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The Personal Computer Magazine and Catalog.
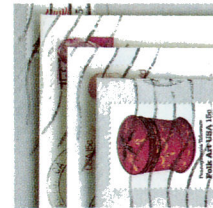
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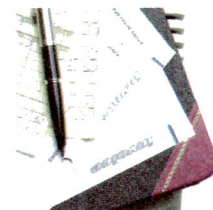
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EDITORIAL

Getting Down To Business

Good new products tend to create new markets, and there is no better example of this in recent years than the personal computer. At first it was thought of only as a do-it-yourself "craze" made possible by low-cost microprocessor chips and other components which could be turned into a computer by knowledgeable hobbyists. The success of computer assembly kits created a market for fully assembled personal computers for less knowledgeable hobbyists. That's where Apple II came in.

Educators quickly recognized that these low-cost, easy-to-use systems could at last make computer-aided learning a reality, thus creating a new market.

Now comes the business market. As recently as a year ago it was still being overlooked as a large market by many in the industry. Business users didn't agree, however, and began buying personal computers and finding their own ways to put them to work, learning to do their own programming if no existing programs would do the job.

This new market, created by the product itself with the help of business users who needed it, is an exciting and dynamic market because new applications are evolving daily. We have tried to reflect that excitement in this second issue of APPLE while also using it to tell the reader about some of our new tools for professional users, such as the Apple II Plus.

We have no doubt that these new products will quietly create new markets of their own, and we hope to hear about them from our readers.

—Walter Mathews

JEF RASKIN'S BRIEF DICTIONARY OF COMPUTERESE

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PERSONAL COMPUTERS IN BUSINESS: AN EMERGING COMPETITIVE EDGE

BY BILL LANGENES

Being competitive in business means getting important data quickly, when you need it. And this is what the personal computer does best of all.

Take, for example, a traveling insurance salesman who takes his personal computer in the car with him to keep customer and inventory information at his fingertips.

Or the senior partner in a Los Angeles law firm who calls his personal computer "my equalizer." His three-man operation uses the data and word processing capabilities of the computer to compete successfully in court with firms many times its size.

The chairman of the board of one of America's major industrial corporations has three personal computers that help him keep abreast of his company's diverse operations, while a financial analyst for a leading Wall Street investment firm uses his personal computer to keep his clients' portfolios.

These businessmen are the vanguard of a growing revolution being created by personal computers, which are bringing the power and efficiency of rapid data processing to small businesses and giving managers of larger firms "hands-on" access to business data when they need it.

Frankly, it is a revolution that is taking place faster than many of us in the personal computer industry really expected. Nearly three-quarters of a million business people are currently using small computers. They came into computer stores and made their purchases, all of which were originally identified in the "hobby" category. But, in truth, a large percentage of those hobbyists were business people learning to "do it themselves" so they could adapt the personal computer to their business needs.

As they did, they gained an advantage over their competitors who were still spending many man-hours on bookkeeping, record-keeping and report-making functions for which computers are so ideally suited.

Bill Langenes' professional involvement with personal computers began when he became Director of Marketing Communications for Byte, Inc. and then Associate Editor of *Computer Retailing*, the first retail trade magazine for the personal computer industry. He currently is with GRT Corporation as Director, Marketing Communications for the Consumer Computer Group, which is producing consumer-oriented application programs and system software for microcomputers.

Sharpening the Edge

Small computers are making new contributions to competitiveness by both increasing internal efficiency and improving customer service. A New Jersey industrial equipment distributor, Don Truesdell, discovered both benefits after installing his computer.

"For the first time in three or four years we were able to get each day's work done within a normal working day," he said. "Our computer has turned out to be an important sales tool as well. We can use the computer-generated product sales analysis reports to give our customers a comprehensive report on all the products they have purchased from us, which shows them we pay close attention to their requirements.

"The system also helps in our dealings with suppliers," Truesdell continued. "It gives us a good image, and they respect our operation. In fact, two of our leading suppliers have told us we are their most highly automated distributor."

Immediate results can often be seen from the use of a computer. An automotive parts warehouse installed a business system to handle inventory. In six months the inventory was reduced by $30,000 with no loss in effectiveness. Says the owner: "The computer more than paid for itself."

A South Carolina manufacturer's representative, Larry Kidd of CV Sales, Inc., found that his personal computer gave him more control of his managerial responsibilities, both financial and personnel.

"I feel that I know much more about the week-to-week progress of my business," Kidd says. He also wrote his own software programs—common among personal computer users—to produce semi-monthly sales summaries for his salesmen. "Now they know exactly what their customers are ordering . . . and so do I." Impressed with the possibilities of his computer, he says "I haven't yet begun to do what I can."

Personal Computer Characteristics

Business people have really just begun to discover the wide variety of uses for personal computers. And that is what makes these small computers so unique, especially in contrast with their larger cousins, the mainframes and minicomputers.

Unlike the larger business computers, which require a specially designed room environment and a data processing staff, a personal computer is designed to be used at an individual level. It is relatively inexpensive, can be as portable as a typewriter, fits on a desk or table with no special electrical or environmental control requirements, and doesn't need a data processing professional to operate it.

But, most important, a personal computer is easy to use. Nearly any person can purchase, install and operate his own. The only demand a small computer places on its owner is that he become involved, which isn't a problem judging from the thousands of business users.

The owner of a marine construction company had no computer or programming background when he bought a microcomputer. His first program handles cash disbursements, doing a week of clerical work in a day. His next program will standardize the bidding procedure to take out the guesswork.

An editor and freelance writer who exchanged his typewriter for a personal computer says: "At the risk of sounding overly enthusiastic, I honestly feel the use of a good word processing computer system will open up a whole new dimension for any writer."

A California psychologist, using his computer to administer and score personality tests, says: "No other group has as great a potential for microcomputer application as the private practitioners, most of all clinical psychologists."

Retailers are highly recommending personal computers too. Beverly Stereo and Electronics, a Los Angeles stereo store, has tightened up its operation with programs for payroll, general ledger, sales entry and inventory. To boost sales, it uses the word processing and mailing list capabilities for producing direct mail advertising. "At the price these things sell for," owner Harry Margulies says, "any retail store with more than three or four employees could use a computer. Maybe 40 percent of them could really profit from one."

Small Computers in Big Business

For the small businessman, personal computers mean that he can economically have access to the same kind of operating and accounting information previously available only to his larger competitors. Within large companies the small computer has opened up new capabilities for department heads and for managers at their individual locations.

It is within big business that computers are truly earning their "personal" dis-

> **"In six months the inventory was reduced by $30,000 with no loss in effectiveness . . . The computer more than paid for itself."**

tinction. There are no programmers and no operators to go through to obtain computer-stored information. Managers themselves can get the information they need when they need it.

Deere & Company is finding that line managers want their own computers. At Ford Motor Company the treasurer's office uses three small computers. The marketing manager of a multi-million dollar California corporation keeps a personal computer beside his desk to help him analyze market data and develop plans.

Sometimes it is competitive pressure that motivates business people to computerize, as was the case of a printer. When he found that a competitor was using a programmable calculator to estimate printing bids, he went out to buy his own calculator. But he discovered wisely, that he could buy a microcomputer for not much more money and have an enormously more versatile machine capable of producing bids as well as handling general accounting.

Dollars and Sense

Obviously it doesn't take an accountant to figure out the benefits of a small computer in terms of dollars, but accountants have been some of the first effective users to enjoy the benefits.

One accountant who prepares about 1,500 tax returns annually switched from a computer service bureau costing $18,000

annually to his own microcomputer for a total one-time cost of about $11,000. It paid for itself in one tax season and is helping him prepare general ledgers for his clients all year long.

A recent analysis of the economics of small business computer implementation projected that an investment in a personal computer could, in some cases, cut manpower requirements in half and increase gross profits from 2 to 10 percent. Another way of looking at return-on-investment is to say that a personal computer would pay for itself if all it did was save 20 percent of the time of one employee for a year, which is a modest expectation indeed.

Before you go running, checkbook in hand, to your computer store, make sure you realize that no $600 computer is going to do all these things for you. In fact, some $6,000 systems might not do all of them efficiently. You should become a knowledgeable buyer and make certain you understand the system you look at. Its computing power shouldn't be too limited for your needs, and either software should exist for your purposes or you should find out how to get the assistance you need in programming the system.

The Business User's Needs

What are the special needs of the business user?

Software is certainly at the top of the list, and both manufacturers and independent software houses have reacted quickly with many new "canned" application packages.

There are also hardware considerations, some of which are discussed in this issue of APPLE.

Hardware expandability is a must. The business system should accept peripheral equipment, such as printers and disks, which are essential. The same system in other applications may require speech recognition capabilities, greater memory capacity, interfacing with a computer network, and so on.

Business system shoppers should also carefully check out the computer retailer to be certain the dealer can provide the training and after-sale service that are necessary for full utilization of the system.

Can you benefit from the use of a personal computer system? Only you can determine that for sure. Certainly current users provide a broad sample. The availability of low-cost computer power has led International Data Corporation, a leading computer industry market research firm, to predict that virtually any organization having $500,000 in annual sales will require a computer or computer services during the next few years if it is to improve its efficiency and remain competitive in the marketplace.

That's why the personal computer can truly be called "An emerging competitive edge."

NEED BETTER FINANCIAL PLANNING? YOUR PERSONAL COMPUTER CAN HELP

BY ART GARCIA

All of us do personal financial planning most of our lives, whether we realize it or not. It may be no more extensive than trying to figure out how to squeeze $1500 in monthly expenditures out of $1200 spendable income, but it is still financial planning.

The problem is that too few people devote the time to financial planning that it deserves. That's why the personal computer offers hope for those who don't plan ahead well enough. It also offers a way for those who already plan ahead to do it even better.

No matter why you bought—or are considering buying—a personal computer, don't overlook the role it can play in financial planning both for your company and for you as an individual.
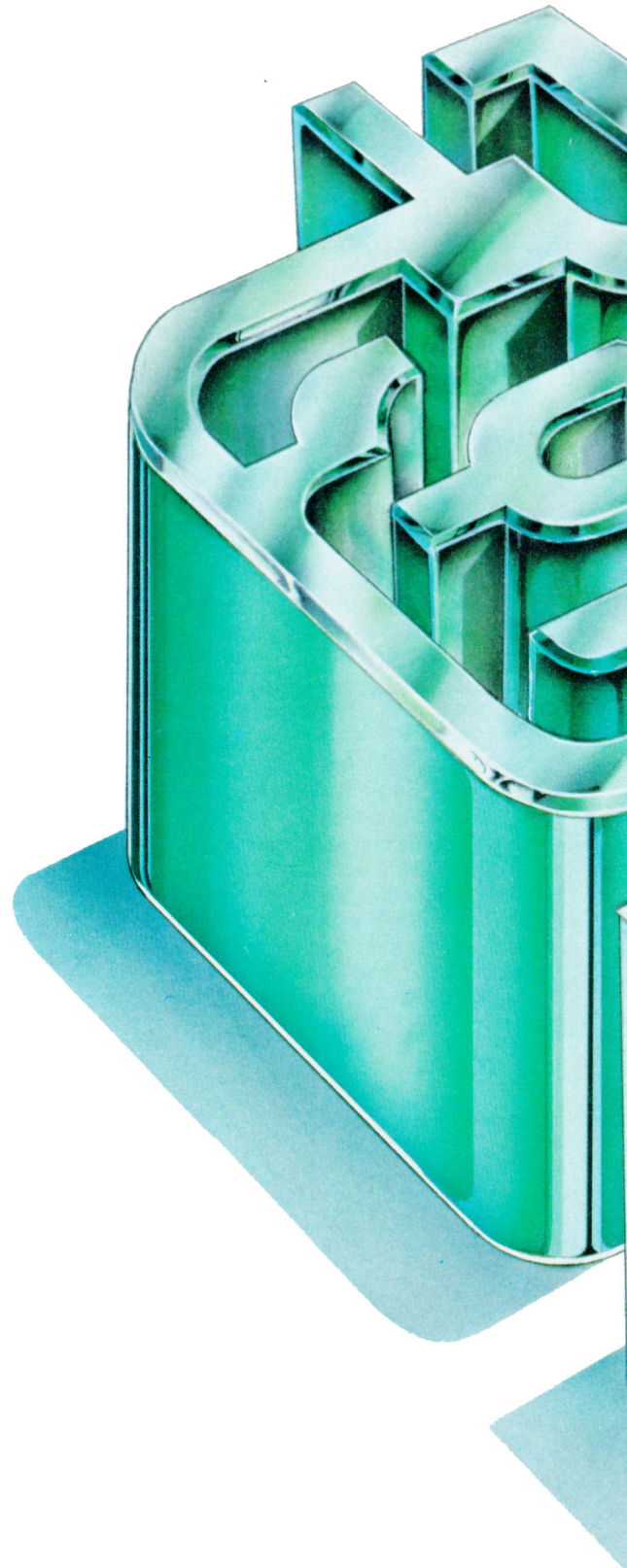
Because inflation is pushing most of us into higher tax brackets, experts agree that laying out a financial blueprint during our productive years will help provide financial protection in our retirement years. With the dollar purchasing only a fraction of what it bought 10 years ago, they say it pays to map out a program that takes into account what the dollar will buy 10, 20 or 30 years from now.

Once thought of as something for only the wealthy, long-term financial planning is important for persons at all income levels and is especially crucial for those earning $20,000 and up yearly.
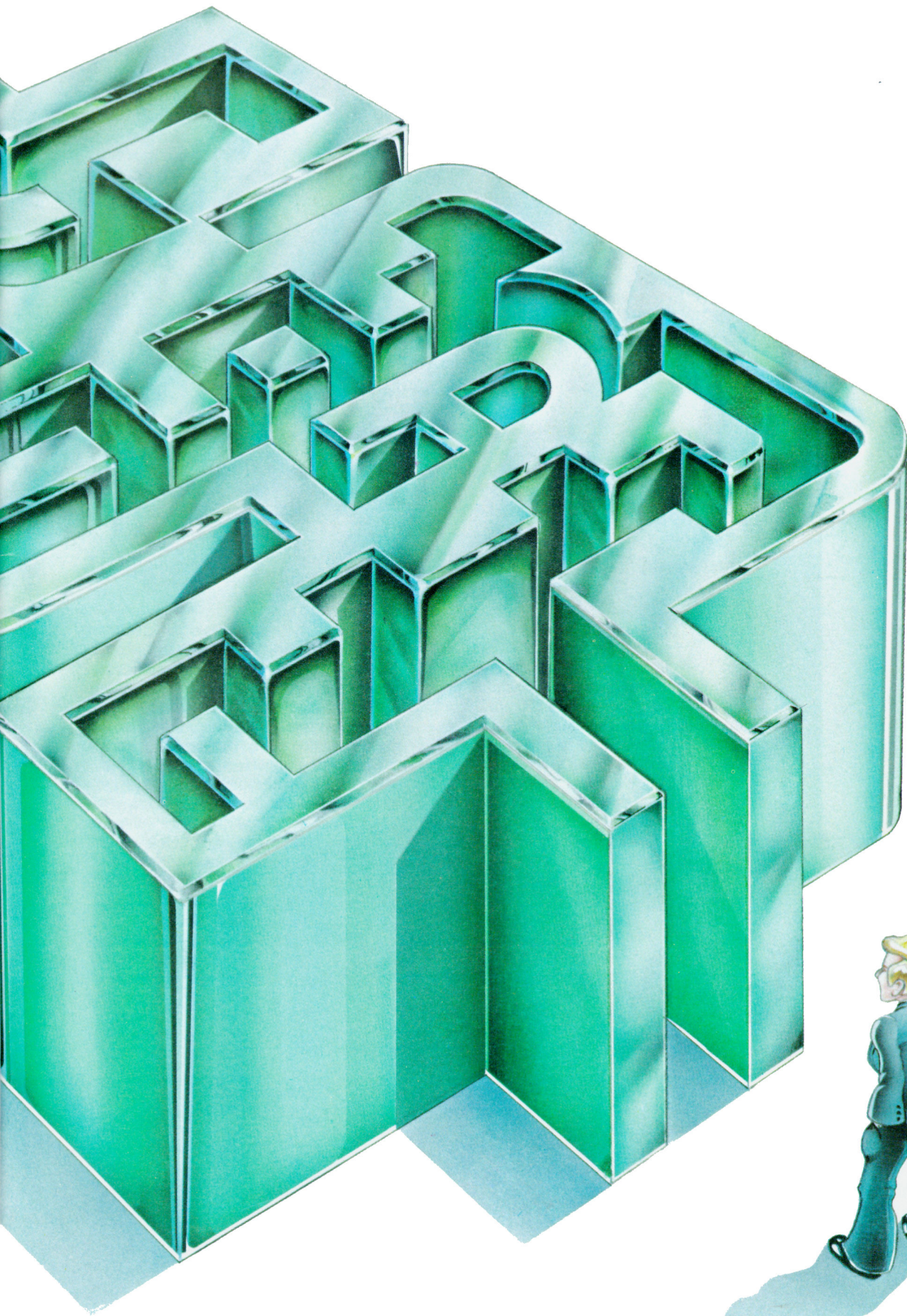
"I've seen many executives earning $50,000 to $200,000 a year who spend every dime they make," reports Dr. Frank Scott, Chairman of Oakland Financial Group in Aptos, California, and a widely known financial planner who relies on computer analysis for his clients.

Art Garcia, former editor of California Business, *now contributes regularly to many magazines on business topics.*

"They figure that as their careers rise, so will their salaries, and they count on their company benefits to protect them and their families in case of disability or death," Scott says. "They're convinced they'll always continue earning more money, so they'll invest tomorrow, not today." It's a familiar trap, especially when most of us would prefer leisure or family activities to fretting over investment plans, trust funds, and tax forms.

A good financial plan helps an individual identify his resources, goals, and risk attitudes, weaving them into an overall scheme that allocates and manages cash to meet future needs. Can this be a task for a personal computer?

"The personal computer is an ideal tool for personal financial planning," says Phil Roybal, Apple's Manager of Product Marketing. "It can act like a financial planning consultant, asking you questions about your financial needs and responding with a recommendation or plan. What kind of life insurance do you need and how much? Should your estate plan include a trust fund? What investments will insure college educations for your children? How can you reduce your tax payments? How much money should you keep tied up in checking accounts? With the right software programs, a personal

computer can easily help resolve these issues," Roybal says.

RE International Systems in Los Angeles has developed a planning system called KISS (Kompact Insurance Sales Systems), which is based on the Apple II Computer. "We sell the system primarily to financial planners," says Mark Malovany, Vice President. "Working with their clients, they can quickly and easily determine insurance and retirement plan needs. The Apple II has been invaluable in helping these clients become more financially sound."

Personal computers can also be used to obtain investment information directly from another computer, as with Apple's Dow Jones Series (see inset). From your home you need only dial a local telephone number and plug the phone headset into an Apple peripheral. Your Apple then talks directly to the other computer, obtaining stock prices and other information. MJK Associates in Santa Clara, California, maintains commodities prices in a large computer data base, allowing Apple owners to "tap into" it for up-to-the-minute prices. "By using his computer the serious investor doesn't have to bug his broker every day for commodities data," says Michael Marriott, President of MJK. "The

Apple allows him to keep track of where he is in gains and losses on a day-to-day basis."

Many personal computer owners have found that they no longer need to rely on financial planners for consulting advice. "The personal computer not only permits the home user to keep a closer watch on spending and investments," says William R. Clabby, General Manager of Dow Jones News Services, "but also reduces the cost and uncertainties of relying on third parties or advisers." The user, in other words, becomes more of a master of his own fate.

In addition to home users, several professional investment analysts have caught the personal computing bug. A good example is Ben Rosen, Vice President of Morgan Stanley, the prominent New York investment firm. "I use an Apple to make earnings forecasts for the companies that I follow," explains Rosen. "I take the balance sheets and income statements from a firm's annual report and put them directly into the computer. Then I use the computer to massage the data." According to Rosen, the benefits of using the personal computer for financial planning are many-fold. "It frees me from doing complicated calculations. Instead, the Apple does them, without errors. I can perform sensitivity analysis, varying items like the tax rate to see how my assumptions affect the financial estimates. I don't have to use pencil and paper anymore," adds Rosen.

In the past few years, there has been a surge of banks, accounting and brokerage firms, insurance companies and independents jumping aboard the financial bandwagon. Their fees for asset management and

financial analysis range from $6,000 and up for those with hefty net worth, down to $200 or less for basic programs.

Do you need those services? That depends upon your own individual situation. But chances are with a personal computer you can work up an effective do-it-yourself financial planning program.

For prudent individuals there's no better time than now to heed Abraham Lincoln's sage advice: "The future belongs to those who prepare for it."

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<<< APPLE II PORTFOLIO DISPLAY >>>
              SAMPLE

CURRENT VALUES DISPLAY.........TYPE C
GAINS AND LOSSES...............TYPE G
QUOTES ON A STOCK..............TYPE Q
PRINTER ON/OFF.................TYPE P


==> PRINTER ON/OFF


TYPE OPTION, PRESS THE RETURN KEY.
(TO BACK UP, PRESS THE ESC KEY)
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DOW JONES AND APPLE

Working in conjunction with Dow Jones News Services, Apple Computer software specialists have developed a group of computer programs called the Dow Jones Series. The programs in this series make it possible for Apple to receive Dow Jones News stories and stock price quotations from computers in New Jersey via a *local* phone call. One of the programs—the Portfolio Evaluator—allows an Apple owner to analyze stock portfolios for gains and losses once stock prices have been "fetched" from Dow Jones. (The video display shown at left shows the Portfolio Evaluator in progress.)

To get an idea of how the Portfolio Evaluator works, imagine yourself being an investor living in California. The New York Stock Exchange opens while you are still asleep. With the proper peripherals, the Apple II can automatically telephone Dow Jones while you sleep and fetch the morning's new stock prices right from New York. These prices update your portfolio on the Apple floppy disk, and the Apple II automatically hangs up the telephone. Then, while you are eating breakfast, the Portfolio Evaluator summarizes your gains and losses and puts them on the screen for you to see.

APPLE MEANS BUSINESS

STAFF WRITTEN

In the short time since personal computers have come on the scene, manufacturers have been working at breakneck speed to keep pace with the new markets and applications that are constantly emerging. Micro-computer kits for hobbyists, who had to assemble and program the computers, grew into fully assembled personal computers on which ordinary folks with no programming background could have fun playing games and balancing checkbooks.

Soon, however, a trickle of business people and professionals recognized the potential for using their personal computers to solve work-related problems. Today that trickle has turned into a roaring river, establishing the personal computer in its new role as a business system.

A large percentage of Apple II computers are now sold for use in businesses, according to Trip Hawkins, Apple's Manager of Business Marketing. ''The Apple wasn't originally intended to be a business computer, and in our marketing efforts we certainly haven't

advertised it as such," Hawkins says. "But our customers have figured out for themselves that the Apple II is so reliable and powerful for the price that they can use it to help solve serious business problems."

Having observed this trend in the marketplace, Apple Computer has given top priority in recent months to developing better products and services for business customers. The results of this new emphasis are now beginning to reach the market.

"The total package of products and service that we offer to business customers is much stronger now," explains Hawkins. "For example, with our new model, the Apple II Plus, you have the ideal foundation for a professional user to get started with. It has an extended BASIC language built in, thus making more sophisticated arithmetic calculations possible. It also has a special 'chip' that makes the Apple operate as a 'turnkey' system. That simply means application programs such as General Ledger start automatically when the computer is first turned on."

In addition, the Apple II Plus provides

"It's amazing how quickly relative novices become solid programmers and learn to apply the Apple to their unique problems."

the primary building block around which the serious user can construct a larger system as his needs change. As with the original Apple II, the ability to expand is an important plus for the business user who doesn't want to outgrow his equipment. "Many other microcomputer companies have been unable to design their products with expansion in mind," Hawkins claims. "As a result, although you may pay less initially than you would for an Apple, you will find that your future needs require special expansion boxes, extra power supplies and cables, and so on. Apple has eliminated this problem."

Another important consideration for expansion is a computer's capacity for being able to operate in different languages. Say, for example, a businessman wants to run a program that's written in the powerful new language PASCAL (see inset). Most microcomputers can handle only one language, which limits their usefulness. Apple, however, has developed a special "Language Card" which, when plugged into any Apple II, allows a PASCAL program to run. This card also

allows use of Apple's two other languages, Integer BASIC and APPLESOFT II BASIC, a language that any businessman or professional can use for writing his own programs.

"It's amazing how quickly relative novices become solid programmers and learn to apply the Apple to their unique problems," says Hawkins. "But, still, it is our ultimate goal to eliminate the need for a customer to do his own programming."

Toward this end, Apple now offers the Apple II Plus Business System, a "turnkey" configuration consisting of both hardware and business applications software, selling for a retail price of $4,995. Included in the system is an Apple II Plus with 48K bytes of RAM memory, two disk drives, a video monitor, impact printer, and business software.

"Because the computer is so small, the customer can just carry it in to the local service center. It will then either be repaired on the spot or exchanged for a working unit through our Module Exchange Program."

The software system consists of General Ledger, Accounts Receivable, and Accounts Payable packages. Other packages are available as options.

"We've taken a long time to get this product to the market, because we wanted to do it right," Hawkins points out. "Many computers have been touted as 'small business systems' without being up to the task. This has made the business market very skeptical about microcomputers. We at Apple believe that this system is the first legitimate small business computer available for less than $5,000."

Who can use the Apple II Plus Business System? "There are two primary types of customers," Hawkins claims. "A small business, probably one with less than $2 million in annual sales, can use the Apple to automate many of its accounting procedures. The system allows a small businessman to better control his cash flow, reduce paperwork, produce reports and summaries automatically, and even print checks and invoices." The second type of customer, Hawkins points out, could be in any kind of organization including major corporations. "These

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New Benefits for the Professional User*

Recent additions to the Apple II product line have been designed with two goals in mind: make the computer "friendlier" and easier to use, and enhance its ability to solve problems for the serious professional user. In addition to the Apple II Plus, the new products outlined below all contribute to making the Apple II the most sophisticated microcomputer that a professional can own and use today.

TURNKEY OPERATION: A plug-in Auto-Start ROM part makes the Apple easier to operate. That simply means that when the Apple is first turned on programs will run automatically without requiring any special commands.

TOTAL COMPATIBILITY: With the plug-in Language Card any Apple can be expanded to contain up to 64,000 bytes of RAM memory. This expansion allows the use of any of Apple's three programming languages (Integer BASIC, APPLESOFT BASIC, and PASCAL), thereby making it possible to use any program or application designed for the Apple II.

TIME AND DATE CAPABILITY: The plug-in Apple Clock and Calendar Card allows the Apple II to keep track of the time of day, thus making it possible to pre-program or time activities.

CHOICE OF APPLICATIONS: Business programs, including The Controller, Apple Post, Point of Sale, and Portfolio Evaluator, provide the business user with better tools for managing money and information. Also offered is the new Disk Utility Pack, including an improved disk operating system and an extensive, easy-to-use manual.

*For a more thorough explanation of these and other Apple products, see the product catalog starting on page 24.

customers look at the Apple II as a business tool for solving specialized problems. The Apple won't run the entire business, but it can tackle some pretty large problem areas, such as forecasting and record keeping."

Hawkins notes that hardware and software alone will not satisfy the business customer. "He also expects top quality service. For example, if the computer breaks down when he is printing invoices or checks, waiting even a few days to fix the problem can put him out of business." In order to remedy this situation, Apple has developed an Authorized Service Center program. Selected dealers have been trained and certified to operate the service operations, 50 of which will be in place throughout the country by mid-summer.

"Each center is stocked with a complete replacement inventory," explains Hawkins. "Because the computer is so small, the customer can just carry it in to the local service center. It will then either be repaired on the spot or exchanged for a working unit through our Module Exchange Program." By year end, Apple expects to have more than 100 of these walk-in service centers nationwide.

A growing number of businesses, both large and small, are discovering that personal computers are valuable tools for improving productivity, information flow, cash control, and overall management performance. "Although the Apple II Plus won't do everything a large business computer system will do, the relative price is so low for the problems it can solve that it has created an entirely new category of cost-effective business equipment," says Hawkins. "For this reason, we prefer to think of the Apple II Plus as a new small system for business."

WHY PASCAL?

JEF RASKIN EXPLAINS . . .

PASCAL is *the* up-and-coming computer language. Besides being available on many computers, both large and small, a version of PASCAL has been adopted by the Department of Defense as this country's standard language for new program development in the government.

PASCAL's popularity is not due to whim or fashion but rather is a consequence of its powerful structure and data types and its clear readability.

For the business user, having PASCAL on the Apple II means that programs will take less space to run, will run faster, and cost less to create and modify (compared to, say, a program to do the same task in BASIC). Whether the user writes the programs or has them written, these advantages will save both time and money.

Much modern equipment is designed in a modular fashion, so that a technician need only replace a defective module to repair a malfunctioning device. PASCAL allows the same technique to be applied to programs. This means that a PASCAL program is more reliable and more responsive to changing needs than is a comparable program in BASIC.

The PASCAL available on the Apple II is not a mini- or micro-PASCAL. It is a full-fledged language that is identical with the PASCAL found on many medium and large computers. PASCAL programs that are written on the Apple II will run unmodified on many other computers and vice versa. In addition, Apple's PASCAL has extensions that allow easy use of the Apple II's graphics, analog inputs, and sound generation capabilities.

With PASCAL, the Apple II is much more than just an excellent hobby or home computer. It is also a serious small system for the computer professional.

A SALUTE TO YANKEE INGENUITY

*America's inventive indepen-
dent businessmen are using
imagination to get more than
they bargained for from their
personal computers.*

BY TERRY BERKE

C all it enterprise, call it "Yankee
Ingenuity," or just chalk it up to
good old American greed.
Whatever you call it, the businessmen
who are buying personal computers all
over the country are astounding the
experts by finding inventive ways of
getting more out of the computer than
routine business tasks.

For example, there's National Presort
of Tulsa, Okla., which uses an Apple II
in a machine that can sort by zip code
12 envelopes per second—the fastest
such machine in the country. Core Labs
of La Place, La., uses an Apple II-based
system to monitor oil drilling operations.
They claim it cuts costs by 15 percent,
while improving rig safety.

This series of brief profiles focuses on
five individuals whose experience might
lead other users and potential users to
apply the same imagination when it
comes to harnessing the power of per-
sonal computers.

*Terry Berke, a former communications spe-
cialist for the American Electronics Association,
is a freelance writer specializing in high-
technology subjects.*

Dr. Nicholson's "Magic Dental Charts"

D r. J. H. Nicholson, a dentist in Dallas, Texas, recently bought a personal computer to help out with office management functions such as payroll, billing and supply records.

With those routine programs easily accomplished, the enterprising doctor turned to his Apple II to help him bring patients back to his office on schedule. Now he's going a step further and devising a program to help make those office visits a little less intimidating.

Dr. Nicholson previously used a manual patient reminder system, but early this year he decided to check out the effectiveness of the system and was astounded by the results. In 1978 alone, a flaw in the system dropped over 90 patients from the recall process. Until then, he had assumed these patients either ignored their six-month reminder notices or had taken their business to another dentist.

The Apple II was programmed to see that reminder notices were mailed on time, and a follow-up mailing to those 90 "lost" patients produced new appointments for over 80 percent of them.

The greatest challenge for the system lies ahead, however. Dr. Nicholson and a software specialist are now devising a high-resolution graphics system on the Apple II. They hope it will lessen the anxiety caused by the nation's most disagreeable chore—visiting the dentist.

When fully operable, the system will enable Little Johnny to see a depiction of the "ideal" mouth with molars, bicuspids, incisors and the like lined up in perfect curvature.

The Apple will then show Little Johnny his own mouth—less than perfect but still his—adding cavities, fillings, bridgework, extractions, etc., all color-coded to help the dentist explain what has been done, what needs to be done, and, hopefully, why it won't hurt a bit.

Admittedly, the graphics can't numb the pain. Dr. Nicholson believes, however, that they can help the patient to relax.

"The visual picture will be something they can relate to," he explained. "It should help put them at ease. At the very least, it is sure to get their attention.

"You mention the magic word 'computer,' put their chart on the screen, and they're going to watch, listen and, if they have any questions, ask them."

Dr. Nicholson and his "magic dental charts" may well become a hard act for other dentists to follow.
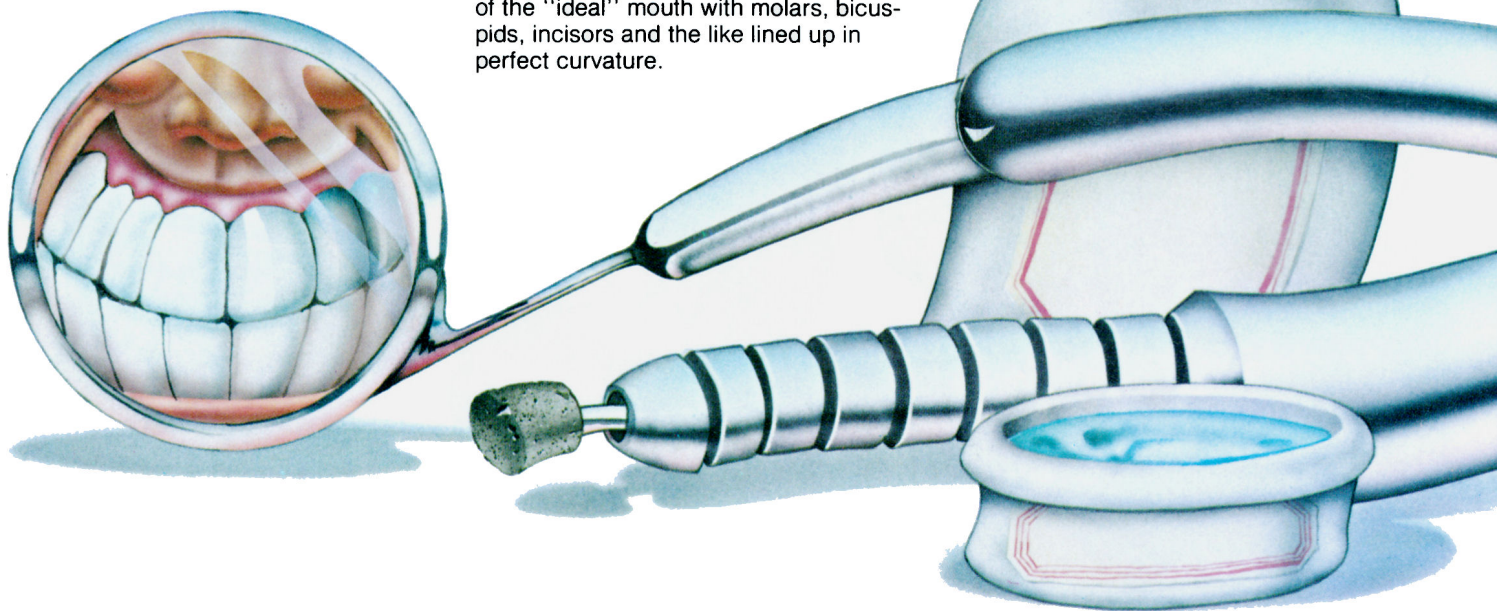
Jim and Kay Weir Reinvent the Wheel

A bilingual Apple II has taken a giant first step towards reinventing the wheel—or at least its first cousin, better known as the tire.

Retreading tires has traditionally been at best an imprecise procedure, relying on a trained eye to match a used tire to a proper size mold. That's changed, thanks to Jim and Kay Weir and their Matrix Selektor—a machine which utilizes an Apple II to make the perfect match.

The result is a better, safer tire, with a longer tread life.

"With the help of the Apple," Kay said, "we're making retreading the precision operation it has to be to succeed." The Matrix Selektor may also have applications for new tire manufacturers, but for now the Weirs are busy working with retreaders eager to try out their revolutionary device.

The Selektor is easy to use, and communicates in either English or Spanish.

An operator mounts the used tire on the machine, which then measures its size, and identifies which mold in the shop (if any) should be used for the retreading. The Apple II then monitors the buffing, and shows the operator when the tire has been buffed down to acceptable parameters.

Their machine was conceived in 1977 during an informal gathering at the National Tire Dealers and Retreaders Association, which eventually helped finance the research and development costs. Kay explained that other attempts had been made to perfect this mold matching and buffing process, but none succeeded until the computer was applied.

Jim and Kay have been in the tire business for over 30 years, but stopped working fulltime in 1960 to do only occasional consulting work. Their invention has now ended that retirement in a big way, as they strain to keep up with the demand for their new product. So far they have manufactured and installed four systems. Their company, Tire Devices in Culver City, Calif., "is inundated with calls and letters from around the world."

Developing the Matrix Selektor was the Weir's first introduction to computer technology. Though they received programming help from Bob Bishop of Apple Computer, they also spent endless hours matching wits with each other and the Apple II in a variety of computer games. It was, they felt, the only way to really get to know their new business partner.

Wilbur Andrews Traveling Insurance Data Base

When Wilbur Andrews first heard about personal computers, he knew instinctively that he could use one to help him better manage the large territory he covers for Pilot Life Insurance Company.

He was right, of course, but he took his computer far beyond the simple record keeping he originally envisioned. Out of his own enterprising programming, he used the computer to develop information he feels "has destroyed preconceived ideas in the field of advanced underwriting and pension planning which have been around for 50 years."

Because he backs that statement with data his clients find hard to resist, business for the Raleigh, N. C., underwriter has never been better.

Wherever Wilbur travels for Pilot Life, his Apple II is usually by his side. When discussing a complicated pension program with a prospective customer, he gets in minutes and displays on a small monitor the complex financial data that used to take weeks. Once a company has joined his client list, the Apple II is used at presentations to show the workforce exactly what their new pension plan offers.

Wilbur taught himself programming because of the diverse financial planning needs of his clients. "They range from farmers to broadcast executives" he said. "It takes a computer, and often individual programs, to provide the difficult answers and handle the immense volume of data we deal with."

Will other underwriter's follow this lead and begin using the Apple II as a sales tool? "They'll have to," he said, "because I believe anybody in my business who doesn't have access to a personal computer in five years will be out of business."
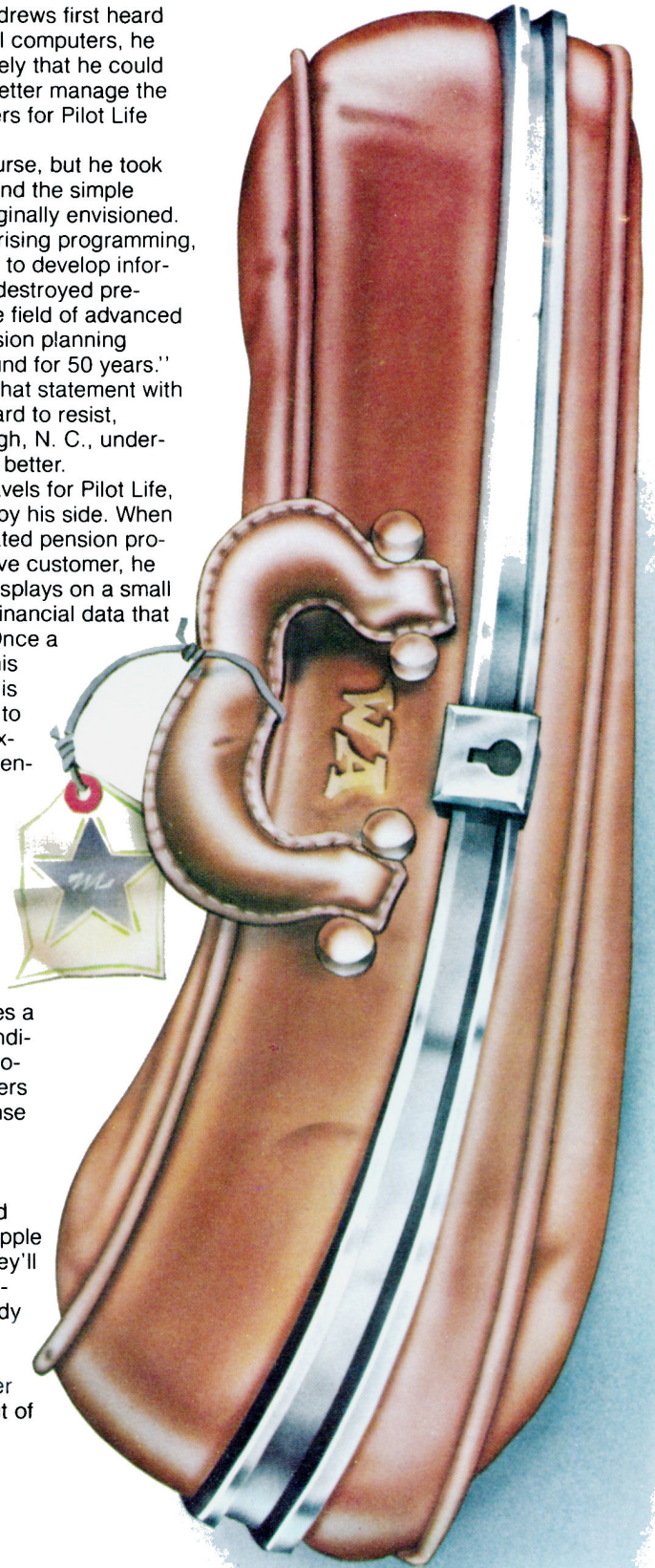
Jeff Leep's Leap from Engineering to Women's Clothes

Jeff Leep came out of Stanford University with a degree in engineering. Then he decided retailing sounded more interesting and, with partner Sandy Harper, became involved in the J. B. Harper women's clothing stores in Northern California.

It was natural, therefore, for Jeff's engineering bent to lead him to computers when the growth of the stores created enormous paperwork associated with order entry, inventory control and merchandise forecasting. He turned to Stanford, where he was able to use time on a large computer to reduce the paperwork

and forecasting problem while he waited for a personal computer to come along that he felt was equal to the task.

A year ago Jeff bought an Apple II, but could find no software suited to the unique requirements of retailing. He sat down and wrote his own order entry program, which now keeps track of all orders placed with his suppliers and then manipulates that information in a variety of ways at his command. The system will tell him, for example, total orders in a number of categories of merchandise, which orders have been received and which are still outstanding.

"Just before we go to market," Jeff said, "we have the system produce all this information on nice, simple forms that

fit neatly into a notebook, using our high-speed printer. All the information we need is right there, in order, and very accessible."

Jeff and Sandy also use the Apple II to determine which merchandise to order in any given month.

"I make sales projections, put this information into the computer, and then have the computer make adjustments as circumstances change. If I think we're going to sell more shoes this month, I hit the right button and out comes a report giving me revised order information based on what we expect to sell. These calculations, which the computer does in fifteen minutes, would represent an entire day's work by hand."

Since he bought the system, Jeff has used his own imagination to constantly expand its usefulness. Now he even does all of his inventory control by computer, pointing out that it does in minutes what would take many hours by hand to compare inventory to sales.

With the two stores now grossing about $500,000 per year, Jeff has heard from a retail merchandising service in Los Angeles that says it will do the inventory and projections for about $150 per month.

But Jeff prefers to do it himself now, since he can accomplish all those things easily and quickly in-house, with order entry thrown into the bargain.

"Compared to monthly charges like those," he suggested, "our personal computer seems like a much better investment."
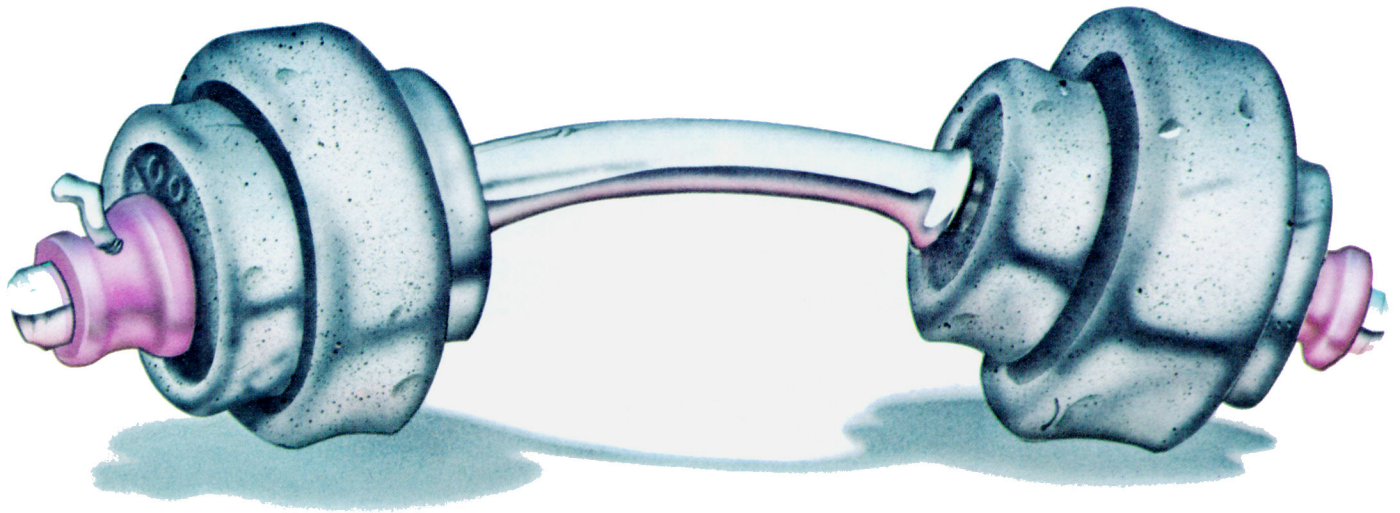
Jim Couch is a busy man who wears two hats for the Venus De Milo health salon chain. As a successful salon owner in Riverside, Calif., and one of only seven corporate franchise salesmen, he expects his new Apple II to ease his heavy workload and add some relaxation time to his hectic schedule.

No stranger to the world of computers, Jim was an electronic components engineer before joining Venus De Milo in 1976. With that background, it's no wonder he's planning to keep his Apple busier than any of his salon's exercise machines.

Right now, his personal computer is handling daily transactions and keeping track of inventory. Once the software is completed this fall, the Apple will become a full-fledged sales partner in addition to doing all the bookkeeping and financial records.

"We generally sell programs on a three-month subscription basis. The Apple will alert me when a subscription is about to run out. It'll be much quicker and much more accurate than the hand-

Health Salon Owner Gives Computers a Workout

purging system we use now," Jim explained.

"If after one week we still can't contact these members by phone, the computer will kick out a mailing list we can use for a reminder notice."

His plans for the Apple II don't stop there, because when he dons his franchise salesman hat, the potential applications seem almost endless.

In fact, he's so high on the importance of the personal computer to health salon management, he'll soon offer the Apple II as part of a sales package for franchise buyers.

"We're also going to install an Apple in the franchise headquarters office. That way, salon owners who decide not to buy a computer themselves will be able to tie into the system and still take advantage of the accounting and financial services they need. For the salons that have their own Apples, we'll set up another system that can give us instantaneous recall of data we can use to help individual owners improve their profits.

"By having access to these sales and marketing records, we can share our expertise with them, and see at a glance what they're doing right. It's certain to be an effective relationship for both parties."

The Belly Dancer Who Shakes, Rattles and Computes

Skeptics who still question the widespread applicability of personal computers in small businesses should bare their midriffs, if they dare, and stroll through Yassmeen's Belly Dance Bazaar, in Los Altos, California.

The bazaar is owned by Jakkee Bryson—belly dancer extraordinaire—entrepreneur and successful small businesswoman—whose Apple II has become more important to her career than finger cymbals.

Jakkee, whose stage name is Yassmeen Samra, is President of Beledi Enterprises, Inc., a thriving business that operates the bazaar and publishes, you guessed it, "Belly Dancer Magazine," which explains in print everything you ever wanted to know about belly dancing and a few things you never even thought about.

She bought her Apple two years ago to help out with bookkeeping, accounts receivable and payroll, but quickly found other uses. "I realized that when my son was born, I wouldn't be able to devote the necessary time to my business. That's when we decided on a personal computer.

"Everything in the bazaar, from exotic costumes to exotic music, is recorded in our computer inventory system. Labels that we run on the Apple are attached to the tags that go directly on the merchandise. It's all computerized, each item with its own number.

"As a result, my business is much more efficient, and I've saved an incredible amount of time. Now, it's simple to find out what's been selling well and what hasn't, which is one of small business's major headaches, inventory control."

When the Apple isn't handling financial and inventory matters, its printer is typing correspondence for her magazine staff writers, or promotional letters for her customers. It also maintains two mailing lists.

Which is all well and good, but doesn't explain how a high school Spanish teacher and counselor, mother and homemaker became Yassmeen Samra, belly dancer.

An avid athlete, Jakkee took up belly dancing in 1972 when a long spell of bad weather forced her off the tennis courts. "I was just looking for something to do. But when the rains stopped, I found that tennis threw off my timing for belly dancing, and vice versa. The choice was simple. I haven't been back on the tennis courts in seven years."
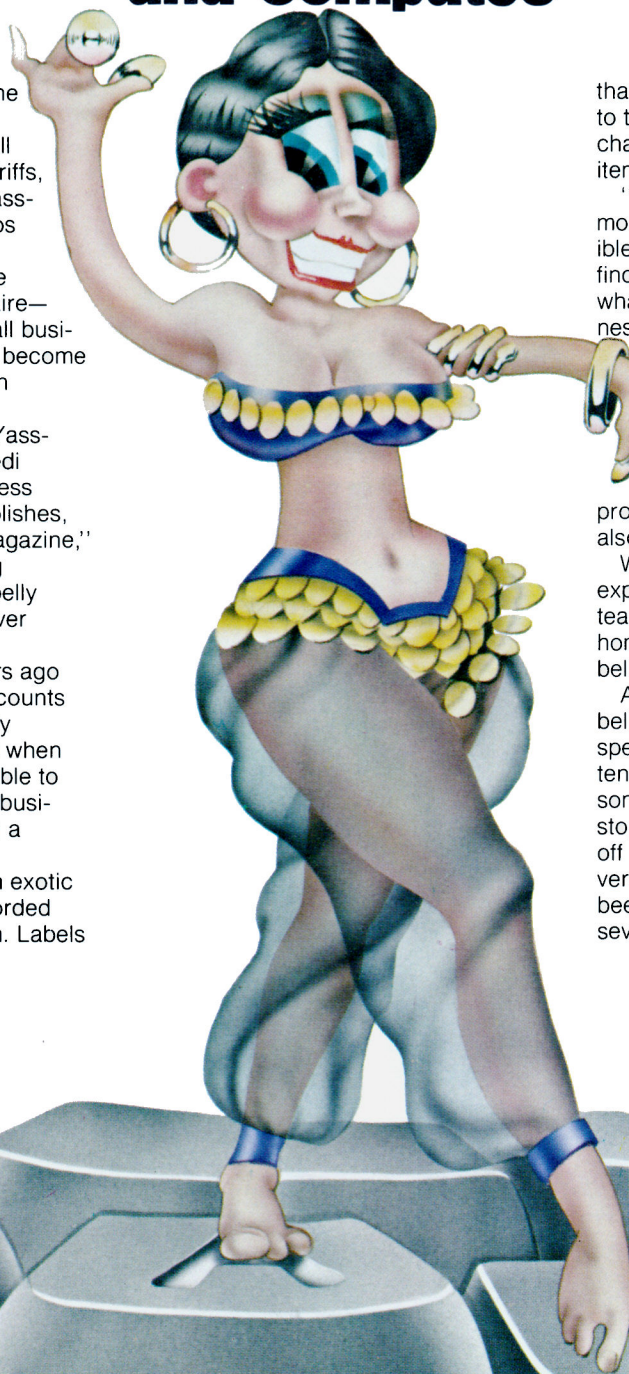
JEF RASKIN'S BRIEF DICTIONARY OF COMPUTERESE

Compilers and Interpreters

Instead of giving glib definitions of these two terms, we will break our pattern and explain these two in more detail. As you will see, the topics are interesting enough to deserve this extra attention.

Compilers and interpreters are needed because writing programs in "machine language" is a nuisance. (A few computers *do* work directly in some human readable form, but this improvement has yet to reach microcomputers. However, remember that anything is possible in this fast-moving field). To illustrate more graphically the trouble with "machine-language" programs, compare the ease of writing

PRINT "HELLO"

with the difficulty of writing

1101010010010011100101001111100010
11010111000010111001100010001

or whatever the computer needs to print that message. You do agree that PRINT "HELLO" is easier, don't you?

Compilers, Assemblers and Machine Language

Each different computer model or group of computer models has its own machine language. In general, all these machine languages are incompatible.

Counting human beings as higher creatures, and computers as lower, we define:

Low-level language

Machine language, or some simple language that is essentially the same as machine language.

The computer can directly perform any operation that is specified in a machine-language program. In jargon, we say that a computer can directly execute a machine-language program.

High-Level Language

A computer language designed to be easy for humans to use, independent of the computer's own language.

We can now, easily and glibly, define a compiler:

Compiler

A program that translates a high-level language into a low-level language.

A computer cannot execute a program in a high-level language directly. One way to make it executable is to compile it into a low-level language.

You can accurately picture a compiler as being similar to a human translator, who hears Armenian and shortly thereafter speaks Portugese (or any other pair of languages). With human translators, however, it would be in bad taste to speak of high-level and low-level languages.

Given this definition, we can define two more pieces of computer jargon:

Source Code (also called "source program")

A program written in a language which must be translated into a low-level language before it can run on a computer.

Object Code (sometimes called "object program")

The program after it has been translated into a low-level language—usually implying that it is now in a form which can be directly executed.

There are many different high-level languages, e.g. BASIC, PASCAL, and Fortran. It is possible (but not often done) to write programs that can change one to another, which gives us a definition:

Translator

A program that converts one high-level language to another high-level language.

Occasionally the term "translator" is applied to a program that converts a low-level language to some other low-level language.

Another specie of computer language, of which you may have heard, is called an "Assembler" or "Assembly Language." Assembly language is not quite so low-level as machine language, but close. It is not nearly so high a level as a high-level language. So we usually lump it in with low-level languages. Basically, an assembler merely provides simple and memorable words (called "mnemonics") that can be quickly and easily translated into the gibberish that the computer understands. For example, instead of having to write

11011000 00000100 01101111

you might simply say

ADD X,M

Certainly the programmer has an easier time remembering "ADD" than the string of zeros and ones. An assembler merely looks up what "ADD" stands for, and what "X" and "M" stand for, and then substitutes the appropriate string of zeros and ones. A compiler does a lot more—the high-level instructions, which the human sees, are not restricted to being close parallels to the underlying machine language which the computer executes.

Actually, due to the process called "creeping elegance," assemblers have come to be a bit more complicated than what has been described. Nonetheless, we have expressed the essence of what an assembler does. Now you understand why assemblers are lumped together with machine language under the rubric "low-level languages."

A translator from machine language to assembly language is called a "Disassembler." Similarly, a translator from machine language to a high-level language is called a "Decompiler."

Interpreters and Simulators

It is possible to think of a program that, when apparently told to add 2 and 3, would subtract instead. In other words, it would *interpret* "2+3" as defining the operation 2−3. It wouldn't *translate* "2+3" into "2−3," it would just calculate 2−3 when it saw the instruction "2+3." With this idea in mind we define:

Interpreter

An interpreter is a program that takes the high-level language program and leads the computer through the steps necessary to perform the operations the program specifies.

An interpreter does *not* translate the source program into an object program, it just runs along the source program, interpreting (carrying out the steps specified) as it goes.

An interpreter is a program that makes the real computer (which we will call Anastasia) behave like a new kind of computer, which we will call Hannibal. Hannibal is so designed that your source program, say in BASIC, is *Hannibal's* machine language. Anastasia's language can be entirely ignored in this process.

Differences From The Point Of View Of The User

In using a compiler, the user must first write the high-level source program, and then—in a separate step—run the compiler to create the low-level object program. If there are any errors, the compiler may catch them and tell the user. Then the user must go back and change the source program, run the compiler again, and repeat the procedure until the program compiles correctly. Then the user can find out if there are any errors in the program (there usually are) that the compiler can't catch. Now the user usually repeats the whole process yet again to fix these errors.

That's the nasty side of compilers. On the other hand a compiled program usually takes up very little room in the computer (that is, the *object program* takes up little room) and usually executes very quickly compared to an interpreted program.

An interpreter must have the entire *source program* available in memory, and must go through the steps required to understand the source program, and break it apart into its components. The activity of breaking apart a program so that it can be understood is called *parsing* the program. A compiler must parse a program too, but it can do this once, before the program is executed—an interpreter must parse each statement every time that it is executed, and it must do this *while* the program is executing. This is the main reason that interpreters tend to operate more slowly for a given program. They have more to do.

On the other hand, most interpreters give error messages as soon as an incorrect statement is typed in. This speeds program development. In addition, no compilation step need be done, so that all you have to do to execute a program is type "RUN" or "GO" or some such command, and the program starts being executed.

Interpreters tend to shorten program development time, but they are usually slower in program execution. Compilers tend to be less pleasant to program, but they are faster in program execution.

If the same higher-level language is available in *both* an interpreted and a compiled form you can have the best of both worlds, developing the program with the interpreter and then running it with the compiler.

Interpreters are usually less expensive to produce (by a computer manufacturer) than are compilers. That is why most personal computers have an interpreted BASIC.

Simulators are interpreters whose source program is in a machine language for some computer other than the one which is doing the interpretation. Useful when developing a new computer, or trying to write programs for a computer that you can't get your hands on. Not a terribly common occurence.

Other Beasts

There are many systems that are somewhere between interpreters and compilers. A line-at-a-time compiler (often called an "incremental compiler") compiles each line as it is typed, giving most of the convenience of an interpreter and most of the speed of a compiler.

For reasons that are a bit outside the scope of this glossary, the high-level language, PASCAL, is usually compiled *and* interpreted. The source code is compiled into a low-level language. This low-level language (called P-code) is then interpreted. This compromise makes the system run somewhat faster than a pure interpreter, and yet be quite inexpensive to implement. This technique also makes it possible to fit a full-feature high-level language into a personal computer at a price most people can afford. 🍎

APOLOGIES TO TELETYPE™
   The Glossary published in the first issue of APPLE improperly used the word "teletype" as a generic name for an older generation of terminals. Teletype Corporation assures us their trademarked product of today, the Teletype™, is widely used and is neither slow nor obsolete. As one trademark to another, **apple** apologizes.

LETTERS TO APPLE

We have established a microcomputer task force (and) have recently heard from members who are interested in a division of our association for new computer technology. We hope to involve Apple in this new interest.

Richard G. Nibeck
Deputy Executive Director
Association for Educational
**   Communications & Technology**
Washington, D.C.

THE HANDICAPPED AND TECHNOLOGY

Your article on "New Learning Aids Offer Help For the Handicapped" was very inspiring and just the lead I need to follow through for our daughter, Mary Lee Termina, who is a quadriplegic with a cerebral palsy–type disease called toxoplasmosis. The only controlled part of her body is her chest . . . a brace, a spout to hit the keys of an electric typewriter and a language board, which fits to her wheelchair, are her only means of communication with others.

I'm sure other parents who love their gift from God, as we do, will be remembering you in their prayers also.

Shirley Chesmer
Pulaski, Pennsylvania

"MEAN" MEANS EDUCATIONAL SOFTWARE

I thought you might be interested in our organization, Microcomputer Education Applications Network, designed to facilitate the development and dissemination of software applications for building-level use in public schools.

During January, our membership grew at a rate of 12 per day. We have identified hundreds of individuals in public schools who are developing software applications for numerous microcomputers, including Apple II.

School officials, individuals or groups can join MEAN at no cost. Users of the software systems will receive discounts on purchases of software; developers will receive royalties for useful and practical applications adopted by other schools or districts; and all interested MEAN members will be provided with current, up-to-date information on the emergence of microcomputer technology and applications designed for educational institutions.

Perhaps some of your readers or users would be interested in our MEAN group.

Charles L. Blaschke
President
Microcomputer Education Applications
**   Network**
Suite 800
1030 Fifteenth Street, N.W.
Washington, D.C. 20005

apple personal computer systems

APPLE II will change the way you think about computers. That's because it is specifically designed to handle the day-to-day activities of education, business, financial planning, scientific calculation, and entertainment. It makes learning to use computers enjoyable and creative, by bringing to the user a new level of simplicity through design sophistication.

Getting Started

APPLE II is faster, smaller, and more powerful than its predecessors. And it's more fun to use too because of built-in features like:

- BASIC—The Language that Makes Programming Fun
- Fifteen-Color Standard Graphics (in an 1,880-Point Array) for Spectacular Visual Effects
- High-Resolution Graphics (in a 54,000-Point Array) for Finely-Detailed Displays
- Sound Capability that Brings Programs to Life
- Hand Controls for Games and Other Human-Input Applications
- Internal Memory Capacity of 48K Bytes of Ram, 12K Bytes of ROM; for Big-System Performance in a Small Package
- Eight Accessory Expansion Slots to let the System Grow With Your Needs

You don't need to be an expert to enjoy APPLE II. It is a complete, ready-to-run computer. Just connect it to a video display and start using programs (or writing your own) the first day. You'll find that its tutorial manuals help you make it your own personal problem solver.

New Features—Apple II Plus

Now APPLE has a new twist—the APPLE II Plus, with our extended APPLESOFT BASIC as the standard language. Designed for the serious user, the Apple II Plus has 9-digit arithmetic precision and exclusive Auto-Start that can run programs automatically when you turn the computer on. Both APPLE II and APPLE II Plus provide the same exciting color graphics, sound, hand controls and computational features. And both systems can take advantage of PASCAL, APPLE's super-language, with installation of the new Language Card (See Expansion Options, pg. C-10).

Color and Sound

APPLE's advanced graphics commands make brilliant, effective color displays something even a beginner can master. Its color graphics can be used for applications ranging from business charts to architectural design. They make any program more effective.

APPLE's built-in loudspeaker prompts you for inputs, warns you of errors, and lets you explore synthesized music and speech applications.

A Learning Tool

APPLE will help you learn what computers are all about. Discover how easy it is to create your own computer programs. Introduce your children to APPLE, and watch them explore and master today's most exciting new technology. Use the Apple Software Bank to start your own library of programs that make learning fun.

Apple Grows With You

Your APPLE is ready to grow when you are. Whether you choose APPLE II or II Plus, you can use all of APPLE's broad line of peripherals, accessories, and software. For example, the basic system shown at bottom left can easily be expanded into the business system shown below by adding two disk drives, printer, and General Business System software.

Introduce yourself to APPLE's advanced tools that set the standard of excellence in personal computers.

APPLES are self-contained computers based on the 6502 microprocessor. Standard features include Integer or Extended (Applesoft) BASIC languages, assembler, disassembler, and monitor in ROM, color graphics, sockets for up to 48K bytes RAM, cassette interface, game I/O connector, typewriter-style ASCII keyboard, high-efficiency switching power supply and rugged structural foam case. Also included as standard are: demonstration tapes, two game controls, and detailed reference and tutorial programming.

Video Display
The APPLE displays text, color graphics, and high-resolution graphics—software selectable. Its graphics commands allow either of two screen "pages" to be displayed with 4 lines of text below the display area.

Text Mode
- 40 characters/line, 24 lines
- 5×7, upper-case characters
- Normal, inverse or flashing characters
- Extensive display control software in ROM
- Full cursor control—protected screen feature
- Fast display—1000 cps

Color Graphics Mode
- 40h $\times$ 48v resolution (40h $\times$ 40v with 4 lines text)
- 15 colors

High Resolution Graphics Mode
- 280 $\times$ 192 resolution (or 280h $\times$ 160 with 4 lines text) 6 colors: black, white, violet, green, blue, orange
- Software character generator available for labeled displays. (See Apple Software Bank.)

Memory
User memory (RAM) is organized in 16K byte increments, and may be easily expanded by inserting the memory elements into plug-in sockets. Up to 48K bytes of total RAM can be installed without requiring expansion chassis or memory cards.

Language (ROM) memory is organized into six blocks of 2K bytes each. System Control is a standard feature and uses 2K bytes. The APPLE II Plus uses the remaining 10K bytes to store Applesoft BASIC. The APPLE II uses 6K bytes to store Integer BASIC, with two sockets (4K) remaining for expansion options.

Inputs and Outputs
All APPLES include as standard an ASCII keyboard, audio cassette interface, 8 peripheral board connectors, speaker, game I/O connector and two game controls.
- Reliable, typewriter-style keyboard
- Fast cassette interface—1500 bps
- Peripheral board connectors Fully buffered, with interrupt and DMA priority structure
- GAME I/O: 4 paddle inputs, 3 TTL inputs and 4 TTL outputs.
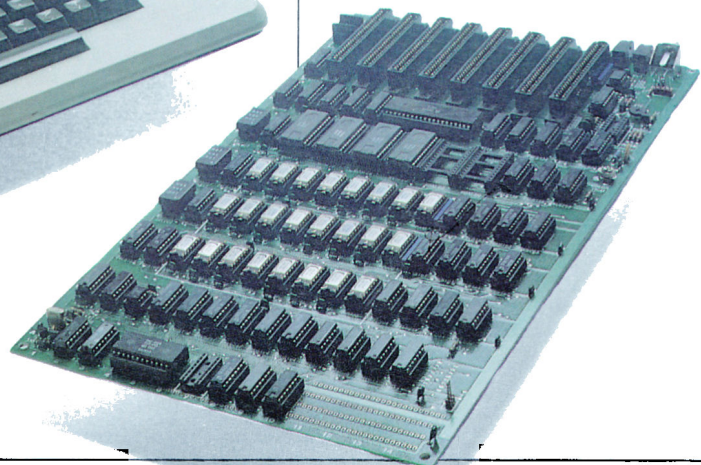
Basic Language

APPLE computers feature one of two built-in BASIC programming languages. Integer BASIC is included in the APPLE II, and Applesoft BASIC in the APPLE II Plus. Applesoft BASIC is also available as a plug-in card option. In addition, PASCAL and both BASIC languages are provided for use with the APPLE Language Card (see Expansion Options, page 11).

Integer BASIC is a fast language that is ideal for games and high-speed graphics. Applesoft BASIC is an expansion of Microsoft's popular floating-point BASIC that includes 9-digit arithmetic for business and scientific applications plus easy-to-use high-resolution graphics commands. (See Apple Software Bank for more information.)

Built-In System Control

APPLE System Control brings your computer alive quickly and easily upon power-up. It offers these additional features:

☐ Disassembler and single-pass assembler
☐ Automatic Input/Output device assignment
☐ Keyboard and screen editing features
☐ Register examine/modify and read/write cassette routines
☐ Hex add/subtract for relative branch calculations
☐ Simulated single-step and trace modes; breakpoint handling (APPLE II only)
☐ Automatic start-up in BASIC (APPLE II Plus only)
☐ Automatic execution of disk programs on start-up (APPLE II Plus only)

Ordering Information

Four types of APPLE computers are available: APPLE II, APPLE II Plus, APPLE II EUROMOD, and EUROPLUS. Standard APPLE versions offer 110 VAC operation and provide an NTSC (American standard) composite video output. The EUROMOD versions have been designed for European (220 VAC) power supply and video output requirements, and are available through Eurapple (international operations of Apple Computer Inc.) in Cupertino, California.

MODEL	BASIC LANGUAGE	POWER SUPPLY	VIDEO INTF.
APPLE II	Integer BASIC	110V,50/60 Hz	NTSC
APPLE II Plus	APPLESOFT BASIC	110V,50/60 Hz	NTSC
APPLE II EUROMOD	Integer BASIC	220/240V,50/60 Hz	CCIR (625 lines)
EUROPLUS	APPLESOFT BASIC	220/240V,50/60 Hz	CCIR EUROMOD

Each of the above four models is available with 16K, 32K, or 48K of memory, using the following order numbers:

Memory (RAM)	APPLE II (U.S.)	APPLE II Plus (U.S.)	APPLE II (EUROMOD)	EUROPLUS
16K bytes	A2S0016	A2S1016	A2S0016P	A2S1016P
32K bytes	A2S0032	A2S1032	A2S0032P	A2S1032P
48K bytes	A2S0048	A2S1048	A2S0048P	A2S1048P

Modem IIB

Modem IIB is a communications package that extends the power of your APPLE by allowing it to tap the resources of time-sharing services, computerized bulletin boards or your office computer from the comfort of your home. It allows you to transfer programs to a friend's APPLE over the telephone network. It even permits you to control an APPLE in San Francisco from another computer in New York. And, with programs like our Stock Quote Reporter or Portfolio Evaluator, it makes your APPLE an intelligent terminal, able to request and process information from large remote data bases.

The Modem IIB package consists of an acoustic coupler (modem) and a Communications Interface Card. The coupler is a 103A-type asynchronous device, suitable for data communication at 110 or 300 baud (10 or 30 char/sec). It operates in either the Originate or Answer modes. Connection to the phone system is accomplished by placing the telephone handset in position on top of the modem. No permanent connection or wiring changes are required.

Modem IIB is supplied with a Communications Interface Card, demonstration tape, connecting cable, and complete documentation. (Order No. A2M0017-U.S., A2M0017P-European)

Communications Interface Card

The Communications Interface Card is available separately to allow you to connect your APPLE to modems, CRT terminals, and other devices employing a serial RS-232C interface. The card's built-in intelligence lets you control these devices easily in BASIC.

Features

☐ Includes Control Programs— No Software to Write
☐ Easily Controlled from BASIC using Simple Commands
☐ Communicates at 110 or 300 Baud, Half- or Full-Duplex
☐ Provides an RS-232C Serial Interface

Specifications

PARAMETER	DESCRIPTION
Signal Level	EIA RS-232C
Data Word Format:	1 start bit, 1 or 2 stop bits, 7 or 8 data bits; odd, even or no parity

The Communications Interface Card comes with Firmware in ROM, DB-25 Connector and mounting bracket, Demonstration tape and Operating Manual (Order No. A2B0003).

Apple
Intelligent
Subsystems

Disk II
Floppy Disk
Subsystem

General Description

Disk II expands your computer horizons with fast, low-cost retrieval of programs and information. It makes inventory, address file, and recipe programs suddenly feasible. It means you can store a year's worth of financial records in one place, and sort through them quickly. And it allows you to handle many other applications that just were not practical before.

Features

□ Powerful Disk Operating Software
   Name Access to Files for Ease of Use
   BASIC Program Chaining to Link Software Together
   Random or Sequential File Access to Simplify Programming
   Dynamic Disk Space Allocation for Efficient Storage

□ Individual File Write-Protection Eliminates Accidental File Alterations
□ Data Transfer Rate of 156K Bits/Sec
□ Storage Capacity of 116 Kilobytes on Standard 5-1/4" Diskettes
□ Powered Directly From the APPLE (Up to 14 Drives) for Low Heat, High Reliability
□ Packaged in Heavy-Duty, Color-Coordinated Steel Cabinet

Specifications

PARAMETER	DESCRIPTION
Access Method:	Random or Sequential—arbitrary record length
Track Access Time:	Varies with number of tracks crossed. 200msec (avg.), 600msec (max. across 35 tracks)
Disk Capacity:	116K bytes (formatted), soft-sectored
Data Transfer Rate:	156K bits per second
Controller	Up to two drives per controller. Multiple controllers can be used.

Ordering Information

Order Number: A2M0004. Supplied with:
□ Floppy Disk Interface Card
□ Bootstrap in ROM
□ Disk Drive and Connecting Cable
□ System Software on Diskette
□ Manual
□ Blank Diskette

Order Number: A2M0003. Supplied with:
□ Second Disk Drive and Connecting Cable

General Description

The Graphics Input Tablet opens up unique new applications by simplifying the input of graphic information from:
□ Maps & Photos
□ Schematic Diagrams
□ Histograms
□ Architectural Renderings
Using the tablet and stylus, one merely traces any series of shapes to convert them into digital information. This data can then be stored, manipulated, and displayed by the APPLE.

The 11″ x 11″ active tablet area allows large and complex figures to be entered easily. Line segments can be created by specifying their endpoints, so that accurate lines can be hand drawn. Area calculations can be performed on the resulting figures. Control software simplifies image generation and allows stylus selection of display effects from a menu supplied on a transparent tablet overlay.

Features

□ Dramatically Simplifies Production of Complex Images
□ Eliminates Tedious Hand Calculations of Graph Coordinates and Figure Dimensions
□ Coordinated Cursor Allows Stylus Selection From Command Tables or Shape Templates on Tablet
□ All Functions Supported From BASIC
□ High Resolution For Detailed Figures—200 Points/Inch

Specifications

Unit consists of external digitizing tablet and plug-in interface card.

PARAMETER	DESCRIPTION
Tablet Size:	15″ square (11″ square active area), 1/2″ high
Image Resolution:	200 points per inch, vert. & horiz.
Input Modes:	Continuous or upon command

Ordering Information

Order Number: A2M0029. Available 2H'79. Supplied with:
□ Input Tablet, Interface Card, Connecting Cable and Stylus
□ Manual and Transparent Tablet Overlay
□ Control Firmware in ROM
□ Control and Demonstration Programs on Tape and Diskette

Apple Intelligent Interfaces

Serial Interface Card

General Description

The Serial Interface Card allows APPLES to exchange data with computers, printers, and other devices in serial format (one bit at a time). It is intended for use (in place of the Communications Interface Card) in applications that:

□ Involve serial printers that don't require "handshake"

□ Use data rates other than 110 or 300 baud (10 or 30 char/sec)

The Serial Card features on-board firmware that provides BASIC control in both block-data-transfer and printer-operation modes. A number of hardware and software switches on the card serve to adapt it to a wide variety of applications, yet it remains simple to use because of its built-in intelligence.

Features

□ Permits BASIC Control of High-Speed Printers and Plotters

□ Quickly Transfers Large Blocks of Data by Telephone (through a modem), or Directly to Local Equipment

□ Handles Half-Duplex Communication from 75-19.2K Baud

□ Programs Easily with Switch-Selectable Preset Conditions for Speed, Line Length, Auto Line Feed and Carriage Return Delay

Specifications

PARAMETER	DESCRIPTION
Signal Level:	EIA RS-232C or 20mA current loop
Data Word Format:	1 start bit, 1 or 2 stop bits, 5-8 data bits; odd, even, or no parity; Checksum is optional.
Character Handling Options:	Lower-case characters optionally converted to upper-case or passed through unmodified and displayed in inverse video.

Ordering Information

Order Number: A2B0005. Supplied with:

□ DB-25 Connector and Mounting Bracket

□ Manual

A wide range of products are available to expand the capabilities of APPLE computers.

Language System

This package includes the Language Card which allows Apple users to take immediate advantage of the powerful PASCAL language along with all the other languages Apple currently provides. The Language Card's 16K bytes of RAM memory electrically replace the ROM firmware build into each APPLE. Upon start-up, this RAM memory is automatically loaded from disk with the user's choice of languages, then electrically protected from change. The loading is controlled by the AUTO-START ROM, also contained on the card. The complete system also includes diskettes containing: the Disk Operating System, a language selection "Hello" program, PASCAL, Applesoft BASIC, and Integer BASIC. The reference manuals for all the above languages are also included. (Order No. A2B0006)

Applesoft ROM Card

This card provides rapid access to the Applesoft BASIC language and frees valuable user memory space for application programs. It contains hardware and software controls that allow it to electrically replace the existing Integer BASIC firmware in APPLE II computers. (Order No. A2B0009)

Auto-Start ROM

The Auto-Start ROM makes any APPLE II friendlier and easier to use by adding such features as:
□ Automatic Disk Loading When System Turns ON
□ Automatic Start-Up in BASIC For Systems Without Disks
□ RESET Protection—RESET Key Halts Program, Returns to BASIC
□ Easy Screen Editing, With up to 90% Fewer Keystrokes

The device is a plug-in replacement for the existing F8 ROM. It is supplied with APPLE II Plus systems. (Order No. A2M0027)

Expansion Memory Module (RAM)

This module allows user memory expansion in 16K byte increments for any 16K or 32K APPLE computer. The module contains 8 RAM devices, installation instructions, and a test program to insure that installation was done properly. (Order No. A2M0016)

Clock/Calendar Card

This plug-in card provides a 388-day calendar and clock with resolution to 1/1000 second. The clock is crystal controlled to yield .001% accuracy. A built-in rechargeable battery keeps the clock on time up to four days without system power, and external batteries may be used for longer periods. Optional interrupt capability simplifies control applications. Supplied with complete operating instructions and rechargeable battery. (Order No. A2M0024)

Monitor II

This 9-inch (diagonal) video monitor is the ideal display for the APPLE when color output is not required. It sits neatly on top of the computer, and provides a very clean and sharp picture. It accepts direct video input from the computer. Monitor II comes complete with cable adapter and documentation. (Order No. A2M0005)

Tape Recorder

A tape recorder is the basic program and data storage mechanism for the APPLE. This one offers the convenience of pushbutton operation, and it runs from either batteries or the AC line. (Order No. A2M0018)

Hobby/Prototyping Card

Create your own APPLE interface boards with this wire-wrap card. The 2-3/4" × 7", double-sided circuit board includes a hole pattern (on 100-mil centers) that accepts all conventional IC's and passive components. It plugs directly into any APPLE expansion connector, and fits entirely within the computer case. Supplied with complete bus documentation to aid the interface designer. (Order No. A2B0001)

System Furniture

Apple offers an attractive desk and side return combination to support your computer system hardware. Both units have cream colored sides, chocolate brown legs, and contrasting wood-grain formica tops. Their design keeps equipment well organized and cables out of sight.
Order Numbers:
☐ Desk (30" × 48")—A2M0034
☐ Left Side Return (18" × 30")—A2M0035

PASCAL

APPLE PASCAL™, incorporating UCSD PASCAL™, offers extended features in a complete, interactive package employing today's most sophisticated structured programming language. It provides advanced capabilities that boost performance and cut development time for large business, scientific, and educational programs.

The software package provides a powerful set of tools for the serious programmer:

EDITOR
□ Fast, screen-oriented editor for program development and word processing
□ 80-character lines (upper/lower case) available with external CRT terminal
□ 80-character lines supported in standard APPLE using horizontal scrolling.

COMPILER—Standard PASCAL plus extensions for strings, disk files, graphics, system programming:
□ Hi-Res: "Turtlegraphics":
   INIT turtle, PENCOLOR, TURNTO, TURN, MOVE, TEXT mode, GRAFmode
□ Text:
   GOTOXY procedure for cursor addressing
   Split screen or horizontal scrolling
   FUNCTION Keypress tells whether character available
□ Library Routines:
   FUNCTION RANDOM
   PROCEDURE RANDOMIZE
   FUNCTION PADDLE
   FUNCTION BUTTON
   PROCEDURE TTLOUT
   FUNCTION KEYPRESS
   And more . . .

RELOCATABLE ASSEMBLER—permits relocatable assembly language routines to be generated and linked to PASCAL programs
FILER—general purpose program for manipulating disk files
SYSTEM UTILITIES
   DESK CALCULATOR—performs basic calculations
   PARAMETER—allows examination and modification of system operating environment
PASCAL operates in a 48K APPLE II or II Plus with one disk drive and an Apple Language Card. An external 80-column terminal can be attached. The package includes:
Language card
5 diskettes, including
DOS 3.2
Integer Basic
Applesoft Extended Basic
PASCAL Interpreter
IC puller
3 PASCAL manuals
3 Basic Language manuals
1 PASCAL card reference manual
(Order No. A2B0006)

Programmer's Aid #1

Programmer's Aid #1 is a ROM-based library of routines to simplify and enhance your Integer BASIC programs. Its capabilities include:
□ High-Resolution Graphics Generation
□ Program Renumbering and Linking
□ Tape Verification
□ Musical Tone Generation (12 timbres and 5 octaves)
□ RAM Testing
□ Machine Language Program Relocation
Programmer's Aid #1 is packaged as a single 2K-byte ROM to be inserted in socket D∅ of the APPLE II. The routines upon which it is based are completely documented in the manual which accompanies the package.
(Order No. A2M0019)

Diskware

The Utility Pack includes exciting new software for disk-based APPLEs, designed to make your programming life easier . . .
□ Disk Operating System (DOS) 3.2—With all the latest features
□ Update 3.2—Updates Existing Diskettes to 3.2 DOS And Preserves Their Contents
□ Applesoft CHAIN—links Applesoft programs together
□ Applesoft Renumber/Merge—Renumbers and merges Applesoft routines into a single program
□ DOS Manual—Over 170 pages of examples and detailed user information
The package comes complete with new System Master Diskette, blank diskette and manual.
(Order No. A2D0010)

Applesoft II Floating-Point Basic Language

Applesoft II is an expanded version of Microsoft's popular floating-point BASIC. Its 9-digit arithmetic and large function library make it ideal for business and scientific applications. Features like high-resolution graphics routines and user-programmable error messages make the language both powerful and easy to use. Capabilities include:

□ 3 Data Types—Real, Integer, and String
□ N-Dimensional Arrays and N-Letter Variable Names (first two letters significant)
□ Extensive Mathematical, Logical and Scientific Capabilities
  EXP, LN, SQ.RT., SIN, COS, TAN, ARCTAN
  AND, OR, NOT, ABS, INT, RANDOM, SIGN
□ String Operations to Aid the Business Programmer:
  Compare: =, >, <, >=, <=, ><
  Concatenate: +
  Variable Type Conversion: ASC, STR, VAL
  Substring Separation: LEFT, RIGHT, MID, LEN

□ Graphics Statements that Simplify Display Programming:
  Print Format Control: NOR-MAL, INVERSE, FLASH
  Graphics Control: COLOR, PLOT, POSN, LINE DRAW, SCRN, GRAPHICS, TEXT, HIRES, ROT, SCALE, SHAPELOAD
□ General Operations that Include and Extend Upon Dartmouth BASIC:
  Program Manipulation: CLEAR, NEW, LIST, RUN, CONT, LOAD, SAVE
  Variable and Function Definition: DATA, DEF. FUNCT, DIM
  Data Handling and Storage: READ, RESTORE, STORE, RECALL
  Loops and Branching: FOR . . . NEXT, IF . . . GOTO, IF . . . THEN, ON . . . GOTO, ON . . . GOSUB, ONERRGOTO, RESUME, GOTO, GOSUB, RETURN
  Input/Output and Format Control: INPUT, PRINT, IN #, PR #, VTAB, TAB, HOME, PADDLE
  Machine Level Statements: PEEK, POKE, CALL, POP, LOMEM, HIMEM

Applesoft II is supplied as a diskette, tape, or plug-in ROM card and is included in APPLE II Plus systems. The diskette version requires 32K RAM (48K for high-resolution graphics). The tape version requires 16K of RAM (32K for high-resolution graphics). The ROM version requires 16K RAM if high-resolution graphics are used. A comprehensive reference manual is included. (Order Numbers: A2B0009—card, A2T0004—tape. Disk version supplied with DISK II Subsystem.)

Integer Basic

This language is a fast integer BASIC that includes the following features (in addition to normal BASIC capabilities):

□ Any-length variable names (ALPHA, BETA$)
□ Syntax and range errors indicated immediately when entered
□ Multiple statements on one line
□ Integers from −32767 to +32767
□ Strings to 255 characters; Single-dimension integer arrays
□ Graphics Commands
□ Paddle read function
□ TEXT and Graphics Commands to set display mode from BASIC
□ Immediate execution of most statements
□ Break and Continue program execution
□ Debug commands: line number trace and variable trace
□ Switchable I/O device assignments
□ PEEK, POKE, CALL, POP commands
□ Auto line number mode
□ RND, SGN, ASC, LEN and ABS functions
□ GOTO expr, GOSUB expr allowed

Integer BASIC is supplied as on-board ROM in the APPLE II and is also included with the APPLE Language Card.

The Apple Software Bank supplies programs to handle a wide range of applications. Currently available programs are listed below. Those titles followed by (number) are available from the corresponding volume of the Contributed Software section of the Bank.

General Business System (GBS I)
The Controller

THE CONTROLLER gives a business control of its revenues and expenses through General Ledger, Accounts Payable, and Accounts Receivable computer software. THE CONTROLLER is designed for a non-technical manager or clerk. It supports either cash or accrual book-keeping, and can easily maintain the ledger, customer, and vendor accounts of many small businesses. THE CONTROLLER provides better control of cash flow, reduces paperwork, eliminates last-minute "catch-up" accounting, prints checks and monthly account statements, and provides information in concise summary reports that allow a manager to make better decisions.

THE CONTROLLER has been designed with fail-safe operation in mind. Its unique data entry system signals typing errors with an audible warning. It automatically makes copies of data files for historical purposes, in case of loss of the originals. And it automatically prints reports before the system will allow the user to close out the monthly books.

THE CONTROLLER Business System consists of three program modules:

□ The GENERAL LEDGER module maintains a file of up to 250 types of accounts with up to $100 million in any one account. Up to 1000 journal entries can be made per month, and a unique feature allows customer and vendor account transactions to be created and posted to the general ledger automatically, without redundant typing. The system produces detailed, easy-to-read management summaries of journal accounts, revenues, and expenses, as well as balance sheets and income statements.

□ The ACCOUNTS RECEIVABLE module maintains a file of up to 250 customer accounts and can process 1000 invoice statements per month. Individual transactions can be for up to $100,000 each. The system produces a detailed summary of receivables, organized by the number of days each bill has been outstanding (aged trial balance). Monthly account statements are printed automatically for customer billing purposes, with optional finance charges added to overdue accounts. The system also produces mailing labels, customer lists, and sales commission reports by salesman.

□ The ACCOUNTS PAYABLE module maintains a file of 100 vendors and allows 300 monthly invoices for up to $1 million each. Payables are organized by due date, so that in planning cash flow a business can customize bill paying to take advantage of discounts and varying net terms. Checks are printed automatically, along with summaries of cash requirements by due date and vendor. The system prints summaries of checks paid, new accounts, and a list of vendors.

THE CONTROLLER is packaged in an attractive 3-ring binder with a manual and several program and data diskettes. It requires 48K RAM, dual disk drives, Applesoft BASIC language, and Printer IIA. (Order No. A2D0012)

Point of Sale

POINT OF SALE is an inventory control and cash register simulation system. It simplifies the retailer's job by eliminating redundant work in filling out lists and forms. Once a customer account is entered, the information is automatically used to generate sales receipts, billing records, mailing lists, and accounting summaries. POINT OF SALE also gives a retailer better control of inventory, resulting in reduced shrinkage.

POINT OF SALE can process backorders, down payments, and refunds, managing an inventory of more than 800 stock numbers.

The system is packaged in a binder with a manual and program diskette. It requires 48K RAM, dual disk drives, Applesoft BASIC language, and Printer IIA. (Order No. A2D0025)

Apple Post

APPLE POST is a data base system that handles the creation and maintenance of mailing lists of more than 2500 names. It allows for easy entry and editing of names, addresses, and phone numbers, and can print lists or actual labels in order by name or zip code. APPLE POST makes it possible to locate names and phone numbers quickly. It uses a unique "phonetic search" feature to locate names even when correct spelling is not known.

The mailing list system is packaged to include a manual and program diskette. It requires 48K RAM, dual disk drives, Applesoft BASIC language, and Printer IIA. (Order No. A2D0013)

Apple
Software
Bank

Business and Finance
Education
Scientific Calculation

Utility Programs

Dow Jones Series

The DOW JONES SERIES consists of three separate products that assist the user in the capture and processing of financial wire service information. All require 32K RAM and Applesoft BASIC.

□ *STOCK QUOTE REPORTER* allows Apple to hold a list of stocks and continually update bid or opening price, asking or close price, high and low for the day, and the current volume of the stock. Stock portfolios are easily changed to suit the individual. All information is available (delayed 15 minutes) through a local phone call to the Dow Jones Service over most of the U.S. Supplied with contract and password for Dow Jones News Service access. (Order No. A2M0022)

□ *PORTFOLIO EVALUATOR* can maintain up to 50 stock portfolios on a floppy diskette, analyzing each to provide summaries of short and long term gains and losses, current values of each portfolio, and shares held. Disk II is required. (Order No. A2D0007)

□ *NEWS REPORTER* allows Apple to retrieve news stories about selected companies, industries, or federal agencies. Stories are obtained via a local telephone call to the Dow Jones Service. Once a company or other topic is selected, the program specifies the number of stories and pages of headlines on that topic, and allows the user to selectively read the desired stories. Disk II is required. (Order No. A2D0011)

□ *CHECKBOOK WITH FINAN-CIAL DATA BASE MANAGE-MENT*—maintains a data base of transactions: the date, amount, recipient, and classification code for each item. It allows check records to be saved, sorted, searched, and displayed. Trial balances can be run, and the account can be reconciled against a bank statement. The program eliminates most of the drudgery associated with checking account management. (Order No. A2T0001)

□ *FILE CABINET* (3)—general data base for storing, searching, and sorting lists of all types of data.

Education

□ COLORMATH (1)—color/sound quiz in basic arithmetic

□ HANGMAN (1)—color/sound guessing game that builds word skills

□ MASTERMIND (1)—A popular strategy game that builds logic skills

□ The Infinite Number Of Monkeys/Integer Basic Subroutine Package (5)—combining an enjoyable animated story with a serious exploration of advanced programming techniques in Integer BASIC

□ ENGINE (3)—HI-RES animation of an automobile-type gasoline engine, including a manual step-through mode

□ THE GREAT AMERICAN PROBABILITY MACHINE (5)—intuitive exploration of the laws of probability through LO-RES animation

□ CALIFORNIA DRIVING TEST (5)—a practice test for California drivers and a fine example of educational programming for all

□ HAMMURABI (1)—a fascinating economic simulation of a small agrarian country. The lives and prosperity of its inhabitants depend upon the player's decisions

□ MORSE CODE (1)—APPLE II now has a perfect fist over a wide range of speeds for those who want to build their skill at Morse Code

□ DON'T FALL (6)—An animated guessing game that builds word skills

□ MATCH MACHINE (6)—A matching quiz with a variety of topics—or build in your own!

□ PROFESSOR TRUE (6)—A true/false quiz on American History

□ MR. MULTIPLE (6)—A multiple-choice quiz on contemporary folklore

Scientific Calculation

□ BONE TUMOR DIFFERENTIAL DIAGNOSIS (1)—to assist qualified medical practitioners in the diagnosis of bone pathologies

□ AIRFOIL (3)—HI-RES graphics program that will plot the shape of an aircraft wing, given the parameters

Utility Programs

□ HI-RES GRAPHICS (3)—a package of graphics routines to assist the user in plotting on the HI-RES screen

□ RAM Test—a test program that provides peace of mind during RAM expansion by testing the installed RAM (Order No. A2T0006)

□ DATAMOVER—a program used to move data and programs from one APPLE computer to another over the phone lines (Order No. A2T0012)

□ HI-RES CHARACTER SET (3)—A program to put characters on the HI-RES screen

□ HEX CONVERTER (1)—Converts numbers between bases 10, 16, and 2. Simple sums and differences in these bases can also be computed

□ INTEGER BASE CHR$ FUNCTION (1)—This program gives you the same ability in integer basic that the CHR$ function delivers in Applesoft Basic

□ INTEGER BASIC RENUMBER AND APPEND (5)—A programmer's aid to renumber entire programs or "glue" one program to another

Entertainment

- ☐ APPLE TREK (Order No. A2T0002)
- ☐ SPACE WAR (Order No. A2T0002)
- ☐ BRICK OUT (Order No. A2T0003)
- ☐ BLACKJACK (1)
- ☐ CHASER (5)
- ☐ KALEIDOSCOPE (3)
- ☐ MISSION: U-BOAT (5)
- ☐ APPLE ORGAN (5)
- ☐ ADD-LIBS I (5)
- ☐ SHOOTOUT (3)
- ☐ INTERCEPT (3)
- ☐ APPLE-VISION (3)
- ☐ SLOT MACHINE (1)
- ☐ BIORHYTHM (1)
- ☐ OTHELLO (1)
- ☐ CHESS (Order Nos. A2T0013 —tape, A2D0009—diskette)
- ☐ PINBALL (1)
- ☐ SINK THE SHIP (1)
- ☐ CATCH (1)
- ☐ CURVES (1)
- ☐ SEVEN (1)
- ☐ TOWERS OF HANOI (1)
- ☐ NIGHTMARE #6 (1)
- ☐ 23 BRICKS (1)
- ☐ YAHTZEE (1)
- ☐ MAGIC LANTERN (2, 4)
- ☐ INTERCEPT (3)
- ☐ APPLE BOWL (Order No. A2T0015)

APPLE products come with complete documentation for users at every level of technical expertise.

Apple II Integer Basic Programming Manual

This manual starts from the beginning and guides the user's first programming efforts. A humorous style and abundant examples make this the ideal textbook for newcomers to personal computing. (Order No. A2L0005, 125 pages. Supplied with APPLE II systems)

Apple II Reference Manual

This manual addresses the details of the system: hardware schematics, firmware listings, special system features, and use of the monitor. It is aimed at the user who is comfortable with BASIC and wishes to become familiar with the advanced features of APPLE computers. (Order No. A2L0001, 151 pages. Supplied with APPLE systems)

Applesoft Basic Reference Manual

This extended BASIC reference manual is written for the user who is familiar with the BASIC language. (Order No. A2L0004, 170 pages. Supplied with APPLE II Plus systems)

Applesoft Basic Tutorial Manual

This manual is for the Applesoft beginner. It provides programming examples and a detailed explanation of the language. (Order No. A2L0018. Supplied with APPLE II Plus systems)

6500 Microprocessor Hardware Manual

This manual is directed at the hardware designer who wants detailed information about the 6502 microprocessor used in the APPLE (Order No. A2L0002, 165 pages)

6500 Microprocessor Programming Manual

This manual addresses the internal structure and assembly language programming of the 6502 microprocessor. It assumes that the reader is moderately familiar with computer concepts. (Order No. A20003, 239 pages)

Disk II Reference Manual

The Disk II Reference Manual explains the installation and operation of Disk II Hardware. It also provides a comprehensive introduction to Apple's Disk Operating System software. (Order No. A2L0012. Supplied with Disk II)

ALABAMA

Computer Center Inc.
433 Valley Ave. Plaza
Birmingham 35209
(205) 942-8567

Computerland
3020 University Dr. N.W.
Huntsville 35805
(205) 539-1200

Grice-Mobile
3696 Airport Blvd.
Mobile 36608
(205) 342-2062

CPU, Inc.
928 S. Hull St.
Montgomery 36104
(205) 262-8260

ALASKA

The Electronics Company
505–15 E. Northern Lights Blvd.
Anchorage 99503
(907) 272-5447

Team Electronics No. 031
404 E. Firewood Lane
Anchorage 99503
(907) 272-4823

Alaska Radio Supply
1000 Harbor Drive
Juneau 99802
(907) 586-3333

Gateway Computers
P.O. Box 7578
629 Mission
Ketchikan 99901
(907) 225-3060

ARIZONA

Byte Shop
24 W. Camelback Rd.
Phoenix 85013
(602) 265-0065

Computerland/Phoenix
3152 East Camelback Road
Phoenix 85016
(602) 956-5727

Byte Shop
813 N. Scottsdale Rd.
Tempe 85257
(602) 894-1129

Byte Shop
2612 E. Broadway
Tucson 85616
(602) 327-4579

ARKANSAS

Programmers Software Exchange
2110 N. 2nd Street
Cabot 72023
(501) 843-6037

Computerland
11121 Rodney Parham Rd.
Little Rock 72212
(501) 224-4508

Data Cope
5706 A West 12th Street
Little Rock 72204
(501) 666-8588

CALIFORNIA

Computerland
1625 El Camino Real
Belmont 94002
(415) 595-4232

Computer Plus
795 W. Imperial Hwy.
Brea 92621
(714) 990-4014

Byte Shop
1812 W. Burbank Blvd.
Burbank 91506
(213) 843-3633

Computer Components Inc.
3808 W. Verdugo Ave.
Burbank 91505
(213) 848-5521

Sunshine Computer
20710 S. Leapwood Ave.
Carson 90746
(213) 327-2118

Coast Computer Center
1685 Tustin Ave. No. 9
Costa Mesa 92627
(714) 646-0537

Computerland
6743 Dublin Blvd.
Dublin 94566
(415) 828-8090

Computer Metrics Inc.
1251 Broadway
El Cajon 92021
(714) 579-8066

Computerland/San Diego East
2992 Navajo Road
El Cajon
(714) 464-5656

Computerland
11074 San Pablo Ave.
El Cerrito 94530
(415) 233-5010

Computerware
830 First Avenue
Encinatas
(714) 436-3512

Business Enhancement Computers
1711 E. Valley Pkwy. No. 109
Escondido 92027
(714) 741-6335

Adventures in Computing Inc.
8756 Warner Ave.
Fountain Valley 92708
(714) 848-8388

Electric Brain
3038 N. Cedar Ave.
Fresno 93703
(209) 227-8479

Rainbow Computing Inc.
10723 White Oak
Granada Hills 91344
(213) 360-2171

Byte Shop
1122 B Street
Hayward 94541
(415) 537-2983

Computerland
22634 Foothill Blvd.
Hayward 94542
(415) 538-8080

Deans Music City
82-704 Miles Ave.
Indio 92201
(714) 347-5245

Computerland
6840 La Cienega Blvd.
Inglewood 90302
(213) 776-8080

Tech-Mart
367 Bird Rock Ave.
La Jolla 92037
(714) 459-2797

Consumer Computers
8907-A La Mesa Blvd.
La Mesa 92041
(714) 465-8888

Byte Shop of Lawndale
16508 Hawthorne Blvd.
Lawndale 90260
(213) 371-2421

Computer Components Inc.
4705 Artesia Blvd.
Lawndale 90260
(213) 370-4842

Computer Stop
16919 Hawthorne Blvd.
Lawndale 90260
(213) 371-4010

Computerland/So. Bay
16720 So. Hawthorne Blvd.
Lawndale 90260
(213) 371-7144

Computique
16611 Hawthorne Blvd.
Lawndale 90260
(213) 370-5795

Avidd Electronics
2210 Bellflower Rd.
Long Beach 90815
(213) 598-0444

Computerland
4546 El Camino Real
Los Altos 94022
(415) 941-8154

Computers Are Fun
2268 Westwood Blvd.
Los Angeles 90064
(213) 475-0566

Byte Shop
4658 Admiralty Way
Marina Del Rey 90291
(213) 822-4384

Computerland
24001 Via Fabricante No. 904
Mission Viejo 92630
(714) 770-0131

Computers Made Easy
819 East Ave. 09
Palmdale 93550
(805) 947-8613

Computerland
81 N. Lake Street
Pasadena
(213) 449-3205

Khalsa Computer Systems Inc.
500 S. Lake Avenue
Pasadena 91101
(213) 683-3311

Hammond Studios
2499 E. Colorado Blvd.
Pasadena 91107
(213) 795-4263

Byte Shop—Placentia
123 Yorba Linda Blvd.
Placentia 92670
(714) 524-5380

Capitol Computer Systems
3396 El Camino Ave.
Sacramento 95821
(916) 483-7298

Computerland/SB
289 E. Highland Ave.
San Bernardino 92404
(714) 886-6838

Byte Shop
8250 H. Vickers St.
San Diego 92111
(714) 565-8008

The Computer Merchant
5107 El Cajon Blvd.
San Diego 92115
(714) 583-3963

Computerland
4233 Convoy
San Diego 92111
(714) 560-9912

Computerland
117 Fremont St.
San Francisco 94105
(415) 546-1592

Mathews TV
214 California
San Francisco 94111
(415) 781-0200

Video Games & Computers
301 Balboa
San Francisco 94118
(415) 221-8500

Village Electronics
5811 Geary Blvd.
San Francisco 94121
(415) 668-4243

Sunny Sounds
927-B E. Las Tunas Dr.
San Gabriel 91775
(213) 287-1811

Computerland/SJ
1077 Saratoga-Sunnyvale Rd.
San Jose 95129
(408) 253-8080

The Byte Shop—S.L.O.
986 Monterey Street
San Luis Obispo 93401
(805) 543-9310

Advanced Computer Products
1310-B E. Edinger
Santa Ana 92705
(714) 558-8813

Computer City
3941-D So. Bristol
Santa Ana
(714) 549-7799

Computique
3211 So Harbor Blvd.
Santa Ana 92704
(714) 549-7373

Byte Shop Computer Store
4 W. Mission
Santa Barbara 93101
(805) 966-2638

Byte Shop
3400 El Camino Real
Santa Clara 95051
(408) 249-4221

Computer Forum
14052 E. Firestone Blvd.
Santa Fe Springs 90670
(213) 921-2111

Computerland
223 S. Broadway
Santa Maria 93454
(805) 928-1919

Karol Music
1515 So. Broadway
Santa Maria 93454
(805) 922-8265

Computer Store
820 Broadway
Santa Monica 90401
(213) 451-0713

Mission Control
2008 Wilshire Blvd.
Santa Monica 90403
(213) 829-5137

Computerland
611 5th St.
Santa Rosa 95401
(707) 528-1775

Santa Rosa Computer Center
604 7th St.
Santa Rosa 95454
(707) 528-6480

Computer Plus, Inc.
1324 S. Mary Ave.
Sunnyvale 94087
(408) 735-1199

Byte Shop—Tarzana
18424 Ventura Blvd.
Tarzana 91356
(213) 343-3919

Byte Shop
2707 Thousand Oaks Blvd.
Thousand Oaks 91360
(805) 497-9595

Computerland
171 E. Thousand Oaks Blvd. No. 104
Thousand Oaks 91360
(805) 495-3554

Omega Micro Computers
3535 Torrance Blvd. No. 10
Torrance 90503
(213) 370-9456

Computer Components
5848 Sepulveda Blvd.
Van Nuys 91411
(213) 786-7411

Byte Shop
2989 N. Main
Walnut Creek 94596
(415) 933-6252

Computerland
1815 Ygnacio Vly. Rd.
Walnut Creek 94598
(415) 935-6502

Byte Shop
14300 Beach Blvd.
Westminster 92683
(714) 894-9131

Computer Components
6791 Westminster Ave.
Westminster 92683
(714) 898-8330

COLORADO

Byte Shop
3101 Walnut Street
Boulder 80301
(303) 444-6550

Team Electronics No. 059
3275 28th Street
Boulder 80302
(303) 447-2368

Computerland/Colorado Springs
4543 Templeton Gap Rd.
Colorado Springs 80909
(303) 574-4150

Team Electronics No. 092
The Citadel
Colorado Springs 80909
(303) 596-5566

Byte Shop
Cherry Creek Center
E. 1st Ave. and University
Denver 80206
(303) 399-8995

Computerland
2422 So. Colorado Blvd.
Denver 80222
(303) 759-4685

Byte Shop
3464 S. Acoma
Englewood 80110
(303) 761-6232

Team Electronics No. 056
107 S. College
Ft. Collins 80521
(303) 484-7500

Team Electronics No. 067
2401 North Ave.
Grand Junction 81501
(303) 245-4455

CONNECTICUT

Technology Systems
208 Greenwood Ave.
Bethel 06801
(203) 748-6856

Computerland
1700 Post Road
Fairfield 06430
(203) 255-9252

JRV Computer Store
3714 Whitney Ave.
Hamden 06518
(203) 281-1453

The Computer Lab
130 Jefferson Ave.
New London 06320
(203) 447-1079

The Computer Lab
243 W. Main St.
Niantic Ct. 06357
(203) 739-4366

Crozier Computer Co.
632 Boston Post Rd.
Old Saybrook 06475
(203) 388-2707

Computer Place (The)
21 Atlantic St.
Stamford Ct. 06901
(203) 329-1689

Computer Works Inc.
1439 Post Road East
Westport 06880
(203) 255-9096

The Computer Store
63 S. Main St.
Windsor Locks 06096
(203) 627-0188

DELAWARE

Computerland
Astro Shpg. Ctr.—Kirkwood Hwy.
Newark 19711
(302) 738-9656

FLORIDA

Computerland/Boca Raton
500 E. Spanish River Blvd.
Boca Raton 33432
(305) 368-1122

The Computer Store/Tampa Bay
1021 B Manatee Ave. W.
Bradenton 33508
(813) 747-8223

The Computer Store
21 Clearwater Mall
Clearwater 33516
(813) 725-4717

Creative Computer Systems
1325 N. Atlantic Ave.
Cocoa Beach 32931
(305) 784-1881

International Computer Systems
2201 Ponce De Leon Blvd.
Coral Gables 33134
(305) 448-5960

Ucatan Corp./Computer Store
P.O. Box 1000, Airport Rd.
Destin 32541
(904) 837-2022

Byte Shop
1044 E. Oakland Park Blvd.
Ft. Lauderdale 33516
(305) 561-2983

Computerland/Ft. Lauderdale
3993 No. Federal Hwy.
Ft. Lauderdale 33308
(305) 566-0776

Electronic Components
2945 State Road 84
Ft. Lauderdale 33316
(305) 584-3404

Datamovers Inc.
2123 Fowler St.
Ft. Myers 33901
(813) 481-5379

Grice—Ft. Walton Beach
417-A Marry Esther Cutoff
Ft. Walton Beach 32548
(904) 242-3158

Computerland/Jacksonville
2777-6 University Blvd.
Jacksonville 32217
(904) 721-2471

Alpha Computer Center
100 Lake Avenue
Maitland 32750
(305) 645-5522

The Electronic Shop Inc.
1285 Cypress Ave.
Melbourne 32935
(305) 259-4025

Byte Shop
7825 Bird Rd.
Miami 33155
(305) 264-2983

Computer Village
931 SW 87 Avenue
Miami 33174
(305) 266-5965

Southern Microcomputer Co.
5901 E. N.W. 151 Street
Miami Lakes 33014
(305) 558-5826

Gulf Coast Computer Center
Hwy. 90 East 87 South
Milton 32750
(904) 623-5638

Tomorrow Today
644-C Massachusetts Blvd.
New Port Richey 33552
(813) 842-3917

Grice—Panama City
725 E. 23rd Street
Panama City 32401
(904) 769-2151

Grice—Brent Lane
266 Bret Lane
Pensacola 32503
(904) 477-8100

Grice—University
7171 N. Davis Hwy.
Pensacola 32504
(904) 476-0042

Computer Age
1308 N. Federal Hwy.
Pompano Beach 33062
(305) 946-4999

Mini-Concepts
1260 S. Ridgewood
Port Orange 32019
(901) 761-0603

AMF Electronics
11146 North 30th Street
Tampa 33612
(813) 971-4072

Microcomputer Systems, Inc.
144 S. Dale Mabry
Tampa 33609
(813) 879-4225

Computer Center of the Palm
Beaches 2827 Exchange Court
West Palm Beach 33409
(305) 689-3233

GEORGIA

Advanced Computer Techniques
290 Hilderbrand Ave. N.E.
Atlanta 30328
(404) 255-8984

CompuShop
5600 Roswell Rd. NE
Atlanta 30342
(404) 252-9611

Bailey's Computer Shop
P.O. Box 5319
2418 Peach Orchard Rd.
Augusta 30906
(404) 798-5348

Computerland of Marietta
2423 Cobb Pkwy.
Smyrna 30080
(404) 953-0406

HAWAII

Computerland/Hawaii
567 So. King St. (Kawaiahao Pl.)
Honolulu 96813
(808) 521-8002

Microcomputer Systems
55 S. Kukul—C109
Honolulu 96813
(808) 536-5288

IDAHO

Northwest Computer Center
6457 Fairview Ave.
Boise 83704
(208) 375-6682

E.A.R.S.
470 First St.
Idaho Falls 83401
(208) 523-8212

Computer Concepts Inc.
Alameda Plaza
Pocatello 83201
(208) 233-1401

ILLINOIS

Computerland
50 E. Rand Rd.
Arlington Heights 60004
(312) 255-6488

Farnsworth Computer Center
1891 N. Farnsworth
Aurora 60505
(312) 851-3888

Dow Com. Inc.
601 W. Industrial Park Rd.
Carbondale 62901
(618) 529-1033

Team Electronics No. 043
Meadowdale Dr. SP LA
Carpentersville 60110
(312) 428-6474

Byte Shop
1602 S. Neil St.
Champaign 61820
(217) 352-2323

Elektrik Keyboard Ltd.
1920 N. Lincoln Ave.
Chicago 60614
(312) 751-1555

Personal Computers of Chicago
100 E. Ohio St.
Chicago 60611
(312) 337-6744

Apple Tree Stereo
122 Simonds Ave.
De Kalb 60115
(815) 758-5461

Team Electronics No. 079
Northgate Mall Shopping Center
Decatur 62526
(217) 877-2774

Videodyssey
416 Lake Cook Rd.
Deerfield 60015
(312) 498-9669

Computerland
136 W. Ogden Ave.
Downers Grove 60515
(312) 964-7762

Nabih's
519 Davis St.
Evanston 60201
(312) 869-6140

Team Electronics No. 141
1150 W. Carl Sandburg Dr.
Galesburg 61401
(309) 344-1300

Computer Station Inc.
3659 Nameoki Rd.
Granite City 62040
(618) 452-1860

Byte Shop of LaGrange
5 S. LaGrange Road
LaGrange 60525
(312) 579-0920

Team Electronics No. 117
4200 16th Street
Moline 61265
(309) 797-8261

CompuShop
5920 W. Dempster St.
Morton Grove 60053
(312) 967-0450

Illini Microcomputers
612 E. Ogden
Naperville 60540
(312) 420-8813

Computerland
9511 N. Milwaukee Ave.
Niles 60648
(312) 967-1714

Apple Tree Stereo
117 E. Beaufort
Normal
(309) 452-4215

Electronics Business Machines
1200 Harger Road
Oak Brook 60521
(312) 654-0060

The Computer Store
7037 W. North Ave.
Oak Park 60302
(312) 386-3323

Computerland
10935 S. Cicero Ave.
Oaklawn 60453
(312) 422-8080

Computerland/Peoria
4507 N. Sterling
Peoria 61614
(309) 688-6252

Wallace Electronics Inc.
4921 N. Sheridan Rd.
Peoria 61614
(309) 692-2616

Imperial Computer Systems, Inc.
2320 N. Central Ave.
Rockford 61103
(815) 962-7580

Data Domain
1612 E. Algonquin Rd.
Shaumburg 60195
(312) 397-8700

Team Electronics No. 071
2716 S. MacArthur Blvd.
Springfield 62704
(217) 525-8637

INDIANA

Stereo & CB City
132 E. Main St.
Bloomfield 47424
(812) 384-4479

Data Domain
2805 E. State Blvd.
Ft. Wayne 46805
(219) 484-7611

Graham Electronics
6101 N. Keystone
Indianapolis 46220
(317) 253-4261

Graham Electronics Supply Inc.
133 So. Pennsylvania
Indianapolis 46204
(317) 634-8202

Home Computer Center
2115 E. 62nd St.
Indianapolis 46220
(317) 251-6800

Digital Technology
10 N. 3rd Street
Lafayette 47901
(317) 423-2548

Video World
921-C Ridge Rd.
Munster 46321
(219) 836-5350

Data Domain
219 W. Columbia
West Lafayette 47906
(317) 743-3951

IOWA

Team Electronics No. 036
4444 1st Ave. N.E.
Cedar Rapids 52402
(319) 393-8956

Memory Bank Inc.
4128 Brady St.
Davenport 52806
(319) 386-3330

Team Electronics No. 113
320 Kimberly Rd.
Davenport 52806
(319) 386-2588

The Computer Emporium
3711 Douglas Ave.
Des Moines 50310
(515) 279-8861

Team Electronics No. 007
2300 Kennedy Rd.
Dubuque 52001
(319) 583-9195

Team Electronics No. 93
The Mall Shopping Center
Iowa City 52240
(319) 388-3681

Team Electronics No. 009
P.O. Box 966
2015 E. 4th St.
Sioux City 51101
(712) 252-4507

Team Electronics No. 139
2001 Leach Ave.
Sioux City 51107
(712) 277-2019

The Computer Center
320 Commercial St.
Waterloo 50701
(319) 232-9504

Team Electronics No. 020
2750 University Ave.
Waterloo 50701
(319) 235-6507

KANSAS

Team Electronics No. 054
14 S. Main St.
Hutchinson 67501
(316) 662-0632

Computerland
10049 Santa Fe Dr.
Overland Park 66212
(913) 492-8882

The Computer Room
7105 105th St.
Overland Park 66212
(913) 648-7105

Barney and Associates
425 N. Broadway
Pittsburg 66762
(316) 231-1970

Team Electronics No. 048
791 N. West Street
Wichita 67293
(316) 942-1415

Team Electronics No. 105
Mall on Harry St.
Wichita 67218
(316) 682-7559

Team Electronics No. 143
7700 E. Kellogg
Wichita 67207
(316) 685-8826

KENTUCKY

Sound Impulse Inc.
Greenup Mall
Ashland 41101
(606) 324-9207

Data Domain
506-1/2 Euclid Ave.
Lexington 40220
(606) 233-3346

Computerland
813 Lyndon Lane No. B
Louisville 40222
(502) 425-8308

LOUISIANA

Delta Micro Computer
P.O. Box 7999
3402 Jackson St. No. D
Alexandria 71301
(318) 442-0217

The Computer Place
3340 Highland Rd.
Baton Rouge 70821
(504) 387-0072

Computer Shoppe Inc.
3225 Danny Park
Metairie 70002
(504) 454-6600

Micro Business Systems
3823 Gilbert
Shreveport 71104
(318) 869-3027

MAINE

Harper Electronics
114-25 Commercial St.
Portland 04101
(207) 772-1156

MARYLAND

The Computer Workshop
1776 Plaza—1776 E. Jefferson
Rockville 20852
(301) 468-0455

Computerland
16065 Frederick Rd. (Rt. 355)
Rockville 20855
(301) 948-7676

Computers Etc.
13A Allegheny Ave.
Townson 21204
(301) 296-0520

Computers Unlimited Inc.
907 York Rd.
Towson 21204
(301) 321-1553

MASSACHUSETTS

Computer Store Inc.
120 Cambridge
Burlington 01803
(617) 272-8770

The Computer Store Inc.
1689 Massachusetts Ave.
Cambridge 02138
(617) 354-4599

Harvard Cooperative Society
1400 Massachusetts Ave.
Cambridge 02138
(617) 492-1000

Tech Coop/MIT Student Center
84 Massachusetts Ave.
Cambridge 02138
(617) 492-1060

The Computer Store
Rt. 9 Deerskin Plaza
Framingham 01701
(617) 879-3720

Two-Way Radio SVC
358 Main St.
Hyannis 02601
(617) 775-8176

Retail Computer Center
455 Center St.
Ludlow 01056
(413) 788-3900

The Sound Company
447 Sumner Ave.
Springfield 01180
(413) 736-3625

MICHIGAN

Newman Computer Exchange
1250 No. Main St.
Ann Arbor 48104
(313) 994-3200

Team Electronics No. 074
Delta Plaza Shipping Center
Escanaba 49829
(906) 786-3911

FLC Inc./Computer House Division
1407 Clinton Rd.
Jackson 49202
(517) 782-2132

Computerland
2921 28th St. S.E.
Kentwood 49508
(616) 942-2931

Team Electronics No. 029
P.O. Box 232 M & M Plaza
Menominee 49858
(906) 864-2213

Computer Mart
560 W. 14 Mile Rd.
Royal Oak 48017
(313) 288-0040

Computerland
29763 Northwestern Hwy.
Southfield 48034
(313) 356-8111

MINNESOTA

Computerland
8070 Morgan Circle Dr.
Bloomington 55431
(612) 884-1474

Zim Computers
5917 Xerxes Ave. North
Brooklyn Center 55429
(612) 560-0336

Audio King
7101 Frame Ave. South
Edina 55435
(612) 920-4272

Team Electronics No. 095
204 Southdale Center
Edina 55435
(612) 920-4817

Team Electronics No. 023
Madison East
Mankato 56001
(507) 387-7937

Team Electronics No. 001
2640 Hennepin Ave. S.
Minneapolis 55408
(612) 377-9840

Team Electronics
350 Rosedale Center
Roseville 55113
(612) 636-5147

Team Electronics No. 004
110 6th Ave. S.
St. Cloud 56301
(612) 251-1335

Team Electronics No. 131
Crossroads Shopping Center
St. Cloud 56301
(612) 253-8326

Team Electronics No. 025
Kandi Mall South Hwy. 71
Willmar 56201
(612) 235-2120

MISSISSIPPI

Entertainment Electronics Ltd.
1855 Lakeland Drive
Jackson 39216
(601) 981-7341

Waynesboro Electronics
613 Mississippi Drive
Waynesboro 39367
(601) 735-3431

MISSOURI

Electronic Components
1306-B South Hwy. 63
Columbia 65201
(314) 443-5225

Futureworld Inc.
12304 Manchester Rd.
Des Peres 63131
(314) 965-4540

Computer Country
235 Dunn Rd.
Florissant 63031
(314) 921-4434

Computerland/Springfield
1950 B. South Glenstone
Springfield 65804
(417) 883-7085

MONTANA

Team Electronics No. 035
P.O. Box 2154
613 Central Ave.
Great Falls 59401
(406) 453-3246

Team Electronics No. 037
1208 W. Kent
Missoula 59801
(406) 549-4119

NEBRASKA

Team Electronics
148 Conestoga Mall
Hwy. 281 & 13T
Grand Island 68801
(308) 381-0559

Team Electronics No. 027
2055 O Street
Lincoln 68510
(402) 435-2959

Byte Shop
8525 Park Dr.
Omaha 68127
(402) 339-7350

Team Electronics No. 028
304 S. 72nd Street
Omaha 68114
(402) 397-1666

NEW HAMPSHIRE

Lafayette Radio/Audio of New
England 31-1/2 So. Main Street
Concord 03301
(603) 225-3313

Audio of New England
777 So. Willow St.
Manchester 03103
(603) 668-4400

Computer Mart
170 Main Street
Nashua 03060
(603) 883-2386

Computerland
419 Amherst
Nashua 03060
(603) 889-5238

NEW JERSEY

Brielle Radio
Higgins & Ashley Ave.
Brielle 08730
(201) 528-7773

Computer Emporium
Bldg. 103 Ave. of Americas
Cherry Hill 08002
(609) 667-7555

Computerland/Cherry Hill
1442 E. Rt. 70 Pine Tree Plaza
Cherry Hill 08034
(609) 795-5900

Video World
Village Green Shopping Center—RT
E. Brunswick 08816
(201) 254-4111

Computer Mart of New Jersey
501 Route 27
Iselin 08830
(201) 283-0600

M & M Opticals & Electronics
Jackson Rd.
Medford 08055
(609) 654-2100

Computerland
2 Dehart
Morristown 07906
(201) 539-4077

Computerland/Bergen City
35 Plaza Rt. 4W
Paramus 07652
(201) 845-9303

Micro Business Systems
Pine Brook Plaza Rt. 46
Pine Brook 07058
(201) 575-9468

Computer Corner of New Jersey
240 Wanague Ave.
Pompton Lakes 07442
(201) 835-7080

Computer Encounter
2 Nassau St.
Princeton 08540
(609) 924-8757

Typetronic Computer St.
806 Rt. 17
Ramsey 07446
(201) 825-7770

Computer Hut Inc.
15 Route 10
Succasunna 07876
(201) 584-4977

Shore Computers
3 Washington St.
Toms River 08753
(201) 341-2288

NEVADA

Century 23
4566 Spring Mountain Road
Las Vegas 89102
(702) 876-7997

Home Computers
1775 E. Tropicana #2
Las Vegas
(702) 736-6363

Byte Shop
4104 Kietzke
Reno 89504
(702) 826-8080

NEW YORK

Micro Systems Store Inc.
269 Osborne Rd.
Albany 12211
(518) 459-6140

Computerland
1612 Niagara Falls Blvd.
Buffalo 14150
(716) 836-6511

Computerland/Nassau City
79 Westbury Ave.
Carle Place 11514
(516) 742-2262

Computer Shop of Syracuse
3470 Erie Blvd. E.
Dewitt 13214
(315) 446-1284

Computer Tree
409 Hopper Rd.
Endwell 13760
(607) 748-1223

The Binary Orchard
S-5854 Camp Rd.
Hamburg 14075
(716) 648-7167

Computerland
225 Elmira Rd.
Ithaca 14850
(607) 277-4888

Micro World Computer Store
435 Main St.
Johnson City 13790
(607) 798-9800

Byte Shop East
2721 Hempstead Turnpike
Levittown 11756
(516) 731-8116

L.I. Computer
General Store Inc.
103 Atlantic Ave.
Lynbrook 11563
(516) 887-1500

Micro Computer Systems
1311 Northern Blvd.
Manhassett 11030
(516) 627-3640

Eastern Tech Electronics
213 Broadway
Manands 12204
(518) 434-1412

Future Byte/Trimex
Route 11
Mooers 12958
(514) 861-3120

Byte Shop
130 E. 40th Street
New York 10016
(212) 687-5001

Computer Factory
485 Lexington Ave.
New York 10017
(212) 687-5001

Computer Mart of New York
118 Madison Ave.
New York 10016
(212) 686-7923

Datel Systems Corp.
1211 Ave. of the Americas
New York 10036
(212) 921-0110

Harmony House II
1167 York Ave.
New York 10021
(212) 751-9188

ASD Home Computer Center
Van Wyck Plaza
Poughkeepsie 12603
(914) 473-9400

The Computer Store
2423 Monroe Ave.
Rochester 14618
(716) 244-5000

Video World
2716 Erie Blvd. East
Syracuse 13224
(315) 446-5357

The Computer Corner
White Plains Mall
White Plains 10601
(914) 949-3282

NORTH CAROLINA

Byte Shop
6341 Albemarle Rd.
Charlotte 28212
(704) 568-8100

Computer Room
1729 Garden Terrace
Charlotte 28203
(704) 377-9821

Computerland/Charlotte
3915 E. Independence B
Charlotte 28205
(704) 536-8500

Futureworld
2514 University Dr.
Durham 27707
(919) 489-7486

Byte Shop
218 N. Elm St.
Greensboro 27401
(919) 275-2983

Carolina Business Computers
350 3rd Ave. N.W.
Oakwood Center
Hickory 28601
(704) 328-3939

Byte Shop
1213 Hillsborough St.
Raleigh 27605
(919) 833-0210

Rom and Rams
Crabtree Valley Mall
Raleigh 27612
(919) 781-0003

NORTH DAKOTA

Team Electronics No. 030
P.O. Box 1512
2304 E. Broadway
Bismark 58501
(701) 223-4546

Team Electronics No. 081
West Acres Shopping Center
Fargo 58102
(701) 282-4562

Team Electronics No. 026
1503 11th Ave. Box 1277
Grand Forks 58201
(701) 746-4474

Team Electronics No. 032
P.O. Box 536
209 11th S.W.
Minot 58701
(701) 852-3281

Team Electronics No. 146
109 Main St.
Williston 58801
(701) 572-7631

OHIO

The Basic Computer Shop
2671 W. Market St. Fairlawn P.
Akron 44312
(216) 867-0808

Cincinnati Computer Store
4816 Interstate Drive
Cincinnati 45246
(513) 874-0600

21st Century Shop
16 Convention Way
Cincinnati 45201
(513) 651-2111

Digital Design
645 Walnut St.
Cincinnati 45202
(513) 421-5005

Graham Electronics Supply Inc.
239 Northland Blvd.
Cincinnati 45246
(513) 772-1661

Computerland/Columbus
6429 Busch Rd.
Columbus 43229
(614) 888-2215

Personal Computers
3264 E. Main St.
Columbus 43213
(614) 236-8966

Computer Solutions
1932 Brown St.
Dayton 45409
(513) 223-2348

Computerland/Cleveland East
1288 Som Center Rd.
Mayfield Heights 44124
(216) 461-1200

OKLAHOMA

High Technology
1102 D Ave.
Lawton 73501
(405) 353-4497

Pro-Am Photo & Microcomputer
513 W. Gray
Norman 73069
(405) 364-5992

Bits Bytes and Micros
2918 N. MacArthur Blvd.
Oklahoma City 73127
(405) 947-5646

Team Electronics No. 086
1867 Penn Sq.
Oklahoma City 73118
(405) 848-5573

Team Electronics No. 115
7000 Crossroads Sq. 2010
Oklahoma City 73149
(405) 634-3357

High Technology
2601-D S. Memorial
Tulsa 74129
(918) 664-9754

Team Electronics No. 077
5305 E. 41st
Tulsa 74135
(918) 683-4575

Team Electronics No. 144
7021 S. Memorial
Woodland Hills Mall
Tulsa 74133
(918) 252-5751

OREGON

Team Electronics No. 151
1023 S.W. First
Canby 97013
(503) 266-2539

The Computer Store of Corvallis
2015 N.W. Circle Blvd.
Corvallis 97330
(503) 754-0811

Custom Computer Corp.
259-2 Barnett Rd.
K-Mart Plaza
Medford 97501
(503) 779-2983

F & H Sound Production
1516 S.W. Emigrant
Pendleton 98701
(503) 276-3772

Camera & Computer Emporium
921 S.W. Morrison
Portland 97205
(503) 228-5242

Team Electronics No. 129
2230 Fairground Rd. N.E.
Salem 97303
(503) 364-3278

Computerland
12020 S.W. Main St
Tigard 97223
(503) 620-6170

PENNSYLVANIA

Erie Computer Co.
1253 W. 8th Street
Erie 16502
(814) 454-8691

Personal Computer Corp.
Frazer Mall
Frazer 19355
(215) 647-8464

T.J. Enterprises
Rt. 40 # E
Grindstone 15442
(412) 785-5311

Computermart
550 De Kalb Pike
King of Prussia 19406
(215) 265-2580

Computerland/Harrisburg
4644 Carlisle Pike
Mechanicsburg 17055
(717) 763-1116

The Computer Workshop
   of Pittsburgh Inc.
4170 William Penn Hwy.
Murraysville 15668
(412) 327-0455

SOUTH CAROLINA

Byte Shop No. 32
1920 Blossom St. P.O. Box 5144
Columbia 29205
(803) 771-7824

CDS Microcomputers
214 W. Evans St.
Florence 29501
(803) 669-3716

Datamart Inc.
1901 Laurens Rd./Ye Olde Towne
Greenville 29607
(803) 233-5753

TENNESSEE

Rush Electronics Inc.
1315 Bluff City Hwy.
Bristol 37620
(615) 764-0831

Eastern Microcomputer Store
5613 Kingston Pk.
Knoxville 37919
(615) 584-8365

Computerlab of Memphis
627 S. Mendenhall Rd.
Memphis 83117
(901) 761-4743

Opus 2
4284 Summer Ave.
Memphis 38122
(901) 682-2455

Doc's Computer Shop
5755 Nolensville Rd.
Nashville 37211
(615) 834-5638

TEXAS

Computer Corner
1800 S. Georgia
Amarillo 79109
(806) 353-5618

Computer Encounters Inc.
3440 Bell, Suite 226
Amarillo 79109
(806) 355-9917

Computerland
3300 Anderson Ln.
Austin 78757
(512) 452-5701

Computers 'N' Things
2825 Hancock Dr.
Austin 78731
(512) 453-5970

Microcomputer Shoppe
5301 Everhart SP H
Corpus Christi 78411
(512) 855-4516

Compushop
13929 N. Central Ave.
Dallas 75243
(214) 234-3412

Computer Imagineering, Unltd.
2825 Valley View Lane, Suite 112
Dallas 75234
(214) 247-6393

Computerland/Dallas
8061 Walnut Hill Ln. Suite 912
Dallas 75231
(214) 363-2223

KA Computer Store
1220 Majesty Dr.
Dallas 75247
(214) 634-7870

Ram Micro Systems
6353 Camp Bowie Blvd.
Ft. Worth 76116

Compu Shop
211-A FM 1960 W (Cypr. Sta. C)
Houston 77090
(713) 893-2060

Computer Craft
3211 Fondren
Houston 77063
(713) 977-0664

Computerland
6439 Westheimer
Houston 77057
(713) 977-0909

Computerland/Houston Bay Area
Camino Village
17647 El Camino Rd.
Houston 77058
(713) 488-8153

Mr. Computer
744 FM 1960 S., Ste. E
Houston 77090
(713) 444-7419

Computer Patch
Santa Fe Square
Odessa 79762
(915) 563-3506

Byte Shop
1474 W. Spring Valley Rd.
Richardson 75080
(214) 234-5955

Concho Communications
3102 Knickerbocker Rd.
San Angelo 76901
(915) 949-8365

The Computer Shop
6812 San Pedro
San Antonio 78216
(512) 828-0553

Computer Solutions
5135 Fredericksburg
San Antonio 78229
(512) 341-8851

The Computer Center
210 Free-Mar Valley
Wichita Falls 76301
(817) 723-6006

UTAH

Computers Made Easy
242 N. University Ave. # 211
Provo 84601
(801) 377-5703

Home Computer Store
P.O. Box 9372
2343 E. 3300 South
Salt Lake City 84109
(801) 484-6502

Computerland/SLC
161 E. 2nd South
Salt Lake City 84111
(801) 484-4416

VERMONT

Macdata
733 Queen City Park Rd.
S. Burlington 05401
(802) 862-8050

Computer Mart of Vermont
159 Pearl Street
Essex Junction 05452
(802) 879-1382

VIRGINIA

Computers Plus Inc.
678 S. Pickett St.
Alexandria 22304
(703) 751-1115

Home Computer Center
12588 Warwick Blvd.
Newport News 23607
(804) 595-1955

Computer Techniques
9215 Midlothian Tnpk.
Richmond 23235
(804) 320-7933

The Computer Place
2718 Colonial Ave. S.W.
Roanoke 24015
(703) 982-3661

The Computer Workshop of
   Northern Virginia
5240 Port Royal Rd.
Springfield 22151
(703) 321-9047

Computerland/D.C.
8411 Old Courthouse Rd.
Vienna 22180
(703) 893-0424

Home Computer Center
2927 Virginia Beach Blvd.
Virginia Beach 23452
(804) 340-1977

WASHINGTON

Computerland
14340 N.E. 20th
Bellevue 98007
(206) 746-2070

Western Micro Computer Center
4204 Guide Meridian
Bellingham 98225
(206) 676-9558

Computerland
1500 So. 336th St.–Pkwy. Ctr.
Federal Wy. 98003
(206) 838-9363

Korten's Inc.
1400 Commerce Ave.
Longview 98632
(205) 425-3400

Omega Stereo
5421 196th Ave. S.E.
Lynwood 98036
(206) 775-7585

Omega Stereo
839 106th Ave.
N.E. Bellevue 98004
(206) 455-1138

Ye Olde Computer Shoppe
1301 George Washington Wy.
Richland 99352
(509) 946-3330

Empire Electronics
616 S.W. 152nd St.
Seattle 98166
(206) 244-5200

Omega Computers
1032 N.E. 65th
Seattle 98115
(206) 522-8220

Electro-Mart Factory Direct
E. 3611 Sprague Ave.
Spokane 99202
(509) 535-2451

Computerland
8791 S. Tacoma Way
Tacoma 98499
(206) 581-0388

Cliff Miller's Cameras
2025 Yakima Mall
Yakima 98901
(509) 575-8806

WEST VIRGINIA

Summerfield Sound Co. Ltd.
134 Norway Ave.
Huntington 25705
(304) 529-6099

WISCONSIN

Team Electronics No. 068
5300 S. 76th
Greendale 53129
(414) 421-4300

The Byte Shop of Milwaukee
6019 W. Layton
Greenfield 53220
(414) 281-7004

Team Electronics No. 088
2619 Milton Ave.
Janesville 53545
(608) 756-3150

Team Electronics No. 017
1505 Losey Blvd. S.
Lacrosse 54601
(608) 788-2250

American TV
West Beltline Hwy.
Madison 53713
(608) 271-1221

Computerland/Madison
690 S. Whitney Way
Madison 53711
(608) 273-2020

Team Electronics No. 008
3365 E. Washington Ave.
Madison 53704
(608) 244-1339

Computerland/Milwaukee
10111 W. Capitol Dr.
Milwaukee 53222
(414) 466-8990

Team Electronics No. 015
7512 W. Appleton Ave.
Milwaukee 53126
(414) 461-7800

Team Electronics No. 075
3301–3500 S. 27th St–Southgate
Milwaukee 53215
(414) 672-7600

Team Electronics No. 097
7700 W. Browndeer Rd.
Milwaukee 53223
(414) 354-4880

Video Images
11521 W. North Ave.
Milwaukee 53214
(414) 778-0210

Fox Valley Computer Store
218 No. Commercial St.
Neenah 54956
(414) 725-3020

Colorton TV
2111 Lathrop
Racine 53405
(414) 637-2003

Team Electronics No. 018
2207 Grand Ave.
Wausau 54401
(715) 842-3364

WYOMING

Team Electronics No. 126
207 S. Montana
Casper 82601
(307) 235-6691

Team Electronics No. 152
Cole Shopping Center No. 432
Cheyenne 82001
(307) 635-2836

D D Camera Corral
60 Broadway
Jackson 83001
(307) 733-3831

CANADA

CompuShop
#103 Horizon Fourteen
723 14th Street N.W.
Calgary ALB Canada T2N 2A4
(403) 283-0751

CompuShop
4014 MacLeod Trail South
Calgary Alberta T2G 3R7
(403) 243-3846

The Computer Shop
3515 18th St. S.W.
Calgary ALB Canada T2T 4T9
(403) 243-0301

Central Distributors Ltd.
350 Des Erables
Lacine QB Canada H8Z 2P9
(514) 364-4222

Cesco Electronics
4650 Jean Telon St. W.
Montreal, QB H4P 101
(514) 335-5511

Compucentre Computer Center
Place Ville Marie
Montreal QB H1J 1Z4
(514) 866-0475

Futur Byte Computers
1191 Phillips Sq.
Montreal H3P 2Z1
(514) 861-3120

Compucentre Computer Center
Place Bonaventure
Montreal QB
(514) 866-5944

Compumart
411 Roosevelt Ave.
Ottawa ONT K2A 3X9
(613) 725-3192

Computer Innovations Ltd.
171 Slater St.
Ottawa ONT
(613) 233-8413

Custom Computing Systems, Inc.
No. 3-204 2nd Ave. North
Saskatoon SK S7K 2B5
(306) 242-7808

Computermart
1543 Bayview Ave.
Toronto Ontario M4G 3B5
(415) 484-9708

Computerland/Winnipeg
715 Portage Ave.
Winnipeg Mant. R5G 0M8
(204) 772-9519

JAPAN

BMC International
Uemachi Bldg. 3F
No. 27 5-Chome Tanimachi
Higashi-Ku, Osaka 540, Japan
Osaka 768-7791

ESD Labs
6-16-3 Hongo Bunkyo
Tokyo Japan

Kashiwagi Research Corp.
2-19-11 Aobadai Meguru-Ku
Tokyo, Japan
03-719-4641

MEXICO

Antonio Trevino Salazar
Sierra Nevada 760
Mexico 10 DF Mexico
520-06-19

Micro Computadoras, SA
Ave. Popocatepetl 196 Local No. 1
Mexico 13 DF
(905) 524-9549

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