers. Then the semiconductor firms contributed the microprocessor, the central works of a computer executed on a chip. For a while, the three classifications really did describe a company's products and define its markets, but then mainframers and microcomputer companies started making minis and minicomputer companies added micros and things that looked like mainframes to their product lines. Meanwhile, a host of frankly imitative enterprises started making computers and gear for computers that could be plugged right into systems built around the wares of the big successful companies.

These outfits went by the names of "plug compatibles" and "third-party peripheral manufacturers"; those who lost some business to them called them "knockoff companies." Probably they helped maintain competition in prices. Many "software" houses sprang up, to write programs that would make all those computers actually do work. Many customers, such as the Department of Defense, wanted to buy complete systems, all put together and ready to run with the turn of a key; hence the rise of companies known as original equipment manufacturers, or OEMs — they'd buy gear from various companies and put it together in packages. Some firms made computer systems for hospitals; some specialized in graphics—computers that draw pictures—and others worked on making robots. It became apparent that communications and computing served each other so intimately that they might actually become the same thing; IBM bought a share in a satellite, and that other nation-state, AT&T, the phone company, started making machines that looked suspiciously like computers. Conglomerates, of which Exxon was only the largest, seemed determined to buy up every small computer firm they could. As for those who observed the activity, they constituted an industry in themselves. Trade publications flourished; they bore names such as *Datamation*, *Electronic News*, *Byte*, *Computermania*. IBM, one executive of a mainframe company once said, represented not competition but "the environment," and on Wall Street and elsewhere some people made a business solely out of attempting to predict what the environment would do next.

I once asked a press agent for a computer company what was the reason for all this enthusiasm. He held a hand before my face and rubbed his thumb across his fingers. "Money," he whispered solemnly. "There's so goddamn much money to be made." Examples of spectacular success abounded. The industry saw some classic dirty deals and some notable failures, too. RCA and Xerox lost about a billion dollars apiece and GE about half a billion making computers. It was a gold rush. IBM set up two main divisions, each one representing the other's main competition. Other

companies did not have to invent competitors and did somewhat more of their contending externally. Some did sometimes use illicit tools. Currying favor, seeking big orders for chips, some salesmen of semiconductors, for instance, were known for whispering to one computer maker news about another computer maker's latest unannounced product. Firms fought over patents, marketing practices and employees, and once in a while someone would get caught stealing blueprints or other documents, and for these and other reasons computer companies often went to court. IBM virtually resided there. Everyone sued IBM, it seemed. The biggest suit, the *Jarndyce v. Jarndyce* of the industry, involved the Justice Department's attempt to break up IBM. Virtually an entire large law firm was created to defend IBM in this case, which by 1980 had run ten years and had been in continuous trial for several.

Data General took its place in this bellicose land of opportunity in 1968, as a "minicomputer company." By the end of 1978 this increasingly undescriptive term could in some senses be applied to about fifty companies. Their principal but by no means their only business, the manufacture and sale of small computers, had grown spectacularly — from about \$150 million worth of shipments in 1968, to about \$3.5 billion worth by 1978 — and it would continue to grow, most interested parties believed, at the rate of about 30 percent a year. By 1978 Data General ranked third in sales of minicomputers and stood among the powers in this segment of the industry. The leader was Digital Equipment Corporation, or DEC, as it is usually called. DEC produced some of the first minicomputers, back in the early sixties. Data General was the son, emphatically the son, of DEC.

A chapter of DECs official history, a technical work that the company published, describes the making of a computer called the PDP-8. DEC sent this machine to market in 1965. It was a hit. It made DECs first fortune. The PDP-8, says the official history, "established the concept of minicomputers, leading the way to a multibillion dollar industry." But the book doesn't say that Edson de Castro, then an engineer in his twenties, led the team that de-

signed the PDP-8. The technical history mentions de Castro only once, briefly, and in another context. They expunged de Castro.

In 1968 de Castro and two other young engineers seceded from DEC. Several completely different versions of their flight exist and have by now acquired the impenetrable quality of myth. Did they quit because, after long and heartfelt labor on a new design, they found that DEC's management would not build their new machine? DEC's management did turn down a new design of de Castro's, and afterward, along with a man from another company named Herb Richman, de Castro and the two other engineers from Digital incorporated Data General and started building their own minicomputer. But did they design this new machine after they seceded, or had they done that job in secret, using DEC's facilities, while still on DEC's payroll? One version of the story suggested the latter. More than ten years later, DEC's founder and president would tell reporters from *Fortune*, "What they did was so bad we're still upset about it." But DEC never sued Data General's founders, and clearly there were other reasons why Digital might have become upset. For within a year, de Castro and company had set up shop in DEC's own territory and had started raking in the loot.

They rented space in what had been a beauty parlor, in the former mill town of Hudson, Massachusetts. Practically all that remains of that time is a black-and-white photograph of this first headquarters. In the foreground stand four young men with short hair, wearing white shirts and skinny ties and the sort of plain black shoes that J. Edgar Hoover's men favored. They are engaged in what is obviously meant to look like routine conversation. The linoleum floor, the metal furniture, evoke motor vehicle departments, and the youths in the picture could be members of some junior chamber of commerce, playing capitalists for a day. Not shown in this bemusing picture is the shrewd and somewhat older lawyer from a large New York firm who helped Data General's founders raise their capital and who became a crucial member of their team. What also doesn't show is the fact that some of

these young men were already computer engineers of no mean repute — their age in this case was no impediment, for computer engineers like athletes often blossom early.

They started Data General at an auspicious time. In the late 1960s, the period memorialized in John Brooks's *The Go-Go Years*, venture capital (among other things) abounded, and although they started out with only \$800,000, more lay in reserve. They also entered a good territory for fledglings. They could not have dreamed of moving in on IBM's markets without truly vast amounts of capital. But the people who bought minicomputers — engineers, scientists, and, mainly, purchasing agents of OEMs — understood the machines. A new manufacturer could reach them through relatively inexpensive ads in the trade journals, and didn't need to build a service organization right away, since these customers could take care of themselves. These were also the sorts of customers who could be expected to embrace a newcomer, if the price was right; they'd prefer a bargain to a brand name.

But around the time when Data General established itself in the beauty parlor, other entrepreneurs were starting up mini-computer companies at the rate of about one every three days. Only a few of those other new outfits survived the decade, whereas Data General, before it had exhausted its first and fairly modest dose of capital, achieved and never fell from that state of grace, a positive cash flow. Why?

The company's first machine, the NOVA, had a simple elegance about it that computer engineers I've talked to consider admirable, for its time. It had features that DEC's comparable offering didn't share, and it incorporated the latest, though not fully proven, advances in chips. Data General could build the NOVA very cheaply. Such an important advantage can depend, in computers, on small things. In the case of the NOVA, the especially large size of the printed-circuit boards — the plates on which the chips are laid down — made a crucial difference. For several reasons, large boards tend to reduce the amount of hardware in a computer. Data General used boards much larger than the ones

that DEC was using. Speaking of this difference and of other less important ones, one engineer remarked, "The NOVA was a triumph of packaging."

Good machines don't guarantee success, though, as RCA and Xerox and others had discovered. Herb Richman, who had helped to found Data General, said, "We did *everything* well." Obviously, they did not manage every side of their business better than everyone else, but these young men (all equipped with large egos, as one who was around them at this time remarked) somehow managed to realize that they had to attend with equal care to all sides of their operation — to the selling of their machine as well as to its design, for instance. That may seem an elementary rule for making money in a business, but it is one that is easier to state than to obey. Some notion of how shrewd they could be is perhaps revealed in the fact that they never tried to hoard a majority of the stock, but used it instead as a tool for growth. Many young entrepreneurs, confusing ownership with control, can't bring themselves to do this.

When they chose their lawyer, who would deal with the financial community for them, they insisted that he invest some of his own money in their company. "We don't want you running away if we get in trouble. We want you there protecting your own money," Richman remembered saying. Such an arrangement, though not illegal, might raise some eyebrows in some corners of the Bar Association. But the lawyer said, again according to Richman, "That's the first time anyone made an intelligent proposition to me." Richman also remembered that before they entered into negotiations over their second public offering of stock, after the company had been making money for a while and the stock they'd already issued had done very well indeed, their lawyer insisted that each of the founders sell some of their holdings in the company and each "take down a million bucks." This so that they could negotiate without the dread of losing everything ("Having to go back to your father's gas station," Richman called that

nightmare). As for the name of the theory behind selling enough stock to become millionaires, Richman told me, "I don't know how you put it in the vernacular. We called it the Fuck You Theory."

In the computer business, your market can be your fate. Although by the late 1970s it was hard to define a company's place in the industry by the sorts of machines that it made, certain broad historic distinctions in ways of doing business still divided a large part of the industry into three segments. The differences showed up in the nature of a company's expenditures. IBM and other mainframe companies spent more money selling their products and serving their customers than they did in actually building their machines. They sold their computers to people who were actually going to use them, not to middlemen, and this market required good manners. Microcomputer companies sold equipment as if it were corn, in large quantities; they spent most of their money making things and competed not by being polite but by being aggressive. Minicomputer companies split the differences more or less; they sold some machines and service to actual users, but spent most of their money on hardware and did a big business by selling machines in quantity to OEMs.

From these distinctions, others hung. A seasoned executive in marketing explained, "With micros it's even more competitive, but historically the world of minicomputers is very rough-and-tumble. IBM would say, 'You got a problem, Mr. Customer? A team of four will be there in an hour.' Implicitly a Data General would say to its customers, 'You have to look out for yourselves.' The sophisticated customer, particularly the OEM who buys a lot of computers and looks for discounts, not service, goes for minis. They're capable of living in a rough-and-tumble world. And I'm not sure that IBM, with its organization, can compete in the traditional minicomputer market. It's like putting a goldfish in a bowl with a piranha."

So you could say that Data General entered a territory that

asked for a certain brashness. And you could also say that life in this territory became less decorous than it had been, when Data General came along. They set out to get noticed, first of all.

In the lobby at Westborough hangs a copy of the first advertisement that Data General ever ran. It consists of just one page. On one side of the page is a grainy photograph of a man's face. This person looks about to do something very mean. On the other side of the ad, he speaks: "Fm Ed de Castro, president of Data General Corporation. Seven months ago we started the richest small computer company in history. This month we're announcing our first product: the best small computer in the world." The message goes on for a while and winds up as follows:

*Because if you're going to make a small inexpensive computer you have to sell a lot of them to make a lot of money. And we intend to make a lot of money.*

This ad's chief architect, a man named Allen Kluchman, who was the company's first director of marketing, told me with a smile, "That ad was independent of any aspect of Mr. de Castro's personality that I knew about at that time. He's the shyest guy I know. He's essentially a pretty humble, private guy."

The ad achieved a certain local fame. It said what many others presumably were thinking, but what none of them felt they should say publicly. For some years thereafter, most of Data General's advertisements contained something slightly brazen. One of the best-known ads wasn't published — some people in the company were by then apparently having second thoughts about the firm's image. But a copy of this unpublished ad hangs in de Castro's office. Over the Data General logo, on a field of white and blue, it reads:

*They Say IBM's Entry Into Minicomputers Will Legitimize The Market The Bastards Say, Welcome.*

Before Data General unveiled the NOVA in 1969 — at the industry's yearly fair, the National Computer Conference — the marketeer Kluchman talked a trade magazine into putting a picture of the NOVA on its cover. They rented billboards on the road from the airport to the conference and put a picture of the NOVA on them; at the hotel where most of the people attending the conference stayed, they talked the management into having bellboys distribute free copies of the *Wall Street Journal* with Data General's advertising flyer inside; at the show itself, they raised the placard bearing their company's name higher than any other. When it came to pricing their machine, they announced extraordinary discounts for customers who bought machines in quantity. Never mind that customers had to buy a virtual warehouse of NOVAs to get the truly big discount. Data General had brought a new ferocity, a bit of Forty-second Street, to the pricing of mini-computers.

"DEC owned 85 percent of the business and there was no strong number two. We had to distinguish ourselves from DEC," Kluchman remembered. "DEC was known as a bland entity. Data General was gonna be unblad, aggressive, hustling, offering you more for your money-----We spread the idea that Data General's salesmen were more aggressive than DEC'S, and they were, because ours worked on commissions and theirs worked on salaries. But I exaggerated the aggressiveness."

According to Kluchman, DEC actually gave them some help in setting up "the Hertz-Avis thing." DEC's management, he said, ordered their salesmen to warn their customers against Data General. "It was great! Because their customers hadn't heard about us." Kluchman imagined DEC's salesmen telling DEC's customers that a dangerous new company was on the prowl, and DEC's customers responding to this news by saying, "Where is this Data General, so we can be sure to avoid them? What's Data General's phone number, so we'll be sure not to call it?" Kluchman laughed. "The calls just rolled in. DEC's customers would say, 'We hear

**you're bad guys. You must be doing something we oughta know about."**

And thinking back to those first heady days, when nearly every little strategy seemed to pay off, and the first millions started coming in, Kluchman said, "It was probably more fun than I or anybody else has ever had in business. It was great ego satisfaction. It was just a *pure gas*."

At the end of fiscal 1978, after just ten years of existence, Data General's name appeared on the list of the nation's five hundred largest industrial corporations — in that band of giants known as the Fortune 500. It stood in five-hundredth place in total revenues, but much higher in respect to the various indices of profit, and for a while climbed steadily higher on the list. Surely by 1980 such a record entitled Data General to respectability. But some trade journalists still looked askance at the company; one told me Data General was widely known among his colleagues as "the Darth Vader of the computer industry." Investors still seemed jittery about Data General's stock. An article published in *Fortune* in 1979 had labeled Data General "the upstarts," while calling DEC "the gentlemen." The memory of that article, particularly the part that made it sound as if Data General routinely cheated its customers, still rankled Herb Richman.

Building 14A/B is essentially divided into an upstairs and a downstairs, and in one corner of the upstairs the corporate officers reside. A wall of glass separates them from the rest of the company. There is no mahogany here. If there is ostentation in the bosses' quarters, it is ostentation in reverse. The table in their conference room, it was proudly said, was the same that they had used when the company was small. Richman's office was comparatively plush. But saying, "We consider ourselves the Robert Hall of the computer industry," Richman pointed out that he had paid for all his furnishings himself and that what looked like paneling on his walls was really just wallpaper.

Among the founders of the company, only de Castro — the

much-talked-about president — and Richman remained engaged in daily operations. Richman had come up through the industry in sales — a supersalesman, some called him — and he had created and run Data General's sales force, which was known if not notorious for its aggressiveness. Curly-haired, trim and in his forties, Richman wore a nicely tailored denim jacket and no tie. "I'm one of the few guys that money made a nice guy out of," he said. "Before, I was just driven, clawing— Success has made me more rational and introspective." He remarked that not long ago he had been playing tennis with a man who had seemed to him just an ordinary fellow, but then he had found out that the man was actually president of an oil company. "And it was one of the largest oil companies in the world, and I was just in awe of him," said Richman. He added, softly, "And yet I bet my net worth greatly exceeded his."

The stock that Richman himself owned in Data General was worth about \$13 million then, but, he seemed to say, he was unhappy with the way certain organs of the press depicted his company's achievements. They were, Richman believed, too often depicted as "ruffians," not as merely rough, which they were proud to be. "We agree that a lot of things we've done around here are wild," he said. "But we can't understand why we're tabloid, instead of the *New York Times*"

Some part of Data General's reputation was easy to explain. The company had promoted it themselves, and maybe it had gotten a little out of hand. Richman suggested, "We've done so much so well for so long that everyone seems to think we have to be doing something illegal." A good point, but not a full accounting.

Some years back, in the early seventies, a company called Keronix accused Data General's officers of arranging the burning of a factory. Keronix had been making computers that performed almost identically to Data General machines. The theory was that Data General had taken a shortcut in attempting to get rid of this competitor. In time, the courts found no basis for those charges and dismissed them. Indeed, it seemed preposterous to think that

the suddenly wealthy executives of Data General would risk everything, including jail, and resort to arson, just to drive away what was, after all, a small competitor. But Wall Street didn't see it that way, apparently. When Keronix made its accusation, Data General's stock plummeted; there was such a rush to unload it that the New York Exchange had to suspend trading in it for a while. More peculiar was the fact that many years later, some veteran employees, fairly far down in the hierarchy, would say privately that they believed someone connected with the company had something to do with that fire. Not the officers, but some renegade within the organization. They had no basis for saying so, no piece of long-hidden evidence. It seemed to me that this was something that they wanted to believe.

I got this feeling more than once. Turning down the road to Building 14A/B one day, a veteran engineer pointed out the sign that warned against unauthorized parking. "The first sign you see says Don't," he remarked. He imagined another sign by the road; it would say: Use of Excessive Force Has Been Approved. The engineer laughed and laughed at the thought.

In a land of tough and ready companies, theirs, some of Data General's employees seemed to want to think, was the toughest and the readiest around.

Certainly Data General's reputation had other underpinnings besides advertisements and imagination. In an industry where sharp marketing practices were common, Data General's were as sharp as any, and by the late 1970s competitors were challenging some of them in federal court. To the contention, leveled in *Fortune*, that Data General played especially rough with its customers, it was only fair to add that many of Data General's customers knew very well what sort of market they were in, and moreover, it was clear that the company could not have survived if most of its customers had not felt at least fairly satisfied. But Data General was litigious, toward customers as well as others. "Sure," said Richman, "if people don't pay us or breach our contract, we litigate 'em." They did so at least in part to assure Wall Street that

they weren't the sort of company that would accumulate a crippling number of bad debts.

The salient feature of Data General, however — what that sharp-eyed, astonished visitor from Wall Street would have pondered— was its growth. This was indeed the industry's salient characteristic. In the main, computer companies that were not dying were growing; they had to do so just to stay alive, it seemed. But no company whose primary business was making computers had grown more rapidly than Data General. Bursts of growth were not uncommon, but Data General had been bursting for a decade, and what's more, it had been maintaining the highest profit margins in the industry next to IBM's. All this would have impressed the analyst from Wall Street, of course, but would also have given him pause.

Building 14A/B and its sparse furnishings, the facts that Data General paid its stockholders no dividends and that its top managers dispensed to themselves and other officers exceptionally small salaries, meting out rewards in the form of stock instead — all were signs of a common purpose. The company had displayed extravagance when it came to financing its tendency to go to court. Otherwise, the management seemed bent on saving all their cash to feed the hungry beast of growth. And, of course, the more this beast gets fed, the bigger it becomes, the more it wants to eat. It is one thing for a company with revenues of a million dollars a year to grow 30 or 40 percent in a year and quite another for a half-a-billion-dollar company to pull off the same trick.

Analysts on Wall Street sometimes become boosters of the companies they follow. Looking for an opinion that was certain to be disinterested, I asked an old friend, a veteran analyst of securities, to take a look at Data General's numbers. He had the advantage of never having followed the company before, and in return for anonymity he agreed to my proposal. A couple of weeks later, he called me back. It seemed to him that Data General was bent on continuing to grow at 30 to 40 percent a year. He pointed out that this meant large growth in everything — in the need for capi-

tal, new buildings, new employees. Between 1974 and 1978, for instance, Data General had hired about 7,000 new employees, roughly tripling its numbers; in one year alone the company had increased its ranks by 71 percent. The analyst imagined the difficulties of finding that many qualified people so quickly. And what must it be like, he asked, to work at a place like that? You'd come to work some morning and suddenly find yourself in charge of a dozen new people, or suddenly beneath a new boss to whom you would have to prove yourself all over again. "That sort of growth puts a strain on everything," the analyst concluded. "It's gonna be intriguing to see if they get caught." He thanked me for putting him onto such a marvelous entertainment.

Where did the risks lie? Where could a company go badly wrong? In many cases, a small and daily growing computer company did not fall on hard times because people suddenly stopped wanting to buy its products. On the contrary, a company was more likely to asphyxiate on its own success. Demand for its products would be soaring, and the owners would be drawing up optimistic five-year plans, when all of a sudden something would go wrong with their system of production. They wouldn't be able to produce the machines that they had promised to deliver. Lawsuits might follow. At the least, expensive parts would sit in inventory, revenues would fall, customers would go elsewhere or out of business themselves. Data General got one leg caught in this trap back around 1973. Six years later, a middle-level executive, sitting in an office upstairs at headquarters, remembered that time: "We were missing our commitments to customers. We just grossly fucked over our customers. We actually put some entrepreneurs out of business and I think some of them may have lost their houses. But we recovered from our shipment problems and never repeated them."

Another way of fouling up had less to do with a company's own growth than with the growth occurring all around it. From observers of the industry came such comments as: "Things change fast in the computer business. A year is a hell of a long time. It's

like a year in a dog's life." In every segment of the industry, companies announced small new products for sale every day. Companies brought out new lines of computers, much more powerful than the ones they replaced, only every few years or so; but considering all the work that went into them and the fact that they required a redirection of effort throughout a company, the pace at which these major announcements came was very rapid too. Conventional wisdom held that if a company fell very far behind its competitors in producing the latest sorts of machines, it would have a hard time catching up. And failure to stay abreast could have serious consequences, because major new computers played crucial roles in the other business of the companies; they helped them sell all their little products and, often, their older types of machines.

At some companies the task of guarding against this sort of crisis fell mainly to engineers, working below decks, as it were. Executives might make the final decisions about what would be produced, but engineers would provide most of the ideas for new products. After all, engineers were the people who really knew the state of the art and who were therefore best equipped to prophesy changes in it. At Data General, an engineer could play such an important role. It was there for the taking. The president, de Castro, liked "self-starters," it was said. Initiative was welcomed at Data General, and in the late seventies it appeared that the company had need of some initiative from its engineers. For Data General was in a bind. The firm had fallen behind the competition: it hadn't yet produced the latest big thing in minicomputers.

Early in 1979 the businessman who told me about Data General's problems and recovery back in '73 hit upon a heroic metaphor for success in the computer business. "The major thing," he said, "is avoiding the big mistake. It's like downhill ski racing: Can you stay right on that edge beside disaster? At Data General we keep coming up with these things that are basically acts of recovery. What Tom West and his people are doing is a great act of recovery."