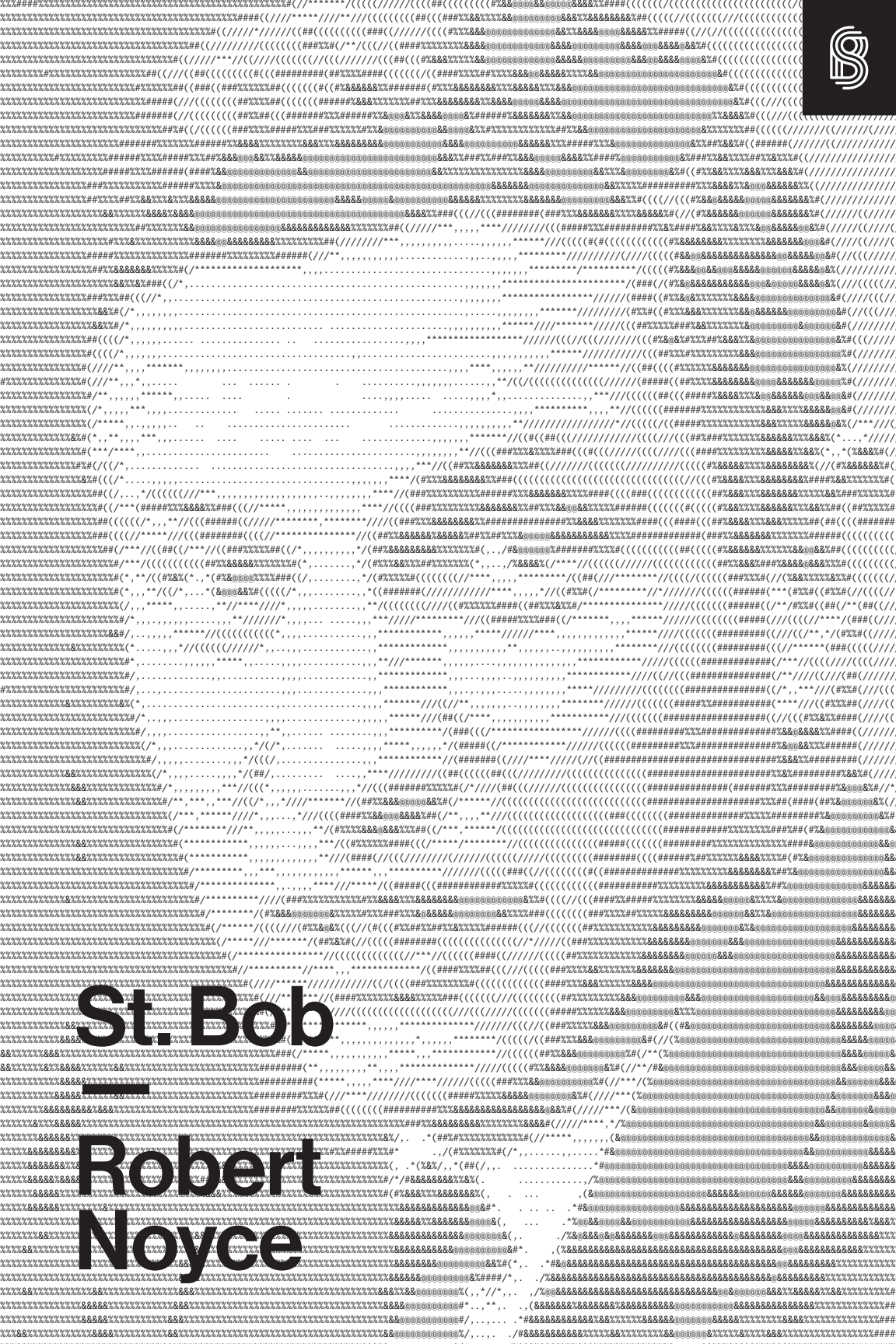
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Robert
Noyce

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An excerpt from

The Big Score

The billion dollar story of silicon valley

Michael S. Malone

"St. Bob—Robert Noyce" is one of the profiles included in Michael S. Malone's *The Big Score: The Billion-Dollar Story of Silicon Valley*. In Malone's words, "*The Big Score* survives because it's the only panoramic history of the Valley's founding days written while they were still playing out," and the figures in each profile built the firms that ushered in the electronics revolution. Stripe Press is republishing the book in 2021, with a new foreword from the author.

Profile

St. Bob – Robert Noyce

The canonization of Bob Noyce began long before *Esquire* magazine hired that chronicler of cultural icons Tom Wolfe to profile the Silicon Valley pioneer for the special "50 Who Made a Difference" issue of the magazine. Rather, it had begun two decades earlier, when Fairchild Semiconductor burst on the scene to become the hottest young company in America, and most of all, when Noyce kicked out the last shivering piling holding up the decaying structure of Fairchild by quitting to help found Intel, the new darling of American business.

But this process of promoting Noyce as the name attached to the semiconductor revolution didn't really occur until recent years, with the belated recognition that, by God, something really did happen out there in Silicon Valley. And then the promotional program began with the newest bigwigs on the block, like Bushnell and Jobs, and then worked its way back. In the seventies, Noyce's peers, like Sanders and Sporck, were accorded at least as much attention as their old boss, and now one of Noyce's partners, volcanic Andy Grove, is earning at least as much attention with his theories of "high-output management."

But perhaps Bob Noyce wants it that way; one suspects that another part of him thrills at every new burst of publicity and bristles when he is passed over for some glory he thinks he deserves. Because Dr. Robert N. Noyce is a man of contradictions. He is neither an individual suffering from deep scars, like Jerry Sanders, nor an unabashed pursuer of fame and glory, like Grove. But, unlike partner Gordon Moore, Noyce is not content with relative obscurity. Rather, Noyce *loves* fame, only he is not

sure if he should. He wants to be loved, yet knows that to be a successful businessman requires the periodic administration of suffering to others. He wants to be a good man but has found that all but impossible with the twin bedevilments of Silicon Valley life and fabulous wealth.

Probably such duality can only be found in a minister's son, and from the Midwest to boot. Much has been made of the fact that so many of the pioneers of Silicon Valley came from Middle America. What is often forgotten is that when these men were born, there wasn't a whole helluva lot west of the Rockies, and after the war, when there was, most of the settlers came from the Plains and not from the East Coast. Further, the roots of these Valley pioneers vary from windswept towns with little more than a general store and a church to the crowded life of big cities.

In reality, when commentators speak of the heartland roots of Silicon Valley's leaders, they are speaking specifically of Bob Noyce, because his childhood seems to capture the essential schizophrenia between wild ambition and sober engineering conservatism that is at the center not only of Noyce's career but of Silicon Valley itself.

Noyce was born in 1927 in southeastern Iowa in a tiny town called Denmark. He was the third of four boys, and his father was a preacher in the Congregational church (as were his two grandfathers). Like most small-town ministers, the senior Noyce was perpetually on the move to new congregations, his family in tow. When Bob Noyce was six weeks old, just enough to travel, his family moved the length of the state, to the southwestern corner and the town of Atlantic.

Noyce lived in Atlantic until he was eight years old. "My earliest memory of that period was that it was Depression time. The church wouldn't pay Dad, so they paid him produce."

In 1935, the family moved across the state again, this time to the northeastern region and Decorah ("a standard Scandinavian/Norwegian Iowa town"). At age 10 Noyce moved to Webster City, then, at 12, to Rennow.

The young Noyce was imbued with the small-town attitude of independence and that, combined with natural curiosity, impelled him to learn how things work. Still, Noyce doesn't remember having a particular affinity for things mechanical; rather, his brushes with what might be called engineering simply grew out of the environment in which he lived. "It was just sort of the way life was. Dad always managed to have some sort of workshop in the basement. And it was the usual rural environment of harvesting in the summer and canning in the winter."

When he was 12, Bob and his next older brother built themselves a hang glider—more like an oversize box kite, really—which nearly got them killed. A year later came their first car. "We made our first 'kluge' [primitive] motorized vehicle from an old gasoline engine off a washing machine. Back in the days when rural electrification was just coming in, there were a lot of gasoline-driven washing machines that were being dumped, and so they were cheap."

By this time, the Noyces had moved to the "metropolis" of Grinnell, a college town founded by another Congregational minister, Josiah Grinnell, in 1854 as his own version of a New Eden. Grinnell, a stiff, Republican, and religious town leavened only slightly by college life, would become Bob Noyce's first—and perhaps only—real home, the place he would credit for his eventual success and on which he would rain some of the gild of that success in later years.

Being a Congregational center, Grinnell was home to much of that sect's bureaucracy for the state. Bob Noyce's father had proved himself an able preacher and was awarded the associate superintendency of the Iowa Conference Congregational Churches, headquartered at Grinnell College. It wasn't a high-paying or influential position, but it finally afforded Bob and his brothers a measure of stability in their lives. Now they could weave themselves into the fabric of the community, become Boy Scouts and develop their reputations in organized sports, attend dances, meet girls, and lead their lives free from the ever-present fear of having to pack up and leave everything they thought mattered.

Young Noyce went through junior high school, graduating at the top of his high school class. It was in his final years in high school, he recalls, "that I began to feel that maybe I had a little bit more than average ability . . . My last year I took college courses, specifically in physics, just simply because I was relatively bored with the stuff that was going on in high school."

He also worked during those years, detasseling corn and hoeing beans, delivering newspapers and special-delivery letters.

When the Noyces decided to move to Illinois, Bob chose to stay behind and attend Grinnell, primarily because he had developed a good relationship with the head of the physics department and decided that this was where he wanted to go to school.

Remarkably, there was almost no better place in the country for Bob Noyce to have been at that time. His physics professor, Grant Gale, had been in contact with John Bardeen (a childhood friend of Gale's wife) and

had obtained from him two of the first transistors, which he studied with his students, including Bob Noyce. This was in 1948.

In the competitive Noyce family, doing well in school wasn't enough to stand out among overachieving older siblings. But Bob found a unique distinction by being the only brother to letter in a varsity sport in college—a fact he still seems more proud of than any grades. The letter was in swimming; Noyce won the state diving championship, and it remains a hobby he still indulges with snorkeling and scuba diving (the Intel insurance underwriters hold their breath every time Noyce holds his).

College was pretty much of a skate for Bob, despite a double major in physics and mathematics. Just how easy is exemplified by the fact that he was presented the Brown Derby Award as the student who got the best grades with the least effort. Noyce filled in his free time with oboe playing and acting, appearing as the lead in a local radio soap opera. But in retrospect, the critical education during the Grinnell years came not from the classroom but from the community itself: "I think a small town has some significant advantages, particularly in that you can see a one-to-one relationship between work and success."

But there was a darker, intolerant, and repressive side to small-town life, and in his senior year Robert Noyce ran smack into it. The occasion was a dorm party, and the organizers, some of them veterans, had decided to reproduce a South Seas luau, probably the first in Iowa. But a true luau needed a pig to roast, and since nobody had any money, Noyce and another student were charged with the task of stealing a pig from a neighboring farm. The two boys wrestled a 25-pounder out of a pigpen and returned to campus as heroes.

The luau was a rousing success. The next morning wasn't. Stealing pigs in Iowa, like horse thievery 50 years before, was just about a hanging offense. Noyce and his cohort went back to the farmer to apologize and found themselves facing criminal charges and expulsion from school. Straitlaced Grinnell College had no compunctions about kicking out its top student for breaking the rules. Meanwhile, Noyce, the preacher's boy gone bad, suffered the wrath of the community.

But he held up, and after Professor Gale cut some deals with the cops and administrators, Noyce earned the comparatively light sentence of a one-semester suspension. It was arranged for him to spend that hiatus working in the actuarial department at Equitable Life in New York City.

Going east wasn't new to Bob. He had spent the previous couple of summers hitchhiking back to a job outside the city in White Plains, carry-

ing a tray as a waiter in a country club. His eldest brother was at the time attending Columbia, so Bob would travel down to Manhattan on his days off and explore the big city.

This trip back to New York wasn't the shock it might have been to some kid just off the farm. But it was spent under a dark cloud. Noyce had been kicked out of college in a scandal, and now his only prospect was to spend the summer and fall working until the school let him back after Christmas—if he had the courage to go back and face the town.

Noyce decided to make the best of his stay in the Big Apple. He went to all the Broadway shows and still passed all of his actuarial exams. He learned the role of statistics in the sociology of aging, "little facts like how people really do unconsciously react to financial incentives: If you pay them to die, they'll die, if you pay them to live, they'll live . . . at least statistically." He also learned enough to make him suspicious about the data used in developing statistics.

The one other thing that Noyce learned during his stay at Equitable was that insurance was not the place he wanted to be: "I went into it with the idea that this was a secure and comfortable place to be. I came out of it with the feeling that it was a terribly boring place to be."

The Bob Noyce that returned to Grinnell in early 1949 was a mature, professional man with a good idea of where he was going. The first priority was to graduate. Though it appeared that his classmates were now a half-year ahead of him, in reality they had only just caught up to all of the extra-credit courses Noyce had taken his first three years. So, without missing a step, Noyce marched back into school and plowed through his last semester.

This last semester was a critical time for Noyce because of the training in semiconductors he was receiving from Grant Gale. Even before the notorious pig episode, Noyce had become infatuated with the transistor and its implications. "Grant had an infectious interest in transistors that he passed on to his students. So by my junior year I began to look at [the transistor] as being one of the great phenomena of the time. And that it would be something good to exploit—well, maybe 'exploit' is the wrong way to put it—but I saw it as something that would be fun to work with."

So Bob Noyce, now 22, decided to pursue the study of solid state physics at the premier school of science on the East Coast, MIT. He enrolled in the doctoral program in the fall of 1949. Unfortunately, where some backwater college in Iowa had been busily studying the implications of the Shockley-Bardeen-Brattain discovery, at the mighty

Massachusetts Institute of Technology "there were no professors around who knew anything about transistors."

Instead Noyce had to pick and choose among the wealth of physics and electronics courses that could be used as background in the study of transistors. As a result, he went into physical electronics: "The major problems in the field at that time were electron emission from cathode-ray and vacuum tubes. But still they had many of the same physical properties [as transistors]; you had to learn the language, the quantum theory of matter, and so on."

Equally important to Noyce's education was attending the few technological conferences revolving around transistor technology. At one of those events he got to stand, if only for a few days, right at the edge of the new technology and to meet famous scientists like Shockley and Lester Hogan.

"It was a relatively small technical community at that time. So you knew the names of the authors of the various papers being presented: You'd see them every summer. It was really quite different from now, where there's so many people working in the field, and so many different aspects to be studied. In those days it was still a question of just understanding the phenomena. The field was still virgin, so every time you did something, you'd learn something new. And it was enormously exciting because there was so much to learn so quickly . . . "

Completing his doctorate (his dissertation was "A Photoelectric Study of Surface States on Insulators"), Noyce set off to find a job that would allow him to indulge his interest in solid state. And right after graduation he married Elizabeth Bottomley, whom he had met in a Tufts musical in which he was performing and she was the costume director.

At that time, just about the only places to go were large established research laboratories at General Electric, Bell, and RCA. But Noyce, in a display of entrepreneurial temperament, decided not to work for any of them. Instead, he picked lowly Philco "because the way I put it to myself at the time was that they really needed me," Noyce says with a laugh. "At the other places they knew what was going on, they knew what they were doing." An equally important reason, Noyce felt, was that at one of the large labs he would be pigeonholed into one tiny corner of technology and would miss out on the big picture. At smaller Philco he knew he would be able to wear many hats, including those of both scientist and businessman, and be able to hop around to different projects.

For that right, Noyce was willing to make some sacrifices (the Philco

offer was the lowest of the group). Bob Noyce knew always to choose God over Mammon, and he was content to make the smaller salary at Philco in exchange for the greater opportunity. ("My only real ambition was to be able to buy two pairs of shoes simultaneously, particularly after having grown up in my brothers' hand-me-downs.")

It wasn't long after his arrival that Philco, like all subsequent Noyce companies, became known as a technology-driven firm. It couldn't take on the big boys in every market, but in the one it chose, high-frequency transistors (used mainly in hearing aids), Philco took the industry lead.

Noyce stayed at Philco for three years. In 1956, he gave a technical paper in Washington. Shockley was sitting in the audience, even then plotting to leave Bell Labs and start up a new company back home near Stanford University. He was also looking for bright young scientists and was mightily impressed with Noyce's presentation. Recalls Noyce, "A month or so later he called me up and said he was starting this thing out here on the West Coast and that he'd like to talk to me about joining him. Well, Shockley, of course, was the 'daddy' of the transistor. And so that was very flattering. And I had the feeling that I'd done my stint in the minor leagues and now it was time to get into the majors.

"So, there was no question in my mind that that's what I wanted to do. I had a brother who was teaching at Berkeley, and, you know, his letters were stories of sunshine and lovely weather . . . "

Soon after, Noyce was out on the Coast talking to Shockley. It was a measure of what would become Noyce's famous self-assurance that he bought a house in the Valley even before he had a job. In fact, he flew into San Francisco on a red-eye, drove down to the Valley to meet a real estate agent, picked out and bought a house in Los Altos (for $19,000) by noon, and made it to his interview at Shockley by two o'clock.

Needless to say, Noyce got the job. At first it seemed like a godsend. Here he was, part of a team of brilliant young scientists working for a man many considered the finest applied scientist of the age. The exclusivity of the place was confirmed just a few weeks later, in November, when Shockley was awarded the Nobel Prize in physics. Shockley took the entire staff to a champagne breakfast at Dinah's Shack, one of the Valley's few serious restaurants. Now Noyce and his colleagues knew they were special; what other company was run by a Nobel laureate? They felt that they were on the brink of changing the world. And in fact they were, but not with Dr. Shockley.

"First of all, let me say that Shockley is absolutely brilliant. He was

one of those people who could take a problem and just distill it down to the essence so he could work on it without getting confused by all the extraneous stuff. It was his ability to abstract and really make a significant contribution. He did not read the literature particularly, and consequently did not get caught in the traps that led other people to dead ends. He was a marvelous intuitive problem solver . . . in terms of being able to attach the mathematics to the essence of the problem and get an answer out where other people might get stuck in the complexity of the calculations . . . Shockley was an inspiring leader to work for in that he was a tremendous generator of ideas."

But Shockley's oppressive style, combined with the fact that Shockley Transistor just couldn't seem to get anything out the door, finally blew the place apart.

It was years before Shockley forgave any of the Traitorous Eight, particularly Bob Noyce, who had been Shockley's favorite. Noyce says, "I remember his wife talking to Betty, my first wife, when we were all leaving and saying, 'How could you possibly do this without telling me?' " Three years later, Noyce ran into Shockley at a trade dinner. Shockley said, "Hello, Bob," then walked away.

They would not speak again for 20 years. The occasion was a Christmas party at Les Hogan's house, when they at last had a long conversation that in the end revolved around Shockley propounding the theory of diseugenics (the race-IQ question) that had made the old scientist a bit of an embarrassment to his Silicon Valley descendants.

Despite the decades of hard feelings, Noyce holds no bitterness toward his older mentor. Like all who worked for the great scientist, he still speaks in awe of Shockley's brilliance, of how he would develop and solidify his latest ideas by patiently explaining them to a younger scientist, like Noyce. Noyce never forgets that had not Shockley decided to come home to Stanford, and had he not had the ambition to start his own firm, there would never have been a Fairchild and, by extension, never the Silicon Valley that has made Robert Noyce a rich and famous man.

But at the time, having walked out of Shockley Labs with the rest of the Traitorous Eight, Noyce found himself almost by default taking over Shockley's role at the new company, Fairchild. How he did in this new role in comparison to that eminence he had just left is apparent in the esteem in which Noyce is still held by those who worked for him. These men, many of them now famous businessmen in their own right, revere Noyce even though for many he is their toughest competitor. In the Silicon

Valley pantheon of Great Men, only Noyce has been elevated into the ranks of Hewlett and Packard; he commands the respect of everyone from the flamboyant Jerry Sanders to hard-bitten Charlie Sporck and the legions of new startup presidents who long to someday be just like him.

Part of this respect is the result of sheer timing. Noyce was there at the beginning, and for many of these now powerful men, he was their first real boss. Another source of respect, particularly among people who only know the man from his reputation, is that he is one of the inventors of the integrated circuit, a founder of Silicon Valley and the head of what was once the Valley's most important company.

For those who worked for him at Fairchild, what made Robert Noyce a giant was that, when faced with the same situation as Shockley, he chose the opposite direction—toward trust in his people and respect for their abilities, toward decency and equality. He chose not to see the problem as an equation to be solved but as a structure in some way based upon the precepts his father had once preached from the pulpit. Like Hewlett and Packard before him, Noyce took the big risk and believed in the natural nobility of people.

It is easy to forget what Noyce accomplished at Fairchild, now that the firm's golden age has receded into myth and memory. But it must have taken a remarkable individual to hold together a company perpetually at a flashpoint with dozens of explosive and brilliant personalities. But Noyce did, and for nearly a decade—two lifetimes in Silicon Valley time—and it exploded then only because control had been wrenched from his grasp.

But for all the many fine things Noyce was, there were many things he wasn't. He was charismatic, a born leader of men, but he was not a great manager, particularly at Fairchild. The company he had built, despite its awesome array of talent, began to stagnate. Noyce was a lab man, a technical guy, not a production manager, and his company always seemed to limp along in that latter, critical department. Part of Noyce's problem was that he erred on the side of decency. The preacher's boy who had wanted out from under the responsibilities of that title now naturally reassumed it. It was important for Bob Noyce to be liked, which paralyzed his ability to fire people or reposition them downward, even when the company and those who worked for it were at risk. The result was that Fairchild sometimes seemed the Peter Principle in action.

Counterbalancing this "weakness" was Noyce's own recognition

of it, and his unequaled skill at finding a lieutenant or partner who had the stomach for dirty work. That was Sporck at Fairchild and Grove at Intel. It might be argued that shifting the nasty business off onto some hatchet man allowed Noyce to stand in a flattering light he didn't deserve, but that's unfair. In every company, if that company is to survive, someone has to hang tough at the top. The tragedy is when that type of person is the only one on executive row. Someone who cares for employees must always be above that hard-nosed executive. Noyce understood that and always remained in command, the balancing force, the conscience of the firm.

Noyce can best be understood as the Eisenhower of Silicon Valley, keeping his egotistical and recalcitrant generals under control and coordinated as much as possible toward achieving the final objective. And, like most men in that position, Bob Noyce has an element of detachment in his personality. Many men admire him, but few seem to really know him. There is an element of reserve, of holding something back. Certainly Noyce is an affable man, a joy for interviewees, a man whose apparent humility puts even the lowliest subordinate at ease. But there is a deeper, harder part to Bob Noyce that when the pressure is on comes to the fore with an unblinking pair of eyes and a clear, cold voice of command.

This other part of Bob Noyce comes from the preacher's boy who learned not to become too attached to a home or a school or friends, because a letter in the mailbox might be about to fling him off into another world. It is the personality of his father, whose profession demanded a friendly, engaging exterior while on the inside it required the discipline and strategy needed to save souls. It is also the young man expelled from school, facing a scandalized community and knowing that after his punishment is over he must be tough enough and sure enough to return to those accusing faces again. And it is the young man, barely out of his twenties, with little business experience, thrown into the role of chief executive of one of the most important firms of the postwar world.

There is a third side to Bob Noyce, one that belies the almost preternatural calmness that seems to hover about him. Scuba diving isn't the only Noyce leisure-time activity that gives underwriters fits. In fact, there is an odd element of danger in most of Noyce's free-time schedule: skiing, hang gliding (a reminder of the old box-kite glider in Iowa; Noyce gave it up when a friend broke his hip and leg while flying Noyce's glider), white-water rafting, sporting around in his Porsche Turbo, and flying his 1947 Republic Seabee amphibious plane. Where this need for ad-

venture comes from is difficult to guess, but apparently the same spirit that led to the stolen-pig caper wasn't purged by nine months of staring at actuarial tables.

Instead of growing easier, Bob Noyce's life in recent years has seemed to grow more complex. He has pulled away from the day-to-day activities of his new firm, Intel, but has not been spared the day-to-day vagaries of Silicon Valley life. In 1974, after 21 years of a marriage that produced four children, Robert Noyce divorced his wife, Betty. A year later, in typical Valley style, he married Intel's personnel director. Betty Noyce enjoyed one of the biggest divorce settlements in the history of California and moved to Maine.

A certain amount of fame surrounded Noyce as far back as Shockley Labs, but in the late seventies, as the world woke up to the wonders of the Electronics Revolution, he found himself pulled in every direction by people who had never heard of him a few years before. Now he was a national figure; in his mid-fifties, after decades of hard work and long hours, facing even harder work and longer hours:

> Let's see, to take a snapshot of a week or so. Last week I was in Washington at this conference on high technology, a government conference on trade, and the SIA [Semiconductor Industry Association] was releasing a report on Japanese targeting. The week before that I was skiing—at least I had skied on Thursday and Friday at Aspen. This week I was here [at Intel] Monday, Tuesday, and Wednesday. I have a board meeting tomorrow and Saturday at Grinnell College. Then I'm heading to Japan Sunday morning for a series of conferences and meetings with customers on Tuesday and Wednesday. Then I'm leaving Tokyo Wednesday afternoon and coming back here to a University of California regents meeting Thursday and Friday . . .

At the time he was interviewed by the author in late 1983, Noyce sat on six corporate boards and two educational boards as well as helping Stanford and MIT improve their engineering curriculum. During the few times he is free, Noyce returns to the home he bought in Los Altos in 1960 that he subsequently improved with a tennis court and a magnificent pool with cascading rapids surrounded by exquisite landscaping.

Bob Noyce, who said all he wanted out of his first job was a challenge and two pairs of his own shoes, is now enormously wealthy: He has

a net worth of several hundred million dollars. And like most men of his Silicon Valley generation, he has only recently begun to enjoy his fortune. How he will spend the rest of his life is still up in the air. He has ruled out politics, teaching (he finds public speaking very demanding), and, having scored big twice, ever again becoming the chief executive of a new Silicon Valley startup.

Whatever he does decide to do from here on out—continue being the spokesman for the semiconductor industry, keep a hand in at Intel, sit on the board of a new company or two—Bob Noyce knows that he has come as close to immortality as any engineer. He played a pivotal part in the creation of the milestone invention of our time and cofounded two great companies—the first one of legend, the second among America's greatest economic weapons. And he has done all those things with grace and dignity and the everlasting respect of those who worked for him and his competitors. In the welter of Valley life, he has set an example of success tempered with decency. In the long run, that may be Dr. Robert Noyce's most important contribution.

> I never had an ambition to become an industrialist. My family had been a long line of teachers and preachers. I guess I was just following those things that were the easiest or most interesting to me. I guess those two things are congruent: What's interesting is easy and what's easy is interesting . . . the old story that you do well what you like to do and you like to do what you do well. Anyway, it just seemed a very natural thing to do . . .


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