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A Salute to Intel's 25-Year Veterans

Of the almost 100 employees who joined Intel in 1968, only eight remain. These hardy souls bring Intel's history to life; they represent not just the company's past, but also its unique spirit. We congratulate each of Intel's eight original employees on their silver anniversaries with the company. Throughout this publication, they share some of their reflections on Intel's first 25 years.

When I came to Intel, I was scared to death. I left a very secure job where I knew what I was doing and started running R&D for a brand new venture in untried territory. It was terrifying. I literally had nightmares.
Andy Grove, president and CEO

Internally, things haven't changed much. Now, when we get the first silicon on a new design, the whole design team crowds around the tester to see how it works. Back then, the whole company came and crowded around the tester.
Tom Jones, general manager, Intel Connectivity Division

My 25th anniversary with Intel is on September 23, and my 50th birthday is on September 30. I have spent half my life with Intel!
Ted Jenkins, vice president and director, Corporate Licensing

We are currently very successful, but in this industry, fortunes can change rapidly. In 1974, we were as successful in memories as we are now in microprocessors. Then the first oil shock hit and threw the world into recession; the business took a long time to recover. I think we're better braced for such situations now, but still, there's no opportunity to sit back and rest on your laurels.
Gordon Moore, chairman

The biggest change I see is that our industry position has shifted completely. We were an upstart; now we're No. 1 in one of the world's most important businesses. We've transformed from a horizontal supplier of memory and logic silicon products to what is essentially a computer company of a different color.
Les Vadass, senior vice president and director, Corporate Business Development

I was the first engineer doing package development at Intel. I'm still doing basically the same thing and I love it. I can hold a product in my hand and see my contribution to it; my identity's in that package. I was supposed to retire almost 10 years ago, but when there's so much going on here, who wants to retire?
George Chiu, senior engineer, Package and Assembly Research

From the very beginning, Intel has had more advanced technology than any other company. It makes me proud to be part of this company.
Nobuko Clark, tech specialist in California Technology Development, Quality and Reliability

There was a unique spirit in our first headquarters in Mountain View. There were many fun-loving, irreverent folks; we became very close. It was hard for me when we moved into the bigger building on Bowers. Then, all of a sudden, we were picking up the phone and calling each other instead of just running over to see people. It's kind of nice in Santa Clara now, to be back under one big roof in RNB!
Jean Jones, executive secretary
Celebrating Intel: A Statement from the Executive Office

When Intel was started in July 1968, we dreamed of building a successful company—but we never imagined that, 25 years later, we'd have over 26,000 employees around the world and annual revenues rapidly approaching $10 billion. In that first year, we developed the processes and first products that would launch us on the road to becoming the world's largest semiconductor company.

We are extraordinarily proud of Intel's accomplishments and contributions in this quarter-century, and of the people who made them possible. Together, we have defined contemporary digital electronics, with the microprocessors, memories and controllers that we have created. We have played a critical role in the PC revolution.

What an exciting time to be celebrating our anniversary. There have been some difficult years—but in 1993, we have record earnings, higher productivity than ever and excellent product lines that support a very strong industry. If we were astrological types, we'd say the planets, the stars and the moon are in alignment. The sun certainly seems to be shining on us. But Intel being Intel, we may not notice, since we tend to be wary of anything that looks like resting on our laurels.

While it's true that we need to stay focused on the future, we do have some real success to celebrate, and the significant milestone of our 25th anniversary reminds us to enjoy it. Whether you've been with us for 25 years or joined us more recently, we thank you for your contributions to Intel's success.

Craig Barrett, executive vice president and chief operating officer
Gordon Moore, chairman
Andy Grove, president and CEO
In the Beginning: Intel Is Founded

One weekend afternoon in the spring of 1968, Gordon Moore dropped by Bob Noyce's home, where Bob was mowing the lawn. The two men stood on the grass and commiserated about the state of affairs at Fairchild Semiconductor, which they had co-founded with six colleagues. Bob, who had co-invented the integrated circuit, was concerned about instability and bureaucracy at the top at Fairchild, and had decided to resign. Gordon suggested that semiconductor memory, an emerging technology, looked promising enough to launch a company and agreed to join Bob in a new start-up. Intel was born.

Bob and Gordon were both well-known and financially successful, yet they gave up their security for the chance to pursue large-scale integrated (LSI) memory. "We were young and arrogant," Bob recalled in 1988. "We wanted the independence to do things our way." Andy Grove joined Bob and Gordon soon after Intel's incorporation and eventually became the third head of the "three-headed monster," as Bob called it, that led Intel.

"We knew we wanted to give this new technology a shot," Gordon recalls. What they didn't know was that their little upstart company would turn the world on its ear, redefining contemporary electronics and changing forever the way the world works.

Like all start-ups, Intel had its share of both stress and celebration. What held the little company through the high tensions and high spirits was the unwavering commitment and vision of its leadership. "We set out to create a whole industry," recalls Intel Connectivity Division general manager Tom Innes, "and Bob and Gordon had the faith in us that made it happen."

Two Found New Firm

MOUNTAIN VIEW — Two founders of Fairchild Semiconductor Division here who resigned last month have established a new integrated circuits electronics company.

The firm, Intel Corp., has leased part of a building at 365 Middlefield Rd. formerly occupied by Union Carbide Corp.'s integrated circuit division. Most of the firm's staff is being moved to San Diego.

Founders of Intel Corp. are Dr. Robert W. Noyce and Gordon Moore. Both were among eight who started Fairchild Semiconductor here more than 10 years ago and helped build it into the world's largest producer of integrated circuits.

They quit last month from Fairchild Camera & Instrument Corp., parent of the Mountain View division.

The firm has experienced slipping profits recently, but Noyce and Moore said they resigned to regain the satisfaction of research and development in a small, growing company.

"We're always redeveloping, reinventing..."
1968

Memorable Movie:
The Graduate

FEBRUARY
Winter Olympic games held in Grenoble, France; Jean-Claude Killy and Peggy Fleming win gold medals.

APRIL
Martin Luther King, Jr. assassinated in Memphis, Tennessee.
Hair opens on Broadway.

JUNE
Senator Robert F. Kennedy assassinated in Los Angeles, California.

JULY
Bob Nooyen and Gordon Moore incorporate new venture as B M Electronics; purchase rights to use Intel name from company using letterbox.
Arthur Rock is chairman of the Board; Bob Nooyen is president and CEO; Gordon Moore is executive vice president.

AUGUST
Anti-Vietnam War riots near Democratic National Convention in Chicago.
Company starts to work on Schottky TTL and silicon gate MOS Technologies.

NOVEMBER
Nixon/Agnew defeat Humphrey/Humphrey in presidential election.

Outside the original Mountain View facility, Intel's entire workforce gathered for a group photo in 1976.

Like any start-up, Intel had its share of challenges. Founders Gordon Moore (left) and Bob Nooyen shared an intense moment in the early 1970s.
The Defining Challenge: Semiconductor Memory

Intel started out with a precise focus: to bring semiconductor computer memory to the market. The large-scale integration of transistors onto silicon was still an emerging business. Intel had to develop the process technologies and the products at the same time, and also convince a skeptical world that the day of the semiconductor memory was at hand.

It was an ambitious goal: the cheapest semiconductor memory element cost 100 times more than magnetic core memory, the dominant computer memory at the time. The fledgling company had to make some significant breakthroughs in density as well as cost to drive up unit volumes.

“We figured we had about five years to get established before the big semiconductor companies would follow in this market and become direct competitors,” Gordon Moore remembers. “And we figured we needed to get to $25 million in those five years, so we could meet that competition. In fact, we more than doubled that goal, with revenues of $66 million in our fifth full year of operation. And it took the other companies seven years to change directions. That early success propelled us on our way.”
Making MOS Work

3.

When Intel started, three different approaches to semiconductor memory offered promise; Intel pursued all three. Gordon Moore refers to this as the "Goldilocks technology strategy." "Multichip memory modules proved too hard and the technology was abandoned without a successful product. Schottky bipolar worked just fine but was so easy that other companies copied it immediately and we lost our advantage. But the silicon gate metal-oxide semiconductor [MOS] process proved to be just right."

Even though MOS was "just right," making memories proved difficult. Andy Grove recalls, "The fab area looked like Willy Wonka's factory, with hoses and wires and contraptions chugging along—the semiconductor equivalent of the Wright Brothers' jury-rigged airplane. It was state-of-the-art manufacturing at the time, but by today's standards, it was unbelievably crude."

Les Vadassz, now senior vice president and director of Corporate Business Development, remembers the first MOS product. "We worked around the clock," he says. "Joel Karp and I redesigned a good portion of the product while the first moon landing was going on. We listened to 'One small step for man' on the radio while we scrambled to rework the chip."

"Then, when we got into DRAM [dynamic random access memory] production on the MOS process, we were shocked by the market response. For our first order we only got about one-third of the price we had expected. Bringing down costs was as significant an achievement as the technical work."

Following Intel's pioneering work, silicon gate MOS became the industry's process technology of choice, while the bipolar process was relegated to a high-speed niche.
A Unique Place to Work: Intel Culture

The egalitarian, open culture that characterizes Intel was built into the company from the very beginning. Bob Noyce’s experience at Fairchild Semiconductor laid the groundwork. “Fairchild was steeped in an East Coast, old-fashioned, hierarchical business structure,” he stated in a 1988 interview. “I never wanted to be part of a company like that. When we started Intel, I saw it as a community of common interests. It was much more a cooperative venture than an authoritarian structure—a community rather than an army. People came here because of their abilities, and we knew we would all prosper or fail together.”

Culture is defined as the collective norms, values and standards that determine behavior in an organization. Forming the backbone of Intel’s culture are the values that guide the company. They were first expressed in their current form by senior vice president and general manager of the Semiconductor Products Group Bob Reed (then director of Administration), who drafted an Intel values statement during the half-time of a Sunday football game. “The only reason I could do it so easily is because the values were already in our blood,” Bob notes. “I was just articulating what was already there.”

“Overall, I think we’ve stuck pretty well to a merit-based system and have avoided political entanglements,” Bob Noyce reflected in 1988. “People get respect or get ahead because of their abilities, not their positions. You can always tell the boss he’s wrong.”

“It’s sometimes difficult to blend Intel culture with Asian tradition

Intel culture is

Carlene Ellis was Intel’s first female vice president. Now director of Information Technology, she spearheaded the refinement and re-communication of Intel’s culture over the past several years as director of Human Resources. Says Carlene, “One of the biggest challenges for managers at Intel is to make sure that we’ve given permission for people to say to the CEO or anyone, ‘What you just did was not good role-modeling of this value,’ And when you’re in a position of high visibility, you may get called on the carpet quite often for not living up to the values. You have to be able to hear that without getting defensive, or it destroys your credibility.”
"People are motivated by the atmosphere of freedom and trust here. No one is telling you what to do; you're expected to use your head." Beth Hernandez, secretary in Assembly Technology Development, Chandler, Arizona; five-year veteran.

"I love the way we laugh at ourselves at Intel. In the early days, we played as hard as we worked. One year during the World Series, we smuggled radios into work. Les Vadasz blew up at us about how irresponsible that was. Then he was back five minutes later to ask what the score was." Paul Metrovich, R&D Lab manager, Folsom, California; 24-year veteran.

"In the mid-1980s, there was a lot of bureaucracy. But by 1988, I think the company had been humbled a bit. Now we accept creativity better; we're more tolerant of diversity."

Eric Murphree, Fab 9 Organizational Development manager, Rio Rancho, New Mexico; seven-year veteran.

We tend to focus on saving face and respecting our elders; we are more reserved.

focused on being aggressive and direct.

We've had to encourage people to speak up with ideas and criticisms. . . . The U.S. is very individual-oriented, but we in Asia fall naturally into teamwork. When the rest of the company is trying to promote teamwork, we're a bit ahead of the game."

P.Y. Lai, vice president of the Technology and Manufacturing Group, general manager of Penang Operations; 22-year veteran.
Left to right: 1103 designer and new Microprocessor Division program manager Bob Abbott, DRAM production supervision engineer Ron Whittier, Lee Vedasz and DRAM development engineering manager Bill Ng. Abbott struggled to get the first DRAM into production. Ron, now senior vice president and general manager of Intel Architecture Labs, recalls, "In 1968, when we started the DRAMs, we were new to the business and we didn't know how to do it. But in practice there's no way to make them." A year later, I was at Intel, responsible for producing these impossible-to-manufacture products.

1972

Favorite TV Program: All in the Family

January

Intel's 1971 revenues: $543,051.

In-10 system-level standard memory system introduced.

April

Intel opens in Munich, West Germany.

May

President Nixon becomes first U.S. president ever to visit Moscow.

SIM-4, SIM-8 development systems are introduced.

June

Five men arrested for breaking into Democratic National Committee offices in Watergate office complex.

July

2102 1K static RAM, company's first commercial product, introduced.

Company enters digital watch business, acquiring Microma.

Stock Participation Plan introduced.

Intel hires 1,000th employee.

August

Summer Olympic games held in Munich, West Germany. Terribes massacre 11 Israeli Olympians.

August

First 8-bit microprocessors, introduced.

October

Intel UK. opens in Oxford.

November

Nixon/Agnew defeat McGovern/Shriver in presidential election.

Making Memories Better: First Intel DRAM

In its first 18 months, Intel produced two static random access memory (SRAM) products. They were moderately successful, but "no great shakes," Andy Grove notes. "We were a little nervous."

The nerves calmed a bit in 1970 with the introduction of the 1103 dynamic random access memory (DRAM)—the world's first merchant market LSI (large-scale integrated) DRAM and Intel's first really successful product. "The DRAM, used to store a computer's instructions and data, was smaller, more powerful, and used less energy than the magnetic core memories that were popular at the time," recalls Bill Regitz, Folson Engineering Service Operation manager, who took part in the DRAM engineering development effort. "However, DRAMs don't offer permanent storage the way cores do, so we had to do a bit of selling. Customers had to be helped to overcome the short-term technical obstacles and see the long-term possibilities of the product."

Attracted by the DRAM's superior performance and smaller size, customers soon caught on. It wasn't long before the DRAM started to bury magnetic cores. By the end of 1971, the 1103 was the world's largest-selling semiconductor device. Its success provided vital capital with which to fund Intel's early growth.

“We focused on understanding...”
A Fortuitous Discovery: The First EPROM

Few of Intel's breakthroughs were more significant—and more unanticipated—than the EPROM. Invented by Dov Frohman (now Microprocessor Products Group vice president and general manager of Intel Israel) and introduced in 1971, the erasable, programmable read-only memory was at first conceived of as a prototyping device.

The original technical paper presented by Dov at the International Solid State Circuits Conference, the premier technical conference for this field, was the hit of the show. Gordon Moore recalls, "Dov projected a film that displayed the bit pattern in the EPROM memory cells. As the cells were exposed to ultraviolet light, the bits dropped out one-by-one until all that was left was the familiar Intel logo, dropped 'e' and all. The bits fell and, when the final one disappeared, the entire audience broke into applause. Dov's paper was voted the best at the conference."

It wasn't until the blossoming of the microprocessor that the full potential of the EPROM was realized. As an alterable storage medium, the EPROM gave OEMs a flexible, low-cost way to store microprocessor programs—thereby rapidly increasing the market for both the microprocessor and the EPROM. The unexpected synergy between the two chips is legendary; Gordon refers to them as "unrelated but happily concurrent developments." The prototyping device became a high-volume memory.

For many years, Intel was the only company that could make EPROMs in high volume. As a result, the EPROM was a significant product family for Intel through the mid-1980s.

"results and acting on them."
Democratizing the Computer: The First Microprocessor

The development of what Gordon Moore calls "one of the most revolutionary products in the history of mankind" began modestly in 1969. Japanese calculator manufacturer Busicom asked Intel to design a set of chips for a family of programmable calculators. Intel engineer Ted Hoff thought he could do better than the unwieldy 12 custom chips called for in the Japanese company's original designs. His solution: develop a four-chip set, centered around one general-purpose logic device that would access its application instructions from semiconductor memory. Ted saw that the same set of chips with different programs could be used for a wide range of applications. Federico Faggin joined Intel to turn Hoff's vision into silicon reality. In nine months, Faggin and his team delivered the 4004, ready to market.

But Busicom owned the rights to it. Sensing the market potential of the chip set, Intel offered to return Busicom's $60,000 investment in exchange for the rights to the microprocessor design. Busicom agreed and Intel introduced the 4004 in November 1971, under the modest headline, "Announcing a New Era of Integrated Electronics." Consisting of 2,300 MOS transistors, the 4004 microprocessor packed as much computing power as the first electronic computer, the ENIAC, which filled a room when it was built in 1946.

"Part of the fun was changing the way people thought about computers," Ted says. "Computing used to be accessible only to a very privileged group—those with access to a mainframe. Today, a typical high school student with an Intel486 CPU-based PC on his or her desk has more power than most mainframes had in the early 1980s.

Information is power. I like the way the microprocessor has spread that power around."
To PC or Not to PC?

When the 4004 came out in 1971, engineers at other companies were intrigued, but they weren't sure how to put the microprocessor to work. Ted Hoff and other Intel design engineers devised a simulator board to demonstrate how customers could develop 4004 products. When it became clear how eager OEMs were for them, Intel sold the boards and was launched into the development tools business. A similar device, designed to help engineers use the first DRAMs, had gotten Intel's systems business on its way the previous year.

"In retrospect, I think of those development tools as the first 'benchtop' computers, because engineers used them in the labs to write their applications and do programming," recalls senior vice president and director of Corporate Strategy Dave House. "The systems had a CPU and an operating system that was basically the precursor to DOS; they had just about everything in them that the first IBM* PC had in it. For a long time, we made more money selling those systems to design engineers than we made selling the chips themselves."

The success of the microcomputer development systems, or "blue boxes," as they were known at Intel, spurred some people to consider the possibility of Intel entering the retail systems business itself. "We recognized the trend toward a computer on every engineer's desk," says Gordon Moore, "but we were very busy growing in our existing businesses. We missed the chance to lead the engineering workstation revolution."

In one particularly ironic example, Gordon remembers, "In the mid-1970s, someone came to me with an idea for what was basically the PC. The idea was that we could outfit an 8080 processor with a keyboard and a monitor and sell it in the home market. I asked, 'What's it good for?' And the only answer was that a housewife could keep her recipes on it. I personally didn't see anything useful in it, so we never gave it another thought."

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"do is different, not how we do it."

Andy Grove,

president and CEO

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1975

Memorable Movie:
One Flew Over the Cuckoo's Nest

Popular Book:
Slagmen

JANUARY
Intel's 1974 revenues: $314,456,000.

FEBRUARY
Intel's Stockholm, Sweden office opens.

MARCH
Intel introduces 8255 programmable peripheral interface.

IEEE-80, world's first in-circuit emulator, introduced.

APRIL
Bob Broyce elected chairman of the Board.
Gordon Moore elected president and CEO.

MAY
Jumbo Jet of Japan becomes first jetliner to reach summit of Mt. Everest.

140,000 South Vietnamese refugees flown to U.S., following fall of Saigon.

Intel's original A1 building in Pocahontas burns to the ground.

OCTOBER
MULTIBUS I specification introduced.

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1834
McCormick's reaper ushered in farm mechanization.

1844
Telegraph brings instant long-distance communication.

1852
Ott's elevator allows high-rise buildings.

1876
Edison's bulb harnesses electric energy.

1885
First adding machine is grandfather of computer.

1913
First airplane flies and begins the air age.

1946
First general-purpose computer.

1971
First microprocessor developed by Intel Corporation.

1973
Production of DNA is born to biotechnology.

(From U.S. News & World Report, 1982)
1976

Memorable Movie: Rocky

JANUARY
Intel's 1975 revenues: $130,780,000.
Intel decides to proceed with development of the 8086 in addition to the iAPX 432.

FEBRUARY
Winter Olympic games held in Innsbruck, Austria.
Dorothy Hamill wins gold in figure skating for the U.S.

APRIL
Intel Japan K.K. established.

MAY
IDDC '80/81 introduced.

JUNE
Company converts to 4-inch wafer.

JULY
U.S. celebrates bicentennial.

AUGUST
2147 static RAM, first bus circuit introduced.

SEPTEMBER
Company opens facility in Santa Cruz.

OCTOBER
Alder, Oregon site opens.

NOVEMBER
Currie/Mandle defeat Ford/Dole in presidential election.
8085 8-bit microprocessor introduced.

DECEMBER
0741/0848, world's first 8-bit microcontrollers, introduced.

1977

Favorite TV Program: Happy Days

JANUARY
Intel's 1976 revenues: $232,975,000.

APRIL
Apple Computer introduces Apple II, a personal computer.

JUNE
Silver Jubilee for Queen Elizabeth II.
Intel opens Rotterdam, The Netherlands office.
Leonid Brezhnev becomes President of the Soviet Union.
Intel starts Penang, Malaysia's 73.

AUGUST
Volkswagen phases out "Bug" in U.S.
Intel hires 10,000th employee.

SEPTEMBER
First Intellect published.
Intel's Oslo, Norway office opens.
2810, first single-chip coder, introduced.
Intel enters bubble memory business.

OCTOBER
Barbados, West Indies site opens.

NOVEMBER
Egypt's Anwar Sadat makes historic first visit to Israel.

An Architecture Ahead of Its Time: The iAPX 432

In 1975, after the 8-bit 8080 processor was established in the market, work began on the next-generation microprocessor. Gordon Moore recalls, "We figured we had one last opportunity to do it right, before the growing installed base led us irrevocably into maintaining the 8080 architecture path."

Out of this impulse, the Intel Advanced Processor Architecture (iAPX) 432 project was born: an attempt to embrace the best theory of the time at every level of design—not just a new microprocessor architecture, but a new system architecture and new operating system software as well.

Intel Fellow and Supercomputer Systems Division director of Technology Justin Rattner led the iAPX 432 engineering team. Justin recalls, "At the time, most Intel microprocessors were going into things like gas pumps and traffic lights. With the iAPX 432, we were aiming to replace minicomputers."

The iAPX 432 contributed to Intel's microprocessor bag of tricks with features such as fault tolerance and self-checking hardware—later incorporated directly into the Pentium processor. More importantly, many new CAD tools and Intel's whole hierarchical CAD methodology were pioneered by the iAPX 432 component team.

In the end, the iAPX 432 architecture proved too complex and unwieldy for customers and was phased out in the early 1980s. But it remains a classic example of Intel's willingness to go out on a limb and learn from all experiences.

The iAPX 432 was an incredibly advanced 32-bit microprocessor architecture that never came down to earth.
Early in the history of the microprocessor, few people could have predicted how significant the Intel microprocessor family would become. In December 1975, the company decided to create the 8086 as its first 16-bit microprocessor. “We knew that a new architecture required new software development—a significant investment on the part of customers and developers,” recalls Jean-Claude Cornet, vice president and general manager of the Personal Computer Enhancement Division (PCED) Mobile Unit and director of engineering for the 8086. “We heavily supported customers’ transition to the 8086. A few years later, IBM’s selection of the 8088 CPU for its first PC created a large installed base that cemented our commitment to compatibility for future generations.”

Since then, Intel has been unwavering in its dedication to its microprocessor family tree. Each new generation proves Moore’s Law by radically increasing the number of transistors packed onto the chip.

“When Intel introduced the 286, the world said we’d never be able to take this design to a 32-bit format, and yet we did it, and we keep doing it,” notes Vinod Dham, Microprocessor Products Group vice president and general manager of the Microprocessor Divisions 5 and 7. “Making chips this complex takes a tremendous conviction in your heart.”

Compatibility remains the key to Intel’s strategy. The Pentium® processor, the latest powerhouse chip in the family, still can run every piece of software ever written for any microprocessor based on the Intel architecture. As Jean-Claude notes, “In a mature marketplace, the best way to bring about revolution is through evolution.”
11.

In 1979, the success of Intel's chief microprocessor family was by no means secure. The 16-bit 8086 and the 8-bit 8088 were winning orders steadily, but the competition was hot. Of particular concern was Motorola's 68000, which beat out the 8086 for a number of key design wins.

In response, Intel launched a campaign in 1980 to make the 8086/8088 architecture the industry standard. The plan was code-named "Operation Crush"; its objective was to generate 2,000 design wins within a year.

The campaign worked, and Intel raked in 2,500 new design wins that year. "We fought a lot of gear-head arguments about why the other guy's chip was better," admits Dave House, director of Marketing at the time. "But in the end, we got every one of those wins because we had the product that solved the customer's problem first."

The most significant Crush result was IBM's selection of Intel's 8088 as the microprocessor for its first PC. Intel had to go to great lengths to win IBM's confidence, since "Big Blue" had never used an outside vendor for a key microprocessor before. "Everything was very secretive," recalls Earl Whetstone, vice president of the Worldwide Sales Group and director of Americas Sales and Marketing. As a field sales engineer at the time, Earl won the IBM design for Intel.

"When we went in to provide technical support, they'd have our technical people on one side of a black curtain and theirs on the other side, with their prototype product. We'd ask questions; they'd tell us what was happening and we'd have to try to solve the problem literally in the dark. If we were lucky, they'd let us reach a hand through the curtain and grope around a bit to try to figure out what the problem was."

What finally clinched the deal for Intel was the company's long-range commitment to the 8086/8088 line, Earl surmises. "IBM was interested in the business issues, such as our plans for future products and our ability to manufacture in volume," he says.

IBM's decision proved a terrific coup for Intel, but no one understood the true significance of it at first. Earl remembers, "A great account was one that generated 10,000 units a year; nobody comprehended the scale the PC business would grow to—tens of millions of units a year."
Senior vice president and director of Corporate Strategy, Law H. House, who was director of Marketing at the time, remembers the sweet victory of beating out Motorola for several key design wins in the 1980 Crush campaign.

Earl Whetstone, Worldwide Sales Group vice president and Americas Sales and Marketing Director, was the field sales engineer who won the IBM PC account for Intel.
Chip Making, International Style

13. Intel opened its first international assembly plant on the small Malaysian island of Penang in 1973. A 1975 fire burned the plant to the ground, but the site was shipping product from rented quarters within two weeks. With P.Y. Lai as vice president of the Technology and Manufacturing Group and general manager of Penang Operations, the site has received major regional quality awards, such as the Malaysian Prime Minister’s Quality Award in 1990.

In 1974, Intel was the first American semiconductor company to set up an assembly facility in the Philippines. A test facility followed in 1982, and the site has survived natural disasters and political upheavals, remaining a solid contributor to Intel’s success.

In Israel, Dov Frohman’s persistent badgering of Andy Grove led to the establishment of the Haifa design and development center in 1974 and the Jerusalem fab in 1983. “Throughout the 1970s, the group at the design center worked very hard to prove to Intel management that the benefits of a highly educated work force outweighed the political concerns about having a fab in the Middle East,” Dov notes. The site has since proven its worth many times over.

Other sites outside the United States include the Intel systems plants in Puerto Rico and in Leixlip, Ireland. The latter is being joined by the new Fab 10, scheduled to begin production soon.

Intel’s international sites have faced special difficulties: typhoons in Penang, volcanic eruptions and a government overthrow in the Philippines, the Gulf War in Israel, Hurricane Hugo and devastating floods in Puerto Rico. Through it all, output has stayed high. “We have overcome enormous obstacles through the sheer dedication of our employees,” says Manila operations general manager Jake Pena.

1981

Hit Song: Betty Davis Eyes
Pop Star: A Woman of Substance
Favorite TV Program: Little House on the Prairie

January
InteI’s 1980 revenues: $854,961,000.
Fab 7, Rio Rancho, New Mexico opens.

February
Intel 432 microprocessor introduced.

March
President Reagan shot and wounded in Washington, D.C.

July
British Prime Minister’s wedding.
Lady Diana Spencer;
Intel opens in Swindon, U.K.

September
France starts service on bullet train between Paris and Lyons.
Bob Hope becomes chairman of Semiconductor Industry Association.

October
Egyptian leader Anwar Sadat assassinated.
Intel’s “1200 Solutions” launched.

November
Intel introduces System 86/330.
Groundbreaking for Fab 8 in Jerusalem, Israel.

December
Scientists identify a new disease: AIDS.

Jake Pena is general manager of operations at the Manila site.

Intel’s Penang site was the first Malaysian Prime Minister’s Quality Award in 1990, the first time the award was ever given to an organization in the private sector.
I 1982

Memorable Movie:
E.T. The Extra-Terrestrial

JANUARY

FEBRUARY
Intel and AMD enter microprocessor peripheral exchange agreement.

MARCH
AT&T breakup announced.
80186/188 high-performance 16-bit microprocessors introduced.
80286 high-performance 16-bit microprocessor introduced.
First LAN co-processor, the 82586, introduced.
2914, first combo codec/timer chip, introduced.

APRIL
Argentina invades Falkland Islands.
P3, Fords Rio, opens.

MAY
U.S. Equal Rights Amendment defeated.

AUGUST
8098, first 16-bit microcontroller, introduced.

SEPTEMBER
Walt Disney Transcripts names Gordon Moore the outstanding CEO for the semiconductor industry the second year in a row.

OCTOBER
7114 4-Mbit bubble memory introduced.

NOVEMBER
CEAMS (Component Engineering Analytic and Manufacturing System) tracking system for water fabrication introduced.

DECEMBER
Dr. Barney Clark receives first permanent artificial heart.
IBM announces plans to purchase 12% of Intel for $250 million.

Turning On to Quality: Intel Manufacturing

The industry downturn of the mid-1980s gave Intel a rude shock about its manufacturing processes. As Craig Barrett puts it, "We suddenly realized we weren't so hot." Intel compared its key indicators with those of world-class manufacturers, many of whom were competitors. "Basically, all our results—yields, throughput time, capital utilization—were pretty abysmal," Craig notes.

The company went back to basics. "We set our expectations higher," Craig recalls. "We trained our engineering staff in statistical process control. We gave more attention to equipment selection and management. We pushed our technology development."

This last solution involved changing the relationship between process technology development and manufacturing, which had historic significance for Intel. "We had always been proud that we developed our manufacturing processes in the factory," recalls Gerry Parker, senior vice president and general manager of the Technology and Manufacturing Group. "However, it was clear that interrupting production to tweak our processes was too disruptive. So we turned Fab 5 over to technology development [it became D1]. When they got the yields up on a new process, the manufacturing teams had to replicate the process exactly."

The results were astounding. Says Craig, "We've made several quantum leaps. For example, in the mid-1980s, fewer than 50 percent of our chips were functional at the end of the line. Today, we regularly have yields of more than 80 percent. Equipment utilization has risen from below 20 percent to as high as 60 percent today."

"People who were in manufacturing 10 years ago think the yields we have today should be impossible. It's a great example of how you can always do better."

Over the years, Intel's manufacturing processes have been refined to allow for chips with smaller circuit sizes, fabricated on larger wafers. The company's first products were made on 2-inch wafers; today, Intel's most advanced products are made on the new 0.6-micron technology process using 8-inch wafers.
"One of Intel's strengths is its ability to focus precisely on a defined technology direction," Les Vadasz reflects. "However, when you are so focused, it's harder to tap other business opportunities that are relevant and worthwhile but don't happen to fit the current corporate blueprint."

With an eye to developing new business opportunities, the company started the Intel Development Operation (IDO) in 1984. "The idea was to fund good ideas, build a fire wall around them and see what developed—a kind of internal venture capital operation," Les says. This "entrepreneurial" focus helped keep many good employees and their ideas inside the company.

Justin Rattner, now an Intel Fellow and director of Technology for the Supercomputer Systems Division (SSD), thought Intel should develop a line of parallel processing supercomputers based on its Intel386 microprocessors. In 1984, the IDO board gave him the funding to give it a shot. Recalls Justin, "Parallel processing was a very risky idea; it required both seed capital and a significant incubation period to develop a business."

Also under the wing of IDO, today's Personal Computer Enhancement Division (PCED) got its start in 1984, selling math coprocessors and add-in memory boards to PC users through retail channels. "Marketing to PC consumers is in Intel's blood now, but at the time it was almost unthinkable," says Intel Products Group vice president and assistant general manager Jim Johnson, who co-founded PCED with Rich Bader.

The combined 1992 sales of PCED and SSD approached a quarter of a billion dollars. Other IDO projects were not successful financially—but, says Les, "There is more to the technology business than accounting for the money. You nurture a sense of what's possible: it's never what is that drives you; it's what could be."

"Intel is a different company now."

Nobuko Clark, tech specialist in California Technology Development, Quality and Reliability
Challenges From Japan

In the late 1970s, Japanese manufacturers emerged as a major force in the semiconductor industry. Heavy Japanese investment contributed to overcapacity in the semiconductor industry, precipitating the industry crash of 1985-86.

EPROM prices were in free fall. Japanese manufacturers were slashing prices to less than half of their actual manufacturing costs. This predatory tactic, known as “dumping” (selling parts at money-losing prices to destroy competitors), is illegal under U.S. trade laws.

Intel and other U.S. suppliers banded together to fight back. A Section 301 case was filed against Japanese manufacturers for dumping EPROMs; the U.S. government initiated a similar case on DRAMs. Japanese companies were found to be selling products below cost. As a result of the unified semiconductor industry front and its persistent lobbying of the U.S. government, the Semiconductor Trade Agreement between Japan and America was signed in 1986. The accord ordered Japan to halt dumping immediately in the U.S. and in third-country markets, and to open its domestic markets to U.S. manufacturers.

Dumping ceased, but not before it had driven most of the U.S. players, including Intel, out of the DRAM market and severely reduced the U.S. market share in EPROMs.
Getting Out of DRAMs

By 1985, falling prices and a glut in the market prompted Intel to jettison its DRAM business. "In retrospect, it's fascinating to see how long we held on, basically deluding ourselves," Andy Grove muses. "By 1985, DRAMs accounted for only 5 percent of our revenue, yet we were spending one-third of our development dollars on the product."

"Finally, I said to Gordon [Moore], 'What would someone do with this business if they came into Intel from the outside?' The answer was clear: 'Get out immediately.'"

"It was an emotional decision. We had been the first to introduce the product and build the business. Even as we were losing market share hand over fist, we clung to the idea that we'd come back. It was hard to admit that it was a battle we had lost."

"In retrospect, getting out of DRAMs when we did was the best business decision we've ever made, both for us and for the industry. We'd have been of no value to the industry as one of many limping memory suppliers. As it was, we were freed to put those resources into microprocessor development and production, which enabled us to become the technology powerhouse for the PC industry. We didn't act a moment too early.'"

Downsizing Intel

The cyclical nature of the semiconductor industry was never more evident than in 1984. Seemingly insatiable demand for the company's products led Intel to add capacity and people at a dramatic rate. Then, in the second half of the year, without warning, demand plummeted.

In response, Intel instituted temporary pay cuts of 10 percent and mandatory days off without pay. "People understood the urgency of the situation, and they rose to the occasion," recalls vice president and director of Corporate Programs Dick Boucher, who was the director of Human Resources at the time. "They gave extra effort without a lot of gristled teeth."

Finally, however, left with an unaffordably large production capability and no growth in sight, Intel resorted to drastic measures. From 1985 to 1986, the company closed seven factories, abandoned several businesses and cut head count by one-third.

What didn't get cut were investments in the future. Intel stuck to its long-term orientation, with combined R&D and capital expenditures totaling 30 percent of revenues in 1986. This difficult period set the stage for the dramatic growth that began in 1987.

Dick describes the layoffs as "a truly awful process. We were not laying off people who were incompetent—many were long-tenured and had successful careers."

Bob Reed, who became director of Administration in 1987, reflects on what Intel learned from the downsizing process: "It made us realize that in a business that will change forever, you need to move people constantly from areas of lesser return to areas of higher return. Redeployment is like always watching what you eat, rather than bingeing and going on crash diets."

Bob Reed (left), senior vice president and general manager of the Semiconductor Products Group, and Dick Boucher, vice president and director of Corporate Programs, remember the painful lessons Intel learned from the 1985-86 layoffs.

1985

Favorite TV Program:
The Cosby Show

January

Intel's 1984 revenues: $1,626,312,600.
Intel Technology Asia Ltd. opens office in Seoul, Korea.

February

U.S.-Japan agree to eliminate tariffs on importation of semiconductors.
IPS3: Supercomputer unveiled.
Intel announces first layoffs in 10 years and plans to close T2 in Santa Cruz and A2 in Santa Clara.

March

OpenNET local area network introduced.

April

Intel ranked 24th in Fortune 500.
ABOVE" board products introduced.
Intel Taipei, Taiwan office opens.

May

Intel's French headquarters open in Saint-Denis-en-Tweed.

June

Intel opens Folsom, California site.

September

Huge earthquake kills thousands in Mexico City.

December

Intel decides to quit the DRAM business.

Bob Nooyen inducted into National Inventors Hall of Fame.

Intel opens Beijing office in China.
An 'Awesome' Intel Corners Its Market

It has turned its key computer chip into Silicon Valley's latest cash cow.

By ANDREW POLLACK

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company dominates the Intel Corp., by virtue of its vast product line and by virtue of the fact that its products are used in so many different devices, it has become synonymous with the word "computer chip." This is because Intel is the only manufacturer of x86-based microprocessors, which are used in computers, servers, and other devices that utilize Intel's technology.

The x86 architecture, developed by Intel, has been the de facto standard for personal computers since the 1980s. Intel's processors have been used in virtually every type of computer, from desktops and laptops to servers and supercomputers. Today, Intel is the leading supplier of microprocessors worldwide, with a market share of around 80%.

Going It Alone with the Intel386 Chip

Today Intel is the sole open market supplier of the genuine Intel architecture line of microprocessors. But that wasn't always the case. Until the mid-1980s, the pattern of the industry was to second-source most products, meaning other companies were licensed to make and sell Intel products, in exchange for royalties and/or the rights to other products.

That pattern began to turn sour as Intel's microprocessor line increased in value and candidates for exchange did not keep pace. When the Intel386 chip was introduced, the company wanted fair compensation. "We just didn't want to put the chip on a silver platter and ship it off to other companies," Andy says. "We wanted to be sure we would get something of value in return."

From this concern was born the decision to remain the only manufacturer of the Intel386 chip—at least until other companies demonstrated they had equally valuable technology to offer in exchange. "I think AMD, especially, thought we were bluffing. They didn't meet our commitments, thinking we'd need their help eventually to meet demand," Andy notes. "It was like a game of chicken, and we didn't swerve."

The sole-source policy pushed Intel to new heights in manufacturing. "We had to commit to supplying the entire needs of the industry," Andy says. "That motivated us to get our manufacturing performance up to snuff. We developed multiple internal sources, so several factories and several processes were making the chips simultaneously. We made major commitments to production ramps, and we didn't hedge."
SEMAPTECH Brings the Industry Together

Heartened by their experience in banding together to get the U.S./Japan Semiconductor Trade Agreement passed, U.S. chip makers found another way to exercise their strength in numbers.

SEMAPTECH (for SEMiconductor MANufacturing TECHNOlogy) was founded in 1987 by 12 semiconductor companies, including Intel, to recover key manufacturing capabilities.

Intel’s commitment to the project was illustrated by Bob Noyce’s 1988 decision to take on the role to lead the consortium as president and CEO. In a 1988 interview, Bob said, “The country had made a commitment to this concept. I felt that if I didn’t follow up with personal involvement when it was needed, it was betraying a trust to the people of America.” Bob’s leadership and influence in Washington were critical to SEMATECH’s early survival.

What held the effort together was the organization’s focus on two clear goals: to regain predominance in the worldwide semiconductor market and to increase the proportion of domestic manufacturing equipment bought by U.S. chip makers. “Five years later, we’ve achieved both goals, although there’s clearly more improvement to be made,” says Craig Barrett, who has served on SEMATECH’s board for seven years.

To Bob, SEMATECH represented more than just the sum of its parts. “This is a model for how government and industry can work together to address the needs of the market and the country,” he said. "It’s a model that’s endorsed by many Americans.”

In 1988, Bob Noyce took on the construction of his third “start-up” as president and CEO of SEMATECH.
1988

Memorable Movie: Big

JANUARY

Intel's 1987 revenues: $1,607,165,000.

Intel's domestic facilities go smokeless.

Employee Cash Bonus announced.

FEBRUARY

Intel Asia Electronics opens in India.

MARCH

Superman turns 50

Intel stock listed for first time on Swiss Stock Exchanges.

APRIL

The Big Bang: 16 new products and development tools designed for embedded control applications introduced.

JUNE

NASA report reveals that global temperatures have risen, creating the "greenhouse effect."

Intel and Siemens announce IBM joint venture.

Intel announces it will build employee showers in most U.S. sites.

Intel List ends.

Intel Foundation established.

JULY

Bob Hegy accepts position as SEMATECH CEO.

OCTOBER

Intel acquires DVI (Digital Video Interactive) technology from General Electric/RAI.

Intel opens Princeton (New Jersey) Operation.

Intel opens new Munich I Facility in Feldkirchen, Germany.

Intel embarks on joint venture with the People's Republic of China to manufacture 16- and 32-bit microcomputers.

NOVEMBER

Bush/Quayle defeat Dukakis/Bentsen in U.S. presidential election.

Taking the Lead in Flash Memory

21.

In 1988, Intel seized the opportunity for a new technology known as flash memory. Toshiba, a Japanese company, invented flash technology, but in an ironic role reversal, Intel, an American company, took the leadership position by improving the technology and making it more manufacturable and affordable. The worldwide flash market has reached $600 million, and industry forecasts predict 100 percent annual growth for the foreseeable future.

Flash offers the non-volatility of EPROMs with the added bonus of electrical erasability. Flash was originally introduced as an EPROM replacement for embedded systems because manufacturers could change or upgrade machine software without having to open the system or replace components.

Intel has increased the density of flash while reducing the cost to help put flash within reach of the new class of portable systems. Flash offers these systems the combination of high storage density plus compact size, light weight, extreme ruggedness and low power. Notes Dick Pashley, vice president of the Semiconductor Products Group and general manager of the Memory Components Division, "It looks as if solid-state technology will eventually render conventional disk drives obsolete in mobile systems."

"Most memory technologies invented in the past 20 years have become low-margin commodities," says Pashley. "Disk drive replacement was a radical idea five years ago, and people were naturally skeptical. A very dedicated and immensely creative team clung to the vision, and today people are believers."

The potential for flash is so significant that Intel has phased out its EPROM design and production efforts in favor of flash.

Flash memory may replace disk drives in mobile computers as well as provide high performance in traditional embedded memory applications.
The Red X Ad Campaign

In 1989, Intel burst upon the advertising world with a bold new ad campaign. The so-called “Red X” ad raised eyebrows wherever it appeared. Dennis Carter, vice president and director of the Corporate Marketing Group, led the group that developed the campaign. “The Intel386 chip was a successful product, but it was priced in the high end of the market. The market was stagnant, and people perceived that the Intel 286 CPU was all that they would ever need. The Windows operating system was coming, giving people a compelling reason to move to 32-bit processors, but that message wasn’t getting across. We wanted a dramatic way to convey that the Intel386 SX CPU was an affordable way to enter the 32-bit world.”

Before it hit the billboards, the Red X campaign stirred up controversy, Dennis recalls. “We were speaking directly to PC consumers for the first time, rather than marketing only to OEMs. We weren’t sure how our OEM customers would react.

“Also, we were concerned that we could actually damage ourselves if people failed to understand the campaign. The red X slashing through the 286 was calculated to grab attention, to cut through the clutter of other advertising. But it could have killed the 286, without moving people to the Intel386 CPU. Dave House called it the ‘Eating Our Own Baby’ campaign.”

Intel previewed the Red X ads in a test market in Denver, Colorado, and they were wildly successful. “We saw significant changes in the buying patterns of PC buyers; they were switching from 286-based machines to Intel386 SX CPU-based PCs,” Dennis says. Among PC buyers, there were very few negative perceptions of Intel as a result of the campaign. OEMs were pleased as well with the movement to 32-bit machines.
Making Intel a household name are (clockwise from upper left): Architecture Manager Team manager Pat Perry; Reseller Support Program manager Chisone Hams; Creative manager Kevin Teixeira; Processor Brand Marketing manager Golly Fundikovski; Intel Inside Program manager Janice Wilkins; and Trademarks and Brands managing attorney Ric Giardina. Proud godfather, vice president and director of the Corporate Marketing Group. Dennis Carter (facing page), watches over the branding efforts.

"The drive to get at issues of substance"

Ted Jenkins, vice president and director of Corporate Licensing.
Making a Name for Intel

The Red X campaign was Intel's first corporate-wide experience with marketing to the PC-buying public. It spawned several programs that continue today, all focused on building the perceptions of quality and compatibility associated with the Intel name.

"What we learned from the Red X campaign was that we could communicate arcane technical ideas—that, in fact, people wanted to hear them," Dennis Carter says. The Architecture Manager (AM) program grew out of this recognition. AMs help information technology managers, dealers and user groups around the world understand the capabilities and benefits of the Intel architecture.

The Intel Inside program also taps the value of the Intel name by encouraging PC buyers to look for systems with a genuine 32-bit Intel processor inside. In OEMs' advertising and on their PCs in the stores, the Intel Inside logo helps PC shoppers tell a genuine Intel CPU-based PC from an imitation.

"...has kept us sharp over the years."
1991

For Song: Unforgettable

January
Intel's 1990 revenues: $3,021,274,600.
Intel Foundation establishes the Robert Noyce Memorial Fellowship Fund.

February
Operation Desert Storm vs. Iraq.

April
Intel's Dave Fleshman awarded the annual Israel Prize in Engineering.
Fab 1 in Santa Clara shut down.
Intel announces it will cease further development of the EPROM in favor of Flash memory development.

May
Intel launches Intel Inside program.
Intel's Touchstone Delta system, the fastest supercomputer in the world, is dedicated at the California Institute of Technology.

June
Croatia and Slovenia declare independence from Yugoslavia; Serbo-Croat battles erupt.

August
The site in Palm Bay, California where Bob Noyce invented the integrated circuit becomes California's 1.000th historic landmark.

September
Baltic republics gain independence from USSR.
Fab 3 begins in Livermore, California.
Intel introduces 23 new networking products.

October
At COMDEX, Andy Grove introduces the concept of computer-supported collaboration with demonstration.

November
L.A. Lakers superstar Earvin "Magic" Johnson announces he tested HIV positive.
Intel launches "Vacancy" commercial on prime-time television.
Intel and IBM establish Robert N. Noyce Development Center.
Supercomputer Systems Division announces the Paragon® XP/S supercomputer.

December
Soviet Union disbanded and is replaced by Commonwealth of Independent States.
Intel opens sales office in Moscow.

Cashing In on Success

Over the years, in good times and bad, Intel continues to invest in manufacturing and R&D. Not all companies have this luxury. Vice president and chief financial officer Harold Hughes comments, "The semiconductor business has truly awful cash flows. There are constant, large outlays for R&D and manufacturing, but the income is very cyclical. So, Intel has put a priority on building a buffer of cash for the times when income is constrained."

Working as an internal investment bank, the Intel Treasury department provides the cash for Intel's strategic programs. The group invests millions of dollars searching for the best possible return, while also minimizing risk. "Intel's Treasury has beat all expectations for returns," Harold notes. "They are creative and innovative; they can smell a good deal."

The Treasury minimizes Intel's financial risk through investing only in secure financial institutions with high credit ratings and high-quality returns. "Our goal is to beat market returns while taking minimum risks," vice president and treasurer Arvind Sodhani notes.

In September 1992, with nearly $2.5 billion in cash and short-term investments on hand, Intel's Board decided to share its success directly with stockholders, in the form of a dividend. "I never thought we'd pay a dividend, because we didn't want to give up any of the cash we might need for the next lean period," Harold says. "It's a statement that our financial position is very secure, and it's important for stockholders to understand that confidence."
Victories on the Legal Front

Since the early 1980s, Intel has become more aggressive in its efforts to protect its intellectual property rights. "Intel's engineers have made many great innovations, and other companies naturally want to imitate our successful products," notes vice president and general counsel Tom Dunlap. "But when we're spending so much on research and development to create those products, we're not about to sit by and let other people piggyback on our efforts."

Legal protection for intellectual property was strengthened when computer software programs became expressly protectable under the 1980 Copyright Law. The 1984 Semiconductor Protection Act prohibited copying of the complex patterns printed on the wafers. The formation of the Court of Appeals for the Federal Circuit (CAFC) has generally strengthened patent rights and made patent rulings more consistent. (Intel has increased the number of patents filed each year from 105 in 1990 to an estimated 420 in 1993.)

"We've gained a certain notoriety, because we've had to resort to litigation with freeloading companies who try to infringe our rights," Tom notes. Among Intel's most significant legal victories is the NEC case of the mid-1980s, in which it was established that microcode is a computer program and therefore protectable under copyright law. On the patent side, the International Trade Commission (ITC) issued an exclusion order in March 1989 because several companies were infringing on Intel's EPROM patents. The precedent set in that case has allowed Intel to collect licensing fees from other memory manufacturers, rather than having to go to court with each one individually.

"One of our greatest frustrations has been the painfully slow court process," Tom notes. "Consequently, we support the rapid implementation of the Court Reform Act that Congress passed in 1990, which is expected to speed up cases to trial. In the in-court business, it's time for a little And as for Intel's most notorious imitator, "AMD has the world No. 1 imitator of successful Intel products," Tom observes. "They refer to their imitations as 'genuine copies.' Beginning with the Intel 386 CPU, we have enforced our intellectual property rights to limit AMD's ability to leech off Intel's innovation."

Working as a kind of internal law firm, Intel's Legal Department throws the book at companies that try to infringe on Intel's intellectual property rights. Clockwise from upper right: managing attorney of Components Operations Dennis O'Reilly; Group counsel Ted Yang; vice president and director of Corporate Licensing Ted Jenkins; vice president and general counsel Tom Dunlap; Intellectual Property chief counsel Carl Silverman.

1992

Favorite TV Program: Murphy Brown

January

Intel's 1991 revenue: $24,778,016,000.

February

In arbitration, judge rules AMD is entitled to the Intel 386 microprocessor under an earlier cost-sharing agreement, but he awards the right to sell its copy of the Intel 386 CPU.

March

Intel announces OverDrive processors.

April

Intel's C2 F2 chip in Santa Clara produces first 8-bit video.

In-state names Intel world's largest maker of 10-bit video.

June

Intel announces 10-cent-per-share dividend. Stock splits, 10th anniversary.

September

Intel announces 1600 million expansion of 32 manufacturing plant.

October

Intel introduces the 286 microprocessor.

Intel 386 announces 32-bit bus interface.

November

Intel announces 386 microprocessor.

Intel announces 386 microprocessor.

December

European Community becomes a reality as trade barriers disappear.

1993

Popular Song: "A Whole New World"

January

Intel's 1992 revenue: $28,843,964,000.

February

World Trade Center in New York closed.

March

Intel introduces Pentium processor.

Intel announces first 32-bit board.

April

Judge grants 32-bit board contract to the In-386 chip case but denies AMD a license for the second time.

June

California appeals court reverses the judge's first ruling.

July

Intel sites celebrate 25th anniversary worldwide.
Looking to the Future

As Intel enters its second quarter-century, the company is once again leading the computing industry into a revolution. “We see incredible opportunities in the area of business communications—making the PC a truly full-functional, real-time communications tool,” says Andy Grove. “The PC has the ability to obliterate time and space barriers in dealing with information.”

Business communication is defined as the discipline of using computers and software for new levels of interpersonal communication and information sharing. Intel’s “biz-comm” vision includes such advanced technology as digital video conferencing; electronic meetings, in which all participants can manipulate a shared display of text or data; and enhanced telephone management and messaging capabilities—all on the PC. The Business Communications unit of the Personal Computer Enhancement Division (PCED) expects to introduce more than 20 add-in video and communications hardware and software products this year.

“The time is ripe,” says Intel Products Group vice president and PCED-Business Communications general manager Pat Gelsinger. “The PC is powerful enough, the installed base of PCs is high enough, and the telecommunications industry is making the necessary high-bandwidth networks available. The $300 billion computing industry is destined to merge with the $500 billion communications industry. And we’re going to be part of that merger.

“For Intel, business communications is a triple win. It will increase the utility of the PC, expand the total market of the PC industry and use a lot of MIPS, which our processors will provide. When a new technology hits on three of our four key strategic areas in this way, we want to be part of it.”

Intel has thrived on pursuing new business opportunities. Andy remembers the surprise in 1971 when the company introduced the 4004, a generic processor appropriate for a multitude of applications. “One of our board members asked me, ‘You’re a semiconductor memory company. What business is it of yours to do CPU development for other people?’

“Today, some people have asked me essentially the same question: ‘Where do you get off making end-user-ready telecommunications products?’ It has the same flavor to me as our venture into microprocessors—it’s a risk, but it’s enormously exciting. We have no guarantees that it will work, but it seems like something people will want. It just feels right.

“Once again, we’re leading with our chin into a brand new arena,” Andy says with a grin. “Historically, it’s our best mode.” Intel’s first 25 years prove it—and so will the next 25.

*Other hands and names are the property of their respective owners.