

How Ray Macdonald's Growth Theory Created I.B.M.'s Toughest Competitor

In trying to expand too fast, the Burroughs chairman says, the other computer contenders were like "moths around a candle." He put profits ahead of market share and ended up getting both.

by Bro Uttal

Predictions about the turbulent computer industry often turn out to be dead wrong, but the record for aberrant prophecy probably belongs to some planners at General Electric. Back in 1964, in a report to top management, they ranked each competitor according to its prospects for success. They thought their own company had a good chance of becoming second to I.B.M. in a few years. And they ranked Burroughs Corp. next to last on their list. The planners forecast that Burroughs "will withdraw from the large systems market... There are rumors that Burroughs or NCR will merge with CDC, Bunker Ramo or, perhaps, each other."

At the time, there seemed to be good grounds for those predictions. G.E. was then a \$5-billion corporation with undoubtedly technical prowess, while Burroughs had captured less than 3 percent of the market with a woefully narrow line of computers, and its bread-and-butter product, accounting machines, appeared to be on the verge of obsolescence. As one of the smallest of the seven dwarfs, with slim and erratic

earnings, Burroughs seemed to have little going for it.

Thirteen years later it is clear that G.E.'s seers—and the many industry analysts who agreed with them—were afflicted with mirror vision. It is G.E. that has withdrawn from the business, having merged its computer operations with Honeywell's in 1970. And it is Burroughs, which stayed the course and shunned merger, that has emerged as the most effective competitor of the colossus of Armonk.

Comparisons with the other mainframers—i.e., companies that produce a full line of general-purpose computers—show how spectacularly successful Burroughs has been. Its revenues, which approached \$2 billion last year, have risen at an annually compounded rate of 14.7 percent over the past decade, slightly faster than I.B.M.'s and much faster than the internal growth of any competitor. As a result, Burroughs can claim about 6.7 percent of the computers in use worldwide, over twice its share ten years ago. After adjusting for the G.E. merger with Honeywell and Sperry Rand's purchase of RCA's customer base, it appears that only Burroughs has been able to substantially improve its market position by internal expansion in the last ten years.

The investors love it

The sweet sound of success rings even more clearly when it comes to profits. Last year, the company earned about \$320 million before taxes—or some 17 percent of sales. That was far lower than I.B.M.'s 27 percent, but well over twice the margins NCR, Sperry Rand, and Honeywell got on computers and of-

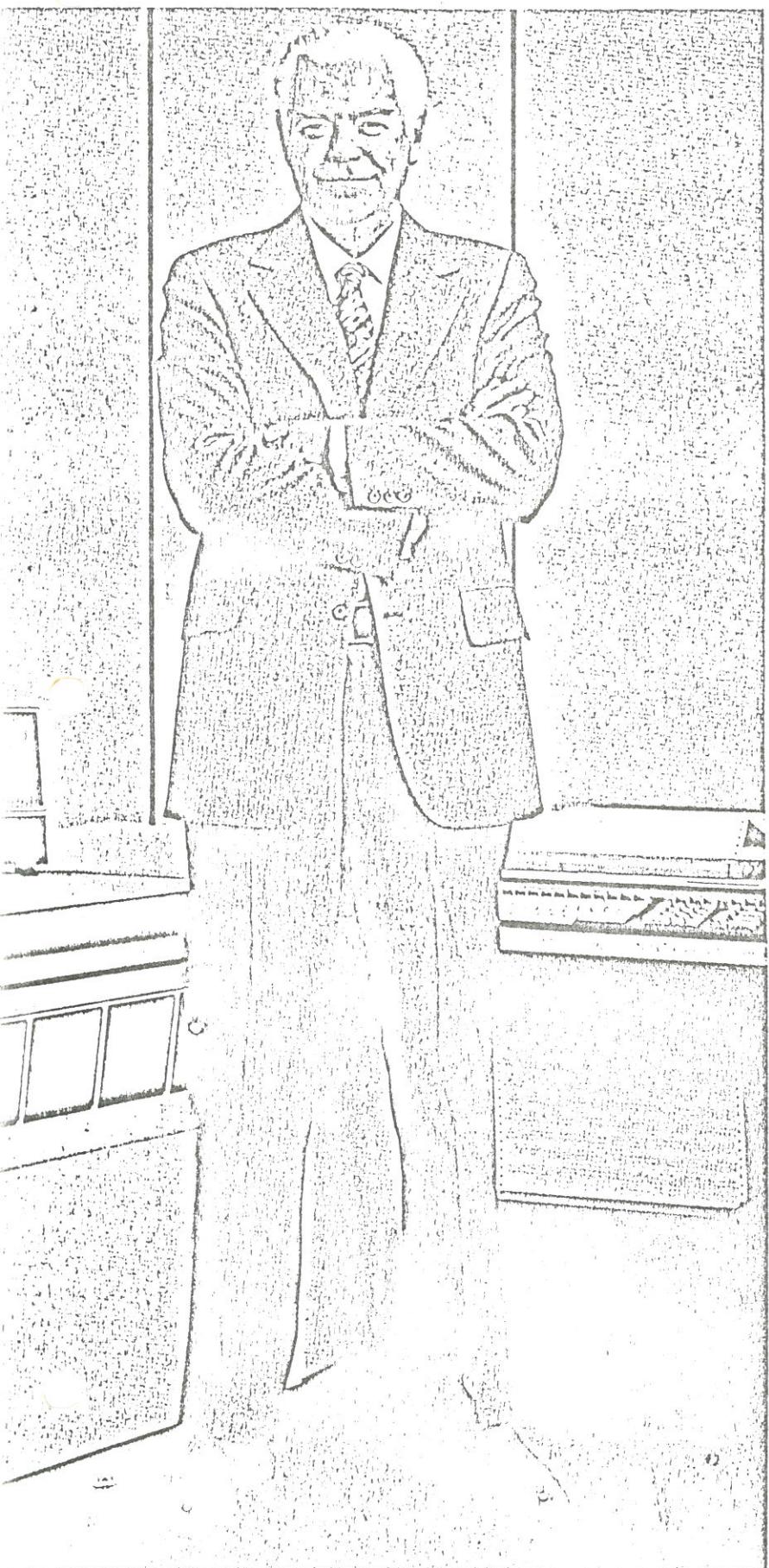
fice equipment. Burroughs's pretax return on assets last year—12.8 percent—was only about half I.B.M.'s, but almost twice that of any other dwarf.

Some investment analysts consider Burroughs to be the only competitor of I.B.M. with a rate of return high enough to justify the risks of the business and to ensure its own survival. Investors clearly agree: Burroughs's stock consistently sports a price-earnings multiple higher than that of any of its rivals, including I.B.M.

Once hooked, they don't get away

The company's transformation from an also-ran into a serious contender can be traced in large part to two products introduced way back in the early 1960's. One of them, the so-called E series of electronic accounting machines, opened up new markets for the company and spewed out profits that Burroughs used to finance the computer venture. The other product, the B5000 computer, embodied a distinctive architecture that made programming easier than it was with the systems competitors were pushing.

The architecture—called "Bartonian" after Bob Barton, a visionary engineer who was among its creators—later permeated the product line and gave the company a potent reputation for technological innovation. And Burroughs, with its tiny market share, could afford to innovate without fear of obsoleting tremendous numbers of its own machines out on lease and as yet undepreciated. The company created program-compatible machines for customers who wanted to upgrade at a time when Honeywell and Sperry Rand were stuck with gaggles of incompatible equipment. While the novelty of the Bartonian



Chairman Ray W. Macdonald

system put off a lot of customers, those who tried it became such devotees that few ever switched.

To an unusual degree, though, Burroughs's success appears to be the personal handiwork of Ray W. Macdonald, chief executive for the past decade. Soon after coming to power, he led a sweeping revision of strategy, organization, and operating methods that revitalized the company. Since then, his flair for daring product development and marketing, coupled with his indelible conservatism in every other aspect of the business, have given Burroughs's products and profits their edge over the competition. Says Lloyd W. Cali, a veteran of twenty-five years and now head of computer systems, "The reason for Burroughs's success is quite simple. Look back in the calendar to 1964, when our present chairman became executive vice president."

A test in the offing

A marketing man, Macdonald has spent his working life at Burroughs and shuns outside activities as a dereliction of duty. His influence on even the minutiae of day-to-day operations would astound most corporate chairmen. Commanding, magnetic, and brilliant—as even his detractors admit—Macdonald has put his personal seal on Burroughs.

But Macdonald is now sixty-four, and unless the company changes its bylaws, he will have to retire this December. Because of his dominance, his likely successor, President Paul S. Mirabito, has not had a chance to prove his capacity to make the right strategic decisions. The ultimate test of Macdonald's leadership—whether he has been able to institutionalize a highly successful approach

to management—is still in the offing.

When Macdonald was elevated to executive vice president, Burroughs was in straits on several fronts. Its major products were the "abc's"—adding machines, bookkeeping machines, and calculators—which were sold mainly to commercial banks. For decades, it had been locked in a seesaw battle with NCR, which in the 1950's introduced an electromechanical accounting machine that used ledger cards with magnetic stripes to store information. Slow to respond, Burroughs found itself fast losing ground.

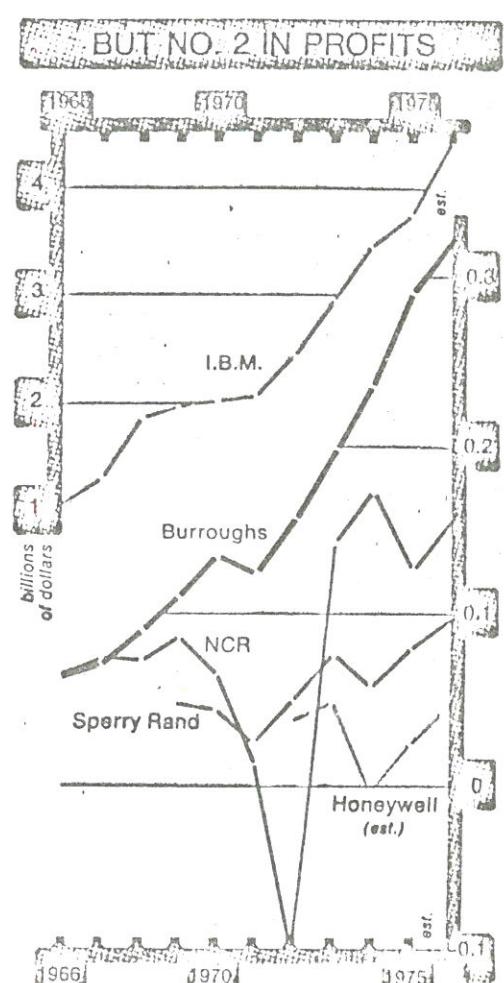
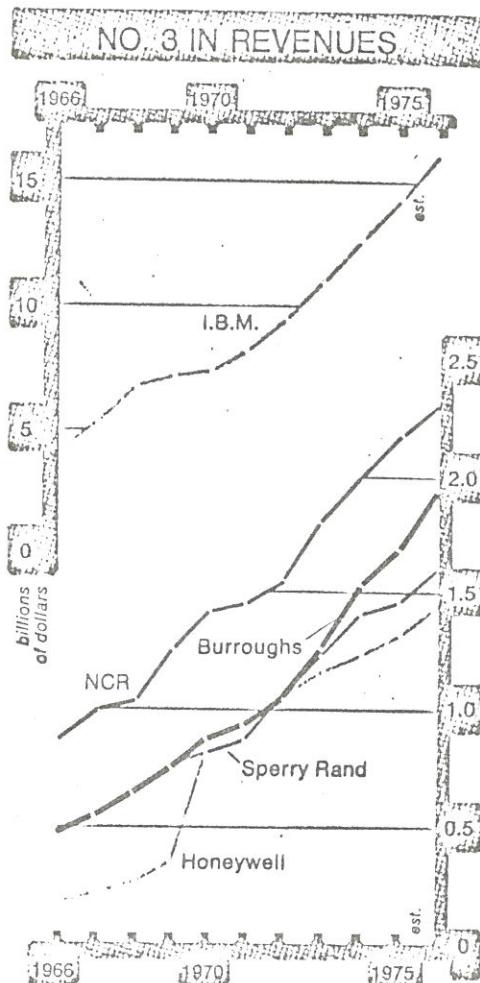
At the same time, the company stumbled into the computer business. Ray Eppert, Macdonald's predecessor as chief executive, had once been the company's hottest salesman in the Manhattan financial district, and while he knew little about computers, he knew a great deal about banks and developed a strategy in line with his background.

At the expense of accounting machines, Eppert decided to concentrate on selling computers to two kinds of users: banks and the federal government. To focus research efforts, he assigned the government work to the company's laboratory in Paoli, Pennsylvania, and commercial development to what used to be ElectroData Corp., a small business-computer maker in Pasadena, California, that Burroughs had acquired.

From the beginning, the rivalry between Pasadena and Paoli was intense—and traces of it remain even now. When Eppert tried to cut back work on general-purpose computers, engineers in Pasadena started quitting. They were soon joined by seasoned ElectroData salesmen, who resented being merged with the purveyors of accounting machines. The emphasis on government work increased the volatility of revenues and squeezed profit margins. And to make matters worse, Burroughs had to write off several money-losing ventures.

A "growth theory" from South America

Macdonald, meanwhile, was running the international division in a way that presaged his performance later on. When he took charge in 1948, the division had sales of only \$18 million; by 1964 the figure had increased eightfold,



Among its major competitors, Burroughs has shown the fastest and steadiest rate of growth in selling and leasing computers and office equipment. If computer revenues alone were charted, Burroughs would be in second place, with \$1.6 billion. The company's spectacular profit performance has been

helped by the fact that Burroughs sells, rather than leases, a high proportion of its equipment. NCR also sells a lot, but has been hurt by big write-downs on obsolete accounting machines. Figures on Honeywell's computer profits are unavailable before 1972; Sperry Rand's data are not comparable prior to 1969.

to \$140 million. And Macdonald was bringing 20 percent of his sales to pretax profits, which helped absorb domestic losses in several years.

Macdonald's conservatism doubtless has roots in his overseas experience. He joined the export department in 1941, hardly a propitious year for foreign sales, and after the war did business in the difficult climate of rising trade barriers, sudden devaluations, and shortages of foreign exchange. A sign in his office read, "A crisis a day is the normal life of the international division."

To this day, Macdonald unswervingly runs Burroughs by a "growth theory" that he first developed in his years abroad. In essence, the theory holds that Burroughs's maximum "sustainable" and "affordable" rate of long-term reve-

nue growth is 15 percent annually, or a doubling every five years. Anything more, Macdonald thinks, tends to reduce the productivity of the sales force and erode profit margins, thus undermining the company's ability to invest in future growth. "The theory started in Latin America," Macdonald says, "where our growth depended on the growth and quality of the sales organization. It works out that 15 percent is the highest rate you can sustain because you have to train people and build the management structure."

Though somewhat arbitrary at first, the 15 percent figure was thoroughly tested: "In one country, we tried to grow the organization more rapidly, but we couldn't get the productivity gains and had to pull back after two years.

We also tried to get a whole region growing faster, but we never could develop an organization entirely of exceptional managers and had to fall back on the averages." As Macdonald gained experience, his ideas about the limits of growth came to depend less on the average learning curves of sales personnel and more on his own corporate goals —increasing profits faster than sales, achieving a pretax margin of 20 percent, and increasing pretax return on invested capital to 20 percent.

First came the ax

Macdonald's preoccupation with profits was heresy among computer-industry executives, including many at Burroughs. The orthodox view, after all, was that before the computer business could be expected to pay off, many years of unprofitable investment were required. Macdonald stubbornly insisted that balanced and limited growth could cut the price of admission, and he did much of his campaigning at meetings of the board of directors, and among senior executives who were chafing under Eppert's administration. Eppert finally acceded to pressures from above and below and made Macdonald executive vice president. The promotion gave Macdonald the chance to apply his principles throughout Burroughs.

He lost no time in setting about reform. Along with Financial Vice President Harry Bowles, Controller Charles Exley, and Paul Mirabito, then a vice president, he formed a Profit Improvement Committee that effectively relieved Eppert of control. Feeling that the very survival of Burroughs was at stake, Macdonald and the committee turned first to increasing profitability by the quickest route—cutting expenses.

Plant managers got the word that they would have to reduce product costs by a minimum of 5 percent annually. The committee slashed the salaries of branch managers by \$1,000 to \$2,000, shaved 4 percent off the commission rate, and radically reduced budgets for field engineering and other types of sales support. Managers who missed their budgets could expect Macdonald to publicly analyze, sometimes at punitive

length, precisely why they had failed, and to tell them how many weeks they had to shape up. Those reforms shocked many executives, and within two years three of ten vice presidents had left.

Not long after his elevation, Macdonald laid out the two market strategies that Burroughs has followed for the past decade. The first was to reverse Eppert's decision and to go after the accounting-machine market that had been downplayed. When the Profit Improvement Committee set out to identify Burroughs's strengths, one emerged as paramount: a sales force highly skilled in "applications selling," which called for assessing the customer's bookkeeping

needs and selecting accounting-machine programs to fit them. But it was obvious that the computers were too sophisticated for most of the salesmen; the 500-man computer sales force, which Eppert had built mostly with accounting-machine salesmen, had the lowest sales per man in the company.

Macdonald shifted 280 of the least effective computer salesmen away from that group and put into their hands an accounting machine called the E2100. An unprepossessing piece of equipment that Burroughs had cobbled together, the E2100 was designed as a stopgap in the battle with NCR—something to hold the fort until the company could launch an all-electronic machine. It had a standard electromechanical chassis modified to do electronic multiplication and hooked up to a steamer-trunk-sized box of core memory (which had 100 times the capacity of mechanical memory). Few Burroughs executives expected much of "the E," as they called it. The marketing department forecast sales of only about 500 over its lifetime.

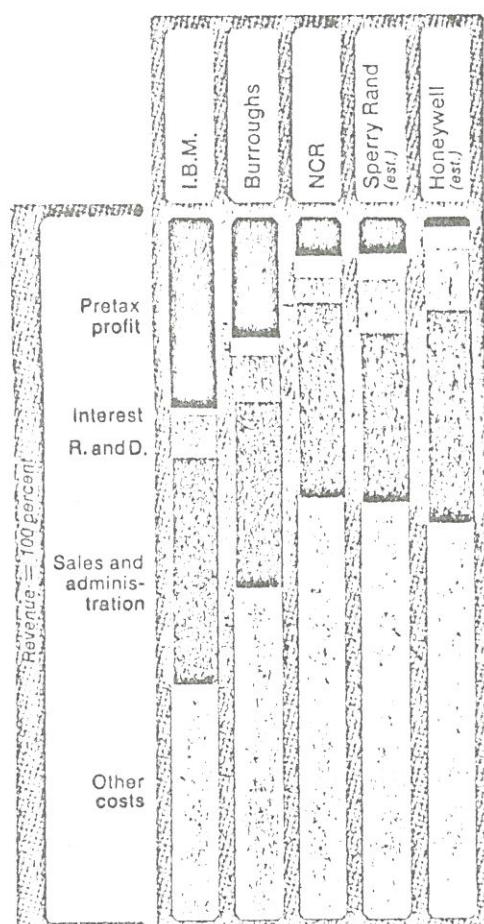
Riding the hybrid vehicle

Macdonald's view was radically different. On a tactical level, he argued, the E was the product best suited to the skills of the sales force. Besides, his experience in Europe, where few small companies could afford a computer, had persuaded him that the accounting machine could still be cost-effective despite its small main memory and slow speed.

Strategically, the E provided a vehicle to ride into the computer business. As a hybrid machine, it would ease the changeover to electronic products by allowing Burroughs to phase out old electromechanical parts and production equipment, and by giving sales and maintenance men some on-the-job training in new skills. The E was inexpensive enough to be sold rather than leased, and given sufficient volume, it could yield a pretax margin of about 35 percent and produce a fountain of cash for the capital-hungry computer business.

Despite the skepticism of Eppert and the vice presidents for product planning and production, Macdonald tripled the

WHERE THE REVENUE GOES



Burroughs squeezes out profits by spending a smaller share of its revenues on interest, sales, and administration than most of its competitors. It also keeps a tight lid on "other costs," which mainly include the cost of goods sold and depreciation of the rental inventory. This chart is based on 1975 data.

sales forecasts for the E, ordered the plants to gear up for volume, and mounted a major sales campaign. Within three months, the company had orders for the 500 machines that were supposed to represent maximum demand. Various versions of the E ultimately accounted for 50,000 sales, expanding the accounting-machine market and tipping the scales against NCR, which had no truly competitive product.

Burroughs quickly set new earnings records. "We mark the turning of the tide with the E," says Macdonald. "Our marketing organization gained strength from it, and so did our finances. It was a shot in the arm at a critical time." It was a shot in the arm for Macdonald, too—he was elected president and chief operating officer and Eppert was eased upstairs to become chairman.

Though Macdonald's emphasis on accounting machines gave the impression that Burroughs was retreating from the computer business, it was in fact the prelude to an enormously ambitious plan for expanding in computers. "The most critical decision for the company—the one from which all other decisions flowed—was to have a full product line," Macdonald says. "Eppert didn't think we could do it. But late in 1964 I had the conviction that it was necessary, that we could do it, and that we could do it within the limits of our resources."

Mass wasn't critical

Macdonald's perception of the need for a full product line was hardly unique. Every aspiring computer manufacturer knew that having a full line helps a company hold onto its customers when they seek to upgrade, and that attaching associated peripheral equipment increases revenues from each installation. What was original—even audacious—was Macdonald's confidence that Burroughs could develop and support a full product line without sacrificing profits in a drive for market share.

Other dwarfs had accepted the "critical-mass theory," first advanced by Arthur D. Little, Inc., the consultants. The theory held that no manufacturer could afford to finance a full line without a sizable chunk of the market, usually pegged



Successor to the Profit Improvement Committee, which reorganized Burroughs, the Operating Committee comprises (from left) Gene Smith, forty-three, the new financial vice president; Chairman Ray Macdonald, sixty-four;

Executive Vice President Jim McCullough, sixty; and President Paul Mirabito, sixty-one. Macdonald does most of the talking and makes most of the decisions. If he retires this year, these privileges will probably be Mirabito's.

at 10 percent. And, of course, capturing a big market share in a lease-based business requires a huge investment.

Macdonald steadfastly rejected the critical-mass theory and its cost implications. "There are two theories of growth in this industry," he remarks with some self-satisfaction. "One is ours, where you plan to grow at a sustainable and affordable rate and put market share low on the list of objectives. Then there are others who thought that this rate was inadequate and took risky measures to increase their growth and market share. They were moths around a candle on that one."

Even advancing by measured strides, Macdonald knew, would require outside financing, and he was loath to let high interest charges tarnish the company's performance. So he, Harry Bowles, and public-relations man Don Young set out to woo the financial community at meetings in Detroit. "We spent a great deal of time on this, and it was artful," says Bowles. "Don would prepare the analysts for three or four hours in the morning, then Ray would take them to lunch and impress them with his detailed knowledge of the business. No one could equal him. Our investor relations were the

best in the U.S.—I.B.M. couldn't match Don and Ray."

The result, in the words of an investment banker close to the company, was that "by the fall of 1966, that stock took off like a scarlet dog, rising from a 1964 low of 22½ to a 1967 high of 192." With that kind of performance and uninterrupted earnings gains, Burroughs was able to raise \$175 million in convertible debentures at record-low rates, issue \$100 million of equity without significant dilution, and bump its credit rating from A to AA—the only dwarf to which Moody's accorded that honor.

Squeezed in Macdonald's vise

Determined to develop a competitive line as cheaply as possible, Macdonald set out to improve productivity in R. and D. Though he didn't cut the research budget, he drummed into the engineers the doctrine of limited resources. As he puts it: "In a rapidly evolving technology, some may argue to commit funds rapidly and take a grand plunge. What we did was to examine what we could afford and set ratios for allocating funds. At Xerox, research teams would say, 'We need this much money,' management would answer, 'We can't give it

to you,' and that was the end of it. They never asked what they could get for two-thirds of the amount. But we asked first, 'What is available?' and then 'How can we spend it best?'"

That simple description understates the pressure Macdonald exerted on the engineers. He told them to design new generations of equipment that would cost only a fifth as much to make as their predecessors. He demanded more products than most people thought could be developed with the available time and money. And he refused to fund redundant research projects, as I.B.M. does, to ensure against failure or late delivery.

"Everyone feels like he's put in Macdonald's vise," says Robert Johnson, vice president for engineering. "It's a principle of the system that you commit more than you think you can do. I'm overcommitted and all my guys are too. More needs to be done than we're ever able to do."

A sense of anticipation

To keep the squeeze on, Macdonald established a rigorous routine for reviewing all aspects of each new product—development cost, financing, plant requirements, potential profits—at least quarterly and frequently more often. He skimmed off the cream of the sales force to come up with product managers who could ride herd on innovations from their genesis to the market.

Bill Lonergan, a former Burroughs executive who has also been vice president for product planning at RCA and Univac, notes that other computer companies use roughly similar techniques, "What's different at Burroughs," he says, "is that Macdonald spends a great deal more time with the product managers—they're almost a direct extension of his office. He builds up that group and really works it over, iterating time and time again on the product plan to make sure that Burroughs ends up with what's right for the market."

Burroughs had the great good fortune of anticipating the kinds of systems most in demand today. Its biggest customers—the banks—had to handle thousands

first to require on-line systems using intelligent terminals, which cleanse the data of errors and perform some computations before passing the results along to a central processor. These requirements turned out to be prophetic of data-processing needs elsewhere.

Pampering the programmers

Even before Macdonald had taken charge, engineers in Pasadena had designed a computer called the B5000, which embodied most of the concepts later diffused throughout the product line. The development team included software specialists, such as Bob Barton, who were generally excluded during the early stages of design at other companies. They structured the B5000 to make programming as easy as possible, putting in several features that proved to be years ahead of their time.

For one thing, the machine operated only on higher-level languages, which are closer to both conventional English and mathematics than the more cryptic assembler languages used on other contemporary machines. It had "dynamic memory allocation" and other innovations that permitted many different programs to be run at the same time. It used two processors simultaneously, which provided the reliability required by on-line transaction-oriented systems. And, finally, the B5000 had a "master control program" that automatically performed hundreds of system-management functions, which people operating other machines had to program for themselves.

The price Burroughs paid for ease and flexibility of programming was an inefficient use of the B5000's main memory, at least in comparison to what a highly skilled programmer using assembler language could wring out of an I.B.M. machine. Luckily for Burroughs, though, the cost of memory has fallen by a factor of ten since 1964, while salaries for talented programmers have gone sky-high. This means that Burroughs has been able to add lots of main memory at relatively low cost to the user. What the customer wants now

The master control program, now in its sixth major stage of refinement, is thought to be the best systems software available.

Even so, the B5000 had little success at first. The system was so unusual that neither customers nor most Burroughs salesmen could understand all its advantages, and it had some obvious defects. "Some marketing people had given up on the idea that the B5000 could ever be made to work effectively," recalls Richard O. Baily, then vice president for marketing. "They thought it was doomed. In the initial stages, even Macdonald was doubtful."

What saved the B5000 was Macdonald's stubbornness, marketing savvy, and close relationship with the engineers. He had taken to spending one week a year at the Paoli research labs, where the director, Irven Travis, his best friend in senior management, would fill him in on the significance of new technologies. Travis convinced Macdonald that the ideas behind the B5000 were excellent, and engineers in Pasadena said they could cut manufacturing costs and improve performance. Macdonald authorized thirty-two major changes to give the system greater speed and flexibility of language, and reintroduced it as the B5500.

It didn't seem to matter that the salesmen still didn't know how to show off the machine's advantages. "We gradually collected an elite of early users," recalls Gary Clark, a former vice president. "They became fanatics about the B5500's ideas and spread the word. The Burroughs machine became the in thing to have among the cognoscenti." Though Burroughs placed only thirty B5000's and lost money on them, it ultimately shipped 175 of the B5500's and turned a decent profit.

The boss would not be rocked

To attract customers worried about upgrading, Macdonald announced the imminent introduction of two larger computers that would be compatible. The larger machines were also important for their prestige value: they would help

of the two—the B8500—turned into a classic case of over-ambition.

Scheduled for delivery in 1967 and widely publicized, it was to use two very advanced components—hybrid circuits and thin-film memory. By mid-1968, though, the engineers realized that they could not produce reliable components at reasonable cost and advised Macdonald to scrap the program. The news was a body blow to Burroughs, but it didn't rock the boss, whose first reaction reportedly was, "I admire people who have the wisdom to realize when they're in deep shit." Burroughs withdrew the B8500, but salvaged the technology for use in other products.

The second big machine Macdonald had promised, the B6500, threatened further to tarnish Burroughs's reputation. Trying to meet stringent targets for delivery time and product cost, the development team had cut corners in designing high-speed circuits and had failed to test the machine thoroughly. Customers, who had ordered fifty of the systems, were left to discover that the B6500 kept breaking down because of "ringing in the backplane"—the tendency of electrical impulses to bounce back and forth among the circuits. Cancellations started trickling in, and rumors on Wall Street drove the company's stock from \$125 to \$108 in two weeks.

"He's never defeated"

Undaunted, Macdonald assured customers that the problem would be solved immediately. At a cost of some \$9 million, technicians painstakingly affixed tiny ferrite cores to the ends of the thousands of circuit chains in order to stop the echoing impulses. Despite some software defects that showed up after the machinery was running well, Burroughs retained all but a handful of customers, and upgraded models of the machine have acquired an excellent reputation. "The B6500 and B8500 could have been disasters if management had been timid," observes a former director. "But Macdonald turns mistakes to his advantage. That's his strength and uniqueness—he's never defeated."

The preeminence of Burroughs in ac-

tributed to the success of its larger computer systems. Unlike highly specialized competing products, a series of electronic accounting machines called the L, introduced in the late Sixties, could be programmed to perform any function a user needed. Macdonald realized that the L machines could be used as intelligent terminals linked to the big central processors, and Burroughs sold thousands of them for that purpose.

The L had no competition until 1972, when NCR finally turned out a similar model, and by then Burroughs was too far advanced to be easily checked. To date, the company has sold more than 140,000 L's—either as terminals or as freestanding accounting machines—with an estimated value of \$2 billion. Macdonald plowed back most of the profits into computer research and leasing.

Looking for a Golconda

The large computers were too big and too exotic for the vast middle range of customers, so Macdonald, essentially pragmatic, abandoned Bartonian architecture and decided to go ahead with a medium-sized machine, the B3500, that was much more like I.B.M.'s equipment. The sacrifice of compatibility for immediate market appeal worked out superbly. Macdonald constantly harangued the development team to keep down costs, and Burroughs won an Air Force contract for 135 machines by bidding \$60 million, \$54 million under an I.B.M. bid. Commercial customers responded so well to the B3500 that it became the company's single most successful computer, accounting for some 990 installations with a listed value of over \$600 million.

More recently, as the market for medium-sized computers has matured, Burroughs and its competitors have been searching for the Golconda of the business—hundreds of thousands of small establishments that had never been able to afford computers of their own. But that market has been a receding mirage. Despite launching ever smaller, cheaper computers, neither Burroughs nor most of the other companies have yet realized the huge volumes that the new machines appeared

Burroughs's first entry in the small-computer market didn't turn out as planned. Under pressure to produce a highly sophisticated Bartonian machine, the development team came up with one that would cost some \$20,000 to make, four times what Macdonald had specified. "We asked for a dohkey," he said, "and they gave us an elephant."

Unwilling to scrap the idea, Macdonald split the model into two lines. One, with the originally specified performance and a medium-scale price tag, has a memory that can be restructured to run efficiently in any higher-level language, and it has therefore been effective as a "fighting machine" used to convert customers from competitive systems. Because it is so advanced, and is compatible with the high end of the line, Burroughs may use it as the basis for a new generation of medium-scale systems. The other small machine, which had half the speed and memory, offered too little for the listed price.

Burroughs went on to develop still smaller models. The latest, launched last April, is called the B80, and is a mini-computer designed in part to replace the L-series terminals and accounting machines. It is too early to say whether the B80 will do well with small users—its design looks terrific but its software is still full of bugs. The competition from more than seventy minicomputer companies is fierce, and thousands of entry-level customers may well be satisfied to stick with their current accounting machines for years to come.

The salesmen were restless

By driving all the way down to minicomputers, Macdonald has given Burroughs one of the broadest product lines in the industry. In some ways, though, the company operates as if it were still a fledgling trying to do everything on the cheap. Macdonald has never relaxed the pressure on product and personnel costs, and he retains the scarcity mentality of the lean years, when the company's resources were a lot more meager than they are now. That approach may guarantee good near-term profits, but it poses a threat to the company's future.

In the old days, when Macdonald

cut the commission rate, he was able to reduce the turnover of salesmen by persuading them that he would plow the money into better products and that their incomes would ultimately rise. But sales-force morale seems to have been eroded recently by low pay, scant technical support, and the management's deafness to complaints. Last year, according to letters circulated by some of the discontents, nearly half of the 325 branch managers voted to form a professional association to deal with headquarters, kicking in \$10 each to pay for attorneys and mailings. Salesmen in the field allege that Burroughs won't hire enough software specialists to help them sell customized systems and to handle new installations.

Burroughs says that its pay, work load, and turnover are standard for the industry. But half a dozen former branch managers and salesmen with whom FORTUNE talked insisted that high turnover rates have left Burroughs with a young and inexperienced sales force. One of the less bitter exiles says:

Burroughs has lost sight of its people. Over the last few years, Macdonald seems to have concluded that the product is so strong it sells itself. But it's people who sell computers, and support that keeps them in place. I'm shocked that they've let this happen—they're mortgaging their future."

Is everybody sullen?

The squeeze is also on the field engineers, who maintain Burroughs's systems. Many field engineers are underqualified and overworked, particularly in large cities. In 1974, 180 field engineers in the Manhattan financial district struck for fifteen months. There were reports of union members sabotaging equipment, and of Macdonald ranting like an anti-labor curmudgeon of the Thirties.

Macdonald prides himself on keeping customers "sullen but not rebellious." Although Burroughs has long had a reputation for poor service, it has lost very few customers, because they are hooked on that Bartonian architecture. But other manufacturers have now adopted some of Burroughs's design

concepts and developed sophisticated master control programs, so the company will have a tougher time trading off service for architecture in the future. Also, small customers, from whom Burroughs expects so much, need good service. They cannot afford to do their own programming and do not lease enough equipment to make it worthwhile for Burroughs to send them a resident field engineer.

William Leitch, a vice president at International Data Corp., the industry's unofficial scorekeeper, notes that his surveys confirm that Burroughs's customers are unhappy with the software support and service they receive. "In the past they have remained loyal," he says. "Now there are problems with the small-systems users and signs of restlessness in the customer base that could reduce orders in the future."

Playing for higher stakes

Macdonald's relentless pressure on his engineers to turn out cheaper machines has continued to produce manufacturing snafus. Sales of one of the smaller computers suffered at first because the plant used inferior connectors to keep down expenses. "The environment hasn't changed," says one recently departed executive. "The physical embodiment of the equipment is seldom up to the quality of the design because of Macdonald's driving on costs."

When it was fleshing out the product line, Burroughs evidently could afford start-up problems because it was producing relatively few machines. But now that it has a large customer base, the consequences could be much more serious, especially when it brings out a new generation and tries to upgrade many users at once. And Burroughs is currently trying to do just that by introducing a new generation based on "current mode logic," a very advanced integrated circuit.

Macdonald is nothing if not analytical, and he seems to be trying to remedy some of the company's shortcomings. Burroughs will soon announce a new, presumably better compensation package for branch managers. It is giving its machines improved automatic diagnostic

programs to cut down on maintenance needs. For the small-business user, it is working up a comprehensive package of application programs. And it plans to spend a lot more money for test equipment to flush out product defects.

But none of those actions goes to the heart of the questions about the company's future—how it will be managed when Macdonald is gone. He insists that he has no qualms about relinquishing his office, because "we have a great team to carry on the business."

It is at any rate a team of special composition. Since Macdonald "has to prove he's the boss every day," as one of his oldest associates remarks, ego conflicts have driven away some of the stronger talents. Last year, months of head-to-head clashes finally convinced Charles Exley, executive vice president for finance and a contender for a top spot, that joining the team meant suppressing his own powerful personality. He left to become president of archrival NCR.

Other valued executives have departed over the last two years, complaining that, as the company has grown, Macdonald's inability to delegate has led to endless meetings and relatively few decisions. With the exception of Mirabito, the heir apparent, Macdonald's top command consists of subordinates from his days in the international division.

"Providing we don't screw up"

Mirabito has a reputation for high competence and occasional flashes of brilliance that Macdonald's commanding presence has obscured. But those qualities may never see the light. Last October, replying to a security analyst's question about his retirement, Macdonald said, "I have no intention of continuing at Burroughs in any dominant kind of situation. I think the ongoing team should have full responsibility, and I can step out of the job with a feeling of very great accomplishment." But then he added, "Now, that's providing we don't screw something up in the next four to six months!" No one is more critical of the company's performance than Macdonald, so he may well find reason to persuade the board that he should stay on. E