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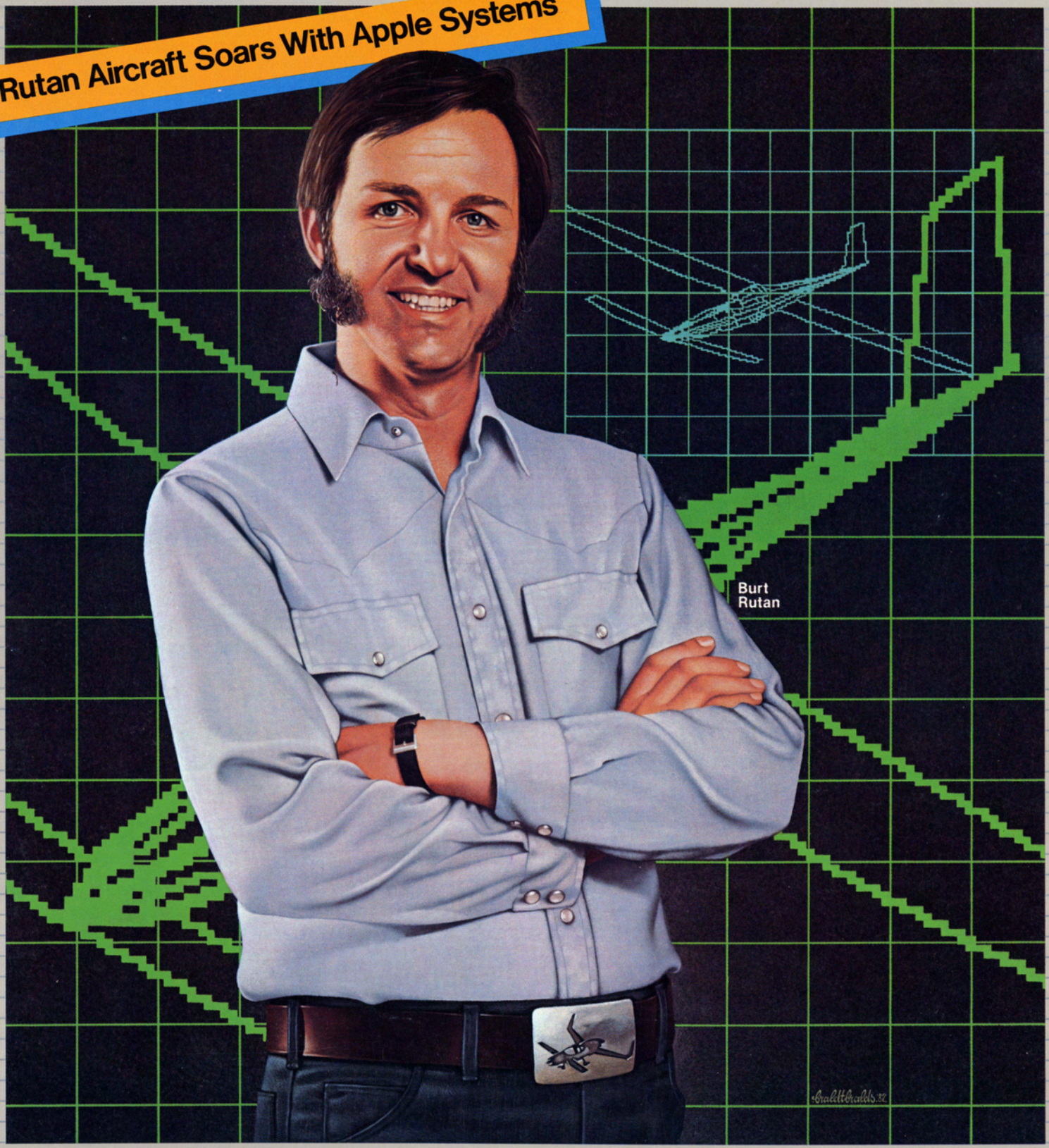
Rutan Aircraft Soars With Apple Systems



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EDITOR: Monte Lorenzet

MANAGING EDITOR: Tony Dirksen

ASSOCIATE EDITOR: Neil Fitelson

CONTRIBUTORS: Dirk van Nuouys, Nancy K. Dirksen, Ron Perrotta, Don Rutherford

PRODUCTION COORDINATOR: Tricia Willcoxon

EDITORIAL ASSISTANT: Karen Steele

DESIGNER: Gordon Mortensen, Mortensen Design

ART DIRECTORS: Gordon Mortensen, Phil Raymond

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ABOUT THIS ISSUE

If you're a regular reader of Apple Magazine, you've probably noticed that this issue looks different. In the past, our covers have highlighted the computer's image in the personal computer revolution. Our new format puts people more directly into the picture.

When you come right down to it, the real story we're following is the people *revolution, and the way folks like yourself are using personal computers to discover, create, and enrich their lives. That's pretty heady stuff. And fascinating.*

Who would know, for example, what a spectacular view at 20,000 feet or a bubbly flute of champagne have to do with personal computers? Burt Rutan and John Wright would—and so will you, after you read the stories about these two remarkable men and their companies.

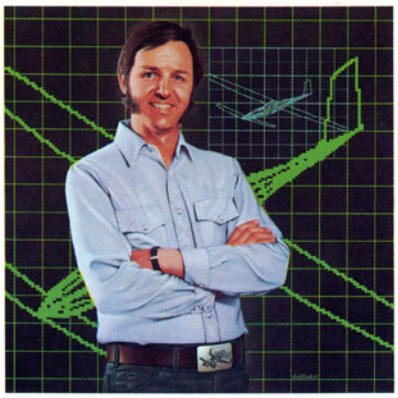
In fact, this whole issue is packed with stories about people in businesses using Apple computers. Some companies are large and well-known, like J C Penney, Arthur Young, and Pepperidge Farm. Others, such as Cybix—which makes an Apple-based system for designing wooden cabinets—are just starting out, opening up brand-new and exciting markets.

This is the first issue of Apple Magazine to be published on a three times yearly schedule. That's not very often, compared to most magazines. But considering that we typically print and distribute half a million copies of each issue, Apple Magazine is actually the largest circulation personal computer publication around.

Bigger and *better. We think it computes.*

Monte Lorenzet
May, 1982

OUR COVER



Burt Rutan is an Apple owner in the classic mold—a bright and unassuming innovator. Rutan designs some of today's most inventive aircraft. Among his planes are home-built tandem-wing craft that are noted for being fast, fuel efficient, and safe.

Our story describing how he uses Apple computers ("Apples Aloft," page 32) echoes a pattern we've heard before. Rutan bought his first Apple system for a specific application (maintaining a mailing list), but he soon discovered that the computer could do much more. Now he uses a squadron of Apples to help him design aircraft.

One of his latest designs provides the backdrop for our cover: the Solitaire, a sailplane prototype that promises to bring him prominence in the world of soaring. He's also started a company called SCALED, which will produce scaled-down versions of commercial and military craft.

The cover illustration is an oil painting by Braldt Bralds, a Dutch illustrator now based in New York. The cover format was created by Apple Magazine's new designer and art director, Gordon Mortensen.

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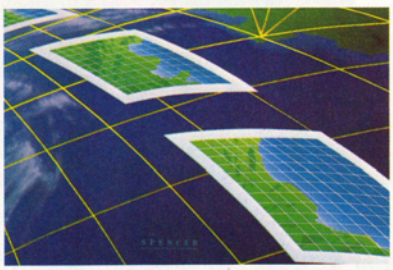

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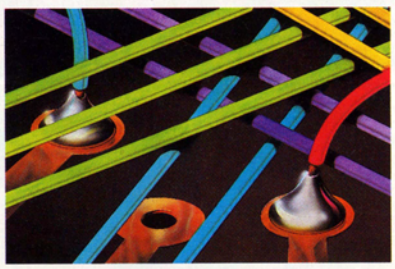

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apple ///

BY MIKE MALONE

APPLE COMPUTER'S PRODUCTS ARE RAPIDLY FILLING THE BOARDROOMS, OFFICES, AND LABORATORIES OF ITS NEW CORPORATE PEERS.

The desktop tools available to business have increased in sophistication during the last decade—electronic calculators have replaced adding machines; mini-cassettes supplanted bulky tape recorders; even telephone systems have been designed to do more than ever before. Now the latest tool—the personal computer—is quickly finding a permanent place on the desks of executives and managers.

The increasing use of desktop computers in business, particularly by small firms, had long been recognized by market watchers as inevitable. After all, the power and flexibility of the personal computer (especially when armed with the latest business software) make it an unmatched tool for helping businesses tackle everyday problems, from inventory control to payroll, memo-writing to forecasting, record-keeping to tax preparation.

ILLUSTRATION: ED SOYKA

What hadn't been obvious until recently is that large corporations face similar challenges at a departmental level. For that reason, these large firms have also begun to look closely at what personal computers can do for them.

Of course, large corporations—with their computer centers and multimillion-dollar mainframe computers—already have vast amounts of data processing power at their command. But, for the day-to-day activities of individual managers and scientists, this processing power is all but beyond reach, its cost prohibitive and its results slow—sometimes days, sometimes weeks. With a personal computer, results are virtually instantaneous.

That's why many companies have turned to Apple computers to give their employees localized processing power. Apple itself has responded to this burgeoning market with a National Accounts Program designed to offer an integrated purchase and support package to large corporate customers.

Several large firms now use Apple systems for a variety of tasks, among them:

- **Rockwell International,** where Apple computers are used by the Corporate Planning Department to generate business graphics and perform specialized types of analysis and calculations;
- **Ford Motor Company,** where Apple systems are used for financial modeling and engineering graphics;
- **Procter and Gamble,** where more than 250 Apple computers are used in offices around the world for financial analysis, data acquisition and control, and word processing;
- **Touche Ross & Co.,** a "big eight" accounting firm that uses Apple /// and Apple II computers in 80 offices for tax planning and returns, strategic planning, graphics, forecasting, and management training;
- **E. F. Hutton Life Insurance Company,** where more than 300 field agents use Apple systems to do word processing and financial analysis, and to custom-tailor life insurance policies for their customers.

The list goes on and on. These companies and the others described in case studies on these pages have discovered that the combination of low price, high power, and availability of business software make an Apple computer the ideal desktop tool, quickly paying for itself in improved employee productivity, and reducing the strain on central corporate computer systems.

"These tools allow us to exercise our expertise at a higher level."

PEPPERIDGE FARM

Food giant Pepperidge Farm of Norwalk, Connecticut, estimates that it has more than 900 distinct applications for its 50 Apple ///s at 10 different plant locations.

According to Peter J. Zezima, manager of computer services, his firm's Apple ///s are being used for everything from market forecasting to production scheduling, labor studies to simulations and profit/loss analysis. Several of the Apple /// systems are equipped with the ProFile mass-storage hard disk. The ProFile disks are networked around a larger centralized disk, allowing Pepperidge Farm managers to download up to five million characters of information at a time from the centralized disk, and then analyze that information at each manager's separate work station.

Pepperidge Farm acquired its first Apple two and one-half years ago and has not stopped purchasing since, says Zezima. When the Apple /// was introduced, the company moved up to it.

The Apples have had an almost revolutionary effect upon most of the company's departments. In the past, Zezima says, business plans that could take weeks to put together—with a resulting loss of time and flexibility—now take hours. "We spend more time on analysis and less on number-crunching. And it's saved us a lot of money.

"You can run a business more efficiently by putting computer power in the hands of the people who make the decisions. And it's a lot easier to teach a manager to use an Apple than it is to teach a computer specialist how to run a firm."

Apparently the management of Pepperidge Farm agrees. The firm now has more than 300 trained Apple users.

The company is also studying the possibility of linking together all of their Apple systems into a single communications network supported by a large central computer. The resulting system, Zezima says, would further enhance their use of electronic mail, word processing, graphics, distributed processing, and other applications.

AUDITING . . . WITH AN APPLE

As more companies have computerized their financial records, their external auditors have had to modify testing procedures to keep pace with the new technology.

Arthur Young & Company of New York, a "big eight" accounting firm, has been a leader in adapting to computerized auditing, and among the first to recognize how personal computers could help their auditing procedures. For the past four years, they've been using Apple IIs in offices all around the country for financial planning and other tasks.

Today, Arthur Young is using the Apple /// to help them perform audit testing more efficiently and effectively. Integrated into a larger system called the AuditComputer,™ it's the latest development in the firm's commitment to the increased use of microcomputers.

"In the past, we've depended only on outside service centers, or run our audit software directly on the client's system," explains Rick Richardson, Arthur Young's national director of computer auditing. "But our software can't be compatible with every system, and what's more, the client can't always provide the necessary computer time to run it."

The AuditComputer makes it possible for Arthur Young auditors to examine and test records without major disruptions to the client. Arthur Young's computer-trained auditors first transfer selected financial data from a company's mainframe computer system onto the AuditComputer's "hard disk." The information on the disk is then analyzed using special audit software developed for the Apple ///; the client often does not have to provide additional computer time for audit testing. The records can be reviewed and sampled without any risk to the information contained in the client's files.

The AuditComputer was developed because Arthur Young auditors wanted to examine and test client records produced on a wide variety of mainframe and minicomputer systems. With the AuditComputer, auditors have direct and easy access to all the data they need to perform their own analyses.

Arthur Young's computer auditors typically need the help of the client's programming staff only at the beginning of the audit, to facilitate the transfer of information from the company's computer. The client's staff tells the Arthur Young professionals how the computerized files are stored. Then, the information is transferred to a large-capacity, 20-megabyte hard disk, either by direct transfer using telecommunications from the client's system to the Arthur Young offices, or by copying from floppy disks created on the client's system.

Once the financial information is loaded onto the hard disk, Arthur Young's auditors use their own Apple /// audit software to sample, analyze, and review it. If there's an enormous data requirement—such as reviewing millions of transactions—the analysis must still be performed directly on the client's system.

"Because it's adaptable to a variety of auditing applications," explains Richardson, "the AuditComputer gives us a tool that's both flexible and cost-effective. We expect it to have a significant impact on our audit testing."

—Tony Dirksen

™AuditComputer is a trademark of Arthur Young & Company.

THE BANK OF LOUISVILLE

With 135 Apple II systems, the Bank of Louisville, Kentucky, is the world's largest financial user of Apple computers—and probably the largest financial user of any personal computer product.

The Bank of Louisville has a long history of using the latest in technology to help its employees improve customer service. Until 1978, the bank used card-programmed calculators to help its 27 branches process installment loans. In August of that year, curious about the newly-born personal computer industry, bank executives decided to acquire an Apple II system and test its effectiveness vis-a-vis the calculators.

"We looked at a lot of systems and decided to go with Apple," says Robert W. Potts, vice president of the microcomputer department. "We were impressed by both its price and its flexibility."

Applications for the computers began to appear soon after they were installed. In a short time, the branch offices were using their Apple systems (equipped with modems) to transmit real estate data from the main office to the branches. They also figured that if information could flow one way, it could flow the other. Soon the branches were using their Apples to send loan applications to the central office.

As the system now stands, each branch has two Apple systems: one with two disk drives and a letter-quality printer for data processing and data transfer; the other with one disk drive and a thermal printer for loan calculations. In addition, there are dozens of Apples at the main office (some connected to large, mass-storage disks) that are used for everything from computation to word processing.

And that's just the beginning, says Potts. As the bank grows, so will its use of Apple computers. Furthermore, the Apples have begun to pay for themselves in an unexpected way. Some of the software that the bank developed for its own use will be marketed to other banks as well.

LAVENTHOL & HORWATH

Laventhol & Horwath, one of America's largest accounting and consulting firms, has more than 50 Apple systems in its offices across the country. They are being used for a wide range of applications, including preparing forecasts and feasibility studies for clients; creating business plans for new company start-ups; doing tourism studies for government agencies; and performing any additional financial and tax planning analyses that clients may require.

"It's a lot easier to teach a manager to use an Apple than it is to teach a computer specialist how to run a firm."

"These tools allow us to exercise our expertise at a higher level," explains Allen Sneider, an audit practice partner in the firm's Boston office.

Laventhol's introduction to Apple came when Sneider bought his own system in 1978. It wasn't until the next year, however, after he acquired a copy of the *VisiCalc*® program, that Sneider began to use the system extensively for servicing clients. (*VisiCalc* is an "electronic worksheet" that allows the user to create financial models in a familiar row-and-column format.)

Soon afterward, representatives of Laventhol's corporate offices in Philadelphia came to Boston to watch Sneider's Apples in action. They were impressed—and decided to acquire Apples for their own offices.

"We've discovered a phenomenal number of ways for using the Apples to help our clients, whatever their business orientation—real estate, health care, leisure, manufacturing, wholesale, or retail," says Sneider. "The machines have easily paid for themselves.

"And we keep on adding to them. Right now we're expanding the use of Apples as intelligent terminals hooked into the time-sharing networks we've used for years, and we're investigating the advantages of local networking."

Mike Malone is a freelance writer and a former business reporter with the San Jose Mercury-News.

More on how other businesses are using Apple systems:

® *VisiCalc* is the registered trademark of VisiCorp.

$100,000,000,000,000 AND COUNTING

Question: What financial market amounts to more than $100 trillion per year and affects nearly everyone in the United States, yet involves only a few private investors?

Answer: The international currency exchange.

Firms doing business internationally have to be concerned with daily fluctuations in currency exchange rates—the official conversion rates between different world currencies that allow, for example, dollars to be exchanged for Deutsche marks, or yen for French francs.

To hedge against losses created by sudden changes in these rates, international firms often buy or sell contracts for delivery or acceptance of currencies at a future date. By doing so, they're able to lock in rates of exchange that they believe are favorable.

Predex of New York City has been one of the most successful firms at forecasting and predicting changes in the international currency exchange market. The firm uses Apple computers to compile pertinent financial data, forecast future movements, and predict day-to-day market changes.

Predex provides this information for more than 80 clients. The company produces four publications that analyze the movements of 27 currencies and forecast buy and sell signals over various time frames, from one day to five years. "We do much of our analysis on the Apples," says Dr. Charles Ramond, president of Predex.

In addition, the firm offers the Predex Telescreen® Service, sending clients daily updated comparisons, forecasts, and graphs of the five major currencies. Using software developed at Predex, an Apple computer in New York can communicate with other Apples anywhere in the world, without the aid of a time-sharing computer.

"We could get the actual figures to them any number of ways," Ramond says. "But there's no substitute for Telescreen's graphic description of movements in currency rates.

"We've gotten a very favorable response from our clients about the Telescreen Service. It reduces one of their major concerns—the fear of not getting the full story of the market as fast as the other guy."

Current clients of the Telescreen Service include Colgate-Palmolive, McDonald's Corporation, Hygrade Food Company, and Gasunie, the largest foreign exchange manager in the Netherlands, and possibly the world's largest exporter of natural gas.

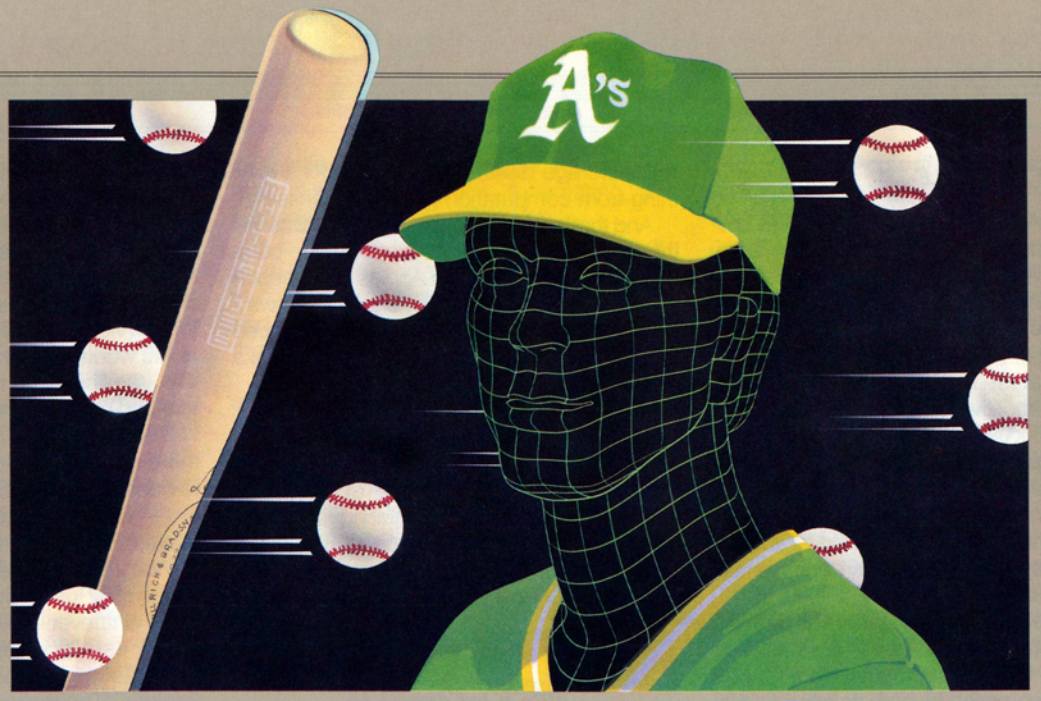
"It helps our decision-making to see up-to-the-minute graphs of currency movements before the European market opens," explains Tjeerd J. J. de Vries, treasurer of Gasunie. The information is sent in the evening from New York via an electronic mail phone call, and is waiting for Gasunie in the Netherlands at the start of business the following day.

Ramond says that an important factor in Predex's choice of an Apple-based system was the dedication of Apple Computer's dealers, who have served Predex by making systems and support available to the company's clients around the world.

As for the machines themselves, Ramond says, "the Apples have done everything we wanted them to do." He realizes that he could go to larger computers, but says, "we'll probably stick with the Apples for a number of years. After all, you don't need an elephant gun to shoot goldfish."

—Ron Perrotta

®Telescreen is the registered trademark of Predex Corporation.



THE A'S HAVE IT

The Oakland A's of the early 1970s were an awesome baseball team. From 1971 through 1975, they won five straight American League Western Division pennants, capturing consecutive World Series titles in '72, '73, and '74.

Between 1976 and 1979, however, the franchise began to come apart at the seams. The nucleus of stars from the championship teams—Reggie Jackson, Vida Blue, Joe Rudi, Gene Tenace, Rollie Fingers, Sal Bando—either played out their options or were traded. Attendance plummeted from 1,075,518 in 1975 to less than 310,000 in 1979.

The A's attendance rebounded to 840,000-plus during the 1980 season, thanks largely to the popularity of new manager Billy Martin.

Walter Haas, Jr., who purchased the team in the fall of 1980 from Charlie Finley, has revitalized the franchise with the help of A's president Roy Eisenhardt and executive vice president Wally Haas. Last year, despite the major league baseball strike that cut 25 home games from their schedule, the club drew a record 1,311,761 fans. Oakland also won the American League Western Division pennant.

But the A's winning season was only one factor contributing to the dramatic turnaround in attendance. Pacific Select Corp, a marketing consulting firm that specializes in the sports business, helped the new management build a front-office staff, select an advertising agency, and develop a comprehensive marketing approach. These changes, combined with the team's performance, raised the A's to new heights of success at the gate.

"Most fans aren't involved in pennant races and won-loss records," points out Matt Levine, Pacific Select president. "Three-fourths of them attend five or fewer games a season, and winning is only one factor in how they spend their entertainment dollar."

In addition to helping with new marketing strategies that put nearly a half-million more people in the seats, Pacific Select also advised the A's on a variety of baseball matters, including media relations, ways to increase the value of radio and television rights, as well as new approaches to game tactics and to streamlining scouting and farm system analysis. All involve an Apple II Plus, affectionately dubbed the A's "Green Apple."

First the company introduced the computer into the team's radio broadcast booth to provide announcers Lon Simmons and Bill King quick access to a wealth of statistical information. According to Pacific Select vice president Thomas Black, "The idea was to enhance the quality of the broadcast by adding fabric to what the announcers had to say about the teams and ballplayers involved.

"The better the broadcast, the more listeners you have, which leads to higher ratings, higher ad revenues for the station—and higher rights fees for the A's."

ADDING DRAMA TO THE GAME

The A's Apple system is equipped with three Disk II drives, a Silentype® printer, a D.C. Hayes Micromodem,™ two monitors (one for computer operator Jay Alves, one for the announcers), and *Edge 1.000* software, written in the Pascal language by Dr. Richard Cramer, Pacific Select's director of research and development. A third monitor is being added to the team's TV broadcast booth this season.

Before each game (the computer travels with the team on the road), files containing up-to-date information on the A's and their opponents are downloaded over telephone lines from a DEC-10 located in Philadelphia. The mainframe, which houses data on all the teams in the American League, also performs analyses on game records logged and uploaded by Alves using *Edge 1.000*.

Available information on each player includes: his current and last-year batting averages; his batting average-to-date against the starting pitcher, the opposing team, and all left- and right-handed pitchers; home and away averages; and batting averages for the player's last 5 and 10 games.

As if that weren't enough,

ILLUSTRATION: KIM WHITESIDES

player performance analyses (such as "Leads team in home runs, doubles, and RBIs . . . Batting .317 with runners on and .366 with runners in scoring position . . . Scores runner from third base with less than two outs 30% of the time . . .") are also at Alves's fingertips.

Because of the volume of data available to them, Simmons and King preselect the types of information they want loaded at various stages of the game. For example, the first time each player comes to the plate, according to Alves, they generally want to see the man's batting averages against the starting pitcher and the opposing team; the second time up, his averages versus left- and right-handed pitching. The broadcasters then weave the details into their play-by-play commentary.

"The computer gives us instant information," says Simmons. "You don't have to thumb through 50 pounds of paper to get the information you need to know."

The system is fast and flexible enough for the announcers to stray from their pre-game plan and make special requests as the contest unfolds. If, for instance, the A's Tony Armas is at the plate with a runner on second, King or Simmons might ask for Armas's batting average with runners in scoring position. Or, if a pitcher appears to be tiring, they can quickly get an update on how many pitches he has thrown (plus how many were balls, strikes, fouled off), as well as how many batters he has been behind in the ball-strike count.

"It helps the announcers add drama to the game," says Levine.

In addition to providing King and Simmons with a steady flow of information, Alves also records every event in the game pitch-by-pitch and saves the data to diskette.

SCOUTING SIMPLIFIED

The Apple II Plus also figures heavily in the A's ongoing scouting efforts aimed at keeping the organization stocked with top-notch players.

A data base management system developed by Pacific Select is used to store and classify information compiled by A's scouts and the Major League Scouting Bureau on thousands of high school, college, and professional players. In addition to listing biographical details (address, age, height, weight, salary, position, organization, etc.), the data base also includes scouting reports on each player's abilities in 10 areas: hitting, power, speed, base running, arm strength, accuracy, fielding, range, baseball instinct, and aggressiveness.

Data files also contain valuable scouting notes ("Never hits to right-center . . . Great arm . . . Throws out runners at third with consistency . . .") useful in the assessing of players.

The system comes in extremely handy prior to the annual amateur draft, as well as when the A's are contemplating trades. "Say the A's want to evaluate all the second basemen in the Yankee and Red Sox organizations under 25 years of age with a total rating of 45 points or more," suggests Black. Instead of wading through file cabinets and spending hours collating the material, "They can rifle through the data base and get a printout within minutes."

The data base, which contains scouting information on the 100-plus players in the Oakland organization, also enables the front office to monitor and assign personnel throughout the A's farm system.

Pacific Select is now approaching other major league teams with the idea of adding Apple-based information management systems to their daily operations. They've already sold a system to the Chicago White Sox that will allow the team to keep track of 2000 players. According to Black, the reception of other teams has been highly favorable.

"There are so many applications in baseball where the portable power of this Apple-based system may be harnessed—broadcasting, media relations, player evaluation, and team tactics—that its use will become the norm in three to five years."

—Neil Fitelson

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BREWING WITH APPLE

The art of brewing beer has evolved slowly over centuries, with techniques passed down from generation to generation. But respect for the wisdom of experience doesn't prevent the best brewers from applying today's technology to their art.

Dr. Joe Owades, director of the Center for Brewing Studies and a consultant to brewers across the U.S., has 25 years of experience in the business. One of his services is the development of new recipes, known in the trade as "mash bills." With his Apple II computer and an off-the-shelf copy of *VisiCalc*, Dr. Owades has set up a quick way to test the chemical validity of his recipes. He enters potential mash bills into his own template, which contains formulas for the relationships among various ingredients, final alcohol content, and cost. With a few keystrokes he can then determine, for example, how an increase in the amount of corn affects the alcohol content, brewing time, and cost of beer.

The proof of the brew is still in the drinking, of course, and now Dr. Owades spends less time calculating mash bills and more time evaluating flavors.

At the Schaefer Brewing Company in Allentown, Pennsylvania, biochemist Charlie Baird has incorporated an Apple II into his quality assurance procedures. Baird has written a program to compile taste-test analyses, comparing up to five separate brews for 21 different characteristics.

"What it's doing is looking for statistical differences between products," he explains. "The taste-test analysts are always generating unmanageable collections of numerical ratings. This program gives them an easy way to identify the statistically significant differences among various brews."

Like personal computer users in other fields, Baird has found *VisiCalc* an "invaluable" tool. "I use it as a one-dimensional data base," he says. "Product goes into the warehouse in chronological sequence, but it comes out as it's needed. *VisiCalc* is the best way I've found yet to maintain

records." He also uses *The Data Factory*® to track customer complaints, which can usually be traced to a quality-control problem in distribution procedures. By keeping all complaints in a computerized data base, Baird can find geographical and chronological patterns to help him identify the source of any problem.

IT STARTS WITH THE HOPS

Although hops have little to do with the alcoholic effects of beer, they have much to do with the flavor. Originally added as a preservative, hops have become an essential ingredient, contributing the distinctive, bittery taste to the brew.

Because of their rapid growth, hop plants are particularly sensitive to the availability of fertilizer and water. To ensure a successful crop, the farmer must keep scrupulous records of how much of each has been put on the field, and when.

During the month-long harvest, the growers have to work hard and fast. Many farms have a crew in the field 24 hours a day, cutting the vines and transporting them to other workers at the picking machines. The plants will then need no more attention until early spring. Because of the changing labor requirements, hops farmers must employ both a permanent staff and a back-up crew of temporary workers who know how to cultivate and harvest hops.

All of these considerations add up to a huge bookkeeping headache. With 800 acres of hop plants under cultivation, Roy Farms, Inc., in Washington state's Yakima Valley, was awash in records: soil quality records, irrigation records, pest control records, crop yield records, fertilization records, and employment records. Last year Leslie Roy, a third-generation hops grower, decided to tame the proliferating paperwork with an Apple computer. Now he keeps his records in an organized, accessible data base.

Roy is collecting data on the yields of different varieties of hops and the results of different growing techniques, in order to make more informed decisions. He is also keeping more detailed payroll records, in an effort to determine exactly how the farm's resources are split between hops and apple production. The Roys had been doing cost studies by hand for years, but they had always had a fairly large uncertainty factor in their calculations.

The Apple computer also lets the Roys take advantage of agricultural software, such as the hop-drying simulation program developed by Dr. Glenn Kranzler and Marvin Stone at Washington State University in Pullman. The program allows hops growers to test out various drying strategies, telling them how long each process would take and how much fuel it would use.

The drying, which is critical to the quality of the hops, is an energy-intensive operation that has become increasingly expensive. In the standard technique used by most farmers, green hop cones are spread in the drying kilns to a depth of 35-40 inches. Air heated to about 140 degrees is blown up through the hops, to bring moisture content from 80 percent to 9 percent.

With Kranzler's and Stone's program, the farmer can manipulate drying variables, such as initial moisture content, drying temperature, and airflow rate, to see what procedure would work best with the available equipment. The program also models non-conventional methods such as layer drying, recirculation, and reverse flow.

"There are significant savings to be realized," says Kranzler. "On the Roys's farm, for example, an energy savings of 10 percent would mean more than a $5000 reduction in their fuel costs."

Initial response to the program has been enthusiastic. The researchers are now planning to take the process a step further by putting an Apple in control of a drying kiln. By programming the computer to take continuous measurements of temperature, air flow, and relative humidity, and make adjustments as appropriate, Kranzler hopes to speed the drying process and to keep fuel costs at a bare minimum.

—Susan Luttner

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LIFE AT THE THRESHOLD

Disaster strikes. Hundreds, maybe thousands, of people are affected. Who has the resources to help?

Threshold America, a non-profit, crisis-intervention organization, often works behind the scenes during emergencies to coordinate relief operations. Since a fast response and accurate information are essential in a crisis, Threshold uses the most current technological tools to help them quickly develop solutions. Among those tools is an Apple.

In early 1982, a disastrous storm struck close to Threshold's Marin County, California, home; killing 38 people, injuring more than a thousand, and destroying 231 residences. Damage was estimated at more than $300 million.

Threshold took on the monumental task of coordinating relief during the critical first days of the storm. And Apple lent three additional computers to the rescue operation.

"We began to monitor the storm on December 31," says Renwick Breck, chairman of Threshold, "and continued documenting it until the end of January. With our information, we were able to see the extent of the mud damage, and make immediate damage assessments that triggered aid from Federal relief programs."

Countless businesses and homeowners benefitted from Breck's list of public and private agencies with resources to donate. He also developed solutions for the victims' long-term needs—solutions such as organizing financial institutions to offer low-interest rebuilding loans, since mud damage is not covered by most insurance.

ILLUSTRATION: BUD THON

"What we are trying to do is to meet emergency needs by matching resources with people in need," says Breck. "But at the same time we are interested in preventing that same crisis from repeating itself."

APPROPRIATE TECHNOLOGY

Threshold's activities have reached around the world. "What we're really doing is using appropriate technologies to meet human needs at home and abroad," says Breck. "After Threshold got its first Apple, our ability to solve problems increased a thousandfold. We are using Apple computers in many highly undercapitalized places where technology hasn't gone before."

For example, Threshold was asked by SEVA (the Society of Epidemiology and Voluntary Assistance) to develop a blindness eradication survey for Nepal. Three Apple computers were sent to Nepal to gather and sort medical records taken from 120 villages and 47,000 Nepalese. The researchers ran the Apple computers—powered by car batteries—continuously for a month at the high Himalayan altitudes. Using this information, Threshold completed a Nepalese blindness prevention model that may be used by other Third World countries.

Eventually, Threshold hopes to create a science applications center where all its documentation will be available. Breck hopes to offer space or ocean travel simulations at the center using Apples. The center will be able to offer a world of places to visit because Threshold has an electronic library of more than 2000 TV news stories and documentaries covering a full spectrum of events.

—JudyAnn Christensen

REHEARSING REALITY: SIMULATIONS OF FLIGHT

EDWARDS AIR FORCE BASE, 1968. Stooping into the cockpit, the cadet anchors himself in the pilot's seat. Through a small window he can see the shine of distant stars and, below, the curve of the earth's horizon.

For a moment, he blinks uncertainly at the console beneath the window, a console mounted with a short, pistol-gripped control stick. Getting a feel for the craft, he tips the pistol grip in either direction, making the horizon tip as the earth slides from view. Righting the stick puts the earth back where it should be, gliding by at the bottom of the window. Nosing the stick forward would put the craft into a fatal earthward plunge, while pulling it back would cause the sensitive ship to cut itself loose from orbit, rising toward emptiness.

Cruising soundlessly in the velvet night of space, the boy worries that he might make a mistake.

Fortunately, the cadet isn't in any danger. The lifelike "window on space" is actually a flight simulator—a learning machine that allows a student pilot to experience flying without ever leaving the ground. Fourteen years ago, flight simulators were the exclusive property of government and industrial organizations who were preparing an elite to hazard the moon. Today, a similar sort of simulation is available on an Apple computer.

Don Sellars is vitally concerned with things aloft. His firm, Jeppesen Sanderson of Colorado, makes aeronautical charts to be carried into the cockpits of commercial airliners. Sellars's work, in a sense, is piloting the pilots.

Currently, he's producing flight-training programs for companies like Cessna, Beech, and Hughes Helicopter, including flight training simulations that use Apple computers. The Apple simulators, of course, do less than today's full-scale flight simulators—enormous machines run by masses of computers and servo motors—which are virtual replicas of commercial or military cockpits. Inside, with student pilots at the controls, the full-scale simulators closely imitate the *sensations* big planes give in the air.

Full-scale flight simulators, however, are astronomically expensive, and used only by commercial and military pilots. In fact, for the price of a single, cockpit-style simulator, a flight school could purchase an airport full of light airplanes.

Don Sellars and his friends figured that new video and computer technologies could allow them to simulate the flight of a small craft at a relatively low price.

The group first created a huge videotape file of scenes shot from the cockpit of a small plane, showing gauges and indicators, the terrain below, and the distant horizon. A student pilot views these scenes like a movie. At certain critical points—such as the take-off and landing—the videotape stops and the student is asked to make the kinds of decisions that pilots make in the air. After the student makes a choice, the computer branches to the section of the videotape that shows what would result.

A variety of situations are stored on the tape, including crosswinds, heavy traffic, and other problems that a pilot might potentially face.

Looking through all that videotape, remembering each scene's location, selecting the appropriate scenes, and assembling them in the correct order was a gigantic task, involving thousands of possibilities and commands. Sellars and his group chose an Apple II Plus because it could be linked easily to a videotape recorder, and could readily handle the mountain of references and cues necessary for assembling a simulation.

First they excluded some scenes by limiting themselves to the critical parts of a student's flight training, the parts that benefit most from simulation. Their first production, called "Flying Into a Terminal Control Area," deals with approaches to large airports. It's no small thing for a beginner in a light plane to enter this airspace, where the air traffic can be fast and heavy.

Next, they divided the simu-

ILLUSTRATION: JÓZEF SUMICHRAST

lated flight into a succession of invisible *decision areas.* "Flying" the simulation into each of these areas triggers important questions about what to do next. As the questions are correctly answered, the simulation lets the student continue to the next decision area.

This two-part approach helped Sellars and his crew produce manageable and useful simulations. It drew on a 60-minute catalog of videotaped scenes that could be "flown" by a student, start to finish, in seven to twelve minutes.

On the combination computer/videotape monitor screen, the student sees what a small plane pilot might see in the air—the plane's control panel, other planes in the area, and, ahead, an urban airport.

As the flight continues toward the airport, the simulation enters the first unseen decision area. The narrator tells the student to contact the airport's control tower. "How do you want to do this?" the voice asks, and suggests four possibilities involving radio frequencies and protocols. Then the simulated flight freezes in mid-air; the choices are displayed on the screen; and the student answers using the Apple keyboard or indicating an answer directly on the screen with a "light pen." The Apple reads the choice, looks up the videotape sequence that displays the consequences, and the flight resumes.

Sellars discovered that when students finished the program they wanted to start it over again, exploring the possibilities they had bypassed the first time. This was cause for joy among the writers of "Terminal Control," since it indicated that students were personally caught up in the weighing and making of judgments.

Harry Felderman, who computerizes the firm's learning programs, explains that "Simulation doesn't replace the printed word, but it does give students an experience that books cannot.

Obviously, this simulator doesn't recline for takeoff or bank on hard turns. It is a simple window on flight, something like the old space simulators at Edwards Air Force Base. But considering that those simulators helped put men on the moon, the concept is pretty darn potent.

—Pete Lundstrom

A CAMERA ON THE COMPUTER

Digitizers convert video signals from a camera into information a computer can understand. While the process itself is not new, it has only recently become possible to use it with personal computers such as the Apple II system.

A video camera about the same size as a standard home movie camera is used to take a photograph. Instead of saving the photo on film, however, the digitizer subdivides the image into thousands of dots. Each dot is given a value, and those values are fed into the computer. The computer can then be used to analyze the dots that make up the image, or to reconstruct the image on the computer screen.

Anticipating what is sure to be a growing market, two companies have developed video digitizers specifically for use with the Apple computer. The Micro Works of Del Mar, California, offers the DS-65 Digisector, while Computer Station of St. Louis, Missouri, markets the Dithertizer II.

"Having the digitizing process available on a microcomputer has been a big breakthrough for those of us involved in medical work," says Dave Keyes of Washington University's Department of Physics.

Keyes is currently using the Dithertizer II and his Apple II Plus to study patients who will be undergoing radiation treatment for cancer.

The thickness of a patient's body in various treatment areas affects the amount of radiation received, because the thicker portions attenuate the radiation beam more than thinner portions do. In treatment, however, the doctor wants to be able to deliver equal doses across the treatment area, which requires determining the various levels of thickness.

"There are several methods of doing this," Keyes says, "such as photographing the area to be treated and trying to reconstruct the image, much the way a mapping center might go about it. I think our method, however, will prove to be the fastest and most economical."

Keyes's approach is fairly simple. He shines a pattern of dots onto the treatment area. A closed-circuit television camera photographs the dot pattern on the patient and the Dithertizer II transfers the image to the Apple computer.

Once the image has been stored in the computer's memory, Keyes enters the location of crucial treatment points. Knowing these points and the direct position of the camera allows Keyes to construct a three-dimensional image of the patient's treatment area.

"If we're treating the chest area, all the way up to the neck, the surface thickness is going to vary," Keyes explains. "The center portion may be 20 centimeters thick and a portion closer to the neck might only be 10 centimeters. If we're aware of these varying thickness levels, we can put a compensation filter in the path of the radiation beam for treatment of the neck area, to even out the dosage."

AS THE BUG TURNS

Pictures of an entirely different nature are being digitized and studied on the University of California at Berkeley campus. In the Department of Entomological Sciences, Division of Biological Control, researchers are using an Apple II and DS-65 Digisector to record the movements of tiny mites before and after they are exposed to pesticides.

"This system provides us with the fastest possible

ILLUSTRATION: MELINDA BORDELON

method of observing the insects' movements before they are exposed to a pesticide, then determining whether they've been affected by the materials we're testing," explains James B. Hoy, one of the researchers involved with the project.

The mites in question are small—less than a millimeter long—so a close-up attachment is fitted on a video camera to record their movements. The video picture is then digitized at one-tenth second intervals and the changing location of the mites is recorded.

"We don't digitize the entire image," explains Hoy, "only a small band of each picture that includes an individual insect. As the bug moves to the right or to the left, an adjustment is made by the computer program so that the portion of the picture that is being digitized also moves to the right or the left. This allows us to zero in on what it is we'd like to see—the insect itself."

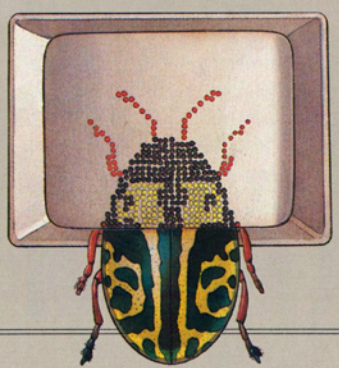
According to Hoy, video digitizing was chosen because it is much less expensive than recording the insects' activity on film; and analyzing the results is much less tedious than standard frame-by-frame observations.

"If you've ever spent several hours watching time-lapse films of insects crawling around, you know just how tiring these kinds of experiments are," Hoy says.

COLONY COUNTING

Computer Sight, the company that developed Dr. Hoy's movement detection system, has developed a package that makes it possible for an Apple computer to measure the growth of bacterial colonies in Petri dishes.

This procedure, known as "colony counting," is a widely used experimental tool in medical research and in the food processing industry. Traditionally, experimenters have manually analyzed each dish, which sometimes yielded imprecise results. "Relying on the naked eye to count colonies can result in mistakes," explains Penny Norman of Computer Sight. "The organisms are small, and will tend to grow together, so the eye has difficulty distinguishing the separate clusters."



Laser and minicomputer systems designed for colony counting range in price from $10,000 to $25,000. With the Apple II, comparable speeds and resolution can be obtained at a fraction of the price.

Using a 48K Apple II running a high-speed language called XPLO, with a digitizing card and camera, the Computer Sight system performs the image processing necessary to pick out bacterial colonies from the background, to judge when individual colonies have merged, and then to make an actual count of the colonies. The system can also categorize each colony by size, shape, color, and density.

"The system gives us the speed we want, a clear, high-resolution picture, and the kind of accuracy that was only available in expensive systems a few years ago," Norman says. "We really couldn't ask for more."

—Betsy Gilbert

UPDATE

In past issues of Apple Magazine, we've spotlighted some of today's most exciting applications for personal computers.

But for every Apple user we profile, there are a thousand others discovering new potentials for their computers. Sometimes, they're using their systems in ways that bear resemblance to the people we've already chronicled.

From Japan, for example, comes word that one animal psychology research laboratory uses an Apple computer to measure the learning capacity of doves. Although researchers on the project don't expect to discover that doves have the linguistic abilities of dolphins (see "Digital Dolphins," Apple Magazine, Vol. 2, No. 2), they do think it may be possible to create a primitive inter-species language that allows communication between doves and humans.

One of the research groups featured in the dolphin story, the Institute for Delphinid Research, has started a monthly newsletter to describe their activities and disseminate information about whales and dolphins. For information, write to the Institute at Box Dolphin, Marathon Shores, Florida Keys, FL 33052.

The Institute has also gotten together with the people who make the alphaSyntauri® keyboard (featured in "From Arias to Avant Garde" in the same issue) to produce a program that generates the sounds used in their dolphin communications research. The program is available from Syntauri Corp., 3506 Waverly, Palo Alto, CA 94306. Cost is $39.95; and all proceeds go to the Institute. You'll need a Mountain Computer MusicSystem® to run the program.

The other synthesizer manufacturer featured in that issue, Passport Designs, has released a new version of their keyboard that, like the alphaSyntauri, uses the Mountain Computer MusicSystem; for more information write them at 785 Main Street, Half Moon Bay, CA 94019. Both synthesizer companies still offer their demonstration recordings: alphaSyntauri will send you a record for $1, a cassette tape for $2; Passport offers a demonstration record for $2.

FROM COMPUTER TO PRINT

At least one of the authors featured in the story about writers who use Apple-based word processing ("Apple Writers," Vol. 2, No. 2) has moved from an Apple II to an Apple /// now that word processing software is available for the Apple ///. Rob Swigart has been using an Apple /// computer with the Apple Writer /// program to write a screenplay of his first novel, *Little America.*

One author not mentioned in the story, Michael Berlyn of Aspen, Colorado, has gone from book to computer publishing. Author of *Crystal Phoenix* and *The Integrated Man,* Berlyn has recently produced a series

ILLUSTRATION: JÓZEF SUMICHRAST

of adventure games for the Apple computer: *OO-Topos, Cyborg,* and *Congo.* They're available from most computer dealers. For more information, contact Sentient Software at Box 4929, Aspen, CO 81612.

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HOW APPLES WORK: SOS

(Editor's note: You don't have to know how an Apple computer works in order to use it, any more than you have to understand how an engine works in order to drive a car.

But many readers have asked us to cover some of the technical features of Apple's systems on these pages. We're answering their requests with this column, in which we'll explain in non-technical terms many of the parts and processes behind our computers.

In this first column, we describe the advantages of one of the more invisible—but indispensable—Apple /// features: SOS™, its Sophisticated Operating System.)

Pressing a key on a computer sets off an intricate chain of electronic events. The computer identifies the key from the keyboard; looks at the program that's being run to decide what to do; and then takes appropriate actions, such as displaying a graph on the screen, performing calculations, operating a disk drive, or controlling some other process.

The person using the computer doesn't see all these electronic events, because the entire process is automatic and virtually instantaneous. To understand how it works, think of the telephone system. Making a call looks simple enough—you dial a number and talk with someone on another phone. The complexity of the intervening steps, however, is staggering. Hundreds of switches toggle to make the right connections; voice signals are carried over miles of wire to a specific destination and then converted back to sound; a record of the call is kept for billing purposes.

Of course, you don't have to think about all these steps while you're making a call, because the telephone company employs a system that automatically operates everything for you. Similarly, a computer employs an "operating system" so the user can do a lot of complicated things with a few instructions.

Early in the history of computing, the "computer operator" was a person who manually performed different chores, such as loading punched cards or setting banks of switches. Since then, we've automated most functions of the computer operator by writing programs that make it possible for these chores to be handled by the computer itself. The collection of programs that replaces the operator is part of the "operating system."

In the past, personal computer operating systems have been simple file handlers capable of only a few control functions. But as personal computer hardware has become more complex—and as programmers have set out to do more with that hardware—operating systems have also evolved toward a more sophisticated level of control.

Thus, Apple created SOS—the Apple ///'s Sophisticated Operating System—which is the first operating system to bring a complete range of services to a personal computer. This, in turn, allows users and programmers of the Apple /// to do more things with greater simplicity than ever before possible.

Four of the principal parts of SOS are: a file manager, a device manager, a memory manager, and an interrupt/event handler.

File Manager. The SOS File Manager controls the flow of information for the computer. All the information handled by the Apple /// is stored in units called "files." The file manager establishes a directory/subdirectory file structure, and allows you to manipulate information within the files themselves.

Since all Apple /// files are SOS-based, you can easily transfer them within your system, or embed a file you've created with one program (such as a *VisiCalc* /// financial model) directly into another program (such as an *Apple Writer* ///-based report).

Device Manager. Imagine you wanted to write a program to send financial data to an office in another part of the country. To do this, you would connect the Apple /// to a device called a "modem," which allows you to transmit data over telephone lines. Without an operating system like SOS, you would have to write a program that runs the modem directly. You'd need to learn the modem's own special commands and characteristics, and then modify all your files into the format that the modem demanded.

But that's like learning how to build a watch, when all you want is the right time. SOS, on the other hand, already has a "device driver" that can run the modem. To use the device driver in a program, all you have to do is activate the modem, and tell the computer to transfer your financial data file to the modem "file." You never have to learn anything about the modem itself—somebody else (the person who wrote the SOS device driver) has already done that work for you.

Memory Manager. In addition to controlling external devices such as disk drives or modems, SOS manages the memory within the Apple /// itself, and allows you to take advantage of that memory without concern for specific memory locations within the computer (long the bane of serious programmers).

ILLUSTRATIONS: CRIS MORTENSEN

As a result, SOS makes it possible for the Apple /// user to develop the largest *VisiCalc* models available on any personal computer, furnishing ample work space for business models and other applications. It makes it possible for a programmer to take full advantage of the special graphics (and other) features of the Apple /// without identifying specific memory locations.

Interrupt/event Handler. Computers are like people—they're often trying to do more than one thing at a time. The SOS interrupt/event handler allows you to interrupt the computer so it can respond to several things at once.

It's possible to interrupt non-SOS computers (such as the Apple II), but the programmer has to understand many details about how the hardware works. With SOS, the programmer has a set of built-in tools that make the interrupt capabilities automatic. For the final users of the Apple /// system, all this makes for a capable system that can do more than any computer its size.

™SOS is a trademark of Apple Computer, Inc.

THE MICRO IN MEDICINE

Children in the intensive care unit at the St. Paul, Minnesota, Children's Hospital are constantly observed with monitoring devices that keep tabs on just about every vital sign; including respiratory functions, oxygen saturation of blood, and determination of cardiac output.

While the monitors are invaluable, says pediatrician Dr. John Tilelli, "the sheer volume of information from them was becoming overwhelming. Not only was there a lot of tabulation involved, but some types of output required tedious calculations for analysis."

To handle the output, to simplify the calculations, and to free the nurses for more critical tasks, the hospital decided on an automated system. They wanted what Dr. Tilelli describes as "a bedside data acquisition system able to collate, order, and display a continuous stream of data."

He and his colleagues soon ruled out the large mainframe systems specifically designed for intensive care wards. They were too expensive ($75,000 and up), and "centered on a single manufacturer's interests," as Dr. Tilelli puts it. Also, when a centralized mainframe would be down, the intensive care ward would be down. So they began to look at smaller computers.

"We wanted a simple design, software that was easy to write, and a system that would make it easy to communicate between the monitors and the computers. Apple offered us this flexibility and expandibility at about $3000 per bed instead of $8000 or more."

The intensive care unit now has 10 Apple computers—one for each bed, one to monitor respiratory functions, and one at the central nurses' station.

Nurses use the bedside Apples to chart observations on each patient. They enter information on drugs and intravenous fluids administered, on blood pressure, temperature, pulse, color of patient, and state of consciousness. Gone are the days of the clipboards and charts once used to tabulate this information.

In addition, each Apple system regularly collects and analyzes input from the various monitors attached to the patient. Dr. Tilelli says that one of the main reasons for selecting Apple computers was that they could be connected to virtually all existing monitor systems.

"We have to translate and standardize the different monitor outputs so the Apple can understand them. By using a 12-bit analog connector from Data Acquisitions, a RS-232 serial interface card, and an IEEE-488 card, we have been able to communicate with each device separately. As new monitors come along, we'll be able to design interfaces individually."

Although children in the intensive care unit can be suffering from any disease or injury, respiratory disorders (such as asthma) are among the most common ailments. As a result, Dr. Tilelli assigned one Apple computer the sole task of keeping watch over the respiratory functions of all patients. This Apple system regularly measures the amount of air being administered by the ventilator to each patient, and collects data from a mass spectrometer, a device that determines how well the lungs are performing by analyzing the components of expired air.

The tenth Apple system is located at the central nurses' station, a spot where nurses and physicians are apt to gather. Here they can check on patients by calling up information on the computer.

What about the future? Dr. Tilelli's interests include echocardiography, which uses sonar to produce an image of the heart. "I'm working on routing the output of an echocardiograph to the Apple, so its display will be projected on the computer's screen. Using a joystick, we can digitize cardiac dimensions in the heart.

"From these measurements, we can evaluate disturbances in the ability of the heart to contract, and initiate therapy earlier than would have been possible before."

Dr. Tilelli is also thinking about expanding the Apple's current bedside role. "It should be possible to automate therapy as well," he explains. "For example, the computer could sense a 10 percent change in blood pressure, and change therapy accordingly. I could even see the day when the Apple could supervise the majority of monitoring and therapeutic tasks."

—Prudence Lindsay

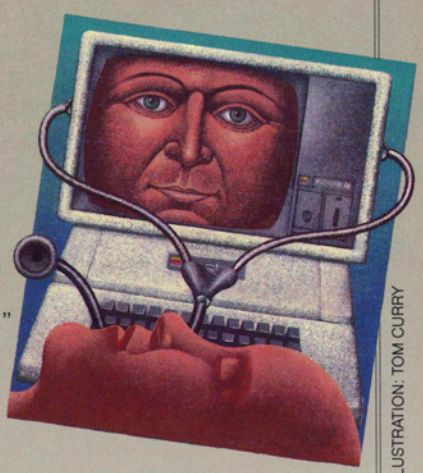


ILLUSTRATION: TOM CURRY


VAWDON

Profile: John Wright

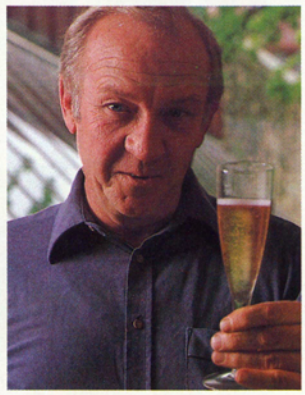
by A. Richard Immel

When the folks from Moet & Chandon, France's largest champagne maker (and one of its most prestigious—it produces Dom Perignon) decided to make an aristocratic sparkling wine in California's Napa Valley nine years ago, little did they suspect that one day their crafty American counterparts would be mixing apples with the grapes.

Actually it's not as heretical as it seems. These are Apples with a capital A, as in personal computer, and the resulting blend is turning out to be as successful as the fine cuvees that have made Yountville's Domaine Chandon one of the premier sparkling wine producers of America.

The responsible party is John Wright, president and chief executive officer of Domaine Chandon. In his boots and countryish attire, the 48-year-old Wright combines the informal insouciance of a gentleman winegrower with the astute, analytical sense of a management consultant.

The Apples were probably inevitable. "It started about two years ago, just before the crush," Wright says. "Ideally, we like to be able to track each grower's grapes—where they are at any point, what the composition of our juice is, what tank it's in, and so forth. We've always done that—but rather laboriously—and I thought it would be nifty to have a microcomputer around to see if we could keep on top of things."



So Wright drove over the mountain to Santa Rosa and bought an Apple II from a local computer dealer. Domaine Chandon hasn't been the same since.

His first efforts were met with some skepticism. The computer was known somewhat unaffectionately as "John's Toy," and the fact he brought in this interloper at the height of the grape harvest (Domaine Chandon's busiest time of year) didn't help. But once Wright started put-

PHOTOGRAPHY: DAVID CAMPBELL

ting the Apple through its paces, the initial grumbling gave way to curiosity, then acceptance, and finally enthusiastic endorsement.

With the help of a couple off-the-shelf programs—*VisiCalc,* the popular electronic spreadsheet program, and *DB Master,*™ a data base manager manufactured by Stoneware, Inc.—and a couple of homebrew programs cooked up by a part-time geophysicist and laboratory assistant, Domaine Chandon is looking after its affairs in ways old Dom Perignon, the seventeenth century French monk who perfected champagne, never dreamed about.

"We did our budgeting for that first year totally on *VisiCalc,* because it simplifies things so fantastically," Wright says. The winery's chief financial officer started using the computer because of the program, and when he began coming in after-hours to get time on the machine, Wright bought another one. Domaine Chandon now has three Apple systems—one that Wright shuttles between his office and his home, one used by the firm's chief financial officer, and a third in the winery itself.

Indeed, what started as a personal management tool for the chief executive has grown into a broad-based and sophisticated system that not only churns out financial reports and government forms, but also is used increasingly in winery operations. For example, Domaine Chandon's winemaker is putting the finishing touches on an inventory control program that will allow the winery to track grapes from the vineyard to the bottle. The reason? To establish correlations that haven't been possible to establish before. The Apple also prepares business forecasts and presentations that wind up in the boardroom of Moet-Hennessy, the parent company, in France.

FROM MAINFRAMES TO MICROS

Wright's decision to try the Apple was largely the result of happenstance, and his wariness of the destructive "mystique" that so easily grows around conventional data processing operations.

Domaine Chandon has long used a centralized minicomputer to handle its bulk "number crunching" accounting duties, such as payrolls and various accounts receivable and payable functions. But Wright deliberately insisted on using an outside consultant for programming. A number of employees are trained to use the mini, but there is no in-house data processing department.

***"We did our budgeting for that first year totally on* VisiCalc."**

Wright tried to use the central computer for business analysis, but found it didn't work out. "It's not terribly useful as a management tool, because you have to try to tell a programmer what you're looking for before he does anything. When he comes back, he often doesn't give you exactly what you want."

Cost was also a major factor. "We have an outside consultant and he's pretty darn efficient, but he still costs so many bucks an hour. If I see that what he gives me isn't going to be what I want, he has to go back and start all over again."

From his reading on the subject, Wright had become aware of microcomputers but he didn't know much about them. Then he toured Apple Computer's Cupertino facilities and got a run-down on some business-oriented programs, such as *Desktop/Plan*™ and *VisiCalc.*

"That got me thinking," Wright recalls. "It wasn't too long before the crush and I thought, 'I could really use that.' So I guess I needed that spark and some idea of what these computers could do."

His beginnings were tentative. He swapped some wine for programming to "customize" his first data base, but things didn't really start rolling until the *DB Master* program came out. Wright now has the entire *VisiCalc* series from VisiCorp (including *VisiCalc, VisiPlot, VisiTrend* and *VisiDex*), *DB Master,* and, yes, even a couple of games (*Gorgon* and *Apple Panic*).

Wright claims he doesn't have much time to play the games. He takes the computer home frequently ("When my wife allows me, that is; sometimes she wants to kick it out"), but he tends to get wrapped up in business work. Like most savvy computer execs, he's aware of the value of games to break the computer ice with chilly employees. Even this has its limits, though. Workers in the wine laboratory claim he locked up their copy of *Space Invaders* and took away the game paddles during the last harvest season when he realized he wasn't getting output for about two weeks.

In common with other personal computer converts, Wright finds he spends more time on the machine than he anticipated before he bought it. "I'm not a night person," he says. "But with the computer there's something there—the interaction, the action, I don't know what it is—but I can really work on the computer at late hours and not feel fatigued or ready to go to bed." But even totting up the time he spends on it, "I would still come to the conclusion it was worth it. I've spent a lot of hours, but they're pleasurable."

Although the Apples were used initially

Angled bottles in "riddling room" are given a quarter-turn by hand every day so sediments can settle out, and later be removed.

more for data processing functions—financial forecasts, inventory tracking, and the like—Wright still feels "the real value of a microcomputer is providing me as chief executive officer with fantastic access to information and the ability to manipulate this information, on my own, in a reasonable period of time."

PLAN M FOR MITTERAND

One example occurred just after Francois Mitterand was elected president of France last year. Wright had prepared three contingent business forecasts—Plans A, B and C—to provide for different degrees of growth. The day after the election he got a call from the head office inviting him to Paris to discuss how the changed political climate might affect business plans for Moet-Hennessy and its subsidiaries.

"I went right to the Apple and produced Plan M for Mitterand and had it running in half a day," Wright says. "I could never have done that by hand."

Wright has also used the computer to develop some fancy graph presentations for a business meeting with top French executives in New York. "I took the Apple with me to New York, plugged it into a TV set, and threw the pre-programmed graphs up on the screen. It was like a slide show except it's more fun with a computer." Since then his French colleagues have asked him if the same thing would work in France. "They're looking into it," he says.

Meanwhile, back in Yountville, the third Apple found its way into the winery—much to the initial consternation, it should be said, of Dawnine Sample Dyer, Domaine Chandon's winemaker. Keeping up with Domaine Chandon's production of more than 200,000 cases a year of sparkling wine requires some 400 tons of grapes a day from 18 different vineyards during the peak of the harvest. (Domaine Chandon buys about 70 percent of its grapes from other growers.) Then, after the grapes are crushed, it's essential to be able to find which of the 87 tanks will hold more juice.

"Dawnine was getting a little up-tight about the length of time it took her to get an inventory of what was in every tank," Wright says. "So I said, 'Oh, we can do that on the Apple.' "

BATTLE OF THE DISK

At first, Dyer was less than enthused. "I had trouble seeing it as anything other than an accounting system," she says. Wright's first example, which was slow, clumsy and complicated, did nothing to change her mind. He finally put on *VisiCalc* where the quantities could be easily logged in and a running total kept of tank capacities.

"We had a battle," Wright says, "because I only had one *VisiCalc* master disk and I'd want to be using it and she'd want to be using it. She'd lock it up in her desk so that I wouldn't steal it. It sort of made a believer out of her." (Dyer recalls the turning point differently: "I think he took my records away from me," she explains.)

"The idea is . . . to develop a system that allows more complete control and access to data."

Already the ability to pinpoint and quantify places and processes where wine is lost for one reason or another (such as in filtration, or inefficient settling of solids) has saved Domaine Chandon a great deal of money. In one case, Wright says, "Analysis on the computer showed that if we bought a special $50,000 lees filter it would pay for itself in one year. So we did that."

"Now we're getting a little more sophisticated," Wright says. Bob Edwards and Dyer are developing a program to keep track of bulk wine inventory. When it's finished it will account for improperly measured tanks, a common problem, and allow the winemaker to analyze the contents of various tanks and pose "What if?" blending questions.

A geophysicist who got tired of the San Francisco rat race, Edwards started working in the wine lab during the grape crush last fall and then got hired to stay on and create some special programs. With his background in performing seismological analysis on large mainframe computers, Edwards was dubious at first about the Apple's capabilities. "When I was in engineering, if you talked about a desktop computer they just snickered and said that if it wasn't as big as a room, then obviously it didn't have any room *inside* it. I wasn't too sure what the Apple could do. I didn't know if I could get enough files into the machine at one time to manipulate the numbers."

Edwards soon found it was no problem at all. "I think we'll actually get away with two diskettes for all of the bulk inventory for a whole year. That's a lot of information." Edwards also sees the Apple as "a very friendly machine that people don't seem to be afraid to touch."

As much as they've done already, John Wright feels that he and his Apple handlers have only scratched the surface of what can be done with their micros. In the winery, for example, winemaker Dyer is enthusiastic about new ways the computer will help her control the winemaking process.

"The idea is not to replace anything or anyone, but to develop a system that allows more complete control and access to data that already exists," she says. Adds Edwards, "I think the intent here is to keep it more on the winemaker's level and less on the machine's level." In other words, it's important to keep the micro in its place as a tool, "a very handy 'gofer' that can access a lot of information in a short time and put it up on the screen."

As befits the chief executive of a fast-growing concern, Wright is toying with more visionary ideas. "We're looking at a hard disk system now and a network," he says. The network would tie together a half-dozen Apples throughout the winery complex. Wright would also like to get a computer correlation of weather and grape quality, computer-assisted wine tasting, an analysis of Domaine Chandon's restaurant operations, and an electronic linkup to the parent company in France.

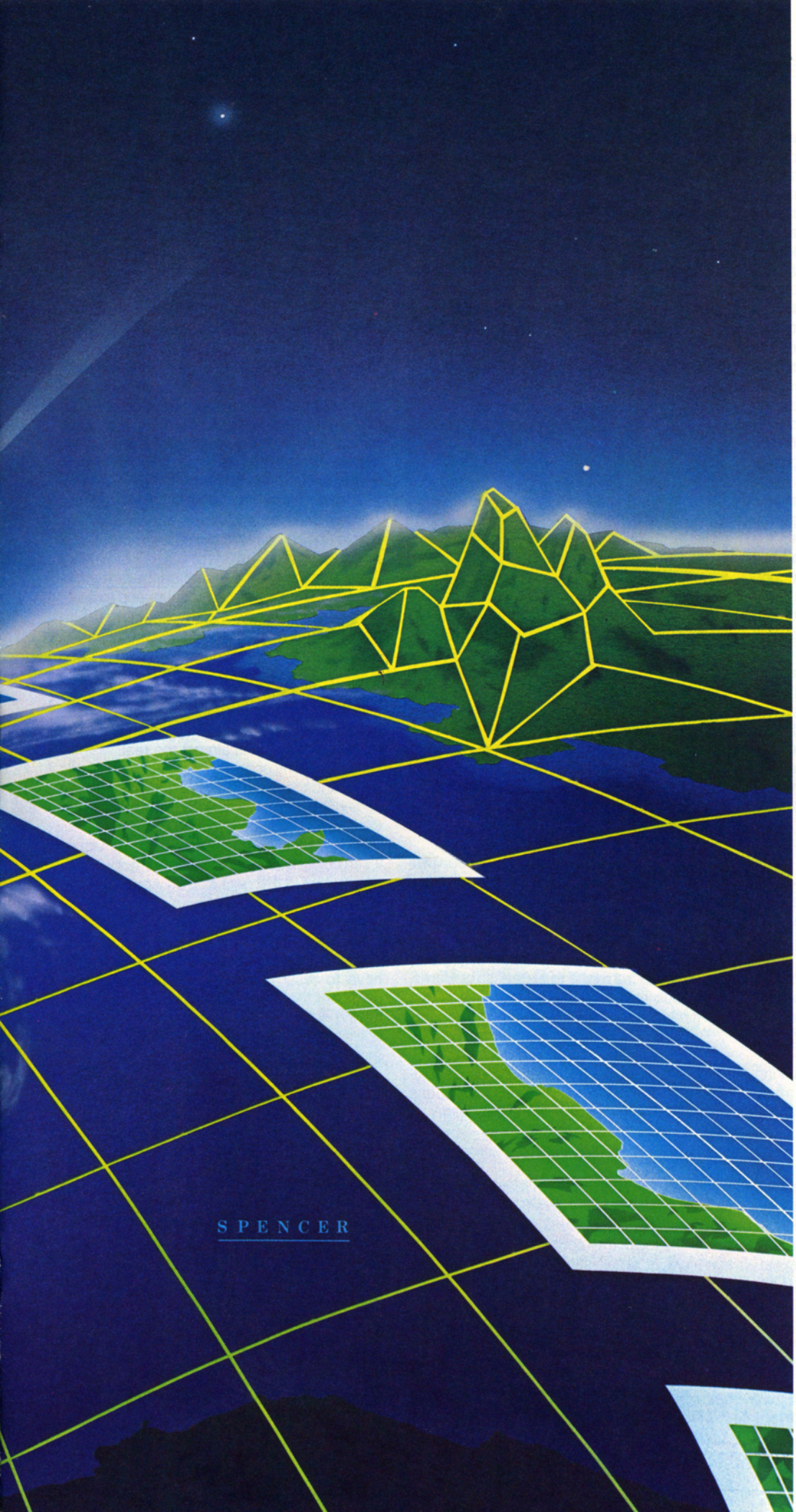
Indeed, as John Wright sits on the edge of his eight-foot round desk and gazes out of his glass-walled office at acres of leafing grapevines, the possibilities seem endless. "I've probably got a hundred possible applications if I ever get around to them," he says.

DB Master is a trademark of DB Master Associates. *Desktop/Plan* is a trademark of Marton, Inc.

Dick Immel, a freelance writer and amateur winemaker based in Moraga, California, was formerly on the staff of the Wall Street Journal.

Enormous 14,100-gallon barrels—set horizontally instead of in standard vertical position—store champagne during primary fermentation.


NASA



by Patty Winter

ASTRO-APPLE

Physics and astronomy have come a long way since Sir Isaac Newton first used an apple for scientific discovery in 1665. Today, modern Apples assist space shuttle experiments, allow us to hear the "music of the spheres," simulate the orbits of planets and spacecraft—and teach students why that earlier apple fell on Sir Isaac's head.

Computers have thrust space exploration into the 21st century. Without their calculative powers, we could have never flown astronauts to the moon or seen with telescopes into the deepest skies.

But as scientists set out on these investigations of space, they sometimes discover that large centralized computers don't meet all their needs. It's not surprising, therefore, that a new generation of computers plays an important role in the new generation of space exploration exemplified by the space shuttle.

Rockwell International, the company that builds shuttles for NASA, is also responsible for coordinating what goes on inside them. Bill Carroll is developing a color graphics program on an Apple /// that will make the task much easier. Carroll is part of Rockwell's Payload Integration team that determines what combination of experiments on each shuttle flight will produce an acceptable center of gravity. His goal is to do as much of that planning as possible with computer graphics.

Center of gravity is important with any aircraft, but especially with

"the world's largest glider," a spacecraft that has no engine power as it lands. If the center of gravity is too far forward when the shuttle reenters the earth's atmosphere, the craft could become unstable; too far back, and part of the shuttle's tail might overheat dangerously. A great deal of care must be taken to produce a safe center of gravity, and that can take a lot of slogging through numbers.

Carroll has taken steps toward speeding up the process. His Apple /// program asks for the weight, length, and desired position of the payload within the cargo bay, then creates two graphic displays on a color monitor. At the bottom of the screen is a side view of the shuttle, showing the payload in the assigned position. On a chart above that, a funnel-shaped plot compares payload weight with cargo bay length.

A light payload can be placed almost anywhere in the bay, but as cargo weight increases, its position must be nearer to the shuttle's own center of gravity. All combinations of payloads must fall within an acceptable envelope of locations to be safe. From the information entered by the operator, the computer calculates the center of gravity and plots a dot on the chart; if the dot falls within the envelope, a payload there will be safe.

Several refinements are still being made, such as making it possible to simulate shuttle payloads that are stacked or arranged side-by-side across the length of the cargo bay. Also, each payload's own center of gravity is now assumed to be in the physical center of the package, which is not always the case.

EYE OF THE SHUTTLE

For Henry Harris of NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California, one picture is easily worth ten thousand printouts. As mission design manager of the Shuttle Imaging Radar (SIR-A) experiment during the second flight of the space shuttle Columbia in November, 1981, Harris was responsible for determining when the sophisticated instrument should be turned on and off as it gazed at the earth from the Columbia's belly.

The SIR-A experiment produced striking images of Greece, the Himalayas, and many other areas, with features resolvable to 40 meters wide. To obtain these images, Harris had to know exactly where the shuttle's radar was pointed at all times. Data from NASA's computers at the Johnson Space Center in Houston could have told him (numerically) what part of the earth lay directly below the shuttle, but SIR-A was not looking straight down. It was angled off by 47 degrees, creating a 200 kilometer offset on the ground between its path and the shuttle's. To save time shuffling and interpreting numbers, Harris created a graphics program on an Apple computer that would show the radar's path on screen maps of the earth.

The finished program worked beautifully and quickly, too, which became important when Columbia's mission was shortened and experimenters had to make the most of remaining time. Harris's primary Apple system was connected to three disk drives, a color monitor, a printer, and a small control box with a joystick and two buttons. An auxiliary Apple transferred onto diskettes the shuttle's "ephemeris" (computed positions for the entire mission), generated by a NASA mainframe computer after the shuttle's final orbit correction.

One disk drive held ephemeris data; a second contained maps of the earth in 30-by-30 degree segments; and a third drive held the SIR-A simulation programs. Harris could call up any portion of the shuttle's planned journey and display the path of the radar.

Harris created a graphics program . . . (to) show the radar's path on screen maps of the earth.

Whenever the radar path passed over an area the SIR-A experimenters wanted to photograph, Harris turned on the simulated radar, causing a color change in the path on the Apple system's video display screen. As a further visual aid, colored brackets appeared along the path as the shuttle moved, indicating restraints such as astronaut sleep periods, rotation of the shuttle, and closure of the cargo bay doors.

Once the sequencing charts had been prepared and delivered to the payload commander, Harris and the SIR-A team could set the simulation going at the same speed as the real shuttle and follow the Columbia's journey. "It was satisfying to watch the path on my simulation cross from land to water," says Harris, "then look at the shuttle telemetry and see that it had crossed over at the same moment."

The SIR-A experiment was an impressive success. The radar data will now be compared with field observations and Landsat infrared photos to find geologic formations associated with oil and mineral deposits.

HOW HIGH THE MOON?

On the Hawaiian island of Maui, Lou Macknick sits in front of his Apple II. At first glance, it appears he is playing some sort of space game: the top of the monitor's screen shows a star field, a small satellite, and a movable square. Once each second, the computer's speaker buzzes and a simulated laser shot darts toward the square. But what are all those strange numbers on the screen, the ones marked "UTC," "Julian Date," "Time Bias," "Dome"? And what is that bar graph below the star field?

Macknick isn't playing a game at all; he's running a simulation of what actually goes on at LURE, the Lunar Ranging Experiment at the University of Hawaii observatory. LURE is part of a worldwide network of stations gathering information on continental drift and the earth's rotation rate. Program manager Macknick uses his Apple to help laser operators at the observatory work more efficiently.

LURE's current target for laser shots is a one-meter diameter, earth-orbiting satellite called LAGEOS (Laser Geodetic Satellite). The return time of the laser pulses, when correlated with times from the other stations, helps pin down the location of each station. This information allows geophysicists to detect the small land mass movements of continental drift. In the future, the lasers will be aimed at small reflectors placed on the moon by Apollo astronauts.

Finding such small targets with only oscilloscope pulses for feedback can be frustrating, due to uncertainties in the satellite's orbit and pointing errors in the telescope. In Macknick's Apple simulation, the image on the screen indicates where a satellite is supposed to be—but that's not usually where it is. To get a return beam from the satellite requires moving the aim point of the laser (represented by the square) until the echo is heard.

Random returns have been programmed into the simulation to duplicate false signals. In light of all this, Macknick jokingly suggests that his simulation is almost too real.

"I can sit my operators down in front of this thing, and they'll go a thousand shots without finding the target. It's exactly like what they do every day at work."

Macknick is ready to adapt the program so it can be used directly with observatory equipment when LURE gets its own Apple system. Laser operators will hear an extra buzz between transmitted laser pulses if the LURE telescope detects returning light. As the satellite drifts, the operators will lose the echo and have to resume their hunting. Macknick is confident that by using the Apple, instead of relying solely on numerical information, the operators will be able to find their targets more quickly.

MUSIC OF THE SPHERES

August, 1981: A billion miles from earth, a small spacecraft enters a turbulent region of space where ionized particles from the sun collide with Saturn's magnetic field. Voyager's "bow shock crossing" could have been portrayed with a chart, but Dr. Fred Scarf of TRW and his Plasma Wave Science team were looking for something more exciting and more understandable. Their solution was to synthesize an audio representation of the event by using an Apple computer equipped with a Mountain Computer MusicSystem®. As team physicist Bill Kurth put it, "Even though we're here to do science and solve the basic truths of the universe, I think we owe it to the public to help people understand what we're doing.

Besides," he adds, "it's fun."

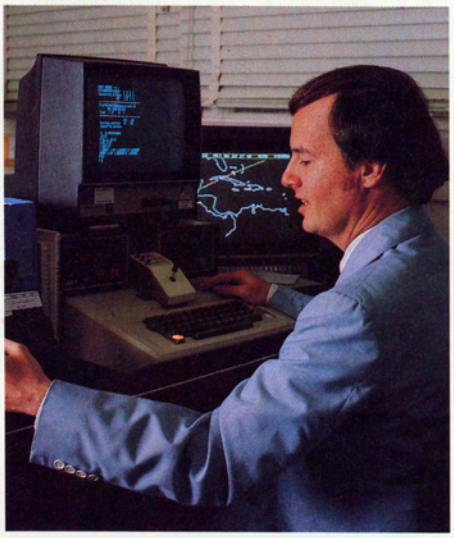
And beautiful. The haunting sounds produced by Scarf recreated Voyager's passage through the turbulent bow shock to the "magnetopause," the calm area between the magnetic influences of the sun and Saturn. The recordings were so popular that many radio and television stations used them in reports about the encounter. The publicity led to some amusing reactions.

"The first time we synthesized the data," says Dr. Scarf, "we were struck by the fact that it sounded like music. We didn't want that." So programmers Roy Tsugawa and Sandy Chang altered the pitch of some of the tones. Despite their precautions, Dr. Scarf later received a call from a woman who had heard the tape on a radio news broadcast. She insisted it proved the existence of life—and of a symphony orchestra—on Saturn.

ASTRO-EDUCATION

Many educational astronomy programs for Apple computers are now appearing, including one being developed by Robert Baumbach of Grand Rapids (Michigan) Junior College, under a grant from the Apple Education Foundation. Baumbach has revised the program, which was originally written for a large computer, so that it runs on an Apple II.

Baumbach's program teaches about constellations, stars, and other celestial objects. Students can specify the season they wish to study, as well as the degree of difficulty of the questions. They can also choose between seeing a city sky (with stars down to third magnitude, such as are found in the Big Dipper) or a country sky (with stars to the fifth magnitude). At the end of each session, a permanent record is made of the student's performance.



Henry Harris of JPL operates a simulation on his Apple II.

Reaction to the computerized tutorial has been favorable. Students rank computer learning ahead of the planetarium because it is more convenient and allows interaction and self-pacing.

Learning is not restricted to classrooms, of course, and Apples are bringing astronomy to planetariums, museums, and homes across the country. In Los Angeles, John Mosley of Griffith Observatory sometimes uses an Apple computer to answer such out-of-the-blue questions as "What day was the moon full in August of 1692?" (for someone writing about the Salem witch trials). Recently, when preparing a planetarium show about the supposed dangers of several planets "lining up" in the sky, Mosley ran a solar system simulation program and examined other similar alignments that have taken place in the last decade.

To those who still doubt that a small computer can help us understand an immense universe, Henry Harris of JPL has some parting words. Did he ever hear, during the planning for SIR-A, that he couldn't do the job with a small computer? Harris calls up on the Apple a map of the shuttle over the earth, and replies, "I used to. Not any more."

®MusicSystem is the registered trademark of Mountain Computer, Inc.

Patty Winter, a regular contributor to Apple Magazine, has written numerous articles for microcomputer and astronomy magazines. She's currently writing a book on the use of computers in astronomy.

A GUIDE FOR AMATEURS

Professional space scientists are by no means alone in their admiration for microcomputers. Amateur scientists are finding that with the power of a personal computer at their command, their work is "amateur" in name only—not in quality.

For instance, you can buy an Apple II program called *Topographic Mapping* that accurately depicts the topography of the lunar craters Aristarchus and Herodotus. Eleven hundred and sixteen points were measured to create the data base, which can be displayed as a contour map, a landscape, or five other forms. The program was written by Dr. John Westfall, an amateur astronomer, professional cartographer, and professor of geography based at San Francisco State University.

Io, a volcanic moon of Jupiter, has also caught Dr. Westfall's attention. In the 1800's, there were occasional reports from respected earth-based observers that the small object looked elliptical instead of round. Could Io's shape have been distorted by volcanic plumes? Dr. Westfall created a graphics program on his Apple II to simulate erruptions on Io, and suggests that some plumes could indeed have been large enough to affect the moon's visual appearance from earth.

Dr. Wes Huntress from the Jet Propulsion Laboratory is a chemist by profession, but when some of his co-workers sent a robot spacecraft to a planet a billion miles away with amazing accuracy, he wanted to know how they did it.

Dr. Huntress had already purchased the subLogic *3-D Animation Package* for the Apple II, so he decided to create his own space exploration simulation. The result is *Saturn Navigator*, a popular Apple II program marketed by subLogic. The "adventure simulation," as Dr. Huntress refers to it, requires the player to choose a spacecraft trajectory to Saturn, orbit the planet, and dock with an imaginary space station located just inside the rings. (As in a real situation, the mission ends if the spacecraft hits the rings!)

The approach to Saturn was the first part of the program Dr. Huntress wrote, "because I wanted to see what Voyager was seeing." Of the finished simulation, he says, "My hope is that people will use it as a game—going on an adventure in space—but that the celestial mechanics will become second nature to them, so that when they read about Voyager or any other project, they'll have a feeling for how it's done."

Amateur astronomers have discovered a multitude of other uses for their Apples. During the last Voyager flyby of Saturn, for instance, the Jet Propulsion Laboratory amateur radio club transmitted pictures of the ringed planet, and many ham radio operators used their computers to translate and display the images. Other space enthusiasts are using Apples to track satellites, run telescopes, and predict eclipses. Programs are available that give accurate positional information—with graphics—of stars, planets, and other objects.

Science writer Eric Burgess (co-founder of the British Interplanetary Society and Fellow of the Royal Astronomical Society) is typical of the amateur astronomers turning to their personal computers for more and more projects. To assist his own observing, he has written over 25 programs which will be published in book form later this year. The package will include rising and setting times of the planets, conversions among various astronomical time systems, the positions of Jupiter's four largest moons, and simulations of annual meteor showers.

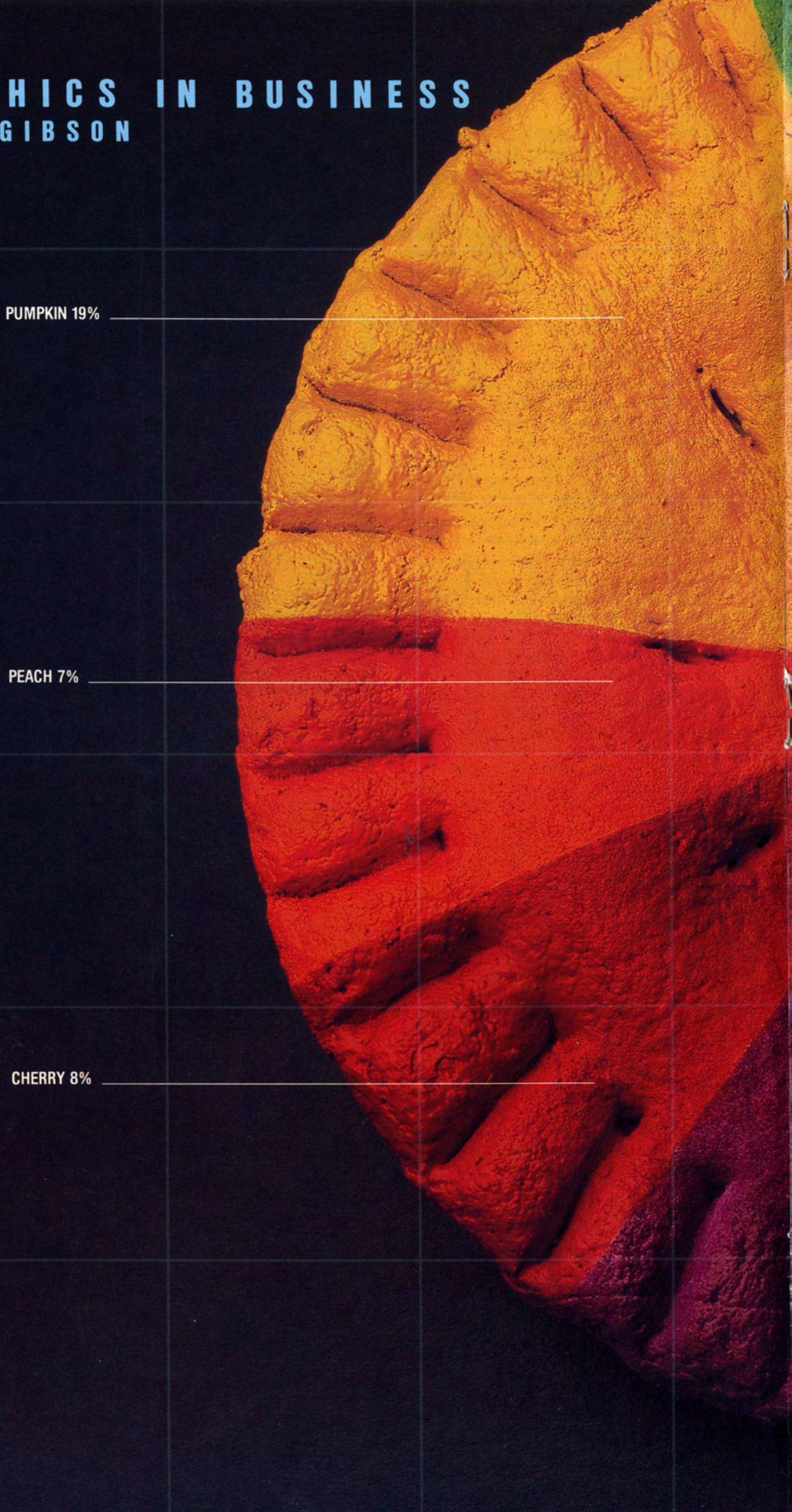
Burgess enjoys being able to travel in space and time with his computerized sky. One winter evening he decided to take a quick trip to the South Pole. "I wanted to see what the heavens looked like from there at that time of year, and whether I could see the midnight sun."

Burgess is enthusiastic about the potential of the personal computer as a learning tool. "You get a book on the dynamics of astronomy, and it's very boring. But if you put those dynamics on a screen, you can see the movement of the planets and get a real feel for what's going on in the sky. And once you get a feel for what's going on, you want to know more about it."

APPLE GRAPHICS IN BUSINESS

BY BARBARA G. GIBSON

In ever-increasing numbers, companies are using computer graphics to see their way more clearly to the bottom line.

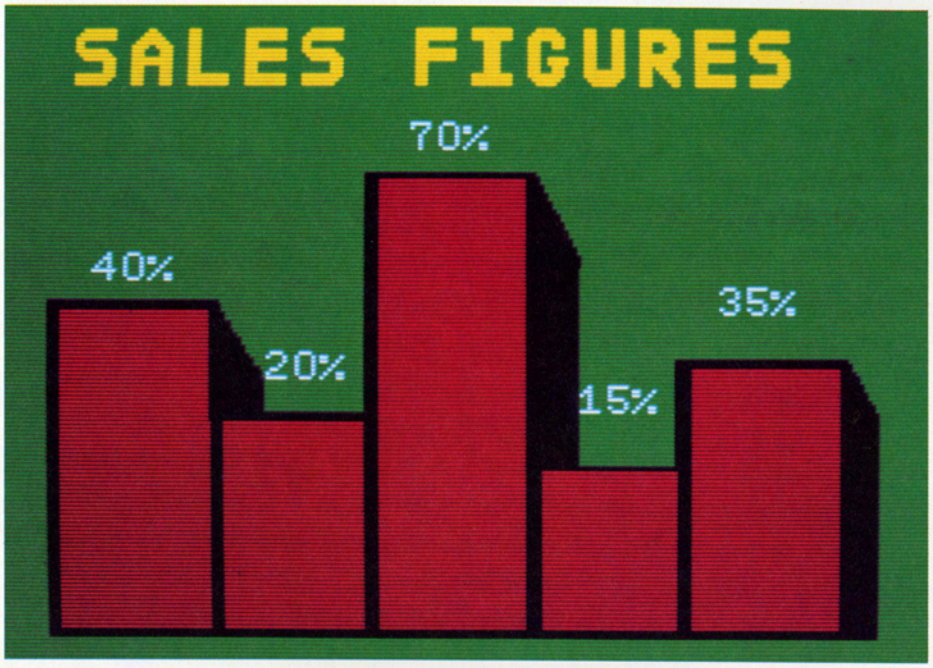


If managers get their way, Wall Street may yet be paved with obsolete computer printouts—those tomes of figures and statistics that weigh as much as grandmother's family Bible and compare to the dictionary in reading enjoyment. Today, with the introduction of low-cost computer graphics systems, managers have a way to convert the endless streams of numbers contained in those printouts into useful, easy-to-understand graphs and charts that help them spot trends, pinpoint problem areas, and make better business decisions.

Bloomingdale's systems analyst Mike Fruchter produces graphs on his computer with a program called *Apple Business Graphics*. "Using *Business Graphics*, I could do the rudimentary graphics almost right away," he says, "and in about two weeks I had full command of the program."

Now, sitting at his computer and using


APPLE 39%
BLUEBERRY 5%
ALL OTHERS 22%



Apple-generated display summarizes one company's sales over a five-year period.

the keyboard to type in simple English-language commands, Fruchter develops graphic displays of profit and loss data, gross margins, and forecasts for Bloomingdale's stores. He also can try different formats—horizontal or vertical bar charts, pie charts, line graphs, area graphs—to see which one presents his data most effectively. And with the use of a plotter Fruchter can transfer graphs from the screen into page-size illustrations, acetate overlays, or slides for formal presentations.

"Twice a year my company has a series of important planning meetings. For the last, I used the computer to produce 80 graphs in one week. The cost savings are enormous, because we used to do graphs by hand, which was terribly expensive. And the information wouldn't come in until the last minute. Now it takes me only about 10 minutes to produce a graph. I can have everything ready in plenty of time, even if the information comes in late."

GROWTH LIKE TOPSY

Computer graphics was once the domain of the scientists and engineers who first produced the technology. But it's becoming increasingly important in other fields as well—in particular, for business decision-makers.

The steady drop in equipment costs and the proliferation of ready-to-run, easy-to-operate programs are expected to propel computer graphics into the business world with Herculean force—at an estimated 60 percent annual growth rate over the next five years. Currently, business users account for only one in ten purchases of computers for graphics purposes. By 1985, it's expected that every other system employed for graphics will belong to a business user.

"The cost savings are enormous, because we used to do graphs by hand, which was terribly expensive."

Many of these business users will be attracted to the easy-to-use features of today's graphics programs. Developing useful graphics with one of these programs on an Apple computer requires no knowledge of programming and no artistic skills. To produce a graph with *Apple Business Graphics,* for instance, you first give the program some information to put on the graph, and then use simple commands (such as "SET COLOR BLUE" or "DRAW BAR") to tell the computer how to present that information. The computer arranges the information, generates the graph, and displays it on the screen of the computer monitor. You can then print the graph to a printer or plotter, or electronically save the image for future use.

With *Apple Business Graphics,* you can generate different types of charts from the same information to see which best presents your data; and enlarge any area of a graph to examine important trend lines. You can also use the program's built-in statistical functions to analyze questions that are important to your business. (For more information on this and other graphics programs for Apple's computers, see the box on page 25.)

Another Apple graphics development program, *Apple Plot,* uses "menus," or sets of options, to guide you through the program, from data entry to graph display. It lets you present your data in bar, line, or scatter charts, and display two graphs (of up to 100 points each) on the same axis.

COMPUTER GRAPHICS FUNCTIONS

Computer graphics systems offer business managers two indispensable capabilities: the ability to summarize data for everyday management and planning problems ("information graphics"); and the ability to provide quality visual displays for reports and presentations ("presentation graphics").

INFORMATION GRAPHICS

To the manager overloaded with work and pressured to make quick decisions, simple pictures offer a welcome alternative to statistics. To market research coordinator Lucy Clark, Apple-generated pictures have become the norm.

Reaching into a desk drawer file, she pulls out a thin packet of papers and drops it onto her desk. "This is how all our sales are doing against our forecasts, for all our products, domestic and overseas. There are probably 40 graphs in this report, and the report is only 15 pages long. It's not very weighty looking, but it shows us exactly how every one of our products is doing and how quarterly sales compare with past years' sales. It doesn't take long to see what's happening, and see where we should concentrate our attention."

When used to monitor performance, the computer can give managers an easy way to identify trends by producing graphs that weigh expenditures against budget allocations, track product performance, compare actual sales with projections, gauge the impact of competition on business, and chart stock and production activities.

In addition, computer-generated graphics can also help managers spot trouble early. In one company, graphs of a manufacturing plant's performance warned of a production shortfall on the horizon. The warning came in plenty of time for managers to take the necessary corrective action.

Computer graphics are also a valuable tool in marketing and corporate planning departments. "We used computer graphs at yesterday's board meeting to examine three alternatives for our money," explains Craig Douglass, a senior business development analyst who uses an Apple computer for graphics at Bell & Howell. "Our graphs compared each investment alternative on the basis of return on investment, return on sales, and cash flow."

Since the computer can graphically display data quickly, it's easy for managers to evaluate different scenarios. Some companies also use graphics to help them locate production

COMPUTER ART: TOUCAN

plants, sales offices, or consumer and advertising markets.

PRESENTATION GRAPHICS

For years, managers have relied on in-house or outside artists to produce high-quality color graphs and charts for presentations, particularly in the boardroom. But visuals produced by computer have three distinct advantages over those prepared manually: cost, speed, and accuracy.

For presentations, graphs generated by computer are converted into printed illustrations (or transferred to acetate for overhead projection) with plotters, many of which provide color. The plotter-generated images can be photographed, translating the graphs into slides for screen projection. Big-screen monitors can also be used to turn the computer itself into a type of slide projector that allows images to be transmitted directly to the boardroom silver screen. (*Screen Director,* a "slide presentation" system that works with the *Apple Business Graphics* program, is described in the box below.)

"This system gives us very good quality," commented one mutual fund analyst, "especially when you consider the price. We've been using computer graphics for sales meetings, and we look good. What we're doing is negotiating for payroll deductions into IRAs, so we're using graphs to show prospective clients how much lower our fees are compared to the fees of our competitors."

"One of the biggest saving graces of computer-generated graphics is that we don't have to tell the world about what we're evaluating," says Craig Douglass. "We used to hire outside artists to prepare graphs for us, and we had to camouflage company names and numbers to keep things classified. Then, when we got our drafts back, we'd peel off 'Company XYZ' titles and press on the right ones ourselves. Sometimes, it looked pretty amateurish. Now that we can develop graphics with our own computer, we have no problem producing working visuals without betraying sensitive information."

Smaller businesses can also use personal computers to generate graphics for presentations. A start-up firm, for instance, could use graphics to demonstrate market potentials to venture capitalists. Or a real estate office might obtain free publicity by producing charts on local housing prices for a local newspaper. These smaller firms, like the corporate managers described above, often have information they must communicate to a busy public. Graphics provide them with a quick and effective way to get their messages across.

When used for presentation graphics, the computer becomes a communications tool that can help people express complicated concepts in simple form. It can produce greater sales for a company, and help individuals better sell their ideas.

APPLE GRAPHICS IN TRAINING

Training department managers also are discovering the value of computer graphics in their work. With the computer, they can easily produce, edit, and update materials for classes and seminars without having to commit themselves to the costs and tedium of redoing existing visuals manually.

One graphics development tool used by many corporate training departments is Apple PILOT, an easy-to-learn programming language designed especially for training and education. With Apple PILOT, a courseware developer can utilize the graphics capabilities of the Apple II computer to teach technical skills such as electronic circuit assembly, and help employees understand complex procedures. The use of PILOT graphics in training presentations engages and motivates employees, making it easier for them to learn.

Developing graphics with PILOT is easy, making it possible for trainers to create their own instructional programs, without having to rely on outside consultants or programmers. Simple keyboard commands are used to draw lines, circles, and rectangles; or the control paddles can be used to draw designs of any shape. Text can be mixed with graphics, and displayed on the screen. These illustrations can then be saved to diskette, and utilized later in training lessons.

One company is using PILOT to train its service representatives about a newly-introduced product. In the past, they would have brought these "reps" to headquarters for training—an expensive procedure that still didn't give the level of personalized instruction that the company wanted. But with Apple computers set up in local offices nationwide, each rep can have a private tutor, and be

THE APPLE-BASED COMPUTER GRAPHICS SYSTEM

The computer graphics system has three main components: 1) a personal computer with video monitor; 2) an "output device" such as a printer; and 3) a software program to generate graphics.

The computer is, of course, the heart of the system. With it, the user can translate numerical information into graphics. Then the video monitor delivers the picture from the computer. The Apple II and the Apple /// also support additional graphics options; for instance, the Apple II supports a Graphics Tablet that uses an electronic stylus to transfer pictures onto the computer's video monitor.

Personal computers such as Apple's don't have to be dedicated solely to graphics. A business person using them for graphics purposes can also run word processing, electronic worksheet, and other programs on them.

Attached to a printer or plotter, the computer can generate page-size illustrations ("hard copies") in either black and white or full color. Among the compatible black and white graphics printers for the Apple II and Apple /// are the Apple Silentype thermal printer and the Qume Sprint 5™ impact printer. Compatible plotters include the Hewlett-Packard 7225A and the Houston Instruments DMP-3, -4, -6, and -7; talk with your dealer to ensure compatibility with your system.

At current count, more than 80 graphics development programs are commercially available for the Apple II and the Apple ///—more than for any other personal computer.

The proliferation of easy-to-use, reasonably priced software has fueled the growth of computer graphics in business. The Apple II and Apple /// *Business Graphics* packages, for example, were created on the assumption that many users would have no computer background. Both of these programs allow managers to quickly create—with simple English commands such as "draw line" and "fill"—point graphs, line graphs, bar and pie charts, scattergraphs, and area-filled charts. The programs also let users customize graphs with any number of vertical and horizontal floating labels; adjust horizontal and vertical axis ranges; perform statistical analyses to determine minimum, maximum, sum, mean, standard deviation, and variance; and establish trends through fitting several types of curves by least squares.

Business and Professional Software Inc., (BPI) the creator of the Apple *Business Graphics* programs, also offers *Screen Director,* a software package that allows the user of *Business Graphics* to sequence through displays on the monitor with a hand-held controller, similar to a slide presentation. BPI will also soon announce, along with Comshare/Target Software Inc., a facility that allows users of Apple *Business Graphics* to transmit their displays over standard telephone lines and have them reproduced as 35-mm slides, overhead transparencies, or color paper copies.

Another firm, Iconix, supplies customers throughout the country with inexpensive, computer-generated, color illustrations, slides, and overhead transparencies. Orders are routinely placed electronically through computer networks such as NCSS and TYMNET,® and delivered overnight by mail.

Toucan Visual Production Systems manufactures a slide-making system that takes graphics information from the Apple II to produce on-site transparencies.

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HOW TO EVALUATE GRAPHICS SOFTWARE

When you look at different graphics programs, look for these characteristics. A graphics program should:

- Be easy to use;
- Plot the types of graphs (pie, bar, scatter, etc.) you want;
- Plot several sets of data on each graph;
- Adjust X-Y parameters to suit your needs;
- Provide labels (horizontal and vertical) and titles;
- Work with data you have developed through other programs;
- Drive your printer or plotter to its fullest capabilities.

trained at his or her individual rate.

SuperPILOT, an enhanced version of Apple PILOT, allows training program developers to easily use Apple computers to control videodiscs, videotape recorders, and other audio-visual devices. This combination of computer and video technologies, called 'interactive video,' allows trainers to mix selected video segments with Apple-generated graphics, computer-assisted instruction, and test questions.

The Regional Kidney Disease Program of Minneapolis, Minnesota, converted its existing videotape library for use in Apple-based, interactive video training of nurses and medical technicians. Students learn the materials at their own pace, while the computer systems handle all record-keeping and testing. Instructors are able to assist those who need help the most, thereby making the best use of their time. (For more examples of interactive video at work, see "Rehearsing Reality" on page 9 of this issue, and "CPR Training" in Apple Magazine, Vol. 2, No. 2, page 18.)

BOTTOM LINE BENEFITS

Whether applied to boardroom or training department, the new graphics technology represents a considerable savings in time, since the computer can convert numerical data into charts in minutes, compared to the days generally required to produce hand-drawn graphs.

There's also a considerable savings in price. Douglass from Bell & Howell says that he used to spend $20 to $30 per slide. With the computer, it costs less than $5 a slide.

And generating graphs on a personal computer can be considerably less expensive—and far more practical—than trying to produce charts on a large mainframe computer system. "There's a multi-million dollar mainframe upstairs from me," says a Colorado securities manager who uses an Apple computer at his desk. "They've been trying to produce graphics on the mainframe for a year. Well, I have a graphics program for the Apple. It gives me every type of graph I'll ever need, and it gives me those graphs now, without having to wait for the people on the mainframe to get around to me."

Ultimately, managers who use computer graphics benefit in two ways. First, it gives them more of what every manager covets—time. Since a manager no longer needs to wade through and interpret rows of numbers, or create lengthy reports to communicate findings to others, there's time to pursue more productive activities.

But perhaps more important is the improved decision-making that's possible with computer graphics. Since graphic illustrations are so easy to interpret, a manager can work with a much larger pool of information than has ever been possible with stacks of statistical printouts. Computer graphics can provide a broader picture and an endless capacity for "what-ifs," making it easier for managers to spot trends and troubles with fewer uncertainties.

COMING UP NEXT . . .

Already, equipment and software have reached a milestone in making computer graphics easier to use, cheaper, and more accessible to computer newcomers. Just a few years ago, such technology usually cost $250,000 or more, and the idea of a graphics system that cost less than $10,000 was unimaginable. Now they're being used by many companies.

Corporate managers will probably be the primary users of personal computer graphics on systems such as the Apple II and the Apple ///. As the information needs of corporations continue to grow, the ability of computer graphics to analyze and present information quickly becomes ever more important. For many managers in these corporations, computer graphics may provide the only means of staying on top of all the information that affects how they do their jobs.

But owners of small businesses may expand their use of computer-generated graphics as well, in order to make sales presentations to customers, analyze budgets, and understand their own financial data more clearly and completely. For owners of small businesses who need graphics capabilities only occasionally, service bureaus and computer stores can provide low-cost graphics production services.

One thing is certain: Both corporations and private businesses are sure to increase their use of computer graphics generated by personal computers. In time, such graphics may be the primary way that most people understand complex statistical information.

Barbara Gibson, a California-based freelance writer, was formerly on the staff of Sunset Magazine and Books.

Caught in the act! Whether you're chewing or charting, apple means good taste.

PHOTO: EMMETT MARTIN

Apple-Aided Design

Designers are trading in their drafting tables for personal computers. Using the conventional tools of the trade—pencils, erasers, rulers, and compasses—a designer might spend hours laboring over the tedious details of a sketch, drawing and redrawing, calculating and recalculating. With a personal computer, the designer can do many of these same things automatically, leaving more time for thinking and analysis.

Computer-aided design has been available on million-dollar "CAD" systems for more than a decade. Some people call it "the new industrial revolution," a way of creating products for the future without putting pencil to paper.

Because of its expense, few designers have actually benefited from this revolution. But now low-priced Apple computers are being used in numerous new design applications. We've documented some of the more exciting examples on the following pages—from the framing of airplanes to the design of integrated circuits.

All of these applications combine the Apple's graphics capabilities with its calculative powers, helping designers see what their ideas will look like, and analyzing whether those ideas will work. In a typical application, a designer might start by drawing ideas on the Apple Graphics Tablet, an "electronic sketch pad" that transfers images directly onto the computer's screen. In the same way that using a pencil and an eraser makes it possible to "think through" ideas on paper, the Graphics Tablet allows a person to play with visual ideas on an Apple computer.

The designer can tell the Apple system to make measurements or adjustments in these drawings automatically, and then send the results to a printer. In some applications, such as the cabinet design system described on page 30, the computer can even generate a list of the necessary raw materials. In order to utilize all this power, the Apple must be programmed to perform these functions. We focus on one general-purpose design development system from Cascade Graphics (page 31), in addition to the specialized design systems described in the other stories.

Another program available from Apple, *Designer's Toolkit,* lets you generate graphics for mapping, architecture, drafting, and other design applications. *Designer's Toolkit* is built around an easy-to-follow "menu" of options that allows a designer to work with different brush techniques, add fine details and labels, and draw from a palette of more than 300 color combinations.

Apple-aided design could change the way tomorrow looks. It can reduce the time-consuming tasks of producing sketches and performing calculations, while it frees designers to utilize their two most important assets: intelligence and imagination.

Beyond Breadboarding

Hire a group of high-paid circuit design engineers. Add vast amounts of money to install and program a mainframe computer for them. Let each wait a turn at accessing the mainframe. Now have them design electrical circuits.

If that sounds cumbersome—and expensive—it is. But most companies involved in circuit design have been using mainframes for years. The large systems have chopped design hours dramatically, and made it possible to create circuits that otherwise would not exist today.

The engineers who design electronic systems and circuits are able to determine that the circuits will successfully work by "breadboarding"—that is, by using a breadboard (a circuit board with holes in it) to temporarily fasten components for prototyping. Breadboarding is an arduous task, and much of it is now done by simulation on large computers.

But now Apple computers, running newly written software, allow engineers to perform advanced breadboarding and circuit analysis tasks inexpensively—and to create some circuits and components that make their work easier.

MUSICAL CHIPS

If you've got time on your hands—in the form of an electronic watch—there's a good chance some of the microcircuits in it came from Intersil Inc., one of the largest suppliers of timekeeping chips to the electronic watchmaking industry.

Intersil, in Cupertino, California, is using an Apple to develop and program what's affectionately known as the ICM7247 Melody Chip. What is it and what does it do? Perhaps you'd like your watch to play the theme from "Star Wars." Or your doorbell to sound the notes from "Laura's Theme." If you're a Chevrolet dealer, you could even treat yourself to "See the USA, in a Chevrolet" every time you open a car door.

The ICM7247 can do all that and more. In fact, it can be programmed so your watch gives you an option of eight different songs. Intersil is certainly not the first company to make a musical chip, but design engineer Glenn Ely says that most others require up to 25 external components to generate music. This chip only requires a speaker, a crystal, two switches, and a small battery.

"As engineers, we were worried that we were going to get locked into programming everybody's song into the ICM7247," notes Ely. "So we went looking for an inexpensive system that would require a minimum of manpower to program the chip." Dave Squires, an Intersil project engineer, designed special software for the Apple II so that chip users (generally manufacturers of finished products, such as watchmakers and car manufacturers) can buy an Apple system to program the song of their choice into the chip. After the customer has programmed the song, Intersil will produce "mask codes" that allow mass production of any song, up to 256 notes long within a 55-note musical range, on a single chip.

8000 TO 9000 GATES

Andy Thompson spent 12 years at American Microsystems Inc. (AMI), a Silicon Valley semiconductor house, where as director of engineering he was involved with the computer-aided design of semiconductor devices. He left AMI two years ago to form Spectrum Software in Sunnyvale, California. "I could see a need for programs to run on the Apple that could help circuit design engineers," he explains.

He's created two comprehensive programs—one to help in the design of circuits, the other to simulate how a circuit will work in operation. Each of the programs comes in digital and analog design packages.

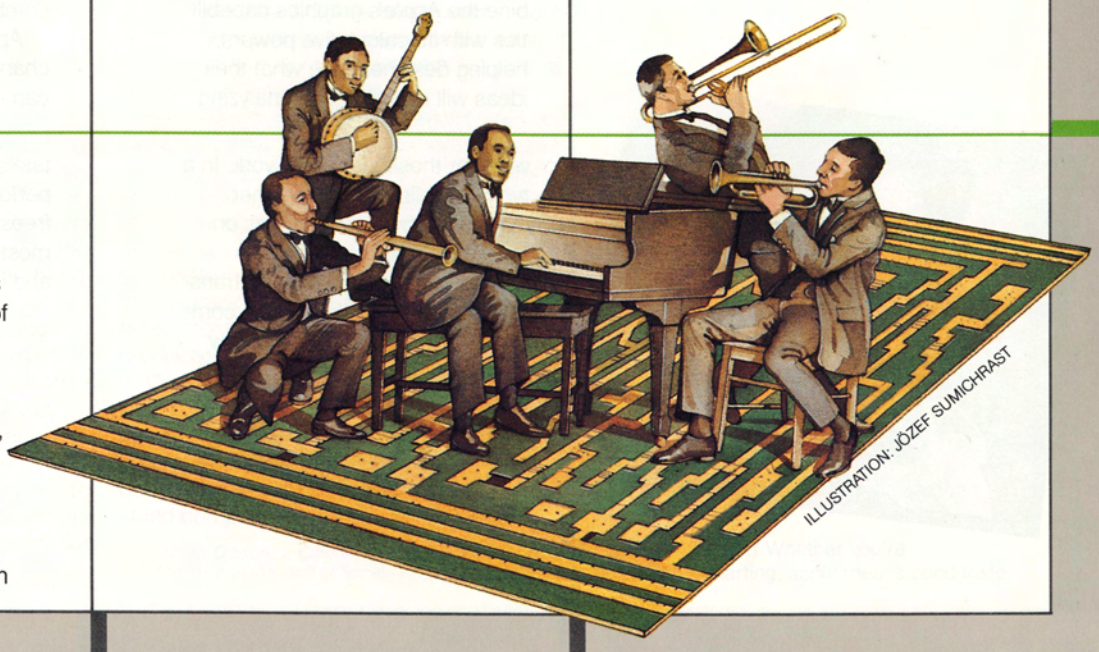


ILLUSTRATION: JÓZEF SUMICHRAST

While his current logic simulator can handle up to 1000 gates—making it probably the most sophisticated program of its kind for a personal computer—he's currently creating a larger version that takes advantage of the Apple *III*'s enhanced capabilities to handle 8000-9000 gates. (A gate is a switch circuit building block that uses "on" and "off" statements to make certain simple decisions.)

Alphatron, Inc. has been evaluating Spectrum's electronic series for use with an Apple system to design custom LSI (large scale integrated) circuits. John R. Duffy, Alphatron vice president, says this combination of hardware and software could move up to 80 percent of the company's circuit simulation from time-sharing to dedicated Apples.

"Besides bringing down the cost of time-sharing, the Apple offers potential benefits in user motivation," says Duffy. "Having an Apple in-house as our circuit simulator, it's likely that more simulations will be done. The result should mean lower reworking costs."

TIME CONTROL

A. F. "Slim" Petrie of Arlington Heights, Illinois, is the author of another Apple program called *Circuit Analysis.* Petrie bought an Apple in 1979, but the program he developed for the computer goes back to 1965. "The original version of the circuit analysis program was done on a time-sharing system at General Electric," he explains. "That's where I first learned how to program a circuit simulation."

The Apple version of the program was released through Apple's Special Delivery Software in 1981. "A big advantage of running the program on an Apple system is that you don't have to pay for computer time. That's especially important, because some computations may take a long time. If you have a very large circuit, it could take three to five minutes per calculation with time-sharing. That would be the time needed to find the output at just one frequency. If you have 20 frequencies, it could start adding up to hours, which you'd be reluctant to pay for on a mainframe computer.

"With *Circuit Analysis,* you can start your Apple and come back when it's done. When I do this for work, I bring the info home with me and run it on my Apple there."

Ron Stetz, a co-worker of Petrie's at Motorola's Automotive and Industrial Electronics Group in Schaumburg, Illinois, finds that an Apple with an electronic design program gives him "time control." "Using the Apple," he says, "opens things up. Lets you play more. So you tend to learn things that shake you from your preconceived notions."

Apple systems are also gaining wide use for circuit design and related engineering tasks at schools and universities. And the applications are often not quite what you might expect.

Frank Leenknecht, a psychology department technician at San Diego State University, designs circuits to be used for psychology experiments. The hardware includes Apples that are set up with devices that monitor behavior. After the data is transferred to the Apple, it's statistically analyzed.

In one experiment, for instance, the activity levels of rats injected with drugs are monitored. After injection, each rat is placed in a box with a photocell. Every time the rat passes the photocell, a pulse is sent to the Apple, which accumulates the counts.

ANESTHESIA MONITOR

Michael Lamb of Tucson, Arizona, is using the Spectrum program to develop a system that will monitor the amount of anesthesia administered to patients undergoing surgery. The multidisciplinary project will result in a completely computerized system that monitors the percent concentration of anesthetic being administered—the traditional role of the anesthetist.

"The anesthetists I've talked to are all for this new system. They're pleased somebody is changing an outdated procedure that's been used for the past 30 years," Lamb points out.

The Apple computer has become an integral part of the project. Using a Spectrum Software mathematics package, Lamb has simulated the breathing patterns of patients. Using Spectrum's electronic series, he developed low-pass filters for use in test signals. Lamb "breadboarded" the circuit he needed for the anesthesia monitor on the Apple's screen. When the program proved the design would work, Lamb built the actual monitor circuit.

Currently, the anesthetist logs the patient's response to the anesthesia every few minutes on paper. But Lamb describes one advantage of the Apple's constant monitoring: "If another operation is required, a physician can take the diskette, examine the information on it, and be able to see how the patient will respond to anesthesia."

Lamb says the University of Arizona plans to package and sell the complete monitor at a price low enough to interest other hospitals in its use.

—by Ron Iscoff

A Designer For The Cabinet Shop

"The stereotype that most people have of a cabinetmaker—a little old man with gnarled hands and a leather apron—it's just not real today," says Mike Hayes, who has owned a custom cabinet business in Van Nuys, California for 18 years. "Hobbyists can afford to do everything by hand. I have to put bread and butter on the table by designing and building a custom product in the least amount of time I can."

An Apple computer is helping the Hayes Cabinet Company and others increase their design efficiency, while allowing them to maintain high standards of quality. As part of a cabinet design system developed by Cybix Intelligent Systems of Chatsworth, California, the Apple could revolutionize the cabinetmaking industry.

Custom shops such as Hayes's differ from manufacturers of "stock" or "modular" fixtures, who build great quantities of identical cabinets for housing tracts. As the name implies, custom cabinet shops make fixtures that are specially designed to fit particular rooms, usually kitchens and bathrooms in luxury homes and condominiums. Although the "little old cabinetmaker" image may no longer apply, these shops do provide an individuality of design and a quality of workmanship that distinguishes their products from mass-manufactured ones.

"By hand it takes eight to twelve hours of work to design and detail an average job," explains Ron Shattuck, president of Cybix. "Doing this work by hand can be the most tedious job in the world, yet every calculation has to be exactly right."

HOW IT WORKS

With the Cybix system, a designer can finish an average job in under 40 minutes. The Cybix package was designed with the computer neophyte in mind. Most of the time, the designer works by pointing at the screen with a light pen, a small device that looks like the bar-code readers used in department stores. The computer detects the light, records the designer's choice of wood type, door design, dimensions, and so on, until each cabinet in the job is completely defined.

The Apple II's graphics capabilities let the designer see the cabinet on screen, section by section, as it is created. Each design begins as an empty box. The designer can then divide it into thirds, fourths, or smaller sections. Doors, shelves in any of several styles, face framing—all design components become a part of the picture and automatically go into the computer's memory.

"For the experienced designer, it's as easy as taking a multiple choice test and knowing all the answers," says Shattuck.

When the design is complete, the computer is left alone to finish the detailing. In an hour or two, the printer will produce a neat stack of fan-folded paper that replaces the standard multitude of hand-done renderings and cutting lists, involving specifications and dimensions for nearly 400–600 pieces of wood in a typical kitchen. It provides the assembly crew with a typed list of specifications, drawings of each cabinet, and a master cutting list that groups together all identically sized pieces.

"I guess I shouldn't have been surprised when an assembler came to me, saying that the printouts were saving him an extra hour on every job," Hayes says. "We sat down and figured out that, because the computer's cutting lists were so easy to read, and because every piece to be cut alike was listed together, as a shop we were saving more than five hours on each job—just in the cutting!"

CUSTOMIZED PROGRAMS FOR CUSTOM SHOPS

"We wouldn't have approached this product if we thought we couldn't accommodate the custom market," Shattuck says. "About 80 percent of the program is generic, but it's that other 20 percent that makes each particular cabinet shop different from all others."

Don Littleton, plant manager of Cabinet Builders Inc. (CBI), a Hayward, California, shop, spent sev-

PHOTOGRAPHY: BARRIE SCHWORTZ

eral weeks working with Cybix's programmers, developing the custom portions of his company's program. He filled out a lengthy questionnaire that covered all of CBI's "shop standards," the procedures and design features that distinguish his shop's products from his competitors'.

"We thought we had a lot more 'ways of doing things' than the program would be able to handle," Littleton remembers. "I was surprised by how adaptable it was. We wouldn't have had to change many of our procedures to accommodate the computer. But preparing the shop standards questionnaire forced me to think about every step in our shop, and I saw how we could do some things more efficiently."

MORE THAN A DESIGNER

"The person who can use our system to the best advantage owns a custom shop with 10 to 20 people working in it," says Shattuck. "The shop might produce anywhere from $500,000 to $2,000,000 in revenues a year. Much smaller than that, and they probably won't think they can afford the system, although it would pay for itself in time, even in a very small shop.

"We spent three man-years developing our product for the Apple II because, for the money, no other computer can do what it does," Shattuck continues. "The Apple is an attractive computer for our system, even beyond its technical capabilities, because owners of smaller shops can buy bookkeeping and inventory software for it that helps them save more time and money."

—by Renee Olsen

The New Drafting

"No one will be surprised," says Dan Johnson, "if drafting tables go the way of the slide rule—into welcome obsolescence. If you own a drafting board, you had better plan on accelerated depreciation."

As president of Cascade Graphics Development of Santa Ana, California, Johnson could change the face of drafting. Cascade has come up with an affordable Apple-based system that promises to save time for designers while increasing their accuracy and productivity.

Cascade offers an inexpensive, two-dimensional design system that contains many of the capabilities found in expensive CAD/CAM work stations, but at a fraction of the price. "Seven Cascade work stations can be put into operation for the same cost as one conventional work station," says Johnson.

"By placing the Apple computer at the heart of the system, we're placing computing power within reach of everyone in the drafting disciplines."

With the Cascade system, a designer can construct and move so-called "primitives" (such as points, lines, text, arcs, circles, and ellipses), create groups of these primitives, and then manipulate the groups with a few keystrokes. The system makes it possible to copy symbols, delete objects, edit lines, and perform a variety of standard CAD movements such as *rotate, scale, mirror,* and *align,* all automatically. A user can pan across a drawing or up and down it, or zoom in to enlarge any "window" or area.

The principle design elements need only be entered once, so there are fewer errors and rejects and a quicker and more precise standardization of parts. "By eliminating the repetitive elements and reducing the risk of error, we are freeing up time for creative thinking and design analysis," says Johnson.

Designs can be stored for future use on eight-inch floppy diskettes or on a mass-storage hard disk drive. Seven dense E-size drawings (34″ by 42″) can be stored on an eight-inch floppy, with up to four disk drives per system.

LINKED TO LARGE COMPUTERS

In addition to its stand-alone design system, Cascade offers a package that allows designers to use an Apple computer as a "preprocessor" to a standard CAD system. In this configuration, two or more Apple computers joined by multiplexers send data to the central system.

Because the Apple systems don't tie up the computational

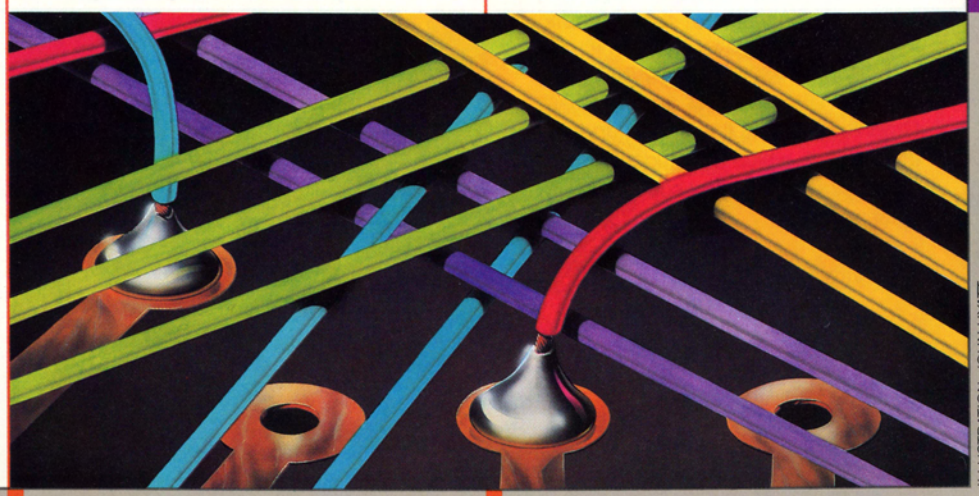


ILLUSTRATION: JOHN HYATT

power of the central system or drain its speed, they offer a formidable alternative to the standard, high-priced work stations that, when used to full capacity, have a tremendous slowing impact on CAD systems.

"For most applications, we're looking at productivity leaps of three-to-one and more," says Johnson. "All the usual two-dimensional drafting projects—electrical and ladder diagrams, electronic schematics, process flow sheets, program flow charts, plot plans, piping and instrumentation diagrams—are more efficiently designed."

TEACHING CAD

The Cascade system has also been incorporated into a course for instructors, as well as a college-level course for engineering and drafting students.

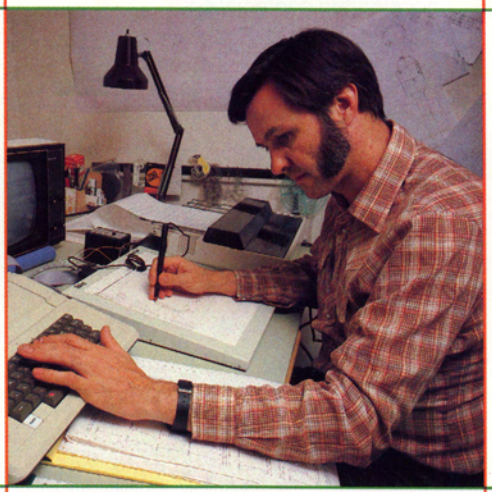
"Teaching computer-aided design procedures and techniques has traditionally required an expensive investment of time and money," notes Johnson. "But this system makes it feasible to teach CAD in schools. The estimated demand for trained CAD personnel is greater than 200,000 people over the next few years. Using the Cascade education system, each drafting student can generate a portfolio of drawings."

A typical Cascade configuration for universities includes an Apple Graphics Tablet, a line printer, and plotters with which the student can create drawings at any scale, resolution, or size.

—by Virginia L. Bennett

Apples Aloft

Out in the high Mojave Desert northeast of Los Angeles, Burt Rutan has set out to shatter conventional aviation wisdom with homebuilt airplanes. Lately, he's been developing designs on his network of Apples.



Leonardo da Vinci dreamed of powered flight 500 years ago. He sketched his 'ornithopter' in the late fifteenth century, accomplishing with his imagination what he had only seen birds do.

But the road to safe, routine flying turned out to be a tortuous, technologically testing, and deadly path for many early experimenters. After the Wright brothers launched the era of powered flight in 1903, developments in aviation technology accelerated. Designers spent the next seven decades creating new ways to fly more people faster.

Then, in the mid-1970s, the world of flight reeled under the influence of rising energy costs. Today, regardless of aircraft type, size, or classification, aircraft designers must deal with the question of how they can maintain performance while they reduce operating expenses.

Burt Rutan has an answer.

TRANSFORMATION IN THE SKY

After years as a civilian engineer at Edwards Air Force Base, where he tested many of the fastest fighters, Rutan set out to create simple, inexpensive airplanes that could deliver similar performance at a fraction of the cost.

Rutan's birds look unconventional. They are built differently, too. His first, in 1972, was the canard-wing VariViggen, configured and named after the Swedish Saab Viggen fighter. Conventionally built of plywood, spruce, and Ceconite, it delivered stunning performance from a modest, 150-horsepower engine.

Rutan followed with the VariEze (a plane 'very easy' to build and fly) in 1974, and then the twin-engine Defiant and the LongEze in 1978—all constructed from foam and fiberglass.

The VariViggen took about 5000 hours to build; the VariEze and other new designs can be constructed in about one-fifth that time. Rutan eschews the laborious assembly of precision metal parts. Instead, the person building one of his planes cuts Styrofoam to shape with a hot wire, finishes it with files and sanders, then covers it with fiberglass. The result is a small, light, and smooth structure that can be built easily by an amateur. And it's safe—virtually unstallable and unspinnable.

ENTER APPLE

The amateurs building Rutan's kits needed accurate and timely data to help them construct their planes. Rutan soon found himself buried by his direct-mail business, publishing information for what is today a builder/prospect audience of 3500 in 40 countries.

To help answer his soaring correspondence needs, Rutan pur-

PHOTOGRAPHY: BARRIE SCHWORTZ

chased his first Apple computer in 1978. He used a mailing list program to add new names, change addresses, and print labels and lists of customers.

Then Rutan realized that the same Apple system he was using as a mail list manager could help him handle engineering tasks as well. He and his staff now have nine Apple systems. "We like to do things economically and efficiently," explains programmer-analyst Pat Storch. "The Apple computer fits right into that philosophy."

Storch and Rutan have created over 50 engineering programs on their Apple systems to assist them with aircraft design and analysis. They've used the Apples to do engineering drawings of sample airfoils and fuselage sections.

"The entire fuselage shape for our sailplane, the Solitaire, was designed on an Apple computer," says Storch. "The computer generates an airfoil shape on the screen. We can examine cross-sections of it, decide whether we want the fuselage to be more rounded or straight, and make changes in order to study different alternatives. We can then print out the shape, along with critical size and performance data."

The programs run on 48K Apple II Plus systems, each equipped with two disk drives, monitor, and printer. Rutan and Storch use an Apple Graphics Tablet as well.

"Burt recently did a vertical stabilizer drawing," says Storch. "He wanted to change the size of the drawing, so he traced it onto the Graphics Tablet and played with it on the computer. The program let him increase the size of the drawing by any percentage he wanted."

SCALED MODELS

Rutan's latest project is a company named SCALED, in which he's building low-cost, scaled-down versions of commercial and military craft. The planes are flown by pilots in tests that replace elaborate wind tunnel procedures.

"We've surprised a lot of people," says Storch. "They didn't believe we could design, build, and flight-test models for less than the cost of a wind tunnel. Testing this way gives us accurate flight data, as well as qualitative data from the pilots that you can't get from a tunnel."

Rutan and Storch knew from the start that they would need some kind of computer-aided design (CAD) system, since creating these scaled-down planes requires them to consider the same multitude of design factors they would have to consider to build a full-scale version. But, as Storch notes, "It's scary to invest $250,000 in a complete CAD system when you're just starting out a new venture."

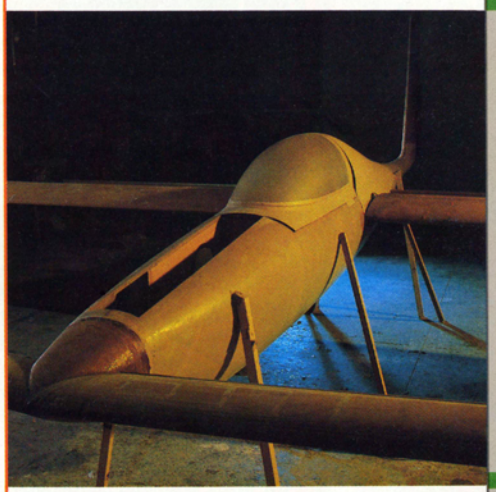
Rutan Aircraft uses the design package available from Cascade Graphics (see related story, page 31). "It gives us the power we need today, and the flexibility to move up if we someday want one of the expensive CAD systems."

Rutan continues to build some of the world's most unusual—and most remarkable—planes. Stay tuned. Much more may be heard from Burt Rutan.

—by John Joss

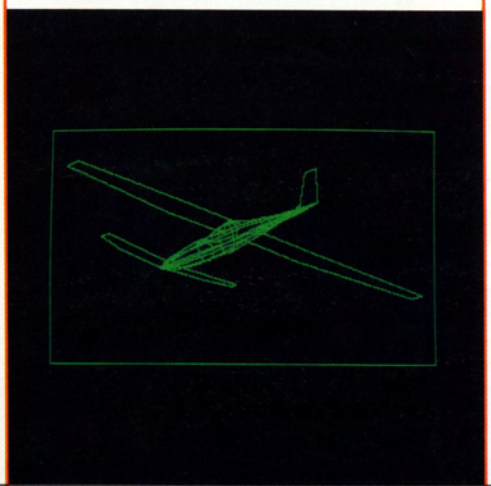
PHOTO: PAT STORCH

Rutan's latest experimental plane, the Grizzley, was designed in part on Apple computers.



Now under construction in a hangar at Southern California's Mojave Airport, the Solitaire will be soaring this summer.

Electronic prototype of the Solitaire (produced with graphics on an Apple II) allows Rutan to analyze design and make changes.



apples on:

ELECTRONIC MAIL

Timely information is important in business, especially when a company makes major buying and selling decisions every day. But it takes most large companies days to gather and prepare reports that contain all the information they need, and days more for those reports to be delivered to their outlying offices.

JCPenney Company, Inc., the nation's third largest retailer, uses electronic mail to reduce the time it takes to send vital information back and forth between its New York headquarters and catalog distribution centers. Using a program called Micro-Courier™ with Apple computers, the company is able to send income, expense, and inventory reports all around the country, instantly. "The system has improved the speed and accuracy of these reports immeasurably, and has significantly cut the flow of paperwork through my office," says Jim Kiser, financial reporting and analysis coordinator of the JCPenney Catalog Division.

The JCPenney catalog operation has grown dramatically from a $46 million undertaking in 1964 to a $1.7 billion business in 1981, making JCPenney the second largest catalog retailer in the world. Nearly 2000 catalog sales centers are served by the company's five distribution centers, which are located in Milwaukee (Wisconsin), Atlanta (Georgia), Columbus (Ohio), Kansas City (Kansas), and Reno (Nevada). A sixth distribution center is scheduled to open in Manchester (Connecticut) later this year.

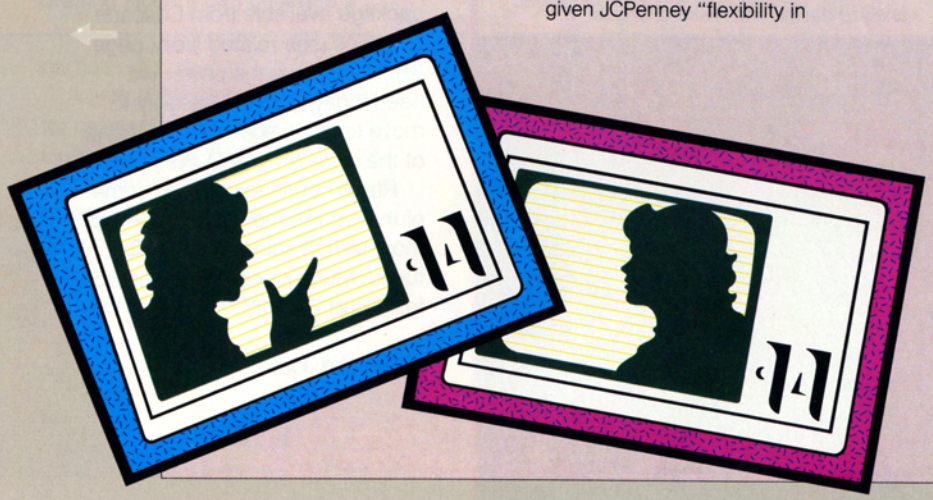
Using Micro-Courier, a manager in any one of these centers who uses an Apple computer is able to transmit computer files directly over the phone lines, without having to first produce a hard-copy printout. Computer users in each location can take the information contained in those files and analyze it on their own machines according to their needs. "In the past, summaries were prepared by hand from printouts produced on our mainframe computer," explains Mr. Kiser, "and reports were either mailed or telecopied from the five data processing centers around the country to New York."

The ability to respond quickly to the market via an effective communications network is critical in consumer retailing, and especially important to JCPenney's because of their emphasis on apparel and fashion-oriented merchandise. According to Larry Braby, Catalog Division controller, the electronic mail system has given JCPenney "flexibility in communicating within the Catalog Division and in getting detailed reports to top management rapidly and at a moderate cost."

The company originally purchased personal computers to give individual computer power to accounting managers, rather than requiring them to depend solely on the mainframe computers in each of the distribution centers. Managers use the Apple computers to track inventory, maintain expense-to-budget data, and perform budget analysis and forecasting tasks.

In order to use Micro-Courier, both the sender and the receiver need to have the program running on their computers simultaneously. With the addition of a clock card, users of Micro-Courier can take advantage of a special program feature that enables them to send messages at any designated time. "Because we use the computers during the day," says Ron Burr, a technical coordinator for JCPenney, "we run Micro-Courier only at night to transmit data between offices. In addition, telephone and transmittal costs are lower in the evenings."

™Micro-Courier is a trademark of Microcom, Inc.



ILLUSTRATIONS: MICHAEL SCHWAB

APPLES ON

FAMILY BUSINESS

How do you keep a teenager occupied during the summer? Lou and Adela Parada of Pinole, California, answered this age-old question by buying an Apple computer for their 13-year-old son.

"We bought it as a learning tool," Mrs. Parada remembers. "We thought Rick might try writing a few simple programs himself. And we knew there were plenty of programs already available that he could use."

Today, two years later, that same Apple computer has become indispensable to Mrs. Parada's T-shirt, miniatures, and silk-screening businesses. Rick writes programs on it for her and for his junior high school, and also uses the computer to help him with his schoolwork.

"It's like a game to us," says Mrs. Parada. "There's almost always one of us using the computer."

At first, the Parada family started with the simplest of systems—an Apple II Plus with their television acting as a monitor. As a family, they used it for entertainment, playing games like *Apple Stellar Invaders* and *Microgammon* (a computerized version of backgammon). Rick read the tutorial manuals that came with the computer, and taught himself how to program in BASIC.

Within a month, he began writing programs for his mother's business. Her major need, like that of many small business owners, was finding a way to keep track of her merchandise. Mrs. Parada stocks 850 different T-shirt transfers and 150 silk-screen designs. Her shop offers 30 styles of shirts in a variety of sizes and colors from 10 suppliers, as well as other items to be printed, such as bags and caps. In addition, she maintains a detailed catalog of miniatures that she can obtain for customers.

After 10 years in business, Mrs. Parada knew all too well the drudgery of manual record keeping. Rick's programs have been designed to streamline the standard procedures of the operation, allowing his mother to continue her normal way of doing business without requiring her to spend as much time reviewing invoices and counting inventory.

One of Rick's programs, the *Transfer List,* identifies all available transfers by supplier, order number, category, and wholesale value. It also keeps a record of purchase dates, figures out the quantity at hand, and calculates the wholesale value of the entire transfer inventory. A second program keeps a detailed record of daily sales, and figures the cost of goods sold, as well as total sales tax payments.

Another of his programs is used to maintain the silk-screen price list. Before they started using a computer, Mrs. Parada would only revise her price list twice a year because of the tedium of making changes. Now, using the program, it's easier for her to set a price on merchandise that accurately reflects her wholesale costs.

In addition to using Rick's programs, Mrs. Parada has purchased several commercially available small business programs. One of them, a general ledger program, saves her the $100 a month she used to pay to a computer service bureau. Another, *Personal Finance Manager,* is used to keep a budget of both home and business expenses. As they've increased their use of the system, the family has added new equipment, including a printer and disk drives.

Although both her husband and son write programs on the Apple II, Mrs. Parada explains that she still prefers to just "push the buttons and make it work. That's fun enough for me." She recommends the system to friends and other businesses. "The benefits to our family, to our business, and especially to our son, have been phenomenal."

APPLES ON

E D U C A T I O N

Until recently, educational resources were so limited in isolated rural Alaskan schools that many students either dropped out after the 8th grade or were forced to attend boarding schools far from home.

Apple computers are helping to change all that by making it possible for small schools in the state to offer a comprehensive high school program.

According to Dr. William Bramble of the Alaska Department of Education, rural Alaskan teachers are faced with extraordinary circumstances. "A village school might have two teachers, with 20 students in grades kindergarten through high school. The teachers must provide all instruction for the children, often without relying on any of the usual conveniences, such as a resource center, bookstore, or nearby supervisor."

In 1978, Bramble's department launched a project to explore the feasibility of computer-assisted instruction in rural classrooms throughout the state. "We had a real challenge. We met it by devising a teaching strategy that uses technology to provide a variety of quality education courses."

After investigating various approaches to computer-assisted instruction, Alaskan educators decided on personal computers because of their low cost and stand-alone capability. Bramble indicates the Apple II was chosen "because it was suited to the instructional application, was judged to be rugged, and could withstand most of the power fluctuations that are common here. In addition, sound educational programming already existed for the Apple II, plus we felt there was the potential for developing much more educational material for it."

Transporting an Apple II to an isolated school can be a difficult task, often requiring several airplane flights and climaxed by a final run on skis. But complex deliveries are a minor challenge compared to teacher training.

To turn teachers into Apple experts, Bramble and his staff put together a three-day comprehensive training course presented alternately in Fairbanks, Anchorage, and Juneau. On the first day, teachers learned troubleshooting techniques and how to perform minor repairs.

"Remember, rural teachers have no nearby computer stores," says Bramble. "Our teachers provide much of the routine maintenance and troubleshooting on our Apples."

On the final two days, workshop leaders examined the instruction process, reviewing software and other educational materials, as well as the roles played by student, teacher, and computer in the classroom.

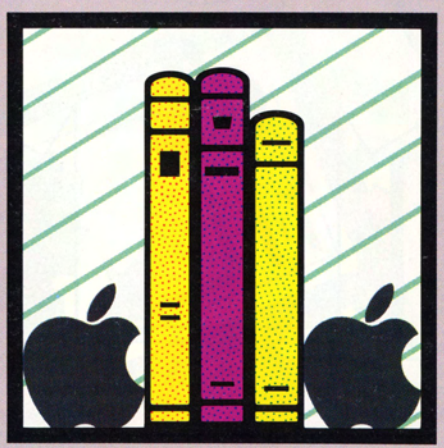
Working with the Northwest Regional Educational Laboratory, the Alaska Department of Education created software to help teach Alaskan history, U.S. history, English, general math, general science, and developmental reading. Two additional courses—consumer education and health education—are currently under development.

"We created our own instructional programs because of our specialized needs," says Bramble. "Our aim is to provide courses with high interest and simple vocabulary, but with content targeted at the student's grade level." (Commercially available software packages are also used in the schools.)

Each of the courses includes 20-40 audio-visual instruction tapes, student manuals, standard textbooks, and software for drills and testing. The Apple II not only scores exams, but also pinpoints those concepts grasped by the student, and indicates others requiring additional study.

According to Ed Obie of the Alaska Department of Education, there are now more than 1000 Apple computers distributed among Alaskan schools. "The computer is not a panacea—it cannot and does not replace the teacher," he cautions. "But we've seen much evidence of what a powerful tool it can be, when integrated with a multi-layered approach that incorporates print, audio, and other video material—all under the creative direction of the classroom teacher."

"The system is perfect for the small school," adds Bramble. "All necessary materials are included in the course package. Students receive individualized instruction and the teacher knows exactly where each student is in each course."



SOLAR DESIGN

The house of the future has arrived, and it's quite a package. Its optimum use of available space and ability to harness solar energy set it apart from the kind of dwellings most of us call home. The fact that an Apple II is built into the house's design distinguishes it even further.

"I like to think of myself as the architect who designs computers into homes," says Gary Fiehmann of Arien Solar Design and Construction in Tahoe City, California, creators of the Arien Intelligent Solar Home. "We're living in the so-called Computer Age, so why not take advantage of what computers are doing to make our lives easier at home?"

It is that philosophy around which the Arien homes have been designed. Utilizing solar energy for both heating and cooling, the houses take energy efficiency one step further by assigning a computer to the task of anticipating weather changes and setting indoor temperatures accordingly.

"I've studied both solar energy and computer programming," Fiehmann explains, "and it didn't take me long to see how the two go together. When I got involved in the solar aspect of construction, I realized that there are a lot of complicated formulas that go into accurately predicting what a structure will do under certain conditions. So why not give a computer the job of making those predictions?"

Actually, Arien homes incorporate two computers. The Arien Sensor is a modified controller board designed for the sole purpose of energy management. It is, in essence, an intelligent thermostat. The Sensor uses a program Fiehmann wrote on his Apple II to control temperatures based on input received from strategic locations throughout the house. The Sensor's output ports are programmed to turn fans, valves, and motors on and off; and to open and close skylights, dampers, and louvers critical to heating and cooling different areas.

Stored on an "EPROM" (Electronic, Programmable, Read-Only Memory), the program also contains a history of monthly temperatures for the home's geographic region. The memory allows the system to predict heating and cooling needs and to set the indoor climate accordingly.

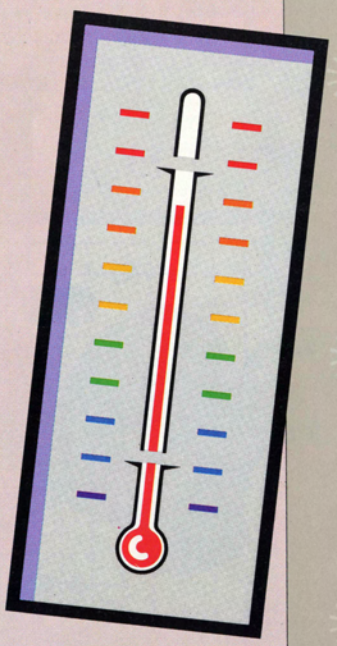
The Arien Sensor performs its job 24 hours a day. Fiehmann designed it to interface with an Apple II which records and displays climatic data. (A computer room is included in the basic home design to accommodate the Apple system.)

While the Apple II could have been used in place of the Arien Sensor to monitor and control temperatures, Fiehmann felt it would be more cost-effective to employ two separate computers.

"The Apple is probably the most flexible of all the small computers around today," Fiehmann says, "and I didn't want to waste its capabilities by dedicating it to monitoring a house 24 hours a day. That's what the Sensor is for. The homeowner can walk into the computer room, check the conditions of the house on the Apple's screen, then use the computer to work on the household accounts, help the kids with their homework, or play galactic war games."

Fiehmann is building a number of new homes in the Lake Tahoe area. He has also sold house plans to many people who are interested in building a solar computerized home in the future.

"This country has been forced to become energy-conscious in the last few years. Our houses are going over well because they can be heated and cooled without wasting a lot of gas and electricity, and without costing the homeowner a fortune."



PSYCHOLOGY

They may only be ink blots, but to a psychologist they're invaluable tools for diagnosing and treating emotional disorders. In the Midwest, an Apple II Plus is helping one doctor use them to get at the core of people's problems faster than previously possible.

A psychologist administering the Rorschach test shows a patient 10 different ink blots, one at a time, then asks the person to articulate what the blots resemble. According to Dr. John McPhee, a Grand Rapids, Michigan, psychologist, Rorschach responses can provide the following insights about a patient's personality:

1. How does the person organize his or her life?
2. Does the person think things through, or react emotionally?
3. Does the person handle complex situations, avoid them, or get bogged down in detail?
4. How does the person perceive the world and project attitudes, values, and motives onto it?

(The test can also be used to determine whether a psychotic patient's illness stems from schizophrenia, mania, or drug intoxication.)

Hermann Rorschach, a Swiss psychiatrist, developed the test during the 1920s. It lost popularity because the interpretation of results was highly subjective; several doctors using it on the same patient could arrive at varying diagnoses. In recent years, however, the Rorschach has come into vogue again because of a scientific scoring system developed by Dr. John Exner, Jr.

With Exner's Comprehensive (Rorschach) Scoring System, a psychologist chooses among 79 variables to score a patient's responses, which average in number from 25 to 30 per test. The majority of variables fall under the headings of: Content (what the patient perceives in each blot); Location (where on the blots these images are located); and Determinant (what prompts the patient's responses—color, shading, or shape, for example). After the psychologist scores the replies, a series of quantitative analyses is performed on the data, the results are charted, and a personality profile arrived at.

Each test typically takes one and a half hours to administer, score, calculate, and chart, the latter two tasks being especially tedious and time-consuming. McPhee, however, has written a program for the Apple II Plus that reduces by up to 40 minutes the amount of time spent making calculations and charts for each Rorschach test.

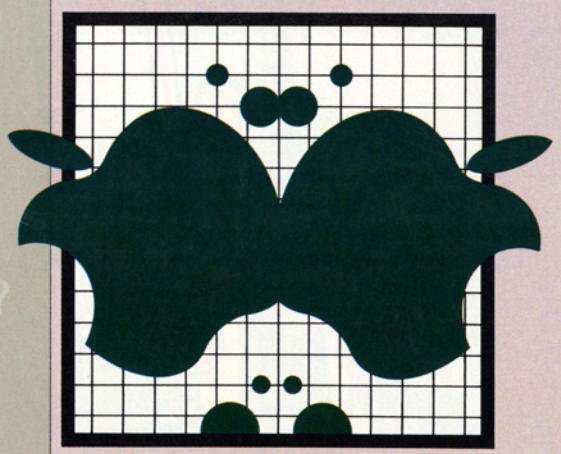
The Rorschach Tabulator, written in Applesoft BASIC, is used to classify and store Exner data, perform the necessary computations, and produce charts from which diagnoses are made. "The program examines the 102 indices vital to personality analysis, with a fraction of the effort involved in manual scoring," says McPhee.

"Previously, when using a calculator, I'd devote a lot of time to rechecking tabulations, because computational errors can alter the accuracy of a diagnosis or treatment recommendation. With the Apple, I have the bonus of knowing that my calculations will be correct first time around.

"I use the time I save to see more patients."

The commercially available program (Hartley Software, Kentwood, Michigan) requires a 48K Apple II Plus and a Disk II drive, and can use all Apple-compatible printers. McPhee designed the software with built-in instructions so that, with minimal training, secretaries can use it to enter data and automatically generate quantitative analyses and charts.

For the past 18 months, McPhee has also been using his Apple to correlate the incidence of mental disorders and solar, lunar, and/or meteorological phenomena. He has the Apple system collecting weather data (temperatures, barometric pressures, wind velocities and directions) from a Heathkit Digital Weather Station, and documenting lunar phases and geomagnetic storms (solar flares). It also keeps daily summaries from Grand Rapids and surrounding Kent County on hospital psychiatric admissions, suicides, and mental health crisis hotline calls.



apple at a glance

A SUMMARY OF APPLE PRODUCTS

More than 400,000 people now own Apple personal computers and use them in business, education, industry, and the home. They're discovering how Apple systems can expand their horizons, while making their lives more productive.

In this issue, we've documented some of the ways that Apple owners benefit from their computers: business people who work more efficiently, designers who think more creatively, scientists who probe more accurately.

An Apple computer can change how you live and work, too. No bigger than a typewriter, an Apple system packs more processing power than many large computers did just a few years ago. And you can use an Apple computer without any special training or knowledge of programming. Thousands of ready-to-run programs—the largest selection in the industry—let you put your computer to work right away.

Visit your local dealer and ask for a hands-on demonstration of the Apple II and Apple III computer systems described on the following pages. (From your dealer you can also get **Apple In Depth***—a complete reference to Apple products—and other guides to help you pick the Apple system that's right for you.) Expand your world. Explore the world of Apple.*

The Apple II:
The Most Popular Computer In Its Class

(1) Apple II with Monitor /// on Apple II stand (2) Disk II drives (3) Interface cards (4) Software packages (5) Silentype printer (6) Graphics Tablet

(7) Manuals and language packages

The Apple II can make your working time more productive, your learning time more exciting, your leisure time more entertaining and creative.

You'll be impressed with its powerful built-in capabilities, including high-resolution color graphics and sound generating features. Its 48K bytes of user memory (64K with the Language Card) allow you to perform sophisticated tasks, from text editing to financial modeling. In addition, you can add accessories to expand your system's capabilities, including: printers that give you a "hard copy" printout of your programs; the Apple Graphics Tablet, which lets you use the Apple II to draw and display computer pictures; or Disk II floppy disk drives, for greater ease in saving and retrieving information.

The Apple II supports a wide variety of languages, including BASIC, Pascal, CIS COBOL,™ FORTRAN, PILOT, Logo, *and assembly language. In addition, you can choose from a complete selection of problem-solving programs for virtually any application. See your local dealer to learn more about the following programs, and thousands of others.*

BUSINESS MANAGEMENT

Tackle just about any financial analysis problem with programs like VisiCalc, Plan 80, *and* Senior Analyst. *Then use* Apple Writer *and* Goodspell *to compose and proofread reports, and* Apple Plot *or* Apple Business Graphics *to present your conclusions graphically.*

Managing personal finances? You can track financial news and stock prices and manage your portfolio with the Dow Jones News and Quotes Reporter *and the* Dow Jones Portfolio Evaluator. *If you operate a business, you can keep close tabs on the bottom line with* The Controller *from Apple; or use the BPI accounting system, with programs for general ledger, accounts receivable, inventory control, payroll, and job costing. If you're an independent sales professional,* Order Tracking System *will help you process, locate, and analyze sales information.*

With Micro-Courier™ *you can send messages from one Apple computer to another, and distribute your letters and reports more quickly. Another program,* Apple Post, *lets you generate mailing labels, keep addresses up-to-date, and manage your mailings.*

If deadlines are a problem, use APM *to organize your projects and* Agenda Files *to keep track of your time. You can SAVE time, too, by using the* Formulex *forms package and* Datatree™ *to help you gather and organize information.*

EDUCATION

We give educators the tools they need to use computers effectively, too. Apple PILOT, Apple Logo, *and the* Shell Games *make it easy for teachers to produce lessons using color graphics and sound capabilities. Any subject is more fun on an Apple computer. Try spelling and problem solving with* Elementary, My Dear Apple, Magic Spells, *and* Math Strategy/Spelling Strategy. *Teach geography with* Supermap, *music with* Apple Music Theory, *or computer science with* Apple How To! *and* Hand Holding BASIC. *And prepare students for the computer age by teaching them word processing and business analysis on a personal computer system.*

Apple also makes it easy to introduce computers in the classroom, with teachers' manuals, classroom copies of the Applesoft BASIC Tutorial Manual, users guides, and a software directory listing all the educational programs that run on an Apple system.

SCIENCE AND INDUSTRY

Increase your efficiency in the lab or on the job with tools that improve accuracy and increase productivity. Apple systems support a complete line of interfaces, including IEEE-488 cards, A/D and D/A converters, and a.c. controllers. With an Apple system, you get more accessory slots for expansion options than with any other computer its size.

Use an Apple computer cost-effectively with Apple programs such as Circuit Analysis *and* Stepwise Multiple Regression. Topographic Mapping *displays land surface features with three-dimensional realism. Another program,* Designer's Toolkit, *lets you computerize the drafting table at a fraction of the cost of expensive computer graphics systems.*

HOME/HOBBY

Whether you want to trim your household budget with Personal Finance Manager, *trim your reading time with* Speed Reader, *or trim your figure with* Diet Analysis, *Apple has the program for you. Explore the world of computer music with* Musicomp, *or try your hand at computer art with* Artist Designer *and* Pascal Animation Tools.

We've also got the games you want to play. Save the world from alien foes with Apple Stellar Invaders . . . *command an interstellar fleet with* Galactic Wars . . . *explore twisting caverns for treasure with* Apple Adventure . . . *or face a heart-pounding race against time and aliens to repair* The Wreck of the B.M.S. Pandora. *If you like cards, try learning the tricks of better bridge with* Bridge Tutor, *and the best betting strategies with* "The World's Greatest Blackjack Program."

™CIS COBOL is a trademark of Micro Focus, Inc.
™Micro-Courier is a trademark of Microcom, Inc.
™Datatree is a trademark of Arizona Computer Systems, Inc.

The Apple III personal computer system gives you professional results quickly, whether you're editing text, developing software, or plotting financial data.

The Apple III comes with 128K or 256K bytes of built-in user memory. The system includes a built-in Disk III drive, which stores 140K bytes of information (about 40 typed, single-spaced pages). You can add up to three more Disk III drives without using any of the built-in slots. Or you can keep a whopping five million bytes (35 diskettes full) of information handy with the ProFile Personal Mass Storage System, Apple's 5¼" hard disk. (And you can simultaneously put up to four ProFile drives on your Apple III!).

Apple III features include: an 80 character-per-line, upper/lower case display; a calculator-style numeric keypad; a sculptured keyboard for maximum typing speed and accuracy; Apple's Sophisticated Operating System (SOS), which automatically controls system hardware; built-in RS-232C and Silentype printer interfaces; and four accessory slots that make system expansion easy and economical. The Apple III Universal Parallel Interface Card lets you attach a variety of parallel-mode printers and other devices to the Apple III. In addition, there's a built-in four-channel, eight-bit A/D converter, and a one-channel, six-bit D/A converter; along with a loudspeaker for audible warnings and user prompting.

An "emulation mode" on the Apple III allows you to run most Apple II programs, and the SoftCard III lets you take advantage of the CP/M™ library of programs. In addition, the Apple III supports a complete line of software that takes maximum advantage of its advanced capabilities. Choose from packages that include:

VISICALC III

A revolutionary software tool for managers, financial planners, analysts, and others, VisiCalc III lets you quickly organize and manipulate numeric models such as forecasts, budgets, and investment strategies. It's actually an "electronic worksheet" that allows you to format rows and columns of information, assume unknowns (like next year's sales figures), and then perform "What if? . . ." analyses to see instantly the results of changing your assumptions. VisiCalc III gives you the largest work space of any spreadsheet program—more than 190K in a 256K Apple III.

APPLE WRITER III

Create, edit, format, and print a wide range of written material quickly and accurately. Apple Writer III gives you the sophisticated features professionals look for in a word processing system, as well as an easy-to-use Word Processing Language for automating your own word processing tasks. Use Apple Writer III with Mail List Manager to personalize form letters for mass mailings.

MAIL LIST MANAGER

Now even small businesses can afford a professional computer mail list system. Mail List Manager lets you create and maintain a label file containing up to 960 mailing records—and sort it in less than 75 seconds. You can print complete or partial lists, and use any size or type of label.

APPLE III BUSINESS GRAPHICS

Make your point graphically with Apple III Business Graphics. The program allows you to create scaled and numbered line, bar, and pie charts, plots, curves, graphs, and much more. And you can print your results to either a printer or a plotter.

ACCESS III

Turn your Apple III into a remote terminal that connects to any mainframe systems supporting intelligent terminals. A special "capture buffer" lets you collect data generated by the mainframe system and save it for later retrieval, so you economize on connection time and costs. VT-52 and VT-100 emulation modes let you use your Apple with a wide range of time-sharing software.

APPLE BUSINESS BASIC

With the huge, 70K workspace available on a 128K Apple III and nearly 200K on a 256K Apple III, you can really take advantage of Apple Business BASIC's powerful features to produce customized solutions to your programming needs. Business BASIC's special 64-bit, 18-digit data type lets you handle the toughest accounting chores with accuracy.

APPLE III PASCAL

Apple's sophisticated version of UCSD Pascal takes the effort out of creating large business, scientific, and educational applications. In addition to being fully compatible with Pascal on the Apple II, Apple III Pascal implements several improvements that take advantage of the Apple III's greater performance and memory features. With the release of Apple III Pascal, Apple becomes the first personal computer company to provide IEEE Floating Point Standard arithmetic.

SCRIPT III

Format your Pascal text files with line spacings, margins, page breaks, underlined words, justified text, and other features. Script III makes your Pascal programs and documents more inviting and easier to read.

APPLE III PASCAL UTILITY LIBRARY

Save time writing and compiling code by utilizing this library of common functions and procedures in your programs.

™UCSD Pascal is a registered trademark of the Regents of the University of California.
™CP/M is a trademark of Digital Research, Inc.

(1) Apple /// with ProFile drive and Monitor /// (2) Letter-quality printer

PHOTOGRAPHY: DAVID CAMPBELL

(3) Software packages (4) SoftCard /// (5) Disk /// drive and disks (6) Modem (7) Language and peripheral packages.

IF YOU WANT TO FIND OUT MORE . . .

. . . about Apple or its products, visit your local dealer for a demonstration of the Apple II and Apple III computer systems.

Your dealer can also show you many products described in this magazine, including:

page 2 GUESS WHO'S COMING TO APPLE . . . The popular *VisiCalc* program used by several of these companies for financial modeling is available for both the Apple *III* and the Apple II computers. Apple distributes *VisiCalc III*, which furnishes Apple *III* owners with the largest electronic spreadsheet available on any personal computer. VisiCorp (formerly Personal Software, 2895 Zanker, San Jose, CA 95134) produces *VisiCalc* for the Apple II.

For information on the Predex Telescreen Service, contact Predex at 1345 Avenue of the Americas, New York, NY 10019.

page 6 THE A'S HAVE IT. And so do the White Sox. We're told other teams are interested as well. Pacific Select's *Edge 1.000* software has been designed for a rather select market of 26 professional baseball franchises. You probably don't qualify. You can still, however, merge diamonds with disk drives by playing *Computer Baseball* from Sirius Software (10364 Rockingham Dr., Sacramento, CA 95827), which lets you manage any of 26 World Series teams (or any other team of your choosing).

page 9 REHEARSING REALITY. The flight-training programs described in the story are produced by Jeppesen Sanderson, 55 Inverness Drive E., Englewood, CO 80112. They're using an interactive video hookup manufactured by BCD Associates, Inc., 1216 N. Blackwelder Ave., Oklahoma City, OK 73106. You can simulate flight on an Apple system with the subLogic *Flight Simulator,* available from subLogic at 713 Edgebrook, Champaign, IL 61820.

page 10 A CAMERA ON THE COMPUTER. Video digitizing combines the computational power of an Apple computer with its superior graphics capabilities. Our story focuses on two manufacturers who produce digitizing systems for the Apple II: Computer Station (11610 Page Service Dr., St. Louis, MO 63141), and the MicroWorks (Del Mar, CA 92014). The Petri dish colony counter software (as well as the XPL0 language system it's written in) is produced by Computer Sight, 2490 Channing Way #503, Berkeley, CA 94704.

page 13 MICRO IN MEDICINE. Dr. John Tilelli would like to communicate with other medical professionals who are using Apple computers. You can reach him at St. Paul Children's Hospital, 345 N. Smith Ave., St. Paul, MN 55102.

page 14 PROFILE: JOHN WRIGHT. John Wright keeps one of Domaine Chandon's Apple systems at his desk, where he can get to it quickly and easily for information. In addition to the *VisiCalc* series (available from VisiCorp.; see above) he also uses the *DB Master* database program from Stoneware, Inc., 50 Belvedere St., San Rafael, CA 94901.

page 18 ASTRO-APPLE. Even we were surprised. When we sent this story out to the quotees to be checked for accuracy, several of them asked us for more information about the *Topographic Mapping* program written by Dr. John Westfall. *Topographic Mapping* allows the Apple computer to display seven different types of topographic maps, all from a single set of data. One quotee was thinking of using the program in a public display; another said it could be useful to his research. *Topographic Mapping* is produced by Apple, and is available as a Special Delivery Software package.

The people at subLogic (see address, above) also produce Dr. Wes Huntress's *Saturn Navigator* program. It requires their *A2-3D1 Graphics Package.*

Several astronomy programs have become available during the past year, including *Tellstar*, a program produced by Information Unlimited Software (281 Arlington Ave., Berkeley, CA 94707). Two levels of *Tellstar* are available: one that shows the visible stars in the northern hemisphere; the other that can be used to examine the night sky anywhere in the world. Another Apple-based astronomy program, the *Stargazer's Guide* from Synergistic Software, (5221 120th Ave. S.E., Bellevue, WA 98006) teaches about constellations and astronomical phenomena.

page 22 APPLE GRAPHICS IN BUSINESS. The *Apple Business Graphics* program is available in both Apple II and Apple *III* versions. Both are distributed by Apple and are available from most Apple dealerships.

The *Screen Director* program that allows you to use *Business Graphics* with your computer like a slide projector is produced by Business & Professional Software, Inc., 143 Binney Street, Cambridge, MA 02142.

Apple also produces *Apple Plot*, another graphics development program; and numerous other companies manufacture graphics programs for Apple's systems.

The on-site slide development package mentioned in the box was developed by Toucan Visual Production Systems, 1033 Battery Street, San Francisco, CA 94111.

page 27 APPLE-AIDED DESIGN. Most of the specialized design systems featured in this section are commercially available. The Cybix Cabinet Design System is manufactured by Cybix Intelligent Systems, Inc., 20211-B Prairie Street, Chatsworth, CA 91311. The Cascade Graphics Development System (featured in "The New Drafting" and now being used by Rutan Aircraft) is available from Cascade at 1700 East Winston Road, Anaheim, CA 92808.

Two circuit design systems were featured in the story—Andy Thompson's from Spectrum Software (142 Carlow, Sunnyvale, CA 94087), and A. F. Petrie's *Circuit Analysis* which is available from Apple. Other manufacturers, including the Hayden Book Company (50 Essex Street, Rochelle Park, NJ 07662), also produce circuit design programs that can be used on Apple's computers.

Designer's Toolkit (featured on the introductory page of the section) is produced by Apple, and is available at most Apple dealerships.

page 34 APPLES ON: The *Micro-Courier* electronic mail program is manufactured by Microcom, Inc., 89 State Street, Boston, MA 02109. It will soon be available in both Apple II and Apple *III* versions.

For more information on the solar design houses, contact Arien Solar Design and Construction at Box 6655, Tahoe City, CA 95730.

apple computer

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