The Book of APPLE SOFTWARE 1984

Edited by
Jeffrey Stanton, Robert P. Wells, Ph. D.,
Sandra Rochowansky, and Michael Mellin, Ph. D.

The one book that should be on every Apple™ computer owner's shelf.
The Book of Apple Software 1984

PROMOTION

Edited by Jeffrey Stanton, Robert P. Wells, Ph.D., Sandra Rochowansky, and Michael Mellin, Ph.D.

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THE BOOK DIVISION
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INTRODUCTION

Any computer is only as good as the software that runs on it. As an Apple microcomputer owner, you are faced with a bewildering selection of software for a variety of applications. Programs offering similar functions have advantages and disadvantages as well as different prices, and it can be difficult to find the right program to meet your needs among the many competing for your software dollars. This is especially critical when a wrong choice could cost you hundreds of dollars, time, and a great deal of frustration.

There is, therefore, a great need for this fourth annual edition of The Book of Apple Software, an evaluative guide to hundreds of the most important software programs available for the Apple line of computers. It offers an inexpensive way to look for the exact program or programs to suit your needs. In the following pages you will find descriptions of some of the most popular, as well as specialized software programs presently available. We hope you will use it as a reference guide, as many software dealers do, to assist you in making informed and intelligent decisions when investing in software.

The Book of Apple Software first appeared in 1980. As an independent, consumer-oriented software review source, it was the first book of its kind and remains an original in the publishing field. It was based on the recognition that even well-stocked computer retail stores, the primary place people buy software, could not possibly hope to keep onhand even a fraction of the software available, nor did retail store personnel have the time to adequately review each piece of software that came on the market. It was impossible for the consumer to know what software was even available, or what the differences were between competitively priced packages. The Book of Apple Software and sister publications became an immediate success, remaining a microcomputer best seller year after year. Given the abundance and growing variety of software available today, the need for critical evaluation continues to grow.

The Book of Apple Software 1984 is a critical review book, not a directory listing. If you want a mere listing of available software with perhaps a few lines from the manufacturer describing each product, you would need to go to another kind of reference guide. The Book covers a majority of the most significant programs on the market in a number of key areas; and each program covered here is analyzed in depth. Basic data and grades on important performance categories are summarized at the top, with descriptive information following on the program’s strengths, weaknesses, and how it compares to similar packages. No public domain software is reviewed here, only commercial offerings.

The reviews and evaluations are produced by experts in their various fields. Accountants were given accounting packages, office managers and professional writers tested word processing programs, teachers were given educational programs, and so on. These packages were field tested—in the office, in schools, or whatever environment was appropriate. The Book Company does not review products in-house, or maintain a staff of professional writers. Instead, our reviewers are consumers, just like our readers (in fact, it is our readers who comprise our reviewing staff). They have no particular ax to grind, except the ax of consumer protection. We strive to maintain their freedom to report on the software exactly as they see fit. For this reason, we do not publish the name of the reviewer with each review, but give instead our collective thanks.

The programs reviewed in this book are not demonstration packages, but the real programs, just as you would purchase them off the shelf. If a reviewer has a problem with a particular package he calls up vendors for customer support, without identifying himself as a reviewer, to find out exactly the kind of help a vendor provides. (This sometimes accounts for the difference between Vendor Support grades for different programs from the same company.) We’re not perfect. We sometimes make mistakes, but we are open to correction and take criticisms very seriously indeed. Reviews will always contain a subjective element, but everything has been done to ensure as fair and honest an evaluation as possible.

Trends
The support that vendors give their customers after purchasing a program has always been a problem, but is becoming an even thornier issue. Putting the burden of customer support on software retailers, which some companies resort to, is clearly unsatisfactory. Charging customers for phone support, where at least the user can talk to someone whose chief function is to answer such questions, is a much better idea. Many companies have lowered the initial price of the program and instituted a policy of charging modest fees to those customers requiring unusual
amounts of support. The notion of charging only those customers who need extra help, rather than penalizing everyone with higher cost software, remains attractive. Also, the complexity of some programs warrants a support policy of this nature. But some companies have indiscriminately raised the cost of telephone support, a few charging $50.00 an hour or more for this service and stating in their documentation that customers had better have their bank card ready when calling in for help.

In addition, the hours kept by customer support personnel at some companies leave a lot to be desired. When a young company is in the “cottage industry” stage, this sometimes cannot be avoided. But some well-established companies still keep limited, irregular hours, such as 10:30 to noon and 2:30 to 4:00 on Mondays and Thursdays. This, too, is unsatisfactory. Customer support, we hope, is looked upon as an essential part of the software business, and should assume normal business hours during the weekdays.

Turning to marketing and manufacturing trends for Apple, Inc., we can note several important directions in Apple’s campaign to retain its leading position in the home computer field. The first of these, we are pleased to say, involves Apples and education. In a concerted campaign, Apple donated more than 9,000 computers to California schools in the 1983 year. The program called “Kids Can’t Wait,” emphasizes the strategic importance of sales to the educational market. While this has provided Apple with a sizeable tax write-off, the marketing strategy is nonetheless laudable. Simply put, Apple hopes that the students and educators will use what they’re familiar with, namely Apple computers, and that they will bring the same computer into their own homes. This expansion into the field of education stands to benefit students, teachers, and Apple sales in the 1984 year.

The next shift in the 1984 tide looks to be the slow phasing out of the Apple III. A reasonable estimate of the Apple III’s shipped in 1983 is about 50,000, a mere one-tenth of the healthy (combined) half million mark set by IIe’s and II+. The III just hasn’t been as successful as analysts thought. This is due to a range of factors, including its price, the lack of compatible software, II, II+, and IIe market dominance, and the notable indifference shown the III by the business community as a whole. As it stands, Apple is dramatically lowering the price of the III in the 1984 year, and we don’t expect it to compete favorably against other members of its own family.

The Apple III’s sophisticated sister, the Lisa, also sold well under the projected sales figures for 1983. With a $10,000 price tag, this computer represents a serious investment for the would-be owner. Although it is sleek and offers state of the art features (including a mouse and built-in database and file management capabilities), its price seems to have proved too intimidating for the buyer. Again, the effect on marketing has seen a general lowering of the price which may, in fact, put the Lisa as the “best buy” for first quarter sales.

To offset 1983’s disappointments entering the high end of the market, Apple is introducing Lisa’s little brother, called “McIntosh,” which is rumored to be the new string in Apple’s bow for continued success in 1984. The McIntosh represents a scaled-down version of the Lisa and will be selling for a fraction of the cost. Still, it will have much to do to compete with Apple’s own II+ and IIe.

Finally, continued upward sales of the Apple II+ and IIe seems assured. Combined sales, as previously noted, came to roughly a half million machines for 1983. What makes the II+ and IIe such attractive buys is the all-around fine performance of the machines, coupled with an affordable price tag, and the widest range of software available for any personal computer currently on the market. The inclusion of PRO-DOS (an upgraded DOS) will greatly expand the IIe’s versatility, as will the availability of Profile hard disks. Indeed, the IIe looks like one of the most cost-effective machines on the market, with all indications pointing to continued ascendancy.

**Forecasts**

Although still regarded primarily as a business machine, the IBM-PC has made huge inroads into the home computer arena. IBM is on the move and poses the most substantial challenge to Apple’s market. Indeed, we currently estimate IBM to control approximately 30% of the personal computer market, and this impetus is growing steadily. Apple, on the other hand, maintains a hold on an estimated 25% of the industry, and its movement appears to be a good deal slower by comparison.

But Apple is not to be underestimated by any means. It is a company that thrives on challenges and is built on innovative marketing strategies and excellent dealer relations. It can also claim the largest selection of machine compatible software available on the market today (a deficiency which has caused problems for such companies as Commodore, Timex/Sinclair, and Texas Instruments). Apple has above all a firm foothold and a solid reputation, and in an industry that moves as rapidly as this, that is the code for continued success.
APOLOGY IN ADVANCE

While we have attempted to include the majority of known and available Apple software, we realize that there are a number of programs which have not been included. In most cases, omissions are a result of our not being aware of a program's existence or our inability to obtain and review a program in time to meet our press deadlines. We apologize for these omissions, and will try to keep you as current as we can with supplemental issues of The Book. We must also mention that software vendors change addresses frequently, and that the suggested retail prices of various products likewise change often. The information published here was correct to the best of our knowledge at the time we went to press, but is subject to change without notice.

We have made every effort to present fair and objective evaluations of Apple software. But it is appropriate to point out here that neither our reviewers nor The Book Company will be held liable for any mistakes or omissions that have occurred. We welcome comments from our readers, of course, and in future editions we will correct or revise errors which are brought to our attention.

Remember: The Book is merely intended as a guide to owners and would-be owners of Apple computers. As a consumer, it is your responsibility to do whatever further investigation you deem necessary before making your software purchases.

THANKS TO THE REVIEWERS

We must gratefully acknowledge the reviewers who have made the 1984 edition of The Book of Apple Software possible. They have labored many hours to share their knowledge and experience with other owners and prospective owners of Apple computers. Our thanks to:

Randall Backus
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John Klein
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Thomas W. Laich
Pieter Lechner
George Lee
Michael Lee
Monty Lee
R. Garner Lewis
Mike Livingston
Mary Majors
Janet E. Meizel
Mike Mikus
J. Kent Miller
Leslie Miller
Donald W. Moore
Don Olson
Elmo Peeler
Connie Peters
Margery A. Pinet
Paul R. Pinet
Jim Ray
Bruce Roberts
Jerry Rogan
Susie Sadlier
David Sanford
Alan Schein
Kim Schuette
Tom Simondi
Paul Smith
Eugene Stark
Grace L. Suarez
Jane Suenderman
Stephen Taffee
Christine Tchalakian
John R. Tkach
Richard S. Treptow
Patrick Turpin
Keith Valenza
Henry Waldman
Raymond Watt
Colin Whipple
Christian Wilson
Don Worth
CRITERIA

Each program included begins with a listing of basic facts and a summary rating, followed by the review commentary. We employ the familiar A through F grading system:

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<tr>
<td>(Superior)</td>
<td>(Good)</td>
<td>(Average)</td>
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Basic facts about a program include its name, the company which manufactures it, its suggested retail price, and several categories which are not entirely self-explanatory:

**Hardware Requirements:** The hardware and other peripheral units required in order to run the program. Most programs will run on the standard Apple II/II+ with 48K of RAM, a monochrome screen, and one or two (usually two) disk drives. System requirements are simply abbreviated to “48K.” Other programs may require greater RAM capacity, a color adapter, a printer, or some other enhancement to run properly. These, too, will be abbreviated: e.g., “128K,” “64K, printer,” “96K, 1200 Baud modem,” etc.

**Language:** Programs are written in a variety of programming languages apart from Applesoft BASIC. Some of these require extra memory cards, operating systems, or other enhancements. Machine language, for example, runs faster than BASIC and is therefore desirable in games or graphics programs. You should be aware of the programming language before you buy a program.

**Availability:** This is on a one to ten scale, indicating whether a program is available from few dealers or many (10 is nearly all dealers).

**Disk or Tape:** The days of Apple programs coming on cassette tape are all but gone; yet there are a few programs still available in both forms. An asterisk (“*”) indicates that the disk or tape is copy protected.

**GENERAL**

These are grading criteria that apply to almost all programs, regardless of category:

**Overall Rating:** This takes all facets and evaluation criteria of the program and, to some extent, comparable programs, into consideration.

**Value For Money:** Is the purchaser getting what he is paying for? Is it good value compared with similar programs? Are there “extras” available at reasonable prices?

**Vendor Support:** Does the software company back its product? Are they available to answer questions? Are they courteous and helpful? Will they replace a defective program disk, get you up and running quickly, repair damaged data disks? Are the prices charged for support excessive?

**Documentation:** Does the documentation answer all questions clearly, and is it extensive? Does it offer a tutorial? Is it well indexed? Is the printing easy to read, and the layout attractive and easy to follow? Does it make use of illustrations? Does it explain processes in technical jargon or plain English?

**Error Handling:** Does the program “crash” during execution? Are there proper error-trapping routines? Are the error messages you get on screen mysterious or easily understood?

**Reliability:** Does the program consistently do what it's supposed to do? Does it do less than it claims to offer?

**Visual Appeal:** Does the program look attractive and well-designed on the screen? Is color used effectively? Does it produce clear graphs, charts, reports, and other illustrations? Does it scroll smoothly from screen to screen? Is it easy to design your own screens? Are its menu options easily understood?

**BUSINESS**

As the title suggests, those programs of a “practical” nature apart from educational and utility packages, even if designed for home use and not the office. One specific criterion not described above is:

**Ease of Use:** Are the screen designs and documentation clear and well laid out, enabling the new user to run the program with a minimum of difficulty? Does it involve annoying features, such as a lot of disk swapping or slow response time, in its operation.
EDUCATION

Any program which purports to teach or offer instruction. Specific criterion includes:

Educational Value: How effectively does the program teach its subject? Is the subject matter of limited or broad appeal?

UTILITIES

In general, those programs whose purpose is to enable you to use your computer more effectively. One criterion especially important to this category is:

Usefulness: Does the program offer a good, necessary, or important tool to the user?

ARCADE GAMES

This category refers to those games considered to be of the "shoot-'em-up" or "action" type. Specific criteria for this category include:

Challenge: Does the game challenge the participant, or is it a game one will tire of quickly?

Controllability: How responsive is the game to either keyboard, paddle, or joystick control?

Creativity: Has the author been creative and imaginative, or not?

Game Concept: Is the idea behind the game sound? Does it require strategy and offer a goal?

Game Depth: Does the game have much of a scenario? Does it offer a number of challenging levels?

Skill Involved: Does the game require strategy and skill, or is it based mostly on luck?

Holds Interest?: Is this game one you would like to play over and over, or is it one that you will soon lose interest in?

Graphics: Was excellent use made of the computer's graphics capabilities, or not? Are the visual effects pleasing or dull?

ADVENTURE GAMES

These games are those considered to be of the "puzzle," text, or (maze) adventure variety. Special criteria for this category includes:

Puzzle Quality: For adventures, how complex are the puzzles or riddles in the game? Does the mapping follow a logical sequence?

Originality: Is the game novel and inventive, or does it smack of conformity in concept and execution?

Vocabulary: For adventure games, how good is the parser, or how well does it understand words and commands that you input?

Text Quality: Are the descriptions imaginative, or bland?

Save/Restore: Does the game have a save-game feature, allowing you to continue later, and how accessible is it?

Difficulty: What is the level of difficulty encountered in this game? Is it challenging, or suited to novice adventure game players?

Graphics and Holds Interest: as above.

MISCELLANEOUS

You will notice that some programs are discussed but not rated. This will occur for one of several reasons:

(A) We received the program too close to the press deadline to thoroughly review it. We felt, however, that the program was of sufficient merit and/or importance to warrant some kind of consideration. Given the time constraints, we tried at least to describe it. A complete review should follow, either in a supplemental issue of The Book or a later edition.

(B) Some programs fall into such specialized categories that a reviewer with expertise in that particular area was not immediately available. However, the program appeared to be of sufficient worth to merit some comment.

(C) The Book Company is a division of a larger organization, Arrays Incorporated, which is engaged in software publishing. We have always provided impartial evaluations of software products, and therefore any programs that could involve a conflict of interest are not rated.
A CALL FOR REVIEWERS

Because software for the Apple line of personal computers continues to proliferate at an amazing pace, and the knowledge necessary to pick software wisely from a host of similar programs continues to expand, the need for our review service has never been greater.

We wish to take this opportunity to issue a call for more reviewers. The variety of microcomputer applications is increasing, and we would like to enlist the assistance of Apple-owning experts in different fields. We want to make The Book as complete as possible, because frequently the only real notice the public will have of specialty programs will be in The Book. But because we provide consumer reports on programs, not simple directory listings, we need specialists to handle certain programs.

There are several benefits associated with being a reviewer, not the least of which is the possibility of amassing software that ties into your particular area of interest at no cost to you. If indeed you wish to become a reviewer, please send us a description of your experience, the type of hardware that you own, and indicate your area of interest and expertise. We would also like a sample review (whether we've evaluated the program already or not), to give us an idea of your writing style. Please send the information and sample to:

The Book Company
11223 S. Hindry Ave.
Los Angeles, CA 90045
ATTN: Review Department

And please be patient. It will take us a while to deal with all of the correspondence.

ATTENTION: SOFTWARE PUBLISHERS AND AUTHORS

The Book of Apple Software presents you, the producer of software, with a unique opportunity to greatly increase the visibility of your programs. There is no other single source of objective software evaluations for Apple owners like The Book. Our sales, surveys, and projection figures indicate that a substantial percentage of Apple owners either own or have consulted The Book before making their software purchases. Likewise, a large number of Apple dealers use The Book when recommending software for their customers and as a reference to assist themselves in ordering products for their stores.

The task of locating, acquiring, and then reviewing the increasing number of software programs for Apple computers is a huge one, and getting more complex each week. We need your help to keep us informed about new products and enhanced versions of existing programs and to supply us with copies for evaluation. At the same time, we will help you by providing you with a showplace for your product that is effective, far-reaching, and yet considerably less expensive than any form of advertisement you may be contemplating. Indeed, The Book is often the only substantial notice the public may receive of interesting specialized programs. In terms of valuable publicity and increased sales, many companies have found it to their advantage to be included in The Book.

The cost to you is relatively little. All we require is two copies of your software for review purposes. Accompanying the software, we also ask that you include a suggested retail price list, information regarding necessary hardware requirements, and the name of a person to contact in case our reviewers have any questions.

Please send your review copies and relevant information to:

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Business programs remain, of course, one of the chief strengths of the Apple. Of all the different categories, business gives you the widest variety of software applications packages from which to choose. And generally the quality of these offerings is high, reflecting the strong competition among software publishers.

But all software is not created equal. Business software for your Apple is priced as low as under $50 to more than $1,500. These programs offer widely differing features and functions. For word processing tasks alone there are many different programs available offering a variety of basic to advanced capabilities and reflecting a wide range of prices.

This bumper crop of business software selections and at times startling price differentiation doesn't necessarily mean that one program is "better" than another. It simply means they are different. You must determine which is the best product to meet your individual needs. Picking the best product for you is not easy, and usually not something you can figure out in just a few minutes the way you might pick albums at a record store. If you don't want to write or have someone write a custom program for your business, you've got to consider what you want carefully and study the market of available programs.

The first place to start is by examining how you presently do tasks you want your Apple to do for you. Gather together as much information as you can about how you currently produce reports, construct sales forecasts, monitor your budget, calculate your business profits, or whatever the jobs are. If possible, bring paper samples of what you are doing manually to your local computer store. Examples here might include contracts, form letters, invoices and other business forms, file cards, ledgers, and so on. This information will help you determine the kind of features you would like to see in a program, and give you an idea of your present costs in getting this work done.

Another point to consider is how much information you want to handle. For instance, if you're looking at word processing, think about the average number of pages in your letters and documents, the detail of your contracts, the amount of letters you send out each week. Do you need a mail list program to go with it for the mass distribution of form letters, or a spelling checker to catch your errors? If you send out many form letters and/or contracts, how much do they differ from each other?

The same foreknowledge of tasks is needed for determining the usefulness to you of other types of programs. In selecting database programs, for example, you should be able to estimate how much information you will want to master, and how that information needs to be organized. What kind of reports do you want? Do you want to include graphics, and, if so, what type? Do you want to combine charts, graphs, and other kinds of illustrations in single reports, or be able to send them directly to typesetting equipment? Do you want to network your Apple with other computers and electronic workstations? Is telecommunications—for example, electronic mail—an important part of your business operation? Will you require a password security system in order to protect sensitive information?

These are just a few of the kinds of questions you should be asking yourself in computerizing your business. Business software for the Apple tends to be more expensive than for other kinds of applications. You'll want to get the most for your money, so take the time necessary to find out as much as you can about packages you are interested in, and whenever possible try them out before purchasing them.
Modeling

So many spreadsheet and modeling-type programs are currently on the market that it presents a bewildering choice to the potential buyer. This introduction will attempt to describe what constitutes a modeling program and outline briefly the procedures for using such a program. However, it is first appropriate to discuss what a model is and what it is used for. A firm definition of terms is necessary.

Computer models are an electronic representation of reality. They exist in many forms. Recently, with the advent of high speed computers, a new form of model is appearing—the math model. For a considerable period of time, scientists have been attempting to describe reality using mathematical terms. The purpose of this description is to predict a future occurrence, given different sets of input assumptions. Such modeling attempts met with frustration until the invention of the high speed computer, because many of the modeling techniques require statistics and repetitive processing when the conditions of the model are changed, and the computations are run many times in order to obtain the optimal result. Because the computer excels in this type of analysis, the elements of a computer modeling system are the actual mathematical representations of the system to be modeled, and provisions for manipulation of that representation.

How can the home computer best be used in modeling? Let's look at the mathematical representation of reality. If we attempt to model a complex system in any detail, we find that the representation rapidly becomes quite difficult to build and interpret, developing into a mathematical construction that is beyond the capability of most home computers. That leaves the small computer to handle only the simplest of mathematical representations—those that require rather simple and straightforward computations. Fortunately, there is a class of models that fit this category and has a large market following: financial models. They are simple, straightforward, and the computations are generally within the capability of home computers. This judgment is reflected in the marketplace, since most of the modeling programs are directed toward financial modeling (either business or personal), and those programs that do allow a broader scope concentrate on financial situations.

Just how complicated can you expect a modeling program to be? Will it help, for example, in the generation of models? The simple answer is yes; however, it is also important to ask if it is economically feasible to produce complex programs. The answer to that is probably no. Remember the definition of a model: a representation of reality, as perceived by each person, is different, and each person must deal with many different applications. To develop a program that will model each of these different realities to suit all needs requires an insight by the programmer that defies imagination. The best we may expect for now is a modeling program that gives you, the user, tools to work with. The actual creation of models will be left to you, to make it as complex or as simple as needed. Perhaps in the future, processing techniques will be developed which will allow the computer to learn in Real-time, and turn general desires into specific model constructions.

What you should look for, then, are modeling programs that best assist you in developing specific types of models. For example, if the model is to be of an engineering system or other type of scientific application, then look for modeling programs that have trigonometric and/or other scientific functions. If a financial model is needed, then such things as depreciation schedules, net present value, and internal rate of return should be available for use. In short, those computational techniques that are generally difficult to program, but necessary to a great many models, should be in the modeling program you buy.

Now, how should the program manipulate the model once it is developed? In the "necessary" category falls the ability to accept the model and to be able to make rapid changes as required. The program should also be able to perform the model calculations in a timely manner and then report the results in a variety of ways. It would be advantageous if the program were able to create graphics, and assist in checking the model's internal logic for you. Other desirable features include the ability to edit data and/or model files, to use multiple data files with any given model, and to create data files from the model runs for later use in other models (or some other program). In short, the program should be as flexible as possible in its ability to handle data and model logic.

You should also give some thought to the form of your model. There are two basic types of modeling programs: spreadsheet and compiler. A spreadsheet is really an electronic worksheet where rows and columns intersect to form "cells." Each cell contains data, text, or a formula that relates that cell to any other single cell or group of cells on the worksheet. VisiCalc is one example of a spreadsheet program. The compiler program presents a model as a file of
equations and variables. The equations use the program’s particular modeling “language,” which generally parallels BASIC. At Run-time, the program will read the equation file and utilize them along with a file containing data to produce the results, which are then displayed or printed as a report. TARGET Financial Modeling is one example of a compiler type program. Either type of program—spreadsheet or compiler—will perform 90% of the modeling the home computer user would be expected to do. Spreadsheets are the most common. For the first-time user, they are probably the most straightforward to employ. On the negative side, however, the spreadsheet, once laid out, is not particularly flexible for reporting the results. Compilers are generally more flexible for reporting the output of a model and will handle more complex problems. But there is no “best” choice. You have to determine what will suit your own needs best.

Finally, consider a structured approach to developing a model and using modeling programs. The first thing you must do is make a very basic decision: what to model. This is more difficult to determine than it may seem. The assumptions that go into the model will have a profound effect on the outcome, and assumptions will be necessary for just about anything more difficult than the simple equation $2+2=?$ (even this equation demands the assumption of base 4 or higher arithmetic; if base 3 is used, the answer is 10). Keep the requirements simple to begin with and only model what is absolutely necessary.

When you determine the end product, sketch out the calculations that must go into that result. Find out what the last step is that gets you to the single number you want; then determine the step(s) to obtain the relevant variables. Next, back up from this intermediate calculation, and so forth, until you get to the variables that are to be entered. If you keep good notes, you should have (in reverse order) a summary of the model calculations. Given these results, go back to pencil and paper and sketch an outline of the type of report you would like to see produced that includes all of the variables to be entered, the intermediate calculations, and the final results. Generally, the variables will be at the top, intermediate calculations in the middle, and results at the bottom. This gives you the logic of the model and at least one report format.

Now, turn on the computer. That’s right, up to this point you have not (or should not have) used the computer. Until you know what you want to do in outline form, the computer will only get in the way. There is no program yet on the market that will really act like a scratch pad—although some are coming close, and many advertise that they are. The way you now proceed is largely program-dependent. In general, you would enter the model logic in some form, either on a spreadsheet or in a logic file for a compiler program. Enter the data, the modeling program takes over, and you compute a result. Note that this is just a result, not necessarily the right result or the answer you want. Everything depends on the logic and assumptions that went into building the model.

The program should now give you options for output—either in report or graphics form (or both). Exercise whatever options you need to get the result you want.

Now comes the fun. Using the model and current data, you should be able to perform sensitivity analyses by changing one variable at a time in order to see how the answer changes in response (“what if” studies). In this way you can see which of the variables have the most control over the model. These variables will probably become the most important in your calculations.

That’s the outline of model building and use in today’s home computer environment. Who knows what the future will bring? Many programs are structured as described above—most of them oriented toward the financial model. The real differences lie in the versatility of handling the model and data, along with the ease of entry and manipulation of those items. Narrow down your choice and then ask to try out the software before making a purchase. You are the one who is going to have to be satisfied.

A final caution. Models are only a representation of reality, and only as good as your modeling data and parameters. If you are not familiar with the calculations that go into the type of model you want to create, have someone there who can do it for you. Unlike game programs, these system models demand that you know what you are doing from the outset. There are very few other types of programs where the maxim “garbage in, garbage out” applies more directly.
Multiplan is one of the most advanced electronic spreadsheet programs on the market. It has virtually all of VisiCalc's capabilities, plus additional ones of its own. The program comes on two disks: a boot disk and a system disk. (The boot disk I received was defective, and the replacement was received in twenty-four days.) The system disk is not protected, so you may make as many copies of it as you need. You can only copy the boot disk once. Multiplan allows you to use either a standard 40-column display, or any of several 80-column cards. There is a utility on the boot disk for configuring the program to your particular system.

The documentation accompanying the program could be substantially improved; the writing style is difficult to understand. Part of the problem with the documentation may be due to the fact that Multiplan is available for many different computers, and the instructions for my version were not specific to the Apple II. For example, the manual refers to a HOME-key, a CANCEL-key, a BACKSPACE, and a TAB-key. My Apple has no keys with these labels. There are sections in the quick reference guide and in the online help that translate these into the actual Apple keystrokes, but it is confusing until you are able to remember the translations.

Multiplan is not a "total load" program. Each time you use the program you must insert the boot disk, remove it, and insert the system disk (which remains in drive one thereafter). The system disk is frequently accessed during the use of Multiplan. If you only have one disk drive, up to 75K of files may be stored on the system disk.

The program offers a number of significant improvements or enhancements over VisiCalc. Some of these are as follows.

(1) VisiCalc only allows you to change column widths globally; Multiplan allows you to set individual column widths.

(2) VisiCalc lets you split the screen into two viewing windows, permitting you to view two different sections of the worksheet at one time. Multiplan lets you view eight windows.

(3) Cell references in Multiplan can be relative or absolute. For example, if the cursor is at row 9, column 10, and you wish to refer to row 3, column 6, you can type in R[-6]C[-4] as a relative reference, or R3C6 as an absolute reference. When you are using the Copy command (the equivalent of VisiCalc's Replicate), the program will not ask you if the references should be copied relatively or absolutely, as in VisiCalc, but will just copy them as you have typed them in.

(4) The Insert and Delete commands are more flexible than in VisiCalc. Multiple and fractional columns or rows may be deleted or inserted at one time.

(5) Individual cells or groups of cells may be locked to prevent the user from accidentally wiping out the contents.

(6) A sort command re-orders rows according to the values within specified columns.

(7) The Name command allows you to assign a name to a cell or group of cells. This name can then be used as an absolute cell reference.

(8) The External Copy command will bring data from a named cell or group of cells in another file to the active worksheet.

(9) Multiplan has significantly enhanced formatting options, including a choice as to the number of decimal points displayed, and an option for inserting commas into large numbers.

(10) Extensive on-line help is available, either by selecting Help from the main command line, or by inputting a question mark during almost any operation.

(11) Multiplan has several arithmetic functions not found in VisiCalc, such as STDEV(List), which calculates the standard deviation of a list of numbers, MOD(N1,N2), which returns the remainder of the first number divided by the second, and several others.
(12) The program does not support DIF files (the means by which VisiCalc passes data to other programs). Instead, Microsoft has designed its own interface file system called SYLK. Considering the number of programs on the market which utilize the DIF format, it would have been better had Microsoft incorporated DIF.

(13) **Multiplan** can read normal VisiCalc files. During the process, all cell references are interpreted as relative references.

(14) **Multiplan**'s Copy command is more powerful than VisiCalc's Replicate. A block of cells can be copied from one position to another with Copy, where Replicate only allows individual cells, rows, or columns to be copied. However, the Copy command can work very slowly if you are copying a large area, and the screen gives no indication that anything is going on for much of that time.

(15) With a 64K Apple II, you will only have 18K of memory available for worksheet space, which is only about half of the memory available with VisiCalc on the same hardware. According to the manual, if you have an Apple IIe with the extended memory, Multiplan will use the additional 64K to give you more worksheet space. In addition, the External Copy command, which allows you to bring in data from other files, partially offsets the relatively small amount of available memory. Of course, there is software on the market to interface VisiCalc with some of the large, 128K memory cards available, such as the Saturn, Legend, and Prometheus. This may or may not happen with Multiplan.

Who would find this program preferable to VisiCalc? It would be easier to answer who would not. First of all, anyone who wants to interface with another program using DIF files cannot use Multiplan for that purpose. Secondly, if you need to create worksheets that are larger than 18K, and are using a II, II+, or a IIe, and cannot afford the extended memory, you cannot use Multiplan. Anyone else should find Multiplan to be much more useful than VisiCalc.

**SUPERCALC**

*Company:* Sorcim  
*Language:* CP/M  
*Hardware Requirements:* 48K

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It’s been said many times in print (and may not be a fair comparison), but SuperCalc is considered to be the VisiCalc of CP/M. Most reviews of SuperCalc turn out to be a comparison between the two programs, and because of their similarities, this is often unavoidable.

SuperCalc is a spreadsheet program in which entries are made into a matrix. Each section of the matrix can be linked by formula to any other section. In addition, text may be entered into and formatted in any cell. The cursor control is through use of a control diamond, or by use of the left and right arrows and space bar (like VisiCalc). Within each cell, formulas may consist of numbers, other cell references, or functions. Numbers up to 16 characters are supported. Text length is limited to 116 characters per cell, and formulas are similarly limited to 116 characters. Numbers too large to fit in a cell will be displayed in scientific notation.

Formulas are formed using standard operators and the following arithmetic functions are supported: SUM, COUNT, AVERAGE, MIN, MAX, INT, and ABS. In addition, some trigonometry functions are supported: SIN, COS, TAN, ASIN, ATAN, EXP, SQRT, LN, LOG10, and PI, IF, OR, AND, and NOT. Conditional expressions may, also be formed. Finally, ERROR, NA, LOOKUP, and NPV functions are supported.

The format commands in SuperCalc are somewhat more extensive than in VisiCalc. Individual column widths may be changed, and if text is entered in a cell with blank entries to the right of it, the text will “spill over” into those cells and remain visible until the cells are filled. The border, which shows row and column locations, may appear on the screen when the spreadsheet is printed. This is especially handy for proofing the spreadsheet. Printing of the sheet may include numbers or formulas, again making proofing easier.
**VISICALC 3.3**

**Company:** VisiCorp  
**Language:** Assembly Language  
**Hardware Requirements:** 48K

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Let's assume you're in marketing and do financial modeling; or you're a businessman or accountant and need a quick accounting statement or cost analysis study considering the effects of variable interest rates; or you're an engineer who needs to do repetitive formula calculations. If so, then *VisiCalc* is not merely a useful program for you, it's indispensable. This program, which initially won an award as the single piece of software that most influenced the growth of the microcomputer industry, has been described as "The program worth buying a computer for."

Briefly, *VisiCalc* is an electronic worksheet. It employs up to 63 columns and 254 rows to work with. You may create any format you wish within these parameters, and perform whatever calculation or manipulation of figures you find desirable. Quite literally, any problem that can be solved by using a calculator or pen and paper can be done by *VisiCalc* better and much, much faster.

Any position on the *VisiCalc* worksheet can be defined as a label, value, or formula. More importantly, any formula can relate to any other positions or combination of positions on the sheet. Whenever any position's value changes, all other items that depend on that value change automatically, without further action on the user's part. For example, say you were doing business forecasting and wanted to increase sales 10% per month. By taking the sales value of the first month at, say, position B1, and simply defining the new month's sales at position C1 as "B1 * 1.1," the C1 value for the second month's sales would be instantly calculated. You may carry on projections through the rest of the year, using constant or variable values. Fortunately, *VisiCalc* has a series of commands, such as "Replicate," which enable the user to easily create rows or columns of repetitious values or formulas, even if each calculation is related to the previous formulas in preceding rows or columns.

*VisiCalc* features a complete set of arithmetic operations (+, −, ×, ÷) and exponentiation; financial functions, such as Net Present Value, Sum, Avg., Min., Max.; and table lookup, plus trigonometric functions. It has added a number of Boolean logic functions for its command structure, such as TRUE, FALSE, NOT, AND, OR, and IF. Additionally, the CHOICE command allows the selection of a particular element within a list, based on the result of another calculation.

Other commands allow the user to fix titles while scrolling the locations in the table, or split the screen in sections so they can see only the portions of the table that they are currently using. Values can be formatted in dollars and cents, scientific or interger numbers, and flushed right or left. New editing features allow you to edit formulas without bothering to retype them from scratch. And one can easily move the cursor around the screen with the standard keyboard commands.

Files can be saved to a disk for later retrieval. Files can be stored as formulas for the calculations on the worksheet or in Data Interchange Format (DIF) for use with *VisiCalc*-compatible programs or other programs using the DIF format. The program also features full compatibility with all line printers. The system allows commands that will suppress or add line feeds and adjust the column width. One simply decides which section of the worksheet is to be printed, places the cursor at the top left, indicates the bottom right of the appropriate block, then prints. Large

*SuperCalc* supports protected cells, so you may create spreadsheets for the novice and be a bit more certain that he/she won't have any trouble using them. Help messages are always available on demand through use of the "?" key. The output command prints or lists the contents of the file, or reproduces all or part of the display. Dump is to the printer, the console, or to a disk for transfer and use in other programs. A Data Interchange Format (DIF) is not presently available for *SuperCalc*, but is expected shortly and may be on the market by the time this is published. Horizontal or vertical windows, either synchronized or unsynchronized, are supported. The spreadsheet may also have horizontal or vertical titles, or both may be made titles.

*SuperCalc* is an excellent spreadsheet program operating in the CP/M environment. It is generally available for many computers, so applications software is easy to obtain. Commercial models are available, and published *VisiCalc* models are easy to reformat for *SuperCalc*. The program's response time is slightly slower than *VisiCalc*, but its increased capability and extra features justify that. The program will not necessarily justify the purchase of the hardware necessary to support CP/M; but if you have it, consider *SuperCalc* for your spreadsheet needs.
worksheets, of course, have to be printed in sections. Either the calculations or the formulas can be sent to the line printer.

The documentation is excellent. Its manual contains a good tutorial for users who have absolutely no experience in programming. It takes between one and two hours to master. A 4 lesson tutorial offers many practical examples and illustrations. The 144-page command reference section offers very good explanations, and some examples of each command using screen illustrations. Best of all, VisiCorp includes a superbly organized chart of all the commands, and a handy foldout reference chart.

To sum up, VisiCalc is a uniquely versatile product applicable to a wide variety of uses and users. VisiCorp has provided retail stores with an excellent demo of VisiCalc's capabilities. Check it out. This is a straight "A" classic, and well worth investigating.

**VISICALC for the Ile**

**Company:** VisiCorp  
**Language:** Assembly  
**Hardware Requirements:** 64K

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The Apple IIe VisiCalc is the same old VisiCalc with a few additions which allow you to take advantage of the Ile's features. It recognizes the up and down Arrow keys, the Delete key, the 80-column card and its lower-case features, including the extra 64K, if available.

There is one major problem. First, let me quote the manual: "Within memory limitations, any existing Apple II VisiCalc worksheet will run with the Apple Ile VisiCalc program. The Apple Ile VisiCalc program is compatible with the Apple Super Serial Card and the Apple Parallel Interface Card. The Apple Ile VisiCalc program supports any printer that was supported by the Apple II or Apple II Plus VisiCalc programs."

I had VisiCalc for my II Plus and used an Apple Parallel Interface Card with an Apple Dot Matrix Printer. I have the same card and printer attached to my Ile. Sometimes it prints properly; other times it ignores commands to compress the print or suppress the line feed. The unpredictability is a major frustration. My dealer has made numerous contacts to VisiCorp. They say, in effect, that I am not capable of operating the program. For about three months, they had the dealer convinced they were right until the latter finally got an Ile, interface, and printer in stock at the same time. He had the same problems, as did another friend with an Ile with the same equipment. VisiCorp's refusal, after such a long period of time, to solve the problem garners them low marks in Vendor Support. The low marks for Ease of Use and Value for Money are in comparison to MagiCalc.

**VISIBLEND**

**Company:** Micro Labs  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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For a time it seemed that every software program which carried a "Visi-" prefix was sure to be useful if not outstanding. Visiblend, by Micro Labs, proves to be an unfortunate exception. Visiblend is an add-on program used to combine many VisiCalc files together. The cells in the files are either added or averaged by means of a format file. Visiblend, using the format file, merges separate reports into a consolidated file. A 48K Apple II/II+, Applesoft in ROM, DOS 3.3, two disk drives, and VisiCalc are needed to use this program.
The documentation supplied with this program is very sparse, and of little help. Three input example files and one format example were provided in the manual. After trying each example at least 4 times, I found only one item that would total correctly, but the screen reported that the whole consolidation process was successful.

Another problem with the program is that after using VisiCalc to make the format file, the Apple has to be shut off (not reset) to enable the Visiblend program to be loaded. After the so-called “successful” consolidation, the machine had to be shut off again to re-load VisiCalc so that the consolidated report could be read on the data disk. It is a cumbersome and time-consuming process. Not recommended.

* This is not, of course, a product of VisiCorp.

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**F.A.S.T.**

**Financial Analysis Statement Template**

**Company:** Continental Software  
**Language:** Machine  
**Hardware Requirements:** 48K, VisiCalc

**F.A.S.T.** (Financial Analysis Statement Template), as the name implies, is a fast and easily used analysis tool for business owners, accountants, investors, managers, or bankers. Virtually anyone interested in determining the financial strengths and weaknesses of one or several businesses will find this program an effective tool.

**F.A.S.T.** provides a comprehensive and immediate analysis of a company’s current financial condition. More to the point, it allows you to compare the present financial standing of the business with past performance, enabling you to make more confident projections regarding your company’s future. The program produces both balance sheets (showing a company’s financial state at a given point in time) and income reports (statement of earnings for a period of time). You can compare balance sheets for two periods and analyze the results; likewise with the income reports.

You can use **F.A.S.T.** for comparison of different companies within an industry in order to evaluate their potential strengths and weaknesses. You can similarly assess the likelihood of obtaining credit for your company, profitability from your stockholder’s report, access the fundamental worth of a company that you are considering for investment purposes, predict the viability of joint ventures, or more profitably adjust inventory to balance with net sales. **F.A.S.T.** can help you with loan decisions, new product pricing, and investments in new equipment. These are just some of the functions that the program can perform. In addition, you will be able to produce immediate performance summaries, balance sheet comparisons, and ratio analyses. The program lets you print out these results as reports.

**F.A.S.T.** templates work with VisiCalc to facilitate financial statement data entry, price/quantity data entry, income report comparisons, and create profitability and statistical analyses. The VisiCalc application worksheets also produce ratio analysis reports, and reports on valuation analysis (financial summary comparison), price/cost, and productivity analysis.

The documentation is well-written and provides clear instructions on the program’s use. Even if you’re not an expert with VisiCalc, the helpful menus and screens assist you in the program’s operation.

**F.A.S.T.** performs a large variety of tasks at a low cost. It is a flexible system that can easily adapt to your own personal business needs.
VC-MANAGER

Company: Micro-Decision Systems
Language: Applesoft
Hardware Requirements: 48K, VisiCalc

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VC-Manager allows you to operate with multiple VisiCalc files, or two DIF files in order to combine them into a single file. Using VisiCalc files, the logic is maintained when formulae, instead of values, are present. Using DIF files, calculations are performed on values alone. (The updated version excludes rows, columns, or cells.)

The calculations which merge files may be quite complex to include all of the standard mathematical functions (addition, subtraction, multiplication, division, and exponentiation). Files may be combined with files or with some constant value.

The simplest example of a use for this program is the addition of four quarterly reports in order to obtain the yearly summary report. Other uses are limited only by one's imagination. Up to 15 files may be combined in one pass; and, of course, this combined file may then be combined with others if necessary.

Of course, very interesting results can be obtained if the files operated on are not compatible in form; but even this is acceptable if you know what you are doing. A nice feature is the time estimate provided by the program to do the job requested.

Finally, if you have a great deal of VisiCalc file combining to do, this could be a very useful program to you.

VC-LOADER

Company: Micro Decision Systems
Language: Applesoft
Hardware Requirements: 48K, VisiCalc

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VC-Loader converts text files into DIF files for loading into VisiCalc or other programs designed to use DIF files (such as Visi treats, Visiplot, or Visifile). The text file may be created by any means, such as a word processor, or downloading from a data base system like the Source. It will also handle Dow Jones type fractions.

In order to use this program, the text file must be in a row/column format. The screen will display the file, and the program allows you to move through it with VisiCalc-like commands (right/left arrows and space bar). Once the section to be converted is located, the fields are specified to the program and then the conversion process begins. Individual line lengths may be up to 255 characters, but only 130 of them may be converted by any one run of the program.

The program has an automatic mode for determining fields. For regular data this is handy, hastening setup operations. For the conversion, either row or column DIF files may be specified. A column specification will speed up the processing of large files.

The manual is quite skimpy; it has no assisting examples or figures. In addition, the last section implies that the program has modern control and data capture capabilities. It does not.

This is a handy, general purpose DIF-creating program. I recommend that any file created first be read into VisiCalc and examined before sending it to other Visi-programs (unless you know exactly what you are doing). This will help avoid serious problems.
Magicalc is one of the best spreadsheet programs on the market. The program is better than VisiCalc, yet is half the price, and it is capable of using any standard VisiCalc file and model except those that contain trigonometric expressions (standard files, not Advanced Version files). The inability to use trigonometric functions is a small price to pay for a program that remedies many of the complaints heard about VisiCalc: 80-column display, entry of lowercase characters, individual column formatting, expanded report formatting, and use of all memory in the Apple—even that added with expansion cards (up to 512K).

Magicalc uses three enhancements: @ROW, @COL, and @ROUND. The first two return the absolute number of the row or column the cell is in. The column letters are converted to numbers, with A=1, B=2, and so forth. You may use the ROW/COL functions in calculations where months are converted to numbers as one example. The @ROUND function is very useful when dealing with multiplication and division in finances. Instead of coming up with fancy formulae (@INT9X+.5) to assure that rounding is correctly applied, this function will do it for you to whatever accuracy you desire.

Many of the major functions called by Magicalc are menu driven. This makes it easy to pick and choose the particular feature you want at the time. There’s only one inconvenient menu feature: before printing you should reset the print format specifications, and you cannot do that directly from the print menu. Instead, you have to go back through the Main Menu, adding a half minute or so to your printing time.

Magicalc gives you the option of three display modes: normal 40-column mode, an 80-column mode (using one of several cards), and a 72-column mode (using the high resolution display). You can change from one configuration to another while running the program, although in some cases you may lose your model if you do (adequate warning is given). The 72-column display uses about 12K of model storage space and is difficult to read. I recommend using the 80 or 80-column mode. An 80-column display is handy for many models; it allows you to see most, if not all, of what you will be printing. I used a Videx board without inverse characters. With that configuration, the program will display 80-columns, but will not have a cursor to show you where the active cell is. You must rely on the display at the top of the spreadsheet—a bit inconvenient, but still useful.

All of the VisiCalc slash commands are present in Magicalc, and all work in the same manner, although there are exceptions. Let’s dispense with the negative exception first. VisiCalc has one undocumented command (the /X command). It causes the current active cell, or some specified cell, to move to the upper left corner of the spreadsheet (the next time you start VisiCalc, try typing the following sequence of characters: /X>G35 and watch what happens). Magicalc responds to /X and will move the cursor, but will not physically put the cell into the upper left corner. Any other cursor movement will cause the spreadsheet to jump to one cell away from that called for in the /X command (depending upon the direction you moved). There is also a sequence that displays one set of cells on the screen with entries going into a different set. On the positive side of the ledger, there are two major command enhancements: /Attributes and /L for individual column widths. The Attribute command lets you specify what kind of data will be allowed in the cell and if the cell is either protected or to be hidden on the display. Being able to hide cells is a nice display (and report) enhancement. You no longer have to move all of the intermediate calculations off to the side of your spreadsheets just to avoid having them print or show on the screen; simply “hide” them. Being able to change the width of individual columns is a long awaited display enhancement as well. It also helps when entering text. There will be fewer cases where you have to split words when the text is longer than global column width.

A few minor bugs were encountered when I pushed the limits of some of the commands. For example, each entry may be up to 229 characters long. When 229 characters were entered and then /E was used to edit the entry, the program hung and had to be rebooted (with consequent loss of the current model). Edit started working at 227 characters (but don’t try to insert any beyond that and then re-edit). The second bug encountered involved insertion of columns in the area of the column BK. When I filled in the last rows of a spreadsheet and attempted to insert a row
and cause entries to “fall off the end,” the program generated an error and would not allow the insertion. Columns were another story. Not only could I drive entries off the worksheet by insertion of columns, but funny things happened to other columns, and, in one case, I got dumped from the program into the Apple monitor (again losing everything). These flaws will probably be corrected soon, and probably will never bother you. After all, when is the last time you filled all of the columns in a spreadsheet? Just be aware that the program sometimes does funny things when you exceed its limits, and save your work often.

The print command has been enhanced. You are still allowed to print to paper or disk, but with added formatting for left/right and top/bottom margins. All margins and setup strings are “remembered” from one printing to the next. Once set, all you have to do is specify the bottom right cell. The Spreadsheet will “print to disk” enabling the creation of command files and datagramming, as with VisiCalc.

The final enhancement involves the storage command. As you might have guessed, since MagiCalc can handle models taking up to 512K of RAM, and the Apple disks hold something over 120K per disk, there must be some way to store and retrieve models that take more than one disk. There is: continuation files. When “disk full” error occurs on Save or an abnormal file termination is encountered on Load, the program lets you insert another disk and continue the process that was interrupted. If, on Save, you do not have a formatted disk handy, you have the opportunity to format one before continuing the save process. This continuation process is one of the most user-friendly features in the program. Other programs that use large data files should consider it.

The manual is complete and covers all topics well. There could be more figures as an aid, but most users should have no trouble with a bit of practice. The program is excellent and should be a strong contender to VisiCalc.

**THE SPREADSHEET, Ver 2.0**

**Company:** A.P.P.L.E.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
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This is the exact same program as Artsci’s MagiCalc (see the program for a review). The only difference is the price. The Spreadsheet, Ver 2.0 is less expensive, but there’s a catch—you must be a member of the A.P.P.L.E. user’s group to purchase it (of course, that does give you a year’s worth of the publication). It is available by mail order only. Call A.P.P.L.E. (Apple Puget Sound Library Exchange) at (206) 872-2245

**CALCSTAR**

**Company:** MicroPro International Corp.  
**Language:** CP/M  
**Hardware Requirements:** Apple II/II + with Z-80 card.  
Two disk drives, printer, and 16K card are helpful.

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_CalcStar_ is a spreadsheet program similar to VisiCalc and SuperCalc. It is designed to be compatible with other MicroPro products, such as WordStar and DataStar. All are similar in appearance when on screen, and have standard cursor control and editing control keys so that any given control key performs a similar (or the same) function in any of the programs. This makes use of this family of programs easier.

As with other spreadsheet programs, _CalcStar_ has spreadsheet coordinates far in excess of what can actually be filled in (because of computer memory limits). With a 56K Apple CP/M configuration there is space for approxi-
mately 600 entries, with each having a 26 character limit. Digits are carried internally to 12 character accuracy.

Text or numeric entries are recognized by the first character typed. You can also change the type and use the entry line as an immediate mode calculator. Formulas employ the standard operators, with the handy addition of a reference text that may be added to a formula after a backslash ("/"") delimiter. This is handy when you are deep within a spreadsheet and do not have the title lines visible. Only one problem was encountered on entry: the back arrow key does not erase text; the CTRL-@ must be used.

Cells within the spreadsheet may be individually formatted to include the numeric precision displayed. A help screen is displayed at all times, but may be deleted on command in order to add five rows to the display. If more help is needed, two screens of help data are available on command. A form of protected data is available with auto entry, allowing access to only the cells with form mode set. In addition, files may be saved with or without password protection. On recall, other forms may be merged into the existing form, and the formulas are automatically adjusted for the new location.

Output may be to disk, the screen, or to a printer. When output is to a disk, provision is made for comma delimited files, so that the data may be entered into programs like DataStar. During output to a printer, the program will segment the output of page width. Title lines are allowed, and page breaks may be forced by appropriate symbols entered into the spreadsheet.

The file saved by CalcStar is not a standard text file and requires a special program (which is provided) to output the contents. The built in math functions are: SUM, CNT (count), AVG, MAX, MIN, SQRT, LOG, LN, ABS, and EXP. CalcStar also has a built-in forecasting function using linear regression (straight line approximation). The command: REGR (<independent variable range>, <start of dependent variable range>) prints the mean of the dependent values in the cursor cell. Following this, three other functions will forecast:

- PROJ (ind var): Projects dependent variable best fit.
- DEPD (dep var): Projects independent variable best fit.
- SLOPE: Gives the slope of the regression line.

Each of these functions operates on the last REGR function computed. Finally, conditional expressions can include the classic form of IF:THEN:ELSE.

CalcStar is a viable entry into the spreadsheet market. It is somewhat limited in memory, but this may be made up with the forecasting functions that are built into this program, but not into the others like it. It deserves your serious consideration, especially if you have other MicroPro products.

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**CalcStar**

**Company:** Comshare Target Software, Inc.

**Language:** CP/M

**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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<th>VENDOR SUPPORT</th>
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If you have the hardware to support the CP/M system on the Apple computer, then PlannerCalc is a fine bargain among financial modeling programs. It is relatively simple to use, yet quite powerful — especially considering its very low price.

Because PlannerCalc is an inexpensive system, some of the options that are available in more advanced systems are missing. These have little effect on most models and reports; but this should be taken into consideration. For a more detailed discussion of some of these missing parts, see the review on MasterPlanner, another Comshare Target program, which is an extension of PlannerCalc.

PlannerCalc is unlike VisiCalc or the other spreadsheet programs. In order to use the program, you first create a command file which specifies all data, formats, and the logical relations between variables, rows, and columns. The program then compiles this file and executes it to produce a report on the screen. This report may take on the characteristics of a spreadsheet at this time; and may even be manipulated in fixed ways once the calculations are performed. To change the logic you must go back to the original file and make the necessary modifications, then recompile and recalculate the model.

Using PlannerCalc, you organize the command file by line number. Each line then appears in the report. With this program it pays to lay out your model on paper before starting to create the command file. It's possible to change...
lines, but once a variable is given a specific line number, it cannot be changed without much difficulty. Nine lines may be added between any two integer line numbers, but once these are specified, the only way to make any significant changes is to retype the file.

Formatting of the reports is done within the command file. Such things as adding headings to the report, putting on column labels, inserting blank lines for visual separation, and underlining are possible. In addition, global format specifications are defined: for example, every cell could display the dollar sign, the percentage sign, or use commas to set of thousands. Negative numbers may be shown in parentheses if desired.

When writing formulas, each line is given a name, and then any other formula using that line may be referenced either by the line number or by the name. This makes the formulas very easy to read. The standard math operations are all supported along with the following functions: AVE (average), CUM (cumulative value), EXPONENTIATION, GREATER OF X OR Y, GROW BY, INPUT (permits changes at model run time), INTEGER, LESSER OF X OR Y, LN, MAX, MIN, and SUM OF X THRU Y. Conditionals are also supported in a standard IF THEN ELSE format. Referencing may be to some absolute location, or to a leading or lagging period. On display, the program will show split screens. A net present value function is also built into the program.

You may print reports as values or as the command file. This reviewer could not find a way to print the report to disk, so that a formatted report could be included into a report via a word processor. This capability is available on more advanced programs.

The PlannerCalc program is an excellent bargain for a user with reasonably straightforward model requirements. As the user's needs grow, the files used by PlannerCalc may also be upgraded by MasterPlanner. If you have the CP/M hardware, this program deserves your attention.

Because of VisiCalc's overwhelming domination of the "modeling" or "spreadsheet" market, other programs in the same field normally wind up being reviewed in comparison to VisiCalc. Senior Analyst, in certain areas, stands up to this comparison very well.

The major advantage of using Senior Analyst instead of VisiCalc applies to those areas where a number of different people will need to work on the same model. Unlike VisiCalc, Senior Analyst provides the ability to consolidate several different models into one. Another advantage is the fact that the program has a certain number of useful functions built in: for example, net present value, linear regression, depreciation formulas, and compound growth rate. VisiCalc could perform these functions, but only if the user created the necessary formulas. VisiCalc's advantage, on the other hand, is its splendid flexibility, its speed, and its ability to interface to or share information with a large number of other programs. Considering your own applications, it might well make sense to have both of these superior programs.

One advantage of working with the Senior Analyst is an ability to define and create the spreadsheet using descriptive names, rather than row and column identifiers which could become confusing or hard to follow. Also, as a financial planner, you will find the ability to include the built-in functions that it supports to be of great advantage.

The other major advantage is its outstanding documentation. Apple provides a fairly complete tutorial, which walks you through the operation of the program starting with very simple examples and working toward spreadsheet models of some complexity. But more, they include a separate reference manual that explains all commands and uses numerous examples.

This reviewer, who confesses to having been confused by VisiCalc-like programs in the past, found this modeling program, while not blindingly fast, very easy to use and effective, and so well deserving of high marks.
**TREND-SPOTTER**

**Company:** Software Resources  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VENDOR SUPPORT</th>
<th>RELIABILITY</th>
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**Department:** Business  
**Sugg. Retail:** $275.00  
**Availability:** 5  
**Disk or Tape:** Disk*

*Trend-Spotter*, the forecasting tool for management by Software Resources, Inc., uses a powerful personalized database with computer graphic data displays combined with statistical information. The program, written for an Apple II with 48K and Applesoft in ROM, runs with one or two disk drives with or without a printer. A printer with graphics capability proves handy if you desire hard copy of the charts. The program consists of one disk with two main programs. You must supply a second disk for the data. The program boots in DOS 3.3 and the data disk must be initialized in DOS 3.3 also. When you boot the disk, the program checks for one or two disk drives. If it finds only one, then you must put the initialized data disk into drive one when the program prompts you to do so.

The two programs are called Database and Display. You use the database to enter raw data and store it on the data disk. You can edit, modify, and even update the data on a regular basis. You can store many different types of data in a monthly, quarterly, yearly, general time-series input, which is data expressed in terms of an amount that changes with time. All types of business data can be projected for the future if the present and past data are input into the data tables. The main part of the program, the Display, really makes up the heart of *Trend-Spotter*. It provides the means of getting information from the data files and presents it on the screen in a large variety of graphic formats. You can change the graphics formats using the statistical programs in the Display program. The Display portion is command-driven in plain English.

The extensive documentation takes you step-by-step through every phase of data input to graphing, changing format, mathematical calculations, forecasting, saving to disk, and so on. The Database Menu consists of the following:

1. Update file (and stats)
2. Create a new file
3. Edit an old file
4. Delete an old file
5. Hard copy file contents
6. Directory of files
7. Go to display program
8. Save DIF file
9. Load DIF file

The graphic capabilities of this program are easy to use and of great variety—bar graphs, side-by-side graphs, line graphs, scatter graphs, area graphs, and any combination.

This excellent and comprehensive program clearly suits numerous uses, such as business forecasting, plotting sales trends, stock market trends, and moving averages. Two additional features are the ability to interface *Trend-Spotter* to *VisiCalc* through the database program and the command which permits direct printing of a graph on a Silentype printer from the display program, as the module accesses the Silentype automatically.
**TARGET PLANNER**

**Company:** Advanced Management Strategies, Inc.
**Language:** CP/M
**Hardware Requirements:** 16K

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<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>VENDOR SUPPORT</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
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**OVERALL RATING**

**EASE OF USE**

**VENDOR SUPPORT**

**DOCUMENTATION**

**VALUE FOR MONEY**

**VISUAL APPEAL**

**RELIABILITY**

**ERROR HANDLING**

*Target Planner* falls into the same category of business planning programs as *Desktop Plan* and *VisiCalc*. Like the others, the program takes data and formulas and combines them according to set rules to obtain output. As the planner, you may then change the input parameters and recalculate the model to observe any changes.

*Target Planner* most closely resembles *Desktop Plan II* (please see that review), being very similar in execution. Differences lie in the ease of performance of certain operations, particularly data entry and speed of execution. In general, *Desktop Plan II* has the better data entry format because you enter data directly into the planning form. With *Target Planner*, you must create a program with your formulas and data entered in the correct locations. At times this program becomes rather complicated. Identifying a particular piece of data in the middle of the program may prove difficult, especially if you are trying to change one number in the middle of a string. However, *Target Planner* outsines *Desktop Plan II* in the entering of calculation rules. Because you actually write a program, the formulas and all connecting logic are laid out in front of you for easy modification. This is of particular value when you have rather complicated formulas involving logic. With the other program, you must alter the program itself to obtain these logical operations. With this program, you have only to insert them into the flow that you have created to perform the necessary calculations. The necessary programs are not difficult to create. *Target Planner* includes step-by-step instructions.

The documentation supplied, although quite complete, requires rereading of some sections for thorough understanding. Your best bet is to follow along with the computer and do the examples as they appear in order to get a feel for the program. Be wary of the examples, however, as some include typos that could lead you astray.

*Target Planner* will not run with just one disk drive. The program also has a quirk peculiar to the Apple II configuration—it only displays forty characters on the screen at a time, even with an 80-column board. You can change the basic configuration of the model you create (within limits). You can add or delete columns from the end of the model only, but you can add or delete rows anywhere in the model.

When creating the model, you can switch the display from the program to a spreadsheet showing the results. Only the format appears; calculations come later. This is useful, but the part of the model displayed on one screen may not correspond with the spreadsheet on the other screen. You may have to line them up. I found this tedious.

You must also exercise some care in using *Target Planner* for large numbers. The program performs calculations using up to seven significant digits only. It really is not meant for engineering calculations and models, only financial or related models. Note also that when using conditional statements in your program, conditions which appear true may sometimes fail. This comes about through rounding off and you should take it into consideration when dealing with very small numbers.
The MasterPlanner program is the deluxe version of the PlannerCalc program reviewed elsewhere in this book. Both are by Comshare Target and use files which may be interchanged. This allows you to start with the inexpensive PlannerCalc version and then, when your requirements increase, you may move up to MasterPlanner.

The general structure of the Comshare Target programs is outlined in the PlannerCalc review. In general terms, MasterPlanner offers many small improvements which make the program a great deal more flexible. For example, in PlannerCalc you are not able to skip lines when printing a report. With MasterPlanner, you are able to skip lines which may be necessary to the calculations, but would add little or nothing to the report. MasterPlanner has the following limits (the number indicates the number of characters): heading = 240, column label = 12, line label = 12, model name = 8 (standard CP/M), line length = 240, cell width = 30, number of lines = 5,000. This latter entry number may vary with your system size.

All of the functions found within PlannerCalc are also found in MasterPlanner, including all forms of conditionals. Absolute and relative column and line referencing are included, so leads and lags may be easily calculated. The horizontal and vertical screen splits are supported, as well as a new function for quadrant splits. History columns may also be added to the model. These enter into the lead/lag calculations. For repeated calculations of the model, there is a command called WHATIF. After performing the basic model calculations, MasterPlanner will recalculate based on the "what if" data supplied.

There are several added features in the file storage module of MasterPlanner. The program allows you to save only parts of a model. This is useful in cases where parts of one model may be of use in one or more future models; or where portions of a model are to be created by different people and then combined into one larger model. After calculation, you may output the data in any model to a disk file for later use.

To use these functions, there is also a consolidate function where two or more models may be combined into one larger model. The user must exercise certain cautions when consolidating models, but this could be a very useful function.

MasterPlanner is a powerful extension of the smaller PlannerCalc program. Its best feature is the added formatting capability, coupled with the ability to divest and consolidate models or sections of models. Few actual financial functions have been added. This would be the one area where improvements might be made.

Try PlannerCalc first. If you like it, consider moving up to MasterPlanner.

The DSS/F is a complete financial planning package that was originally released overseas. DSS/F started as "Rusty's Computing System", named after its programmer, Mr. Rusty Luhring. When the program was released in the United States, it became MICRO DSS/F for Microcomputer Decision Support System/Financial. The name implies that there will be planning modules in the future for other areas (the manual points out that these will be in the areas of project management, personnel, and forecasting).
The first feature that strikes you about the program is its unique protection system. You are free to copy the software as many times as you want for backup purposes, but you will only be able to run that software on one particular machine. With the program, you are provided a slide changer remote control mechanism with a 16 pin plug on the end of the cable. This outfit must plug into the game socket in the Apple computer. The device serves two purposes: (1) it changes “slides” during the slide show feature and (2) it has an embedded ROM in the slotted end that contains the protection device. Periodically, the program checks for the presence of this ROM and its accuracy. If the ROM is absent, the program will abort. This type of hardware protection would appear to be very difficult to duplicate (and more costly); thus, you might expect to see it more often in the future.

The program is written using the Apple Pascal language system; therefore, you must have that system in order to make it work. Two disk drives are mandatory when running this program; having three would not hurt. An 80-column board and printer capable of printing 132 columns are also helpful for taking full advantage of the program features.

The DSS/F program is a financial planning package à la “Visicalc”, “Target Planner”, and “Desktop-Plan/II”. It is primarily a combination of the latter two, with extended capability that directly applies to the business situation. It is these add-ons that make the program much more useful (and expensive).

When using this program, you are required to create a model and then write a “program” that describes that model. The program describes the logic of the model, while relating each variable or constant in the model to all of the others much like the other planning programs. You are required to do all the work, but that also gives you the required flexibility to do whatever you want.

Once the logic file is checked-out and compiled, a data file is created and validated, after which calculations may be performed. All of these steps take place relatively rapidly once the logic and data files are produced. At this point, you have several options. You may view the data on the screen in essentially any format you want. While in the display mode, you may change input data and then perform “what if” exercises. As many changes as you desire can be accommodated, with the results displayed on the screen.

You may also output to the printer. All you have to do is generate a report format file and run the program with the file as output. “What if” cases are performed as easy as changing the data file and rerunning the calculations. Several format files and data files may reside concurrently on disk for ease of changing either the logic, the data, or the output format. There is also an option for “quick printing” results without the need for creating a report format. This allows you to “draft” your model and then format it exactly the way you want it with the report format. This is a time-saver when building a model for the first time.

Graphics are also included by the planning package. Pie charts, bar charts, stacked bar charts, and line drawings are supported. Any of these may be displayed directly from a save computation file or programmed via output file specifications. These graphs and others you may create by hand may be saved to disk as pictures that may be recalled sequentially in the form of a slide show — rather effective for business presentations, since either text or graphics (or both) may be located on a slide. Seventeen pictures are allowed per disk. Display is advanced either forward or backward (just like a slide projector) via the remote control that is attached to the game port. The only problem that this reviewer had with this feature was an inability to stop the show! The instructions provided said to use the “ESC” key, but that did nothing.

Up to this point (with the exception of the slide show), the program would seem to do the same things as some combination of “Desktop-Plan/II” and “Target Planner”. Thus, what are the enhancements?

Enhancements include the use of financial functions among the stable of functions that can be called upon in the logic. There are several: discounted cash flow (including net present value, internal rate of return, and payback time); depreciation (including straight-line, declining balance, or sum of the years’ digits); loan amortization (including interest paid per period, principal paid, remaining balance, and total payment); and tax calculations (to include tax loss carry forward and lookup table for finding the appropriate bracket and rate). The net present value computations will discount a row of numbers at a constant rate or at rates you specify to arrive at the NPV. A perpetual cash flow stream is also supported, as are calculations that give the NPV of a given stream of values for several streams of discount rates. The results of these multiple calculations may then be used to make financial decisions by using greater than, equal, or less than comparisons with some decision variable.

Internal rate of return is computed in a similar fashion. Either a given cash flow will be used or the function can assume an infinite cash flow. The payback function computes the payback period for a cash flow stream. No payback is indicated.

The depreciation function allows either straight-line or declining-balance depreciation. Residual value may be specified and the half-year convention may be taken into account. You also have the option of switching over to straight-line or sum of years’ when declining balance crosses over. If several dollar amounts must be depreciated, starting in multiple periods, the total depreciation is returned. If you want to use the sum of the years’ digits depreciation, that capability is also provided in function form.

Four functions are provided to perform the loan amortization function: interest, principal, balance, and payment. Each of these performs the necessary calculations (given the input data), producing the data for the report as
you specify.

The tax loss carry-forward function computes the amount of loss forwarded year by year for use which can be applied to the profit and loss figures as displayed in a row on the screen.

When building the models, all the standard arithmetic functions are supported. In addition, you are able to shift numbers right or left for moving the calculation into another period. You may also allocate annual figures across months. Accumulation of value is supported, as well as total values.

The program will handle both simultaneous equations and matrix operations. You must identify these situations to the program; simultaneous equations are not automatically detected. The matrix operations include addition, subtraction, multiplication, and division and operate between the work area and a file. Care must be taken to make certain that there are the same number of elements (rows and columns) in the file as there are in the work area.

In addition to the standard report features, the DSS/F program supports automatic consolidation wherein elements of a financial picture may be reported individually and then combined into a composite picture. Selected rows and columns retrieved from a report are available for "quick looks" during "what-if" gaming. An interesting addition to the report generation feature is the ability to swap rows for columns and vice versa.

At this point, you might be telling yourself that all this sounds good, at which point you may ask if the system is worth the $1,500 cost. The answer to that question depends upon the use to which you will put the package. If all you want to do is plan the household budget, you probably won't want this program, unless you have a desire to own an expensive toy. If you have a serious application for financial modeling, then this program could well pay for itself in a rather short time. As a comparison, consider the use of MODEL1 on the "Source" in non-prime time hours (truly a conservative comparison). Assuming the conservative figure of 15 hours per week at the current connect time rate of $4.25 per hour, the $1,500 investment will have been recovered in just under six months (24 weeks). At the prime time rate, recovery is quite a bit shorter.

The DSS/F manual is sufficient to run the program. There are not too many examples, but the commands and how to use them are adequately described. The program took some time to learn; however, once learned, it was fairly easy to use.

The DSS/F is an excellent program. It has been field-tested for a couple of years now before being released to the public. If you have a need for a sophisticated financial planning package, DSS/F is a good choice.

Statistical Programs

ANOVA II
Company: Human Systems Dynamics
Language: BASIC
Hardware Requirements: 48K

OVERALL RATING A-
EASE OF USE B
VENDOR SUPPORT B
DOCUMENTATION B
VALUE FOR MONEY B+
VISUAL APPEAL A
RELIABILITY A-
ERROR HANDLING B

ANOVA II performs a complete analysis of variance for both simple and complex research designs. The program will accommodate one to five factors and two to thirty-six levels per factor, for a maximum of 120 treatment combinations and a maximum sample size of 100 subjects (or data points) per treatment combination. The program will generate descriptive statistics and an analysis of variance summary tables for each cell of the design. The design may be completely randomized, between-within, or a repeated measures/randomized blocks design. An analysis of co-variance program is also included, although only one co-variant may be defined at a time for each analysis. An advantage of this program is that it allows both equal and unequal sample sizes to be analyzed.

Graphic representation of the data is displayed on the monitor screen. Although the program does not include the capability to print out these graphs, it does allow the information to be saved in a binary file so that it may be later accessed by a graphics dump routine program and printed out. Human Systems Dynamics recommends a program such as the GRAFFPAK from SmartWare (which can be purchased through Human Systems Dynamics at a discounted price) or THE GRAPPLER card from Orange Micro.
The program assumes that you are familiar with the computer and have a fairly sophisticated knowledge of DOS jargon, file structures, and Applesoft error messages. Those who are less sophisticated with the computer can learn to use this program, but it is not for the novice.

A minor annoyance of the program is that error messages are represented by their code number only, and there is no explanation of what the error numbers represent. Thus, you will need a DOS reference manual which includes the DOS error codes.

A warning: some of the earlier ANOVA II programs (sold prior to June, 1983) may have a "bug" in the analysis of covariance program which makes this analysis impossible to run. I discovered this in my program, and notified Human Systems Dynamics. I was told that the "bug" had already been corrected, but I had apparently been sent the uncorrected version. However, the corrected version was mailed to me free of charge, and it arrived within a few days time. This suggests that Human Systems Dynamics follows through with their customer support policy. The program is presently available through mail order only.

I was very impressed with the program once I learned, through some trial and error, how to avoid certain problems. In spite of the relatively minor weaknesses, it is a good program for the money.

**ELF-The Statistical Package**

**Company:** The Winchendon Group  
**Language:** Applesoft and Machine  
**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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<th>RELIABILITY</th>
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*ELF-The Statistical Package, Version 5.0,* is an extremely ambitious statistical software package similar to mainframe programs such as the *Statistical Package for the Social Sciences* (SPSS) and the *Statistical Analysis System* (SAS). You should already be familiar with the diverse array of statistical procedures contained within the package, as it is not intended to be a tutorial on the subject. *ELF* comes on two non-copy protected disks, so back-up copies can be made. The majority of *ELF* is written in Applesoft, which gives you the opportunity to both review and modify the programs. Machine language is used when added speed is essential.

The first of the two disks, Volume 51, presents a Utility Menu offering the following options:

1. Quit
2. Set System Parameters
3. Create a New Database
4. Change/Add Variable Names or Correct Data
5. Add New Observations to Database
6. Transform a Database
7. Print Reports
8. Move Database to New Disk
9. Convert Database
10. Analyze a Database

The first disk deals with activities relating to *ELF* database preparation. You respond to either menu choices or screen prompts to perform the desired activities. The screen information and manual are both very clear in walking you through *ELF*. Errors, with the exception of resets and write protected disk messages, are trapped, and the program typically responds with the required input advice.
Database creation is straightforward. You begin by first naming the database, then each variable in sequence. Entering %END stops the procedure. Next, you have the option of changing any or all of the variable names. The final variable names are written to a dictionary file for the database (e.g., DEMO.DICT). You may then use a portion of the standard keyboard as a numeric keypad for data entry. Provisions are included for either right- or left-handed keypads. The former redefines the keyboard as follows:

```
7 8 9
U I O become 4 5 6
J K L 1 2 3
M    0
```

ELF then defines a data entry screen format which is called a mask. The mask, which may contain multiple screens, lists the observation number and each variable name with ten digits of space to enter each variable value. Exponential values can be entered, and data may be written to the database or edited using the standard Apple cursor control keys. When all the data has been entered and the database has been closed, ELF will print a summary table with the name of the database, the number of observations, the number of variables and the name of each variable. Provisions are included in ELF to convert any existing sequential data file into an ELF database. In addition, ELF can translate files to and from DIF, Apple Plot, Curve Fitter, Scientific Plotter, and mainframe statistical packages using either fixed columns or free format (comma delimited). The only constraint is that the existing file cannot contain alphabetic characters which ELF will not accept.

The second disk, Volume 52, presents a Statistics Menu with the following options:

1. Quit
2. Set System Parameters
3. ANOVA Menu
4. Correlation Coefficients
5. Discriminant Analysis
6. Factor Analysis
7. Probabilities (T, F, Chi Square and Normal Statistics)
8. Scattergram
9. Simple (Univariate) Statistics
10. Stepwise Regression
11. T-Test on Means
12. Tables (Crosstabs, Frequency, Histogram)
13. Return to Utility Menu

Statistics computes the mean, variance, standard deviation, standard error, minimum, maximum, range, sum, kurtosis and skewness for any or all variables in an ELF database. The Tables option presents either crosstabular tables using up to three classification variables, or histograms with a single independent variable. With crosstabular data, rim totals are computed along with values for Chi-Square, the Contingency Coefficient, and Cramer's V. The remaining options perform the procedures indicated including one and two-way ANOVA, linear correlation and (stepwise) regression, univariate regression (scattergram), and discriminant analysis. The factor analysis module includes both principal component and principal factor (squared multiple correlation coefficient or largest off diagonal element), diagonal estimates with Varimax, Quartimax, and Equimax rotations. The Probabilities option is not well explained, but substitutes for the lengthy appendix tables found in most statistics textbooks.

In terms of accuracy, ELF is limited in all of its computations by the Apple. Large numbers, rounding, nine significant digits, and single precision computations can effect the accuracy of the statistical procedures. Nonetheless, due to the sophisticated algorithms used by ELF to minimize these limitations of the Apple, corresponding procedures run with ELF and SPSS/SAS yield very similar results. Overall, ELF is a very useful, relatively inexpensive, and easy to use tool for someone who needs to perform statistical computations.
**SPEED STAT**  
**Company:** SoftCorp International  
**Language:** Applesoft/Machine  
**Hardware Requirements:** 48K

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This program is designed to emulate the frequency and cross-tabulation methods of statistical analysis found on mainframe computers. You first define the variable by name and the type of data (alphanumeric codes or a complex set of numeric options). Data is entered initially as part of the same module for each variable. Missing values are accepted. Entry of the last variable is awkward, because, if you press Return after the last variable, another unnamed variable is added. Update of data must be done through another module, a fact not completely clear in the manual. Data from other programs can be added by the use of DIF files; however, the program does not allow the creation of DIF files for the output to other programs. The tables produced by the report module are very similar to those of SPSS, one of the most widely used mainframe systems.

The strengths of the program are in the outstanding visual charts produced. Data entry and setup are not difficult, and the print routines are easy to set up. The documentation is spotty. The organization and the tutorial are quite good, though not perfectly clear. However, there is no indication of the programming language used. Information on how to initialize a disk is buried in the middle of the manual and the index is meager.

The program has some inconveniences in organization, such as needing to go back to the Main Menu after viewing a report on screen to print, the ability to only save one setup of the statistics on a disk, and the inability to save the report formats once they are set up. The size limitations of the system depend on the number of variables with an absolute maximum of 2,048. Only one disk per data set is permitted. The program is badly overpriced for what it does.

**STATS PLUS**  
**Company:** Human Systems Dynamics  
**Language:** BASIC  
**Hardware Requirements:** 48K

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**Stats Plus** is a general statistics program which performs these ten analyses:

1. Descriptive Statistics—including means and standard deviations.
2. Frequency Distributions—including cumulative frequencies or proportions. Percentile points and descriptive statistics are also included. Additionally, the program will graphically represent the data as a bar graph or frequency polygon on the monitor screen.
3. Pearson Correlations—utilizing as many as eight variables.
4. Simple Linear Regression—for a single predictor/independent variable and a single criterion/dependent variable. The analysis includes descriptive statistics for each variable, regression coefficients, coefficients of correlation and determination, standard error of estimate, and a test on the significance of the slope coefficient. A scatterplot of the data will also be produced on the monitor screen if desired.
5. Multiple Regression—for two predictor (independent) variables and one criterion (dependent) variable. The program generates descriptive statistics, correlations and partial correlations, an analysis of variance table, regression coefficients, and significance tests.
6. T-Tests—this option allows a t-test to be performed between two independent sample means, or between two related (dependent) sample means, or between a single sample mean against the population mean.
(7) Analysis of Variance—for a one or two factor design only, with equal or unequal sample sizes. Designs must be completely randomized with an independent sample of observations in each treatment condition. The program generates a full ANOVA summary table with F ratios, P values, and descriptive statistics for each cell of the design.

(8) Nonparametric Statistics—this program performs statistical analysis of raw data which is ranked. The six tests that are included are the Mann-Whitney U Test, the Wilcoxon Signed Ranks Test, the Kruskal-Wallis Test, the Friedman ANOVA by Ranks, the Spearman Rho, and the Kendall Tau.

(9) Contingency Tables—this program accepts data in the form of frequency counts from the keyboard only. The three tests offered are the Fisher Exact Test, the One Variable Chi-Square Test, and the Two Variable Chi-Square Test.

(10) Cross Tabulation—the program will perform a one to five way cross tabulation which allows descriptive statistics and simple frequency data to be generated using data from different files (variables).

The program assumes that the user is familiar with the computer and has knowledge of DOS jargon, file structures, and Applesoft error messages. (For example, error messages are represented by their standard Applesoft error codes. To determine the meaning of these error messages, you will need a DOS reference manual which explains the Applesoft error messages.)

Although the program will produce graphics that are displayed on the monitor, it does not include the ability to print out these graphs. In order to print graphs, Human Systems Dynamics recommends a graphics dump routine program such as the GRAFPAK from SmartWare or THE GRAPPLER card from Orange Micro. GRAFPAK can be purchased through Human Systems Dynamics at a discounted price. Stats Plus itself is available through mail order only.

One limitation of the program concerns the inability to delete data from sequential files, and this can be a decided disadvantage for some users. The problem is that once a sequential file is defined as having a certain number of scores (data points) within, a score cannot be deleted from the file. (Sequential files are often used to represent all scores measured on one specific variable.) A score can be modified, but it cannot be deleted. However, it should be mentioned that the inability to delete data only occurs with sequential files. It does not occur with random-access files. Both types of file structures are available with this program. The advantage of sequential files is that they allow data to be deleted from the file. Thus, the user may choose to utilize either type of file.

**TWG/ARIMA**

**Company:** The Winchendon Group  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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**TWG/ARIMA** is The Winchendon Group's Auto Regressive Integrated Moving Average software package designed to compute Box-Jenkins forecasts using time series data. It obviously is not intended for the general audience, although the manual does offer a good overview of the forecasting technique involved and is written in an understandable fashion.

**TWG/ARIMA** comes on a single disk which is not copy protected, so you can make back-up copies. The programs themselves are all written in Applesoft, making them both listable and modifiable. **TWG/ARIMA** defines data within two files: a dictionary file containing the variable names, and a data file conceptually stored in a "rectangular" format where rows represent observations and columns represent variables. **TWG/ARIMA** uses any sequential data file as a database as long as there are no alphabetic characters in it. This procedure is well explained in the manual.

Much of the **TWG/ARIMA** package covers the development and maintenance of databases. After the database itself is given a name, names are assigned to each variable and a verification procedure prompts you to confirm these names. An input screen, or "mask," is then set up for data input. Editing makes use of the standard Apple cursor keys (Escape-I,J,K,M). Extensive variable transformations are possible, including the creation of new variables. To facilitate data entry, software keyboard options are available to convert the following keys:
A program called COPYTEXT is also included to move and back up TWG/ARIMA databases.

The ARIMA statistical menu has options for: (1) Identification; (2) Estimation (and Diagnosis); and (3) Forecasting. ARIMA is a mathematical technique used to forecast a variable based only upon the variable’s past values; there are no outside influences taken into account. The Identification begins by selecting a database and a specific variable to be analyzed. The values of the variable (i.e., the time series) must then be made "stationary." To do this you must use such appropriate data transformations as Box-Cox, centering, or differencing, which are displayed on screen. Seasonal adjustments may also be taken into account within the model.

Following the transformations, you can graph the data. The graph includes the database name, variable name, mean, variance, number of observations used, number available, degrees of freedom, and any transformation, differencing, or centering that may have been done. TWG/ARIMA prints both the autocorrelation and partial autocorrelation coefficients, along with a graph of their statistical significance. These intermediate identification stages can be saved in a file named TWG/DATABASE NAME.XXXX, in which you select any title for the last segment of the file name, keeping in mind the 30-character DOS limitation on file names.

The estimation and diagnosis phase of the program, like earlier phases, presents questions on the screen which walk you through the procedures necessary to develop estimates of the autoregressive and moving average coefficients from the transformed, or model data. You select the database, model, and number of time periods before checking for backcasting, variable, number of observations to use, degree of autoregression, degree of differencing, degree of moving average, seasonal parameters, constant/intercept, convergence criteria (percent change in sum of squares, percent change in parameters, and maximum iterations), and starting parameter estimates. TWG/ARIMA does not include options for the exact maximum likelihood estimation. The iterative computations proceed, while an indicator in the upper right-hand corner of the screen shows the program is working. The outputs of this procedure are: (1) summary table—sum of squared errors, residual variance, number of observations, degrees of freedom, the raw constant value, and a list for each variable with its value, t-statistic, and significance level; (2) correlation matrix—between coefficients if there are more than one; (3) autocorrelations—values and graphical representations; and (4) a sum of squares grid. As in the previous stages, this version of the model can be saved as a file for forecasting.

Forecasting is the final phase of ARIMA and it, like the earlier phases, presents screen prompts to walk you through the procedure. You are asked to identify the database, model (from the identification phase), version (from the estimation and diagnosis phase), the number of time periods ahead to forecast, the time period to use as the base forecast period, and the desired confidence interval. The output of this phase includes: (1) a report containing the time period and forecasted value, along with the upper and lower confidence interval values; (2) a report containing the time period, the actual values (if they exist), the forecasted values, and the difference between actual and forecasted values; and (3) a scaled graph containing the time period (i.e., observation), the actual values, forecasted or predicted values, and the upper and lower confidence interval values. Sample outputs from all TWG/ARIMA procedures are contained in an appendix within the manual.

Overall, TWG/ARIMA is a straightforward, easy-to-use product. The package includes well-known sample databases from Box and Jenkins’ Time Series Analysis, Forecasting and Control text. TWG/ARIMA will provide economists, students, and other professionals an alternative to mainframe ARIMA analysis.
You should do a considerable amount of homework before buying software, no matter what kind you are interested in.

This is especially true of accounting packages. Despite the standard rules of accounting, every business has unique little nuances involving the tracking of its financial performance, and no one knows your business better than you and your accountant. For this reason, you may well want to enlist the aid of your accountant in selecting the proper accounting software for running your business.

Just as good accounting involves painstaking attention to detail, selecting a good accounting program or linked series of programs involves attention to detail. You should closely examine your present accounting system:

- How many transactions do you conduct a month?
- How large is your chart of accounts?
- How flexible is your chart of accounts numbering?
- Do you have or need divisional or profit-center accounting breakouts?
- What financial reports do you presently generate, and what additional ones do you want?
- Do you currently have a working budget, and, if so, how detailed is it? If not, what would you like to see in one?
- Do you want automatic ratio analysis?
- Do you want to link your system to spreadsheets or other types of modeling programs?
- Do you want to "graph" your financial trends for greater clarity?
- Do you want batch or automatic posting?
- Will you need to have your system integrate with other types of accounting programs? For instance, do you want general ledger, accounts payable, and accounts receivable programs as an interlinked system?

These suggestions are based on choosing a general ledger program, but the same preparation is needed in selecting other types of accounting programs—payroll, inventory control, accounts receivable, and so on. Ask yourself what you are doing now (either manually or automatically), and what you want a software program to do for you now and in the future. Consider expansion capabilities as your own business grows.

Something to be concerned about in selecting any kind of software package, but even more so in accounting, is the issue of vendor support for customers after they have purchased the program. Call the software publisher (preferably before you buy) and find out what kind of warranty and service you can expect after you’ve bought the program.

You will be surprised to learn how many software publishers don’t take customer support calls from end users; you have to get help solely through very busy dealers. If you’ve got a problem running an accounting package, which your business depends upon daily, you will want to be able to call the publisher directly if the dealer cannot solve your problem. Therefore, investigate your support options completely. Automating your business is too important a step to leave this to chance.
THE COMPUTER PROGRAMMED ACCOUNTANT
GENERAL LEDGER, ACCOUNTS RECEIVABLE,
ACCOUNTS PAYABLE, PAYROLL

Company: Continental Software  Sugg. Retail: $250.00 each
Language: Applesoft  Availability: 7
Hardware Requirements: 132 Col. printer optional  Disk or Tape: Disk*

GENERAL LEDGER

Any General Ledger, by its very nature, can by complicated to implement. This is especially true if the intended user is not an accountant and perhaps is also new to computers. It is therefore extremely important that a General Ledger Program meant to be used by the non-accountant be as easy to use as possible, as error-free as possible, and at the same time be powerful enough to provide quick, accurate and meaningful information to the user. It is equally important that the program provide the user’s accountant with accurate, concise figures derived from established accounting principles with verifiable audit trails.

Continental Software has done a good job in achieving these objectives.

FEATURES:
A) The program comes with a complete chart of accounts that can be used as is or modified for the user’s specifications. The user may also design his own custom chart of accounts by using the pre-printed form that accompanies the package.
B) Data entry is easily accommodated, since the user is again provided with a form for that purpose and the program itself checks that everything is in balance before allowing posting.
D) The program generates well-designed and readable reports:
   1) Profit and Loss Statement
   2) Trial Balance
   3) Balance Sheet
   4) Complete Journal Activity Report
E) A unique feature provided is that data in any account may be graphed and displayed on the screen.

SPECIFICATIONS:
1) 120 accounts in the Chart of Accounts
2) Approximately 1,000 transactions per month
3) Provides current year vs. previous year figures
4) Maintains approximately (depending on number of monthly transactions) a single year’s history

ACCOUNTS RECEIVABLE

First things first. In this module, the user is able to print invoices. In the past, this reviewer has found it somewhat surprising that in all the Accounts Receivable programs for the Apple that I have encountered, they only allowed statement printing — no invoicing. I realize that businesses differ in operation but I’m sure that many small businesses are similar to mine (computer supplies) in that I use invoicing almost exclusively and send statements only as a back-up or as a prompter for overdue accounts. In any event, with this program you can do both.

Invoices and credit memos may be carried on an open item or balance forward basis and can be shown either way when statements are printed. There are several options for printing statements, such as, by selected customer or only those with overdue balances.

Another seldom found but nice feature involving this module is the fact that you have the option of printing your invoices and statements on either blank computer paper (as in most programs) or on pre-printed, three-part carbonless forms (available from Continental Software).

An interesting touch is the way the user can define what constitutes column headings on a computer — a simulated manual journal. Sales categories — up to four — may be defined for the Sales Journal, and sources of cash — up to five — may be defined for the Cash Receipts Journal. This allows income and cash to be “spread” among several accounts if necessary. Thus, the user may allocate sales as needed.
Both the summary Aging Report and the detailed Aging Report are well designed, with an individual's name and phone number included for quick follow-up on overdue accounts.

The other reports generated by this package include a sales report showing the month's and year-to-date sales and last date of sale, Journal Reports, Customer Lists and Labels and a General Ledger Posting Report.

**ACCOUNTS PAYABLE**

In most respects, this module operates just like Accounts Receivable in reverse.

The module prints checks and allows you to mark which invoices you want to pay. It will print an Aging Report and a Cash Requirements Report.

Again, the journals, in this case Purchases and Cash Disbursements, may be customized by the user to spread transactions.

**PAYROLL**

Continental's Payroll module provides the user with an easy-to-use method of keeping track of employee records as required by federal, state and local law for all 50 states and the District of Columbia.

Complete Personnel Files are maintained for all employees.

A nice feature of this module is that the federal tax tables as well as the user's unemployment tax rate, FICA rate and limit and local payroll tax rates may be changed at any time by the user. When the payroll tax rates and/or limits change, most programs will not correct the previous amounts already deducted. This program will.

When it comes time to enter payroll data to generate checks, employees may be called up by name, pay period or department. The Payroll Journal may be printed totally, by pay period or by department.

When checks are printed, the employees' personnel files are automatically updated to reflect the current quarter and year-to-date totals.

Information for Form 941 and W-2 forms may be generated as well as Form DE-3 for California users.

A tax table update service is available for an additional charge of $50 per year. Continental will mail additional tax data disks as required to subscribers of this service along with a utility program that prompts the user as to how to update federal and/or state tax tables as needed.

Note: Continental Software has produced a set of audio tapes and a demonstration disk for its accounting modules. This demo package might be a good way for you to check out the suitability of these programs at a nominal cost.

**GENERAL ACCOUNTING**

**Department:** Business

**Company:** BPI Systems, Inc.

**Language:** BASIC

**Hardware Requirements:** 48K

**Sugg. Retail:** $395.00

**Availability:** 8

**Disk or Tape:** Disk

The BPI General Accounting package for the Apple III is precisely what the name implies: a general accounting package containing all the major components such as: General Ledger, Cash Disbursement, Payroll, Accounts Receivable, and Accounts Payable. When you consider the functions that BPI performs and compare it to similar systems, its $400.00 price tag is reasonable. While I would not recommend BPI for a large corporation such as General Motors, it definitely would satisfy the needs of any small to mid-sized company, such as a medical group or an architectural firm.

You don't need to be an accountant to use this package, but you really should be familiar with general bookkeeping practices and terminology, because the manuals make extensive use of accounting terms.

BPI is menu-driven; the menus are clear, if somewhat crowded. In other words, until you become familiar with the system (which doesn't take long) you might need to search the menus for the function you want. Your current menu path is always displayed in the upper right-hand corner of the screen, which helps, even though it is in numeric code rather than a textual description.
A good example of program set-up is included in the package. Most of the manual addresses entering data and producing reports for a fictional company known as Corner Home Improvement. If you follow the manual through, you will be able to check your output against output generated by the authors (included in the second volume of the manual, along with a number of worksheets).

Apple distributes the BPI package and it is available through any authorized Apple dealer. While Apple technical support is available, anything to do with the internal operation of the package is referred to BPI in Austin, Texas. The manual lists the BPI customer support phone number, but if my experience is any indication, they are understaffed (I usually got a busy signal).

The manual covers installation of the package on a system which includes a Profile. If you have a Profile attached to your Apple III, installation is a snap. If, however, you have some other high-capacity storage medium (and some storage device is required), you had better be familiar with the System Configuration Program on your Apple III Utilities disk because you will be giving it a fair amount of use. In addition, the manual does not give any hints concerning configuring the system with anything other than a Profile. The smallest device that I have found to work as the “big” disk is a Micro-Sci A143 (double-sided, double-density) disk drive, and if you use the A143, you will probably need at least one external Disk III for data storage. Throughout the manual, BPI assumes that you are working with a Profile attached to your system, so you will need to make the corresponding adjustments to the instructions.

Short of hitting Control-\ or Control-Reset, the program won’t crash. Let’s just say that the BPI program is very good at error-handling. The six disks in the BPI package are not copy-protected. As a matter of fact, the installation section of the manual leads you through the back-up of the disks.

My impression of the package is that it is well-designed and that a lot of attention was paid to making it an easy package to use with a Profile; however, advertising for the program does not even hint at the fact that a Profile is necessary (unless you consider the picture of an Apple III with a Profile as a hint). Only on the back of the package, under System Requirements, does Apple state in small print that a Profile is needed. If you have a Profile, the documentation deserves an A; if you don’t, it gets a D. My other complaint is that the documentation includes an Errata Sheet, which is fine, but the Errata Sheet includes a coupon to send in with a check for $15 if you would like a copy of the manual with the corrections incorporated, and I think that this is a little tacky. If the corrected manual sets are available, they should be included with the package and the update offer extended only to those who purchased the program before the manuals were corrected.

I used General Accounting on an Apple III with 256K, one external Disk III, and a Micro-Sci A143, and was very pleased with all facets of the program. The program is even teaching me how to keep my books in better shape so that I may avoid the last-minute rush to get ready for my accountant at tax time. I don’t use all of the features of the program, such as printing checks, but it is nice having them there as my business grows.

In short, if you’re looking for a general-purpose accounting package for the Apple III, I would strongly recommend the BPI package, but if you don’t have a Profile, you should either consider getting one or, if you don’t think you can work out the configuration yourself, hire a consultant.

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**BPI GENERAL LEDGER**

**Company:** BPI Systems, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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**Department:** Business  
**Sugg. Retail:** $395.00  
**Availability:** 4  
**Disk or Tape:** Disk†

The *General Ledger Accounting System* by BPI Systems Inc. of Austin, Texas, makes up a complete accounting system for an Apple II 48K with ROM card, two disk drives, and a printer capable of printing at least seventy-two columns. You should interface the printer with either the Apple high-speed serial card or the Apple parallel printer.
interface card. The package contains four disks and a comprehensive manual which takes the first-time user through all the steps necessary to implement the system. The fourth disk (a data disk) has a sample business entered on it so that you can practice. The three main disks are the Data Entry Disk, the Posting Disk, and the Maintenance Disk.

The main feature of this program is its ability to run multiple commands with automatic execution of the commands selected by use of a Queue. You can enter data disks only with an identifying code made up of six characters. This allows different companies to use the system by changing the Data Disk and accessing with the proper code. The system also includes a General Journal which can access any account in the General Ledger or any subsidiary ledger. Also important is the ease of correcting input errors. The back-space key erases any error, or you can use the General Journal by entering a journal entry with a matching offsetting entry to correct an entry made to the account after it was posted. This works just as a set of books kept manually does.

The Data Entry Disk has all the commands for entering data to the various journals in the system and the commands for printing the journals, posting the ledgers, preparing financial statements, and closing books. This occurs automatically with the use of the Queue commands.

The Posting Disk includes the commands necessary for posting all entries to the various ledgers after sorting them by account number. After the General Ledger is sorted, it is printed automatically or shown on the screen if the printer has not been turned on. After the General Ledger is printed, all subsidiary ledgers are also printed, including the payroll ledger. You can execute the Post command any number of times during the month before running the end-of-month command (a nice feature). You can also generate a profit and loss statement at any time, as well as a balance sheet.

The Maintenance Disk helps you open a new set of books and set up a new chart of accounts. When you set up the chart of accounts, changing the last digit of the account number produces multiple profit and loss statements for different departments, stores, or branches. This disk is used to initialize the Data Disk used for that particular operation. The Create Accounts command on this disk opens up a list of subcommands which allow you to create a general ledger, a payroll ledger, an accounts receivable ledger, an accounts payable ledger, cash disbursement prompts, invoice register prompts, merchandise purchased journal prompts, cash journal prompts, and store configuration.

All in all, this program has been well thought out, and excellently documented and executed. I found no errors in testing the entire program. This complete, integrated system contains superior features found only in very large computing systems. Any small or professional business will find the program very useful. The system handles up to 400 General Ledger accounts, 100 Payroll accounts, 200 Accounts Payable accounts, 400 Accounts Receivable accounts (which can be expanded), and 200 Cash Disbursement accounts.

ACCOUNTS PAYABLE

Company: BPI Systems, Inc.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A
EASE OF USE A
VENDOR SUPPORT A

DOCUMENTATION A
VALUE FOR MONEY A
VISUAL APPEAL A
RELIABILITY A
ERROR HANDLING A

Department: Business
Sugg. Retail: $395.00
Availability: 8
Disk or Tape: Disk

The BPI Accounts Payable program will keep track of expenses and cash outlays for a variety of businesses. It can be used by itself or will interface with the BPI General Ledger system. The software package consists of five disks: Vouchers (Invoices), Checks (Disbursements), Entry Posting, Maintenance, and a sample data disk. The system is copy-protected, but an extra disk set can be purchased from BPI for $40.00 BPI will repair or replace a damaged disk for $10.00.

Accounts Payable requires a two disk system—one drive for the program disk and the second for the data disk. In this configuration, the program can manage ten checking accounts making payments on up to 1,000 vouchers. The system can record expenses and disbursements in 350 general ledger accounts involving purchases from as many as 250 different vendors.
The program documentation is extensive and includes a tutorial sequence for every function of the program. There is a full chapter devoted to problem solving, a complete listing of error messages, and a large glossary of terms. An appendix contains examples of printed output and a set of blank worksheets help you configure the system to the particular needs of your business.

The Accounts Payable system is menu-driven and includes a command queue feature to sequence several commands through the system without your interaction. This time saving feature is helpful because the price you pay for the myriad of user-friendly features is response time. The system is very slow (20-40 seconds) between program tasks when returning to the main menus and when updating system records. The software format is highly standardized and all program disks utilize common commands. During program operation, all control characters that can be used at any particular time are displayed at the bottom of the screen with a short definition of each. This prevents you from having to refer back to the manual during program operation.

Accounts Payable keeps records for both accrual and cash accounting methods and can automatically record periodic disbursements (rent, lease payments, installment loans, etc). The program will produce reports on every area of payables recordkeeping: Accounts Payable Ledger, Check Register, Vendor Files and Ledgers, Voucher Register, Report of Invoices by Age, and even a Cash Requirements Report for cash flow analysis. The program will also print disbursement checks on appropriate check forms.

BPI ACCOUNTS RECEIVABLE

Company: BPI Systems, Inc.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B+
EASE OF USE A-
VENDOR SUPPORT B-
DOCUMENTATION B+
VALUE FOR MONEY A-
VISUAL APPEAL B+

BPI Systems Inc. manufactured Accounts Receivable for use by small businesses. To operate this system you need an Apple II with 48K, two disk drives, and a printer capable of at least seventy-two columns. Unfortunately, the program seems to best suit a Centronics Printer although the Equipment Required List does not specify this. My printer, a Paper Tiger, could not produce the hard copy listings.

The program consists of three disks: a Data Entry Disk, a Reports Disk, and a Maintenance Disk. A fourth disk contains a complete set of accounts with balances forward so that you can practice entries. The system comes with a protection device that you must plug into the game paddle I/O socket to run the program. A very nasty thing happens should you try to run the program without this device: the data disk in drive two gets completely erased. This happens because the disk gets initialized, so when the system invokes New, the program on the disk in drive one is deleted.

Accounts Receivable is a complete, almost automatic command execution system for this type of data entry. Almost all commands are issued so that as many as eight different commands can be executed in sequence without further user input. The program includes an Invoice Register, Cash Receipts Journal, and General Journal, which has a skeleton General Ledger that you can tie into the General Ledger System (also by BPI). After posting to the skeleton General Ledger, all accounts can be transferred to the BPI General Ledger system automatically.

The Reports Disk prints up to sixteen different reports at your option any time during the accounting month. Since the program is not intended for billing, the option was not included and it will not print invoices. Statements are printed in one of two ways, either with balance forward or with open items. You make that choice when you generate the system.

The Maintenance Disk sets up all necessary accounts on the data disk, including the skeleton General Ledger. This system handles 500 accounts and 1,000 transactions per month without too much trouble. If a data disk becomes full during the month, the screen displays instructions for creating two or more disks to handle the volume.
The manual is well written and covers almost every phase necessary to get the package up and running. One important feature incorporated in the entry routine allows you to correct any error entered by using the back-space key.

Although not inexpensive, this well-designed program fulfills its purpose admirably. I would like to see the option of a billing program to produce invoices to tie into the receivables program, because most of us do need such a capability in a program.

**PAYROLL**

*Company:* BPI Systems, Inc.

*Language:* Applesoft

*Hardware Requirements:* 48K

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*Department:* Business

*Sugg. Retail:* $395.00

*Availability:* 8

*Disk or Tape:* Disk

*Payroll* will manage a complete payroll—including taxes and withholding—for businesses with up to 9,800 employees. It can be used by itself or will interface with BPI’s *General Ledger* and *Job Cost* programs.

The software package consists of five disks: Data Entry, Entry Posting, Maintenance, Tax Tables, and a sample data disk. The system is copy-protected, but an extra disk set can be purchased from BPI for $40.00. BPI will repair or replace a damaged disk for $10.00. The system has been thoroughly tested by a CPA for reliability and accuracy, and when you register the software with BPI, a disk containing the latest tax tables for your state is forwarded to you with the system.

*Payroll* requires a two disk system—one drive for the program disk and the second for the data disk. *Payroll* can keep pay records for up to 9,800-plus employees and a $9 million payroll. Pay records can involve up to 99 general ledger accounts and 100,000 journal entries. The program will manage pay records calculated on a salary, per hour, or commission basis and will make deductions from each employee’s pay according to individualized instructions for that employee.

The program documentation is extensive and includes a tutorial sequence for every function of the program. There is a full chapter devoted to problem solving, a complete listing of error messages and a large glossary of terms. One appendix contains examples of printed output and a set of blank worksheets that help you configure the system to your particular needs.

*Payroll* is menu-driven and includes a command queue feature to sequence several commands through the system without your interaction. This time saving feature is helpful because the price you pay for the myriad of user-friendly features is response time. The system is very slow (20-40 seconds) between program tasks when returning to the main menus and when updating system records. The software format is highly standardized and all program disks utilize common commands. During program operation, all control characters are displayed at the bottom of the screen with a short definition of each. This prevents you from having to refer back to the manual during program operation.

*Payroll* will produce a variety of pay-related reports: Payroll Register, Check Register, Pay Statements and Earnings Records, General Journal, W-2 Forms, and a Tax Information Report to make end of the year calculations easier. The program will also print payroll checks on appropriate check forms and BPI has a suggested form they market separately.
**INVENTORY CONTROL**

**Company:** BPI Systems, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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**Inventory Control** gives the small to medium-sized business a tool for ordering, pricing, and managing any type of inventory. It can be used by itself or will interface with BPI's General Ledger and Accounts Receivable programs. The package consists of four disks: Data Entry, Entry Posting, Maintenance, and a sample data disk.

**Inventory Control** requires a two disk system and can support three disk drives. The two disk system can manage up to 1,000 items in inventory while a three disk system will track 2,200 items. With either configuration, your inventory records can include up to 500 customer accounts and 200 different vendors.

The program will monitor reorder levels for all items and automatically produce purchase orders to bring the inventory up to minimum levels. In addition, the program will produce packing lists for shipments to customers and price labels for either stocking or sales operations. The system has provisions for comparing recorded inventory levels to physical inventory results—including adjustments for shrinkage and overages. **Inventory Control** will produce reports on inventories sorted by your stock number, a vendor stock number, list price, reorder quantity, and six other criteria.

When it comes to program documentation and user-friendliness, **Inventory Control** appears to be the "weak sister" in the BPI Accounting System. Although all program disks utilize common commands, the program format is not as standardized as the other programs in the BPI system. Whenever entries are required, the program gives an audible "beep." Unfortunately, this beep is the same tone used by the Apple monitor system to indicate program interruption or a system reset. This doesn't affect the operation of the program, but it is very annoying to the experienced Apple user.

The manual is similar to the others in the BPI system, but there is no problem-solving chapter and very little troubleshooting information. For example, **Inventory Control** gives you no direct way to configure the system for various printers. During my initial test of the program, all reports and labels were printed on a single line. A short telephone call to BPI fixed the problem; I had to "fool" the program into providing the linefeed signal by telling it I was using a serial printer interface—even though my printer is a parallel model. The control for this feature was buried in the Edit Accounts command.

These drawbacks do not overshadow the utility of the system—particularly if your other accounting programs run on BPI software. **Inventory Control** does interface well with other BPI programs and provides efficient inventory management. It is simply not as polished as other members of the BPI family.

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**VERSAPAYABLES**

**Company:** H & E Computronics, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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**VersaPayables** is virtually a mirror image of **VersaReceivables**. It, too, is designed to interface with VersaLedger II and offers a complete accounts payable system which will print checks and check registers, allow for full or partial payments, print vendor mailing lists and all commonly used accounts payable reports. The program will keep track of discounts and will automatically select and pay the vouchers that can be discounted, or you may manually select vouchers that can be paid.
The program prints vendor data, transaction and aging reports, and mailing labels. It will handle from 10 to 450 vendors and from 4 to 40 transactions per vendor, depending upon the number of vendors selected (this must be selected at the beginning of the program and cannot be changed later).

The program suffers from virtually the same limitations as VersaPayables, but is much faster. Vendor data can be entered in VersaPayables much more rapidly than customer data in VersaReceivables. Care should be used, when selecting this program, to insure that it can handle your company's demands.

Documentation and other ratings are on a parity with VersaReceivables. The error handling rating was lowered as a result of the program's inability to detect a user error when I attempted to manually print a voucher transaction report. This resulted in one entry being duplicated three times.

Both VersaPayables and VersaReceivables suffer from being written in Applesoft. As a result, data processing is slow.

VERSARECEIVABLES
Company: H & E Computronics, Inc.
Language: Applesoft
Hardware Requirements: 48K

VERSARECEIVABLES is part of an integrated accounting package consisting of VersaReceivables, VersaPayables, VersaPayroll, VersaInventory and VersaLedger II. (All of the other modules interface with VersaLedger II according to the manufacturer). VersaReceivables is an accounts receivable system which the publisher estimates will handle up to 600 customers and transactions a month, depending upon the customer transaction mix. The more customers, the less transactions, and vice versa. The system is designed for an inventory based business and, contrary to the publisher's claims, is not suitable for the itemized time billing required by most professionals. The program will only permit itemization of a limited number of the most recent account transactions, with the other transactions being totalled as a balance forward.

A customer has two record files called CUST/DAT and TRANS/DAT which contain, respectively, the customer's statistical information and the transaction billing data. The billing information can be entered directly into the CUST/DAT file or an invoice can be generated which will also place the information in the file. Invoices or statements, limited to 25 separate items, can be generated at any time, and invoices may also be automatically generated, providing a fixed monthly charge is involved. This feature would be ideal for businesses that invoice fixed monthly charges such as pool service, gardening, etc.

The program will invoice customers, print customer mailing labels, generate monthly or periodic statements, credit partial or full payments to either specific invoices or to the earliest open balance, and will also print commonly used accounts receivable reports.

Reconciling open accounts is slow. Although I did not load the program to its maximum capacity, the manual states that 300 customers with 23 transactions each would require two hours and thirty minutes for reconciliation.

The program itself is also slow entering debit or credit transactions. For example, once a debit transaction is entered by you, the program can take from 20 to 37 seconds in order to accept and record the data. This is obviously a disadvantage when large amounts of data must be entered.

Another disadvantage of the program is that it must use NEBS 9042 invoices and NEBS 9060 statements. I have found the NEBS checks to be over priced and would assume the same to be true for other NEBS forms as well. For $25.00 the publisher will customize the program so that other forms may be used.

Documentation is less than adequate. The manual does not explain the hardware requirements, and since the program was originally developed for the TRS 80, and the manual supplied with the Apple version is the original TRS 80 version. Apparently, the program has been upgraded since the manual was written, hence the on-screen menus differ in some respects from the manual. A four page loose-leaf addendum is supplied for Apple II users, and
a one and a quarter page insert for the Apple appears in the back of the manual. The two conflict. The one in the back of the manual was written for an earlier version of the program. Neither addendum, however, explains this fact. Fortunately, the on screen prompts are sufficiently easy to follow so that the deficiencies in the manual are not critical.

The first version of the program I received was totally frustrating. Among a multitude of other defects, the program would not print invoices and would bomb when this function was attempted. Telephone calls to the vendor were promptly answered by a knowledgeable and helpful programmer who gave sufficient instructions to correct the specific problem. However, after the "fix" was applied, another bug would crawl out of the woodwork, necessitating another call and repetition of the same scenario. Finally, the programmer suggested I return the disk, and when I received the updated version, the program functioned without error. Obviously, however, the program was marketed for the Apple before it was thoroughly tested (a too common occurrence in the industry).

The current version of VersaReceivables is fine, given the limitations discussed above. It is suited to fixed monthly charge users. It is not suitable for itemized time billing users. Depending on the type of customer transaction your business requires, this program may or may not satisfy your needs. For example, with 450 customers, it will only handle 6 itemized transactions per customer. However, with 81 customers, it will handle 60 itemized transactions per customer. Transactions exceeding the program's capacity are converted to a balance forward category.

According to the advertising, "every VersaBusiness module is guaranteed to out-perform all competitive systems and at a fraction of their cost. If you are not satisfied with any VersaBusiness module, you may return it within 30 days for a refund." This policy should offer you an opportunity to evaluate the system prior to a final purchase, an added bonus.

VERSAPAYROLL

Company: H & E Computronics
Language: BASIC
Hardware Requirements: 48K

OVERALL RATING       C-
EASE OF USE           D
VENDOR SUPPORT        C+

VERSAPAYROLL is a group of interactive programs on one disk that will compute and maintain payroll records for up to 500 employees. The system will allow you to print employee listings, employee year-to-date totals, and required government quarterly reports. You will also have the option of printing all paychecks, paychecks for selected employees, or manually writing the checks using system generated figures. You may also override deductions, if required, for overtime hours, commissions, etc.

VERSAPAYROLL can be used in conjunction with the program VersaLedger II. VersaPayroll's manual is written for the TRS-80 computer and includes a four page Apple II addendum. The program disk is not protected.

Program operations are performed from Main Menu and Sub-Menu selections. While the program basically performs well, I feel that the Apple II version lacks the error handling and screen prompting routines that are now considered essential. A basic example of this occurs when you are requested to enter the date. You are shown a flashing cursor on the screen, but no format to enter the date. If you enter 01/01/83 you have no problem. However, if you enter Jan. 1, 1983 all you see on your reports or printed checks is Jan. 1. The reason for this is VersaPayroll will not allow you to enter a comma, and anything you enter after a comma will be ignored.

One nice feature of the program is that you may enter the current tax tables without sending to the publisher for an update; however, I found that certain state and local tax tables cannot be entered in the format required by the program, and this means that these deductions must be manually computed and entered at the time the payroll is prepared. I would also like to point out that only one state and one local tax table can be used, so if you have employees from different states or cities that also require income taxes, you will have to maintain a separate payroll system for each state or city.
Because the programs are written in BASIC and there is a considerable amount of disk activity, the operation of the program tends to be slow. For example, when you request that all payroll checks be printed, you must confirm this answer before each check is printed, necessitating spending several hours at the keyboard for a large payroll system.

While Versa Payroll will perform most of its intended operations, I would suggest that you get a demonstration from your software dealer to insure your complete satisfaction.

**AGRI-LEDGER**

*Company:* Small Business Computer Systems, Inc.  
*Language:* Applesoft  
*Hardware Requirements:* 48K

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The complete Agri-Ledger package is menu-driven and includes a comprehensive, well-written manual and four disks. There are two program disks (one for use as a back-up), a data disk, and a cash flow template disk for use with VisiCalc or MagiCalc. Nearly all aspects of the program are user-defined. For example, you may use the program's account codes, or assign your own. You may keep records for only one farm, or up to twenty-six different farms. Each farm may have as many as 99 different enterprises, although the basic 48K Apple hardware setup will support fewer than six hundred different accounts.

Agri-Ledger provides seventeen report titles, most of which have several user options. The Schedule F report provides complete information for your tax return, including line numbers. You may select the report for a single farm or enterprise, or several. In addition, reports are available on a monthly, quarterly, or yearly basis.

Probably the biggest problem with Agri-Ledger is that it uses a double entry accounting system which requires extra time and effort. Another problem, or limitation, is the difficulty in setting up account codes. Changing account codes is a chore in this program. Finally, enterprise analysis is limited to financial analysis only. This program does not attempt to tackle feed conversion for the hogs, the calving interval for your cow herd, relative fuel consumption for machinery combinations, or related questions, unless you are willing to settle for answers only in dollars and cents.

As for error handling, the program is designed to test your entries. If the entries are inappropriate or out of a given range of possibilities, the program will not accept the entry. If you do make an error and press the Return key, you must complete the entire entry before you can correct it. I found this a very distracting feature. However, all mistakes can be corrected at the end of each screen you enter, or edited at a later time.

As a farm accounting system, Agri-Ledger is well designed. The documentation is simple yet thorough. The practice session takes you through enough of the program options to acquaint you with its features, and the well organized manual has detailed explanations for every option. The index is good, but many key terms are omitted. The "Accounting Terminology" and "Glossary" are nice added touches.

SBCS offers a jewel of a warranty. It is written in plain English, and promises that SBCS will fix the program or replace it as long as you don’t abuse it. It promises free updates, and guarantees a provision for converting data to the update. Many free program modifications are offered in the manual, and SBCS suggests that other modifications will be made at a modest charge if so required by your operation. Also, SBCS offers a very good demo plan. For $30.00 you can order the demo and decide if this program will fit your needs. The $30.00 applies to the purchase of the package.

It would be difficult to find a better farm-oriented double entry accounting system for your Apple, and the demo disk lets you judge the program’s usefulness for a very modest fee. SBCS provides excellent customer support. Their pride in their program appears to be well-justified.
THE INVOICE FACTORY

Company: Micro Lab
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: B–
EASE OF USE: B
VENDOR SUPPORT: B

DOCUMENTATION: B–
VALUE FOR MONEY: B–
VISUAL APPEAL: B

RELIABILITY: B+
ERROR HANDLING: B+

You can use The Invoice Factory either as a stand-alone program or in conjunction with The Data Factory. With it you can prepare invoices and statements and keep track of each customer's account. The name implies that you use the program to prepare invoices, but it does much more than that. It prints invoices and monthly statements and maintains and updates customer records and present balances. It is, however, a specialized program designed for a company that deals with “hard” goods that can be identified and priced by item listings. A company dealing in services or “soft” goods would find no use for the program.

Like The Data Factory, The Invoice Factory is menu-driven and easy to use. You start by entering Master Accounts or a list of all your customers. The format that you must use is well laid out and well enough defined to make this easy to do. Next you prepare the shipping variables. This part of the program can save your company hours of manual calculations because the computer figures shipping costs based on a product's weight and the Zip Code destination. You can update UPS charges as their rates change. I found this section totally accurate in every respect. After you enter the shipping variables, you must enter product information, including a description, price, and shipping weight. The system lets you use 100 products; while you choose which ones to use, the arrow keys control the scrolling of the list on the screen.

After you have established a Master Accounts file, a Shipping Information file, and a Product Price and Weight file, you are ready to print out the invoices. You can accomplish this procedure easily by following the instructions in the manual, which even provides a set-up routine to help you line up the invoices in the printer prior to running them. Of even more importance, however, is the program's ability to provide statements, accept payment posting, issue credit memos, and print reports. The system makes up a complete office billing package for small businesses with hard products. It handles all phases of the billing cycle and keeps track of customers.

Several negative elements cropped up during use of the program. For example, you must use invoices preprinted with your company name and address or else use a rubber stamp. Also, since the computer numbers the invoice (after you specify where to start), you cannot use invoices with preprinted numbers. This could present a security problem. Finally, the invoices lack a line for comments to add a personal touch.

You can use the files created by The Invoice Factory with The Data Factory. A conversion program lets you add to the file information, change the fields around, and otherwise customize the program. Going from one system to the other proves awkward at best, and, without proper precautions, can result in file damage.

INFOTORY

Company: S.S.R. Corp.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: B+
EASE OF USE: A
VENDOR SUPPORT: B+

DOCUMENTATION: B+
VALUE FOR MONEY: B+
VISUAL APPEAL: B+

RELIABILITY: A
ERROR HANDLING: A

Infotory, an Inventory Management System by S.S.R. Corp. of Rochester, New York, is a complete system for keeping track of purchase orders and inventory for a business which does not keep more than 9,999 items of one type in its inventory. You need an Apple II or Apple II Plus with 48K and Applesoft in ROM with two disk drives. For all reports you need a printer which allows eighty columns on 9.5 x 11 inch paper with sixty-six lines per page. You cannot change these documents as the program disk is copy protected. The printer card can be either a serial or
parallel interface version; the DOS controller card can be either 3.3 or 3.2.1. If you use a DOS 3.3, the program handles about 1,200 inventory items; otherwise, it handles only 1,000.

The package contains two disks, a program disk and a data disk with a sample inventory program. The extensive documentation supplies all information necessary to get the system up and running. The programs are menu-driven, with the three daily entries Receiving, Sales, and Purchase Orders. As you enter these, a printed copy of all transactions provides a complete audit trail.

*Infotory* lets you make an inquiry on any item and provides inventory reports, price lists, sales, and cost analysis. In addition, a unique report called *Anyreport* allows you to create various reports using various combinations of available fields or data elements. Because the program helps you keep track of purchase orders, it lets you know when to replenish stock on hand.

The menu for the program disk follows:

1. Receiving entry
2. Sales entry
3. On order P/O entry
   (Note: These are daily entries.)
4. Inquiry on items
5. Inventory report
6. Price list
7. Sales and cost analysis
8. Anyreport
   (Note: These are information and reports.)
9. Add new items (inventory)
10. Change/update items
11. Delete items
12. Clear sales/cost data (for new period)
13. Initialize new data disks
   (Note: This is the data maintenance section.)

The stored data items are Avg. Cost, Descr., Item #, Location, On Order, Period Cost, Period Sales, Price, Qty. on Hand, and Qty. Sold.

The program calculates the cost on hand, cost on order, gross profit, percentage of gross profit, margin and percentage of margin, and maintains a reorder flag.

All in all, this very complete program well suits the business that does not surpass 9,999 items in stock or sold, and does not have any item that sells for more than $9,999.99.

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**SYSTEMS II Ex**

**Company:** Westware, Inc.

**Language:** BASIC

**Hardware Requirements:** 48K

**OVERALL RATING**  B  **DOCUMENTATION**  C  **RELIABILITY**  B

**EASE OF USE**  C−  **VALUE FOR MONEY**  B+  **ERROR HANDLING**  B

**VENDOR SUPPORT**  B+  **VISUAL APPEAL**  C

**Department:** Business

**Sugg. Retail:** $1,595.00

**Availability:** 4

**Disk or Tape:** Disk

SYSTEMS II Ex is all you ever wanted in a comprehensive small business accounting package and more—possibly too much more. It includes modules for Accounts Receivable, Accounts Payable, Inventory, Ledger, Payroll and a Database. There is an optional job costing module. There is password entry control to the different modules and a feature to establish audit trails. The modules are integrated (i.e., entries in one module automatically adjust other modules as appropriate). You can print invoices, statements, checks, age receivables, set up inventory reorder levels, mailing lists, budget goals, prepare employee pay checks and tax reports, trial and final balance sheets and statements, and a virtually unlimited assortment of other reports for one or more “profit centers.”
But in order to accomplish all this, the system needs to be set up by someone knowledgeable in accounting methods and practices. It also requires sophisticated computer use and entry procedures. A provided card, which sorts and keys data as entered, must be installed in one of the computer motherboard slots. Disk drive speeds are critical and are tested as part of the installation procedure (although, while one of my disk drives did not meet the criteria, it seemed to cause no problem).

Running the system to full advantage requires entering data—lots of it. No program can be better than the information entered. For this system, operating as it does from one computer terminal, this means that clear records of all transactions must be carefully made at their source.

SYSTEMS II Ex offers a good entrance into computerized business accounting. It allows for considerable sophistication and expansion of your business modules. A hard disk version of the program is also available.

THE ORDER SCHEDULER

Company: High Technology, Inc.
Language: BASIC
Hardware Requirements: 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
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<td>B-</td>
<td>B+</td>
<td>B-</td>
<td>B-</td>
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The Order Scheduler provides the small business with a simple but effective computerized system for handling purchase orders. It will keep track of all unfilled and partially filled purchase orders, arrange them by the date received, and print an order schedule report for the shipping department. The number of items actually shipped is then listed on the report and entered into The Order Scheduler, which automatically updates the purchase order file and prints an audit trail.

To begin, you create the master file by inserting an initialized disk into drive two; no user-formatting is allowed. After the master file has been created, purchase orders are easily added by entering pertinent data:

1. Account number
2. Purchase order number
3. Date ordered
4. Date desired
5. Stock number (numerals only)
6. Total quantity ordered
7. Quantity to be shipped at each shipping period
8. Balance (to be shipped)
9. Shipping date
10. Frequency with which scheduled quantity will be shipped

Three reports are available. The order schedule report lists all purchase order data and includes a blank line on which to write the number of items actually shipped. The second report, the account status report, provides the status of purchase orders for selected accounts as of the current date. The third report, the account/order list, provides a quick reference to all purchase orders by account number in order to answer customer inquiries. It lists the account number, the purchase order number, the ordered date, and the record number.

Account numbers and purchase order numbers may contain up to eight alphanumeric characters. Stock numbers may contain up to four numerals. Purchase orders, which can be easily searched and edited, may contain up to 90 items. File capacity is in inverse proportion to the number of items on each purchase order; the maximum number of purchase orders is 1,592. If the average purchase order contains about five items, capacity drops to 530; at 90 items, file capacity is only 34. However, a purchase order is automatically deleted when the complete order has been shipped, so capacity is not a problem. Since filled orders are deleted, however, The Order Scheduler cannot be used as an historical file of completed purchase orders.
It is important to note that *The Order Scheduler* program disk cannot be copied. One back-up copy is provided at no additional charge upon registry of the licensing agreement. Additional copies are provided at a nominal charge.

Menu-driven, easy to use, and involving no disk swapping, *The Order Scheduler* comes with a 36-page guide which has a readable text and many examples. The main weaknesses of *The Order Scheduler* are an overall simplicity, the deletion of filled purchase orders, and the lack of report flexibility. Many users will want *The Cashier*, a companion program by the same author, which is designed to improve the report capabilities. Also, there is no provision for entering the customer’s name, only the account number. The user needs a list of all the account names as well as their numbers.

### BUSINESS CYCLE ANALYSIS

**Company:** Instant Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

<table>
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<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>VENDOR SUPPORT</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
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<td>C–</td>
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This program is designed to produce a 12-month moving average (12-MMA) of a data series (e.g., Sales per Month), and then to produce a “pressure curve” using that 12-MMA. A pressure curve is defined as a graph of the ratio of a variable (such as Sales) in a particular period, compared to the value of that same variable in a previous period. This is done by dividing each monthly data point in the 12-MMA by the data point for the same month one year earlier. This ratio in turn is multiplied by 100 to convert it to a percentage. Once all the pressure points have been calculated, they can be plotted to produce a pressure curve. The program’s author claims that from observing a pressure curve, you can tell if a particular data series (e.g. Monthly Sales) is growing or declining, and if it is doing so at an increasing, constant; or decreasing rate.

The program requires at least 60 data points (i.e., 5 years worth of data) in order to produce meaningful figures. The data can be saved to disk, and the graph can be printed if you have a printer with graphics capability and a proper interface card, like the Grappler Plus. Program operation is straightforward, and the documentation does a good job of explaining the program’s operation and the theory behind the use of pressure curves.

The program is very limited in scope, and it is doubtful that even a small business owner, much less a sophisticated business manager, will gain much assistance from it.
Word Processing

Word processing programs offer a greater range of price and features than perhaps any other kind of program. In order to intelligently choose word processing software for your Apple you should have a good understanding of the concept of word processing and of the features that comprise a word processing system. In many cases, your own word processing needs will determine which features will be most important to you, making it imperative to know what you are buying before you invest in a product.

Essentially, a word processing system can be defined as a program or collection of programs designed to allow you to enter and edit textual matter, then store it temporarily within the memory of the computer and permanently in some external media (e.g., disks) for producing a printed document. The advantages over traditional typewriting in the speed and accuracy of entry, ease of editing, reproduction, and reorganization of written material are enormous; and these advantages are making themselves felt in all areas of text handling, both in business and in the home. Word processing a business letter makes it possible to quickly correct minor mistakes, move words, lines, or entire paragraphs around, and perform complicated formatting tasks, all without retyping each revision.

A typical word processor fulfills three major functions: text editing on the display screen; file management in internal memory and external storage; and formatting a document for printing. These particular functions are not usually divided into separate modules, nor can you easily distinguish them as you use the program. In fact, most of the more advanced word processors running on the Apple have been designed so that you deal with editing, formatting, and printing decisions as they arise in the normal process of creating a document. Program designers have generally attempted to ease the transition from typing to word processing. They have tried to keep the actual functioning of most word processors transparent to the user. As much as possible, the choices you make in word processing will resemble the traditional choices you are familiar with from working with a typewriter. Nevertheless, it will be convenient here to discuss these three functions separately.

THE EDITOR

The editor is perhaps the most important part of a word processing system. It allows you to type in text from the computer keyboard and modify it on-screen as needed. It is particularly important that your word processing software have a good editor. A slow, cumbersome, or otherwise inadequate editor can make word processing more difficult than using an ordinary typewriter. Most editors operate on a collection of text held in memory, and allow you to display sections of the text on a terminal, add or insert additional text, change, delete, copy, or move existing text, and scan for selected strings of characters.

There are two major classes of editors: the line-oriented editors and the full screen type. Line-oriented editors, as their name implies, require that you format and input text line-by-line. Such editors survive primarily as elements of operating systems and programming languages, but they are rarely used for word processing these days.

Full screen editors, on the other hand, fully exploit the Apple's video terminal (also commonly referred to as a Cathode Ray Tube or CTR). The Apple's terminal allows twenty-four lines to be displayed on a TV-like screen. Using the computer, you can selectively erase or rewrite them, not necessarily in the order that they were originally written. This design allows a full screen editor to "throw" a large number of text lines up on the screen where you can use the cursor control and function keys to move around on the screen and make changes in the text. (Control characters are those commands invoked by pressing the Control key in conjunction with another key, such as CTRL-D; "function" keys are commands invoked by pressing two keys at the same time, such as the Escape or Open-Apple and another key.) Add to this capability special editing commands (usually invoked by Control or function characters), and a very powerful editor is the result.

Line-Oriented Editors. Attached to early computers one would always find the popular teletype terminal. This device was essentially a computer-driven typewriter, printing messages from the computer on a roll of paper and accepting input from the keyboard. Based on this device, early editors were line-oriented. In other words, your input was accepted in the form of a series of lines, each ended by pressing the Carriage Return key. When you were not typing in text, the computer could send output, also in the form of lines. A line-oriented editor is generally command driven, allowing you to instruct the computer to accept input lines of text, list selected lines as output, delete lines, substitute strings of characters, and scan. The advantages of such an editor are that it can run on almost any terminal, hardcopy or video screen, and, being command driven, it is somewhat easier to learn to use. The disadvantages are that it is at times hard to find your place in the text, making editorial changes can be awkward, and lines must
There are several commands you should expect to find in a good line-oriented editor. Line-oriented editors allow you to refer to a line either by a numbering scheme (such as the BASIC editor) or by a "current line pointer" concept. In the first case, should you want to list the first twenty lines of text in a document, you might say "LIST 1,20" or list lines 1 through 20. In the second case, you would position an imaginary current line pointer to the top of the document (with a TOP command) and then you might issue the command "LIST 20" or list the current line and the lines following up to 20 lines. There is usually a line adding command which, when invoked, allows you to enter lines of text automatically, one after another. Also, there are commands to delete a line or a range of lines, and insert lines (similar to the adding command) between other lines. To facilitate finding a line which needs changing, there should be a scan command which searches a document for a given character string; and, once found, there should be a string substitution command, to allow minor changes to a line and so avoid retyping it.

In addition to these basic commands, there are several possibilities. A very useful feature is the ability to "globally" (i.e., throughout the text) change a given character string to another. Suppose you have entered a form letter written to a Mr. Lee. Now you want to send the same letter to Mr. Green but Mr. Lee's name appears all throughout the letter. A global replace command would change all occurrences of the string "Mr. Lee" for "Mr. Green," shifting the remaining text on each line to the right to make space for the longer name.

Another useful command is one which permits copying of a line or group of lines from one place in the document to another. This is usually done by specifying the starting and ending line numbers of the lines to be copied and the number of the line after which they are to appear.

Some line-oriented editors support a "local edit" command. With this command it is possible to ask the computer to list a line of text, placing the cursor on it for updates. You may then move the cursor over the line, making selective changes, inserting or deleting characters at will, then replace the old line in memory with the modified one when you press the Return key. An "edit" command may become the most useful in the line-oriented editor's command set.

Other commands can set tabs (as on a typewriter), erase all text in memory to begin entering a new document, and display the amount of memory left in which to enter text. There are also many word processing functions which can be included as commands (these will be covered in greater detail below).

**Full Screen Editors.** Most full screen editors display text lines on the screen, and you move your cursor around at will to make changes. The screen can be thought of as a window or "viewing port" on the text in memory. Using Control or function key commands, you can move this window around over the text in memory, giving you access to different parts of the document. In general, the function and cursor control keys or commands move the cursor up, down, right, left, to the upper left corner of the screen, to the lower left corner, to the preceding or following word, to the end or beginning of a given line, or to preset tab positions. In each case, the movement of the cursor does not affect the text in any way.

In addition, there might be commands to move the screen window "down" or forward through a document, "up" or backward, and, if horizontal windowing is supported, to the right or left. This latter movement would only be necessary if lines in the document could be longer than the line length of the screen. Commands to move the window to the beginning and end of the document, or to the thirty-first line, for example, are also useful.

Other necessary commands include a search capability. When the target character string is found in the text, the cursor is left over it to make changes easier. A global search and replace is also a must. It should be possible to delete characters in a line and have the editor shift the remaining characters over to take up the space occupied by the deleted ones. Conversely, an "insert" mode should be provided to allow characters to be inserted in the middle of a line, shifting remaining characters to accommodate them. In the vertical direction, there is a need for a line delete command and a line insert command or mode as well.

Most full screen editors provide a means for moving or copying blocks of text lines from one place in the document to another. This is usually done by first "marking" the first and last lines to be moved with a special command, saving the block thus marked in an internal holding area, moving the cursor to the new place, and recalling the saved block of text.

Other commands can allow for the shifting or tabulating of text, splitting or joining lines, and setting, clearing and using tabs. Signalling when you enter text beyond a specified column is also a desirable feature (unnecessary where text is automatically "wrapped around" to the next line down when the right margin is reached). Some editors provide commands to operate on words. A Control key might delete the word to the right of the cursor, for instance.

Since there are a limited amount of Control and function key combinations on the keyboard, it is possible that the editor might operate in different modes, re-using the same commands for different functions depending on the mode.
you are in. Some editors have a “cursor movement mode” in which Control keys move the cursor or the whole window. Entering another command might place the editor in a “change” mode, redefining the function and Control keys to have entirely different meanings. In general, it is better to avoid this design due to the added complication in memorizing all of these commands, but some use of modes should be expected.

Some editors set up for word processing will automatically prevent the splitting of words across line boundaries. This means that, should the last word you type on a line not fit (as is often the case), the editor will automatically move it to the beginning of the next line for you. This is the “wraparound” feature mentioned above. Some editors operate only in this mode, and at times these can be hard to deal with when you try to place data in fixed positions on a line.

The overwhelming majority of the many word processors running on the Apple employ screen-oriented editors. Only a few, mostly older programs, still use line editors. In addition, there are editors which fall somewhere in between (let’s call them “command driven screen editors”) which are line-oriented editors in every sense except that a portion of the screen is set aside to display an updated image of the text after each command.

THE FILE MANAGER

Once a document has been entered into the computer’s memory through the editor, a provision is needed to save it to disk. The file manager within the word processing system is provided for this purpose. Commands are usually available to load into memory a document which had been previously stored on disk; or conversely, to save a document which has been entered into memory as a file on a disk. A command to list the documents stored on a given disk is necessary, as well as commands to copy, delete, or rename these files. Some of the more sophisticated file managers will allow you to save a portion of the memory image (lines 250 to 273, for instance) as a file on a disk, or to load a file from disk as an insertion into the middle of the document currently in the editor’s memory. By using this feature it is easy to piece together a document from “canned” or boilerplate segments. Some word processors use “virtual memory” techniques to constantly take the current section of a file from disk and replace the sections with which you are not currently working. This approach to memory management means you can work with files many times larger than can be contained within the Apple’s internal memory. If you have large quantities of RAM you can also use a number of different utility programs to create a “RAM disk” which can improve access time significantly.

An important consideration when evaluating a file manager is its use of a standard file format. Some word processors use a non-standard DOS format for files, either to provide more efficiency, special purpose capabilities, or to protect the software from being illegally copied. If you’re considering such a word processor, ask yourself if you intend to use the package for anything other than word processing. If the file manager supports a standard file format (one which can be accessed by BASIC or other operating system languages), then the editor can be used to type in programs as well as text documents. Also, although many such packages also offer a form letter or mailing list capability, it may be desirable or necessary to interface your own mailing list files, written using other software, to the word processor. Non-standard file formats can also limit your flexibility when it comes to copying files and making back-ups.

THE PRINT FORMATTER

Second only to editing in importance is print formatting. The print formatter accepts your edited document as input and sends it to your printer to create high-speed typewritten output. This may seem simple, and it can be. But usually the print formatter’s job is quite complex. A good formatter must keep track of how many words will fit on an output line, never allowing a word at the end of the line to be broken in half or hyphenated at random. It can “justify” the resulting line so that both the right and left margins appear even, and it can determine when a page is full, then automatically go to the top of the next page and print a title and/or page number.

In the simplest case, input to the print formatter is pure text lines dumped to the printer without change. To cause the formatter to “massage” the text into a more presentable form, formatting commands must appear in the text at strategic places. Either you insert them on-screen while editing, or the program formats automatically according to your instructions entered at the beginning of the task. Thus, you enter text and format it with special commands to tell the formatter exactly when to go to a new line, where a paragraph is to begin, and when to underline or over strike. In order to better understand the capabilities of a formatter, certain terms need to be defined.

Line filling. The line length of the editor is usually, but not necessarily, the same as the final output image. If there is a difference, a “line filling” technique is commonly used. To allow for this, the formatter can be made to do “filling.”
This means that, after moving an input line to the output line buffer, there is room for more characters on the output device; the formatter then fills the output line by "stealing" words from the next line(s). On the other hand, if the output line is shorter than the input lines, the formatter will only use as many words on an input line as will fit, and will use the remainder as the first part of the next output line. Another use for filling is in revising documents. Suppose you have entered a document with the editor but now realize that you left out a word. After inserting the word into the line, you would either have to live with a line that is a little longer than any of the others or else retyping the remainder of the paragraph if filling was not available. With the filling option it doesn't matter what the output looks like, because the printed lines will be filled and look normal. When filling, some word processors will "eat" or throw away excess blanks between words, reducing down to one blank between words and two following sentences. This practice either can be an asset or a liability, depending upon the types of documents being entered.

Justification. Text justification is a concept related to filling. Lines can be left justified, right justified, centered, or fully justified (even margins). Everyone should be familiar with left justified lines. This simply means that the text starts on the left margin and words are separated on the line by one space. Left justified lines have what is called a "ragged" right margin, since it is unlikely that every line will end in the same column. Right justification, rather less useful, is the opposite of left justification. All of the lines appear to have been shifted over to the right so that the last character in each falls even along the right margin column. A fully justified line is similar to the appearance of typeset material, such as you find in this book. To justify such a line, the formatter adds spaces between the words on the line (as evenly distributed as possible) to force the last word to the end of the right margin. You could do this on a typewriter, but this would require typing the line once, calculating the number of spaces to add and the place to put these spaces, and then retyping the line adding the proper number of spaces between each word.

Examples of normal left justified text and fully justified text are shown in Example 1 and Example 2, respectively. Example 2 may appear better than ordinary typewritten text but it is still a long way from the appearance of typeset material. This is due largely to the limitations of the typewriter. An ordinary typewriter (and most computer printers) will "escape," that is, move the carriage a fixed distance, after each character is typed. Thus, the carriage moves the same distance for the letter "i" as for the letter "D." Some of the newer printers allow this "escapement" to be varied, depending on the width of the last character typed. This is called "proportional spacing." The result is a product much more akin to typesetting (Example 4). Since these computer-controlled printers can move their "carriage" in very small increments, it is possible to justify lines much more evenly than before. This practice is called "incremental justification." Example 3 is the result of both proportional spacing and incremental justification.

(1)
The Association for Computing Machinery (ACM), which has long advocated freedom of expression for scientists around the world, now stands accused of censorship. The brouhaha erupted late last month when the 37,000 member society was accused of "censoring" two candidates' ballot statements for the association's upcoming election of national officers. The accusations were made by present office holders. They have accused the ACM "establishment" of trying to rig the election by this effort.

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There should be, therefore, a capability for filling in left or fully justified lines. Some word processors will operate only in the filling mode (it cannot be turned off). This can be a disadvantage when tabular information is being entered (especially if the formatter "eats" blanks, as mentioned earlier). In general, it is best if data can be entered as a stream of words to be made into paragraphs, filling with or without justification, or as an exact image of the output (such as a table or chart) with filling and justification off.

Other formatter commands allow you to specify left and right margins, the number of lines to skip at the top and bottom of the page, the title that is to appear at the top and/or foot of each page, the position of any page number, line spacing (single, double, etc), underlining, boldface or overstriking, centering lines, and paragraph indentation.

Some of the more sophisticated word processing systems provide additional formatting capabilities. Among these is a "widow prevention" feature. A widow is a portion of a paragraph, usually only the first line or two, which may appear at the end of a page, with a remainder of the paragraph appearing on the top of the next page. This is considered undesirable. Some word processors will not start a new paragraph if only two lines are left on a page, but will automatically go to the next page. Trailing widows are also possible, but these are a lot harder to eliminate and usually only expensive typesetting software can deal with them.

Another advanced feature is the ability to process a form letter, reading mail list files and inserting names and address data into specific places in the letter. Some packages offer this as a separately purchased option, others provide it as standard. Also, some treat form letters specifically, while others allow a more general ability to read records from an external file, skip blocks, and loop.

Other features to look for in a formatter include support for special characters. These may be available on a printer but not necessarily in the character set of the editing keyboard. Another useful capability is that of turning the formatter's output on or off. Many times, while "debugging" a document, it is desirable to print only a selected portion (in the middle or at the end) while still processing the beginning of the document for pagination, etc. This feature can also be used to insert comments to the person editing the document that are not to be printed in the final version. Also, some formatters allows commands to pause printing, prematurely abort printing, and obtain strings of text from the terminal for insertion into the documents (for example, the document can prompt the person printing it for its output line length).

One final capability which can be much more useful than it might appear is the ability to "proofread" a document by running it through the formatter and placing the output on the video screen exactly as it will appear on the printer. This can save a great deal of time and paper. Some word processors include spelling checkers. Auxiliary programs offer such options as footnoting, minimal style checking, and providing synonyms.

A part of each formatter is its interface to the user. The interface should allow the specification of default margins, page sizes, whether forms are single sheets or continuous-feed paper requiring a pause after each page in spacing, and, most important, the address of the printer interface. Some word processing systems will also automatically load the printer interface routine as well. It should also be possible to abort printing at any time.
CHOOSING A WORD PROCESSING SYSTEM

There are two basic categories of word processors: those which are relatively simple and inexpensive; and those which are complex and powerful, and considerably more expensive. Depending on the use you intend to put it to, you should emphasize either ease of use or functionality. The cheaper and more limited variety will probably satisfy you if your needs don't go much beyond basic report or letter writing. However, if you plan to work with large manuscripts, technical papers, form letters, contracts, mass mailings, and so on, then you should consider the more powerful programs.

Price is not always a good indicator of the quality of a word processor or its value to you. A powerful word processing system could be a burden if you must re-learn it each time you use it. Pay special attention to the degree to which the editor conforms to the conventions you are familiar with in your other uses of the computer. For instance, one word processor might use a Control key to move text up rather than the usual downward direction. The occasional user might find that the liability this presents more than offsets the advantage this software provides, say, in totaling columns of figures within reports. On the other hand, if you intend to do a great deal of word processing, or if you will be entering books or manuals, a more powerful word processor will be a better choice. Even the most unconventional and idiosyncratic editor can become familiar and easy to use by working with it continually, whereas one which does not support needed formatting functions and requires extra effort during editing will soon become frustrating. In either case, you should see each piece of software you are considering demonstrated in a way approximating your use before you decide to buy.

Word processing on microcomputers has been revolutionized over the past several years. Many advanced features previously found only on dedicated word processors or mainframe computers now occur in software for microcomputers. Because they take advantage of expanded memory and other hardware advances, some word processors can offer almost the same power as far more expensive dedicated word processors. Some of the following advanced features are available on a few of the programs included in this book, while other represent program offerings you can expect to see developed in the near future.

The Editor

PROGRAMMABILITY — Some more advanced editors allow a limited programming capability. You could use this, for example, to run through the document looking for a character string, and then shift text around in the lines where it is found.

USER-DEFINABLE KEYS — The choice for the command behind a given Control or function key combination ought to be left up to the user. You can alter default key settings. Also, you can define a key to be a string of characters, a commonly typed word (such as "the"), a string of editing commands, etc. A number of separate programs allow you to program the Apple's keys for customized use with many word processors.

HORIZONTAL WINDOWING — Most word processors do not need more editor line length than the width of the screen; but the use of the editor on other files with various record lengths would require the ability to move the full screen editor's window to the right as many times as is necessary to view the longest line.

SPLIT SCREENS — This feature allows you to divide your full screen into two or more windows, each viewing a different portion of the file or different files. With a given command you can switch between these windows, giving the effect of having several (smaller) terminals.

TEXT COMPRESSION — Since storage on floppy disks is limited, a useful feature would be the ability to compress duplicate characters (such as several blanks in a row) into a "compressed format" for storage on the disk. When the file is loaded later these sequences can be expanded again.

The Formatter

MACROS — This could be the most important of all new features in a formatter. A macro is a collection of formatting information and text, all collected under a single special word. Whenever this word is entered into the text, it is replaced with the text and formatting commands it represents. The use of macros makes the setting up of standard chapter headings very easy, for instance. Macros can be written to simplify a complicated formatting command set for a specific purpose, such as legal documents. Macros should be able to accept parameters at the time of their invocation as well (such as the title of a chapter).
TOP/BOTTOM PAGE EXITS — Used in conjunction with macros, this feature would invoke a given macro whenever the top or bottom of a page is reached to allow special formatting.

RECTO/VERSO — This allows a different running head or foot title and page number placement for even or odd numbered pages. A capability for ejecting to an odd or even page should be provided so that chapters will begin on a righthand page.

KEEPS — If illustrations or diagrams are to be added after the document is typed, space must be left for them. This space is called, in typesetting terms, a “keep.” Keeps can be as simple as skipping a few lines or as complex as allowing the text to “flow” all around a rectangle in the middle of the page. The formatter should also allow for keeping a reference to an illustration on the same page (or its recto or verso page) as the keep for the illustration.

MULTIPLE COLUMNS — It should be possible to specify text to be put into several columns across the page like a newspaper. Doing this is complicated, since windows must be avoided on a column level and keeps must be handled properly.

PROPORTIONAL SPACING — To more closely approximate the look of typesetting on a professional quality printer, software should support true proportional spacing.

INCREMENTAL JustIFICATION — Along with proportional spacing, justification should be at the 60th of an inch level with inter-word as well as inter-letter justification.

HYPERHENATION — To improve the justification of short lines (especially columnar text), a good hyphenation algorithm and exception dictionary for the automatic hyphenation of words is a must.

WIDOWS — Leading and trailing widows should be avoided both on a page and column basis.

SUB/SUPERSCRIPTS — For printers which can handle them, subscripts and superscripts should be supported.

MULTIPLE TYPE FACES — It should be possible to switch fonts or, in the case of a printer, pause to switch the daisywheel, ball, or thimble for headings and italics.

SPECIAL SYMBOLS — Support for math characters for producing formulae may be required.

SPELLING CHECKER — Algorithms and dictionaries could be used to check the spellings of common words. (This is readily available for a number of programs, but usually as a companion package purchased separately.)

TABLE OF CONTENTS/INDICES — A computer is well suited for compiling an index or table of contents from key words embedded in the text. (Again, there are independent programs available which perform this task.)

BOXES, RULES, AND LINES — With the graphics capabilities of some high quality printers, drawing boxes or lines for tables and charts should be part of the formatter’s command set.

PAGE VS. GALLEY — Most word processors produce pages. A “galley” is a continuous stream of text which is later cut up and pasted-up into pages for reproduction. Although you would expect the production of galleys to be a subset of page production, this is not always the case, because some formatters insist upon skipping lines or sending line-feed commands to the printer.

FOOTNOTES — In addition to the superscript support, the footnote information should be made to fit at the bottom of the page on which it is referenced.

REVISION BARS — When revisions are made to program documentation, a vertical bar is sometimes placed in the margin to indicate to the reader where additions or changes have been made since a previous version.

COUNTERS — If several numbered paragraphs appear in a document, it is sometimes better to have the formatter assign these numbers sequentially so that insertions will not require extensive hand renumbering.

ABSOLUTE TABS — This is the ability to tab directly to a column on the line, both forward and backward, within the margins or outside of them. This allows the overwriting of a row of periods with text by tabbing back to the beginning of a line to produce, for example, table of contents entries:

Chapter 1 — I Am Born .......................................................... 1
Chapter 2 — I Go To School .................................................. 15

OUTPUT TO A TYPESETTER — It should be possible to produce an output file on the disk from the formatter in a format acceptable as input to computerized typesetting equipment. Having this capability can save money when typesetting work is sent out to a typesetting service and re-entered there. Since there are many kinds of typesetters and no industry standard for their input, this capability may not appear in microcomputer-based word processing software for some time to come.
VERTICAL JUSTIFICATION — Just as a line containing words can be justified by adding spaces between words and letters, so a page can be justified by adding small increments of space between paragraphs and lines.

A Cautionary Word

The programs available for microcomputers vary widely in performance and in cost. None of them will give the microcomputer user all of the capabilities of a $15,000 dedicated, mainframe word processing system. If you have experience using one of these dedicated machines, you may be disappointed in the performance of even the best of the programs for personal computers. Remember, your microcomputer is a relatively low cost, general purpose machine designed to accommodate many different tasks. Word processing is only one of them. The dedicated word processors were created specifically for this job and provide many extras not yet available on microcomputers.

Nevertheless, even if you already are experienced with these dedicated machines, you will find most of the programs presently available to be functional, many times more useful than an office typewriter, and considerably more fun.

WORD PROCESSING HARDWARE REQUIREMENTS

One of the caveats in considering purchasing a word processing software package for the Apple is the additional hardware that might be required. This is more relevant to the II/II+ than the new Ile, which comes with upper and lower case characters, independent cursor control keys, Tab, Caps Lock, Delete and function keys on a substantially improved keyboard. But even the Ile does not come standard with 80-column capabilities, let alone such extras as a printer, spooler, or programmable keypad. If you are just entering the world of word processing, it is a good idea to try to find a software package that is usable with your existing hardware configuration. If this isn't possible, add the cost of the various memory and interface cards (16K, 80-column card, perhaps a Z-80 language card) to the cost of your software.

Remember that the basic Apple II/II+ has a 40 x 24 column display monitor, which is inadequate for most word processing work. Also, the use of a TV set as the video screen for the Apple will limit the clarity of the characters because of its low resolution. The prolonged viewing of text on a TV screen can be very tiring on the eyes. The use of an 80-column card requires the use of a good, high quality monitor designed for the purpose. The higher the resolution, the better the quality of the text being displayed. Consider also what a color monitor will be like to work with over a long period of time. These, too, can be very hard on the eyes.

Selecting the proper printer for the output of text is also an important consideration. Ideally, we would recommend two separate printers. One, a high speed dot-matrix printer would print rough drafts, internal correspondence, and other hard copy that does not demand the quality lettering produced by printers costing much more. The second, a letter quality printer (daisy wheel) would print the final, typewriter quality printout of the word processing system.

Most users will want to avoid the expense of two separate printers. You must evaluate your specific needs and purchase a printer that offers the type of finished output which will satisfy you. If you work with text that will ultimately find its way to a typesetter for printing, a dot-matrix printer will probably work well if you plan to "down load" your files directly to the typesetter. If, however, you want typewriter-like quality for letters or other documents, then you should look at the available letter quality printers on the market. Until recently, a printer of this type would cost between $3,000 and $4,000. Today, you can find several daisy wheel printers on the market for under $1,000. One of the newest printers to hit the market recently combines a fast dot-matrix mode with a slower, higher density dot-matrix mode almost as good as a letter quality printer. It produces "correspondence quality" printing.

If you plan to print a large number of letters or documents such as mass mailings, realize that the printing process will be both time-consuming and tedious. Feeding in paper, starting the printer, and otherwise babysitting the printing process demands time that you could utilize elsewhere. A printer that includes a buffer, or the addition of a printing spooler, will allow you to use this time more effectively by freeing the computer for the next task. Software makes the Apple II a useful word processing system, but the hardware selected to support the software also proves of great importance. In your evaluation of the best word processing system for your needs, always consider the hardware required, and also the additional hardware available to make the job of producing the final output easier.
### Word Processing Comparison Chart

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Price</th>
<th>Min. Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 APPLEWRITER IIe</td>
<td>Apple Computer, Inc.</td>
<td>$145.00</td>
<td>48K</td>
</tr>
<tr>
<td>2 BANK STREET WRITER</td>
<td>Broderbund</td>
<td>$95.00</td>
<td>48K</td>
</tr>
<tr>
<td>3 EASYWRITER PRO</td>
<td>Information Unlimited</td>
<td>$249.95</td>
<td>48K, 80-Col card</td>
</tr>
<tr>
<td>4 EXECUTIVE SECRETARY</td>
<td>Personal Business Systems</td>
<td>$250.00</td>
<td>48K, 80-Col card</td>
</tr>
<tr>
<td>5 FORMAT II</td>
<td>Kensington Microwave</td>
<td>$375.00</td>
<td>48K</td>
</tr>
<tr>
<td>6 HOME-OFFICE</td>
<td>Muse Software</td>
<td>$199.95</td>
<td>48K</td>
</tr>
<tr>
<td>7 MAGIC WINDOW II</td>
<td>Artsci, Inc.</td>
<td>$149.95</td>
<td>64K</td>
</tr>
<tr>
<td>8 PEACHTEXT</td>
<td>Peachtree Software</td>
<td>$500.00</td>
<td>48K, CP/M, 80-Col Card</td>
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<tr>
<td>9 PIE WRITER</td>
<td>Hayden Book Company</td>
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<tr>
<td>10 POWER TEXT</td>
<td>Beaman Porter, Inc.</td>
<td>$299.00</td>
<td>64L</td>
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<tr>
<td>11 SCREENWRITER II</td>
<td>Sierra On-Line Systems</td>
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<td>48K, 80-Col card</td>
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<tr>
<td>12 WORDSTAR</td>
<td>Micro Pro International</td>
<td>$495.00</td>
<td>48K, CP/M, 80-Col card</td>
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<tr>
<td>13 ZARDAX</td>
<td>Computer Solutions</td>
<td>$295.00</td>
<td>48K</td>
</tr>
</tbody>
</table>

### Overall Rating: How does the program compare to other available software designed to meet the same needs?

### Ease of Use: How quickly can you learn the program?

### Value for Money: How does the software's price compare with other comparable programs?

### Adequate Documentation: Does the package provide enough information to teach you how to use the system?

### Sufficient Examples: Can you follow the program's functions from the "hands-on" examples?

### Tutorial: Does the program include its own training section?

### Reference Card/Sheet: Does the documentation contain a detachable summary of commands?

### Embedded Commands: Does the program contain its own commands?

### Number of Commands: A crude indication of overall power and sophistication of formatter and editor.

### Variable Line Spacing: Can you change the number of lines per inch?

### Variable Page Length: Can you change the length of the page?

### Page Numbering: Does the program do automatic pagination on top and bottom, or is it variable?

### Page Titles: Can you carry headers or footers for each page automatically?

### Tabbing: Is there an adjustable tab?
<table>
<thead>
<tr>
<th>Command-Driven or Menu-Driven: Does the program issue commands from a Main Menu or from separate commands?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Editor Screen Width: What is the line length in characters of the screen display?</td>
</tr>
<tr>
<td>Max. Size of File Memory: How long can each file be?</td>
</tr>
<tr>
<td>Global Search Command: Can the program search throughout the entire document without constant instruction?</td>
</tr>
<tr>
<td>Move/Copy Blocks: Can the program automatically shift the location of blocks of text or copy them elsewhere in the document or to another file?</td>
</tr>
<tr>
<td>Hyphenation: Does the program automatically provide hyphens?</td>
</tr>
<tr>
<td>Error Recovery: How easy is it to retrace your steps or to cancel a mistake command?</td>
</tr>
<tr>
<td>Centering/Justification: Does the program allow for automatic line or word centering? Will it justify the right margin?</td>
</tr>
<tr>
<td>Line/Column Counters: Does the program keep track of how far across and down the page the cursor is located?</td>
</tr>
<tr>
<td>Sets Default: Does the program automatically set page parameters and issue printing commands?</td>
</tr>
<tr>
<td>Specific Interface Card: Does the program require additional hardware for specific printers?</td>
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</tbody>
</table>

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<td>YES</td>
<td>T,B</td>
<td>H,F</td>
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</tr>
</tbody>
</table>
# Word Processing Comparison Chart

| Editor Functions | Command Driven or Menu Driven | Screen Width | Number of Commands | Max. Size of File in Memory | Global Search Command | Move/Copy Blocks | Hyphenation | Error Recovery | Centering/justification Line/Column Counters | Printer Support | Sets Default | Specific Interface Card | Specific Printer Support | File Management | Uses Standard DOS Files | Automatic Back-up Files | Issues DOS Commands Inside of Program |
|------------------|-------------------------------|--------------|-------------------|----------------------------|-----------------------|---------------------|--------------|--------------|--------------------------------|-----------------|--------------|----------------------------|--------------------------|----------------|---------------------------|--------------------------|--------------------------------|}
| MD               | 40                            | 18           | 32K               | YES                        | YES                   | YES                 | NO          | NO           | NO                              | YES             | NO           | YES                              | NO                        | YES           | YES                          | NO                        | YES                           |
| CD               | 40                            | 16           | 4p.               | YES                        | YES                   | NO                  | YES         | C            | NO                              | YES             | NO           | NO                              | NO                        | NO           | NO                          | NO                        | NO                           |
| CD               | 40                            | 33           | 10K               | YES                        | YES                   | NO                  | YES         | YES          | NO                              | YES             | NO           | NO                              | NO                        | NO           | NO                          | NO                        | NO                           |
| MD               | 40                            | 18           | 10p.              | YES                        | YES                   | NO                  | YES         | NO           | NO                              | YES             | NO           | NO                              | NO                        | NO           | NO                          | NO                        | NO                           |
| MD               | 80                            | 58           | 1p.               | YES                        | YES                   | NO                  | YES         | YES          | YES                              | YES             | NO           | NO                              | NO                        | NO           | NO                          | NO                        | NO                           |
| CD               | 40/70                         | 42           | 32K               | YES                        | YES                   | NO                  | YES         | NO           | YES                              | YES             | YES          | YES                              | NO                        | NO           | NO                          | NO                        | NO                           |
| MD               | 40/70                         | 30           | 14p.              | YES                        | YES                   | NO                  | YES         | YES          | YES                              | YES             | YES          | YES                              | NO                        | NO           | YES                          | NO                        | NO                           |
| MD               | 80                            | 52           | N/A               | YES                        | YES                   | NO                  | YES         | YES          | YES                              | YES             | YES          | YES                              | CP/M                      | NO           | YES                          | YES                        | NO                           |
| CD               | 40/80                         | 45           | 22K               | YES                        | YES                   | NO                  | YES         | NO           | YES                              | YES             | YES          | YES                              | YES                      | NO           | YES                          | NO                        | NO                           |
| CD               | 40/80                         | 20           | 48K               | YES                        | YES                   | NO                  | YES         | NO           | NO                              | YES             | NO           | YES                              | NO                        | YES          | NO                          | NO                        | NO                           |
| CD               | 70                            | 31           | 64K               | YES                        | YES                   | NO                  | YES         | YES          | YES                              | YES             | NO           | YES                              | NO                        | NO           | YES                          | NO                        | NO                           |
| MD               | 80                            | 47           | N/A               | YES                        | YES                   | YES                 | YES         | NO           | YES                              | YES             | NO           | YES                              | NO                        | NO           | NO                          | YES                        | NO                           |
| MD               | 40/80                         | 21           | 13K               | YES                        | YES                   | NO                  | YES         | YES          | NO                              | YES             | NO           | YES                              | NO                        | NO           | NO                          | NO                        | NO                           |

**Specific Printer Support:** Does the program support specific printers?

**Uses Standard DOS:** Does the program use standard DOS commands or does it use other language?

**Automatically Creates Back-up Files:** Does the program protect your document by providing a second file in the program?

**Issues DOS Commands Within Programs:** Can you use the operating system without exiting from the program?
Apple Writer IIe is a word processing program written specifically for the Apple IIe and DOS 3.3. Although similar to Apple Writer II, this version makes excellent use of the new IIe keyboard. It is an adequate word processing program for most home and undemanding business users. However, sophisticated users may find some of the text editing and formatting procedures somewhat restrictive.

Apple Writer IIe consists of two copy-protected program disks (Master and Backup), a manual, and a WPL manual. "WPL" is the abbreviation for Word Processing Language. This programming language is not difficult to learn, and it is used to perform some advanced word processing tasks with Apple Writer IIe.

Apple Writer IIe requires only one disk drive and a 40-column screen; but a second drive eliminates a considerable amount of disk swapping, and an 80-column card allows you to view the document you are creating as it will be printed. An extended 80-column card allows you to store much more text in RAM, but doesn't represent a major word processing enhancement unless you work with very large documents.

The manual is a good reference guide to operating the program, and includes a tutorial in Appendix A that will have you writing, editing, formatting and printing standard documents in just a few hours. The CTRL-commands required to operate the program are logical and easy to remember. If you happen to forget some of the commands, a Help menu is available on-screen.

By using the Closed-Apple key and the Arrow keys you can move up or down the screen twelve lines at a time, or back and forth one word (or twelve characters) at a time. The Open-Apple and Arrow keys are used to perform such tasks as block moves, deleting text, and so on. Moving blocks is accomplished by temporarily storing the data in RAM before inserting it elsewhere, and one problem you may encounter is that the temporary RAM location can hold only about 1K of text at a time. So moving large blocks of text may require several steps. This can be an irritating limitation.

Apple Writer IIe displays a Data Line at the top of the screen. This Data Line informs you of how much memory is left, the current cursor position, the length of the document, the document's filename, and several other functions. By pressing the Escape key, the Data Line changes to show you the current tab settings. Press the Escape key again and all you see is text. Once more brings up the Data Line again.

In addition to the standard CTRL-commands, Apple Writer IIe makes use of embedded print formatting commands. These are also logical and so easily remembered. For example, .LJ means Left Justify, .CJ is Center Justify, and .LM10 sets the left margin at 10 spaces in from the edge of the paper. Apple Writer IIe also lets you embed Control or Escape characters in your text, to allow your particular printer to perform such special functions as underlining, boldface and shadowstrike, or sub- and superscript characters.

You may also create a customized Glossary which lets you enter a frequently used phrase simply by pressing two keys. For example, in writing this review, I created "Apple Writer IIe" as a glossary word. Whenever I wanted to type "Apple Writer IIe" I only had to press the Open-Apple and A keys, and "Apple Writer IIe" was entered into the text. You may have up to ninety-nine such definitions in one Glossary.

You may save your current active file in part or entirely, or load a complete or partial file that is already stored on disk. You may also save Tab settings, Printer files, or Glossary files to disk for later use.

The Word Processing Language part of the program includes its own manual, used both as a reference and as a tutorial. I cringe at the thought of having to learn a new programming language; but I discovered that, once I'd mastered the Apple Writer IIe commands, it was easy to learn the WPL. Using them together, it was a pleasure to accomplish some very attractive word processing tasks with little effort.

Among the tasks that Apple Writer IIe and WPL can jointly perform are the creation of custom reports, individualized form letters, arithmetic calculations within texts (useful in creating reports), repetitive program functions, and the creation of your own menu programs. WPL programs are written using Apple Writer IIe, and
executed from within the program by entering the Load module and typing "DO PROGRAM NAME." WPL performs many sophisticated tasks; but one that is required perhaps more than any other is the ability to repeat tasks, such as the printing of personalized form letters. Using WPL, you merely type the form letter once; the WPL program will fetch new names and addresses from a mail list file and continue to print letters to all the individuals you want to contact. It is a powerful portion of the package.

*Apple Writer IIe* and the WPL represent a reasonably complete word processing system. It is also, for the most part, enjoyable to use. I did find that I missed the commands to clear text from the cursor to the end of the line, paragraph, or page, as well as some other snazzy commands. I also found that a very fast typist can sometimes be confused by the Type Ahead buffer. But *Apple Writer IIe* is a good package, able to meet most of your Apple IIe word processing requirements.

### APPLE WRITER IIe—An Introduction

**Company:** Apple Computer, Inc.  
**Language:** BASIC  
**Hardware Requirements:** 64K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>B</th>
<th>DOCUMENTATION</th>
<th>B+</th>
<th>RELIABILITY</th>
<th>B</th>
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<tbody>
<tr>
<td>EASE OF USE</td>
<td>B</td>
<td>VALUE FOR MONEY</td>
<td>B</td>
<td>ERROR HANDLING</td>
<td>B</td>
</tr>
<tr>
<td>VENDOR SUPPORT</td>
<td>B+</td>
<td>VISUAL APPEAL</td>
<td>B</td>
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</tr>
</tbody>
</table>

*Apple Writer IIe — An Introduction* is a product training package for the *Apple Writer IIe* word processor put out by Apple Computer, Inc. It includes a manual and sample documents disk to be used in conjunction with the *Apple Writer IIe* program disk. The documents disk contains sample text files that you manipulate as directed by the tutorial.

Part One of the manual, "Getting The Basics," is a tutorial on the use of standard *Apple Writer IIe* editing commands. This part of the manual takes approximately one hour to study; and when you've finished, you'll be able to create, edit, and print documents and reports using *Apple Writer IIe*. Part Two, "Moving On," explores such advanced word processing features as the use of embedded commands, document formatting, footnotes, and so forth. It takes less than two hours to complete this section.

Although the *Apple Writer IIe* manual includes a tutorial, I believe that the "hands on" experience promoted by this product training package will help you to quickly master the fundamental operations of *Apple Writer IIe*.

### BANK STREET WRITER

**Company:** Broderbund  
**Language:** Assembly  
**Hardware Requirements:** 48K, 64K recommended

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>B+</th>
<th>DOCUMENTATION</th>
<th>A-</th>
<th>RELIABILITY</th>
<th>A-</th>
</tr>
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<tbody>
<tr>
<td>EASE OF USE</td>
<td>B+</td>
<td>VALUE FOR MONEY</td>
<td>A-</td>
<td>ERROR HANDLING</td>
<td>A</td>
</tr>
<tr>
<td>VENDOR SUPPORT</td>
<td>B</td>
<td>VISUAL APPEAL</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Bank Street Writer* is a bare bones, inexpensive word processor that is ideal for novice computer owners and students who need to write correspondence or class papers. Its most attractive aspect is the ease with which it allows you to enter and edit text. The authors have designed an uncomplicated package so that novices can have the word processor up and running in less than ten minutes. There are no complicated series of editing commands to learn, and no complex formatting codes to input. And best of all, there is always a help menu above the eighteen line block of text you are entering or editing.

The program deals with text in two distinct and separate modes on a Hi-Res screen that displays both upper and lower case. The user is normally in the WRITE or CORRECT mode. The cursor can't be moved about without damage to the text. The two arrow keys are used to erase text before or after the cursor. When the cursor is to be
moved in order to make corrections or insertions, the ESC key puts you in the EDIT mode. The cursor is moved about with the I, J, K, M keys. This EDIT mode also allows you to erase or move blocks of text. Any of these modes can be activated by moving the highlighted menu prompt to the appropriate mode, then pressing the return key. While these blocks are limited to fifteen line segments, larger segments can be shifted in multiple passes. The blocks are clearly highlighted in inverse, and if you make a mistake these segments can be replaced by simply moving the menu cursor at the top of the screen to its opposite; i.e., UNERASE or MOVEBACK. Since only the last block is in the safety buffer, you must be careful when doing a series of block moves or deletes. In addition, the EDIT mode has the ability of global search and replace.

There is a TRANSFER mode menu that handles all I/O operations. Text files can be loaded or saved to disk as binary files and disks can even be initialized from this menu. The prompts are adequate, and safety features throughout prevent you from losing data files. Even if you attempt to clear the screen from memory, it asks if you have saved your text. Printouts of your text are also performed from this menu. There is a choice of printing the file as final copy or as a preliminary draft which appears as it does on the screen, thirty-eight characters wide. This latter mode is useful for editing.

While users have fairly good control of the printed format of their documents including the ability to preview the page breaks and the setting of line widths and spacing, the final printed document leaves something to be desired. First, there is no right justification. While purists will argue that it is useless without proportional spacing in that there is often bad spacing between long words on short lines, it looks cleaner than a badly ragged edge. Remember, since word processors can’t hyphenate to make words fit better on the line, the ragged edge look is quite pronounced. Perhaps more annoying is the inability to indent the beginning of a paragraph. There is an indent feature, but this only works on a block of lines or until it is cancelled by the first carriage return. While it is possible to calculate how many characters are on the first line of each paragraph and then put in a carriage return before continuing the paragraph, it ruins the spontaneity of writing. Users will have to settle for that modern look of no paragraph indents. If you need a blank line between paragraphs just put in an extra carriage return. The printing process works on any printer and is adjustable in the UTILITY section of this program.

Apple II Plus computers with 48K can only store 1300 words in memory with this program, but users with a 64K card can store approximately 3200 words. For example, this review, which was written with Bank Street Writer, is 1,000 words long. Longer files must be saved in segments on the disk. These can be chained together during printing so that it appears that there is no break. Users of the new Apple IIe computer will be pleased to know that that the program can automatically use all 128K of memory. In addition, the four arrow cursor keys substitute for the set I, J, K, M cursor keys, and the shift key works in customary fashion. Incidentally, the program supports all lower case adapters using the hard wired shift key modification.

The documentation is just as easy to read as the program is to use. It is clear, concise, and logically arranged. There is even a glossary in the back to explain the terms. The entire booklet is only twenty-eight pages long.

This program was developed at the Bank Street College of Education and has been extensively field tested among students of all ages. I think it is a very good choice for very young students and some older children and adults who need a bare bones word processor that is uncomplicated to learn or use. The program is very forgiving, if a user makes a mistake. On the negative side, it does not have a very good print formatter. I particularly don’t like the design structure, although it is quite popular and similar to Applewriter. While shifting between the WRITE and EDIT modes eliminates the need for control characters for cursor movement and deletion, it makes moving the cursor to change simple misspellings tedious, since you need to toggle between the two modes often while using Bank Street Writer. In sum, the program is user friendly, adequate for small and simple tasks, and inexpensive.

SCREENWRITER II
Company: Sierra On-Line Systems
Language: Applesoft/Integer
Hardware Requirements: 48K

OVERALL RATING B-
EASE OF USE C+
VENDOR SUPPORT B+

DOCUMENTATION C+
VALUE FOR MONEY B+
VISUAL APPEAL B

RELIABILITY B
ERROR HANDLING B

Screenwriter II is advertised as the program that allows the user all of the features and function of a professional word processing package without the need for additional boards for the Apple. No 80-column card, no Z-80 card, and no 16K language card are required.
The program itself works in both the 40 and 70-column formats. The format commands (40C and 70C) are hidden in the instruction manual; and references to them do not appear until page 51. The program defaults to the 40 column mode when you boot it up, so if you have the right hardware you must remember to switch to 70 columns each time you use the program. Having a 70-column rather than an 80-column format appears initially to be a limitation. If you consider the standard typewritten page, however, you will discover that it is normally only about 65 columns wide, with the rest of the space being used for margins.

The display of the 70 column text is not as good as an 80 column display, and on a TV set or color monitor it is hard to read. Using a good quality monochrome monitor for our tests made the screen appearance acceptable. The characters are generated on the program’s graphics page, so they are not as crisp and clear as those generated by one of the 80-column cards used for other systems.

The manual is moderately well-written. The first chapter allows the user to get into the program right away. However, some of the information that is of great importance to a first time user is hidden in appendices which are not referenced in the Table of Contents. These items include STARTUP, DISKETTE USE AND CARE CHECKLIST, PRINTER TEST, and SHIFT KEY MODIFICATION. Each of these sections is well written, and should be consulted prior to using the program.

On-Line Systems’ advertising suggests in part that Screenwriter II “moves word processing on a microcomputer into the world of the mainframe units.” This is a bold claim indeed, and one to which I must take exception. Screenwriter II is an adequate program with many functions useful in word processing; but, due to the limitations of both the Apple hardware and the software itself, it does not even come close to the products being offered on a minicomputer, let alone a mainframe.

The lack of function keys is a major problem associated with writing a word processing program for the Apple II/II+. This lack means that multiple keystrokes are needed to accomplish many of the special operations that make word processing such a powerful tool. On-Line Systems has made some effort to utilize commands that make sense to the user and are, therefore, fairly easy to remember. CTRL-P is advance one page, CTRL-B is move the cursor to the beginning of the text, CTRL-E moves it to the end of the text, and so forth. But once the obvious commands are exhausted it takes some imagination to assign codes that are logical. Several of the commands used are different between the Command mode and the Insert and Change mode. This means that you not only have to remember a control code (or look it up on the chart), you must remember which command does what in two different modes of operation. For example, a CTRL-I in the Command mode allows you to insert text; yet this same command is a CTRL-C in the Insert and Change mode.

Screen cursor positioning is difficult at best. CTRL-A moves the cursor down the screen well enough, but there is no easy way to move the cursor directly up the screen. The ESC and CTRL-A keys move the cursor to the extreme left side before moving it up along the margin. (One of the better methods for screen cursor positioning is to use a joystick, putting the program in the “Mouse” operating mode.) Further, editing in the 70-column format is ridiculously slow: your buffered input gets so far ahead of the screen display that the user becomes confused.

The command chart furnished with the program is well laid out and easy to read. It is divided into Editor and Printer sections, and commands can be quickly located and used. The embedded command structure is excellent using a period (.) to precede the command, followed by two letter designations that represent command options: e.g., .LM is left margin, .RM is right margin, .J is left justify, and so on.

File management is accomplished in an obscure and strange manner, occasionally producing unfortunate results. When files become too long to reside in memory, the program saves portions in various places on the disk. Users are warned not to touch the disk drive, and for good reason: the program has been known to scramble a file or two, or even cough up program source code in the middle of text files. Empty disk space must be at least twice the size of your standard text file, in order to ensure a margin of safety.

All in all, Screenwriter II is a very powerful word processing package, offering most of the features required for occasional or medium use applications. As with many of the available packages, it takes some getting used to; and the manual is something less than outstanding. The Editor is designed to let the user become familiar with the basics of word processing and be able to produce usable output almost from the start. I was impressed with the program, and, despite its flaws, believe it to be a good value.
FORMAT II
Company: Kensington Microware Ltd.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING C + EASE OF USE C + VENDOR SUPPORT C DOCUMENTATION C VALUE FOR MONEY C - RELIABILITY B ERROR HANDLING B

Format II is the only word processing program to come complete with the necessary cable to perform a Shift Key Modification without requiring other tools. The instructions necessary to accomplishing this upgrade to the Apple are very complete. In addition, a chip is furnished for use with a Videx 80-column board. This ROM chip allows the Videx board to display characters in “inverse video,” as required by the program. You are cautioned that, should you leave the game paddles plugged in and also plug in the shift key modification cable, “strange things” will happen to your system. The program also supports the five most popular 80-column cards with no other modifications.

The instruction manual is well-written, although the type size and design format leave much to be desired. (The manual is thick, so the decision to use microscopic type was probably based on economics.) No screen display illustrations or examples are provided, but the text walks you through the start-up procedures and operation of the program. One of the first sections is “Format II as a typewriter.” It is quite detailed, allowing the first time user to get a feel for both the program and the computer as it relates to a standard typewriter. This helps smooth over intimidation problems that can often occur. But note: one of the more confusing references in the manual is to a “page.” This term is used in place of a “file,” and is another name for a complete document.

Margins are pre-set to allow a 72-column page. The manual describes how to change these default values; but its default settings (1 and 75) are not standard for word processing. This requires the user to change the values each time the program is used, which is rather a nuisance. One of the nicer features offered by the program is the use of the CTRL key as the Shift Lock key, corresponding to a normal typewriter. Not only does this give the user access to the special “super-shift” symbols on the Apple keyboard, it also allows the user to type in uppercase lines without having to hold down the Shift key or use two keys to enter Shift Lock.

The system also utilizes “word wrapping” in most cases. This moves a word down to start the next line if it overruns the right margin. (Some of the earlier Apple word processing programs merely divided the word between two lines.) Format II has in addition a unique system of automatically hyphenating words that, although too long for one line, would make the line too short if the whole word were moved down to the next line. If you type not a word but a series of letters, the program lets you know that it cannot insert a hyphen. Deciding how to handle the situation is left to you.

The program only allows you to input 60 lines of text at a time, a severe and often inconvenient limitation. After line 60 the computer “beeps” at you, and then you must choose between saving the page or printing it. You must exit the program’s “edit” mode with a CTRL-D, return to the Main Menu, and decide what to do with your page. I found this irritating when working with longer documents. Forcing you to save the text at the machine’s convenience rather than yours as you go along becomes an annoying intrusion. If the 60th line falls at a natural break, there is no real problem. If, however, it falls in the middle of a sentence or paragraph, it is disconcerting to have to stop, save the page, and then continue without the saved input being displayed any longer. And some saved text cannot be easily recalled.

Text formatting is required in order to be able to accomplish any of the more involved editing commands. Moving paragraphs, deleting sentences, or changing the parameters require you to leave the “edit” mode and enter the “format” mode of the operation. This is done by pressing the ESC key, calling up the formatting mode, then hitting ESC again to return to editing. Once you get the hang of this operation it is easy to do; but it demands a “mental” shift from the edit commands to the formatting commands, extra effort and thought on your part.

The program is menu driven. A full description of available options is displayed each time the menu comes up. Each option is accessed through the menu; and switching from operation to operation is quite simple. If you hit Reset by mistake in any mode other than print, you will be returned to the menu with no disastrous results. Should you hit Reset during printing, it is possible to lose the information unless it has been saved to disk. You can move between edit, print, save, format, and other disk commands from the menu. If you need to initialize a new disk, this can be done from the menu without having to exit the program. Saving text in 60 line increments, the program will “remember” your document name and save the next page under that name as page 2. This is useful in that, once you have finished typing, the catalog of the working disk will indicate the file information by page. If you are working on a file called “Test” it will be displayed as Test page 1, Test page 2, and so on.
Error handling is well done. The most common mistakes and problems have all been addressed. For example, if you try to start a document that duplicates a page name which already exists, the program will remind you of that fact. If the disk is full, it will handle that problem also without risking the loss of text you have already entered.

The print routine allows you to "spool" the pages (text files) saved to disk. You can specify the starting page and the last page desired, combine different files from the same disk, and specify the number of copies of each you would like to print. Printing routines are menu driven as well. It is only necessary to answer the questions presented on the screen to properly configure the program for your specific printer.

Format II offers a full complement of editing commands: underline, find, insert, justify, close, search and replace, and most of the other functions that you would expect from a quality word processing program. It has some annoying drawbacks, but after getting used to the way the program handles pages (text files), and remembering to switch between the edit and format modes for full editing functions, it became fairly simple to produce good quality text using this program. For the user who produces short letters and documents this program is especially easy to learn and use. For longer documents, and multi-page letters, I found it to be cumbersome to use; and switching back and forth between pages proved to be a problem. Trying to compose on the computer, move paragraphs around between files, and format the entire job properly was a very time-consuming project. The program can be recommended only for light word processing chores, which makes it rather expensive compared to the other programs currently available.

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**EASY LETTERMEMO**

**Company:** Alphastar Software  
**Language:** Assembly  
**Hardware Requirements:** 48K  

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It is indeed refreshing to have the opportunity of reviewing a program that fulfills the promises made in the accompanying literature. *Easy Lettermemo*, created for the specific purpose of producing letters and memos, performs these functions well and at a modest cost. It was not designed to be a full capability word processor, and anyone purchasing it as an inexpensive substitute for one may well be disappointed. For example, the program will not automatically center text, bold face, double strike, provide super or subscript, footnote, globally search and replace, move words or blocks of text, or for that matter, change the basic format of the letters and memos it creates. What it will produce are well-formatted letters and memos.

The manual is well-written and easy to read. After about twenty minutes with the manual and ten minutes on the machine, I was able to produce an acceptable letter. My wife, who has had no prior word processing experience, was able to do the same after spending about 30 minutes with the manual and another 30 minutes at the keyboard.

We simply followed the screen prompts. The first prompt asks for the sender’s address and date, the second the recipient’s address, the third the body of the letter, and, finally, the closing. The letter is automatically formatted, and can be printed and/or saved to disk. The procedure to write a memo is similar, except that the screen prompts require a response to TO, FROM, and DATE prior to typing the body of the memo. You can automatically address envelopes. Multiple copies of letters or memos, as well as multiple envelopes bearing the same address, can also be printed. The program accepts either single sheets or fan-fold paper.

The edit commands are limited, compared to a full capability word processor; however, they are adequate for the program. You can insert and replace characters, move the cursor in all directions, and delete words or lines. Lines can be joined, and the screen can be scrolled up or down. The program will save, load, or delete text, and catalog or format a data diskette.

Unfortunately, the program only supports one disk drive, and so disk swapping is required. An eighty column card is not supported; the screen wraps after the fortieth column is reached. The printer does utilize the full 8½” x 11” page when printing. *Lettermemo* does not support a standard Shift-key modification, and the ESC-key serves as a Shift Lock key for upper and lower case. The screen will only display upper case letters, so capital letters are highlighted in inverse video to distinguish them from lower case.
In summary, if you wish to restrict your word processing to writing letters and memos, *Easy Lettermemo* is a well conceived program that performs its limited function more easily than most word processors, and at a fraction of the cost. I own three full-capability word processors, and in the future will probably use *Easy Lettermemo* for simple correspondence and memos because it is, in fact, so easy to use.

**PIE WRITER**

*Company:* Hayden Book Company  
*Language:* Applesoft  
*Hardware Requirements:* 48K, 80-column card and printer helpful  

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*PIE Writer* is a reworking of Programma’s *Apple PIE*. The original *PIE*, a popular program, was an early entry into the world of word processing. Hayden has made every attempt to retain all of the features found in version 2.0 of *PIE*; and the 2.0 files can be utilized by the new *PIE* after they have been Muffined up to DOS 3.3.

Several new commands and functions have been added. *E* now stands for editing an existing file, *N* is to create a new one; and status information is now provided to indicate the name of the file being used, the length of that file, and the amount of memory remaining on the disk. The catalog command has been shortened to *C*; and although the key locations for edit commands remain the same, many of the names of the functions have been changed. Thus “POP” is now referred to as “Recall,” and so on.

*PIE Writer* has two display modes. The first, without the use of an 80-column card, allows a display of 38 columns across the screen; the second, with a card installed, displays 78 columns of text. Both allow up to 21 lines of text on the screen at one time. The feature allowing the user to move to a second screen for additional line length has been retained as well. In the 38 column mode, this feature permits the display of up to 68 characters across the screen; in the 78 column you can get up to 128 characters. In this latter mode, the screen shifts to the right with an overlap of the two screens.

The Command Card furnished with the program is well-designed. A copy of the keyboard, showing the command symbols, is added to the standard key names. At first glance, a novice looking at the command sheet could be confused about using the program, as it is overly busy in appearance. But if you study the card, you will find that is is well-organized, and the functions are all grouped by use. As with the earlier version, illustrations are used with many of the commands to specify the number of characters, or some other option. There are almost too many commands: most of them will not be used by the average person. As an example, tab settings can be established with any of 7 different command combinations; and the use of both the CTRL and ESC keys are required for many of the commands.

The manual appears to be complete, with sample lesson plans offered in a clear and concise tutorial; and a reference section is provided that allows the user to find the specific command or series of commands needed to perform a function. Sections are also provided for “advance topics”: form letter creation, data file access, label printing, and communications. For anyone familiar with machine language, the manual lists important starting addresses, giving you enough information to make modifications to the program.

*PIE Writer* is a very powerful word processor. It provides more functions than most users will ever need. The program lists so many different commands that it appears to be a more complex program to use than it really is. I'd recommend that you learn to use it with a minimum of commands, then as you go along add the commands that perform functions used for “fancy” productions. If you try to learn all of the available commands and functions at first sitting, you may come away with a negative impression of what is a fairly flexible package. It is reasonably priced, providing a lot of word processing power for the dollar.
Advertised as a program with "office-of-the-future options," the Executive Secretary includes most standard word processing features plus a connection to VisiCalc and several database management programs. It also has a mail-merge feature, electronic mail capability, and conditional printing commands. The program does contain many useful features and could add to your library, but this remains a qualified approval because better programs exist should you need a good word processor only.

One of the first features that you run into requires you to modify your Apple. This allows you to use the Shift key normally, but you will probably void your warranty by making the modification. The program package provides the necessary wire and connector. The instructions are not in the manual; they come as an add-on. Make sure that the package you buy includes them. For newer Apples, the alteration is quite simple; for older Apples, you must take the case apart and perform a solder modification to the printed circuit board.

The program disk is protected, but the company has an excellent replacement and back-up policy. You get one back-up disk upon receipt of your registration form. The company replaces damaged disks for registered owners for $7.50 during the first year after purchase. The same price gets you program updates for a year or more.

The manual, organized into a series of lessons, teaches you the program features in logical progression. You should follow directions explicitly, as the program requires you to learn many commands to make full use of its capabilities. In general, the program reacted as described in the manual, but some minor problems indicated that the manual still contains some kinks to work out. For example, don't be surprised if the screen displays something other than the display described in the manual, such as an "up" arrow instead of an asterisk for the prompt character (this happened with a Videx board).

The program requires Applesoft in the Apple in order to boot, so a system with a language card requires a double boot to load the language first.

The program is divided into modules from menus. The editor module operates as a combination character and line editor. In order to edit, you must first move to the correct line. Then you can perform word and character operations within that line, but you cannot move text from line to line although you can compress the text after editing. The edit file numbers each line, but the numbers don't show on screen. To get them, you must print a copy of the document. All standard word processing features come with the program, including wordwrap, and the Shift keys work. In fact, without the modification to the computer, it takes some complicated maneuvering to enter a capital letter on the screen. Typing response is rapid, with no loss of letters. Since the lines do not scroll, changing text calls for a bit of work. For each line you must delete and add text, or go into add mode behind the text to be deleted and then backspace over it, effectively deleting it. You can then add the replacement text and compress the document. You must use the latter method if you need to change the first character in any line, since the editing function works on a line-by-line basis. However, moving text around is relatively easy. You mark the text to move and then designate the spot to receive it. One caution: you must place the mark as the last character in the line above, otherwise the first character will not move. The manual does not point this out.

The editor supports approximately 3,500 words of text. There is no provision for scrolling to disk when the memory is full; instead, the program prompts you to save all or part of the file before it will accept more input. You must split really long documents into subfiles. Luckily, creating subfiles is just as easy as moving text. You must remember to include the first character in a line, as pointed out above. The subfile concept proves quite useful when you need to type in a great deal but make few changes on a document-by-document basis. Subfiles may be referenced at any point in the text and will be included in the final document as if you had typed them in at that point. You can also use the subfiles to create printer formats, form formats, or abbreviation files. You can print a draft of your document for use in editing. If you do, start at the bottom of the document and work your way up so that deleting a line won't change line numbers in the rest of the document before you have a chance to edit it.
The program contains an unusual search and replace feature. You can search only for a short string (about ten letters). Once you have found it, you may obtain a repeat search simply by recalling the command—the string remains in memory. If you want to replace after the search, you can. Repeat replacements require several keystrokes to implement. No automatic global replacement exists for this program. Another strange feature of the search function is that it does not seem to be sequential. Entering the search command for a single letter in a file found the letter, but seemingly at random within the file. Replacement of the letter also added a space. This function needs work.

Another feature of the program behaves strangely. When you type in a string of letters and the input line length exceeds the right margin, the wordwrap feature causes single letters to appear at the edge of the screen as you type. When you employ the file compress to combine them again, a space appears between each letter. There is no command to let you split a word from one line to another at printing. To print, the program reads the file plus embedded print commands. The program uses Applesoft routines and performs extensive character manipulation while printing. This results in periodic (and frequent) garbage collection. If the program appears to hang, just stay with it. All of the standard word processing features are supported at print time. Page numbers appear where you specify them, or you can use a standard set of defaults built into the program. Another option orders the program to remember where up to ten variables occur in the document so that in subsequent references you can specify the variable and have the page number printed in its place. You can also reserve space for a file. You specify the number of lines needed and the program prints that file (when its size does not exceed the page length). This lets you include tables or figures without worrying about overlapping a page boundary. For example, you could include VisiCalc output in a document with this method. The program also helps you fill in forms. You specify horizontal and vertical spacing through the keyboard or from a file. Finally, the printer supports special character sequences, but you must define the characters. To use one of the commands, you insert a three-character sequence within the document for each special character. Likewise, a three-character sequence entered into the text substitutes for abbreviations (defined during text entry) ranging from short words to long phrases. You can build a library of these abbreviations and include the library file at the start of the document. This feature could greatly simplify text entry of repeating complex phrases (as in legal terms) or repetition of terms.

The manual states that you can transfer files from one disk to another. I could not make this feature work.

Currently, many word processors perform most or all of the functions described above. The Executive Secretary does not stop here, however. The word processor includes a database management system in the form of an electronic card file. You define a card master with each line having a given name. Then you enter data into the file. Once you have created the file, you can add or delete data, search, sort, print, or add it to a text file for applications such as mass mailings. If you print the card file by itself, you can create reports to generate total to subtotal lines containing numeric information, up to thirteen lines per card file. You need to read the instructions carefully and experiment if you use the report generation function of the card file module, however. The tab stops specified differ according to whether the data is alphanumeric or numeric (in which case you can take totals). If you want to combine these card files into a document, you should have two disk drives. If you do not, then the document file and the card file must occupy the same disk.

You can also create “cards” using popular database management systems. Advertisements for the program claim that it supports several programs, but the manual specifies support only for The Data Factory. I did not have all of the programs available, so could not test the advertising claims. At any rate, you can modify the data contained on cards prepared on other systems. A command exists to change words on any or all lines from all capitals to all lower case (or vice versa). The conversion is selective, so you can leave the first letter of each word capital if you wish.

One final bit of customizing involves conditional printing. You can test lines or portions of lines in card files, then make printing decisions based on those tests. This gives you the option of customizing your document depending upon the contents of the card file. Very few word processors contain this feature. As an added bonus, an electronic mail option exists, but it requires a Hayes Micromodem in Slot #4 and a similarly-equipped Apple on the receiving end. A California Computer Systems Clock in Slot #2 enables you to date and time-stamp documents. Be sure to read the warning on page 71 of the manual: the program will not adequately support all printers.

The Executive Secretary possesses many features that could prove very useful in an office. The program comes very close to its claim of being a complete office package. With corrections of problems and quirks, it should fulfill them nicely.
**Home-Office** is an upgraded release of a program that's been on the market for several years (previously called Supertext 40,56,70). Muse Software has added several improvements to the package, but has still not learned how to produce an instruction manual that is concise and easy to use. The files are now protected on disks that must be initialized by the program instead of standard DOS files.

Confusion is something of a problem with this program. A quick reference card included with the program is helpful, but it lacks organization. As with the manual, you must hunt for the information required to perform a task. The Apple II keyboard and its lack of function keys makes it necessary for most of the special editing and format functions to be performed using combinations of the CRTL and/or ESC keys with other keys. For example, to lock the program into upper case characters you use CRTL-C; or to insert a block marker you use a CRTL-V. Some of these are logical (and are therefore easy to remember), but many of them seem to have been picked out of the air. Logical commands include a "+" to indicate forward text direction, a "-" for backwards direction, an "L" to move one line at a time, a "P" to move one page at a time, and an "M" to insert an invisible marker that may be searched for (as when entering indexes or glossaries for documents). On the illogical side, you must remember that an ESC-/ moves you to the end of a file, and ESC-RETURN places you back at the top of the screen.

*Home-Office* is nevertheless one of the most versatile programs available for the Apple II. It includes most of the necessary word processing options, such as search and replace, page numbering, print headers, and user-definable characters. In addition, the program supports printers that will provide output with boldface, underlining, and the centering of text. The symbols used to denote these commands in the text are difficult to interpret, and certainly hard to remember during proofreading.

One advantage of *Home-Office* is that it can be used in three different column display modes: 40, 56, or 70 columns. This allows a first-time user to purchase this package and, without having to add an 80-column card, sit down at the keyboard and immediately get involved in word processing. As you progress, an 80-column card can be added, making the 70-column mode operational.

The program does not require a shift key modification, although it is supported and makes entering text easier. (Take heed, though, that this modification may void the warranty on your Apple. If you are already past the ninety-day warranty period, you have little to lose and much to gain from the shift key modification.)

It only takes about one hour to learn to use the program well enough to manage a standard letter, but it may take three hours or more to learn to handle a document of several pages. The program offers several special features, including the ability to design your own character sets. This lets you define and build your own character set, even using unique or foreign alphabets or characters not available on the standard Apple keyboard. The design process is complex, but you can store the results to disk for later use.

Another special feature, called Auto-Link, permits you to link several different files on multiple disk drives. This feature supports the Find and Replace, and Print and Load commands. It handles "boilerplate" documents, in which lines or paragraphs are put together to yield a polished final copy.

Overall, I found *Home-Office* a reasonably good product, offering enough power and flexibility for most word processing applications. Learning the program (once you get past the poor manual) is fairly simple and straightforward. A novice should produce quality documents within a short period of time using this program.
Potentially one of the better word processing systems available for the Apple II, **EasyWriter Professional** was written entirely in the FORTH language by John Draper. It incorporates a full-screen editor, file management system, and formatter/printing interface which runs independently of the Apple disk operating system. This generates both advantages and disadvantages. Although the disk access for loading and saving text files is somewhat faster and more efficient in terms of space utilization, the inherent incompatibility with DOS prevents using EasyWriter for anything other than word processing. The program provides most of the essential features of a file manager (Load, Save, Delete, Catalog), with the possible exception of Rename, but has no Exec capability. In addition, copying files or loading/saving/appending portions of text files is cumbersome at best. Because of the arbitrary limitation of thirty-one files per disk, you could encounter space problems.

The editor is well thought out. A full screen system, it employs Control characters for all commands. Unlike some editors, it does not present you with a lot of confusing modes to keep track of. You may have trouble telling when you are in insert/insert line mode, however. The editor uses the standard 40-column screen with no horizontal windowing, and automatically moves the last word at the end of a line to the next line to avoid splitting words. Upper/lower case is handled with inverse video (the Dan Paymar chip is not supported). Perhaps the two worst failings of the editor are the lack of a global replace command and the cumbersome move block command. Recovery from hitting Reset is possible, but can result in data loss.

The print formatter comes with a full complement of formatting commands. It operates in filling mode only. All excess blanks compress to one blank. This makes setting up tabular information difficult. The tab feature presents a real nuisance, since you must define all of the tabs even if you only use one on a given line. Another irritant is the appearance of all formatting commands not only at the start of a line in the editor, but also at the start of a formatted output line. The use of left margin and line length specifiers as opposed to left margin/right margin means that changing the left margin changes the right margin. On the other hand, you can define special characters, vary line spacing even to the point of suppressing line feeds completely, employ titling and page numbers, and print multiple files. **EasyWriter** possesses the unique ability to make use of Diablo, Qume, and SpinWriter incremental justification (at least inter-letter spacing). It does not possess form letter or mailing label capability.

The easy-to-use printing interface allows you to specify all the normal defaults (slot, page width, etc.). The program provides special support for several common interface cards, and automatically loads a custom interface when you boot the disk. Please note, however, that some interface routines tend to drive EasyWriter wild, especially if they change the right screen margin in zero page.

On the whole, **EasyWriter** is only an average word processing system. It seems to have the potential for improvement. You might consider getting this program if ease of use is very important (the prompting screens and messages are very good), or if you want the Diablo incremental justification feature.
**WORDSTAR (Version 3.3)**

*Company:* MicroPro International  
*Language:* CP/M  
*Hardware Requirements:* 64K

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**OVERALL RATING**  A−  
**EASE OF USE**  C+  
**VENDOR SUPPORT**  D  
**DOCUMENTATION**  B+  
**VALUE FOR MONEY**  B+  
**VISUAL APPEAL**  B  
**RELIABILITY**  A−  
**ERROR HANDLING**  B+

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*WordStar* remains the best selling of all word processing products presently available for the Apple. It is also available on many other microcomputers, and when “shop talk” turns to word processing, this program is generally held up as the best.

While I agree that it deserves most of the praise bestowed on it, I do have some reservations, primarily regarding its use by the occasional word processing operator. Because it is powerful, it is a very complex program, requiring a fairly long time to learn; and during that time, it requires an almost constant consultation of screen menus or reference cards until a high level of confidence and proficiency is obtained. If you do not use the program often, you will probably have to re-learn it each time you come back to it, which could prove frustrating.

A screen-oriented program, *WordStar* allows you to see on-screen almost exactly what you get on paper. There are only a few exceptions to this: for example, underlining and boldface type are indicated on the screen by Control characters. This is due to the limitations of both the hardware and the software package.

The program is slow to move between commands, especially if the full help menus are left on the screen (they can be turned off), and speed typists will find, as they return to typing text immediately after invoking a command, that they will “lose” — there is a delay in video display — several characters or even a complete sentence while the program is handling the requested task. (“Slow” is of course a relative term in the world of microprocessing: sitting in front of a blank screen for more than 3 seconds is slow compared to typing functions, and users tend to become impatient.)

A major problem with the program has to do with formatting: indentation, aligning text in columns, and, finally, right justification. All of these functions are used heavily in business, yet are awkward to accomplish with *WordStar*. They can be done, but not easily and not consistently. If, for example, you go through the effort required to change indents, line lengths, and paragraph indentation when creating a document, then forget to reset the margins when you reform the entire document, all of your nice work will have been rearranged to reflect the last margin setting selected.

Lining up text for use with a proportional printer is also difficult, unless you force a hard space after column numbers or items that you want to have lined up on a page. Otherwise, *WordStar* uses different increments for spaces, and the left edge of the text tends to look ragged.

Nevertheless, having voiced these reservations, I must admit that *WordStar* is an excellent program, well suited to both personal and business-oriented applications, and deservedly the industry standard by which all other word processors are measured.

*WordStar* is a CP/M-based and cursor-oriented word processor. Screen formatting for text is displayed as it will appear on the printer. *WordStar* can accommodate lines up to 240 characters in length. This is the most significant modification comprising Version 3.00. In prior versions, when the text line exceeded 78 characters in the display area, it simply wrapped around the screen. With this version, when you exceed the 79 character mark, the entire screen shifts to the left by 40 characters with no wrap-around. This means that you can no longer see all of the text on the screen at one time, but must scroll the screen in 40 character increments. If you have been using earlier versions, this change will take some getting used to. On the plus side, the change means that you no longer have to contend with tables that overlap on the same screen, resulting in much easier text alignment.

Added enhancements to *WordStar* may be used to advantage by specifying imbedded characters. These characters will be interpreted by either the print routine within *WordStar* or by the “MailMerge” overlay.

Because of the implementation of CP/M on the Apple, *WordStar* is hardware-dependent. Be certain to check the version you receive for compatibility with your particular configuration.

One particular feature of *WordStar* is noteworthy: you have to try hard to go astray in using the program. A very thorough help menu is available throughout all processing stages; after becoming familiar with the program, you have the option of reducing the help menus in size and scope. After you become completely familiar with the program, you can erase them altogether. This form of prompting is quite valuable.

All of the standard cursor controls are available (and then some). The control characters which move the cursor are logically organized on the keyboard. Moves by character and word can be performed in the horizontal direction and by line or page in the vertical direction. The cursor only moves within the text area. Word wrap is available on text entry and, as text scrolls down, the prior line is formatted as specified by the defined output format. Effectively,
you can see in real time how the justification will look. Centering is also available.

Text entry is not limited to memory size. Scrolling will take place both forward and backward and, as memory becomes full, text is read from disk. Because of the characteristics of CP/M, you must make certain that you have sufficient room on the disk for the primary and temporary files. Otherwise, an error will result and you may lose text.

Another nice feature of the program is paragraph reforming. For each paragraph, you have the opportunity to change margins, line spacing, justification, or just "clean up" after editing. Optional hyphenation of words also occurs as paragraphs are reformed. WordStar has the ability to suggest places within long words for inserting a hyphen if moving the entire word would result in uneven line spacing. You may then accept the suggestion by moving the cursor to another location for the hyphen or force the entire word down to the next line. If this function is used and then the paragraph is reformed later, any word that has to be re-combined is done in such a way that you can later edit out the hyphen without disturbing the justification.

All common editing functions are included. Character, word, and line insertion and deletion are supported, as are all block functions. You also have the ability to read and write from additional files and set return-to-place markers. The search-and-replace function is quite flexible and can be performed one time, multiple times, or globally. Selective replacement (under operator control) is also supported.

Because text is formatted on the screen exactly as it will be printed, you will be able to determine page breaks as you are editing (unless you reformat with imbedded commands).

The print function operates on files that are saved with WordStar. Default values for margins may be used or dynamic reformatting may be accomplished, using imbedded print commands. Headers and footings are supported. Page numbering may start at any defined page. The page numbers may also be located in the center of the page or any other location for printing facing pages (left and right). The page number may also be imbedded within the header or footing on the document.

Page ejects may be automatic or forced (for instance, if the number of print lines do not fill the specified logical page size).

All of the standard enhancements supported by quality printers may be used by WordStar. Sub and super-scripts are supported, as are variable pitch and alternate ribbon color.

Justification may be accomplished by inserting spaces between words or by micro-justification in increments of 1/120 of an inch, if this feature is supported by your printer.

The print option also allows you to print one file while editing another in real time. The edit-while-printing function works quite well. WordStar seems to have overcome some inherent Apple hardware limitations. This allows efficient setup of files for later printing. There are provisions for reformatting text during printing, but there are no provisions for modifying text based on conditional statements.

WordStar comes with an INSTALL program for matching the program to your system; however, you still must match the exact version purchased to your basic system configuration.

The manual is extremely complete and well written. All commands are clearly described and examples are provided. Of course, with the help function, you should not have to refer to the manual very often after an initial reading.

All in all, WordStar is a superb program, filled with attractive features, and powerful enough to handle most text processing requirements for Apple users. It is versatile, and, once mastered, easy to use. Coupled with the "MailMerge" and "SpellStar" options, it becomes a major addition to any office using a microcomputer. Since WordStar is available on so many of today's machines, it has almost become a "universal" word processing program, so moving from machine to machine is no problem in most cases. Having mastered it on the Apple, a user could sit down at any number of different machines and produce a finished document without much re-training. A wise investment.

WORD HANDLER II

Company: Silicon Valley Systems, Inc.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING C
EASE OF USE B
VENDOR SUPPORT B

DOCUMENTATION C
VALUE FOR MONEY C
VISUAL APPEAL C

RELIABILITY C
ERROR HANDLING C

Department: Business
Sugg. Retail: $59.95
Availability: 4
Disk or Tape: Tape

Word Handler II is a simple, straightforward word processing program for the Apple II. Its introduction claims that you will be capable of doing "useful" work within 20 minutes of booting up the disk. The program is fairly easy
to use, and easier yet to learn; but it is filled with odd instructions, and a continually "blinking" screen which is very hard on the eyes.

The program displays 66 columns of text with no additional hardware required. The characters are well-formed on the screen, although the "W" and several other characters are filled in, which makes them hard to read. In the 40-column mode, the program wraps lines in order to handle lines of text longer than the screen will display.

One of the first indications that this program requires a somewhat different type of control by the user is the fact that, in order to change the printer specifications, it is necessary to remember to hit the space bar while the program disk is booting up. Failure to do this will result in the default selection of the last printer specified. Other oddities may be found in the use of the Command characters in the "normal" (edit) and inserting modes. For example, the right arrow key normally moves the cursor to the right one space; when inserting text, this same key is used to indicate the end of the insert sequence. CTRL-L in "normal" use moves the cursor a line at a time (it should be preceded by an arrow key to indicate which direction); in the insert mode, this same command means to add a "half spaced carriage return." I noted other inconsistencies as well. The use of the ESC key leaves much to be desired. Hit the ESC key once and the next character you type will be in upper case. Hit it twice and you will have moved the cursor to the next tab stop. Some of the operations specified are executed by the use of the arrow keys. Copy, or delete a character, is accomplished by the use of the right arrow key, but cancelled by the left arrow key.

Yet, despite this, some of the commands make sense. CTRL-W, CTRL-L, and CTRL-P indicate the movement of the cursor by a word, line, and page, respectively. (However, remember to use the arrow keys to indicate the direction the cursor should move.) The command structure is limited; but includes most of the common commands.

Word Handler II offers several nice features not generally found in Apple word processing programs. One of the modes of operation is called a "form" document. In this mode, it is possible to set up a form that requires fields to be completed. When you call the file onto the screen, it asks that a document name be given for a finished product and creates a new file. The old file, or the standard form, is also kept intact so that it may be reused. If you have forms that need to be duplicated frequently, this is a very welcome feature. Another feature unique to this program is its ability to print "small" pages. This means that you can use an 8.5" by 11" standard sheet and print out four pages on it. The setup procedure is not easy to master; you must first determine exactly how many small pages are to be printed, and then lay out the paper to handle this. But the instructions are clear, and so with a little experimentation it is possible to end up with a document printed on both sides and folded like a small book. If you would like to have mirror image margins (the margin on the left page flush right, and the right page flush left), the program will allow you to set this up also.

Both the manual and the included instruction card are simple to follow and easy to read. The manual doesn’t make use of any screen illustrations, But the text is well-written, and even a beginner should be able to produce a usable letter or document after only a few short sessions with this program.

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**PEACHTEXT (Magic Wand)**

*Company*: Peachtree  
*Language*: CP/M  
*Hardware Requirements*: 48K

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<thead>
<tr>
<th>OVERALL RATING</th>
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<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
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<tr>
<td>B+</td>
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In my opinion, *Magic Wand* was one of the best CP/M based word processing programs on the market. There was a problem, however, in that very few stores carried it, and fewer yet knew anything about it. Peachtree bought it, and has renamed it *Peachtext*. They have also added significant improvements to the program.

First, Peachtree added a master menu. The earlier *Magic Wand* required you to enter the editor and the print routines directly from the CP/M system level. Now you only need to type "MW" and a complete menu is brought up on the screen. From the menu, moving between the editor, print commands, spelling correction, mail merge, and data transmission sections of the program is as simple as typing a two letter name: "ED" for edit, "PR" for print, "MS" for spelling (Magic Spell), etc.

The commands are easy to learn because they all make sense: "LM" is left margin, "RM" is right margin, "IN" is indent, "PI" is paragraph indent, and so on. Even if you have not memorized the commands, you can still comfortably enter the editor and begin typing text. The print routines have default codes that will permit even the
novice to produce acceptable text from the very beginning. The program may be learned in less time that it takes to master other programs. The commands are so well defined that it is easy to return to the program days later and continue from where you left off.

Help menus have been added which walk you through most of the commands. These menus are available at all times, but do not appear on the screen unless called up. They are excellent, as is the chart of commands included with the manual.

The manual is the best I've seen, divided into general information, self instruction, reference guide, and appendices. The "self instruction" section uses screen display illustrations as well as concise descriptions of each operation and command. A quick tour of this user's guide will allow even the first time user to become proficient with the program in a very short time.

Many of the features available in this program will only be used occasionally by the average user. Internal math, variables, a GET command for inputing new data from the keyboard, and string commands are all available. When you want to try one of the complex options, all that is necessary is to refer to the examples listed. This speaks highly of the manual.

The main word processing command menu supports entry into the editor, print routine, copy program; and such functions as delete file, rename document, display directory, get help, end the program, swap disks (it's not as easy to do this with CP/M as it is under DOS), and change the default drive. In addition, you can enter the spelling checker, mailing list, and even the data transmission program from the main menu. Peachtree has made the basic program a lot friendlier.

Files are handled as standard CP/M files; and they are copyable. One of the changes made that has caused some problems is that each of the files now ends with "DOC." The original Magic Wand did not use the last three characters except in the case of backup files (".bak"). In order to help keep track of the various files, I developed a system of using the last three digits of the file name for the date or the type of file information. This file, for example, is called: "Peachtxt.ev1" ("ev1" stands for evaluation). Other files would have had ".let" for letter, ".quo" for quote, and so forth.

The program supports the most sophisticated printers, allowing boldfacing, super and sub-script characters, automatic page numbering, indexing, and imbedded commands. One of the features most utilized is the simple method of changing line length, indent parameters, and text formatting options. Once you get familiar with the program it is possible to use screen formatting to get a visual representation of the text's final appearance. Format changes may be made either by embedding commands in the text as you type, or by changing the default values prior to printing out the finished product.

The new mailing list program (sold separately) is very easy to use, and allows a full complement of "mailmerge" options. It will allow you to search the file, add a name, and sort by any field. The program allows you to design your own format, store up to 15 fields of information, and format labels. Used in conjunction with Peachtext, it provides the user with a very powerful system.

The spelling correction program is fast and easy to use. It comes with the Random House Dictionary, making it one of the most powerful programs available. You can build your own dictionary by adding words to the existing one, and combining the two. My copy would not integrate directly with the Peachtext menu because the spelling program was not named properly. It took several attempts to install it correctly on the Peachtext disk, but once up and running, it works well.

There is no perfect word processor, and there are a few things that I would like to see changed. First, the program is sold pre-configured for a specific machine and a specific printer. Should you change printers, or 80-column cards, you must get the program re-configured by a dealer, or send it back to Peachtree. Second, the default values provided for the print routine cannot be changed. They are not set up for any of the normal letter or document formats I am familiar with, and this requires adding commands to every document you produce. If the default values had been supplied for a standard business letter (or better, were user-selectable), it would have greatly increased the program's usefulness.

Peachtext offers more power in a word processing package than any other available for the Apple. It is easy to learn and simple to use. While one of the more expensive programs available, it should be seriously considered by users who need to be able to produce many high quality documents with a minimum of effort. The only foreseeable problem with this package is that you may have trouble locating a store which carries it. Even more trouble is trying to find someone who can provide you with a working demonstration of it.
LETTER PERFECT
Company: LJK Enterprises, Inc.
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING: B
EASE OF USE: B
VENDOR SUPPORT: C +

DOCUMENTATION: C
VALUE FOR MONEY: B-
VISUAL APPEAL: B

RELIABILITY: A
ERROR HANDLING: B

Letter Perfect represents good value in a basic, easy to learn and use word processor. The program incorporates a number of special features, such as: document merging; file merging for form letter production; on-screen format previewing; a safety file locking function; BASIC program file editing capabilities; support and easy access to special printer characters and functions; and a modem configuration for data transfer. A straightforward menu system provides easy access to all editing, printing, and file management functions. Letter Perfect also furnishes a full screen editor and imbedded editor commands for all formatting.

This word processor supports all the popular 80-column boards, and can also be used with the standard 40-column Apple video, if a lower case character generator is provided. Although only one disk drive is required for operation, Letter Perfect lets you direct all text files to Drive 2 in two-drive systems. The program has built-in configuration selections for the most common interfaces and printers, as well as the Micromodem II, and offers an easy menu approach to configuring for any other printer you may have. In the configuration module, you can also define up to four printer fonts for automatic call-up by number within your documents.

The editor uses control characters for a full range of cursor and text movements, insertions, deletions, caps lock, search, search and replace, buffer creations and additions for block text moves, underlining, boldfacing, etc. Unfortunately, there is little apparent logic to the control characters selected for each command, so memorizing them is more difficult than it need be. Nonetheless, you need to make only a small investment of time to learn the limited number of commands necessary for the full range of editing functions.

The editor also lacks an easy insertion mode for typing additional text in the middle of existing material; you can insert a blank space or line at a time, but cannot instruct the program to automatically move subsequent material ahead to make room for new text. A final inconvenience of the editor is its failure to rejustify text automatically after insertions and deletions; you need to enter a special command to rejoin parsed words and close up spaces after editing. Editor-related functions include the ability to merge any file on disk to the end of the current file in memory, and to lock files to prevent accidental over-writing.

You can assign a complete set of formatting capabilities by imbedding commands in your document while entering it through the editor. These commands enable you to modify the system defaults established during program configuration. Since the editor handles all document formatting, you can move quickly from editing to printing without delays. Multiple formatting commands can be entered on a single line, along with comments, and include: variable margins and line spacing; headers and footers; page numbering and resetting with optional alternating page position; full or left justification; centering or right justification of lines, headers or footers; selection of up to four printer fonts; subscripts, superscripts, and other special characters or capabilities. There are tabs, but no automatic paragraph indentation. You must request a negative indent at each use. You can preview formatted documents on the screen from the main menu, although this feature is of real value only if you have an 80-column board.

Letter Perfect’s most outstanding feature is its file merging capability for form letter and report production. This easy-to-use module lets you merge Letter Perfect documents with all or selected records from a file you create either in LJK’s Data Perfect database program, or within Letter Perfect itself. Creating a file within Letter Perfect simply requires entering data strings in a consistent order.

The user manual is adequate, but poorly organized and formatted for reading and reference. Some stylistic improvements, type variety, proper headings, and better listing and indexing of contents are needed to make the current text usable, and to do justice to the program.

Letter Perfect itself lacks some of the more sophisticated features (like hyphenation, footnotes, macros, or indexing) of other word processors in the same price range. It has the virtue, however, of being quick and easy to learn and use. It would be a good choice for a user who needs basic functions with form letter production capabilities.

As a final note, LJK Enterprises will replace a damaged disk for $10 on the first occasion, but charges $30 for backup copies and subsequent replacements.
PowerText, a very powerful word processing program, approaches the task differently than most. The average word processor tries to show you what you are typing in something like its final format. This means that every time you type a letter you must do the tabbing, indenting, and spacing on the screen, and for the most part, what you see is what you get. With PowerText, you type material in rough draft, adding certain code words which tell the program where to insert information into the final document. Then, by specifying a particular format file, you tell the system to print your material in that format. Pre-set formats are provided by the system for personal and business letters, reports, memos, and “landscape” documents, which are wide pages with 132-column margins. You can also design your own custom formats for any document which is typed often.

In addition to specifying the general format of the material, you can insert special commands in the text to tell the system to underline, center, print subscripts and superscripts, indent, draw boxes around paragraphs, form text into columns, justify left and right margins, change the spacing or pitch, and perform a number of other text-shaping miracles. Some of the more amazing functions enable you to create columns in any number and width, tables of contents, boxed calendars, and screenplays. One of my favorites is the automatic outlines function, which makes this chore almost a pleasure.

The editor is extremely powerful. You can delete, move, copy, insert, and search for words or sentences. You can edit more than one file at a time and transfer information from one to the other. You can create and insert form documents and “boilerplates” into your document at any point. When you save a file, the system creates a backup document. This cuts down on the available disk space, however. The program is fairly easy to learn. It is not really menu-driven, but a reminder line appears at the top of the screen.

Some annoying error messages cropped up, especially in the printing mode, which has been expanded and upgraded. This function enables you to view the finished text on the screen or send it to a printer. The documentation warns that “abnormal terminations” might occur, and sure enough, they did. One of the most annoying was a “string overflow” message which would not permit my document to print. Apparently this was due to the length of my file name, which was legal but up to the limit. By fooling around with it I was able to get it to print, but it was a bother.

The word wraparound sometimes hides the last letter of a word from sight, and if you make corrections to the text, it does not readjust the margins, so that large portions of a sentence may run off the screen.

It is possible to crash the system if you work at it, and also to destroy files—a good reason for the automatic file backup. The program is not copy-protected, so you can make your own backups. The company also provides a five year warranty. The manual is adequate, with a very good tutorial which leads you through the steps of creating different types of documents while teaching you the basic commands. There is a reference section, but no index or list of error messages. There are no tabs dividing the sections and no pull-out reference card. Directions for the more complicated functions could be clearer.

The system requires two disk drives, and supports an 80-column board and a one-wire shift key modification. Both are necessary for serious typing.

This very powerful, professional level processor is simple enough for the occasional user. Once you get used to typing in a rough draft format and not seeing your final product right away, you begin to appreciate its power. The system basically makes it possible to type at full speed without worrying about margins, tabs, columns, or centering, yet come out with a highly polished piece of printed material.
Magic Window II is an enhanced version of Arscii, Inc.'s Magic Window, offering a number of new features while retaining the easy to learn and use approach. It is completely menu-driven, with subsystems for hardware specifications, formatting, editing, file maintenance, and printing.

This new version supports 80-column boards, the standard Apple 40-column screen, and its own built-in 70-column video. The latter, unfortunately, is extremely difficult to read. With any of these video configurations, the screen scrolls horizontally to display lines of up to 160 characters. The program also supports "one-wire" shift key modifications and lower case adapters. A special driver diskette lets you configure the system for your printer. You can easily use the program with either one or two disk drives, and it also supports hard drives.

Magic Window II handles document formatting on a completely visual basis. You enter the format subsystem to establish or accept defaults for the document's page length, margins, and line spacing (double or single). The only internal formatting commands are for left, right, full, centered, or no justification on a line by line basis. You set up all internal formatting (columns, indentations, etc) using your own screen movements rather than commands. Consequently, the monitor always displays text exactly as it will appear on the printed page. This technique spares the novice the trouble of learning many new formatting commands and techniques; however, it lacks flexibility and efficiency. You can't change the justification mode or sectional margins and columns without physically adjusting each line, and you must manually perform all indentations and the like. You cannot simply instruct the program to apply previously established formats. A special editor command is required to enter top and bottom titles, which are limited to one each.

Relatively few CTRL character commands are required to efficiently accomplish editing and screen movements. Magic Window II assigns commands on the logical basis of keyboard placement for easy learning and recall. Some of the editor's special features include search and replace, a buffer for moving (but not copying) text, a ditto command for copying a character or characters from one line to the next directly below, and the ability to generate special non-keyboard characters and printer instructions with a CTRL command. The editor's chief disadvantage for users accustomed to a full screen approach is its line editing orientation. When you first create text, it will wrap down to the next line automatically. Once entered, however, the text is handled in single line units, requiring you to issue justification commands to rewrap paragraphs each time you insert or delete. Even text buffer movements are handled on a line-by-line basis.

Magic Window II's filer subsystem provides versatile file maintenance and manipulation. You can use it to save, load, and list both formatted files (with established margins, tabs, etc.) and unformatted files. Because each line of an unformatted file is stored as a separate unit, you can load and transfer any portions you like for efficient and flexible merging with a formatted file. This feature also facilitates transfer of files created with other programs to Magic Window II for editing, and use of Magic Window files by other programs. Another good feature is the editor's direct access to DOS commands, so you can initialize disks, delete, rename, and lock files without leaving the program.

The printer subsystem provides a number of useful capabilities, including printing all or part of a document, page numbering from whatever beginning number you specify, multiple copies, soft copy for transmission through a modem, and creation of file lists for multiple file sequencing. Another nice feature is the ability to print files directly from memory without first having to store them on a disk.

The Magic Window II manual is adequate. It explains operations clearly, but the organization is poor. It makes little sense, for instance, to explain the printer subsystem before the editor, especially in what purports to be a tutorial approach. These tutorials come in the form of exercises at the end of each chapter. They work well in chapters covering only a few points, but in the editor chapter the exercises are really needed during the explanations, not afterwards. The manual also lacks an index for reference purposes.

Arscii, Inc. will replace damaged diskettes free of charge within the 90-day warranty period, or for $20 within one year. Back-ups are also available for $20.
Magic Window II lacks some of the more sophisticated features (like automatic footnotes, hyphenation, macros, and built-in form letter production) of other word processors in the same price category, but it would be a good selection for someone wanting an easy-to-use program that interfaces with the related application programs in the Artec product line such as Magic Mailer, a form letter merging program; Magic Words, a spelling checker; and MagiCalc, a spreadsheet program.

**ZARDAX**

**Company:** Computer Solutions  
**Language:** Machine  
**Hardware Requirements:** 48K, printer

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
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</thead>
<tbody>
<tr>
<td>OVERALL RATING</td>
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<tr>
<td>RELIABILITY</td>
<td>A</td>
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<tr>
<td>ERROR HANDLING</td>
<td>A</td>
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</table>

Zardax, published by Computer Solutions of Australia, is a powerful yet easy to use word processing system for the Apple computer. The program has all the capabilities required by most users, and yet is simple enough for you to use most of the program's features without spending a lot of time studying the manual.

The Zardax system requires a 48K Apple II plus with at least one disk drive. Two drives will eliminate disk swapping. Also required is a hardware modification to the Apple to allow you to use the actual Shift keys on the Apple keyboard to access uppercase characters. The package includes the needed information and supplies, although Apple users who have a Videx Keyboard Enhancer, don't need to make this modification. Zardax does support most printers and interface cards currently available for the Apple II, but the manual mentions some interface cards that may require special drivers to bypass the interface card's firmware. Other optional hardware includes a 16K RAM card installed in slot 0 so that the user can work with much larger documents than would normally be possible, and an 80 column card installed in slot 3 which enables the user to view a full 80 columns of text on the monitor as opposed to the standard 40 columns.

There are basically two types of word processors available. The first is a command driven system, in which you tell the program specifically what you want to do. The other type is referred to as a menu-driven system, where all of your options in any particular section of the program are displayed and you simply make the appropriate choice. Zardax is a menu driven system which makes the program easy to use for newcomers.

Word processors, in general, are divided into two distinct sections. The first is the Editor where your text is entered and manipulated to your satisfaction. The second major portion of the program is the Printing/Formatting section. This portion of the program takes the text that was entered in the Editor and sends that text to a printer in a manner that you have described. One nice feature in Zardax is a function called Videoprint. This option allows you to view your formatted document onscreen and make changes in your text before sending it to the printer, which saves paper and printer time.

Since most of the time you spend using a word processor is spent in the Editor, it is important that it be simple to use and very straightforward. The authors of Zardax have done a very good job of this. The Editor (as well as the rest of the program) uses the Apple's Hi-Res screen. This allows the program to display both upper and lower case characters without the need for a lower case adaptor. If you are using an 80 column card, the program uses the card's character set.

When you are entering text in the Editor, it is not necessary to hit the Return key except at the end of paragraphs. The program automatically wraps words around to the next line if you have reached the fortieth column of text (the eightieth column if you are using an 80 column card). The one drawback is that Zardax does not break the line at the end of a word. If you reach the final column of text in the middle of a word, the portion of that word which will fit on the current line is placed there, and the rest is fit on the next line. Not to worry, though. When documents are printed, words which may have been split in the Editor appear properly on final printout.

The editing commands are quite logical. To move the cursor you use control sequences (i.e., ctrl-D moves the cursor down one line, ctrl-U moves the cursor up one line). The rest of the commands are equally well thought out and include left and right movement, movement up and down through the text in ten line increments, direct movement to the beginning or end of your document, as well as movement to preset tab stops.
Some of the other Editor features allow you to do much more sophisticated text editing. One of the nice extras is the Search and Replace function. This is a feature which is found in most word processors, but the nice extra here is what is known as the Verify function. This means that each time the program finds the word or phrase that you want to replace, you will be asked whether you wish to replace it in this particular context. This allows for selective replacement inside your document. Another nice touch is that with two keystrokes the current paragraph that you are working with can be moved above or below the following paragraph. This is a very simple process for what would normally be a complicated "Block Move." Still another feature available in the Editor is the Insert command. This allows you to insert text not just from the keyboard, but also from files that have already been saved to a disk. Other Editor functions include character deletion from either the right or left of the current position, and deletion of large blocks of text. All in all, the Editor section of this program is very simple to use, and complete enough to handle almost any editing task.

Control of your document's appearance is handled by embedded formatting commands. These commands are two letter sequences preceded by a ctrl-O. These commands control such things as page length, form length, line length, justification, page numbering, headers and footers, centering of text, the length of paper, and many other items too numerous to mention here. Many of the other available commands are printer related, and can be used if your printer is capable of performing these operations. These include single or double width characters, bold face characters, changing the pitch of the printer, super and subscripting, and switching back and forth between red and black ribbon. One final formatting feature that I have not seen in any other word processor, Apple or otherwise, is the ability to program up to seven of your own formatting commands depending upon your printer's capabilities.

Once your document has been entered in the Editor, all appropriate changes have been made, and formatting commands (if any) have been added, it is time to print it. You have several options when you want to view your final product. You can view it on the screen prior to sending it to a printer (as previously described using the Videoprint option), you can use Draft option which will automatically print one copy of your document, or you can use the Print option for final output. When this option is chosen, you will be asked how many copies of the document you wish to print, and, if it is a multiple page document, which portion of it you would like to print.

The documents produced by Zardax are first-rate. The justification is very good, and with a little experimentation with the formatting commands, you will find it is very easy to create professional looking documents in a very short period of time.

The documentation supplied with Zardax is excellent in some places, and lacking in others. It is almost as if two separate authors wrote the manual. Fortunately, the good portions of the manual are the examples and tutorial section. The documentation gets very vague in the more advanced sections, such as the section describing printer drivers. On the whole, however, the documentation is more that adequate for 90% of the users of the program. The strong point is its tutorial.

When all is said and done, Zardax is an excellent word processor which allows novices as well as experts to create very impressive looking documents without having to have an in depth knowledge of computers or word processing. As a final note, due to the cost of this program, the prospective buyer should check carefully to be sure that this program can configure to his hardware.

Super Spellguard is the latest version of one of the pioneer spelling checker programs for microcomputers. It provides a fast and easy method to correct spelling and typographical errors in the text files produced by the most popular word processors for Apple CP/M. To do this, the program scans through your entire text file and tries to match each and every unique word with an entry in its dictionary. Naturally, not all mismatched words are misspelled, but all words which fail to match are brought to your attention and can be handled in a variety of ways.

Super Spellguard uses a single dictionary of about 20,000 words drawn from common English usage. You can easily expand this dictionary by adding selected words from any document being proofread during the interactive
review of mismatched words. Alternatively, the dictionary can be directly modified outside the proofreading process. By using a comprehensive set of dictionary management functions, you can create an entirely new dictionary from any text file, delete selected words from a dictionary, combine two dictionaries, and subtract one dictionary from another to form a third.

Super Spellguard runs extremely fast. A typical proofreading time for even a fairly long document (say around 15,000 words, or 30 pages) is only about one minute. Of course, you still aren’t through until you have settled on a disposition for every mismatched word, and that process can take much longer than the original proofreading time.

Each mismatched word is presented one by one. Unfortunately, just the single word is presented out of context. At your option, you may mark an incorrect word for later correction, add a correct (but unrecognized) word to the dictionary, ignore a word which may be correct but inappropriate for such addition, or return to the previous word for review. Super Spellguard does not offer the capability for you to correct mismatched words which are spelled incorrectly. To do this, you must use your own word processor. However, the program will aid in this process by marking every mismatched word you designate with a special symbol of your choosing. (This allows you to use a global search function in your word processor to locate and correct the misspelled words.)

With only a 20,000 word dictionary, Super Spellguard tends to flag a lot of fairly common (but unrecognized) words as well as any specialized terms, abbreviations, and so on, which are peculiar to the subject matter of the document. This can be annoying, for it makes the review process lengthy. The gradual addition to the dictionary of other commonly used words, and the creation of specialized dictionaries for each subject area will greatly alleviate this problem. Naturally, it is important that any words you add to the dictionary be spelled correctly.

Super Spellguard provides several other thoughtful features. These include the ability to alter the default selections for certain file names, the marking character, automatic back-up creation, as well as provisions for verifying the program integrity, and entering any small revisions which might be provided in hardcopy from Sorcim. The program comes with an excellent manual of almost 90 pages, handsomely bound. Super Spellguard is, in fact, easy to use, and it is reliable and very quick at doing its job—helping you find your own mistakes before they appear in print.

THE SENSIBLE SPELLER

Company: Sensible Software
Language: Assembly Language
Hardware Requirements: 48K, 2 drives recommended.

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<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>VENDOR SUPPORT</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
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<tbody>
<tr>
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<td>A</td>
<td>A</td>
<td>A</td>
<td>A –</td>
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<td></td>
<td>B +</td>
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The Sensible Speller is an outstanding, comprehensive program for verifying spelling in a user’s word processing files. Often one’s writing ability is judged by correct punctuation and spelling, and so it is quite important to have a companion program such as this to add to one’s favorite word processor. Four separate versions of the program have been developed capable of working with virtually any word processor that currently runs on the Apple II/II+.

There are versions for CP/M, Pascal, Super Text, and all other word processors that save their files as standard binary or text files on DOS 3.3 disks. Each of these versions will run on either a one or two disk drive system.

Sensible Software uses a very fast machine language to handle larger files, comparing words in it to the 85,000-word Random House Dictionary, Concise Edition supplied on two disks. First, the file collects the most difficult, or commonly misspelled words. These are then compared to the 45,000 most used words contained on the main dictionary disk. Then the number of unknown words is listed. At this point, the user has the option of listing these words on the screen or printer, or reading in the second part of the dictionary. If the latter option is chosen, usually the number of unknown words will drop. This is a rapid procedure, as the program compares words against the dictionary at more than 1,000 words per second. As an example, a Screenwriter II text file was read into The Sensible Speller. It contained 1,213 words, 492 of which were rare. The 31 unknown words flagged after the first pass through the main dictionary disk dropped to only 21 when the supplementary dictionary was used. Naturally, these included a number of proper names not found in the dictionary in addition to the numerous misspellings.

My main complaint with all spelling checker programs is that they do not actually correct mistakes but only mark which words are misspelled or otherwise unrecognizable. I realize that this is in effect a safety feature which gives
you the choice of whether to correct the word or not. But often I can't tell whether a word is misspelled, or simply not listed in the dictionary disk, and so I spend considerable time in looking the words up manually. But I must note that while running the aforementioned test I could not find the correct spelling of "infrared." Unable to find the word using infa- or infe-, I chose to use the program's search mode under "List Dictionary Option." I designated the wild card option, and asked the program to find all words similar to "in?red." Much to my surprise, it listed the word "infrared" after scanning a portion of the first disk. This method of tracking words is certainly a boon to anyone who has trouble spelling; but it is rather inconvenient to users who have only one disk drive system, because the text file and dictionary disk must be swapped frequently.

During the proofreading phase of the program, the user's file is reread and displayed in a three line window at the bottom of the screen. Reading is continuous until the program encounters one of your errors. Having seen the word in context, you have a choice of passing the word as okay, marking it with a predefined symbol in your file, noting the word for inclusion in your dictionary, or listing the dictionary for alternative words (as in the example above). Once you have completed proofreading, you can return to your word processor and search for those characters marked in your file for correction. I rarely like the program to mark my own files. I prefer instead to have the program pass each word during the proofreading phase while I mark the errors by hand on a separate listing. (This helps me to improve my spelling ability.) But there is one disadvantage to this system: if it is not marked, the program will ignore a misspelled word when it encounters it a second time.

The Sensible Speller offers a comprehensive dictionary. It is very easy to add or delete words from it; or you can create an entirely new specialized dictionary. After proofreading your document, you may choose to add several new words to the dictionary from your last file. However, this procedure requires two disk drives. There is also a global add feature for adding entire groups of words. You simply need to type all of the words into a word processing file. Words can also be deleted in a similar fashion. There is room for nearly 10,000 new words on the main dictionary disk, and this space can be checked on at any time.

There are a few limitations to this program. For instance, a document cannot contain more that 2,048 words in any file to be proofread (this depends somewhat on the length of the words involved). However, this should rarely cause problems, since a ten page document contains about 5,000 words on the average; so almost every other word would have to cause difficulty in order to reach this limit.

The Sensible Speller is an outstanding tool for anyone who does a great deal of writing on a word processing system. It eliminates much of the drudgery of finding and correcting misspelled words in a document, and can even perform a word frequency analysis of the words used in the text. It is simple to use, and the documentation is clearly written. The company also includes a paperback copy of the Random House Dictionary, Concise Edition in the package. I would recommend the program very highly.

**DIC-TIO-NARY II**

**Company:** Sierra On-Line  
**Language:** Assembly Language  
**Hardware Requirements:** 48K, 2 disk drives and printer helpful.

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<tr>
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<th>VENDOR SUPPORT</th>
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<td>C</td>
<td>B</td>
<td>C</td>
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<td>B</td>
<td>C+</td>
<td>B</td>
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</table>

**Dic-tio-nary II** is a spelling checker intended for use with word processing applications. Its 28,000 word dictionary can check for misspelled words, text, or binary files produced from a number of popular word processors. It is designed particularly to interface with Screenwriter II, Pie Writer, and Apple Writer II files; but, if embedded control characters are ignored, it should work with any word processor that saves standard DOS 3.3 files.

**Dic-tio-nary II** is a two-disk package. The program is protected, while the wordbook disk can be copied and modified. The user can add 1,500 new words in the standard configuration. Since the user can create many wordbook disks, each dictionary copy can be used for different applications. Adding and deleting words is entirely menu driven. The entire dictionary can be listed on a line printer. The listing is lengthy (130 pages), and cannot be printed in sections. You can only abort by hitting RESET, so if you need a listing, you might plan to go out for the evening while it is printing.

The program can be used with systems having either one or two disk drives. Single disk drive systems require extensive disk-swapping between the workbook and your text files. A disk swap is required every half page of single-
spaced text on a standard sheet of paper. This is an annoyingly slow procedure when processing large files.

The only way you can accurately judge the processing speed is on systems with two disk drives. If the program is in the self-running mode, it prints unknown or misspelled words on the line printer. It takes five minutes to process five pages of single-spaced text. Because it supports 16K RAM cards, there is some speed increase realized during text processing.

When text files are processed in the prompting mode, you have a choice of ignoring the word, marking it as misspelled in your text file with your selection of a rarely used symbol, or adding it to the dictionary so that you don’t encounter the word repeatedly in the file. These flagged words are shown in their proper context in a two-line window at the top of the screen. In addition, you can correct misspelled words within the file if you have a two drive system. This appears to be useful for minor changes; but this is not a word processor, and letters cannot be inserted or deleted. They use a temporary work file for safety.

Choosing the automatic mode allows you to print a list of misspelled or unknown words on the line printer. This mode offers only a list; it doesn’t show where they are located in the document. The advantage of this mode is that the entire document can be processed unattended (if you have two disk drives). On single drive systems, the output is cluttered with disk swap prompts. It’s too bad that the text file can’t be marked simultaneously while the printout is generated.

A spelling checker is only as good as its dictionary. While 28,000 words is only a small portion of the approximately 600,000-word English language, this number can be adequate if you add your own personal 1,500 word dictionary. Although the program recognizes contractions, many plurals and adverbs are not recognized. The system dictionary didn’t contain common words like “eat” or “awed” in its wordbook. In comparing *Dic-tio-nary II* with *The Sensible Speller*, the same document was tested for non-recognizable words. *Dic-tio-nary II* found 43 unrecognizable words in a lengthy six-pass procedure on a single drive system. Using the competitor’s larger dictionary, 21 words were located. You get a significant increase in speed if you ask it to do a word analysis on the file and simply ask it to list unknown words.

I found the program useful for locating obvious spelling errors or words that contained transposed letters. However, the regular dictionary flags so many words it doesn’t recognize that, even with the ability to scan sections of the wordbook, I spent considerable time using a book dictionary to make sure I’d spelled the words correctly. What I would really like to see is a spelling checker that gives me what it thinks is the correct spelling of a word and asks me if that is the word I meant.

Overall, I would recommend this program to anyone doing a substantial amount of word processing, provided you have two disk drives. Although it is not the best nor the fastest spelling checker, it has the advantage of being the least expensive.

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**MAGIC WORDS**

**Company:** Artsci, Inc.

**Language:** Assembly

**Hardware Requirements:** 48K

**OVERALL RATING** A-

**EASE OF USE** A-

**VENDOR SUPPORT** A

**DOCUMENTATION** B-

**VALUE FOR MONEY** B

**VISUAL APPEAL** B

**RELIABILITY** A-

**ERROR HANDLING** A-

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*Magic Words* is a spelling checker designed for use with its companion programs, *Magic Window* and *Magic Window II*, as well as most other Apple word processors. It can check spelling and produce printed error listings for all Apple text and binary files, and can create marked files for most word processing programs on the market. The program is operated entirely through easy, well-presented menus, and offers considerable flexibility in checking options. With 48K, the program has room in memory for approximately 500 user defined words at one time. With a 16K card, the memory space for custom dictionary terms is increased by 12,000 characters, allowing room for approximately 2,500 user defined words.

Documents are compared for possible spelling errors against a built-in dictionary of approximately 14,000 words, along with any dictionaries created by the user. You create your own dictionaries from previous document checks, or simply by loading and designating any document file as part of the dictionary. You can produce customized dictionaries effortlessly, and you can easily load them for different checking sessions. The only liability to this system is that the built-in dictionary cannot be updated or edited; you must repeat the process of separately loading all
customized dictionaries, having *Magic Words* take the time to go through and compare them for duplicates every time you run the program.

Each time you request a checking session for a document, you have the option of attended or unattended operation. In unattended operation, *Magic Words* will locate all words not matching those in the dictionary, and identify them in a marked file, and/or add them to a printed error list. After the checking session, you can load your word processing program and use its search feature to locate all marked words and make the appropriate changes. You can use the default CTRL/SHIFT-P, or designate any other key combination of your own. The printed error list can be used along with, or in place of the marked file. It identifies the page and line of each word, and places it in a context of from 2 through 254 characters. You specify the number of context characters as well as the format parameters (page length, width, etc.) for the list.

In attended operation, you can still produce a marked file and/or printed error list. You will also receive a series of prompts for each word, allowing you to mark and/or list it as incorrect, correct it on the spot, ignore it, or accept it as correct. A key advantage of attended operation is that when you accept a word as correct, it is added to the user dictionary, so you aren't prompted for it the next time it appears in the document. (In unattended operation, every occurrence of a word not already in the dictionary will be marked or listed.) The chief disadvantage of attended operation is that it is slow, and you can't walk away from the computer while a file is being checked. Slowness is common to spelling checkers, however, and no worse a problem in this one than in others. Moreover, you can significantly increase the speed of both attended and unattended operation as you build appropriate customized dictionaries.

The documentation reflects the program's menu structure in that the explanations for each section are clear; but the manual lacks a basic overview of the program's purpose and function, and a clear explanation for using each of its menus and features.

All things considered, *Magic Words*' flexibility, ease of use, and low price make it a very good value in a spelling checker program.

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**THE EXECUTIVE SPELLER**

*Company: Sof/Sys, Inc.*
*Language: Applesoft*
*Hardware Requirements: 48K*

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
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</thead>
<tbody>
<tr>
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<td>A-</td>
<td>C+</td>
<td>N/A</td>
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<td>A</td>
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</table>

The *Executive Speller* is a complementary program to the *Executive Secretary* and *The Personal Secretary*. It is designed to compare files produced by either of these systems and provides a dictionary to identify certain words. These words are then candidates for being misspelled.

The dictionary, which comes on the back of the program disk and must be copied from, is advertised to hold 25,000 words, but only comes with 10,000. This is only briefly mentioned in the documentation, so you may have to do quite a bit of dictionary maintenance before the program is matched to your writing style.

When proofreading, you may read only, or proofread and correct your copy. If you choose correction, you may update the dictionary as well. A single document or string of documents may be picked for operating on. You must be present for correction, since the program stops at each word and asks what you want to do with it. If you have a word misspelled the same way in many locations, you must correct it in every location; the program will not remember for you.

Updating the list is straightforward and may be done during document correction, or as a stand-alone function. Should you choose the latter and merge a full document disk with an existing dictionary, be certain that there are several programs on television you want to watch while the process takes place. Several hours may go by matching 25,000 words to another 25,000 words. This is no problem; just be prepared for it. A useful addition in the next version would be the creation of a file of words from the correction process which could then be added to the dictionary.

If you feel the need for checking your work as typed on the *Executive Secretary* or *The Personal Secretary*, this program could be useful. Just remember that it is not automatic and requires your attention during the run.
SpellStar, an excellent program, makes a fine addition to WordStar. Nonetheless, there are a few things you should know before buying the program. First, you must have two disk drives to run the program, one for the disk with the text file and one for the dictionary. A third drive supports the program disk, but is not required because you can exchange the program and dictionary file disks when necessary.

In the simplest terms, SpellStar processes your text file, sorts the words to another file while eliminating duplicates for optional inclusion in the dictionary, merges the sorted list with the dictionary and checks for matching words, and flags all words not in the dictionary. These words, correct or incorrect, are then examined for spelling errors or inclusion in the dictionary. Since some forms of the same word (plural, possessive, present tense, past tense, etc.) occur in the dictionary’s 20,000 word vocabulary, the same word may appear on the screen in several different forms.

At this point, the sorted file is read. You have the option to specify that the program stop for each flagged word. When it does, you can ignore, fix, or set aside the word for later inclusion in the dictionary. If you choose, you can even make a supplemental dictionary of special terms. You make corrections under WordStar’s control, with all of its editing features. You can alternate between WordStar and SpellStar as needed. You can update the dictionary at any time by adding or deleting entries, or create an entirely new dictionary.

A word of caution seems called for. Since SpellStar takes your document apart, its work files are the same size as the document itself. In using the program, you would be wise to format a separate disk for the text file you want to work on and PIP (transfer) the file to that disk. This avoids the problem of running out of disk space (except for very large files, which you can split into smaller files).

**BOOKENDS**

**Company:** Sensible Software, Inc.

**Language:** Machine

**Hardware Requirements:** 48K

**OVERALL RATING**  B+

**EASE OF USE**  C

**VENDOR SUPPORT**  B+

**DOCUMENTATION**  C

**VALUE FOR MONEY**  B-

**VISUAL APPEAL**  B

**RELIABILITY**  B+

**ERROR HANDLING**  B

Have you an extensive collection of written material you would like to catalog? Are you a researcher/writer making extensive bibliographic references and annotations? If so—and you are willing to make the effort it takes to construct an electronic database—this program could prove most useful.

**Bookends** collects its information through a series of fill-in fields: Titles, Journals, Volume, Pages, Date, Publisher, Keyword(s), Abstract, and Classification. Each of the fields accepts 255 characters, except Abstract, which allows 720 characters, and Classification, which accepts one character. There are practically no restrictions on the form of the entry, and you may skip inapplicable fields. The information is placed in a self-named file in records much like a stack of electronic library index cards. One problem: the program supports upper/lower case input and output, so if you don’t have a Shift key modification, a substitute must be used to signal if you wish upper or lower case. In this instance, it is “Control-S,” a two-key operation which can slow up entry considerably.

To achieve its rapid searching ability, **Bookends** unloads an entire file called up from the disk into memory, which means file size is linked to memory size, 85 to 170 references in 48K, and 120 to 240 references in 64K. Of course, any number of files can be kept on disks. References can be alphabetized by author, keyword, or title, and can be
selected by number, author, date, keyword, or title. There is a limited Boolean And/Or search facility. It is also possible to list all the authors or key words in a file.

The real magic of the program lies in its ability to output the references (to screen or printer) in a virtually unlimited assortment of self-designed formats. You can even mix formats in a single listing, and the listing can be appended, bibliography-form, to a text file prepared on your word processor. How far you can carry this will depend on your skills as a librarian, your ingenuity in using Bookends programming directions, and your understanding of the codes that make your printer work.

I hate to criticize documentation that includes a built-in Help file and a tutorial, and which contains a table of contents and an index, but the net result is almost as confusing as it is helpful. The electronic Help file simply duplicates material found in the program’s handbook. The tutorial exercises do not move you through the program’s features without considerable back and forth referencing. The disk space utilized for the former could have been better used to enhance the latter.

### Mailing List

**ADDRESS BOOK**

<table>
<thead>
<tr>
<th>Company: Muse Software</th>
<th>Department: Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language: Applesoft</td>
<td>Sugg. Retail: $49.95</td>
</tr>
<tr>
<td>Hardware Requirements: 48K</td>
<td>Availability: 7</td>
</tr>
<tr>
<td>Disk or Tape: Disk*</td>
<td></td>
</tr>
</tbody>
</table>

**OVERALL RATING** B  
**EASE OF USE** B-  
**VENDOR SUPPORT** B  
**DOCUMENTATION** B  
**VALUE FOR MONEY** B  
**VISUAL APPEAL** A  
**RELIABILITY** A  
**ERROR HANDLING** A

Since most mailing list programs cost from $19.95 to $39.95, when the *Address Book* arrived from Muse Software with a price of $49.95 I suspected something special. To begin with, a mailing list program should keep an orderly record of your address list with a minimum of effort from you. After all, if the computer can’t do it faster and more accurately, why bother? The *Address Book* does handle data efficiently. The program prompts you all the way through data entry. The line where data is requested displays in inverse. You can easily change information before saving the record to disk. The problem with the program is getting there. For instance, the documentation tells you not to use the program disk for data. Since the manual states that you can store up to 700 names at 120 bytes each plus assorted index files at two bytes each, it seems obvious that you cannot use the program disk—you would surely run out of space long before reaching 700.

The program has the advantage of using multiple disks and drives to keep the flow of labels going, although I could not find a way to interlink the numerous disks for sorting purposes. You can define the indexes, but they are limited to two characters. You can also customize label formatting (printing up to six labels across), a flexibility valuable to the many users who want the label-printing capability. The only drawback is the lack of a provision for printing a test label. You must be sure that you have lined up the label perfectly before printing.

One problem came up in defining printer format. Inadequate error checking of incorrect information entries means that if you enter ludicrous information, the program may or may not reject it. When I tried this, the program rejected some entries while in response to others, it returned to the menu. Furthermore, a function is needed that would allow you to print a master list of all entries. This would enable you to verify the accuracy of entered data and to access information in a given file. Unfortunately, the program will not print out a master list. A given record cannot exceed 120 characters, so a master list cannot be printed. Moreover, the program does not track the approach of the maximum 120 characters. Had it been designed to cut off line entries, this would not pose a problem. One last problem: the documentation claims that a Control-Q will allow you to exit the program and return to BASIC. This did not work.
MAGIC MAILER

Company: Artsci, Inc.
Language: Applesoft
Hardware Requirements: 32K

OVERALL RATING: B
EASE OF USE: A-
VENDOR SUPPORT: A-

DOCUMENTATION: C
VALUE FOR MONEY: B
VISUAL APPEAL: B

RELIABILITY: B-
ERROR HANDLING: C-

Magic Mailer is designed to merge mailing lists with form letters, creating personalized correspondence and other documents. The program is specifically designed to use documents and data files created in Magic Window or Magic Window II. But it can also handle documents produced by other word processing packages that generate standard Apple II sequential text files and data files from database programs generating Apple DOS 3.3 sequential text files.

The program is operated entirely from one easy-to-learn, easy-to-use master menu, and it offers considerable flexibility in its file-merging techniques. You can load in special print drivers for your printer after you boot the program, and you can also use the menu to specify operational features such as multiple disk drives, the interface slot, single sheet feed, and so on. Unfortunately, the program is not as error-proof as it is easy to operate.

Magic Mailer can merge up to 20 data fields in a document. For each field, you have the option of specifying conditional leading and/or trailing text; upper, lower, or mixed cases; and full, right, left, or centered justification. Magic Mailer can also automatically sort out from a single combined field the city, state, and zip code as well as the title, first, middle, and last names from a one-line name field. Print options include multiple copy printing; merging of data from your keyboard entries as well as existing data files; on-screen editing and the selection of data records; and sophisticated computer selection specifications. You can, for example, use Boolean logic and string comparisons to have the computer select and print a letter only for those data records representing customers who live in a given zip code area, are listed as having one of several given products, and whose purchase dates and serial numbers fall within specified ranges.

The program's documentation is adequate, but not very well organized and lacks a few important user-friendly touches. You need to wade through complex and confusing explanations of the most sophisticated procedures before you can even work around to the basics of the program. It also lacks an index, and a list of error messages to assist you when things go wrong. However, to make up for these deficiencies, the vendor support group is very helpful and efficient.

In general, the program offers good value in a separate mail merging package with sophisticated data treatment and computer selection capabilities. It can most easily be used as a companion to Artsci's "Magic" software series, but it is also adaptable to some other word processing and database programs.

F.C.M.

Company: Continental Software Co.
Language: Applesoft
Hardware Requirements: 48K; printer helpful

OVERALL RATING: B
EASE OF USE: A-
VENDOR SUPPORT: A-

DOCUMENTATION: C
VALUE FOR MONEY: B
VISUAL APPEAL: B

RELIABILITY: B-
ERROR HANDLING: C-

F.C.M. does everything that a "filing, cataloging, and mailing" program should do, and a good deal more. It is a personal or business mail list/mini-database program. Perhaps the easiest way to describe the program is simply to list a few of its strongest features:

1. Custom formatting. Unlike a number of mail list programs, this program allows you to create screen formats other than straight mailing lists using as many as 9 lines. This kind of flexibility gives it mini-database capabilities, like an electronic file box. You can also customize labels both for printing labels and envelopes (including a return address feature), and there is a provision in the program that allows you to create a special message on any of the 9 lines when printing in either mode. Because of its format flexibility, F.C.M. can handle most foreign addresses, and up to a 10-digit zip code.

2. Enhanced printing capabilities. The program prints out full master lists or selected lists of your entries, as well as specially sorted lists for label or envelope printing. In addition to handling special message lines, F.C.M. can handle enhanced printer commands, such as a compressed print mode; if your printer has a 14" carriage, you
can print as many as 9 labels across, 9 lines per label. Standard labels will only accept 6-8 lines per label, but this program makes allowances for oversized labels.

(3) Fast search and sort routines. Each diskette stores up to 750 separate entries, and the program allows you to extend your files on multiple diskettes. You enter records at random (i.e., over a long period of time and in any order you want). The program will let you search for entries, edit them, delete them, or sort them according to special needs (such as alphabetical order, company names, memos, or specific zip codes) by any of 12 different categories or combinations of categories. As a nice bonus, the sorting routine itself is extremely fast.

This program also operates with a "Form Letter" module, which provides the facility to use the program with several of the two most popular word processing systems for the Apple: for example, Apple Writer II/Ile, Screenwriter II/Ile, Superscribe, Pie Writer, and others. "Form Letter" permits you to create letters with your word processor, and then custom address them using the names stored in your F.C.M. files.

Documentation for F.C.M. is very good; but the program is well organized and completely menu-driven, so much so that you rarely need to consult the manual. For a program this flexible, it is surprisingly simple to operate.

Considering its price, F.C.M. offers powerful mailing list features. Yet perhaps its greatest attribute is its flexibility. Because the screen labels can be custom formatted, F.C.M. may also function as a mini-database or cataloging system. With it you can create catalogs listing your record collection, coins, stamps, recipes, whatever; or lists for inventory or insurance purposes. All of these lists or parts of them can, of course, be printed out. This versatility makes it considerably more useful than a simple mail list program.

MAILMERGE (MergePrint)

**Company:** MicroPro International  
**Language:** Machine  
**Hardware Requirements:** 48K, Z-80 card

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>A</td>
<td>D</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

MailMerge, an overlay program designed for use with the WordStar text editor, is a questionable investment if you do not need to merge small files into large documents, either at print time or when sorting items for a text file for printing multiple copies. If you do need to do this, MailMerge is an indispensable aid to WordStar text manipulation. MailMerge includes fourteen commands for handling files. You can use the command repertoire to perform the following: specify the data file for inserts; display the name and order of the data in the file; and perform repetitive reading of a specific file to the end. You can also specify a variable for use in the text, or at print time. During printing, you can have messages displayed or cleared from the screen. You can add files within text (as in adding chapters to a book). You can also specify print-time line formatting to include justification, left and right margins, and line spacing.

The program works well and as advertised—a feat rare in the software market. If you need these capabilities for use with your WordStar, the overlay is well worth the price. Please note that Version 3.00 of WordStar uses an overlay called Mailmerge.ovr, while older versions use Mergprin.ovr.
APPLEPOST

Company: Apple Computer, Inc.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING C+  DOCUMENTATION B  RELIABILITY A
EASE OF USE C  VALUE FOR MONEY C+  ERROR HANDLING A
VENDOR SUPPORT C  VISUAL APPEAL B+

Applepost, a mailing list program, has few (if any) peers in terms of selection criteria and error handling. Each time you make a new entry, the program searches the files for duplicates. If it finds one, it will notify you so that you can check the entry.

The program sorts mailing lists alphabetically, by zip code, or by any combination of five floating utility codes. This capability makes it one of the most flexible programs available for handling mailing lists, and you can tailor it for specific markets or categories. The one major drawback in the program is its speed. It is very, very slow. Each time you enter a name, the program checks the entire database currently on file while you sit and wait. With a list of any length at all, it can take over twenty seconds to enter a single name and get ready for the next. It also stops after every twenty-two or so names to merge the new entries into the file, a process that can take ten or fifteen minutes.

Each data disk holds 500 names, which ranks this program among the leaders in file capacity. If your list contains more than 500 names, you can use additional disks. However, you can only sort within a disk, and you cannot merge disks unless you put additional drives on your system. A two-drive system handles 500 names.

The Applepost program is an excellent investment for someone building a mailing list a few names at a time, or someone who needs a program that will pull out names according to numerous selection criteria. If you have an existing list that you want to put on your Apple II and only need one or two ways to select names for mailing, I suggest you look elsewhere.
Data Base Management

The exact meaning of “database management” varies according to the level of sophistication being sought, what kind of database you want to create, and how you want to use the information you store in it. There are three basic levels of sophistication among present database programs, ranging from the simple to the highly complex. Their functions and prices vary accordingly.

In the most general sense, a database is simply a collection of information organized in a particular way for one or more purposes. One simple database we all use is a telephone book. It contains names and phone numbers, and is organized alphabetically so that it is easy to look up someone’s phone number. Dictionaries, catalogs, and library file cards are also examples of databases that we use regularly.

A computerized database management program accepts, organizes, and stores information, manipulates it in various user-specified ways, and reports the results. The database program for you should be the one which most closely handles the data the way you’d like it to.

The simplest database is a fast, electronic version of a basic index file card system, such as has been handled traditionally in an address book or small box full of 3” x 5” cards. If that’s how you’ve handled your needs in the past, then a relatively inexpensive and simple file manager program of limited flexibility will probably serve. At the “middle” level of sophistication and price are those programs which offer you a fair amount of power and considerable flexibility, yet are still easy to use. With them, you should be able to format data storage and manipulation in various ways to meet different needs; and they should be able to store, sort, edit, retrieve, and calculate data, as well as produce reports in different ways (various kinds of graphs, charts, alphanumeric reports, etc).

The first two levels are basically file managers; they are only able to retrieve and manipulate selected items from a pre-defined file. At the expensive “high” end of sophistication are relational databases. These systems have the ability to link together elements from a number of different files in the same database. Yet, while these programs are powerful in coping with a variety of informational needs, they make no pretense about being easy to use. In some cases they are virtually programming languages for creating customized databases.

A database consists of files. Each file is made up of different records, and each record is made up of “fields”—individual units of related information. Let’s say, for example, that you were creating an address book, a file limited to business clients. Each unit of information—name, street address, city, state, zip code, telephone number—is a separate field of data. These fields, linked together, form one record in the file. Within the database, you could create several files, one for business addresses, one for friends, one for relatives, and so forth.

What, then, should you be looking for in a database? One obvious feature is ease of use, ease in designing file formats, and other user-oriented operating features. You’ll simply have to try out a few (or look at demonstration versions) in the store.

Another feature is the reliability and size of your data storage capabilities. Are there backup procedures? Are there checkpoints for system failures? How many files of a given size can the program handle at one time?

Flexibility is also an important factor in selecting your database program. The area of greatest concern is the ability to reformat data in various ways, both the ways in which you add information and obtain printed output from it. You’ll also want flexibility with “default options.” Programs often come from the publisher with preset data entry formats and other features that come up automatically (that is, “by default”). You should be able to change the default values (the standard setup of the program) to meet your individual requirements.

You should also check the program’s arithmetic capabilities. For example, along with adding, subtracting, multiplying, and dividing, can your database perform exponential calculations?

The ability to edit and sort data is also an area of concern. What can you change? What are the decimal specifications and monetary formats available? How is the sequencing of records performed? Can you sort files in ascending and descending order? And when you’re sorting, can you use more than one field at a time as search criteria? Can you specify multiple fields, string values, or a range of records numbers when conducting searches?
Finally, there are some other features to look for in databases, depending on your needs:

- reporting capability
- file expansion (which allows for virtually unlimited file storage capacity and sorting ranges spread out over multiple diskettes)
- modification capability
- the ability to match, merge, or update with two or more files
- indexing capability
- master file extraction for building other files with shared data
- the ability to interface with other kinds of programs.

Whatever database you choose, remember that the accuracy of the output will not exceed the accuracy of the information you enter into the program.
<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>VENDOR</th>
<th>PRICE</th>
<th>NUMBER OF RECORDS</th>
<th>CHARACTER PER RECORD</th>
<th>NUMBER OF FIELDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONDOR 3</td>
<td>Condor Computer Co.</td>
<td>$650.00</td>
<td>32,767</td>
<td>1,024</td>
<td>127</td>
</tr>
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<td>DATA FACTORY 4.0</td>
<td>Micro Lab</td>
<td>$300.00</td>
<td>225</td>
<td>18,000</td>
<td>88</td>
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<tr>
<td>DATA PERFECT</td>
<td>LJK Enterprises, Inc.</td>
<td>$99.95</td>
<td>Var.</td>
<td>511</td>
<td>32</td>
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<tr>
<td>dBASE II</td>
<td>Ashton-Tate</td>
<td>$700.00</td>
<td>65,000</td>
<td>1,000</td>
<td>32</td>
</tr>
<tr>
<td>DB MASTER</td>
<td>Stoneware</td>
<td>$230.00</td>
<td>1 Mil.</td>
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<td>INFORMATION MASTER</td>
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<td>1,980</td>
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<td>QBASE</td>
<td>Applied Software Technology</td>
<td>$189.00</td>
<td>N/L</td>
<td>4,000</td>
<td>50</td>
</tr>
</tbody>
</table>

**Number of Records:** How many individual records (discrete user-defined groups of information) can be kept in one file?

**Character per Record:** How long can each record be?

**Number of Fields:** How many separately defined portions of each record can there be?

**Field Length:** How long can each separately defined portion of a record be?

**Disks per File:** How many floppy disks can be used to contain the records of a single file?

**Hard Disk Compatible:** Does the program work with a hard disk as the primary storage medium?

**Sorts by any Field:** Can you rearrange the file according to the information contained in any user defined field?

**Sorting Level:** On how many fields can the program sort with only one set of instructions

**Multiple Key Searches:** Does the program locate information for you according to several criteria simultaneously?

**Record Number Displays:** Does the program tell you where the information with which you are working is located according to its own bookkeeping?

**Sample Data File:** Does the package include a disk with a sample file stored for your instruction?

**Print Option:** Do you have any choice about how to print reports of your stored information?
<table>
<thead>
<tr>
<th>FLD LENGTH</th>
<th>DISKS PER FILE</th>
<th>HD DISK COMPATIBLE?</th>
<th>SOORTS BY ANY FIELD?</th>
<th>MULT KEY SEARCHES</th>
<th>REC# DISPLAYED</th>
<th>SAMPL DATA FILE?</th>
<th>PRTS/RTS &amp; MLNG LBLS</th>
<th>LANGUAGE</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Var.</td>
<td>YES</td>
<td>YES</td>
<td>32</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>Machine</td>
</tr>
<tr>
<td>239</td>
<td>2</td>
<td>N/A</td>
<td>YES</td>
<td>4</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>Mach. BASIC</td>
</tr>
<tr>
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<td>9</td>
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</tr>
<tr>
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<td>1</td>
<td>NO</td>
<td>YES</td>
<td>5</td>
<td>YES</td>
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<td>BASIC</td>
</tr>
<tr>
<td>839</td>
<td>1</td>
<td>NO</td>
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<td>1</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>Pascal</td>
</tr>
<tr>
<td>78</td>
<td>N/L</td>
<td>NO</td>
<td>YES</td>
<td>3</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>Pascal</td>
</tr>
</tbody>
</table>
**ALADIN**  
*Company:* Advanced Data Institute America  
*Language:* Pascal  
*Hardware Requirements:* 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-</td>
<td>A</td>
<td>A-</td>
<td>A</td>
<td>A-</td>
<td>B</td>
</tr>
</tbody>
</table>

With the software market saturated with look-alike spreadsheets and database management systems, it's been several years since I can remember being truly impressed with a new business software package. Upon my initial examination of *Aladin*, I marveled at the extent of its capacity and versatility. I could not help wondering how it could possibly implement such a powerful system within the confines of an Apple computer. I had only seen such features before on mainframes.

*Aladin* is a synthesis of a relational database, word processor, spreadsheet, statistical package, and a text plotter. According to the manual, it is capable of handling 256 files on-line, 512 fields per file, and 1 million-plus records per file. There is no limit to the number of key fields, and it has extensive sorting abilities as well. Manipulation of the fields, files, and relationships is flexible and easy to do. You can easily impress your clients with the professional quality of the reports and screens. It is possible to make queries in English and Boolean logic of unlimited complexity. Moreover, *VisiCalc, SuperCalc, WordStar, EZ-Writer* and *Apple Writer* files can be integrated with *Aladin*.

Its documentation is a welcome sight indeed. Included within its pages is a good introduction for first-time users of computers and database systems. It is user-oriented, menu-driven, with its manual divided into several tutorials which also includes an informative reference section. I noticed a few minor discrepancies with the manual and the actual operation of the program, but a closer look resolved the problems. When a system is more extensive, it is natural that you will be required to remember more, but since this is an integrated system, it is easier to learn one system than four different ones written by four different companies.

Before opening the manual, I felt the price tag seemed a little high. After studying the program, however, I concluded that with its unprecedented power and flexibility, it would be a shame if consultants, problem-solvers, decision-makers, etc overlooked this package and purchased separate, more expensive packages which failed to keep up with *Aladin* standards. If you feel it is beyond your budget, I would still encourage you to look at the manual or read a brochure describing the system in detail.

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**dBASE II**  
*Company:* Ashton-Tate  
*Language:* CP/M  
*Hardware Requirements:* 64K, 2 disks, Z-80 card

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>C</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>

*dBASE II* is an excellent program. It is called a database program; it probably should be called a database language. The program will not only save and recall data, but will support a large variety of commands that allow you to write programs to manipulate the data. In fact, if you are willing to put up with the slower operation of a general database manipulation program, you need few other programs to run a business. *dBASE II* is a powerful, and consequently expensive program. Because of this, it may not be a program for the small computer owner who needs a database to keep track of his Christmas mailing list. But, if you have a large amount of data which you have to use in different ways, *dBASE II* will serve your needs quite well.

The system will accept 65,535 records per database file with 1,000 characters per record grouped into a maximum of 32 fields. Each field is limited to a maximum of 254 characters. Numbers are carried at up to 10 digit accuracy with the largest and smallest numbers limited to ten to the plus or minus 63rd power. Character string length,
command line length, and report header lengths are limited to 254 characters with index key length limited to 100 characters. Five maximum expressions may be in a SUM command. If you exceed these specifications, you probably need a larger computer.

*dBASE II* maintains files differently from many other database programs. Often you will find files stored with comma delimited fields. In this form, only the character string or number that you have placed into the field is stored, and each is divided from the next by a comma. On recall, the program will read the file, counting the records as it goes. When the correct record number is found, it is read and then displayed or operated upon as required. This is an efficient method of storing records since the data is “packed” into the fewest number of characters needed. *dBASE II*, on the other hand, stores its data in an “unpacked” form. Each field is stored as if it were completely full of data. If it is not, spaces are added as needed. This is not efficient for storage space, but turns out to be quite a bit more efficient when the time comes to recover and manipulate the data. Since each field is stored at its maximum length, all *dBASE II* needs to know to quickly find any field in the database is the database structure and the record number. From this, a “pointer” may be calculated which directs the program to the exact start of the field in question. Since the computer knows the start of the file on disk, all the program has to do is move the file pointer to the desired point and start reading data. It’s not necessary to read each character and then search for and count delimiters. This results in considerably faster access to data within the database. If the database is quite large, this is a definite advantage. What you trade by using *dBASE II* is disk storage space for running time.

The best way to show the flexibility of the program is to briefly describe the commands available to you. These will be grouped functionally.

Commands that deal with file structure:

CREATE - Defines a new file. The file structure may be defined at the keyboard, may exist as a file created by another program, or may emulate an existing *dBASE II* database.

DISPLAY and LIST STRUCTURE - Shows the structure in use.

MODIFY STRUCTURE - Changes any part of the database structure at the expense of destroying the data in the database. If the modification does not affect field length within the existing records (like changing the name of a field), you can still save the data in a temporary file and later recover it.

Commands that operate on files:

USE - Defines the appropriate database.

RENAME - Renames an existing database.

DISPLAY - Shows the databases on disk, or all files on the disk.

COPY - Creates a backup copy of any database.

SELECT - A powerful command which allows you to have two databases open at the same time.

QUIT - Closes all open files and drops you back to CP/M.

Commands for organizing databases:

SORT ON - Reorganizes the entire database in the order specified. Only one key is allowed at a time, but consecutive sorts may be performed for multiple keys.

INDEX ON - Sorts the database, but does not actually reorganize it. Instead, an index file is created and used to point to appropriate records when the database is used.

Commands to combine databases:

APPEND FROM - Adds records to the file in use.

UPDATE FROM - May be used to modify data in the current file. Indexed files may be used if both are sorted on the same index key.

JOIN - Creates a third file from two other files.

Commands that allow editing, updating, and changing data:

DISPLAY, LIST, BROWSE - Allows you to examine records in a variety of different screen formats. BROWSE, in particular, gives you the option of full screen editing of up to nineteen records at a time.

DELETE, RECALL - Marks or unmarks records for deletion. PACK - Physically deletes marked records from a database. COPY and APPEND also have this effect.

INSERT - Inserts a record into the database.

EDIT - Gives you full screen editing of a particular record.

REPLACE - Changes data in selected record(s) throughout the database.

CHANGE ... FIELD - Changes data in selected field(s) throughout the database.

@ ... GET, READ - Displays a variable in a specified screen location, allows you to input and modify it, and then reads it into the database when correct.

Commands for using variables (*dBASE II* allows you to use up to 64 memory variables when writing applications programs. The following commands work with these variables.):

LIST MEMORY, DISPLAY MEMORY - Shows all current variables, their data type (character, numeric, or logical), and contents.

& - Returns the contents of a memory variable as a literal character string that the program may then use in some manner.
STORE...TO - Establishes or changes variables.
RELEASE - Terminates the use of the named variable(s).
SAVE MEMORY TO, RESTORE FROM - Saves current variables to a named file and then recovers them from that file.

Commands that allow interactive input:
WAIT, WAIT TO - Stops program operation and waits for a single keystroke. The second version places the keystroke character into a memory variable.
INPUT, ACCEPT - Obtains data from you and places it into a memory variable.

Commands that search a database:
SKIP - Moves forward or backward through a database.
GOTO - Moves to a specific record in the database.
FIND - Locates a specified indexed character string.
LOCATE - Searches for a specified string even if not previously indexed.

Commands that output data:
@, DISPLAY, LIST - Used to output expressions, records, variables, and structures.
REPORT - Creates a custom format and then uses that format to output records. The format is stored for later use.

@ . . . SAY - Formats output to the screen or to a printer.

Commands for programming:
DO - Starts a program or sub-program module.
IF..ELSE...ENDIF - When used in a program, performs optional tasks; can also be used for branching to sub-programs.
DO WHILE...ENDDO - Performs the specified tasks until the specified condition is false.

dBASE II operators:
Arithmetic: (+, -, *, /, +, -
Relational: <, >, >=, <=, =, =
Logical: (), NOT., .AND., .OR., & ($ is a substring operator to test if one string is contained in another.)
String: + (joining), - (joining without blanks)
dBASE II functions:
# (record number), * (deleted record), EOF (end of file)
I (convert to uppercase), $ (substring select)
@ (substring search), & (macro substitution), TRIM (trailing blanks)

This may seem like a quick reference guide to dBASE II, but listing the commands available best demonstrates the flexibility built into the program. The language is so complete that the manual has an accounting system presented as an example. The example uses ten database files and 34 command files to drive entry and editing of data.

The one dim point on the dBASE II star is its current manual. All the information necessary to use the program is in the manual, but it is sometimes very hard to find in a useful form. At first you will find yourself flipping between the reference section, the introductory chapters, and, as a last resort, looking for a function in the accounting example to determine its best use. We understand that the manual is being rewritten, however, so this should not be a problem in the future. Additionally, there are several books on the market which describe dBASE II and give examples of its use. The program is worth this small inconvenience.

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CONDOR 3
Company: Condor Computer Company
Language: Assembly
Hardware Requirements: 64K

Department: Business
Sugg. Retail: $650.00
Availability: 2
Disk or Tape: Disk

OVERALL RATING B DOCUMENTATION B
EASE OF USE B VALUE FOR MONEY C
VENDOR SUPPORT C VISUAL APPEAL C

RELIABILITY B ERROR HANDLING B

Condor 3 is a rather expensive, but sophisticated, relational database management system targeted to simplify the more complex business-related data recording and processing such tasks as Inventory Control, Customer Records, Accounting, Personnel Reporting, and similar functions.
The "relational" reference simply describes a database concept which uses a number of different information files working with one another to organize and output data according to your wishes. The Condor 3 relational database system lets you define your requirements, add or build the files you need, and subsequently form relationships (output reports) among these files.

This rather impressive, user friendly CP/M oriented software package is both versatile and complex. Three "Master" disks are provided with the Condor 3 system documentation, along with a detailed System Installation Guide. Your first session on the computer requires seven blank disks for system installation and software backup protection. Obviously inherent in the operation is a lot of disk swapping.

The Operating System comes with three unprotected disks. You are then instructed to make a set of Master copies of each of the original disks and a set of working copies. User data files quickly fill numerous additional disks.

The system supports transactional processing so that the master file is updated by a transaction file. This provides an efficient method for posting transactions and concurrently developing an audit trail of each transaction posted.

The Condor 3 Report Writer lets a user specify the complete format of any desired report. It also accommodates the use of reprinted forms such as invoices, insurance claim forms and income tax forms.

Program operation requires the entry of a License Number during the start-up sequence. The absence of the individually assigned code will automatically limit the size of the computer files that can be generated, as well as freeze out the usage of the database commands of Destroy and Empty. This measure has presumably been included to inhibit the unauthorized proliferation of the software package.

The documentation is very good, written so that any novice who can follow instructions can work his way through the system with little difficulty. The examples presented are clear and relatively easy to understand. Error trapping appears complete and adequately placed.

A major shortcoming of the program is the absence of any form of file security or data protection. Anyone who has the ability to turn on the system has immediate access to all of the datafiles that have been established.

Overall, Condor 3 is a very versatile, user friendly software package and deserves careful consideration by any prospective buyer seeking an all-purpose relational database management system. Although on the expensive side, the Condor 3 Database Management System provides you with a complete ADP support package.

The Incredible Jack combines personal filing, word processing, calc analysis, and the ability to print mailing labels all in one package. It does not do a first-class job of any of these.

The program uses the Videx Videoterm 80-column card and Videx Enhancer II. The manual implies that almost any 80-column card will work with Jack, but the program will not work if anything but an 80-column card is in slot 3. According to the documentation, the program can be used without either an 80-column card or any sort of hardware-based lowercase capability. There are instructions in the documentation for using the program without an 80-column display. There are also instructions for those who have the standard Shift key modification, and for users without either the Shift key modification or a keyboard enhancer.

Jack's strongest area is word processing. The text editor is similar to the Apple Pascal editor, with additional features such as word-wrap and the use of a ruler line similar to WordStar's to define left and right margin settings. The cursor movement functions are not as extensive as WordStar's, but they are probably easier to learn. According to the manual, files can be created which are as large as available disk space. There is one feature of the program which is not explained in the manual. If you are entering text in the overstrike mode, word-wrap will not work properly if there is text following the cursor on the screen. The problems created by this caused me a lot of head-scratching until I wrote to BSI and they explained the solution. It is necessary to use the Insert and Delete
modes, instead of the Default overstrike mode, when editing previously entered text. This can be very inconvenient at times. The program is also missing some features such as hyphenation and embedded commands to create page breaks. This means you can end up with very odd looking text.

BSI advertises that Jack can do calc analysis. It certainly does not have the capabilities of a spreadsheet program. Its biggest deficiency is the lack of an equivalent to VisiCalc's Replicate command, so that a formula cannot be created once and then duplicated over a range. The program does allow you to enter formulas using named areas (there are no cells such as there are in spreadsheet programs), but each formula has to be entered separately. The program will calculate IF-THEN-ELSE in your formulas. Therefore, as a spreadsheet program, Jack is of little use, but the ability to perform calculations can be helpful when Jack is being used as a word processor, since you can put calculated fields into a letter or report.

The database management functions of Jack are also extremely limited. The program allows you to enter various pieces of information and then print them out, but it does not allow you to do very much with the information while it is in the file. Specifically, you cannot sort the file and you cannot access it with your own programs. You can transfer user-specified portions of a file to another file. The print function has a sort directive that allows the file to be sorted according to a field you select, but the file itself remains unsorted, so the sort would have to be done each time the file is printed. The program has no report formatting capabilities.

The database management function does work with the word processing function to let you create form letters quite easily. You can also use the file for form letters to create another file for printing mailing labels.

The publisher charges $30.00 for telephone support. Payment of this amount gets the user a Hotline ID number, which is used when you call in with questions. If you do not pay the $30.00, you may contact BSI by mail. When I did that, it took about two weeks to get an answer back. BSI sent me a free backup disk when I sent in the registration card.

To call Jack an integrated software system is an exaggeration. You should not buy Jack expecting to get full-featured spreadsheet and database management programs. Jack is a word processing program which has some positive features and some deficiencies. I have used two other word processing programs which had form letter capabilities, and Jack is easier to use than either of them. Jack also lets you perform arithmetic within your text. There are other word processing programs available, however, with better editing and text-formatting features than Jack. This might be a good buy if you could find it for less than $125.00, but the current list price of $179.00 is too high.

Quick File IIe is a versatile file handling package that eases arranging, entering and extracting information, and preparing reports. Many of the commands are presented in menu form (that is, when you are presented with a table of options, you press one or two keys to order something to be done), and you can call for pages of explanations of the various options at almost any point. While you could start using Quick File IIe without looking at the manual, I think that you will find it useful to first read some of the sections and practice with the sample files provided. The book is easy to read and explains the program in a very thorough manner. The disks may be copied by a DOS 3.3 copy program.

The program should work with any common printer and can send control codes for printer set up. I have used it with the Apple Dot Matrix Printer and the manual states that it will run on the Silentype and Qume Sprint 5 printers. I strongly recommend an 80-column card, and an extended card (extra 64K memory) can be very handy. Of course, you will also need an Apple IIe.

You may enter 26 files on one disk, 15 categories in one file, 76 characters in one entry, 20 characters in any category or file name, and 39 or 79 characters in a report title (40 or 80-column display). How many records you enter
in one file depends on how much memory is available and how many characters in a record. Apple says that assuming 75 characters per record, you may have 140 records per file with a standard IIe, and 600 if you have the extra 64K of memory. All the records of a file are in the machine at once so it doesn't have to keep running to the disk. Your information may be presented in a "multiple record layout" (columns of categories and rows of entries), or you may "zoom" any record to a "single record layout" with a maximum of 1,140 characters.

All formats for displays and reports are completely under your control. You may specify the categories used, the widths and their position on a line or, for single record layout, their position on the page. Categories deleted to make a specific format are merely hidden and may be restored at any time. Reports may be in "tables" (multiple record) or "labels" (similar to address labels), and calculations using add, subtract, multiply, and divide can be arranged by one or more categories in alphabetical or numerical sequence both forwards and backwards.

You can search for information in two ways. The more complicated allows you to specify up to three characteristics in any of nineteen conditions. Quick File uses the Open-Apple key (IIe only) to give you a dozen two-key commands, each of which opens up even more options. One of these is Open-Apple? which presents pages of instructions and explanations tailored for every mode. When you have finally used these choices and prepared the formats you want, entered data and prepared reports, the program will not let you walk away and lose your work, but, instead, gives you more options in saving or ignoring the changes made before going on. If you have Apple Writer IIe, you can use your files to prepare form letters or simply merge selected records with an Apple Writer document. I will not pretend that I have covered all of the features available, but I think that you have an idea of the flexibility and power at your fingertips when it comes time to computerize your shoe box full of 3" x 5" note cards.

There are a few problems with this program. With all the records of a file in memory at one time, you have fast access to, but a limited number of records per file. At least one other program I use (The Incredible Jack) lets you have one file on a disk with up to one thousand records. Apple makes some boast about converting almost any date and time entry to a standard format, but they forgot to implement this on the report headers. Moving categories around for formatting can be rather slow, but it is a small price to pay for the fact that you can put things just where you want them. Even with these small bugs, Quick File is still a great program and well worth the money.

QBASE

Company: Applied Software Technology  
Language: Pascal  
Hardware Requirements: 16K; printer

OVERALL RATING  C+  
EASE OF USE  B+  
VENDOR SUPPORT  A  
DOCUMENTATION  B  
VALUE FOR MONEY  C-  
VISUAL APPEAL  B-  
RELIABILITY  A  
ERROR HANDLING  A

QBASE is a database/report system designed to handle index card-type applications. To take advantage of the report generator, a printer is essential; an 80 column card, while not required, is very helpful for viewing the entire "index card" page format.

QBASE comes with five diskettes. Disk #1, the Design Program Disk, is used to create the file. Information is stored in a user-defined format limited to one page in length. If fields are short, 50 can be squeezed onto the page. There can be only one file per diskette, with a maximum of approximately 904 records. As you approach the 50 field limit, the maximum number of possible records decreases to about 180. The key, used to identify each record in the file, may be one or two fields and up to 40 characters in length. After designing the record form, you may copy it for use in another file, or redesign it even after data has been entered—a very useful feature. The Design Program Disk also includes a system of validation checks to guard against data entry errors, plus provision for default values and computed fields.

Disk #2, the Filing Program Disk, is used for entering and editing data, and retrieving forms. It also has a helpful calculator function with a display area at the bottom of the screen that allows the user to perform arithmetic functions: rounding, changing the sign of a number, and division. The ASSIGNMENT command puts a number onto the form from the calculator display area without re-keying the number.
Disk #3, the Report Program Disk, prints reports based on data in the file. The user designs the report by first selecting the fields, then the total (up to 8 fields) and subtotal (up to 3 levels). Next, he selects the records (using up to 9 criteria), and how to sort the selected records (up to 3 fields), including ascending or descending order. By using EXPORT, the data can be sent to another computer, enabling a word processor program to produce form letters.

Disk #4, the Tutorial/Utility Disk, transfers data from an existing form to a new form containing a different number of fields and/or a different key. It can also print mailing labels. A helpful option here is to delete duplicate consecutive labels.

Disk #5, the Report Work Disk, stores the data temporarily and sorts. Since QBASE uses three diskettes for producing a report—the Report Program Disk, the Report Work Disk, and your own file diskette—some disk swapping will be necessary on a 2-disk drive system.

The program’s strength lies in its ease of use and the many features it shares with the more expensive DB Master program, including a pretty good report generator. Its weakness is a limited file size and few available fields within a record. It’s a good little personal filing program, but seems a bit overpriced for an index card system.

**VISIFILE**

**Company:** Visicorp

**Language:** Applesoft

**Hardware Requirements:** 48K

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The VisiFile program was designed to replace the CCA DMS program, and is more user-oriented than that program. Like all recent Visi-type software, the package possesses an easily comprehended, menu-driven structure, and a well-written and straightforward manual. You will find the functions easy to understand, and, having read the manual, will probably not have to consult it except for rarely-used functions.

Since the VisiFile program essentially replaces CCA DMS, a question immediately arises as to whether CCA files will convert to VisiFile formats. This presents no problem other than that faced in taking any thirteen sector CCA files to MUFFIN to sixteen sectors. You simply rename the data files along with the Maintfiles file. You can only convert the data files; you cannot convert the report, label, and index files. Instead you must reconstruct them using VisiFile. One benefit of conversion comes with the exclusion of the field identification used by CCA DMS, which means that you need use only the field name for record retrieval and updating.

VisiFile constitutes a flexible file management system. It stores information in fields within records contained in a file. Multiple files may occupy the same disk, but I would not recommend this for large files. All records must fit on one storage disk (about 10,000 single-page types allowed). Each record contains up to 232 characters, consisting of up to twenty-four fields. You can define fields in alphanumeric or numeric format. Numeric fields reach up to thirty-eight numbers in length.

The flexible formatting capability of this program makes up one of its most useful and interesting features. With this option, you can change your data formats (within the maximum constraints, of course) at any time. For example, you might need to change your address files from a five-digit zip code to a nine-digit one. With VisiFile you can do this without re-entry of data. The program inserts blanks in all the proper fields, and as you acquire the new information, you simply append them to the existing zip code field in each record. A side benefit of this flexible formatting lets you create new files from parts of other files, combine two existing files, and create partial files.

File definition is straightforward and quite easy. On data entry, you can employ the mapping automatically established by the program, or you can remap the fields so that some display on one page and others on the next page. You might find it disquieting to see only part of the entry at one time, but this results because the fields overlap the screen in size. As you enter data, the previously entered data scrolls off the screen to the left. On returning to accept the data, only the leftmost portion appears on the screen, forcing you to remember where you left off, because you cannot see it.
Editing of data entries is easy. You can insert or delete letter by letter, or clear to the end of the line with the cursor. This adds to the versatility of the program.

I did encounter a rather serious problem with the program. I could not configure the system for my serial printer, a Diablo 1620 interfaced through the Apple Serial Card. Of course, I don’t know whether the problem comes with the program or just with my copy. At any rate, I could not review the printer report generation functions. The formats appeared to work when sent to the screen, taking the 40-column width into account.

You can produce both reports and labels with VisiFile. Report width ranges up to 225 characters in length. Labels utilize a variety of formats, up to five across the printer page. Computed fields are available on output with formulas that you specify. Be sure to read the manual carefully, since the formulas read from left to right and parentheses are not permitted. You must exercise care to produce the correct results.

You can create as many indices as you wish, but only one is active at a time. When you enter data, therefore, you must update the associated indices afterwards. The indices do make possible relatively rapid location of the data.

If you use other Visi-type packages, you will find one of the program’s abilities of particular use: VisiFile can create Data Interchange Format (DIF) files from the database. You can then read these files directly into the other programs for spreadsheet calculations (VisiCalc), plotting (VisiPlot), or statistical manipulation (VisiTrend). Of course, you can access the data files created by writing your own applications programs.

The VisiFile program makes an excellent addition to other Visi-type applications. The flexible formatting features make it extremely useful, since you can adapt its basic form for many different uses. If you require a versatile file management program and can live within the short record constraints imposed by this one, then by all means consider VisiFile.

**VISIDEX**

**Company:** VisiCorp  
**Language:** Machine language  
**Hardware Requirements:** 48K, Apple II/II +. Two disk drives, printer card, and clock card recommended.

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VisiDex is an information storage system that has its roots in the old “Whatsit” program. Information is entered on screens (electronic index cards) and catalogued using keywords. Recall can be done by keyword or by sequential search through the database for specific non-keyword strings. Printing is sent to the screen, a text file, or to hardcopy, one screen or portion of a screen at a time.

The manual is quite good (as are all of the VisiCorp manuals). It is organized in the form of tutorials which take you through the program in an organized fashion. A reference section is included to cover details, and a quick reference card is provided for the experienced.

All disk operations, including initialization of a data disk, must be performed through the program. VisiDex uses a non-standard DOS.

The screen display and menus are similar to those of all recent VisiCorp programs. The top two lines consist of a command and status area, while the bottom two lines provide useful information (keywords in the case of VisiDex). This leaves some 20 lines for information entry on any given screen. This is a useful screen format, in that it makes all data that you need to operate the program available to you instantly.

Entering text is done in free form, and editing features are included which allow insertion and deletion of text within any screen. You may create keywords or phrases while entering data, or any time afterwards. At least one keyword must be associated with a screen before it can be saved.

Cursor movement during editing is done via a Control diamond, but the standard I,J,K,M keyboard designations are not used. VisiDex uses the W,A,S,Z diamond.

Once a screen is deleted, you cannot recover it; however, it still takes up space on the disk. To recover the unused space, you must back up the disk. This is not particularly convenient; however, it does force you to back up your data at intervals — a useful practice.
When retrieving data, the program gives you the option of keyword search or string search. Using a keyword results in rapid recovery; string search requires reading and searching all screens on a disk. Wildcard characters are supported.

For ease of data entry, templates may be created. In this way, a standard form can be available for use repeatedly at the user’s discretion. The only caveat is that each template must have a unique keyword associated with it.

VisiDex makes it possible to move screens from one disk to another in addition to splitting a file. Text may also be transferred from one screen to another.

VisiDex has one rather interesting feature relating to the calendar. You are able to key a screen to a date and then use the program to show the screen several days or weeks before the keydate, or repeat the screen each weekly or monthly period. When you run the program it searches for a calendar card for the date. If found, that is used for the keydate search; if not, you are asked for the date.

The program also has a perpetual calendar. Any month can be displayed and, if a day within that month is a keydate on any screen that has been saved, it is marked. Note that within any file (disk), years are not relevant except to place the weekdays in the proper place on the calendar.

Many print options are included. The only thing you cannot do is extract data from the screens and manipulate it as you can in other database management systems. Entire screens may be printed, or parts of a screen (starting from the top, down a specified number of lines). The only formatting you can do relates to data entry. If you force text into inverse video on entry, you have the option of printing it or not. For example, this would allow you to exclude telephone numbers from mailing labels.

There are two conditions present when VisiDex will interact with standard DOS, for which two drives are necessary. On data entry, the program will read text files from the second drive. On printing, the program will print to a standard text file on the second drive.

Be careful when reading data from a text file. If you attempt to read beyond the end of the file, the program encounters an “end of data” error and may have to restart itself.

One minor annoyance is the keyboard sound. Each keypress results in a click; there is no command to disable this feature.

In many ways, this is a useful program, especially if you are involved in applications requiring keyword searches or calendar searches. If you can’t think of an application, VisiCorp has listed 101 of them included in Appendix D of the manual.

**DATAFAX**

*Company:* Link Systems

*Language:* Pascal

*Hardware Requirements:* 16K

**OVERALL RATING** | A  
**EASE OF USE** | A  
**VENDOR SUPPORT** | A  
**DOCUMENTATION** | B  
**VALUE FOR MONEY** | A  
**VISUAL APPEAL** | B  
**RELIABILITY** | A  
**ERROR HANDLING** | A  

**Department:** Business  
**Sugg. Retail:** $199.99 (40 col)  
$249.00 (30 col)  
**Availability:** 7  
**Disk or Tape:** Disk

Datafax is a database management program that operates in a similar manner to VisiDex. Data entry is free-form on a screen or a series of screens. Recovery is through the use of keyword searches. This is a very flexible system for data entry and recovery, but is quite limited if you need to format different reports from your data.

While the program is written and runs under Pascal, you do not need the Pascal operating system. All of the files required to run Datafax are on the distribution disk. You do need to have a 64K configured Apple, however. Because the system runs under Pascal, your hardware configuration is important. The manual clearly spells out these requirements.

The data is organized in sets composed of folders, with folders made up of screens. Throughout, key words tie the data base together. Words, combinations of words (up to 28 characters), or dates may be specified as key words; and the program keeps track of everything in alphabetical order (dates come first). You may search for key words singly or in combination.

When entering data, Datafax uses a simple but effective screen editor. Commands allow you to move around the screen and insert/delete text or lines as required. Screens may also be moved, added, deleted, or copied. There is also a tab function.

All phases of operation are controlled by single or double keystroke commands. For the most part, any of these commands may be changed under user control to make a set more in line with a particular user’s desires.
Data storage capability is limited by the mass storage available. Number and length of key words directly affects the number and length of folders which can be stored. The message is that key words should be short to be effective; this also speeds up execution. Keyword search also allows a wildcard character "*".

Folders found by a search may be printed to a disk or printer. Printing keys are optional. If the keys are not printed, you may accelerate the number of lines that may be printed. From this, you may create a mailing list by putting the address in the top three or four lines of a screen with supplementary data following. To create the list, print only the top lines on all appropriate entries.

An autokey feature assists keyboard entry. With this, the same keys may be assigned automatically to one or to many screens or folders. An additional entry feature allows you to create standard Pascal text files with the Pascal editor and then read these files into Datafax. Only a few rather simple instructions must be followed to accomplish this. The Datafax files may be similarly downloaded into Pascal text files.

Datafax is extremely easy to use and, as a manager of a simple data base which does not require formatted reporting, it is quite useful. Recommended.

**FILE-FAX**

**Company:** TMQ Software, Inc.

**Language:** Applesoft

**Hardware Requirements:** 48K

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File-Fax excels in the certainty of data entry. You can design enough input checks so that once the system is set up, you can turn over the input to a clerk and walk away. For example, you use brackets to define the length of each field right on the data entry page. This prevents superfluous data from being typed where only a street address is required. Moreover, you can define the kind of data that is to be typed into each field. In database talk this is known as defining the attributes of a field. You can set up each field to accept only alpha, numeric, plus/minus signs, blank spaces, dollars/cents, yes/no, decimal numbers, or any combination of these. The user can also leave the attributes open, so that a field will accept any kind of data.

Defining attributes can, of course, be a painfully slow process. File-Fax eliminates that. Attributes are selected for each field by moving the cursor to the field, and then passing the cursor over a one-line list of attributes. The attributes are selected with the Return key. In addition, the user can automatically left-or right-justify anything in the field using the same cursor routine.

Of the thirty-one fields permitted on a data screen, File-Fax will sort eight of them at once. The type of sort is largely determined by the type of data in that field. Searches may use either a match or a range. Multiple "wild cards" are permitted, which in effect allow you to search for an approximate match. Help is always just a "Control-G" away in the form of a constantly accessible page. This Help screen defines the commands and codes for the current mode.

File-Fax's basic output is a row and column report. There are no default, "give me whatcha got," quick reports. You define the content of each report. The report format is then automatically saved onto the data disk for future use. Defining the report format is no more difficult than taking out a piece of scratch paper and scribbling out a few headings, some vertical lines for columns, a couple of subtotals, and a grand total. The difference is that instead of a pencil and paper, you use the screen and the cursor as tools. Through scrolling, File-Fax allows the 40-column screen to view an 80-column report format. In addition, if you are careful at placing the fields for the report, File-Fax can print address labels. It cannot print them 2-up or more; only a single column of address labels is possible.

The documentation consists of a large tutorial; not very handy for later reference. However, Help screens are readily accessible on-line. A more serious defect of the documentation is the virtual absence of information about the characteristics of the system. For instance, not until one-third of the way into the tutorial do you discover that your 2-drive Apple can handle 4,400+ records, and with 8 drives over 18,000. Nor does it tell the potential user that the system is stand-alone and will not interface with any other program through DIF or any other format. Nor does it tell anything else about the program's system until you've paid the money and already have it in use. This is partly due to the fact that TMQ Software, Inc., is trying to save time and money by writing one set of documentation for five

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**FILE-FAX**

**Company:** TMQ Software, Inc.

**Language:** Applesoft

**Hardware Requirements:** 48K

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different computers. If you wipe a disk, finally, the replacement cost is steep: $30.00. A back-up is likewise costly at $20.00.

In summary, this program is not the best choice for someone who wants a quick database system and a few “quickie,” one-time reports. It will suffice, but there are other programs with defaults set up that will compute a modest task in a shorter period of time, though perhaps in a less flexible fashion. On the other hand, for those who are managing large databases, or have regular reports, or both, it is excellent. It provides input checks, record formatting, and report formatting on a completely customized basis that is eminently well suited to the regular database user. As a final note the program is fully compatible with the Apple IIe.

**DATA FACTORY (Ver. 4.0)**

**Company:** Micro Lab  
**Language:** Applesoft  
**Hardware Requirements:** 48K, 16K card

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The Data Factory, a powerful file manipulation program, seems to compete directly with DB Master even though the two programs differ in both form and, to some extent, function. In addition, the 4.0 version differs so widely from the 3.0 version that if you have or are familiar with the latter, you probably will not recognize this one. The program comes in one of two versions. The older, somewhat updated, goes by the name the Mini Factory and costs $75. This review concerns the newer Data Factory, the advanced version.

The package comes with two copies of each program disk and uses DOS 3.3. You boot the disk to begin. If you have a language card or a 16K card, you must first boot a systems master disk to load the card with Applesoft, and then boot the Data Factory disk. All data and utility files are stored on the data disk. The program disks are write-protected. The manual, complete and with easy-to-read index tabs, comes in an easily updated binder. You must read the manual thoroughly before using the program, because of the many caveats (numbers of fields, lengths of fields, number of sorts, etc). In most cases, the limits are reasonable, even excessive for any use you might have. You should become aware of all of them before starting, however, because strange things will happen if you don’t heed the warnings. As just one example, if you guess wrong when queried as to the length of the longest field you intend to sort or search, you stand a chance of getting an out-of-memory error. The manual fully explains all of this.

When entering data into fields, you have the option of moving forward or backward through the fields by use of Control key responses. The Esc key duplicates the field from the previously entered record. With numbers, the program accepts negative numbers and scientific notation. You can store records in memory for fast entry and then dump them to disk, or you can dump each record to disk if you don’t want to re-enter data on any problem.

Reports are available for many configurations, but the output lacks the flexibility of some of the other system available. You do have the option of horizontal or vertical formatting. With horizontal formatting, you can place two fields in the first print line with other fields printed underneath. You can store up to ten formats on any file.

Printer set-up with Data Factory is quite good. The program supports outputs of up to 600 horizontal characters. You also have the option of setting a left margin (useful for reports that must go into a binder). You can put any printer control characters that you require into the program. If you need the Esc character for your printer set-up, the instructions detail this procedure. If you have an 80-column card, you can set this up as the printer slot assignment and see any outputs as they would appear on a regular printer (with eighty columns) before committing the format to disk. Be sure to test the program with the card you have in the store before purchase, since this procedure develops problems with some boards. All boards do not possess a common set of Control characters.

The program also possesses a number of handy features. You can use it with a modem, for example. Leave home in the morning with Data Factory up and running with the menu on the screen, and call in from another Apple during the day. You can access the program for any features that do not require a disk change or printer output. (I have not tried this to see if it works.) The Replace feature replaces up to 10,000 items in a single pass. You can replace items in all records, specific records, or records with specific entries in them. In addition, you can replace, add to, subtract...
from, multiply by, divide by, or make corrections to arithmetic fields. The 10,000 items consist of forty groups of fifty entries for changing five fields in each group. The routine works as rapidly as the Apple DOS can access the disk. You can also transfer records from one database to another or move the records to another existing database (a feature usually not available except as an add-on). Moreover, you can add or subtract fields from your database, change field lengths or positions, append records (with the same or different file structures, although you may encounter problems with different structures), and make other useful changes. The program also includes a method for testing a disk for a suspected bad sector, and for moving the data surrounding that sector.

The Sort routine lacks speed, but you can sort the file into any format and saved the sorted database under another name. Unique to the program is its ability to sort dates when they occur in the standard form: MM/DD/YY. Most programs require a YY/MM/DD format. You can sort up to twenty levels if necessary.

The math functions of the program let you add, subtract, multiply, or divide one field by another. Within any field, you can also total, average, or count items. While doing this, you can also invoke the from/to feature to search between two items (like two dates). You can also compare two fields and index fields. The index gives you a list of all the record numbers in which a particular item appears.

One feature that could stand improvement relates to deleted records. With Data Factory, you cannot recover these records before a sort deletes them completely. Since the records are only marked for deletion, not absolutely deleted, it should be relatively easy to recover them.

Other useful abilities include output of bytes on your data disk. The manual describes further applications in detail. The experienced programmer can find file structure information. Another section in the manual describes just about any error message that you might encounter and what to do about it.

Micro Lab has started an interesting expanded warranty for their programs. For a flat rate of $30 per year, they will replace blown or damaged program disks in any number as long as they do not appear to have been tampered with. In addition, Micro Lab will send you updates of the programs as they come out. Data disks are supposedly compatible with any updated versions of the program.

DATASTAR (Rev. 1.1)
Company: MicroPro International Corp.
Language: Machine
Hardware Requirements: 48K, Z-80 Card

OVERALL RATING B DOCUMENTATION B RELIABILITY A
EASE OF USE B VALUE FOR MONEY C ERROR HANDLING A
VENDOR SUPPORT D VISUAL APPEAL C

At first glance, you might mistake DataStar for a complete database system. It is not. It is a data entry, data retrieval, and data update system: that is, a limited file manager. It does not have comprehensive sorting, filing, and printing capabilities. What it does, it does well, however, and combined with other MicroPro products (such as WordStar with MailMerge and SuperSort), it gives you all the capabilities of the most sophisticated data management system. You pay the price for this flexibility and capability in dollars (you need all of the subsystems to attain the system's full flexibility) and complexity (you must learn how to use three subsystems).

This program offers the useful feature of creating data files that a great many other applications programs can read. That makes it valuable as an input module for applications. With DataStar, you can input data to create or update a file, then access the file with inventory, accounting, employee, or other applications without re-entry of the data for each application.

Like WordStar, DataStar has comprehensive Help messages and instructions on-screen during data entry. This makes it unnecessary to refer to the user's manual every time you need help. In fact, I did most of the testing of this program after only a short run through the manual. All other help that I needed appeared on the screen.

You create the forms for data entry. Two programs make up the DataStar system: FormGen and DataStar. You run FormGen initially to create the forms necessary for data entry. When you want to enter data, you run DataStar. The maximum character count per line is 225, as is the maximum number of lines. The default extends seventy-nine
characters by seventeen lines; anything larger requires specification before or during the form-generating process. When you generate a form, you are not limited to just data as input. You can enter any text into the form; thus, instructions or prompting can occur within the form. You can also specify fields for verifications and masks for editing. For example, you can specify that a two-letter state field be checked against a file of state abbreviations. This helps prevent adding mistaken data. You can also specify an edit mask for data entry, such as designating zip code fields as numerical only, preventing entry of alphabetic data. The edit mask also allows you to specify the entry of a particular symbol in a given location in a field if other symbols occupy positions on one or both sides of that position. For example, you can specify the format of a phone number to match the standard (xxx) xxx-xxxx; you must enter the numbers in order, however. *DataStar* will take care of the rest. You can save the fixed characters in the file at your option.

The form generation function also possesses the useful ability to specify computed fields. You can enter several numeric fields on a form that requires a total. *DataStar* will compute the total and automatically enter it during the data entry process.

*DataStar* provides several methods for searching for specific records within your data file. You can search by key, by search mask, or by record in the order entered. You can edit, update, or delete any record retrieved as desired. Deleted records remain in the file marked as such. Through use of *WordStar* and *SuperSort*, you can retrieve marked deleted records. *DataStar*, however, cannot select a deleted record. You should periodically perform file maintenance to reorganize the file by key index to remove the deleted records.

Data entry is extremely fast, allowing input at normal typing speeds. The system is designed for and supports high-volume data entry. With edit masks, typing errors will normally get caught. Another feature supporting accuracy is the ability to batch verify jobs. In this mode, you data goes into a temporary file for later verification. This dual entry system gives you a set of checks and balances. *DataStar* also supports file access during data entry so that you can set up a file of standard parameters for a customer, have the operator enter that customer’s number, and have *DataStar* place the standard data into the form. You need to change only the specific information that requires alteration. This saves a great deal of time and limits errors.

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**INFORMATION MASTER**

**Company:** High Technology Software, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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*Information Master* is a file management program which allows the user to create an almost unlimited number of data file systems. Each file system resides on its own individual diskette designated by its own particular subject or information class. A file system can contain as many as 1,000 individual records, depending primarily on the length of the record and the number of ways you decide to have the file ordered (sorted) and reported. A record usually consists of up to 20 data fields of 99 characters each. The system allows up to 5 sorts of a record file with 6 keys each.

*Information Master* can help solve your record keeping problems. You can, by carefully following the program’s operations manual, define a file, enter data, sort the data, search the newly established file for specific data, modify the file, delete a record or a part, select an output format, and print a desired report. Data can be output in up to 15 different user specified/constructed report formats, with up to 15 columns of data per report for any given file system.
**LIST HANDLER**

**Company:** Silicon Valley Systems  
**Language:** Assembly  
**Hardware Requirements:** 48K II/IIe


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*List Handler* is among the best electronic list handlers presently on the market. It is also among the more expensive ones on the market. There is certainly no disappointment in its capabilities or performance. But because of its high price you will have to judge its value for your individual applications.

This program makes efficient use of disk space (up to 3,000 records per disk). When you consider that the program can direct the activities of as many as eight disk drives, you could theoretically handle a telephone book for a small city (that is, you could link 24,000 records together using eight drives). Each of those records can have up to 255 fields, and each field as many as 200 characters. The longest that any record can be is 4,000 characters. If you need large record sizes, the number of records per disk is reduced proportionally.

One thing is immediately apparent when you boot the program: your Apple produces upper and lower case characters, even if you don’t have an 80-column card. Moreover, the letter size and spacing is completely proportional (e.g., with “M’s” wider than “I’s”). *The List Handler* uses an excellent ASCII-type font on the Hi-Res screen to give you more than 70 columns. If your Apple is wired to an ordinary TV monitor you may have trouble reading it. It is otherwise a pleasant set of letters to read, and will work well with a properly adjusted color monitor and flawlessly with a Hi-Res monochromatic or Hi-Res RGB monitor.

Silicon Valley Systems had the good sense to realize that most of the people who buy this program are already likely to have a large mailing list or other kind of list on another program. Few people buying list managing programs begin with the prophetic observation that the little list they start today will grow to enormous proportions tomorrow. *The List Handler* can work with existing lists in a DIF formatted file. If, however, you happen to own the companion word processing program *The Word Handler*, you can also convert any text files so that they can be read by *The List Handler*.

One thing you’ll notice after you’ve converted an existing file (list) is that it’s not as jam-packed on the new disk as you’d expect. This is because the DIF files leave a lot of blank space. However, *The List Handler* makes up for this with a rapid sort routine. It will sort even a cumbersome DIF file twice as fast as the average database program will. So you have the best of both worlds: the files don’t have to be retyped, and the sort speed is high.

If you do have the foresight to buy a large capacity program like *The List Handler* before you start your mailing list, its speed will impress you. The more information that can be jammed into RAM, the faster it goes. This program does a good job of getting it all in there; and, once in RAM, running it through the selected routines (search, edit, sort, etc).

The entire program is menu driven, but menu driven with a difference. The initial menu is like any other. It gives you a choice of operations. Once you choose to sort records, for example, the next step is to specify which records and in what order. Not only does *The List Handler* run quickly, it is easy to operate. You are given a page format with four or five commands at the bottom and a clear two-word explanation of each. In the middle of the page you scroll through the sort choices using the Arrow keys. Which segment of the list to search is determined by any combination of Equal/Not Equal With character strings and Before/After/Between record designations. The sorts are forward and backward, using alphabetical, numeric, or date sort criteria. Most important, the choices are in simple English, not some sort of logic vocabulary.

The output can either be to labels, or a list, or a columnar report; or you can scroll through the list for non-specific searches. An additional output option is printing form letters created by *The Word Handler*.

Starting a new list is very simple. You merely label the data fields already there, then enter data one screen at a time. There are no field definitions prohibiting alphabetical characters in numeric fields, or vice versa. There’s no need to be concerned about predicting the length of a field.

This is a good list handler program, and, in my opinion, worth the asking price. It will let the Apple produce mailing lists, labels, and manage files of huge proportions. It will handle small lists quickly and easily, and give you a great deal of room for growth.
Business people who own the IIe will cry "At last!" when using this three-program series of small file management, report, and graphing packages. Software Publishing obviously understands its audience and under what conditions their programs will be used. Here's an example. When you have a presentation tomorrow morning and you've only just gathered the information together, absolutely the last thing you want to do is to confront the complexities of a computer business graphing program. What you really need is a tool that will take you from raw data to reports or chart and graphs quickly and easily.

*pfs:*File/Report/Graph is that tool. It is a system of three separate but integrated packages that combine simply into a single business tool. The manufacturer's claim that the programs "let you use your personal computer without requiring that you become a computer expert" is certainly justified. The tradeoff is that the desirable qualities of speed, ease of use, and reliability limit what you can do with the data.

You begin with *pfs:*File for data entry and storage. It allows you to completely customize your data entry forms. Field labels can be placed anywhere on the screen. The form itself, in fact, can be 32 pages (screens) long. Most of the time a single page will do. The program accommodates one file; about 1,000 records per disk. You enter data simply by tabbing through the various fields and keying in information on the newly created form.

The IIe version offers some enhancements over the previous incarnation of these programs. It allows full use of the IIe's advantages: the keyboard, upper and lower case characters, and 80-column screen formats. But perhaps even more useful are the search routines for paging through the data once it's been entered. It will look for certain numbers, ranges of numbers, blanks, words, letters, exact matches, and inexact matches using "wildcards." It will also look for anything "not" the preceding. Any file made with *pfs:*File will work on the II or II Plus as long as it is in a 40-column format and uses all upper case characters.

*pfs:*Report is also straightforward in its operation. It produces columnar, tabulated reports from the *pfs:*File data, and uses the same search functions. It has the ability to easily generate new columns which are mathematical derivations of other columns; it can average, subaverage, count, subcount, total and subtotal figures. It orders the report on any field, either alphabetically or numerically. The order is A to Z or 9 to 0. The highest number is reported first, which, when you consider it, is the usual way business reports are displayed. You can designate a reverse, 0 to 9, ranking by using a special trick of alphabetization. Z to A cannot be used.

*pfs:*Graph produces line, bar, line and bar, stacked line, stacked bar, and pie charts. It does not produce scatter charts. It accepts data from *VisiCalc* DIF files, *pfs:*File, or the keyboard. The program will superimpose four sets of X,Y data on one graph. Entering data for these four is like entering data for four separate charts, again a simple operation. To make data entry easier, after the X-axis data is entered the first time the program repeats the X entries for each of the remaining sets of data. When producing a line graph with numeric X-axis data, the individual data points can be changed to vary in each of the four subgraphs. When the program puts the four together in the superimposed version, it reads all four sets of X-axis data, produces a continuous scale for all of it, and plots each line with its differing X,Y intercepts clearly marked. This is a pleasant surprise when you first run the graphing module. The Y-axis data is always numeric. X-axis data may be any form of date, word, or number.

The graphs produced are black and white or color. In the color mode, the program gives you no choice but arbitrarily selects which colors to use. At times, especially combinations of line and bar charts, the colors it chooses interfere with the clarity of the graph. It is good to have defaults, but being able to alter color choice is a desirable feature. Bar graphs and line graphs provide left and bottom scale labeling, chart titles, and a key to the data involved. The pie charts have a chart title and a key. There is no movable labeling. The program provides automatic scaling which can be easily changed. The Y-axis data can be displayed in two ways through every type of bar or line chart. It can be displayed either as the actual points, or it will plot a running total which accumulates the Y-axis data. This can be useful if you need to show monthly progress on the way to an annual sales goal.
The graphs are saved as charts of data, not as Hi-Res, 34-sector pictures on a disk. This is a disadvantage if you want a quick copy of the chart, or if you want to use one of the available graphics programs to alter the appearance of your graph. It's a simple change in the program to get the graph onto the disk; future editions of the program should include this capability.

The limitations on the amount of data that pfs:Graph will actually plot are a maximum of 36 points for each of the four sets of data superimposed on the chart. This really is as it should be. Other business graphics packages have set the limit far too high and the result is that the labels collide and become unreadable, or the graph becomes so busy as to communicate nothing. pfs:Graph is just right: it always produces a presentation quality graph, precisely what the business person needs. It just cannot do much fancy graphics work, but frequently that isn't what serves most user's needs.

One of the real attractions of these programs is that they integrate into a single system. Data is easily shared and manipulated by all three. In fact, the integration goes beyond the mere ability to share the same data disks. It carries you through visually familiar formats, no matter which module is used. This consistency extends to documentation as well. The user's manuals are uniformly good in their approach, style, layout, and general “user friendliness.”

Software Publishing has created an integrated system that is limited in its capabilities but highly reliable and easy to use. Because of the limitations, the price per program seems high. But if you want consistent performance in programs that are easy to understand and use, then you ought to consider this file management system.

### DATA PERFECT

**Company:** LJK Enterprises, Inc.

**Language:** Assembly

**Hardware Requirements:** 48K

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**Department:** Business

**Sugg. Retail:** $99.95

**Availability:** 7

**Disk or Tape:** Disk

*Data Perfect* provides excellent value in an economically priced file management program with considerable flexibility and sophisticated features. It offers a variety of input and output formats, well-integrated backup procedures, mathematical functions, sorting, merging, and format modification capabilities. However, it lacks ease of use. Modifying input and output formats is frequently awkward and time-consuming, requiring repetitive cycles through program modules to execute simple changes and procedures. Further, the command vocabulary is often confusing. Finally, like many purveyors of microcomputer software, LJK refers to its file management program as a “data base” program. This usage is common in the micro industry, but buyers should realize that microcomputer data bases cannot mirror the power and complexity of data bases on minis and mainframes. Only a few, like *Condor II* and *dBASE-II* employ methods of organization more sophisticated than the straightforward file.

Only one disk drive is required, but for easy backup, sorting, reformatting, and merging you need two drives to avoid constant disk swapping. The program can take advantage of the standard lower case character generators for upper/lower case data input, and of the popular 80-column boards for screen formatting, but it also works very satisfactorily with the Apple’s unenhanced upper case and 40-column screen width. You can even format 80-column or wider reports with ease, using the 40-column screen.

The program is capable of merging into a file (or “database” as *Data Perfect* understands the term) any DOS 3.3 compatible random access or sequential text file, and interfaces with LJK’s *Letter Perfect* word processing program for form letter production and text editing of records.

Each database is created on a separate disk, and can have up to 32 fields per record, with a maximum field length of 127 characters and record length of 511 characters. Field types include alphanumeric, date, numeric, or formula. Up to sixteen formulas per record are permitted, and can include a number of special mathematical functions. The maximum number of records is limited to a single diskette and determined by the length of each record. The procedure for backing up a format is automatic in two-drive systems.

One continuous, easy procedure creates a file, or database, by assigning the screen position of each field, the field name, and field data type definition. You are well advised to follow the manual’s suggestion to plot out in advance the screen format on graph paper, because post-creation modifications are awkward. To move or modify a field requires (Q)uitting add mode, (K)illing the field, (R)eturning to add mode, and reentering the field. There is no
simple procedure for moving or modifying an existing field. It is easy for the new user to get lost somewhere along the way in this sequence, but repeated use makes it easier, if not much less time-consuming. After establishing all the fields with their definitions, you can set defaults for any desired fields, and are then given a full statistics record for the file to review before final saving.

Data entry is flexible and easy. A number of time saving commands and control character sequences provide for efficient editing procedures and easy movement around the screen. Global updating is also available, and can be used to mark records selectively for use in form letters.

Record searches for viewing, editing, or inclusion in reports can include criteria from up to four different fields, with two criteria per field. Record number and record number range searches can also be combined with field criteria. Single character (?) and unlimited character (s) (*) wildcard capabilities are available for character string searches, so you can specify both complete and partial field contents. Searches can also specify a full range of mathematical relations and “include” for each search field. Multiple-criteria searches permit you to specify that either all criteria must be met, or that a match on any one will suffice. While all these options are easy to use, this Boolean capability provides an example of the sometimes confusing command vocabulary. To set up the Boolean relationship, you respond to a “verify” prompt with a YES for “all” or Boolean AND, or NO for “any” or Boolean OR. The YES or NO are, in fact, in response to the “AND TYPE SEARCH?” query at the bottom of the screen, but these queries are awkwardly placed and often missed. For safety, you constantly need to refer to the manual for proper interpretations of unfamiliar procedures.

The manual accompanying Data Perfect is adequate as a reference guide, but lacks a tutorial leading you in proper sequence through the necessary procedures to begin using the program. Loading a data base, for instance, comes before creating one. While this order corresponds to the menu sequence, it doesn't make much sense to the beginning user, who may be confused to learn about file loading before he has created a file. The omission of error correction procedures from the Create chapter can also leave the new user stranded if he makes a mistake. (If you find yourself in this position, check under “Reformat a Database” in the Utilities chapter.) The review copy of the manual was a preliminary one, so we hope that these problems, along with typographic errors, will be corrected in general release versions.

Data Perfect offers a number of useful housekeeping functions as part of its Utilities menu. This menu backs up data from one disk to another (data is backed up separately from database formats); packs a file and deletes unnecessary records for space conservation; and displays a database format and checks formulas, field lengths, etc. without reloading the database.

The Utilities menu also offers more sophisticated features to sort, reformat, and merge files. Files can be sorted in ascending or descending order on up to four fields with a maximum of 255 characters. You can also limit the number of characters on which to sort in any field. The reformatting feature permits you to add, delete, or change fields in a file, and with the merge capability, you can do so without loss of data. The merge option can also transfer data from any Data Perfect file into another, or convert any Letter Perfect or other DOS 3.3 random access or sequential file into a Data Perfect database.

Data Perfect’s flexible report generation capabilities include both columnar reports and a labels option. The columnar report format permits up to seven header lines, and two detail or data lines for each record. Page widths can take advantage of wide printers with up to 127 columns. Boldfacing capabilities are also supported. You can use existing formulas or create new ones for each report, total any number of fields, and specify up to four subtotal level breaks. Full editing capabilities for modifying reports are included. The labels option allows you to format labels with up to nine data lines. Although no page-top heading is permitted, you could also use this option to create reports requiring more than two data lines. In both columnar reports and labels, field names and literals can be incorporated into the data lines. Full search criteria can be used for selective record printing of both reports and labels.

In short, Data Perfect is a versatile and sophisticated file handler with excellent organizational and report-generating abilities. It is useful in business and would be especially valuable to a user intending to produce printed, formatted files. Combined with Letter Perfect, it makes an attractively priced package. Some problems with documentation and with awkward procedures can be easily solved, but a prospective user should realize that a certain amount of familiarity with the programs is necessary to fully utilize the program’s potential.
Synergistic Software has replaced its former file management system, "The Modifiable Database", with this flexible, three-function package. It includes: a data base manager (The Data Reporter, itself), also capable of producing pre-formatted reports and incorporating primarily the same format as the former system, TMD; a text editor capable of producing user-specified, free-form reports (The Report Generator); and a graphics formatter (The Analyzer/Plotter) for producing pie or bar charts plus dot or line graphs using the system's data base for statistical functions (i.e., x/y references for min/max, mean, standard deviation, and correlation coefficients).

The file structure is uniquely designed. The logical data base (all related records) are written to disk as separate files if the 2,168 byte capacity per logical file is exceeded. Synergistic Software claims this approach allows faster response for viewing, updating or correcting records; record retrieval is in fact very fast, which can be attributed to minimized disk-access time. However, the same principle applies in this system as it did for "The Modifiable Database": searching and sorting, as long as they are performed within the range of the records residing in memory, will still be optimally faster.

A feature not normally associated with file management systems for the Apple is thoughtfully provided in THE DATA REPORTER — upper/lower case input to the system. In order to display this capability, as to be expected, you will need a lower case adapter (Paymar, Lazer, et al). Although the disk is protected (for a nominal $5.00 remittance, they will send you a back-up copy when you mail in your registration card), the programs and files can be transferred to other disks as required. This means, nonetheless, that you will still need the original master to boot the system.

One seeming omission (a carry-over from "The Modifiable Database") is the lack of a report title option in the standard (default) format for report generation. This reviewer, however, received a cordial and more-than-cooperative response from Synergistic Software when he called to obtain some information on the memory limitation (HIMEM) specifications for programming this feature into the system. Their open-mindedness about suggested enhancements was also much appreciated.

The documentation is thorough and nicely-packaged, although a modicum of the inevitable, ubiquitous typos/misspellings are present (seemingly the ongoing condition involving all microcomputer documentation; and — self-effacingly, said he — probably not excluding this book and/or review). Synergistic Software has published an errata correction document, sent out on request, implying a thoroughly professional approach to a problem that is not that salient in its documentation.

Some of the system's vital statistics include:
(1) LOGICAL FILE SIZE — unlimited.
(2) PROTECTED — partially.
(3) FILE ORGANIZATION — random.
(4) FIELD SIZE — 50 bytes.
(5) FIELD SIZE PER RECORD — 35.
(6) RECORD SIZE — 250 bytes.
(7) RECORD SELECTION — up to 20 levels.
(8) REPORT FEATURES — Horizontal columns, auto-formatting, arithmetic cross-footing, subtotals, summary reports, up to 3 sort fields.
(9) FIELD/RECORD REFORMATTING — with data intact.
(10) PASSWORD PROTECTION — with the Corvus' hard-disk version (Corvus feature).
(11) MAILING LABELS — yes.

There are many other serviceable features included in this package that can be utilized in processing the data base functions, the report generator and the plotter/analyser in conjunction with each other that make this a very useful and flexible system for personal and small business applications. THE DATA REPORTER represents a good investment, with its multi-faceted capabilities.
The General Manager supports hierarchical database organization. Simply put, this means that you can establish records that depend on other records, which in turn depend on other records, and so on. The structure, if mapped out, would look like the organization chart of a business with one master record (the parent) at the top and branching records (offspring) subordinate to the single master record. An example of such a database structure from academics might consist of basic student information (parent) with billing information and grades (offspring). The billing information might further include overdue notices (second-generation offspring).

This system is very user friendly. If you have a language card or a 16K card, the program will load Applesoft and treat the card's unused memory bank as space available in RAM and use it for the data buffer. The Master Menu lets you change the parameters of the system (number of disk, printer slot, etc), create/edit screens for data entry, initialize data disks, access databases you have created, sort, reorganize the database, print out database statistics, and run special programs you have written. You should read the manual carefully when formatting your system, however, because the program uses disk designations which may not match the way you set up your system. This lets you put the program disk in any drive, but unless you designate it as disk "A" the program won't recognize it. Sierra On-Line Systems tried to make this easier by including screen messages telling you the slot to use, drive number, and disk volume number. The program supports up to four disk drives, but it will operate with a single drive if you swap disks. The manual states that the program also supports Winchester-type drives.

You establish a screen for each level in the hierarchy. One screen per level is expected. Each screen (level) is identified with designated keys for sorting and linking each screen to its origin. If the screen displays information common to the parent or another offspring, the program automatically forwards that information and enters it into the offspring when you enter data. You do not need to enter data into all screens at one time. By using special keys you can locate any parent and offspring, and enter other information as required. At least, so the manual claims. Unfortunately, when I tried this feature following the directions in the manual, a fatal error (Return without GOSUB) occurred. Luckily, the error handling routine trapped the error, and recovery was excellent.

The program supports all of the standard database features for entering and modifying data. You can format fields within each record, and the program also supports special formats for use with such data as phone numbers. As a nicely-implemented additional feature, the program allows computations within and between screens. Also, when searching for a record, you can apply selection criteria which include the standard logical functions as well as range and exclusion.

The General Manager possesses the powerful and handy ability to reorganize the database at any time. You can add, delete, or change the length of fields at will; the program accounts for those changes during the reorganization process. At that time it also realigns the database pointers and records to give better disk access.

In addition to all these benefits, The General Manager lets you interface with user-written Applesoft programs to accomplish things that the master program cannot. The manual describes the Applesoft enhancements made by the authors, and describes how to access user programs with the ampersand (&). Some commands that add processing enhancements are: &Open, to open a database; &Info, which yields information about field locations; &Recin, which reads data from a particular screen into a data array; &Find, to locate a particular record using defined selection criteria; &Outfld, which fills in computed output-only fields. The program disk includes a sample invoice program. Appropriate appendices summarize commands.

The program supports multiple disks for a single database. It uses other techniques, such as variable-length records, to reduce the amount of space required by data on the disks.

The General Manager makes a good addition to the growing number of database managers. Its flexibility in transferring data from one screen to another, in applying this data to output field calculations, and the ability to interface with other programs make it very useful. However, it is comparatively easy to lose input data or completely destroy your database because of all of its inherent flexibility. This trade-off proves worthwhile if you need versatility and open-endedness in a database software package.
**THE PERSONAL SECRETARY**

**Company:** Sof/Sys, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K Apple II or II+, printer.

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The Personal Secretary is a low-end version of the Executive Secretary, a complete word processing and simple data base management system. Like its parent, The Personal Secretary contains a complete document editor, a print program, and a built-in mailing list data base system. All files are upward compatible with the Executive Secretary.

The program uses the 40-character Apple screen. Wordwrap occurs on text entry and editing with formatting. Both result at print time. Cursor control is easy, using the arrows (CR), and “/” key diamond. Text entry is like a typewriter if you have installed the shiftkey mod wire. The program will work without that, but getting capital letters is awkward, since CTRL-L must be pressed before and after the letter. Better to install the mod; it's easy enough.

All standard editor functions are present, including search and replace. As in the Executive Secretary, the search and replace function operates in a strange manner. When searching a file for the single letter “t” in order to replace it with the string “aa,” all were found, but not in the order that they appeared. The program found approximately every third letter on a single pass and then went back to the beginning and started over again. Three passes were necessary to catch all. This is not a real problem for short files, but can get discouraging on long ones. All other editing functions worked well, and I judged them generally easy to use.

Almost anything that your printer can do, this program will support in one way or another. The manner in which this is done is worthy of note. Using dot commands (a period followed by two letters), you may define any type of printer command. For example, if you have a Diablo 1620, the sequence ESC-A will change to the red ribbon. If, on the other hand, you define “.cl” (for color), then any time you use “.cl” in your text the printer will print the characters following in red. (Don't forget to define the ESC-B sequence so you can get back to black.)

Another useful feature of this word processor is the ability to use conditionals in your text. With this, you can use portions of your card files (also created by The Personal Secretary) to define the final text product. One example of this would be for sending thank you letters to contributors. Depending upon the amount donated, the letter would have varying items of praise for the contributor and his/her ancestors. (This is a feature that I wish my WordStar had.)

The card file built into the program has room for 299 cards per file and also has search and sort capabilities. The cards are limited to a fixed number of entries, but these are sufficient for a reasonably complete mailing list with comments. Lines from these card files may be inserted into text at print time, allowing for a complete mail-merge capability. Using the comment sections of the file, the conditionals described above allow for a powerful system.

The Personal Secretary is a good addition to the low-end word processor market. It has some quirks that you must get used to and a manual which could stand considerable improvement; but for the price, this package will provide a very complete system. Consider it.
Supersort, an extremely flexible tool for data file manipulation, covers a wide range of applications. Sorting, merging, and record selection functions are carried out on files compatible with a wide variety of languages operating under CP/M or similar systems.

The program is configured to sort up to thirty-two input files and merge them into a single output file as required. If you have thirty-two pre-sorted files for merging, they will read as input within system limitations or constraints (memory is the main limitation). Sorting and merging of input files is specified in the same run for greater efficiency. Record selections, file conversions, and other features of the program can be used independently of the sorting and merging process.

Supersort input files may contain ASCII, BCD, and/or binary data with logical record lengths up to 4,096 characters. The records may be (1) fixed length, (2) variable length with a carriage return as the delimiter or with the length specified at the beginning, or (3) COBOL relative files. Fields used as sort keys for testing record selection may have either a fixed column position and length or a variable comma-delimited position and length. This allows for maximum program flexibility.

Supersort allows up to thirty-two key fields; you may specify each as ascending or descending sequence with different data attributes. You may further designate the key fields as ASCII, BCD, or binary formats. A nice feature is the use of numeric ASCII options sorts on all free format numbers, including exponential notation. For those using FORTRAN or BASIC to create files that require sorting, this means that the program supports most print formats.

Binary data types include fixed-point for any length, signed or unsigned, stored as low-high or high-low. Additionally, MicroSoft floating point (single or double precision) is supported. These include the integer plus single and double precision real-data types conforming to MicroSoft MBASIC and FORTRAN specifications. Some of the specific options are EBCDIC characters, processing lower case as upper case, treating the last rather than the first character of a key as most significant, and ignoring the high order (parity) bit.

Record selection is extremely flexible and powerful. Records may be selected or excluded. Any number of conditional tests may be made on any field against a specified value, a range of values, or against another field in the same record. Values for the test may be specified as text strings, BCD numbers, or binary values in octal, decimal, or hexadecimal.

All of the usual test operators such as less than, equal to, greater than, and so on, are supported. In addition, there are two other operators: between and not between, which serve as range testing for values. These tests may also be combined with AND, OR, and EXCLUSIVE OR operators.

Some added features can be useful. The beginning and ending record numbers for each sort input file may be specified for selective processing. You also may change the output disk for added processing capability with smaller computer systems. Another option that helps reduce disk use is a tagging option in which only pointers to records are used during sorting and merging. The records are then retrieved via a high speed random access algorithm for writing to the output file. Printouts at the console can be a simple “it’s done” type message, to a full explanation of what was done, including disk space usage.

With the record selection capabilities of Supersort you may also perform file conversion functions; for example, converting fixed-length records to records with comma delimiters. Fields within the records may also be rearranged with simultaneous sorting if needed.

A particularly useful feature of the program is the ability to create a key index file with the aid of DataStar. With this feature you may use WordStar to globally change some feature of the database and then use Supersort to recreate the index file. This is helpful when you change the input form with the DataStar program. Record numbers are also available for creating multiple keys. In addition, the sector number and byte offset at which each record begins are available as yet another method of creating an index.
The program operates by either interactive keyboard command mode, or by use of a command file for often-used sequences of operations. In addition, Supersort has relocatable object code for use as a subroutine in FORTRAN, COBOL, or assembled programs. The relocatable code may be modified to delete unneeded features, helpful in memory-limited systems.

Supersort uses a heapsort algorithm with modifications to adjust internal memory allocation, input/output buffer sizes, and other variables in response to the job at hand. With large amounts of RAM there will be less disk activity.

DB MASTER

Company: Stoneware, Inc.  
Language: Applesoft & Machine  
Hardware Requirements: 48K

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**Master** is one of the most powerful of the database systems that I have reviewed. It gives you enough flexibility to build almost any type of file and retrieve the data in almost any format. Because of its complexity, it runs somewhat slower than some of the other programs on the market; however, the added features make the processing delay acceptable. A big plus in its use is the inclusion of password entry and three levels of protection. This makes it ideal for use in an office that needs to limit access to certain files. With the three levels of protection offered, a clerk can access data through a predetermined level, while confidential information remains private.

The program is powerful and easy to use, but you really need to have the **DB Utility Pak** to use in conjunction. You must have the **Utility Pak** to change file structure. In addition, should you damage a disk, the **Utility Pak** permits you to save the data.

While I liked the program, the manual failed to measure up. It contains all of the information, but finding a specific item requires hunting through the documentation. You can build files following the manual, but trying to format outputs for the printer is a different story. The manual does not always agree with the screen menu, making the task awkward and confusing until you get the hang of it. Trying to print labels, for example, proves a major task if you depend upon information provided in the documentation. You must dig through the manual to find explanations of several required steps.

The system requires an Apple II or Apple II Plus with either Applesoft in ROM or a 16K language card. It does not support any of the 80-column cards, but you can use it with a modem to transfer files between systems (in conjunction with the **Utility Pak**). While the system will operate with a single disk drive, two make it easier to use. Stoneware recommends two in order to cut down on the number of disk swaps required.

Creating files is a simple process if you take the time to plan what data fields you need to enter. To test the program’s ability to create files, I built a database (of subscribers to a newsletter) containing over 600 files. I used the master file to produce various output reports. I also ran labels for all subscribers, including labels for people whose subscriptions would expire the following month, and paid and unpaid subscribers. In other words, once I had entered all of the data, I could extract it in any way that I wanted. Although disk access time and disk swapping seemed to take a long time, the program yields results that make the wait worthwhile.

Screen formatting lets you format a database in logical sequence and set up the screen for easy data entry. Once you master the set-up instructions, building a file is simple. Sort keys let you sort the files in a number of ways. “Wild card” sorts and searches let you search or sort any character or characters within a field.

**DB Master** requires many disks, partly because you need two blank disks for each file (one for the file and one for the “utility,” or file set-up information). Moreover, you need additional disks for use during the Sort operation and formatting of the printer reports. Only one program disk comes with the package, and it is solidly protected. However, Stoneware provides a free back-up disk upon completion of the user registration. Stoneware also provides a “reset” protector, as well as screen layout forms to help you set up a database. These make the system even easier to use. A hard disk version should become available in the future, but there are no current plans to allow operation in the 80-column mode.
This package ranks among the best microcomputer database manager systems on the market. The shortcomings involve file editing functions. For example, to access an existing field for editing, you must complete the entire entry before moving to the editing mode. Another problem arises if you insert a disk at the wrong time— you may destroy the data on the disk if you do. I had trouble reading the screen prompts for disk swapping, so I would advise caution to avoid inserting the wrong disk into the wrong drive. The format is always the same, no matter which disk or drive the prompt specifies, but the drive number, name of the disk required, and other information appears in inverse display. But all in all, this fine database management system possesses a flexibility and power hard to match.

**DB MASTER UTILITY PAK #1**

**Company:** Stoneware, Inc.

**Language:** Applesoft

**Hardware Requirements:** 48K

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The *DB Master Utility Pak #1* extends the basic *DB Master* program. It adds the capability to merge and recover files as well as translate files between the *DB Master* file format and the Data Interchange Format (DIF), as used by many other programs. In effect, with the translator, *DB Master* files may now be used in other applications.

Before buying this support package, you should insist on opening the package and reading the instructions since many of the programs have restrictions. The first restriction that applies to all programs is the need for two disk drives. Another suggestion that will save time is to have a copy of your current file statistics in hand before attempting any of the file operations. In many cases you will need them and cannot access them in the program at the point when the system asks for them. If you get into one of these situations, the only way out is to back out of the program to a point where you can retrieve the statistics; a time-consuming process. In the general warning category, the *Utility Pak* does not maintain secondary keys when using merge or modify operations. You must rebuild them for any file written to by the *Utility Pak* modules. Finally, certain examples of following will yield some bizarre results, such as merging dissimilar files with the same name, recovering a master file using another file's utility diskette, or translating incorrectly formatted data back to the *DB Master* file. Above all, before using the program, be sure to back up your data.

The restructure program allows changing of file formats. You can change the primary key fields, delete fields, add fields, add a screen page, change the location of fields on the screen, and alter the field labels or field types. In essence, the program creates a new file with all or selected data on a new set of diskettes. Of course, report formats, short forms, and other auxiliary functions will not be transferred across. Take care if you change the primary key. If you do, and consequently create duplicate keys, you may lose some of the records; only the first record that the program finds with an identical key is moved.

The replicate option creates a new file with all report formats or short forms, but with no data. The new file contains no secondary keys; however, if fields are designated as secondary keys, they will be built as you add data. This utility is best used for creating new file disks at the start of any accounting period while using the original disks for the historical file.

You have the option of merging all records or selected records. In addition, you can delete merged records from the original file and/or overwrite any duplicate keys in the destination file. The merge option is handy, but difficult to use. You really need to know your file structure, because any records from different files with the same formats are merged. If the files are not matched, you are likely to lose data. A back-up of the files you are working on thus becomes very useful.

If you have a problem with one of your disks, you can use the recover module. Before you can recover a crashed data disk, you must have an intact utility disk—another reason to back-up your disks. Without the utility disk, you can recreate one with the proper file structure; however, if the record structure is not exact, the records will not be recovered.
Of particular interest in the Utility Pak is the ability to transfer information from DB Master files to DIF and back again, making it possible to use DB Master information in other applications. In testing this utility, a DB Master file with several field types was successfully transferred to VisiCalc. Transferring the VisiCalc file back would have required a BASIC program (and consequently, was not tested). Finally, if you use the file transfer utility, make certain that you follow the format in the DIF specification module exactly.

Family Roots, a specialized data base program for the serious genealogist, stores, modifies, searches, retrieves, displays, and prints out genealogical data. Obviously designed by one who understands the genealogical researcher's requirements, it is intended for the more serious researcher. Family Roots is well organized and simple to use; it would be a tremendous aid to anyone planning to research his "roots," or write a family history. The program will print all common data forms and sheets, such as pedigree charts, family group record charts, and ascending or descending ancestral listings for relatives to fill in missing data.

Family Roots consists of six main programs and six utility programs on two disks. Of the six main programs:

- **EDIT** stores the basic input record data on each person, such as name, birth date, marriage status, spouse, names of children, address, death, etc.
- **CHARTS** prints four standard genealogical charts that can be tailored to the user's requirements.
- **SHEETS** displays or prints data sheets with all the information on an individual or a family, with the latter organized in the standard Mormon format.
- **LISTS** displays or prints listings of people in requested sequences.
- **SEARCH** sorts data files by the field or element of information that the user desires.
- **TEXT** allows storage of notes, data, reports, or even a complete history on an individual that can be retrieved with related data on that person.

The utility programs provide the capability to prepare blank data disks, print address lists of living relatives, configure your particular system, and change program parameters and other program modifiers. Extensively menu driven, the program is simple enough for either the inexperienced computer user or genealogist to use if the instructions are explicitly followed. The disks are not protected, so that the user has full access to the files and programs for archiving or incorporating changes. Family Roots is compatible with 80 column cards, clocks, and lower case adapters.

Most genealogy programs are limited to about 1,000 records, severely limiting serious researchers who may have up to 10,000 names to file. Family Roots, on the other hand, has unlimited records capability; but with larger data bases, two or more disk drives are almost a necessity. The program supports up to six drives, and permits records on one disk to be interrelated with those on another. It also allows the user to define his own limits on the number of children or number of marriages, for instance, rather than working with a fixed number.

The EDIT function provides all of the standard fields that a genealogist uses to record data (including footnotes). It allows up to nine user-defined fields to be added as a standard entry; records may be redefined to add or delete fields without having to rework previous entries. The TEXT feature supplements record entry, and can be important for allowing storage of notes or even unlimited pages to be linked to the standard record data. In all, it gives the user complete flexibility to design or modify his individual management and retrieval system.

By assigning an ID number to each person as he is entered, subsequent entries requiring data such as "parent of" or "child of" can be linked by entering only the ID number, saving both data entry time and disk space. The ID numbers are automatically numbered as you enter data, but they may be changed or reassigned if desired. Data entries are in the standard genealogical format of day/month/year, but entries in other formats such as "1891?" or "11/11/1787" may also be used. The SEARCH capability allows sorting with as much flexibility as data entry. Searches may be made for all people living in a certain area in a range of years, or for all people with a common name or birthdate in a certain area. The print out capability permits using various printer fonts, while the parameter change feature permits revising a format to print out only specifically desired information.
The documentation is a comprehensive 175+ pages with basics for the novice computer operator. Even so, the manual is confusing at times, and may take some study to fully comprehend because of the many features and flexibility of the program. Better examples of screen displays would have been helpful. Moreover, setting up the configuration for printers (other than a Paper Tiger) is not well explained. Beyond that, however, the manual is complete and covers most problems and errors likely to be encountered.

The program has a few deficiencies. For one, the speed of the searches is slow. A “pointer” capability would have been helpful such that only a few characters could be entered to represent a large number of data. For example, for a person with 50 ancestors, born, dead, and buried in Chicago, you are required to enter “Chicago, Cook County” three times in each record.

*Family Roots* comes the closest of all the genealogy programs now on the market to satisfying the widest range of the user’s needs. The author of the program has anticipated almost everything that a serious genealogist could desire. The genealogist with a large data file, who desires a means to access and manipulate it, will love this program. There are many less expensive genealogy programs on the market, but *Family Roots* is probably the best value for the money for the serious genealogist.

### Membership Manager

**company:** Hi Tech International  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
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*Membership Manager* is a database management system designed to perform tasks associated with maintaining membership records and billing individual members. As such, it is a highly specialized program which would not be useful for many other applications. The main portion, which the company calls a “Base Module,” handles the bulk of the record-keeping and billing. The complete package comes with five diskettes; you must then initialize eight additional data diskettes.

The “Base Module” contains the basic membership information, such as name, address, dues paid, and so on. The system will determine the billing dates and amounts for four different billing periods. It will store up to 385 records per disk. More than one disk may be used. HiTech International offers to perform this data-entry function for you for $150.00 per 100 records.

Another module enables you to keep a list of prospective members to whom promotional information may be sent. A third diskette receives the names of previous members. These can be entered manually or automatically as they are dropped from the roster. There are modules which let you keep track of members’ payment habits, the extent of their participation in organizational activities, and a history of dues charged. These three modules and the prospective member module require that you enter the information manually, in effect creating four additional databases. Whether this data, which cannot be analyzed or printed out by the system, is truly useful depends upon the size of the organization and the manpower available to make the entries.

The size and labels of the fields are preset and appear designed for a business organization, such as a Chamber of Commerce. It is not as well suited for a political or professional organization. More flexibility in the field names and lengths would improve the product.

Two diskettes contain data for creating form letters and mailing labels. However, this requires that you have *Magic Maller* and *Magic Window* (both by ARTSCI). This additional expenditure seems excessive in the light of the $2,500 price tag of the *Membership Manager* program. This also triples the difficulty of learning this otherwise useful module, since you must master both *Magic Window* and *Magic Maller* as well as this program. Using this module also involves a large amount of disk swapping. Soon the table is covered with diskettes and chaos reigns.

Another module lets you create a Buyer’s Guide, listing the members’ services and a roster of the membership. These operate adequately, but the printout format is unimaginative. It would be nice if you could lay out the format so as to create camera-ready copy for printed directories.
The system also includes a graph routine which produces a bar graph of the income per month. The dollar amounts begin with $5,000 a month and increase in increments of $5,000, which perhaps suggests the size of the organization at which this program is targeted.

The billing routines work well and print attractive bills and cash journals. This routine will automatically print a bill for each member whose dues are payable that month. The books can then be updated to reflect payments. This may well be the most useful part of the program.

The program has several serious problems. The first is that the manual is amateurish and inadequate. It is only 65 pages long, lacks an index or reference sections, and has no tabs or other quick references. The short and regular tutorials which are supposed to lead the user through the steps are not logically arranged nor are they informative. It is surprising that a manufacturer of a program that costs $2,500 would produce a manual of this quality.

Disk initialization does not work. Following the instructions results in a “syntax error in 35616” message. Since the program coding cannot be inspected, the result is frustrating. The diskettes can be successfully initialized using Apple's System Master, but the manual does not say this. The company does not list a hot-line phone number, but a call to the office number listed in the literature eventually connected me to a gentleman who admitted that this error had crept in while the program was being copy-protected, and the DOS initialization was actually the only way to initialize the diskettes. Finally, the program suffers from frustrating, cryptic error messages.

The program embodies a good idea. Being a membership chair or treasurer of an organization is usually no fun, and this program makes some of the drudgery more bearable. But it could be a lot better. Simple things, such as friendlier error messages, better debugging, and especially more professional documentation, would go far towards making this program worth the $2,500 the vendor is charging.

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**TIME MANAGER**

**Company:** Image Computer Products, Inc.

**Language:** Machine

**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
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Time Manager, a personal information and organization system, was designed as the first in a series of programs for managing business and personal affairs. This particular program acts as a daily organizer, accounting program, diary, and project coordinator with historical capabilities. It operates on two levels: by the month and by the day, covering the period from 1900 to 2155 A.D.

The well-constructed manual takes you through the basics of using the program, then explains the expanded capabilities. I found only one discrepancy between the manual and the program: the manual tells you to use disk drive #1 to copy a data disk and the program (correctly) tells you to use disk drive #2. Otherwise, the program runs just as described—a rare treat.

Time Manager processing options consist of priority, permanence, category, and text portions. You set the priority at “1,” “2,” “3,” or “Note.” The “Note” entry allows the entry to move from day-to-day as part of a “to do” list. These entries always appear on “Today’s Date.” The “Note” priority, the lowest level in the listing, may simply consist of reminders or diary items for record purposes. The permanence entry setting is either on or off. Permanent entries appear on the same date year after year, making it unnecessary to enter holidays and birthdays every year. Category is a letter designation from A to Z assigned to each entry. This allows you to sort entries and display only those that apply to a given situation. You specify which letter applies to which category, but the program comes with twenty-six predefined types.

You should limit entered text to thirty characters per entry, but the program includes provisions for multi-line entries. You should still avoid them, however, because full program capabilities are not available for them. You can define data disks for either six-month or twelve-month periods. With the six-month disk, you get up to 256 entries; the twelve-month disk allows 512 (with DOS 3.3). Starred entries do not fall within the specified limits, and
thirty-two such entries are possible. You can make up to 127 entries on a given day, displayed sixteen at a time. Scrolling commands retrieve the entries on screen for display. You can modify all entries as necessary. Easy cursor movement and clear commands control the editing functions.

If you want to define selection criteria for display of information, you can apply one or all three filters: category, keyword, and priority. Only entries meeting the sum of the criteria specified will display. Since only the selection criteria filters are set, you can scan through the disk forwards or backwards to find the entry or entries that you want.

The totalling and accounting subsection makes up an interesting and useful function of *Time Manager*. You can establish and maintain up to nine different accounts, and obtain totals for any or all of the accounts for a day, a month, or the current year. You can also maintain running totals for specific days or months. You place the accounting information into the text portion of the entry, preceded by special symbols designating the particular account. You can report multiple accounts in one single-line entry. You can also give preset values to accounts for special applications.

Finally, you can create up to twelve notepads or screens full of data as a reminder. For example, you can use abbreviations in your entries, then create a notepad with the defined abbreviations. Each notepad has twenty-three lines of forty characters. You also have a notepad editor for text entry.

When you pay for this program, you do not actually buy the program, but rather a license to use it. In the event of termination of the license by either party, the entire package originally supplied must be returned to Image Computer Products—with no refund. The disk carries a ninety-day warranty. You can obtain a back-up disk (subject to the same license agreement) for $10.00. A reference card and disk with sample data complete the package.
ASOC is a comprehensive option analysis package that can be used to help determine potentially overpriced and underpriced call options. Simplified data entry combined with a comprehensive screen display is intended to simplify the complex job of option analysis. For speculators and market professionals who use Apple computers, ASOC is intended to provide a comprehensive program utilizing a dividend-corrected Black-Scholes model and an elective Expectation model to aid the investor.

ASOC comes with a hands-on, step-by-step explanation of procedures. A specific example is used to describe all the program prompts and required input, as well as the program output. There is no discussion on theories or specifics of trading in options. ASOC is written for people who already have a general understanding of buying and writing stock options. Additionally, the trader must understand the significance of the program's output and how to interpret hedge ratios, expectations, and other factors.

Booting ASOC presents you with a Hi-Res title screen and a menu page. It takes about a minute to get to the menu and run the desired selection. The delay is excessive after using the program several times, particularly if you are doing a series of runs for analysis. Once the Main Menu is up, you can select either the ASOC analysis or a Commission schedule review/change. Selecting Option 1 will start the ASOC program and prompt you for some preliminary input such as printer output option, risk-free interest rate, the number of days you plan to hold the option, and whether or not you want to compute the expectation values. If you select to compute the expectation values, the calculations take a lot longer. After the preliminary information is given, you enter specific stock data for up to twenty stocks. For each stock, you enter the current stock price, annual dividend, current option price, number of contracts and whether to buy or sell, the option strike price, days to expiration, and finally stock volatility. Much of this information is available from business papers; however, stock volatility is usually not available except from specialized publications. (A Stock Volatility program is provided as well as suggestions for special publications.)

You cannot save data. This is a major drawback, particularly if you are examining the options for a particular stock. The ability to read a previously saved file and then edit the values would simplify data entry even more. Since one of the advertising claims is simplified data entry, this would improve the product considerably.

Second, there is no way to vary the holding period for different options. Since the preliminary prompts requested the holding period, that time is the same for all data entries. To change that time requires you to rerun the program. Third, days to expiration is not an easy calculation. The manual suggests you use a page from a published option guide for this. Unfortunately, if you don't have this document, you will have to find some other means of getting the information.

You can review the output for all the stocks you entered via a menu selection. Once finished, you exit the program and have to reboot. If you selected not to print out the output at the very beginning, ASOC provides no option for you to later change your mind. If you had entered several stocks and found one where the figures looked good, you cannot select to have the output dumped to the printer. Second, there is no restart provision with ASOC. Once you are finished with a specific analysis, you must reboot if you want to enter more data. If you are conducting a series of analyses for given holding periods, this becomes a significant drawback. The expectation results take a considerable amount of time. For each stock, the average is about four minutes. For a random selection of five stocks, the program took twenty-two minutes to complete.
The program is statistically accurate. In comparison with other programs and actual hand computations, ASOC is well within the 97 percentile of predicted results for the examples tried. Since commissions are involved in several of the calculations, it is important to input the commission schedule (see Option 2) that your brokerage firm uses.

The Volatility program is on a separate disk and is used to compute and update the volatility for each stock that is of interest. The disk will permit you to maintain, update, or change a file of up to fifty-two weeks of stock prices for each of one hundred stocks. There is no set of data for the user. Instead, you must construct your own database and enter all the data from scratch.

ASOC is a very accurate program for computing statistical data for call options, but it is specifically designed for only one area of option trading—call writing and buying—which severely limits its use.

THE PERSONAL INVESTOR

Company: PBL Corporation
Language: Unspecified (Runtime Pascal?)
Hardware Requirements: 48K, 1 or 2 Drives, and a D.C. Hayes Micromodem or Apple Communications Card and acoustic modem

OVERALL RATING: B+
EASE OF USE: A-
VENDOR SUPPORT: B+
DOCUMENTATION: B+
VALUE FOR MONEY: B+
VISUAL APPEAL: B+
RELIABILITY: B
ERROR HANDLING: B

The Personal Investor is a stock portfolio management program with a built-in capability to communicate with the Dow Jones News/Retrieval Service. It can retrieve business news, update (via current prices) the value of stocks in the portfolio, and retrieve quotes for any other stocks in a pre-assigned list. The program does not retrieve or store historical price information, nor does it include any charting capabilities. Current price information can, with some difficulty, be entered in manually.

With a second disk drive to hold the data diskette, the program allows storing current price and dividend information on up to 300 stocks, with up to 600 purchases and 500 sales on a single diskette. For more capacity, you can start additional data diskettes. When a stock is entered but not purchased, the program will automatically collect quotes from the Dow Jones service, but these will not appear in portfolio reports.

A significant limitation of the program for the serious stock market investor is that it only handles actual cash purchases and stock sales (i.e. long positions). There are no provisions for margin calculations, or buying or selling options. Nor are provisions made for selling short or writing covered options on stock you already own. It does handle multiple purchases of the same stock very nicely, as well as stock splits (incorrectly entered stock splits can even be "backed out" by entering the split backwards).

The program produces four reports: a Tax Report showing long and short term gains realized from purchase and sale of stocks, a Description and Price Report showing what stocks are in the portfolio together with the most current price information, a Gain/Loss Report showing the unrealized gain or loss for your holdings based on the most recently entered price, and a Dividend Report showing dividend dates, projected dividends and dividend yields. Unfortunately the organization and content of these reports is very questionable. Perhaps in order to insure that an 80-column printer is adequate, several reports are too brief. For example, the number of shares purchased or sold is missing from both the Tax Report and the Gain/Loss Report. There are also no reports to "trigger" forthcoming important events, such as stocks going long-term or x-dividend.

The user interface for this program is very nicely done. The menus are well organized and easy to follow; data can be entered and changed quite easily. There is a heavy emphasis on using special characters rather than additional menus to make selections (e.g. "1", "$", "&", to signify "split," "sell," and "delete"), but the options are always spelled out on the screen and it all works well. Additional features include a "cursor calculator," which allows basic math manipulations while entering data values, and the ability to either clear out previous transactions completely, or retain a summary if desired. Another nifty technique allows you to handle commissions either by ignoring them, entering them as a percent, or entering them as dollars.

The documentation is quite thorough and readable, with plenty of pictures of screen formats, and a good index. There is no sample data disk, but the manual leads you through several adequate examples.

The program appears to be written in Runtime Pascal, and this implies at least two important consequences for this reviewer. First, it simply did not operate properly on a system which includes a Smarterm 80-column card. More precisely in this case, the program video output was not visible at all on the normal video monitor. When the
80-column card was removed, the program functioned normally. Second, the printer has very rigid slot requirements for those which hold your printer interface and modem (slot 1 and 2, respectively). The program disk itself is copyable for backup purposes.

In summary, if your stock trades are relatively long, you don’t trade options, and you wish to access the Dow Jones News/Retrieval Service, then this may be the program for you.

**CHART TRADER PLUS**

**Company:** Omega Microware  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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**Department:** Business  
**Sugg. Retail:** $199.00  
**Availability:** B  
**Disk or Tape:** Disk

The Chart Trader Plus (with Auto-Run Graphics) is part of the Investor's Tool Kit series of technical analysis investment programs from Omega Microware. The package actually consists of three programs: *Data File Management*, *Graphic Charting with Analysis* and *Graphic Charting with Analysis II* (with auto-run graphics). The package is designed to permit the more experienced commodities and futures investor to perform technical analysis on those markets. The program, however, will not make any predictions; it is up to each individual investor to interpret the results.

The package provides the following technical analysis capabilities: single or multiple moving averages; moving average oscillator; high/low price band; percentage price band; constant price band; daily open, high, low, close bar charts; overbought/oversold indicator; relative strength indicator; on-balance volume; volume and open interest graph; and momentum rate of change and momentum oscillator graphs.

The first step in using the program is to prepare data files. The documentation states that "if you already have data in one of the formats that our programs accept, such as the Computrac data format, then you are ready to run." However, nowhere do they state what other formats are acceptable, nor mention how to access a remote database. Data can be entered manually. You must first enter the time period to be charted. The date input permits you to enter only the month, the year, and the day of the week of the month you are in, so you better keep a calendar handy. The program will then ask you to input values for Open, High, Low, Close, Volume, and Open Interest for each day (or week) of the time period being analyzed. Program operation is straightforward, with helpful menu prompts included along the way.

The heart of the package is the Graphic Charting with Analysis II program. This program lets you select any data file for technical analysis. All charts and graphs can be saved to disk or printed (if you have a graphics-capable printer and an appropriate interface card). As with the *Data File Management* program, this program is menu-driven, with self explanatory menu selections. The Auto-Run feature is designed as a controller to permit automated running of the Graphic Charting with Analysis II program. Up to 20 Auto-Run files may be contained on a single disk. Each Auto-Run file is capable of automatically running many combinations of commodities and technical analyses as defined by the user. This is a big time saver. As with the other programs in this package, the Auto-Run feature is menu-driven, operates in a straightforward manner, and has helpful menu prompts.

The problem with the package is the documentation. Simply put, it is awful. The manual is 45 pages long with none of the pages numbered. Some of the pages were obviously out of order, and the manual is spiral bound, making it impossible to re-arrange pages. Three different type styles are used: dot matrix, daisy wheel, and standard typewriter, giving the impression that the manual was thrown together. The Data File Management section lacks important information such as accessing remote databases, while the Auto-Run section contains too much repetition, making it hard to know which page you should be on or why. Also, the examples of program operation are poorly displayed. All in all, the documentation amounts to an unprofessional job.

This package is a very good tool for assisting the commodities and futures trader in storing, retrieving, and analyzing data to make a buy or sell decision. Poor documentation notwithstanding, it is a recommended purchase.
The **Dow Jones Connector** is not a computer program. Instead, it is a package which gives you a connection to the Dow Jones News/Retrieval service, one free hour of prime or non-prime time use, and a one-year Blue Chip membership. The "manual" which is provided in the package is simply a copy of the most current Dow Jones Fact Finder (operating guide).

The Dow Jones service is aimed at the business person interested in investment management or the latest business news. As a service to investors, Dow Jones provides historical quotes on stocks and current quotes on stocks, bonds, warrants, mutual funds, Treasury issues, and options. In addition, several databases report on company financial data for the analysis of companies. Regarding general business, the Dow Jones databases give you direct access to news stories from the *Wall Street Journal*, weekly economic updates, text searches of the Dow Jones news, and such general interest items as the text of *Wall Street Week*, weather reports, sports information, movie reviews, and an on-line encyclopedia.

The Dow Jones service is a good database system which can be of great use to the business person or personal investor. One thing that you should keep in mind when using the Dow Jones service is the cost. Database use is charged by the minute, with different costs for each database. Some have great differences between prime and non-prime time, while others have little difference. Also, some services have fixed charges in addition to the connect time. Before using the Dow Jones service, you should write down the complete sequence of commands you expect to use so that you do not have to take time to look through the manual while online. When using the service, it is also helpful if you instruct your terminal program to pass all Control characters through without reacting to them. The Dow Jones computer uses a variety of control characters in its protocol, and at times these can have very unexpected effects on your display.

The **Dow Jones Market Analyzer** is a powerful technical analysis tool for stocks and other investments. The program is largely Menu driven, with single keystrokes carrying out complex operations. For example, with only four keystrokes from the Main Menu, you can get current-day quotes for any stocks and then add those quotes to your historical file. That does not sound like much until you realize that the computer has to go through many steps to do this. It must load several different programs, connect to the phone line, dial a local Tymnet or Telenet number, log onto the Dow Jones computer, issue all of the correct commands to retrieve the needed data, log off the Dow Jones computer, and hang up the phone. Finally, it must reformat the data retrieved from the form received and stored on a temporary work disk to that required by the history disk. Once begun, the process is automatic, with provisions to note any errors and even to attempt an automatic recovery from those errors. Once data is stored on the history disk, the program has many charting capabilities for performing technical analysis on one or several stocks. Briefly, there are several varieties of moving averages, straight-line constructions (such as a least squares fit and varieties of trend-lines), price/volume indicators, and oscillators. All graphics are displayed on the Apple Hi-Res
screen. You can save the screen for later printing with a routine and printer of your choice, or you can insert a screen dump routine into the program if you have one. The manual provides sub-routines for the Grappler interface card, Apple Silentype, and Trendcom 200 printers. Finally, along with the program, you receive a Dow Jones News/Retrieval membership and one hour of free, non-restricted use of the service.

First, I must comment on the use of the Apple computer for technical analysis of stocks. Most technical analysis makes extensive use of graphing techniques. On the Apple, you must perform this analysis using graphs displayed on the Hi-Res screen, which, unfortunately, is too small to do an adequate job, especially if your analysis techniques encompass several years of data and rely on long-term trend-lines to establish past performance. The Dow Jones Market Analyzer takes this into account and always uses the maximum horizontal screen space for the displayed graph, regardless of how many points are to be plotted. The example shown contains 75 data points. For this review, one chart was plotted using 252 data points. At this density, the individual days cannot be distinguished on the screen. The plot represents the limit that the program can handle. When plotting large data files, you have the option of only using part of the file, but you cannot specify which part. If you specify a number of points lower than maximum, only the last will be plotted. There is no way to plot just the front half of a file, for example.

Once you construct the basic plot for a stock, you have a number of options to call upon for analysis. Perhaps the most common is the moving average. Standard, weighted, and exponential moving averages may be plotted, with you specifying the number of days and weights. A simple 12-day moving average is shown in the example. Many believe that when the stock price crosses its moving average, that is a buy or sell signal. Others compare several moving averages with different time spans to assess the strength of a stock. The program will allow you to draw either, using stock high, low, or closing prices as the basis for the lines. When drawing these lines, you indicate endpoints with a graphical cursor that moves from left to right across the graph. The Arrow keys control this movement. The date; high, low, close prices; and volume for the entry at the cursor and entries on either side of it are shown at the bottom of the screen. Pressing H, L, or C indicates to the program that you want high, low, or close price for the point in question. This is an elegant solution to the problem of designating plot points, but on a large data file, it takes much time to move from one side of the screen to the other (a couple of minutes when using 252 data points). The program could be greatly enhanced by putting in commands to allow speedier movement through the data.

Another common, simple analysis technique involves the construction of support/resistance, or trend-lines. The program will allow you to draw either, using stock high, low, or closing prices as the basis for the lines. When drawing these lines, you indicate endpoints with a graphical cursor that moves from left to right across the graph. The Arrow keys control this movement. The date; high, low, close prices; and volume for the entry at the cursor and entries on either side of it are shown at the bottom of the screen. Pressing H, L, or C indicates to the program that you want high, low, or close price for the point in question. This is an elegant solution to the problem of designating plot points, but on a large data file, it takes much time to move from one side of the screen to the other (a couple of minutes when using 252 data points). The program could be greatly enhanced by putting in commands to allow speedier movement through the data.

In addition to trend-lines through data points, the program allows you to specify 1/3 and 2/3 speed resistance lines. These lines are drawn above or below existing trend-lines and at a steeper or shallower angle, depending upon whether the trend-line is moving up or down. The analysts say that the lines indicate areas of support or resistance for a stock once it crosses its trend-line.

One problem with the program is that you cannot save your work. Once you have taken the time and trouble to draw all of the various trend-lines, moving averages, etc., the commands that produced those indicators are not saved. Thus, the next time you want to look at that stock, you must reconstruct your previous work. The only provision for saving work is to create a Binary file of the Hi-Res picture.

Not all analysis is performed using stock prices. Trading volume is often considered essential for recognizing accumulation or distribution. If a stock breaks through its trend-line on the upward side without significant activity, some would consider the upward move to be weak. Thus, trading based on the breakout might be questionable. The normal program display shows individual-day volume performance below the price graph. The volumes are normalized to the lowest value in the period being graphed (one day will always show zero volume), and the average trading volume is shown by a broken line. The value of this average is displayed on the bottom of the screen.

Other available volume indicators are the negative and positive volume (NVI, PVI), cumulative volume (CVI), price-volume trends (PVT), and daily volume (DVI). The NVI and PVI relate drops or rises in volume to changes in closing price. The CVI maintains a running total of excess up-volume over down-volume over time (using standard techniques, since actual volumes associated with up and down moves are not known). The PVT is an offshoot of this, using percentages of the price move to determine how much volume to add or subtract to the cumulative total. Finally, the DVI indicates volume moves based on whether a stock closes above or below the mid-point of its daily high/low range. The program computes all of these indicators based on standard formulas, all listed in the manual. Their use is optional, and their value is largely subjective. Most technical analysts use only a few indicators, and they develop a feel for how those indicators act over time for particular stocks.
The \textit{Dow Jones Market Analyzer} also produces oscillator charts, which show trends that may not be obvious from simple graphs. One example is a "momentum" curve: classically, the moving average of a moving average. The oscillator is created in the form \( X(I) = A(I) - Z(I) \), where each of \( A \) and \( Z \) are different indicators. The creation and use of these oscillators are limited only by your imagination. I cannot comment on their validity.

The last analysis technique allowed by the program is comparison charting. Using this, you can compare how a $100 investment in a stock or market index performed in relation to another stock or market index. Five different stocks or indices may be displayed simultaneously. They are shown in different colors, so if you have a monochrome monitor, you may have trouble picking an individual line out of the chart when they all run together. The same problem occurs when attempting to print comparison charts.

The program is well constructed and works very well in all commands. The manual is good, but a bit sparse. It seems that the program has been updated recently, but the manual has not. For example, recently the Dow Jones computer service added the capability to retrieve up to a year's historical prices, instead of 24 days as in the past. The program allows you to access the full year's prices, but the manual only indicates the capability to retrieve 24 days. The manual addresses the problem that someone with an old Apple II with a RAM card faces when loading Applesoft and then running the program (simply booting the disk won't work). The instructions call for booting the Apple master disk first to load Applesoft, then booting the program disk. This does not work. Instead, first boot the Apple master and then issue the command Run Menu to start the program. The program disk is copy protected, with the caution that a copy attempt will destroy the disk. I didn't try it. Provided with the program package are two system disks (one a back-up) and two blank data disks (one for historical records, the other for temporary data).

The \textit{Dow Jones Market Analyzer} is a significant tool for technical analysis of stocks and similar investments. If technical analysis is your forte, and you can live with the constraints of the Apple Hi-Res screen, then this program may be of considerable help to you. Note that a Hayes Micromodem or acoustic coupler, a second disk, and a printer are highly recommended. Also, a color monitor helps when comparing stocks.

\begin{table}
\begin{tabular}{|l|c|c|c|c|}
\hline
\textbf{DOW JONES MARKET MANAGER} & & & & \\
\textbf{Company:} Dow Jones Software & & & & \\
\textbf{Language:} Run-time Pascal & & & & \\
\textbf{Hardware Requirements:} 48K, Hayes Micromodem and printer & & & & \\
\hline
\textbf{OVERALL RATING} & C & \textbf{DOCUMENTATION} & B & \\
\textbf{EASE OF USE} & A & \textbf{VALUE FOR MONEY} & C & \\
\textbf{VENDOR SUPPORT} & B+ & \textbf{VISUAL APPEAL} & A- & \\
\textbf{RELIABILITY} & A & \textbf{ERROR HANDLING} & A & \\
\textbf{Department:} Business & & & & \\
\textbf{Sugg. Retail:} $299.00 & & & & \\
\textbf{Availability:} 8 & & & & \\
\textbf{Disk or Tape:} Disk* & & & & \\
\hline
\end{tabular}
\end{table}

\textit{Dow Jones Market Manager} claims to be a portfolio management tool for the private or professional investor who requires an accounting and control system for maintaining multiple portfolios. The program is part of a series marketed by Dow Jones. It performs as advertised. However, it is limited in that transaction costs, stock dividends, dividend date, and option termination dates are not recorded, making it impossible to obtain a yield analysis, monthly income forecasts, a price/earning analysis, or a summary of transaction costs. While these are not necessary for portfolio control, the actual yield being obtained (as opposed to the dollars) is necessary to determine if your investment strategy is working.

The program is copy protected and the manual states that "copying will make your program disks unusable." Two program disks come with the package. Further back-up disks are available for $30. If you don't have all of the hardware listed above, the program will let you operate without a particular item. All are recommended, however, for efficient operation.

The program will control up to 26 different portfolios with a maximum of 150 "tax lots" or positions. You may access the Dow Jones computer for each stock in your database (up to 150). In addition, you have the option of retrieving and storing a total of five news stories concerning your stocks on the data disk. This program, like the others in the series, cannot transfer data to other Dow Jones programs, nor can it retrieve data obtained by the other programs. This effectively doubles or triples your data retrieval costs if you use all three Dow Jones programs on the same stocks (the \textit{Manager} and the \textit{Analyzer} are the two you would most likely use together).
The Manager is menu-driven and easy to operate. Follow the instructions to communicate with Dow Jones, maintain a portfolio, generate reports, price securities, setup your system, and perform a number of maintenance utilities. When you communicate with the Dow Jones computer, you have the option of gathering news, current quotes, looking at stored news, or going into a terminal mode where any of the other Dow Jones databases can be accessed. In the portfolio maintenance mode you may add, change, or delete transactions, enter cash transactions, and delete gain/loss entries. Entry of cash can help keep track of transaction costs and dividends, but will not give you accurate yield analysis. Four reports are available: holdings by portfolio; holdings by symbol; realized gains/losses; and an audit trail of year-to-date transactions. When in the pricing securities mode, you have the option of auto or manual pricing. Using the auto pricing option the computer will do all necessary data retrieval, display and storage. In the manual mode, obviously, you enter the data yourself. The last recorded entry is shown as a default. Finally, utilities are provided to create a new data disk, erase a gain/loss file, erase a year-to-date file, back-up a data disk, and condense an open position file (necessary when your transactions approach the 150 limit).

The Dow Jones Market Manager is an adequate portfolio management program that complements the others in the Dow Jones series. It can serve the needs of many, but is deficient in a few key areas.

DOW JONES MICROSCOPE

Company: Dow Jones Software  
Language: Applesoft  
Hardware Requirements: 48K; modem; printer.

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<th>OVERALL RATING</th>
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The Dow Jones Market Microscope is designed to assist the investor who makes decisions based on fundamental market information, versus technical analysis like that performed by the Dow Jones program, the Market Analyzer. The fundamental indicators used by the program are those on file in the Dow Jones computer timesharing database. A total of 68 indicators are recognized. From those 68, you may select up to 20 and pull them from the Dow Jones database for storage on the program's data disk. The data disk will hold up to 20 lists of stocks with up to 50 stocks in each list. That gives you a total of 1,000 stocks and 20 indicators per stock on a single data disk. One drawback is that the same 20 indicators must be used for all stocks on the same data disk. The solution to this is to use multiple data disks for storing data—one disk for every different set of indicators (assuming that you need more than 20).

To start the program you must have Applesoft loaded into your computer. The manual makes no provision for older Apples with a 16K card and Integer on the motherboard. The correct sequence requires you to first boot the DOS Master disk to load the 16K card, and then issue the command Run Mod with the Market Microscope disk in place. From that point on, the program is menu driven and, with a quick test using the sample session, easy to use. Note that the Dow Jones Microscope is compatible with the II.

I ran the program to its limits. I selected fifty stocks (half on the New York and half on the American exchange) and automatically retrieved 20 indicators for each stock from the 68 available. The indicators were selected such that both the Dow Jones Media General and Corporate Earnings Estimator databases would have to be accessed. All information was accurately obtained and stored on disk. At 300 baud, from logging onto the Dow Jones computer to hanging up the phone took 80-½ minutes. Current rates for the two databases used (assuming the Blue Chip membership discount and non-prime time) is 60-cents per minute. The basic data, therefore, cost $48.30. You will probably incur lower costs because you will rarely need to screen 50 stocks, but be advised that this screening is expensive. You will have to decide just how much you are willing to pay for the data. The program has no provision for entering the data manually, so you are locked into using the Dow Jones computer service.

Now that you have collected the data, the program gives you several analysis options. The first that you will probably want to use is the option to screen your stock choices for possible purchase. You may specify up to 16 of the 20 indicators on which you collected information and create a "buy screen." For each of the indicators on your screen, you will be asked to specify if you want the stocks ranked from low value to high, or high to low value, and the critical value above or below which you consider the stock a poor buy. Once the complete screen is specified, the program will search the data for each stock and rank them for each indicator. The symbol "*" is used to indicate
where the critical value that you specified is for each indicator and ranking. All of this information can be printed for your inspection. In addition, a matrix shows stocks versus indicators. From this matrix, you can readily see which stocks fall within all or the majority of your indicators. This part of the program works well. When you have a portfolio and want to screen for those stocks that you might wish to sell, the program sets up “sell screens” as well. Before entering buy or sell screens, do a bit of research and make certain that you have the information required on hand before starting. To avoid inaccurate results, examine the raw data collected from Dow Jones for its format and make certain that you use the same.

A second analysis option is the production of “price alerts.” Instead of gathering data on all indicators, the program will access Dow Jones for the current price and volume only. Using screens you establish with up to 12 criteria, price alerts may be issued when the criteria are met. In addition to the preceding features, the Market Microscope also has the E-Z Terminal features of all Dow Jones software, allowing you to access the portions of the Dow Jones database not automatically accessed by the program. The program has no provisions for using collected data, but this option does allow you to obtain news stories from the Wall Street Journal. Finally, the terminal program is not particularly sophisticated, but serves the purpose of logging you on and accessing data.

If fundamental analysis is of interest to you and you need a program to collect basic information, and then screen that information in various ways, the Dow Jones Market Microscope should be high on your list of programs. On the other hand, if you are a casual investor who buys one stock a year, the expense of the program and data collection may not pay.

**Dow Jones News and Quotes Reporter**

- **Company:** Apple Computer, Inc.
- **Language:** Pascal
- **Hardware Requirements:** 48K; modem

| OVERALL RATING | B- |
| EASE OF USE | B+ |
| VENDOR SUPPORT | B |
| DOCUMENTATION | A |
| VALUE FOR MONEY | B- |
| VISUAL APPEAL | A- |
| RELIABILITY | A- |
| ERROR HANDLING | A |

The Dow Jones News and Quotes Reporter is a terminal program designed especially for the service by the same name (see the review for the Dow Jones Connector for a description of this service). The program is specifically designed to easily access the news service and current/historical quote service provided by Dow Jones. A terminal mode is also provided which, with the proper Dow Jones system commands, will allow you to access any feature of the database.

The program displays the information it receives as a series of screens, each screen representing one page received from Dow Jones. You may print each screen in order to record the information, but no provision is made to transfer information to disk for storage and later use by other programs. The program can receive and handle both 40-and 80-column information. By shifting between 40-column screens with Control-A or with an 80-column card, you can simulate the 80-column display.

A particularly nice feature of the program is its ability to log onto the Dow Jones system automatically if you have an autodial modem. Even with an acoustic modem, once the Telenet or Tymnet connection is made, the log-on process is automatic. With autodial, the system will attempt a connection, and, if unsuccessful, will try an alternate number. Once connected and logged on, the program accepts your commands. If you think too long, the program protects you (and your pocketbook) with a timeout feature that logs you off. When this happens, you will have to redo the log-on procedure. This may be a bother, but may ultimately save you money if you require a lot of time during your connection.

The program manual is complete and well organized. In addition to the program, you receive a Dow Jones contract for connection to the database, and a current version of the Dow Jones operating manual for reference. The Dow Jones News and Quotes Reporter is an introduction to the Dow Jones service, but will probably be supplanted by more general programs as your needs grow. Consider those needs carefully when thinking about programs to access the Dow Jones database.
The Market Maverick is a program designed to predict target values for stocks based upon the effect of inflation on price-earnings ratios. Using your projection of inflation, the program first calculates a target price-earnings ratio for the market as a whole. Then, with your inputs of estimated earnings growth rate, percentage of earnings paid out in dividends, estimated earnings per share, and volatility of historical earnings, the program computes a stock's target P/E and target price. After the target values have been calculated, they are compared with current prices to determine upward and downward potentials. All the stocks that you are evaluating are then compared and ranked in terms of their upward potential. By performing these calculations, the program can warn you when a stock is overvalued and alert you to stocks that might be undervalued.

To use the Market Maverick, you must gather all the information necessary for the program to perform its calculations. To help you in this research, the program comes with a data disk listing the most current information on about 950 stocks. If you find this useful (and you will if you screen more than just a couple of stocks), you may subscribe to a service called the Maverick Manager and receive a similar disk each month. The cost of the service is $180 per year, with the first year discounted to $120. If you choose to enter the data yourself, the best source is Value Line, assuming that they report on the stocks which interest you. The next best source would be your broker, although he may not be very interested if you do not do enough trading to make the research worth his time.

An interesting feature of the program, the optional "sensitivity analysis," allows parameters to be changed until the target value is equal to the current price. You may then use this information to see what growth rate or level of earnings is implied by the current stock price. This can be useful when evaluating growth stocks. If the growth rate cannot be supported by the underlying data, then you may be analyzing a "glamour stock." If you own such a stock, you should watch the price closely because it is probably overvalued. After running the "sensitivity analysis," you may then display a graph of growth versus price, or normalized earnings per share versus price.

When using the Market Maverick, you will probably want to screen a group or several groups of stocks. The program allows up to 255 different databases with up to 200 stocks in each. Eight of these may be on the same data disk. With this capability you may investigate stocks in a common industry group or any other group you wish. Before changing databases, be sure to save your work or it will be lost. Your databases may be manually or automatically updated over time. For automatic updating, the program reads files saved by either the Dow Jones Market Analyzer (see review in this section) or Dowlog.

The program performs the functions advertised, but, like any other investment analysis program, this does not mean that it guarantees you profits. It is a tool which you must decide how best to use. The manual is complete and even includes a section on the theory used by the program, so that the advanced investor may make a better judgment on the accuracy of the results. As indicated, you will also receive the most current version of the Maverick Manager disk with information on 950 stocks. The Market Maverick is an interesting program that gives you reasonable data upon which to base decisions. Note that this program has an IBM 64K version.
THE MARKET TECHNICIAN

Company: Datamost
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: B+
EASE OF USE: B−
VENDOR SUPPORT: B

DOCUMENTATION: B+
VALUE FOR MONEY: A−
VISUAL APPEAL: B+

RELIABILITY: C
ERROR HANDLING: B

The Market Technician is a technical analysis and charting program that permits the user to store and retrieve overall market (NYSE) data in user-defined formats for analyzing the strengths and weaknesses of the market. In addition, it has the capability for entering and maintaining a database of individual stock price and volume data, either by manual entry or by accessing the Dow Jones News/Retrieval Service (DJN/RS). The Market Technician can also accept DIF files generated by other programs, such as VisiCalc and VisiPlot/VisiTrend, and provides a utility to convert data files created by the Market Technician into the DIF format for use by those other programs. However, there is no provision for any stock portfolio management, such as recording purchases and sales.

One of the most important features of the program is the Market Database, which is supplied on a separate disk. The Market Database contains 13 daily NYSE statistics, such as the DJIA and the S & P 500 Index, including two computer-calculated statistics: the Advance-Decline Line and Net Cumulative Volume. The Market Database statistics start at January 2, 1979, and continue to a "current update date." It must then be kept up on a daily basis by manual entry of the market data (obtained from such sources as the Wall Street Journal). Be sure to check the date of your disk. Mine was six weeks behind, which would have meant the manual entry of over 350 data items. However, a call to Datamost had an updated disk quickly on its way to me.

The raw market data in the Market Database is transformed by the Market Technician program into data files of 120 time periods (days or weeks), which can then be used to perform price-volume analyses. In addition, the data files can be graphed in almost any form, such as price-volume, moving averages, momentum series, oscillator line, and trend line. The program will also graph the relative strength of any two data files, overlay two separate graphs, and perform a statistical analysis of the correlation between the two data files. All charts can be printed or saved to disk.

The program also creates individual stock data files, known as “stockfiles,” containing 120 days of price and volume data. Up to 40 of these stockfiles may be stored on a separate disk, and multiple disks may be created, allowing you to store as many stockfiles as desired. The stockfiles can be analyzed and graphed in exactly the same manner as the Market Database data files described above, and the program has the capability of adjusting for stock splits. Data entry is either manual or through the DJN/RS. A “bug” apparently exists in the manual entry mode, as the program would not properly accept manual-entry data for either the historical database or the daily update. A replacement program disk had the same problem. A call to Datamost failed to come up with an immediate solution; however, the Datamost staff was cooperative and offered to contact the program's author to resolve the problem. Access to the DJN/RS is rapid, straightforward, and fully described in the manual.

The program is menu-driven, and uses the right and left arrow keys to move the cursor to the various selections, where hitting the Return-key will complete the entry. An improvement to the Graph Data menu would be a prompt to replace the program disk with a data disk after the menu appears. Error trapping is good, and an error will return you to the menu or prompt you to re-enter the data.

The manual is 75 pages long, contains sample printouts of the various charts and graphs, and takes you step-by-step through each menu screen, showing you what the screen will look like and then describing each menu selection. However, because of the order in which the menus are presented, certain key information (like how to set the system parameters) is not available until you are halfway through. I strongly recommend that you read the entire manual before attempting to run the program.

Overall, the extensive analysis and charting capabilities, ease of operation, and attractive price make the Market Technician a program well worth the investment.
The Intermediate Composite created by the Market Tracker is touted to be an "intermediate-trend timing index which provides buy and sell signals on the Dow Jones Industrial Averages." The index is based on a variety of technical market indicators which are combined into a composite buy/sell signal. This is not a stock indicator, but a market indicator, and may or may not be applicable to a specific stock you are studying. This is an important point, because the direction of the market only partly affects the individual price of a given stock, and it's possible for a stock to rise in a bear market and fall in a bull market.

To use the Market Tracker you must input information about several market indicators. Among these are:

1. Dow Industrials closing average.
2. Short Interest ratio (published monthly but required daily).
3. Number of new highs.
4. Number of new lows.
5. Most active figures.
6. Number of net breakouts (you must use Stock Tracker to find this).
7. Climax indicator (interpreted from graphic data).
8. Dow Jones chart pattern (interpreted from graphic data).
9. Number of advances.
10. Number of declines.
11. Ten-day advance/decline number (interpreted from graphic data).

Entering the data into Market Tracker takes a minimal amount of time, while compiling the data takes considerably more time. For example, one of the input items is the number of net breakouts for the thirty Dow Industrials as determined by the Stock Tracker program (also marketed by H & H Trading Company). The processing of thirty stocks takes 25 minutes, not counting the time it takes to compile the raw price/volume data as input to Stock Tracker. Plan on spending at least an hour a day once you get the hang of collecting and entering data into this program.

Some of the input data requires your interpretation of graphical data (indicated in the list above). Interpretation rules are provided in the manual, but sometimes determining breakout points for graphs is not easy, especially when the graph oscillates about the relevant point. Also provided are some rules for combining the results of Market Tracker and Stock Tracker when the latter issues a "doubtful" signal. These rules are handy, since the actual theory behind the combination of programs is not clearly stated.

All data entered is stored on a special data disk. Because moving averages are used for several of the indicators, the relevant data covers only the last 30 days. You may edit any data within that period, and the program will re-compute the composite index from that day forward. Data older than 30 days resides on the disk for archive purposes, but you cannot edit it to obtain a corrected index.

Also included on the disk is a graphing program which produces either Hi-Res screen graphs or Low-Res printer graphs of the various input parameters. You may use these graphs for determining the indices which require graphical interpretation, but the manual recommends that you do not. The Hi-Res graphs are too small to show accurate trend-lines, and the Low-Res graphs are not accurate enough. Use the plot paper provided with the program. It gives you a permanent record of all past decisions, and this is important: your interpretation of the graphs is crucial to the program's operation.

Market Tracker does everything it claims to do in terms of creating an indicator to show the stock market trend. I am not prepared to comment on the accuracy of the indicator. The program is very time consuming, and you must decide if you want to put in the time for the return.
**Options-80**

Company: Options-80  
Language: Applesoft  
Hardware Requirements: 48K

OVERALL RATING  EASE OF USE  VENDOR SUPPORT  
B  B-  

DOCUMENTATION  VALUE FOR MONEY  VISUAL APPEAL  
B+  B-  C  

RELIABILITY  ERROR HANDLING  
B  B+

*Options-80* is a helpful package used for analyzing investment opportunities in stock options. The program compares the potential gains or losses from the sale or purchase of puts, calls, and spreads. Although stock options are widely traded—often the number of options traded exceeds the daily volume of trades in the stock itself—these legitimate investments are viewed by the uninitiated as the “lottery tickets” of the Exchanges. *Options-80* does not reduce the risk in trading options; it merely calculates that risk in terms of an annualized return (or loss) on money invested in the option position, a helpful tool in weighing the options available.

The single most disappointing feature of this program is that it requires manually inputting the current prices for the options to be compared. The Dow Jones News Service, through modem connection to a local telephone number, provides current quotes for listed options at a cost of ten to fifteen cents a minute. Yet this program requires you to input current prices from the *Wall Street Journal* or some other source. This is inconvenient—large paper, small print, and you must convert fractions to decimals. But, more important, it often makes data unavailable in time to construct models for decision making. If the morning paper arrives as the market opens, the option prices, in most cases, will have changed by the time the decision-making models can be constructed. I would gladly have paid twice the price for this program with the auto-dial and log-on feature found in the better stock market software.

With that criticism aside, the program does well what it promises to do. The documentation is well done and even entertaining. It has an index, but should have an appendix of defined variables. One graph can be used to compare one, two, or three options on the same stock—three calls, three puts, three options, etc.—each with striking price and/or expiration dates. And there is more. The program also compares different spreads, decisions of whether to buy back an option previously sold, and writing covered calls. For all of these, the graphs show the annualized return on the option positions relative to the up or down movement of the underlying stock. Graphs can be printed immediately (provided you have written a screen dump program, which can be easily inserted to this software) or saved to disk (but a second drive is not supported).

The program allows you to configure several other components to the investment return analysis which are often ignored: commission cost, dividends on the underlying stock (if owning the stock is part of the transaction), the cost of money, and the difference between buy and sell prices. The program also computes in dollars for any option transaction contemplated, the immediate cash received or cash required and the maximum risk of any deal. Understandably, it does not quantify risk, nor does it attempt to compare such open-ended positions as the “naked” call write.

*Options-80* does all the arithmetic for analyzing your option alternatives, according to your cost of money and commissions circumstances, in terms of annualized yield potential. If there is a revision with auto-access of current quotes, my rating would go up.

**OptionCalc**

Company: Savant Software, Inc.  
Language: Applesoft and Machine  
Hardware Requirements: 48K

OVERALL RATING  EASE OF USE  VENDOR SUPPORT  
A-  A+  B  

DOCUMENTATION  VALUE FOR MONEY  VISUAL APPEAL  
B+  B-  A-  

RELIABILITY  ERROR HANDLING  
A  A  

*OptionCalc* uses Black-Scholes’ theory to calculate the theoretical Put and Call option values for a given stock. You input the current date; stock symbol, price, and volatility; T-bill rate; quarterly dividend per share; next ex-dividend
Stock Market Programs

The Book of Apple Software

date; exercise price; and expiration month. Given this information, the program calculates the Put and Call option values, the exact expiration date, the delta or hedge ratio, and the Put and Call symbols. All data appear on the screen in an easy-to-read format. You may change individual items in order to make “what if” exercises easy. (The Black-Scholes model is well known to option players. This review makes no attempt to validate that model.)

OptionCalc’s screen display is good. Each item to be entered appears on its own line. Cursor control allows you to move to any entry at will. Date entry is particularly interesting. The program recognizes virtually any form of the date that you might want to use. The month may come first or second, be spelled out or abbreviated, be a number, etc. Any date between 1980 and 2079 will be accepted. If you are still using the program in 2079, I suspect that you may be able to talk Savant Software into updating it. Numbers are equally easy to enter, and are recognized in many forms. For example, 9.25 and 9 ¼ are both recognized as the same number. The program handles calculations to six significant digits.

The basic use of the program is to see if Put and Call options are over- or under-priced in today’s market. The manual outlines various methods of doing this, although some specific examples would be helpful. The program provides excellent visual display of both the input and output data. The only problem with this program is that you have to pay for it. The Black-Scholes model, which forms OptionCalc’s useful core, is available in several forms through your local computer club as public-domain software.

### Portfolio Master 3.1

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<td>Language</td>
<td>Applesoft</td>
</tr>
<tr>
<td>Hardware Requirements</td>
<td>48K, 2 Drives, plus (for automatic retrieval of stock prices) D.C. Hayes Micromodem</td>
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**Overall Rating:** B-  
**Ease of Use:** A-  
**Vendor Support:** C  
**Documentation:** B-  
**Value for Money:** B-  
**Visual Appeal:** B  

**Department:** Business  
**Suggested Retail:** $195.00  
**Availability:** 3  
**Disk or Tape:** Disk*

**Portfolio Master 3.1** is a program designed to help manage a securities portfolio — that is, to record purchases and sales, compute gains and losses, keep track of option expiration dates, and evaluate current holdings. For the latter purpose, the program can access the Dow Jones News/Retrieval Service to obtain current prices for securities in the portfolio, or they can easily be entered in manually from other sources. No historical price information is recorded, nor is any charting capability included.

A single data disk can store many named securities’ portfolios (just how many is not specified), each one consisting of purchase and sale information for up to 100 different securities. The program is designed to accept transactions involving any of a wide range of security types, including stocks (long and short positions), options, bonds, and even rights and warrants.

The program automatically maintains a CASH entry, and partially keeps track of changes in CASH due to purchases and sales. There is no direct provision for a margin account, however. Both stock splits and stock dividends can be recorded, but you cannot record covered options on your own stock.

The program allows you to print on-screen or with the printer several different 40-column reports showing gains and losses (both long and short-term), specific purchase and sales information, and expiration and/or maturity dates for options, bonds, T-bills, etc. Some nice features include summarizing securities by category, sorting by name within category, and showing, for each security or category, the percentage its value bears to the entire portfolio. In addition, there are two 80-column reports summarizing all the above information as either unrealized or realized gains and losses. Unfortunately, in including all types of securities in the same format (essentially a stock format), these reports afford only sketchy treatment of certain other types of securities. For example, they do not include option strike prices, or dividend and bond yields.

This program has a competent user interface. Menus are organized well enough, and data entry and correction is easy (however, prices can be entered only as decimals). It contains provisions for a variable printer and modem slots, as well as printer control functions and line feed control. A password and two different phone numbers can be stored for Dow Jones access.
The documentation consists of a small, 70-page manual which is quite readable as far as it goes, although it needs amplification (to include all menus and to discuss all input options). No sample reports are included, a serious omission. But a sample portfolio is provided with the program for experimentation. The program disk is protected from copying by ordinary means, but a free backup disk is promised upon return of a completed registration card.

This is a useful program, easy to use, and is general enough for the average investor. On the other hand, it might fall a little short of the needs of a professional securities analyst.

**SOAP [STOCK OPTION ANALYSIS]**

**Company:** H & H Scientific  
**Language:** Applesoft  
**Hardware Requirements:** 48K

| OVERALL RATING | B+ |
| EASE OF USE | A- |
| VENDOR SUPPORT | A |

**DOCUMENTATION**  
**VALUE FOR MONEY**  
**VISUAL APPEAL**

**RELIABILITY**  
**ERROR HANDLING**

H & H Scientific has come out with a useful and reliable business package in the program Soap. With Soap, you may calculate and graph (with High Resolution graphics) anticipated profits or losses on option trading.

If you're an experienced investor, Soap can take care of a lot of the necessary record keeping associated with option trading. For the novice, the fact that you can set up a scenario and follow it through without risking a money investment, makes Soap a valuable learning tool.

The program is fairly straightforward in its approach, and relatively easy to use. Documentation is adequate, although one always hopes for more.

So for those investors already familiar with stock options, and novices interested in learning about them, Soap is definitely worth a look.

**STOCK MARKET ADVANCE/DECLINE TIMING PROGRAM**

**Company:** Dr. Roger Altman  
**Language:** Applesoft and Machine  
**Hardware Requirements:** 48K

| OVERALL RATING | C- |
| EASE OF USE | B- |
| VENDOR SUPPORT | D |

**DOCUMENTATION**  
**VALUE FOR MONEY**  
**VISUAL APPEAL**

**RELIABILITY**  
**ERROR HANDLING**

The Stock Market Advance/Decline Timing Program is designed to give guidance on overall market movement, not on individual stocks and options. It uses daily and/or weekly data of New York Stock Exchange (NYSE) Advancing and Declining Issues, which are entered into the program from the keyboard. The program then calculates the Advance/Decline Line (ADL) and makes “predictions” on the performance of the market, including recommendations on the trading action to be taken. These predictions and trading actions are presented for upmarket (bullish) predictions and downmarket (bearish) predictions, with the predictions based on market expectations for the next 5-25 days using daily data, and 3-13 weeks using weekly data. Advance/decline points (a measure of performance calculated by the computer) are indicated for the bullish and bearish predictions, with the expectation that the investor will take the action that will yield the largest amount of positive Advance/Decline points.

The timing system used in the program is based on the penetration of one exponential moving average through another. The author claims that the degree of penetration as well as the time period used for both exponential moving averages were derived from computer analyses of a database consisting of thousands of prefiltered input values.
Program usage is straightforward. Upon booting the disk, you will be asked if you wish to use a Silentype printer to record results. The program will apparently work only with a Silentype printer, as I could not get proper operation with my Epson MX-100 (with Grafrax) and a Grappler+ interface card. Next, you will be asked to select either the daily or weekly option, and then you will be given the opportunity to manage the existing database or enter new data into the database. Following completion of data entry, the program will make its predictions. You may view either all of the predictions to date, or only the most recent predictions. After viewing the tabular output, you will be given the opportunity to see a graph of the ADL as well as a plot of the points gained in both rising and falling markets. This graph is very difficult to read, as there are no labels or values presented for either the horizontal or vertical axes. Following presentation of the graph, the program is terminated.

The problem with this "one pass through" system is that you must reboot and go through each step every time you want a different option, such as looking at all of the predictions instead of just the most recent ones. Also, if you change your mind after making a selection, you cannot escape except by pressing Reset and rebooting.

The program is copy-protected, and a back-up disk is provided. Vendor assistance is very difficult to obtain, as the author is an independent publisher with just a post office box for an address and no telephone number shown.

The "manual" consists of 15 loosely bound, single-sided sheets, more in the style of a technical paper than a manual. The write-up could have been clearer on how to interpret the predictions.

The bottom line with any system is how well it performs its intended job. In my opinion, Stock Market does not perform well. Looking at the 1983 predictions at the time this review was written, we have the following:

<table>
<thead>
<tr>
<th>A/D POINTS</th>
<th>BULLISH</th>
<th>DATE</th>
<th>BEARISH</th>
<th>A/D POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>+2</td>
<td>Buy</td>
<td>12/23/82</td>
<td>Cover</td>
<td>-596</td>
</tr>
<tr>
<td></td>
<td>Sell</td>
<td>01/03/83</td>
<td>Short</td>
<td></td>
</tr>
<tr>
<td>+2090</td>
<td>Buy</td>
<td>01/21/83</td>
<td>Cover</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Sell</td>
<td>01/27/83</td>
<td>Short</td>
<td></td>
</tr>
<tr>
<td>+4519</td>
<td>Sell</td>
<td>03/14/83</td>
<td>Short</td>
<td>-781</td>
</tr>
<tr>
<td></td>
<td>Buy</td>
<td>04/11/83</td>
<td>Cover</td>
<td></td>
</tr>
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<td>Short</td>
<td>-1184</td>
</tr>
<tr>
<td>+135</td>
<td>Buy</td>
<td>05/05/83</td>
<td>Cover</td>
<td></td>
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<tr>
<td></td>
<td>Sell</td>
<td>05/17/83</td>
<td>Short</td>
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In just 5 months, the program made 5 Buy/Sell recommendations, with 3 of the 5 involving buying and selling within a one-week period. The only ones guaranteed to make money with this approach are your stockbroker and the IRS.

While the ADL is one of the most important indicators of overall market performance, it should be used in conjunction with other indicators to get the most accurate picture of the market. Furthermore, no purely mechanical system will ever replace logical analysis and rational judgment by the human investor.

**STOCKFOCUS**

**Company:** Centennial Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**EASE OF USE**  
**VENDOR SUPPORT**  
**DOCUMENTATION**  
**VALUE FOR MONEY**  
**VISUAL APPEARANCE**  
**RELIABILITY**  
**ERROR HANDLING**

**Department:** Business  
**Sugg. Retail:** $59.95  
**Availability:** 7  
**Disk or Tape:** Disk

*Stockfocus* is a fundamental analysis stock market tool, designed to provide an investor with an estimated range of reasonable value for a particular stock. The system accepts data about the capital structure of a company and its last five years' earnings and dividend payout history. Using this data, *Stockfocus* will calculate and estimate (1) the lowest reasonable per share value, (2) the highest reasonable per share value, (3) the percent change that the stock would undergo if its current price moved to either of these values, and (4) the price earnings ratio that the stock would have at either of the two levels as compared with the current ratio.
The model used in *Stockfocus* was developed by the operations research department of a major money center bank and has been in use for the last three years. The authors claim that it is currently being used by well over 50 financial institutions throughout the country. The model estimates the value of a stock by capitalizing the recent earnings performance given the capital structure of the company and the prevailing cost of capital. It assumes that the earnings record and capital structure of the company’s recent past will be typical of its near future. While it is true that a company’s future performance will reflect its past, the rapidly changing financial states we live in would caution against this assumption. For the high valuation, the model assumes an investor time horizon of 15 years and a prevailing cost of capital of 10%. The low valuation uses an investor time horizon of 5 years and a prevailing cost of capital of 15%. These cost of capital values can be changed in the model and easy adjustment is provided for making changes in the range of 8 to 18%. No provision is made for adjusting the time horizons.

Data input requires entering from the keyboard information on the company, projected financial data, and historical financial data. An entry must be made for each item. The company, historical, and current year data can be obtained from a good stock advisory service or reference, such as “Value Line” (in fact, this is the recommended reference). Projected data may be determined either by your direct estimate, or if a growth percentage is entered, the program will apply that percentage to the current data for its projections. Results can be saved to disk or can be printed. A simple graph is presented along with the numerical data for the high-low values. A unique feature of the system is the Help menu, which is a text file containing messages on how to enter data. This Help menu can be accessed at any time.

The manual is a perfect example of more not necessarily being better. It is approximately 80 pages long, in loose-leaf form. However, not even one tab or divider is provided to help separate one section from another. Information, such as keyboard entry requirements, is repetitious. This makes for an overly complex and confusing manual. However, it does contain a good description of the calculations performed, a fine glossary of terms used, and examples of the various input and output screens.

The program is copyable, using standard Apple copying programs. It is recommended that data disks be prepared separately from the program disk.

### STOCK PORTFOLIO SYSTEM

**Company:** Smith Micro Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
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<tbody>
<tr>
<td>B</td>
<td>C</td>
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<td>C</td>
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The *Stock Portfolio System* is a program for use in managing a stock and option portfolio. It allows the user to record purchases, sales, commissions, dividends and splits, and prints reports showing the resulting gains or losses. In addition, upon entering current price information for unsold holdings, the user may obtain a report showing the current value of his portfolio. The program does not provide for the storing of historical stock price information, and cannot be used to access any stock services via telephone.

This program is designed to allow you to record most common transactions involving your stock and option holdings. Only one portfolio can be stored on a data disk, and although no mention is made of how many transactions can be recorded over the course of a year, presumably the number is adequate since no historical price information is stored. There is an important provision for both cash and margin purchases. The program calculates the margin account equity, which you can also update by entering margin account interest expenses as well as money market interest income. You can record dividend payment schedules, as well as dividends actually received, both cash or stock. Stock splits can also be adequately reflected in your records. Option purchases and sales can be recorded, as well as any options you might write on your own stock.

The program produces some nicely designed reports, including current portfolio status (for which you manually enter an up-to-date price for each of your holdings), realized profits and losses on past transactions, dividend income, and interest expenses and income. Another useful feature allows you to flag important events which will occur in the upcoming 30 days (a variable term would have been nicer), such as stocks going long-term, dividends.
due to be paid, and expiring option contract. There is provision for transferring active stock records over to a new year, and the package includes a sample portfolio which can be used for practice in running the program. This is a program which is fairly complete and adequate to the task it sets for itself. That is why one is saddened to note that this version suffers from a serious flaw in implementation. Specifically, the program mishandles the problem of allowing a user to correct mistakes as he types in data. After entering an entire screen of data, any errors in input must be corrected by retyping every item on the screen whether in error or not — dates, dollar amounts, numbers of shares — all of it must be retyped. According to the program’s author, by the time this review is published, a revised version will be available in which this flaw has been corrected; and several other enhancements will have been incorporated, including the ability to update stock prices via telephone interface with the Dow Jones Service. It is upon the expectation of this revised version that the above ratings are based.

The program comes with a handsomely bound, but brief, 32-page manual printed by a dot-matrix printer. The program disk is protected from being copied by ordinary means, but a free backup is promised with the return of a signed license agreement.

**STOCK PRICE FORECAST**

<table>
<thead>
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<th>Company: J.R. Software</th>
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<tr>
<td>Language: Applesoft</td>
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<td>Hardware Requirements: 48K</td>
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<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>B-</th>
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<tbody>
<tr>
<td>EASE OF USE</td>
<td>A-</td>
</tr>
<tr>
<td>VENDOR SUPPORT</td>
<td>B-</td>
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<tr>
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</tr>
<tr>
<td>VALUE FOR MONEY</td>
<td>C+</td>
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<tr>
<td>VISUAL APPEAL</td>
<td>B</td>
</tr>
<tr>
<td>RELIABILITY</td>
<td>A-</td>
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<tr>
<td>ERROR HANDLING</td>
<td>C-</td>
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The Stock Price Forecast program uses statistical techniques to predict a particular stock’s high and low prices during some future period (usually a 12-month period). The program works with twenty years of past data about cash flow, earnings, dividends, and stock high/low prices. Using this information, the program performs a regression analysis to relate stock price to other variables. Two equations are created: one for stock highs and one for stock lows. Once you generate the equations, you are asked for predictions of a company’s cash flow, earnings, and dividends for the future period. The program will then use the developed equations to “predict” the future stock high and low prices.

The program is written in Applesoft and offers little sophistication. Since no error-trapping routines are used, you may easily make a mistake on any input statement. There is no defined way to exit the program, although if you are at the Main Menu and press Q, you are dumped back to Applesoft with a Stop statement. The manual is adequate, but does not describe the theory particularly well. Data sheets are provided for the collection of data on stocks, and the Value Line is cited as a good source of data for both past information and the required predictions of cash flow, earnings, and dividends.

As stated in the manual, Stock Price Forecast is a tool to help make decisions, not an absolute authority on stock prices. Some stocks will have good correlation between the data and prices; others will not. The manual suggests that you simply ignore those that don’t. That’s all well and good if you are simply screening stocks. If you want to use the program on a particular stock, however, you may find that you cannot. Of course, because the program claims to work best using twenty years of data, you cannot use it to analyze many new stocks. The other point to keep in mind is that the same service recommended for future projections of input data — Value Line — also makes predictions of stock prices. If you only want a simple projection, then you don’t need the program; just go to the library and read Value Line. The program would be most useful if you want to see what the effects are for different input data. Consider your needs carefully before making a choice.

The Information Master original program disk is copy protected, so be particularly careful during the initial learning period. High Technology promises to provide purchasers with a back-up copy at no additional charge after they have received and accepted your signed license agreement.

A problem with Information Master is that it lacks recovery protection from the accidental pressing of the Reset-key, a common problem on the Apple. High Technology should consider providing a “reset protector” (a small o-ring) with the documentation package, much like Stoneware did in the early days of DB-Master.

The documentation that comes with the package is detailed and offers an excellent example of the hand-holding operator’s manual. The text is supported with figures and screen representations. Almost all activities are menu
driven and simplify the process of data entry and manipulation. In addition, a number of excellent sample file systems are included which demonstrate Information Master's ability to adapt to a variety of formats including inventory control, sales, payroll, property management, education, and mailing labels.

Error trapping could be improved. On a number of occasions during the review process, I encountered data hang-ups which could only be cleared by using the Escape-key. Another annoying feature is that a large amount of time is spent waiting for the computer to run. Routines should be developed to speed up this process and improve the time efficiency.

The report generation procedures are complicated, although the excellent tutorial descriptions help to clarify them. The use of worksheets is essential the first time through. Here again an improvement would have been to allow the reports to be developed using the CRT, and let the software do all the format definitions behind the scene.

The capabilities of Information Master can easily be expanded by simply adding a couple of very useful companion programs which are also distributed by High Technology. Data Master and Transit are accessory packages that will expand the file systems of Information Master. Data Master lets you alter the file layout of the existing Information Master files without the usual problems of re-entering the data. Transit will convert existing data files from using other software packages into files that can be used by Information Master.

In conclusion, Information Master will provide an excellent working package for anyone who needs a sophisticated file management capability that can support file definition, creation, maintenance, manipulation, and revision.

**STOCK TRACKER, Version 3.5**

*Company:* H & H Trading Company  
*Language:* Applesoft  
*Hardware Requirements:* 48K

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<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
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<tbody>
<tr>
<td>B+</td>
<td>B-</td>
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<td>A</td>
<td>A</td>
<td>A-</td>
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Department: Business  
Sugg. Retail: $395.00  
Availability: 7  
Disk or Tape: Disk

The program Stock Tracker uses technical analysis of stock data to produce buy/sell signals. Unlike most other technical analysis programs, which use price information, Stock Tracker uses volume in connection with the direction of price movement to predict future price trends. The program uses a modification of Joseph Granville's On-Balance Volume theory in order to track volume moves. Granville's basic thesis is that volume patterns precede price patterns. Any sustained buying or selling of stock will be followed by a price change. Support and resistance levels for the volume indicator are produced and used to signal buy or sell decisions. These signals call for: (1) buy stock and buy call option, (2) hold stock position and hold option position, (3) sell stock and buy put option, (4) close stock position and close option position, (5) hold stock position and close option position, and (6) stock warning and option warning.

The setup of the program is straightforward. First, you create a data file. If you do not have a data disk, the program lets you create one, a process which takes several minutes (be prepared for much disk activity). Though I did not examine a data disk, the program appears to be setting up a system of random access files over the entire disk surface. This would account for the long initialization process. Once you create a data disk, you are ready to start entering data. In former versions of this program, you were only allowed to make single entries, which the program would follow with extensive calculations. This made data entry tedious. This version corrects that problem and gives you the option of single entry, or batch entry of up to 30 at a time. The extensive processing still takes place, but now you can let the computer "do its thing" while you do yours. When you choose the option of entering 30 days of data (or 30 individual stocks for the same day), be prepared for a 25-minute session during which data entry will take you about 10 minutes and processing another 15. During that time, extensive disk activity takes place.

Another useful addition to this version of Stock Tracker is its ability to edit data files already on disk. After you have changed the erroneous data, the program will then recalculate all subsequent data. This may be useful should you discover a typing error or find that your data source published incorrect information. You may review all data entered and computed by the program through a print option in the Main Menu. Once you enter enough data to
cause several buy/sell signals, you may opt to print only a summary of the signals instead of the total data. You can thus track the action of stocks without sifting through many pages of data. In addition, you can display or print the decision table in order to study the set support/resistance levels and other critical program parameters. The final method of displaying data involves a graphics representation of either a stock's price, its volume, the volume indicator, or some combination of these. You may direct the graph to the Hi-Res screen or to the printer as a Lo-Res chart. The graph is initially displayed with the high and low values defining the vertical axis. If this is unacceptable to you, there is also an option which allows you to change the axis values. There is no option which allows you to save the Hi-Res graph to a data disk. You can, however, insert your own graphics print routine. You can insert the proper disk B-Save command into the program if you wish.

This version of the Stock Tracker program formats data disks differently from previous versions. It also has a Convert program which allows you to upgrade your old data disks. While Stock Tracker is fairly clear to run, interpreting results requires a certain amount of judgment. To help you, the manual dedicates 16 pages to a discussion of the theory behind the volume calculations and how to interpret the results. This section will not make you an expert in the use of the program, but it does introduce you to the basics. If you consider volume an accurate indicator of stock price trends, Stock Tracker could be what you have been looking for.

H & H Trading Company has instituted a new customer support policy. It will no longer provide free support to its customers, with the exception of a period of one month from the date of purchase. After this time, support will be charged at a rate of $50.00/hour, with a $25.00 minimum charge. The company advises that "persons calling in by phone for assistance should have their bank card ready." We advise you to take this policy into consideration before purchasing a $395.00 program.

### WALL STREETER

**Company:** Micro Lab  
**Language:** Applesoft  
**Hardware Requirements:** 48K  
**Sugg. Retail:** $300.00  
**Availability:** 7  
**Disk or Tape:** Disk

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>VENDOR SUPPORT</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
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The Wall Streeter is an integrated, menu-driven package of four stock analysis and portfolio management programs. It provides for weekly updates of the stock market database via modem-supported communication with CompuServe Information Service, or, optionally, through manual input. The database permits tracking of up to 98 different stocks. It can also track the Dow Jones Industrial Average, the New York Composite Indices, advances and declines, Value Line Timeliness and Safety, Standard and Poor's rankings, beta, dividend yield, price/earning ratio, number of shares traded per day, forty weeks of prices, and high and low prices of forty weeks for each of the 98 stocks.

The Wall Streeter focuses on stock-price and market-index trends to aid in buy/sell decisions. It calculates and charts crossover moving averages and computes ratios of current-, 5-, 15-, and 40-week averages of market indices and stock prices. These ratios are compared with flexible, user-determined criteria to indicate and recommend appropriate buy, hold, sell, or sell short actions. Tentative criterion values for these ratios are proposed based on popular textbook statistics, for which references are provided.

The package further provides for weekly updates. It also tracks stock purchases, commissions and interest associated with transactions, and overall results of gains and losses from initial investments. Hard-copy summaries of the corresponding reports can be provided if you have access to a printer.

The manual accompanying the Wall Streeter is simple, clear, and direct. Included are examples helping you understand the various menus and the reports. A sample data disk is provided to assist you in learning to use programs. An especially nice feature of the package is its hierarchical organization of the underlying menus. This allows for branching between programs without having to use more than one command or to change disks.
Although the Wall Streeter has many desirable characteristics, it also has some disadvantages. First of all, because it uses Applesoft BASIC, it runs slowly. Secondly, the Lo-Res graphics do not make for crisp pictures of trends. As a result, you have to mentally project trend-lines across histogram “bars.” You cannot detect small fluctuations in data without referring to the table underlying the graph. Finally, there is a small, but irritating “bug” in the analysis result, you have to mentally project trend-lines across histogram “bars.” You cannot detect small fluctuations in data.

The Wall Streeter is likely to be welcomed by those who follow a number of stocks, especially if they choose to subscribe to CompuServe Information Service to update their databases.

### THE WALL STREET PLOTTER

**Company:** Dickens Data Systems, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>VENDOR SUPPORT</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
</tr>
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<tbody>
<tr>
<td>A-</td>
<td>A</td>
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<td>A-</td>
<td>B+</td>
<td>A</td>
<td>A</td>
<td>A</td>
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</table>

The Wall Street Plotter accepts data input from the keyboard or a file created by a “data capture” program, graphs that data for any defined 84-day period, and creates an optional four-day moving average for the data. If you wish, the program will also perform a trading cycle trend analysis: a form of momentum analysis which issues buy and sell signals in the form of graph threshold crossings. You set the thresholds using a measure of stock volatility. This program, however, only performs technical analysis, and you are advised that the program may issue several buy signals or sell signals in a row with the possibility that a sell signal will be at a lower price than a preceding buy signal. This points out a truth about stock market analysis programs: never trade on the basis of a single technical indicator. Indicators are guides, not infallible trading signals.

The Wall Street Plotter has several sub-programs, including a data file editor, a plot generator for the high-low-close plots, the trading cycle trend analysis program, and several system utilities. The editor allows you to create a new data file, save data to disk, list files to the screen or printer, or modify data files. The standard graph is a daily plot of high-low-close prices along with volume. To this you may add a four-day moving average. Generally, the program will select the vertical axis divisions. You may, however, set them yourself in order to correlate other charts from the same stock over different time periods.

The trading cycle trend analysis program analyzes the data file, then produces a double graph showing stock prices on the top half and the trend analysis on the bottom. Buy and sell lines are clearly marked on the trend analysis graph. A crossing from the bottom buy area into the central zone indicates a buy signal, and a crossing from the top sell area into the central zone indicates a sell signal. For the analysis, you will be asked for the 52-week high and low values of the stock, which are used to calculate the stock’s volatility. If you do not have them, however, the program will calculate a volatility based on the data in the file. At this point you are once again given the option of specifying vertical axis information.

System utilities are the last menu option. With these, you may print the graphics plots, save or load plots to or from the disk, change the system specifications for data disk drive, create a data filter for developing data files from “captured” data files, and create a download module for the program Superplotter.

The Wall Street Plotter performs as advertised. I examined four stocks over the 84-day period starting February 8, 1982, and examined the buy/sell signals. The program issued the following signals. For IBM, only two signals were issued: a buy at 59 with a sell at 63-% some 28 days later. International Harvester issued the following signals in order: buy at 5-%, sell at 5-½, buy at 5-½, buy at 4-%, sell at 5, and buy at 3-%. Bank of America gave a sell signal at 19-%, a buy signal at 17-%, a sell at 18-%, a buy at 18-%, a buy at 17-%, a sell signal at 19, and finally a buy at 16-%—all over an 84-day period. Tandy yielded these signals: buy at 31-%, buy at 27-%, sell at 30-%, sell at 31-%, and finally two buys at 28-% and 27-%. If you were to have acted on the first buy signal for each stock and sold on the first sell signal with transactions.
of 100 shares each, you would have started with $11,325 and gained $487 over the 84-day period. This is 4% over the period, but does not take into account any transaction costs (broker fees and the like). Naturally, just because the program produced these results this time, there is no guarantee that it will do so in the future. Use The Wall Street Plotter at your own risk.

Real Estate Programs

PROPERTY MANAGEMENT

Company: Continental Software
Language: Applesoft
Hardware Requirements: 48K, 2 Disk Drives, Printer (132 columns)

Continental Software's Property Management system is designed to help automate all of the bookkeeping functions normally required in the management of income property. It is applicable to both residential and commercial properties, and provides time- and money-saving assistance to either the professional property manager or to an individual owner. To begin, the user records detailed information (much of it optional) about each property and all of its rental units and tenants. This information can be printed in several different report formats. These reports show rental unit characteristics such as size, rate per square foot, number of bedrooms and baths, utilities paid for, etc, as well as such tenant information as name and address, telephone, lease dates, rent amounts, alternate mailing addresses, and more.

Each month the standard rental charges are automatically posted to each tenant's balances. Then, throughout the month, the program records a complete transaction history of all tenant charges, deposits, payments, refunds, and write-offs, maintaining current balances for all accounts. There is a complete, printable audit trail for all transactions which take place during the month.

In addition, all property-related expenses, depreciation, and non-rent income may be recorded in a flexible IRS-like income/expense format which can be modified and expanded in order to create custom reports.

Although the program uses double-entry bookkeeping internally, this is transparent to the user unless he elects to interface to other Continental Software CPA accounting packages. In that latter case, each month the program can automatically receive summary account information from the Accounts Payable program (if computer check printing for bills is desirable), and/or transfer summary account information to the General Ledger program (for a Balance Sheet and more detailed Profit and Loss Statement).

Many well-organized and readable reports can be printed, with user-selectable variations. These include property and rental unit descriptions, tenant information, rental status, transaction history (audit trail), and an income/expense summary. In addition, the program can produce a formal, accounts-receivable type ageing report (with variable ageing intervals). It can also print out tenant statements with mailing labels, if desired.

Other notable features include: (1) tenant rent dates may vary throughout the month; (2) tenants who are overdue or scheduled to vacate within some specified period can be flagged in on-screen or printed reports; (3) as an option, late charges can be automatically computed and posted to delinquent tenants; and (4) rent increase dates and percentages can be recorded and printed for rent control purposes.

Accompanying this program is an extremely thorough user's manual of over 200 pages, which includes step-by-step instructions with detailed screen representations, a diagram showing monthly processing steps, a complete set of sample reports, a glossary, and a very complete index.

The following system capacities apply to a 48K Apple with 2 standard mini-floppy disk drives: A maximum of 10 properties, each with a separate set of books, may be stored on a single data diskette. (There is no limit on the number of data diskettes which can be generated.) A maximum of 100 rental units (and tenants) can be defined for a single property. This means that a single diskette can store one complex of 100 units, or two of 50 units, or ten of 10 units. Future versions taking advantage of storage devices with greater capacity are planned.

The program itself is easy to use, although some thought must be given in advance as to the organization of accounts. Data input has deliberately been made as easy and foolproof as possible, and the well-organized menus allow speedy access from one program segment to another.
This program is an extremely useful and cost-effective tool for the professional property manager. However, it can also assist the individual investor with several units of income property by helping him to formalize his bookkeeping habits, with an eye toward greater profitability (e.g. from reduced losses due to misplaced or incomplete information); provide assistance at tax time; or keep investment partners adequately informed. If any of these fit your situation, then the Property Management system merits your consideration.

**REAL ESTATE ANALYSIS**

**Company:** Powersoft  
**Language:** Applesoft  
**Hardware Requirements:** 32K

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Real Estate Analysis provides three primary features: (1) Real Estate Analysis Program, (2) Generation of Amortization Schedule, and (3) Generation of Depreciation Schedule. The program provides for a variety of input parameters relating to income property analysis and a meaningful analysis of a selected income property. Input parameters divide into three separate sections—Loan Data, Income, and Operating Expenses. Loan Data has an option for existing or new financing, but does not consider multiple loans. Income includes rental income, yearly increase in rent, vacancy factor, and “other” (remaining combined income). Operating Expenses has an option for lumped operational expenses or detailed inputs. The program set-up makes it easy to change or edit any individual input parameter and run comparative data afterwards. You can display or print the output, which consists of a summary of the data input and an analysis summary of the results by year (the number of years for analysis is open to choice). Analysis includes cash flow before and after taxes, adjusted basis, capital gains, pre-and post-tax proceeds, and return on investment. A set of seven plots is available for display only. You are cautioned to hand calculate the results to help you understand the treatment of the data output. You must also read the documentation very carefully to determine the assumptions made. For example, the depreciation value is 85% of the purchase price; this may be valid for some properties, but not for others.

Sections two and three provide amortization and depreciation schedules and are fairly straightforward. To sum up, this is a handy program for the individual, but less so for the professional.

**REAL ESTATE MODELS FOR THE EIGHTIES**

**Company:** Commercial Software Systems  
**Language:** Machine  
**Hardware Requirements:** 48K

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As anyone knows who has any involvement at all with real estate, the days of the simple fixed rate mortgage are over. Today, almost every real estate deal involves some sort of “creative financing.” This situation has given rise to a new language. Before buying or selling you should be familiar with such mortgage terms as: adjustable rate, graduated payments, wraparounds, balloon payments, and buy downs.

You'll find Real Estate Models for the Eighties to be a productive tool in assisting you to evaluate these new types of mortgages. The program is set up as a series of VisiCalc-compatible templates; this means that these models are pre-formed for you and must be loaded into your VisiCalc program. The specific templates include:

1. Detail amortization
2. Summary amortization
3. Comparative depreciation
4. Wraparound mortgage
5. Cash flow and equity return protection
Each template provides an adequate and useful analysis. Documentation is sparse, but it is usable provided you are already familiar with the above terms. I would have preferred the inclusion of a fuller description of each template, to assist those not deeply knowledgeable in real estate financing. It effectively requires an a priori expertise in real estate. But apart from these limitations, the program works well, and generally meets the objectives that it sets out to achieve. Not for the novice, but worth investigating.

Realfocus is designed to help the real estate professional or investor evaluate the potential performance of a particular investment. Although the program performs a number of other useful functions, its main task involves the computation of the “internal rate of return” (IRR) and “modified internal rate of return” (MIRR) of an investment. The program analyzes a property’s cash flow and estimated sale price, and calculates what an interest rate would have to be on a hypothetical savings account to yield the same amount.

This is harder than it sounds. For one thing, items such as depreciation, your tax rate, the present value of future receipts, inflation, financing, and so on, have to be considered. This program, believe it or not, does it all; it even computes the most arcane creative financing possibilities. For instance, it can handle up to six mortgages on one project, accounting for “balloon” mortgages, equity participation by the lender, and any combination of rates and years. It also depreciates according to the new ACRS rules, switches over to straight-line at the correct time, and computes depreciation recapture. All this in 10 minutes; that is how long it took me to key in and print out a complete, attractive report on a project after spending about an hour reading the manual and working through the very clear tutorial.

One disk is provided with the program. However, it is copyable and listable. The instructions for making a working copy are among the clearest I have read. After making the working copy, the original can be filed away. Data can either be saved on the working disk or on a separate data disk, on one or two drives; no disk swapping is necessary.

The manual is both good and bad. At first, the typographical errors bothered me. I work on the assumption that a document which is not proofread cannot be well written. But this manual, while it looks amateurish, is very helpful. It is divided into an excellent hands-on tutorial, and a handy reference section. It only lacks a good index and a good proofreader to make it perfect.

Entering data is easy and straightforward. Errors are handled gracefully, and the system encourages a what-if approach to changing data items. Information can be stored on disk or printed out in either a draft or finished format. The final product would be totally acceptable to a client. The program can analyze one project or several and run them together or in phases. It is possible to project an entire planned development or a duplex. You can even produce reports for part-owners.

The theory that the program is grounded upon, the “internal” or “modified internal” rate of return, makes a lot of sense to a real estate professional and can be easily explained to a client. It emphasizes the advantage of a real estate investment and puts the final product in a readable format. Realfocus offers an effective selling tool for a professional and an excellent analysis/comparison tool for an investor.

The modest price of this program, its practicality, its ease of use and its unprotected, listable (and therefore modifiable) aspects make it an excellent buy for either the real estate professional or the serious investor. It is close to perfect. If the publishers hire a manual writer who can spell, they would get straight A’s.
Tax Programs

THE TAX ADVANTAGE

Company: Continental
Language: Applesoft
Hardware Requirements: 48K

_The Tax Advantage_ is a good general purpose tax preparation program. It supports Form 1040, schedules A, B, C, D, E, G and SE, and forms 4562 and 4797 (this latter form is not mentioned in the manual, but is part of the program).

The program is very easy to use. All functions are menu controlled, or are input with a few easily learned keystrokes; and in most cases won't have to be memorized since they also appear in a help menu at the bottom of the screen. When the program starts, you are asked to input some basic identification data (or review that data, if already entered).

Once you've entered all preliminary data the program proceeds to Form 1040; and when you come to a line that requires another form, you simply call it up. The same is true of the other schedules. If, for instance, you require a form for calculating the data, an option allows you to simply call up that form on screen as needed. You are not encumbered by memorizing the forms; the program prompts you with the necessary hints. (Of course, if you want a specific form, you must know what schedule it appears on.)

A very useful feature of _The Tax Advantage_ is its ability to itemize any line on the form at any time. Simply move the cursor to a line and hit the “I” key. You can then add specific items into an itemization file, the sum of which is then entered onto the line in question. Itemization takes priority over any single entry that may already be on the line. An “inverse video”-I indicates that you have itemized a line, and will not allow you to make a single entry into the data file.

Several other nice features include the ability to show tax calculations at any line in Form 1040. The 40-column Apple screen requires that many line items be abbreviated. Since these abbreviations are difficult to remember, type “D” on any line and a full description of the item will appear on the screen. Full editing capabilities are available for data entry and modification.

The program is also capable of temporarily overriding figures entered onto the Form 1040. CTRL-X allows you to override several lines, including those already itemized. An “O” will temporarily override a single entry. These options let you easily calculate the year-end tax figures of one or more tax strategies.

Another convenient feature is the printing capability. _The Tax Advantage_ enables you to print out your data, facilitating information entry onto Form 1040. It will also print out schedule forms which can, in turn, be attached to Form 1040 and submitted as backup copies.

If you submit your own tax returns, it is recommended that you double check your figures and calculations; and the program can be extremely valuable when used in conjunction with your personal tax accountant. _The Tax Advantage_, finally, is also an effective tax planner for projecting income into the rest of the fiscal year.

One caution in using the program: be very careful when entering data. The character accept routine is slow, and if you type at a normal to average typing speed, you may lose characters. This is being corrected, and subsequent versions should be improved. All updates and customer support services will be provided to you for one year upon registration of your program at a $10.00 extended warranty fee. Also, next year’s version of _The Tax Advantage_ will be offered to registered owners at half price.

_The Tax Advantage_ will meet the needs of most users, and will definitely facilitate the seemingly insurmountable task of filling in your tax forms by the April 15th deadline.
The Professional Tax Plan (PTP) is a tax planning tool designed for use by both individual taxpayers and professional tax preparers. As a planning tool, PTP will not prepare your tax return for you. Rather, it will help you in making the financial decisions necessary to reduce your present and future tax liability. It does this by providing you with two different planning modes: (1) a single situation for up to 5 years, and (2) a comparison of 5 different situations for one year. The program contains tax rate schedules and tables for tax years 1981 through 1984. For years after 1984, the program will use the 1984 rates, though these rates will be indexed if an entry is made in the “Cost of Living Adjustment” input screen (see below for a discussion of input screens).

In its latest version, PTP has been updated to reflect the provisions of the Tax Equity and Fiscal Responsibility Act of 1982. The program will handle virtually any tax input/computation. Its only limitation is that it does not compute the limitation on regulated futures contracts if the Section 509 election is made.

PTP uses both a program disk and a data disk, so while it will work with one drive, the use of two drives greatly speeds up the program operation. The program is menu-driven, with entry instructions shown on each menu. There are 95 input screens, each one described in the manual. An Input Reference Guide listing each of the 95 inputs is included. These input screens cover Filing Status, Exemptions, Income, Deductions, Credits, Payments, Indexing, etc. The program will automatically advance screen by screen as you complete data entry, or you may skip to any screen by entering “S” and the screen number. Pressing the “?”/” key while in the data entry portion of the program will display a Help screen, providing you with information as to what to enter for a particular tax input. When data entry and calculations are complete, the program lets you print results for all, or selected situations or periods.

The manual is very comprehensive and contains two numerical examples that demonstrate virtually all of the program’s capabilities. One problem is that some key items, such as information on which years tax rate schedules are included in the program, are buried in the examples. These are stumbled across when they should be highlighted. Pictures of most of the menu screens are shown.

Both the program disk and the data disk are copyable by COPY A. However, it should be noted that program usage is through a non-exclusive and non-transferable license granted by Aardvark. An annual maintenance policy for tax law changes and program enhancements is available.

In summary, PTP is a comprehensive, easy to use tax planning program that should assist both taxpayers and tax preparers in making the decisions necessary to reduce tax liabilities. However, no program, no matter how comprehensive, can ever fully replace a trusted and competent tax advisor. As long as there is an IRS, there will be a need for a CPA.

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This program is the same as Tax Break Planner, but only for one tax year. It does not have multi-year projection capabilities and costs $50 less. Annual updates are $50, and backup disks $5. Although this is a good program that does exactly what it says it will, the Tax Break Planner seems like a better buy because of the multi-year forecasting function. (Please see the review for that program.)
**TAX BREAK PLANNER**

**Company:** ProForma Software  
**Language:** BASIC and Machine  
**Hardware Requirements:** 48K

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This tax planning program computes your taxes for the current year and future years by indexing. You start out by entering the information on worksheets generated by the program or directly onto the screen. This is not a line-by-line tax preparation program. Some schedules, such as Schedule A (itemized deductions), Schedule D (capital gains/losses), and Schedule G (income averaging) require information in some detail, but this program runs after all the schedules have been computed because it integrates the figures from all the schedules, computes the various deductions and credits that depend upon other figures (such as child care credits and medical deductions), and figures the lowest possible tax.

Data entry and correction are easy, and the program leads you step-by-step through the operation. The manual is clear and assumes no computer knowledge. It has an explanation for each line of information required. After entering the data, you can change it or calculate the tax. This latter step takes only sixty seconds. The program displays the results on the screen or prints them in an attractive and easy-to-read format. You can then make changes in the original entries or perform “what if” projections for future tax years. Each change and projection can be saved on disk and printed. One nice extra is the “Audit Potential Score.” Using statistical data, the program compares your chances of audit against the average. A score over 200 suggests a high possibility of audit.

Vendor support is excellent. I called ProForma because the program would not compute IRA and Keogh retirement amounts for a taxpayer who was an active member of a partnership. A revised disk was rushed out to me after a friendly consultation.

Updates for the next tax year are available for $50; backup disks for $5; and a new program for printing the forms, for $75. These very reasonable charges must be considered when evaluating the total cost of any tax program. Some charge nearly as much for updates as for the original program. Also to be considered is that the program will run on the unenhanced 48K Apple. It does not require two disk drives or a printer.

This is an easy-to-use, fast, and powerful program, backed by a good company.

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**TAXCOMP**

**Company:** Morgan Computing Co., Inc.  
**Language:** N/A  
**Hardware Requirements:** 64K

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**Taxcomp** is not a program but a series of VisiCalc templates. It allows taxpayers who use the form 1040 and certain of the basic schedules (A, B, C, D, E, G, and SE) to calculate their federal income tax liability. The templates will not print the tax forms for you, however, they only perform the calculations. Also, the templates and the accompanying documentation is not designed to teach you income tax law. Again, **Taxcomp** will only do calculations. You are responsible for providing the proper input.

You begin by booting up VisiCalc and loading one of the four VisiCalc files on the Taxcomp disk. The manual instructs you which file to load based on your filing status. After that, it is a matter of following the instructions for entering data for the various forms. I found the instructions easy to follow, although it is possible that someone who is not familiar with VisiCalc would have a more difficult time. I entered data pertaining to a client of mine with a moderately complex return (salaries, itemized deductions, rental income and expenses, and income averaging). The tax calculation was correct, as it arrived at the same answer as another income tax program I use.
The program comes with 1982 tax tables entered. In the manual are tax rates for 1983 and instructions on how to enter them into the templates. The instructions properly note that this procedure does not "assure compliance with 1983 tax law," as changes in the tax laws occur every year.

The program also suggests a method of keeping tax records during 1983 using the templates, but the suggestion seems impractical. After loading the template, there is only about 5K of worksheet space left (4K if you use the Videc Videoterm preboot disk with VisiCalc to get 80 column display). If you have moderately complex financial affairs, you may run out of memory if you attempt the suggested entries.

There is no provision in the manual for customer support. But if you are familiar with both the tax laws and VisiCalc, you probably will not need it. The manual explains the templates quite adequately. However, page one of the manual states that Forms 2106, 2441, and 3468 can also be computed using the templates. This is incorrect. I was unable to find any provision for filling out these forms.

I attempted to use Taxcomp with another spreadsheet program I have which is able to read VisiCalc files. In the past, I have had no problem using this program with VisiCalc files, but it was unable to completely read the Taxcomp templates.

Finally, I think that $100.00 is too much to pay for tax calculations on a small number of forms, even though these are the most widely used individual tax forms. Prospective buyers will have to make their own decision about that.

**TAX-MANAGER**

**Company:** Micro-Lab

**Language:** Applesoft

**Hardware Requirements:** 48K

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The Tax-Manager is a tax preparation program that collects information for and prints out nine forms (1040, 2106, 4726, 4625, 6325, 2210, 2441, 3468, and 5695) and seven schedules (A,B,C,D,E,G, and SE). Unfortunately, as a tax preparer, all the program does is ask you to fill out the forms. The only calculations performed are the same you could do with the print form and a four-function calculator. No feature allows you to use the program to collect information and then report the results of that collection. This limits the usefulness of the program if all you have to prepare is one tax form.

Of course, once entries are made and stored to disk, you may then go back and change one or more to see what the effect is on your final tax. For tax planning, the program becomes more useful although you still must know where, and on what form, to make the entries.

The program does have an interesting sub-program that allows you to search a file by keyword to find tax tips. You may, for example, search for all entries having to do with veteran's benefits, and the program will present tips for you to consider when tax planning. You can find most of the tips by careful reading of IRS Publication 17, which explains all of the common forms and the allowable entries, but having a keyword index can be a help since the government documents are not always conveniently organized.

The program performs well and is easy to use. If you do not have Applesoft in ROM, you will have to boot the DOS Master disk first in order to load Applesoft into your memory expansion card.

Another sub-program helps you find required forms. The program asks a series of questions and then uses your answers to determine the most likely set of forms you will need.

The manual is laconic, at best. It gives the most basic information with no screen displays or other graphics to guide the beginner. The manual pages are lost amongst the space available in the 7" x 9" three ring binder provided for them.

Two copies of the master disk are provided, and Micro-Lab has a reasonable replacement policy ($10 and 30-days); or, if you prefer, you may purchase an extended warranty for $30/year. With the warranty, you receive free replacement for damaged disks and all updates as issued.

The best feature of this program, finally, are the sub-programs to help you find deductions and to determine the proper set of tax forms for you. The tax preparation portion of the program does its job, but it is not outstanding.
Although it does not figure taxes for a particular year, the Tax Planner is very good at computing long-range tax calculations. Once you have the amounts worked out, this program helps you project your tax liability into future years. It also allows you to play “what if” games by changing the assumptions made for each year. Thus, it is possible to work out four different assumptions for four different tax years. These assumptions can then be compared to each other to determine tax strategies for coming years. The system is geared toward the professional programmer. It supports a number of different users and clients. Nevertheless, it is easy enough for individual tax use.

A nice feature of the Tax Planner is that once the data is entered for the first year, the system will reproduce and recompute the data for succeeding years and assumptions. Therefore, it is only necessary to key in the basic information once for each client. After that, only changes need be entered. The program also has a utility function which allows you to change the parameters for each tax year. For example, even though initially the Tax Planner may have been programmed for the years 1982-85, you can update it.

The screen editing commands are easy to use, and the computations are very quick. Data entry and correction is simple. The program is menu-based and almost self-explanatory. You can produce printed reports which compare a maximum of four years to each other or to four assumptions. The reports are attractive and professional-looking. The program also includes an excellent depreciation module which produces charts for all types of computations, including accelerated cost depreciation as well as straight-line, declining balance, etc. You can also prepare separate state and federal schedules. The system can use data from CPAids’ Master Tax Program, a tax return preparation program. The Tax Planner will lift the data required directly from the Master Tax Program and use it in the tax projections. This integration would substantially reduce typing and calculation time and is another nice touch. An additional module computes tax on the sale of a residence.

Documentation is weak. The manual provided is stamped “for evaluation only” and perhaps is not what is provided for the end user. It lacks an index and tabbing, and the information on formatting Apple disks is slightly incorrect. That the system can be used so easily is a tribute to the program itself, not to the manual. I had no reason to call the company, which was a good thing, since they provided neither a hotline phone number nor even an address in the manual.

The program is powerful and easy to use. It fulfills a real function and does it well. The individual taxpayer, unless financially very active, might find it a bit expensive, but it is an excellent tool for the tax advisor.

The TAX PREPARER program is very useful for record keeping throughout the year and investigation of alternate tax strategies. Just about any schedule or form that you may need is represented in the package (schedules A, B, C, D, E, F, G, R&RP, SE, TC and forms 1040, 2210, 2106, 3468, 4562, 4726, 4797, and 5695).

It is important to note that this is a record keeping program and not a program which will tell you what to do to optimize your tax position. You must make the decisions on what to enter on to the forms and what is legal and not.
This is important to remember when using any program of this type. Another important point to keep in mind is that there is no guarantee put forth by the software vendor regarding the accuracy of computations in the program. The IRS insists on holding you responsible for the accuracy of what you turn in to them. This is not to imply that the TAX PREPARER makes errors. It is only an advisory that you will be held responsible for inaccurate input results.

All of the software worked as advertised and updates for each form were posted to the 1040 as required. It is possible to make errors if certain forms are used before others, but these cases are spelled out in the instructions. Records are kept by code name so that several files can be placed on a data disk either to record different strategies or to accommodate several clients should the program be used for commercial tax preparation. This is very convenient.

Output can be either to the screen or to a line printer. If line printer output is used, the form may be sent directly to the IRS as part of your tax return (except form 1040). In the case of the 1040 requirements, there are provisions for formatted output onto a standard form 1040.

Another useful feature is the ability to create itemized lists for various entries. The system lists of up to 1,000 entries, each of which will be summarized by the program and totals entered onto the appropriate forms. The lists may be printed as supporting data for the IRS.

Data entry is relatively convenient and editing data entries is quite convenient. This helps when studying alternatives.

Program documentation is marginal. The instructions will allow you to run the programs properly but that is about all. Only a few forms are provided in the appendix. A sample return is included with the program disk, which is helpful in learning how to use the program. Error trapping is relatively good in handling user problems. Nonetheless, it is possible to bomb the program by doing really offbeat things.

Because tax laws change yearly, Howard Software offers a nice update package. Each year in January, an update will be produced and be available to all users "...at a fraction of the cost of your original disk." In addition, packages which include more forms are in preparation along with certain state returns.

This is a very useful and well-designed package, with nice functional features.

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**Personal Finance**

**DISK-O-CHECK**

**Company:** High Technology  
**Language:** BASIC  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**B**  

**EASE OF USE**  
**A**  

**VENDOR SUPPORT**  
**B-**

**DOCUMENTATION**  
**B**  

**VALUE FOR MONEY**  
**C+**  

**VISUAL APPEAL**  
**A**  

**RELIABILITY**  
**A**  

**ERROR HANDLING**  
**A**

**Availability:** 7  
**Disk or Tape:** Disk

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**Department:** Business  
**Sugg. Retail:** $100.00

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Disk-O-Check is a checkbook program designed to record, print, and reconcile one or more checking accounts. This system has the capacity of storing approximately 2,300 checks and deposits. After using this program for about two months, I have discovered only a few flaws. First, the system takes approximately twenty-five seconds to load, which seems too long when compared with other checkbook programs. Second, the system sorts checks and deposits by date. Thus, when you enter checks or deposits with several different dates that are out of sequence, you may have to wait as long as seven or eight minutes for the program to sort these against those that have already been sorted and stored. Although the manual cautions you concerning inputting checks and deposits that are chronologically out of sequence, I really did not appreciate the warning until I had to wait for the system to sort new inputs.

On the other hand, Disk-O-Check is a menu-driven program which is very easy to use. The program includes a sample check file with step-by-step instructions that can be completed in less than twenty minutes the first time through. There are five entries that you must make for each check or deposit: check number or 000 for deposit, date (MMDDYY), description of payee, amount, and a one or two letter code. This program highlights each deposit on the screen for easy viewing.

One advantage of Disk-O-Check is that the program will automatically print the next consecutive check number and the year of your checks once you have entered the month and the day. (This can be a problem if you run a test check.) In addition, the description field for your checks and deposits will accept up to twenty-five characters.

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Disk-O-Check permits you to design and set up one or two letter codes for your deposits and checks. For example, you can let the letter "M" stand for all checks paid for medical expenses including doctors, hospitals, and drugs. Also, since the system permits a two letter code description, you may create subfiles on each family member by adding a second letter to the code. Thus, at the end of the month or year, you can quickly summarize and analyze the total amount of family medical bills or the medical expense on each family member. You can also create subfiles for different autos, travel expenses, or just about anything else. This feature allows Disk-O-Check to be used by a small business for recording its general ledger.

After all checks and deposits and your codes are entered, Disk-O-Check will list and print to the screen or printer those checks under a particular letter code or all checks and deposits by pressing the “S” key for “summarize checks.” Once you have chosen this option, you may print a full list of all checks and deposits stored in a particular code or just the totals. You may search for a check by check number, date, description, amount, or code. During your search, if no check is found, the screen will display “no match” and the computer will beep twice.

Unlike other checkbook programs, Disk-O-Check has no budget analysis or check printing capabilities. However, overall I found Disk-O-Check to be a reliable and easy to use system.

THE HOME ACCOUNTANT

Company: Continental Software
Language: Applesoft BASIC
Hardware Requirements: 48K

The Home Accountant is one of the most comprehensive home financial programs available. It is also one of the most popular, remaining a best seller since its introduction two years ago. It is compatible with a wide range of printers, and it can be set up for several system configurations (but not hard disks). The documentation is extensive and well written. To set up the system, just follow the examples presented. You do not need to know a particular accounting system, or be an expert accountant yourself.

You select one of the ten modules of the program through a Main Menu. One of the first steps in setting up the system is to choose a budget category. Up to 100 categories are allowed. All budget categories are allocated into five broad areas: assets, credit cards, liabilities, income, and expenses. You can enter a maximum of nine digits in any dollar amount per transaction, with a maximum of ten digits in any totals column.

The system will keep track of five checkbooks. Entries into the checkbook accounts can be divided into any of the established categories. For example, you can divide a loan payment into principal and interest, or a paycheck deposit into tax, retirement, and dues. When you enter checks, the program assumes they have not cleared the bank. After you receive a bank statement, you may note the outstanding checks as cleared, and the reconciliation is complete. You can also print checks, but you must purchase special formatted checks for this purpose.

The Home Accountant offers extensive search and edit capabilities. You can search through entries from the checkbook, cash account, or credit card accounts. The search criteria offers a combination of information (for instance, date, check number, or amount). When the search matches up to the information you want, it is presented on the screen for editing. You can also interface the program with Continental’s Tax Advantage program, flagging relevant income and expense entries for later transfer into the tax preparation program. This saves you the bother of rekeying in much data when it comes time to do your taxes.

The graphics module is good. You can select any category for a graph, and you can compare both expenditures and budgeted amounts. Presentations, on screen only, can be in the form of bar, line, or trend analysis graphs. If you need copies, you must save the graph on a separate disk and print it using a program other than The Home Accountant.

Extensive reports are available. For example, you can produce reports by category with budgeted and actual amounts. Other choices include a personal balance sheet summarizing assets and liabilities, or net worth statements. These summarize from one month up to twelve. A summary of all entries can be printed, or you can specify search criteria to limit the number of entries. For example, you can print a list of all checks written that are tax deductible, or print all entries to a credit card. A printer capable of 132-column print is required for some reports. The reports
cannot be printed on the screen for examination. Therefore, if you just want to browse through some categories, you can use a lot of paper in a short time.

Three options allow for some future financial planning. These include calculation of the value of an investment in the future, monthly amounts for a future goal, and projected budget planning with inflation taken into account. Output is in the form of tables and graphs.

Continental Software wants you to be satisfied with the program. The warranty states that they can make changes without notice, but you can enroll in the software support group at a nominal fee and thus be kept up-to-date at all times. A phone call to the customer support group is always helpful. If you want a home financial program, I recommend that you consider buying *The Home Accountant*. Some programs offer different features, but few are as comprehensive.

## MONEY STREET

<table>
<thead>
<tr>
<th>Company: Computer Tax Service</th>
<th>Department: Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language: BASIC and Machine</td>
<td>Sugg. Retail: $99.95</td>
</tr>
<tr>
<td>Hardware Requirements: 48K</td>
<td>Availability: 3</td>
</tr>
<tr>
<td></td>
<td>Disk or Tape: Disk</td>
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</tbody>
</table>

MONEY STREET does what you would expect a checking account program to do: it keeps track of the money. No need to be an accountant with a tax practice to run this program. It operates like your checkbook does, only it provides a great many more functions. *Money Street* instantly answers questions about your bank balance, which checks haven’t cleared, or how much you’ve spent in each budget category. In addition, it will produce a number of reports. One welcome feature of this program is that its formats contain nothing new—no surprises; nothing to learn; the territory is completely familiar.

The first step is to set up some spending categories; there can be up to a hundred of these, such as rent, car, food, and so on. The categories can be grouped and subtotaled. Pressing Control-O at any time during the program will produce a list of these categories and the amount spent in each. Next, we move to the checkbook. The screen is set up exactly like your check entries: check number, date, payee, category, and amount. Row after row, a line for each check entry appears just like your checkbook. The balance is always displayed, as is the balance for the category of the last check. Hit Control-O and you can instantly toggle between your current check entries and your balance by category (a very handy feature). Reconciling the bank statement is easy as well. Simply enter the check numbers that have cleared the bank, and tick them off as they appear on the screen for verification. Any mistakes made on entry can be easily corrected. In addition, there are no monthly closings which can make records inaccessible. There is a constant running total of 100 categories, the account balance, and 2400 checks. *Money Street* can handle a list of unreconciled checks of up to 200. That’s probably enough for most users for at least a year. Finally, you are left with 15 reports that will provide the status of your account for any time, category, check number, payee, and so on. It produces reports and summaries of each reconciliation, and will give trial reconciliation reports in case the bank and you disagree. (*Money Street* will interface with most printers.)

A utility disk is offered with the package for $25.00. My advice is to buy it. The utility disk will allow you to make two copies of the *Money Street* master disk. It also allows some additional sorts of your checkbook data that are not available on the master. There are, however, other copyable programs with more features that cost less than *Money Street*.

The documentation, like the program, is first rate. It provides a tutorial with sample entries. There is no documentation accompanying the utility disk; however, there are sufficient instructions on the disk to use it properly. Overall, this is a user friendly program that fulfills its intentions and manages a checkbook.
The Money Tool is a series of money management programs for financial recordkeeping, checkbook maintenance, and budget management. It can carry up to 12 checkbooks with 500 transactions each per year, with up to 120 user-defined deposit/expense categories per checkbook. It will provide a complete transaction report on a limit of 500 transactions. Up to 900 transactions may be summarized in other reports, and summaries of data are available with no limit on time period or number of transactions. All reports are tabular, i.e., there is no provision for any charting or graphing (nor will it print checks). The Money Tool also provides for checkbook/bank reconciliation.

Another feature is a budget spreadsheet for each deposit/expense category on a daily, weekly, monthly, and yearly basis. It also enters reserve allocations, and reports the activity against these allocations. However, there is no direct comparison report of budget vs. actual by category. It will generate a transaction report using the same deposit/expense categories, showing total and average daily charges for the period. Categories can be combined in summary reports, so that all cash expenditures could be accumulated and presented as a single line item, for example.

The Money Tool initially assists you by providing recommended titles for most of the category code numbers. These can be changed, deleted, moved around, or new titles added as you wish. Entering the category code number (01-99, AA-AU) takes you to a transaction menu where you will enter the dollar value of the transaction. The program uses default entries for check No. 1 on January 1st of the current year. If it is not a check transaction, or if you are starting at any other time than the first of the year with a check number other than No. 1, you have the opportunity to make the appropriate revisions. A key item missing from the transaction entry is the ability to code the transaction for tax purposes. A partial solution would be to set up deductible and non-deductible categories. Also missing is an automatic payment feature that would facilitate the handling of recurring transactions like rent or mortgage payments.

The program has extensive editing capabilities and will permit you to revise any entry, add entries by opening space between previous (existing) entries, and delete entries, all with a minimum number of keystrokes.

The main program is copy-protected, though the data files can be transferred to another disk. If you have two drives, it is recommended that all data files be placed on a blank disk in drive 2.

The manual is 67 pages long and consists of two parts: a 16-page tutorial, and a detailed description of program operation, features, and reports. The tutorial is not as complete as it should be. You must read the entire manual to have a clear understanding of program operation. Also, the tutorial makes reference to abbreviations that are not explained until much later in the manual. Both the manual and the disk come packaged in an attractive binder.

In summary, though it lacks some features, The Money Tool's ability to keep accurate and extensive records of your income and expenses, coupled with its reasonable price, definitely make it a program worth buying.
**PERSONAL FINANCE MANAGER**

**Company:** Apple Computer Inc.

**Language:** Applesoft BASIC & Assembly

**Hardware Requirements:** 48K

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**OVERALL RATING**

- **B+**

**EASE OF USE**

- **B+**

**VENDOR SUPPORT**

- **C**

**DOCUMENTATION**

- **B-**

**VALUE FOR MONEY**

- **B**

**VISUAL APPEAL**

- **B+**

**RELIABILITY**

- **A-**

**ERROR HANDLING**

- **A-**

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Personal Finance Manager, a family budget management program designed specifically for the Apple II, keeps records of family expenditures, analyzes spending patterns, simplifies maintenance of tax records, and verifies checkbook statements. It stores 2,600 family financial records (check transactions, deposits, credit card charges, bank service charges, and cash expenditures) with a limit of 200 entries per month for one year and a carry-over of 200 entries from the previous year. It supports twenty-four categories for expenditures, twelve credit card accounts, and one checking account. It provides for designation and sorting of tax-deductible expenditures, reconciliation of monthly checking account statements, and comparison of actual spending habits and budgeted amounts that you define.

The system includes features helpful for a relatively simple family financial system. The extensive menus make the program easy to use, especially when used with the instruction manual. Main Menu selections include entering data; searching, sorting, and editing data; reconciling the checkbook; defining budget categories and summarizing them; defining credit account categories and summarizing them; providing a system status report; initializing the system; and quitting. Additional selection menus appear within most categories. All menus operate as described in the manual.

Data entry is simple, with requested input fields for check number (or entry category), date, fourteen-character notation, amount, tax status, and two-character account identification. All fields occupy a forty-character line. Especially convenient is the ability to enter the face amount for a single check or credit card change into several budget categories and still reconcile the monthly bank statement. Default entries for consecutive check numbers and for the same date facilitate data entry, as does displaying deposit amounts in inverse video.

The program lets you monitor expenditures on a monthly and year-to-date basis, and lets you compare expenditures to budgeted amounts. You can display summary data in either tabular or bar-graph format. You can also input credit account charges as they occur, immediately determine the amount owed, and include credit charges in budget categories along with check and cash entries.

A status report shows your current place in the system. You can initialize the system and start a new year with a carry-over of unreconciled items. Using the FID program on the DOS 3.3 System Master lets you save the data file to a back-up disk. Lucid error messages, well documented on the screen, also receive further explanation in the manual.

Even considering these useful features, I was frustrated by several inadequacies of the system. For example, the system only handles one checking account. My family has more than one. The restricted binary classification format for deductible or non-deductible codes severely limited my attempts to organize our records for tax return preparation. You need multiple coding to organize Schedule A, Form 2106, and other tax-deductible expenditures because tax categories do not always match family expenditure accounts (especially when limited to twenty-four categories).
In the face of competition, the Powersoft people have upgraded their checkbook program a third time. In this version, they have shown consideration for their earlier customers by including a data transfer program for converting the older checkbook data files to the newer format.

Super Checkbook III is a relatively easy-to-use yet comprehensive personal checkbook program. The new version includes a more versatile input routine for entering checks and deposits in six data field formats (actually four, since two are used for date formats). They consist of Transaction, Month, Day, Code, Description, and Amount fields. Using the Transaction code field, you can enter interest payments, service charges, automatic teller transactions, and so on. However, no feature exists to display these codes automatically, so you must keep the manual handy. The documentation does define the codes, but the display does not. An automatic payment feature lets you designate up to twenty recurring transactions (such as house payments) and enter them only once from a separate menu. You will also find it easier to make corrections from the menu with this new version.

Unlike most other checkbook programs, this multi-module system organizes data into one large data file, rather than monthly files. You can enter either 1,350 or 1,850 transactions (depending on whether the budget code is alphabetic or numeric) into a data file. You use the Search option extensively in the reconciliation mode, where you can spot any outstanding checks with a glance. The plotting module displays monthly bar graphs, using text characters. This makes it possible to output them to any printer. You can plot income and expenses for different months or any category using the codes for any month.

The program does have some minor limitations. It does not have a budget program that would let you compare actual expenditures or income against projections. You also do not have full use of a memorandum feature capability, although the Description field accepts up to thirty-two characters. Overall, the absence of these two features does not detract from the utility of this fine package. With Powersoft's improved documentation and its ease of use, this program is an outstanding value for the price. You will find it very helpful in balancing home checking accounts and handling tax-deductible items.

Because the system is unprotected (as most financial and business software should be), a beginning Applesoft BASIC programmer can easily modify it to implement default options involving bank account name, printer specifications, and other prompts which normally require user responses each time you run the system. I commend Powersoft for ignoring convoluted protection procedures that most software companies have devised for their business packages. The only valid justification for protecting business software necessitates the vendor's providing immediate and unlimited disk back-ups as needed. The cost of this could be covered in the package price. The likelihood of this remains as remote as the same vendor providing software modification support for unique business applications. In my opinion, financial packages (personal and otherwise), extending through business application software, should remain unprotected for back-up and modification reasons; otherwise, the exercises in futility exemplified in attempting to devise new software protection schemes will continue to keep juvenile programmers burning the midnight oil, while business waits for an answer to the down-time production and support problems in the micro-computer field.
DESK CALENDAR II

Company: Telephone Software Connection
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B DOCUMENTATION C
EASE OF USE B VALUE FOR MONEY B
VENDOR SUPPORT C VISUAL APPEAL B

DESK CALENDAR II is a memo-type package that can store daily appointments, memos, reminders, or a diary of the day's activities. It was designed to interface with all standard clock cards, using a board to display a running digital clock at the top of the screen. However, a clock card is not necessary to use this program.

A working disk with initialized data files is generated from this program. It generates a one-year calendar starting from the month of your choice. This operation takes eight minutes. It incorporates all major holidays in its monthly files. An appointment schedule can then be entered, or reminder messages for any date of that year. Reminder messages can be flagged so that they appear every day for a full week before the event or only for that day. There is also a feature that allows one to enter a memo for every Tuesday of the year or for every 3rd Thursday. Entries can be later edited for any particular day. There is also a search function for finding any keyword included in data for a range of months, allowing you to locate a particular appointment under someone's name.

Upon entering the program, either you or your clock tells the program what day it is. You can either look at your daily schedule on screen or send it to the printer. You can also ask to see another day. Included is a feature to allow you to see all of the reminders for a particular set of dates. The program found all of the holidays but for some reason could not locate my own reminders; however, they did show up for the day requested. The program also features a perpetual calendar. Apparently, there is no range limit because B.C. dates work, too. And there were only ten months in a year back then, in the dark ages. Finally, there is an option for printing all the appointments and memos for an entire year.

The program is useful if you have a busy appointment schedule and no secretary to keep track of things. Since you wouldn't access it more than once or twice a day, it could be a fairly unobtrusive and (if used discreetly) private source of scheduling information.

VISISCHEDULE

Company: Visicorp
Language: Pascal derivative
Hardware Requirements: Apple II or II+ with at least two disk drives.

OVERALL RATING A- DOCUMENTATION A
EASE OF USE B VALUE FOR MONEY B+
VENDOR SUPPORT N/A VISUAL APPEAL N/A

VisiCorp has developed a winner with VisiSchedule, their newest addition to the Visi-group of programs. With VisiSchedule you are able to perform complex project planning in a relatively straightforward manner. Project line items are entered with their characteristics (cost, duration, prerequisites, etc). The program then calculates and displays the corresponding schedule with associated resource allocations.

The program, running on an Apple with 48K, can handle up to 50 line items. The Language Card (or 16K card) adds capability up to a total of 160 line items. This is one case where the additional hardware is extremely helpful.

VisiSchedule uses the Critical Path Method (CPM) as its technique for analysis, as opposed to PERT (Program Analysis and Review Technique). The CPM abbreviation will be used in this review, and should not be confused with the CP/M operating system (which this program does not use). CPM is a more visual technique which produces schedule charts. PERT treats a series of events using probability to estimate expected time required to do the job and is, in this reviewer's opinion, hard to use. CPM, on the other hand, treats activity durations and definitions as fixed, and then determines where the critical path is and where slack time may be. If one variable is changed, the entire schedule will be recalculated.
The Book of Apple Software

The program comes with a program disk and an example disk. A backup is available for the program disk (for $20). In order to obtain it you must send in the program registration form with the money. The program disk is copy protected.

The original program was written in Pascal, but neither the Language Card nor the Pascal operating system disks are necessary. There is no source code, only the machine language implementation.

Program loading is straightforward: simply boot the program disk with a data disk in drive two. The Apple must be configured to support Pascal operation or some of the features will not work. This means that the boot disk must be in slot six and the printer must be in slot one. You may have cards in other slots, but the system will not use or recognize them. The standard 40-column screen is used even if you have an 80-column terminal card. There is a list of printers and a printer card that the program has been tested against in Appendix A of the documentation. Of particular note is that VisiSchedule will not work with the Mountain Hardware CPS card, the California Computer Systems parallel (7728) card, or the SSM AIO parallel card at all. There is another unworkable combination: the NEC Spinwriter 5520 with the SSM AIO serial card. One other configuration that will not work is the D.C. Hayes modem in slot three. The program will not boot in this configuration. If you have any questions, be certain to ask your dealer, or write/call VisiCorp.

The program uses the standard Visi-type menu where the arrow keys and spacebar move the cursor and the return key selects the function. This is an excellent method of selection, and other programs could learn from the example.

On boot-up, VisiSchedule will ask you if some basic information is correct. You'll likely have to change the date, but that is all. Dates may be entered as MM/DD/YY or DD/MM/YY, at your choice. You are also allowed to enter relative dates in the form +60D or -5W, which will add 60 days or subtract 5 weeks in this example. You may also manipulate months and years in this manner.

In the schedules, VisiSchedule will handle up to 999 time units between the period 1/1/1977 through 12/31/2065, and recognize leap years. Unfortunately, the program will only schedule on a daily or weekly basis. You cannot program a schedule where all tasks are measured in units of months or years, so long term schedules are impractical when using VisiSchedule. This is not a serious limitation, but should be kept in mind before buying the program since your application may depend on long term scheduling.

From the main menu you are allowed to: load a program from disk, modify or create a program in memory, clear the memory, delete files from the disk, format a disk (this requires Pascal format for data disks, DOS will not work), save the schedule in memory to disk, print the schedule, change the data disk drive (from two to six disks supported), and write to DOS (but more on that later). All functions appear to work smoothly, with adequate error trapping and recovery.

As you move into actual project scheduling you will be given options to change descriptive information, and then be led into the menu, which allows you to establish the baseline for the task. This menu covers the descriptive information such as units for the various cost tracking. As a side note here, be aware that VisiSchedule will only handle numbers of four non-negative integer digits; so be certain that you set the units correctly (dollars, thousands of dollars, etc).

When setting up, you can also change one, or all nine of the manpower skills which may be associated with your project. In addition, you may set your normal workweek and the holidays you expect to observe. Up to 24 days may be specified as holidays.

A full range of graphic displays designate the various jobs, such as the following examples:

- A critical job (one that affects the entire project).
- A non-critical job (one with slack time).
- A completed job.

Since the display is only 40 columns wide, there are several techniques the program uses to allow you to view the schedule. By hitting CTRL-A, the screen shifts over 40 columns, so you really have 80 columns easily available. For schedules over 80 characters long there are scroll commands which allow you to shift the schedule by an amount and direction that you specify. Displays of the manpower and direct cost figures are also available, as well as displays of a line's prerequisite and successor information.

Of course, you may modify the schedule once the data is entered. Particular lines may be moved, changed in their characteristics, and lines may be inserted and deleted as required.

Once data is entered, various manipulation techniques are available: from simple renumbering of the tasks, through sorting, to more complicated techniques of analysis, which level manpower across the schedule.

It is also possible, when marking task completion, to mark partial completion and then have the program rescheduled. This turns out to be extremely handy as the program progresses, and Murphy's Law starts to apply itself. You have an instant recalculation of the schedule to show the effect of anything not happening according to plan.

Like other VisiCorp programs, the VisiSchedule program supports DIF file transfer. Of course, since the program was written in Pascal and not under DOS, the process is not quite as simple as it otherwise could be.
First, realize that the schedule information is not placed into the DIF file; only the manpower and cost data will be transferred. In simple terms, what you have to do is first create a data file from the program. Then you enter the option called WRITEDOS. After several disk swaps between your VisiSchedule data disk and an initiated DOS disk, the DIF file is created for entry into any of the other VisiCorp programs such as VisiCalc for analysis, VisiFile or data management, and/or VisiPlot/VisiTrend, for statistical analysis and display. Of course, there is no provision to transfer data back to VisiSchedule. Appendix B in the manual has further data on transfer to other programs.

The program has an excellent error trapping routine with descriptive error messages. The backup policy does leave something to be desired. Paying $20 for a duplicate program disk (and only one is allowed) is stiff; especially considering the habit of Pascal to access the disk quite often when compared with DOS, or other assembly language programs.

VisiSchedule is a good program with many applications. It is generally well written and flexible enough for most applications; although the lack of long term scheduling may be a handicap for some.

**FINANCIAL FACTS**

**Company:** Howard W. Sams & Co., Inc.

**Language:** Applesoft

**Hardware Requirements:** 48K

**OVERALL RATING**

**EASE OF USE**

**VENDOR SUPPORT**

**DOCUMENTATION**

**VALUE FOR MONEY**

**VISUAL APPEAL**

**RELIABILITY**

**ERROR HANDLING**

**Department:** Business

**Sugg. Retail:** $59.95

**Availability:** 8

**Disk or Tape:** Disk

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**Financial Facts** is a collection of nineteen general purpose programs for financial planning and information. The nineteen programs are:

1. Regular Loan Payment
2. Amortization Table
3. Straight Line Depreciation
4. Declining Balance Depreciation
5. Sum-of-years Digits Depreciation
6. ACRS (Accel. Cost Recov. Sys.)
7. Future Value of an Investment
8. Annual Interest Rate
9. Loan Term
10. Remaining Loan Balance
11. Last Loan Payment
12. Loan Principal
13. Nominal Interest Rate
14. Effective Interest Rate
15. Required Investment
16. Minimum Investment
17. Regular Withdrawals
18. Regular Deposits
19. Annuity

A particular program is selected by entering its number and pressing Return. A word of warning: once you have made a selection, the program requires that you follow through with it completely, or else hit Reset and reboot. Also, another small annoyance is that whenever you boot, you must enter the facts about your printer (if you have one) before you can make a program selection.

The menu for the program selected will then appear on the screen and prompt you for data entry, such as Principal, Annual Interest Rate, and so on, and displays the results of the computation almost immediately. You are given the option of changing the data and re-running the calculation, or exiting to the Main Menu. In addition, the Amortization Table program (#2), the three Depreciation programs (#3-5), and the ACRS program (#6) can be printed out.
The manual does a good job with program operation, showing you how the menu will appear, and presenting a numerical example for each of the nineteen programs. However, none of the fundamental formulas nor the underlying theory for any of the programs is shown or described. Both the manual and the disk come packaged in an attractive binder.

Before going out and buying this program, you should consider that it is really only a pocket calculator in disk form. In fact, some of the better pocket financial calculators not only cost less, provide the same (and sometimes more) financial computing capability, but can also manage statistical and linear regression analysis, and come packaged with an excellent tutorial on financial theory. In summary then, what you gain in ease of data entry and calculation speed must be weighed against the loss of flexibility, versatility, and portability.

**Gusher**

**Company:** High Technology  
**Language:** Pascal  
**Hardware Requirements:** 64K

Gusher by High Technology is intended for use by small independent oil operators who need to track expenditures on wells, bill those expenditures to the various paying owners (working interest or capital interest owners), and distribute the revenues of a producing well out to the owners of the well (revenue interest owners). Gusher handles up to 100 owners per well unit.

The program has been specially designed to eliminate the more common accounting problems which an oil and gas operator encounters. Among these are the following:

- Determining and printing joint interest statements for working interest owners.
- Determining revenue distribution from production runs.
- Writing checks (using your checks) to each revenue owner, pro-rated according to his interest rate, including pro-rating the windfall profits tax.
- Generating well payout reports.
- Calculating and printing A.F.E. (Authorizations for Expenditure) reports.
- Keeping track of the balances of revenue owners and working interest owners and the payments of working interest owners.
- Generating 1099 reports, giving the amounts of gross production, production tax, and windfall profits tax paid to each revenue interest owner.
- Writing checks to pay invoices from vendors, indicating the wells to which the invoices were posted, and tracking how much has been paid to each vendor (up to 60 vendors and 1,200 invoices per well or unit).

Gusher is easy to use. Each entry is made only once, and the computer saves it and calls it up whenever needed. For example, when you receive an invoice from one of your vendors, you type it into the computer and choose the expense category to which it applies. Later, the effect of that invoice will show up in: (1) the check which the computer will write to the vendor, (2) the well payout status report, (3) the A.F.E. report, and (4) the joint interest bills to the working interest owners, as well as several other reports which Gusher generates.

Gusher provides for tracking leasing packages which may contain from one to fifteen wells. Each leasing package becomes a unit and the number of units is unlimited. In addition, expense categories can be customized if desired. For your convenience, the program comes with fifty-three of the sixty possible expense categories already defined. These are, however, totally variable to conform to your unique bookkeeping system.

Accounting information is readily accessible. Gusher lists revenue and working interest owners, vendors, vendors' invoices, amounts paid to revenue owners, and amounts to bill working interest owners. The reports give useful information in a highly organized, condensed form.
ESTATE TAX PLAN 1.2
Company: Aardvark Software Inc.
Language: Runtime Pascal
Hardware Requirements: 48K, 80-col. printer

OVERALL RATING: B  DOCUMENTATION: B–
EASE OF USE: B   VALUE FOR MONEY: B
VENDOR SUPPORT: B  VISUAL APPEAL: B
RELIABILITY: B+  ERROR HANDLING: B+

In these economically perilous times, any program that adequately addresses problems in personal financial planning deserves attention. *Estate Tax Planning* is just such a program. Estate tax law is complicated, but this program seems to have most of the bases covered. It is up-to-date, using the recently enacted Economic Recovery Tax Act of 1981; and an update service is available to keep the program current.

*Estate Tax Planning* provides for the many specific factors necessary for an estate analysis: allowable deductions, disposition of assets, death tax liabilities, special deductions, bequests, and so on. One excellent feature of the program is that you can operate it in a “What if?” fashion, which lets you manipulate several financial alternatives at once in order to come up with the best plan or plans.

The biggest drawback of the program, however, is that the user really has to be an expert in this field, as well as in legal matters, in order to take full advantage of *Estate Tax Planning*. A better approach might have been to expend the necessary time and effort required to make the program more tutorial in design. This does not mean that it should make everyone experts in this field; but it is important that individuals have at least a fundamental knowledge of estate planning. Then, after the user runs a number of assumptions, it should be reviewed with an expert. This could only be more productive in terms of the user’s real needs.

JOB COST
Company: BPI Systems, Inc.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: A  DOCUMENTATION: A
EASE OF USE: A–  VALUE FOR MONEY: A
VENDOR SUPPORT: A  VISUAL APPEAL: A
RELIABILITY: A  ERROR HANDLING: A

*Job Cost* is a comprehensive system for the small to medium-sized contractor or job-oriented business. It can be used by itself or can interface with the BPI General Ledger and Payroll systems. The software package consists of five disks: Data Entry, Reports, Entry Posting, Maintenance, and a sample data disk.

*Job Cost* requires a two disk system—one drive for the program disk and the second for the data disk. It can manage 200 jobs consisting of up to 2,000 accounts and purchases from 200 different vendors. The program documentation is extensive and includes a tutorial sequence for every function of the program. There is a full chapter devoted to problem solving, a complete listing of error messages, and a large glossary of terms.

The program is menu-driven and includes a command queue feature to sequence several commands through the system without your interaction. This time saving feature is helpful because the price you pay for the myriad of user-friendly features is response time. The system is very slow (20-40 seconds) between program tasks when returning to the main menus and when updating system records. The software format is highly standarized and all program disks utilize common commands. During program operation, all control characters are displayed at the bottom of the screen with a short definition of each. This prevents you from having to refer back to the manual during program operation.

*Job Cost* keeps a record of both income and expenses for each job—including any amounts retained by a client as a performance bond. This information is used to generate a Profit/Loss statement for each job, and a cost analysis summary. The program will also handle inventory transfers for use of “on hand” materials or for shifting materials between jobs. If you enter standarized costs for various work units (roofing labor hours, cubic yards of concrete, linear feet of lumber, etc.) the system will automatically calculate cost and price extensions.
Job Cost will produce reports on job status based on costs-to-date information. You enter the estimated percent complete for each job task and the program develops a complete analysis of current costs versus the cost of the completed job. The program will also produce job estimates for use in bidding on work or in negotiating final prices.

TELOFACTS2
Company: Dilithium Software
Language: Pascal
Hardware Requirements: 48K

| OVERALL RATING | A | DOCUMENTATION | A |
| EASE OF USE | A | VALUE FOR MONEY | A |
| VENDOR SUPPORT | A | VISUAL APPEAL | A |
| RELIABILITY | A | ERROR HANDLING | A |

This is a program to help people who conduct surveys, questionnaires, tests, polls, or other analysis systems. As such, it serves a specialized function, but should still appeal to those whose jobs involve the gathering and analysis of information. It is modestly priced and can be used by anyone—from a professional campaign manager conducting statewide popularity polls to a graduate student working on a thesis involving questionnaires.

The program does exactly what it claims and does it nearly perfectly. Although it can run with 40 columns, a single disk drive and no printer, it operates best with an 80-column card (which it searches for automatically when booted), two drives (which eliminates disk swapping) and a printer. The system also responds to the one-wire lowercase modification on the Apple, enabling you to switch between upper and lowercase using the Shift key. This is not mentioned in the documentation, although you could probably figure it out quickly enough.

The system is easy to use and completely menu-driven. The menus utilize simple, consistent commands, which are usually displayed at the bottom of each screen. The commands let you create, change, and save a questionnaire of up to 100 questions with five possible answers for each question. Answers can be weighted so as to gauge their importance. The answers can either be typed into the program from written questionnaires, read into it using the Mountain Card Reader (a device which reads "mark sense cards"), or entered directly onto the program. This latter approach can also be used for telephone surveys, with the person conducting the survey entering the answers on the computer as they are given, saving endless hours of data entry time and making analyses of answers available within minutes of completing a survey.

The program then performs several types of analyses on the data. Means (averages), medians, and standard deviations are instantly computed, as well as the number and percentage of respondents who choose each answer. These analyses can be performed on the entire questionnaire or on individual questions. It is also possible to perform analyses using only partial responses. For instance, the user can study the reading habits of women over 35 who shop regularly at Neiman-Marcus.

Results can be scored and respondents ranked. This makes the program useful for administering tests or compiling personnel databases. Lists of people meeting certain criteria can be created. The actual uses are much wider than are first apparent, and the publishers welcome correspondence from people who have put the program to new and unusual applications. I thought of one myself: a survey for a change of venue motion in a criminal case which has received sensational publicity.

The documentation is the best I have seen. The program comes in a very attractive three-ring binder. The writing is clear and thorough, without being childish or condescending. The manual is divided into Installation, Tutorial, Reference, Glossary and Index sections—separated by tabs. A Table of Contents is provided for each section and the Index is complete. I found no typographical errors. Even a quick reference card is included, and the installation section is clear enough for a beginner. The tutorial is excellent, guiding you from the initial step of creating a questionnaire to analyzing the data in every light. There is even reference to a book on setting up and conducting surveys.

There are just a couple of bugs in this program. The manual instructs you in setting up printer codes and allowing for the Card Reader. This requires writing on the program disk. However, the disk provided did not have a write-notch. My printer (an Epson) nevertheless worked perfectly. The toll-free number provided a quick solution.
to the problem. The program is copyable, so the answer was to make a copy onto a disk which was not write-protected. The bonus of calling was finding out that I could make my own backup copies; this is not mentioned in the documentation.

Another problem was that I couldn’t discover a way to print out a questionnaire without answers on it. The closest I could come was printing it out with 0 responses. This means that if a written questionnaire has to be prepared, it would have to be retyped using a word processor or typewriter. Maybe I missed something, but I was unable to find any instructions in the manual for printing out only the questions. These, however, are minor errors in an otherwise nearly perfect program. As indicated, the publisher provides a well-staffed, toll-free hotline. In addition, when the registration card is sent in, you receive a free backup disk.

This program does a specialized job, does it very well, is easy to use, and is moderately priced. What more could anyone ask for?

**MENU II**

| Company: C & H Video | Department: Business |
| Language: Applesoft & C | Sugg. Retail: $39.95 |
| Hardware Requirements: 48K | Availability: 5 |
| OVERALL RATING B+ | Disk or Tape: Disk |
| EASE OF USE B | DOCUMENTATION B |
| VENDOR SUPPORT A | VALUE FOR MONEY B |
| RELIABILITY B | ERROR HANDLING B+ |

*Menu II* brings to the microcomputer a kitchen/diet aid that actually works. The program is well documented, and even a user new to computers should be able to follow the installation instructions. One of the program’s nicest features is that it is unprotected, and the end user may make as many backup copies as he feels necessary. He also may enter the program and make minor changes to titles, categories, etc.

The menu-driven program and superior tutorial take the user easily through set-up and help him to develop menus for the three meals of the day. Two user-defined variables also allow him to keep track of calories, sodium, carbohydrates, etc. When the user inserts the variable he will also give a unit of measure, for instance, milligrams or calories. The program displays a running total of the assigned variable to help the user keep within assigned dietary guidelines.

After you have assigned parameters you must enter your data base of recipes, probably the most boring task associated with the program. The authors provide a small data base to help you get started, and they have made it extremely easy to move, change, or delete any of original recipes. You can develop menus for periods as great as two weeks, print them out, or automatically make shopping lists from them. The shopping list may be printed either for exact measurements or rounded amounts. A good feature of the shopping list is the ability to add non-food items, and to expand the list. The program automatically assimilates into one amount different quantities of the same food item required by different meals. However, if one recipe calls for “Hamburger 1 pound” and another for “Hamburger 3 pounds,” the quantities will not combine because “pound” differs from “pounds.” The same applies to “oil,” “cooking oil,” and “olive oil.” The program is well written, but the user must give it information in a very precise form.

The program also has a comments section for additional cooking instructions. I preferred simply to enter a page and volume reference to the cookbook from which a recipe originally came. This approach saves disk space and entering time, but still provides speedy access to the proper reference if necessary. Another good feature is the program’s ability to automatically adjust quantities. When you enter a recipe, a screen prompt inquires how many it will serve. Later, you might want to feed the same dish to a different number of guests. No problem, just enter the number of people you wish to serve, and the program will automatically adjust the quantities involved. Naturally, it will also adjust your shopping list to reflect the different amounts. If you plan to feed large crowds I recommend that you develop the initial recipe using large divisions like #10 can of tomatoes, or 1 pound of salt. No sense in having an updated program that asks you for 2,333 teaspoons of salt. The authors plan to bring out additional disks that will contain ethnic foods, such as Irish, Italian, German, and others. These culinary data bases will sell for $15 apiece. The authors also invite users to send in their favorite recipes for inclusion on disk.

This household program is well written, well documented, and easy to use. It will make Mama want to bring the computer out of the closet and into the kitchen where she can use it too. After all, when Dad bought that funny Apple II, she missed out on a new kitchen floor, so the least he can do is bring this program home where she too can learn to love the Apple. This program might also be useful to small restaurateurs and caterers.
**VERSAFORM**

**Company:** Applie Software Technology  
**Language:** UCSD Pascal  
**Hardware Requirements:** 48K, 16K language card

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With VersaForm you can design your own business forms, enter information on them, print them out on blank paper or preprinted forms, and then create custom reports using your data. The form you design on the screen resembles the paper forms you have been using. The printed reports and forms can then use some or all of the information on your original screen and format it any way you like. The data on the reports can be sorted according to any specifications you desire. For instance, you can produce a report of all your customers in Illinois who owe more than $500 and then print out bills for them.

The documentation is among the best I have seen. The slipcase contains a special tutorial manual and disk which takes you step-by-step through entering information on a form and printing out a report. A spiral-bound manual has chapters on designing forms, setting up automatic checking and filing, entering data, searching for forms, using the calculator, sorting the information into reports, copying forms, and formatting information for preprinted forms and mailing labels. The manual appendices contain information on formatting and copying disks, error messages, and configuring the system to your hardware. There is a complete index and a table of contents, as well as a separate summary booklet for reference.

The forms are very easy to design, thanks to excellent on-screen help. The system prompts you when action is needed and usually explains what it is doing. After only a short while, you can do without the manual. When you design the form, you can ask for automatic error checking on individual entries. After you define the type of information the system should accept, VersaForm can check the entries as you make them. For instance, you can specify that an entry calling for an account number has eight digits. If you later key in six digits and a letter, the system will not accept your entry. You can also specify automatic lookup. When you enter one item, such as a part number, the system will look up and fill in the part description, the price, or whatever other information you desire. The system can also automatically insert the date which you first entered when you booted the program. Although it sounds difficult to design such a sophisticated form, it is made easy by the system's step-by-step, on-screen guidance.

You can instruct the program to perform calculations automatically. For example, if you enter a unit price and a number of units, you can tell the system to multiply the two and figure the tax. You can tell it to add columns and rows or perform any other mathematical function. You can specify left, right, or decimal place justification. The system will round off numbers if you desire. It also permits you to perform mathematical calculations on screen as you enter data on a built-in calculator. The form you design includes an unlimited number of fields, but each of them no more than twenty characters long. You can also have columns of data on the form.

After you have designed your basic form and entered information on it, you can design report formats to sort, analyze, and print out this data, then save them on disk. You can also send out data to Pascal-based word processing programs to create form letters. The manufacturer mentions MTF Pascal Word Processor as a compatible program.

If you need to print out your information on an existing preprinted form, VersaForm will let you lay out your data to match the form. The module for doing this is easy and powerful. Mailing labels can be prepared with this function, though they print only one label across.

The system requires two disk drives and supports an 80-column board and a one-wire shift key modification. Control-A will enable you to use the shift key. The manual does not mention this, but the people at Applied Software told me when I called. All the disks (six of them) are copyable except one, and the publishers will send you a backup of that one free. A replacement costs $14.95. These are very generous terms and further illustrate the high quality of this package.

The system has some limitations. Although a single form can have more than one page, each field is limited to twenty characters. More importantly, you can only search for records using one field, called the index key. This can be any field you designate, but it means that if you designate account number, for example, to be your index key, then you cannot search through your records by name. When producing reports, you can select reports that match any specification, so it is possible to select only those records which match a particular name. They will not appear in
their original format, however, but in the report format which you have designed. I found no bugs in my copy, and thoroughly enjoyed learning and using the program. It ideally suits almost any business and has many uses even in the home.

VERSAFORM LEGAL OFFICE MANAGER

Company: Applied Software Technology
Language: UCSD Pascal
Hardware Requirements: 64K, VersaForm Business Form Processor

OVERALL RATING A
EASE OF USE A
VENDOR SUPPORT A
DOCUMENTATION A
VALUE FOR MONEY B
VISUAL APPEAL A
RELIABILITY A
ERROR HANDLING A

This is a template or for use with the VersaForm Business Form Processor. Three disks contain a basic record format, three different client bills, and monthly report and scheduling formats, all designed specifically for a law firm. You simply transfer these formats to a data disk and then use the VersaForm program to enter information and print out reports. The system stores information for any number of attorneys or clients. Usually one disk is assigned to each attorney. The system is ready to use "as is" or can be customized to suit your specific needs. For instance, automatic checking and filing can be specified so that when the manager enters an attorney's initials, that attorney's hourly billing rate is automatically placed in the correct field and the initials are checked against a list.

The system works like this. The office manager enters the information from a new case file onto a record. The record has space for the file name; the file number (which becomes the key by which the record can later be located); the client's name, address, and other personal information; the attorney's initials; the case type; and other coded information which later produces specific reports. Then the manager enters the date, a description of the action performed (such as a court appearance or client interview), the number of hours, and the rate, if necessary. As explained above, the system can automatically fill in some of this information. The system then adds up the fees and costs, subtracts the client's payments, and prints out a balance due. It also keeps a running total of the hours spent on the case and the total cost. At the touch of a couple of keys, it prints out a bill on the office letterhead. You can also program the billing to occur automatically once a month. Nothing could be simpler.

Six management reports are provided. Three give information on accounts receivable by attorney, by case, and by age of the receivable. Other reports detail the hours and fees recorded and generated by each attorney, and one prints an index by file name so that you can look up the file number quickly. These reports are printed out 132 columns across. You can send a code to the printer to set up compressed mode if available. The system will support a hard disk, and instructions for setting it up are provided in the excellent documentation. In addition, you can easily create new reports. For instance, one firm may want to know how many low-fee or criminal cases it is carrying. The program leads you step-by-step through the creation of a new report. A scheduling system permits you to produce schedules for each attorney or for the whole office. The information is entered on a simple form and reports print out on a daily or weekly basis. The system provides sample attorney interview and time sheets which can be used to feed required information to the program.

The manual is clear and easy to use, leading you through the steps of entering information, selecting and printing out reports, and customizing the system. It provides instructions on daily procedures, weekly and monthly housekeeping duties, and backing up disks. It assumes no prior computer experience and is very well written.

The program ran perfectly and was quite easy to learn. A prospective buyer should be aware that he or she could create these templates using the VersaForm Business Form Processor alone. It would take time, however. Like templates for other programs, such as VisiCalc, this program saves time and effort, especially for the computer novice or the business person who just wants a turnkey operation. In this case, for about $550, a law firm has an easy-to-use and efficient billing system which provides useful and rather sophisticated management reports. In addition, it will have the separate VersaForm program, which has a wide range of uses.
This program helps you plot roads between major cities and highway intersections in the United States and Canada. The database contains information on over 400 points in the U.S. and Canada for planning routes. If you do a lot of travelling, you should find this a very useful program.

I found the program simple and interesting. You can list the cities in the database, list the road connections for specific cities, plot your own route, or let the computer plot a route for you. Additionally, you can change the average speed and miles per gallon figures used in the calculations. You also have the ability to change the distances in the database if new roads are constructed in the future. The manual contains a listing of all points in the database. Each city or junction is assigned a number. When using the program, you can use either the number or the city name. The program always asks you to confirm that it has called up the right place.

I found the "compute shortest route" function the most useful. This computes the shortest distance between the two points you enter. You can then check a roadmap and see if you like the route. If you do not like the route, you have the option of deleting some of the routes and asking for the next shortest route. For example, I asked for a route from Los Angeles to Minneapolis. The route plotted did not use freeways, and as I was also looking for the fastest way, I asked for a re-plot. When it did this, it routed me over freeways. The total distance was only twenty-one miles greater.

After a route is plotted, you can get printed reports. Three print formats exist. The first, a route summary, does not list any of the cities passed through if you do not have a route change. This comes in forty-column format, so it is easily readable on the screen. It gives you the routes taken and the time required. The route listing also comes in forty columns, giving all cities and intersections encountered and the times between each in addition to the total time. The detailed route listing comes in eighty columns and is hard to read on the screen. This not only gives you everything the forty-column listing gives you, but it also tells you how much gasoline will be used between points and lists both elapsed and remaining values. Gasoline consumption is figured using twenty miles per gallon and speed using fifty-two miles per hour. You can change these parameters and have the route figured again.

Overall, I find this an enjoyable, easy to use program, helpful to travellers.
EDUCATION

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More and more classrooms are being equipped with Apple computers. One of the most important as well as gratifying uses for the Apple is in the field of education. The computer can provide an interactive learning experience for students, and easily adjusts to their learning speed. It is little short of amazing to watch children from the ages of five years old and up literally sitting for hours mesmerized in front of the computer. Engaged in what they think of as game activity, they will continue to use the computer indefinitely.

Obviously, the object of a good piece of educational software is to teach. To do this effectively, it must involve the student, challenging the learner while entertaining him at the same time. Programs often have to lead the student while at the same time test and adjust the skill level in order to be successful in conveying knowledge. It is also important to record the results periodically, and be flexible enough to meet the needs of a number of students. These are formidable tasks that cause many programs to fail. Fortunately, children are used to learning and absorbing information from the medium of television. Programs that take advantage of the Apple's sound generating and graphics capabilities, and successfully avoid being condescending toward the student, will most likely succeed.

Educational programs are currently in their infancy, with lots of room for growth. LOGO is an example of a language that has been specifically developed for educational programming. As new and better programming tools become available to the educator, they, not programmers, will cause a mushrooming in the volume of available software. Educational uses for the computer do not have to be directed solely towards children. The potential for adult education—for example, office training seminars—is just as enormous as ordinary classroom use. There are already a number of programs available designed to teach people how to use their computer and various software packages. The use of the computer itself is an ideal medium for this kind of teaching.

It has been heartening to see the rise in the number of educational programs available for the Apple, a trend expected to continue in the coming years. The use of the computer for education is still in its infancy, but the future looks promising indeed.
This spelling improvement package employs a unique approach in teaching this currently undervalued skill: visual reinforcement as opposed to pure word memorization. Its purpose is to utilize the left side of the brain (reason) in combination with the right side (imagination) for enhancing one's spelling ability by "seeing" the words in the mind's eye. This is accomplished by clever use of graphics characters and color for displaying the words and emphasizing their structural images, using flashing upper/lower case letters and changing chromatic values.

Booting the system is no problem if you have Applesoft ROM. Alternatively, if you possess a Ram or language card minus Applesoft ROM, the usual procedure of loading Applesoft, then accessing the package disk (PR#6 if disk is in Slot #6) still prevails: the laborious two-boot route. Because this disk is protected and will not catalog, the convenience of including Applesoft (FPBASIC) and an auto-load boot isn't easily accommodated.

There are actually two functional menus in the system: the SPELLING menu, which essentially provides a tutorial on the content, and the PRACTICE selection (actually an option within the SPELLING menu), which consists of the word lists and exercises. Both make the well-written documentation almost superfluous.

The SEE HOW TO SPELL option within the SPELLING menu provides the most interesting directions on using the system. Color highlights are used to exemplify the way in which words sound alike, although spelled differently (homophones). Drawings demonstrate word associations with physical objects or pictures. A word is presented in either different colors (with the same color for identical letters), lower case, or sequential display (letter by letter) to reinforce its correct spelling. Demonstrating a word in these varied ways forcibly impresses it on the cognitive senses, according to research done by the authors of WHOLE BRAIN SPELLING.

A compendium of 200 word lists consisting of 10 words each is included for easy-to-difficult practice levels. The higher the numerical choice associated with each list, the more complex the words. Each word is output on the screen for study upon selecting a list. Hitting the RETURN key causes the word to disappear, resulting in an empty box being presented for hopefully entering the correct spelling of the previously displayed word. If the student misspells the word, a colored box will be superimposed over the incorrect letter; if a letter is omitted, a caret (') will indicate its intended location. The word is then displayed for another attempt. If the word is correctly spelled, it is displayed in the box, each letter changing color in the manner of a neon billboard — pyrotechnic and congratulatory visual fanfare; a nice effect.

As stated in the documentation, the package is not meant as a comprehensive rote spelling course but rather as a methodology for developing word visualization abilities. It succeeds very nicely in its objective; however, it could have been designed as a more effective and flexible spelling system if customized word lists could be included and saved, as well as a score-keeping capability. This apparent shortcoming might be offset by the fact that this system could serve in another capacity: as an adjunct to a typing tutor package, in that the manner in which the words are displayed provides an excellent vehicle for practicing the touch-typing method.
CLAIM TO FAME & SPORTS DERBY

**Company:** Don't Ask Software  
**Language:** Machine Language  
**Hardware Requirements:** 48K & Word Race

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Word Race — Claim to Fame & Sports Derby is an add on module to the Word Race system. You must own the original Word Race master disk to run this package. Each of the three modules contains 600 questions.

Claim to Fame is a trivia test about famous people. A personality must be matched against six possible choices. Many of these names are quite recognizable. They include people like Earl Warren, Xerxes, Rudyard Kipling, and Alexander Fleming. Before you rush to your encyclopedia, Fleming invented penicillin.

Sports Derby presents trivia questions concerning sports personalities. It is a great game for those fans who claim to know obscure sports’ facts. Many of the personalities that you must identify have either set a sport’s record; for example, one may have been a coach of a famous team.

Intermediate Word Race is a module suited to children aged 11 to 16. You must match definitions to words like “slither,” “puncture,” and “tinker.” It is similar to games on the first disk.

COMPU-READ

**Company:** Edu-ware  
**Language:** Applesoft  
**Hardware Requirements:** 32K

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COMPU-READ consists of a series of four programs designed to aid one’s reading ability. The four programs are as follows:

COMPU-READ I - A skill building series in which you respond to three letters at a time as displayed on the screen. When they disappear, you try to key in what they were. The participant controls the number of tries and the speed in which the letters are presented. Upon finishing the number of trials requested, a performance report is given upon request.

COMPU-READ II - Designed to improve skills in rapid recognition of words and phrases. The participant has control of the word list used and the number of trials. A performance report is given at the end of the program.

COMPU-READ III - This program is designed to improve skills in vocabulary by identifying synonyms and antonyms. The participant has control of the word list used, the number of trials and speed of the display. As in other programs, confirmation of correct answers is given, as well as corrections for those that are wrong.

COMPU-READ IV - Four sentences are presented at different times. The words are changed each time a new sentence appears. The participant must answer a question about each sentence after it leaves the screen. Again, the participant has control of the number of trials and speed and a performance report is presented at the end of the program.

The objectives for the aforementioned programs are: (1) increase reading speed, and (2) increase memorization of reading material. In addition, two other programs exist which enable you to build your own word list and generate these lists for the COMPU-READ program. This program can be an asset to the teacher as a skill builder and a motivational device. Both children and adults can benefit from this program by increasing their skills in reading ability. Adequate documentation is provided along with a rather flexible program.
COMPU-MATH DECIMALS

Company: Edu-Ware
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A
EDUCATIONAL VALUE B
VENDOR SUPPORT A

EASE OF USE A
DOCUMENTATION B
VISUAL APPEAL A

ERROR HANDLING A
RELIABILITY A
VALUE FOR MONEY A-

COMPU-MATH DECIMALS is the final program in the Compu-Math series and is intended to teach decimal arithmetic plus related skills — decimal to fraction conversions, rounding off, and percentages. The program has a pre-test and option menu which proceeds by providing general instructions plus examples and practice for the student, followed by a proficiency test.

The program possesses mixed qualities. Its explanation of decimals and conversion of decimals to fractions is excellent, although it ignores entirely the problem of changing common fractions (e.g. 1/4 or 3/8) to decimals. Beyond the very first part of the program, the examples are unnecessarily complex and, in several cases, wrong! The examples for decimal division use results which are infinite decimal series and which the program simply truncates after an arbitrary number with no explanation whatever.

As in all education programs, the basic question is, "Will the student learn from it?" Here the answer is yes, up to a point. Utilizing the definitions, simple addition and subtraction, the program is an excellent learning tool — though not as good as the "Fractions" program in the same series. Beyond that point, the program definitely needs work. The concept has good potential and, in a revised version, this could be an excellent program.

COMPU-SPELL (six levels)

Company: Edu-Ware
Language: Not specified
Hardware Requirements: 48K

OVERALL RATING B
EDUCATIONAL VALUE B-
VENDOR SUPPORT B+

EASE OF USE B
DOCUMENTATION B+
VISUAL APPEAL B

ERROR HANDLING A
RELIABILITY A
VALUE FOR MONEY B-

Compu-Spell is a well-designed and well-documented drill and practice program designed to teach spelling on six sequenced levels covering grades four through eight and adult/secretarial. Each graded disk contains from sixty-four to sixty-nine units of ten to fifteen spelling words each, plus file building routines to allow the addition of user-created spelling units. A System Disk maintains the records of up to sixty people, monitoring student progress through the program. System options accessed through clear menu choices allow you to set data disk sequences, establish password protections, determine acceptable scores, and develop additional units of appropriate words. A second options menu allows you to set and change your place in the program.

The instructional model for Compu-Spell makes the following assumptions: (1) that spelling is rote memorization; (2) that spelling is a writing task; (3) that learning behavior and performance behavior should reinforce one another; (4) that the desired outcome is to memorize correct spellings. However, the total absence of spelling rules in the program may concern some people. This approach should certainly influence your decision on buying the program, whether for use at home or in the classroom.

The major drawbacks in this program involve the presentation of the spelling words themselves, and, in some instances, the writing of the sentences given as context. First, since the instructional philosophy of the program centers on memorization, you must memorize the word before beginning. Failure to note the word or its correct spelling will doom you to trying every key on the board in order to continue. Second, the sentences given as context do not always provide enough clues to prompt an easy recall of the desired word. These two aspects of the program may prove frustrating, particularly to young people. Finally, the context sentences in some instances contain slang.
usage, misspelled words, and awkward constructions. This disturbs some parents and teachers.

Before purchasing Compu-Spell you should understand and accept the program’s philosophy as an appropriate method of learning to spell. You should also plan to spend a good deal of time acquainting your students with the proper use of the system and its quirks. A combination of spelling rules and memorization would have provided more efficient and more instructionally sound aid to those learning to spell.

CONSONANT-VOWEL-CONSONANT

Company: Microcomputer Workshops
Language: BASIC
Hardware Requirements: 48K

**OVERALL RATING** | A– | **EASE OF USE** | B+
---|---|---|---
**EDUCATIONAL VALUE** | A– | **DOCUMENTATION** | A–
**VENDOR SUPPORT** | B | **VISUAL APPEAL** | B–

ERROR HANDLING | A
RELIABILITY | A
VALUE FOR MONEY | B–

Consonant-Vowel-Consonant is one of several educational programs by Microcomputer Workshops, and helps to validate the saying that not all good things come in pretty packages. The program is geared to elementary grade levels 3-5, and offers a drill in consonant/vowel recognition.

The student is asked to fill in the initial blank of a three letter word in a consonant-vowel-consonant order. Thus if _AD is presented, the choices are bad, had, fad, etc. The program works up seven steps with smiling faces appearing after the correct completion of each word; frowns appear if an incorrect consonant is entered. An option allows the student or teacher to create his or her own bases, or to allow the program to randomly generate bases from those stored in memory. The student must make the correct entry before advancing to the next level, and at the completion of the staircase, a large happy face appears on the screen and winks.

The on-screen instructions are clear and understandable, and the program itself is simple, offers positive reinforcement to the child, and is very effective in teaching a basic reading and consonant-vowel recognition lesson. This is a no frills program (Microcomputer Workshops has invested more time in devising their learning package than in packaging their learning devices), but it accomplishes its task. The addition of sound could improve the overall appeal of the program, but aside from this suggestion, I can find no other criticisms of this well-thought out educational drill.

ENGLISH ACHIEVEMENT I-V

Company: Microcomputer Workshops
Language: BASIC
Hardware Requirements: 48K

**OVERALL RATING** | A– | **EASE OF USE** | A
---|---|---|---
**EDUCATIONAL VALUE** | A | **DOCUMENTATION** | A–
**VENDOR SUPPORT** | B+ | **VISUAL APPEAL** | B

ERROR HANDLING | B+
RELIABILITY | A
VALUE FOR MONEY | C+

English Achievement I-V is a group of five programs designed to give students practice in the English grammar portion of the College Entrance Examination Board (CEEB) Composition Test. They provide basic drills in the categories of grammar, punctuation, diction, cliche, and mixed metaphor. English grammar is admittedly a dry and, for just about every student faced with the prospect of the CEEB, worrisome subject. While these packages offer no fancy trimming, graphics, or audio effects, they put the student through drills which, if repeated with diligence, can help improve his score on the exam. Scoring follows ETS. For each wrong answer a quarter of a point is subtracted from the total number right. At the end of a sixteen problem drill, the approximate English Achievement score (below 300-700+) is displayed. Each program offers complete instructions on how to proceed and opens with a sample problem.
English Achievement I presents a sentence with an error in either punctuation or grammar, and the student must determine what this error is from the choices presented on screen. For example, the program gives the following sentence:

Melville’s books are among Mr. Pike’s most cherished possessions. Each being more loved than the next.

In this instance the error exists in the sentence fragment (correct the sentence by replacing the period with a comma—possessions, each being more . . . ). One very important feature is that after each sentence the computer indicates whether the choice was correct or incorrect, and gives an explanation in either event, of the corrected version.

English Achievement II sets up problems of the type designed to test the student’s knowledge of correct usage: diction, wordiness, grammar, cliche, and mixed metaphor are covered. The drill awards correct responses by flashing cutey, but encouraging messages:

Keep trying! You’ll catch on.
Correct answer was 3.
Error was faulty comparison.

After completing the set of sixteen questions, you may review your score, print the results, end the program, or do another set of problems.

The objective in each achievement test is clearly stated. Achievement III attempts “to give students practice in preparing for the variation format of the CEEB English Achievement Test.” This is best explained with the use of an example.

Many objected to him being chosen.
1. did object to his
2. resented him
3. objected to his
4. had objected to him
5. the original is best

The above sentence contains an error in pronoun case, and the explanation to the correct answer, #3, is to use the possessive case before the gerund “being.” As an added note, there is ample opportunity for variation and practice as each test in the Apple series contains 200 sentences. Achievement Tests IV and V, finally, allow students practice in preparing for the labeling format and editing format of the CEEB.

Each drill ends with an Analysis of Errors which is very useful to the student. This portion gives the percentage of errors in each category (i.e., subject/verb, shift in voice, pronoun agreement), allowing the student to tell at a glance his or her areas of weakness and where improvement is needed. The educational value of this error review is self-evident. I suggest that the user begin printing these results from the first session with the computer. As he advances and his mistakes are more easily recognized, his score will improve; and the printouts down along the road will be a source of positive reinforcement.

Microcomputer Workshops has designed a fine educational series that will be extremely useful to the student in preparation for the CEEB exam. The computer, an infinitely patient tool, is put to good use in helping the student strengthen his grammar. Although I think the disk version is overpriced, I’d still recommend the investment in the entire set of five programs.
French Achievement I is one of a series of programs by Microcomputer Workshops designed to give students practice in preparing for the vocabulary section of the CEEB Achievement Test. The method is to fill in the blank with one of four possible answers. You may also skip the question if you don't know the answer and return to it later.

The program's responses to your answers are often amusing and offer positive reinforcement to the student. If you are correct, the answers are pretty straightforward such as: c'est vrai, d'accord, or tres bien! You are then given the option to ask for the translation, define any of the words, or continue to the next question. On the other hand, if you make a mistake, you might get messages like: quand meme, helas, and desole! The translation is given and, as before, you can go over the definitions of any of the words, or continue to the next question.

After you finish the set of twenty questions, your approximate ETS French Achievement score (below 300 to 700+), appears on screen along with your right and wrong answers and the number of problems you skipped. If you wish to try another set of problems, the next score reflects both tests. The program next provides a list of the words which you missed. Definitions for all the words are available for review; verb infinitives and nouns are given along with their gender. Finally, you may review your mistakes, try another set of problems, or end the program.

The program uses a Hi-res display of the entire French character set, including all types of accents. There is a total of 150 problems, each with options, explanations, and translations. The program's French dictionary contains over 600 words.

This menu-driven program is very easy to use, and the documentation provided with the program is very clear and concise. The desk itself is copy protected, and there is no provision made for a back-up. French Achievement I would be a valuable addition to the classroom, or to the individual student studying for the CEEB at home. Two suggestions for improvement would be to provide an option to quit at anytime during the program, and to include an option which would allow the instructor to create new questions. But, for the money, this remains a very good buy.

French Vocabulary Builder, an educational program designed to supplement a beginner's course in French. The program consists of 500 common words divided into ten categories, or lists, such as "Traveling," "Shopping," and "What to Eat." These words are incorporated into two games: an animated version of Hangperson and a multiple-choice drill. Whether used by one or more students, the French Vocabulary Builder provides an entertaining, challenging way to acquire a basic French vocabulary.

Before you begin playing a game, you may review the individual vocabulary lists, and you must choose one of three translation modes: English to French, French to English, or a combination of the two. The first drill, Hangperson, consists of twelve words. Given a word in one language, you must find its counterpart in the other. Using the keyboard, you fill in the letters of a blank word by choosing from the alphabet displayed at the top of the screen. You have five chances to guess the correct word before a drawing of a gallows with a hanged person appears on the screen, indicating that you've lost.
The second game, a series of twelve multiple-choice questions, is in the form of a pyramid. You are given a word in one language and must choose one of four translations listed on the screen. Each time you guess correctly, you win a sum of money (which increases geometrically with each correct answer), and you ascend one rung of the pyramid. If you miss a question, you lose all your money and return to the bottom rung of the pyramid.

The French Vocabulary Builder has many merits. First, you cannot review a word list once you’ve begun a game; in other words, you cannot peek at the correct answers. Second, at the end of Hangperson, missed words are repeated, thus giving you a chance to replay a particular word that gave you trouble before. Third, in the pyramid game, once you guess a word, the three other choices are also translated; thus, you learn four words during each turn.

Two minor shortcomings are that (1) the circumflex mark on the letters “o” and “e” are difficult to detect on the screen, and (2) the final score is not kept in Hangperson; it would be nice to know how many of the twelve words were missed or answered correctly. In addition, once you begin a game, you cannot stop in mid-stream and select another option. You must go through the entire 12-word sequence. Should you change your mind, it would be good to be able to cancel the game and go back to the Quiz Index.

The manual is clear and concise. It includes lists of all the vocabulary words, the rules of each game, and sample worksheets (with answers) for each category. Overall, the French Vocabulary Builder is certainly an asset to any educational software library. Although it does not stress pronunciation, this program, nevertheless, offers a novel way of practicing French vocabulary.

GERMAN TRAVEL VOCABULARY

Company: Control Data Corporation
Language: BASIC
Hardware Requirements: 48K

OVERALL RATING EASE OF USE DOCUMENTATION VISUAL APPEAL
EDUCATIONAL VALUE B- A-
VENDOR SUPPORT A B+

ERROR HANDLING RELIABILITY VALUE FOR MONEY
A A B-

German Travel Vocabulary, part of the Plato system, is designed to familiarize users with 500 common German words helpful to travelers. The program promises to help build vocabulary and improve your ability to translate, providing drill and practice in word recognition and definition. Practice words include those that a traveler might encounter in restaurants, airports, train or bus stations, while sightseeing, and so forth.

The drills translate from English to German, German to English, or a combination of the two. You can review lists of words and their translations on the computer or through the documentation prior to the drill. The documentation is only fair, but includes forms to keep records. The two drills take the form of games: “Hangperson” and “Pyramid.” Hangperson (the old standby, “Hangman”) involves guessing the correct letters of a word. All letters of the alphabet (and the German umlauts) are displayed at the start, but the letters disappear as you guess them. The program rejects duplicate answers. Occasionally the German article appears as part of the word; this can be confusing at first. The other drill, Pyramid, asks you to choose the correct translation of a German or English word from answers in multiple choice format. Each correct answer adds a block to the pyramid and money to your total score. However, incorrect answers erase all current winnings. The game format makes the drills fun.

German Travel Vocabulary, although designed for individuals, includes some suggestions for group activities. However, some knowledge of German is required for group use. The program is best used as part of a more comprehensive language course to reinforce lessons or as a review for someone already familiar with the language, mainly because it reinforces sight vocabulary. It is not intended to help a person pronounce or better understand spoken German, although it may produce some residual benefits for those already familiar with the German language.
The most difficult mental task each of us must master is learning to speak, a task usually accomplished by the age of three or four. The second most difficult task, and probably the most important, is learning to read. Small wonder that teaching children (and adults) to read proves so very difficult when spontaneous reading by the age of three or four is considered a mark of genius.

The Reading Machine is sophisticated, complex, well-designed, and reasonably priced. It provides teachers with various drills that teach twenty-nine different skills essential to learning to read. You can individualize lesson plans, lesson formats, positive reinforcement formats, and advancement sequences for sixty different children. Various games and colored patterns selected by the student reinforce lessons. The program records the work done by each student. You can also print out hard copies if you wish. Photocopyable forms give you additional room to manually record the student's overall progress.

The Reading Machine is not a stand-alone program, but requires a teacher's assistance. A parent can use the program, but should do so in cooperation with the student's teacher. Be forewarned that if you buy this program, you must read the instruction manual completely. I found the forty-four page instruction manual generally well written, especially the educational psychology behind teaching reading, which is well documented and interesting.

Having praised the program, I must point out several design flaws. The two main problems are the slow running time (due to disk I & O), and the hunt and peck use of the keyboard encouraged by the program. Moreover, some terms in the first sections, such as "alphanumeric," lack needed definition. Also, it helps to have an assistant sit with the child at some points in the program, not always feasible in a busy classroom. Another problem is that the program assumes a child knows the keyboard and how to type— an unreasonable assumption given that children aged four to thirteen will likely have to hunt and peck. Moreover, studies have shown that programs that foster the hunt and peck approach during the early years are likely to be detrimental later to learning proper typing skills.

The sample lesson plans repeatedly refer to such teaching aids as large alphabet letters the child can handle, photos and printed words of those photos, and flash cards. While you may have some of these materials, it takes time to find them. They don't come with the program, nor does the publisher tell which items to buy. (Most parents would find this very frustrating.) The lesson plans, wonderful as far as they go, need more attention in the manual; however, you can skip them entirely.

The program comes with one main backup disk (uncopyable) and a picture disk (copyable). You should copy the picture disk at once for backup. I don't think the two main program disks will survive the classroom for long. Schools should be allowed to buy multiple copies of the main program disk at a greatly reduced price, but the publisher does not make such an offer.

To use the picture sections, you really need two disk drives. It is too much to expect children to switch the main program disk and the picture disk back and forth, as well as being too hard on the disks and the drives.

I found it hard to recognize some of the pictures, and in some cases the same picture appears for two words. For example, a picture of a cloud with rain illustrates both "cloud" and "storm." In exercises where the student finds the missing letter, the letter appears upper case in lower case words. Other teachers objected to this strongly. Passwords were too short and did not appear on the screen when typed in.

Six children aged five to ten enjoyed the program greatly and sought time to play it. The program, in my practice, was effective in teaching the material it contains.
SAT English 1

Company: Micro Lab
Language: Applesoft
Hardware Requirements: 48K

SAT English 1 is designed for high school students preparing to take the SAT college entrance exam. The programs, covering the verbal half of the test, introduce the student to the test's style and format in a non-timed situation. The program's philosophy is to have students learn by their mistakes. Thus, a student is advised why a choice is either correct or incorrect, and in turn learns the meaning of these words while gaining an understanding of why a different choice is correct. In this regard, the program is excellent.

However, what I think is lacking is depth to the program. The student tries the instruction portion once, then takes the test portion several days later, and is finished with the disk. The disk covers five brief sections of verbal comprehension: 1) Analogies (25 word pairs); 2) Antonyms (25 word pairs); 3) Completions (25 sentences); 4) Comprehension (1 story- 5 questions); and 5) English grammar (20 sentences with errors). While it might be difficult to put more material on a single disk, using any section more than once becomes repetitious.

Certainly upper middle class parents will spend any amount of money on any educational material that will help their child get into college. If a parent wants to introduce a student to the SAT test's general format with an educational package that gives positive feedback, fine, this program helps. But if they expect this small package to act as a tutorial to markedly improve the pupil's score, this program won't do it. Verbal skills are absorbed over a period of years by reading a fair number of novels and non-fiction books. It would be best to interest your children in reading long before they become seniors in high school.

SCRAMBLE

Company: Ahead Designs
Language: Applesoft
Hardware Requirements: 48K

Scramble is a spelling program for children in grades one through six. It presents words with their letters "scrambled" or misspelled, projected on an attractive, Hi-Res screen layout. The letters are almost % of an inch tall (on a 12 inch monitor), and the display shows a scoreboard with the points earned, number of words completed, and the descriptive name of the word list in use. The student is allowed two chances to spell the word correctly before the correct spelling is given. The words are in groups of 20, and up to 13 letters may be used for each word.

As the instructor, you have a number of options in setting up the program. You will decide which word list to use, whether or not to display the score, retain the sound effects, or allow the student to see the words before starting. You can also create and edit lists; the program comes with four, and the diskette will hold almost 200. Scramble keeps track of all your scores and is menu driven.

There are two areas that I think could be improved. First, the students' scores (for up to 30 students) are neither saved to disk nor can they be sent to a printer. You must enter the teacher utility to examine the "gradebook" and then make your own notes. The second problem is that the word list must be chosen by the teacher from the utility; the students cannot select the list they will work on without interrupting you.

On the bright side, the program is not protected, so you may get into it and make changes if you have the necessary skills. While you are poking around on the disk, take a look at ALPHASH; it is the subroutine that Ahead Designs wrote to create those % inch letters and is free for you to use in your non-profit programs. In all, Scramble is a nice little program, and a good value for the money. Happy spelling!
SAT* WORD ATTACK SKILLS
Company: Edu-Ware
Language: Apple Pilot
Hardware Requirements: 48K

OVERALL RATING A  EASE OF USE A  ERROR HANDLING B
EDUCATIONAL VALUE A  DOCUMENTATION A  RELIABILITY B
VENDOR SUPPORT B  VISUAL APPEAL N/A  VALUE FOR MONEY B+

SAT*Word Attack Skills is appropriate for the college-bound student or for individuals seeking to improve their vocabulary. Those students required to take the SAT test prior to entering college will discover that this package provides excellent additional preparation for the vocabulary and reading comprehension sections. The program’s best feature is the practice in the use of words as part of meaningful sentences rather than isolated definitions. Word connotations, roots, prefixes, word analysis skills, and the SAT antonym format are included. The user has the following options: test mode, instruction mode, synonyms, antonyms, word derivations, practice questions, and test scores. In addition, SAT*Word Attack Skills aids the user in test taking techniques. The documentation is excellent.

SENTENCES
Company: Micro Power & Light
Language: Applesoft
Hardware Requirements: 32K

OVERALL RATING B+  EASE OF USE A  ERROR HANDLING A
EDUCATIONAL VALUE B  DOCUMENTATION B  RELIABILITY A
VENDOR SUPPORT B  VISUAL APPEAL B  VALUE FOR MONEY B

SENTENCES is a program that is applicable to the second and third grade student. The child is instructed in identifying the subject, predicate and sentence fragments of a complete sentence. The programmers included a baseball game format in which the student scores a point when a correct answer is given. Review is always available if the child is having difficulty or simply wants reinforcement. Also, the child builds his own sentences towards the conclusion of the program, thereby, testing his knowledge of the subject. The authors might have expanded their program to include nouns, verbs, etc. This program has enough variation in its format to be interesting and enjoyable to the primary student.

SPANISH ACHIEVEMENT I
Company: Microcomputer Workshops
Language: Applesoft BASIC
Hardware Requirements: 48K

OVERALL RATING A  EASE OF USE A  ERROR HANDLING A
EDUCATIONAL VALUE A  DOCUMENTATION B  RELIABILITY A
VENDOR SUPPORT B+  VISUAL APPEAL A  VALUE FOR MONEY A+

Spanish Achievement I, one of a projected series of disks designed to give tenth to twelfth grade students practice with the type of questions used in the CEEB Spanish Achievement Test, contains 150 multiple choice problems presented either randomly or in sequence. The package contains one disk, plus several pages of documentation outlining the objectives of the program and giving ample instructions and suggestions for classroom and individual use. The program is menu-driven with all necessary instructions displayed on the screen. To answer a question, you type one number to indicate your choice among the four possible answers. After you enter the response, the correct choice lights up and two of a series of (Spanish) comments appear, all appropriate and encouraging, some even funny. An incorrect answer provokes mildly negative responses. After this, a single keystroke brings a display of the
English translation and definition of any choice, with an explanation of why it was correct or incorrect. When you complete a group of twenty questions, the score is displayed. The score, compiled as in an ETS examination, also shows the number right, the number wrong, and the number skipped. You can call up a dictionary display showing verbs in the infinitive form and the gender of nouns.

*Spanish Achievement I* is a thorough, well-written, well-presented way to practice for an examination or reinforce comprehension skills.

**THE SPANISH HANGMAN**

*Company:* George Earl  
*Language:* Integer [also works on Applesoft, Machine]  
*Hardware Requirements:* 32K

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**Spanish Achievement I** is a Spanish/English language hangman game with an internal vocabulary of 1600 words and 450 sentences. For each internal list, you may play the game involving translating from English to Spanish or Spanish to English, or you may guess the words given. Thus the program could be reasonably used to teach either English or Spanish.

Error handling in the program is good — it uses the GET function to eliminate endless pushing of the RETURN key and prevents the user from making any mistakes other than pushing RESET. Unfortunately, there are several problems that detract from the usefulness of the package. Once you have correctly guessed the last letter in any program, the system progresses automatically to the next problem; thus, in order to study a problem to see if the translation makes sense, you cannot put in the last letter while you examine the sentence! In addition, the problems do not seem to be graduated in any way to allow you advancement in a logical fashion to a better vocabulary. The documentation is essentially nonexistent; some advice on how best to use the program would be very helpful.

Certainly the bottom line on a program of this type is — “Does it help you to learn Spanish?” Although I would not have expected it of a hangman game, the answer is yes! And the game is fun, either by yourself or with the family. While some improvements would be nice, this is a good program if you want help with Spanish.

**SPEED READER**

*Company:* Apple Computer, Inc.  
*Language:* Applesoft  
*Hardware Requirements:* 48K

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The *Speed Reader* program follows the techniques of most of the classic speed reading courses that you might take at your local high school or college. There are exercises with letters, words, and groups of each, progressing from a rather long display time to reasonably short display times.

Once the warm up exercises are over, you can go on to the exercises with phrases. Here an entire article is shown to you a phrase at a time, and at a speed of your choice. From there the entire article is shown. Comprehension tests follow each article. The program will tell you how well you did, but you must record your results on paper to chart your progress. A program improvement would allow the user to record his/her scores into a file on disk so that the computer could keep track of progress and report it out over time.

*Speed Reader* uses the Hi-Res screen to display all text. The type font is easy to read and should give no problems. A square is placed on the screen at the point where text will appear, giving the user a focal point.

The program comes with three disks: the program disk, a backup, and a data disk with the text of the reading.
exercises. It boots on any configuration Apple, including the old II's with Integer Basic on the motherboard and a 16K expansion RAM in slot 0.

*Speed Reader* is advertised to “sharpen your perception, increase your eye span, and improve your eye movements.” With practice, the program will help you to do all of these things. The extent to which this improves your reading speed will depend upon the work you put into your practice.

**SPELLING BEE**

**Company:** Edu-Ware  
**Language:** Applesoft  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>EDUCATIONAL VALUE</th>
<th>VENDOR SUPPORT</th>
<th>EASE OF USE</th>
<th>DOCUMENTATION</th>
<th>VISUAL APPEAL</th>
<th>ERROR HANDLING</th>
<th>RELIABILITY</th>
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SPELLING BEE is designed to teach children from kindergarten to third grade-levels to spell words consisting of from one to two syllables. The technique is done through the presentation of pictures rather than the usual show-a-word method. The child is then asked to enter the correct spelling of the concrete word after its picture is briefly displayed. There are 20 lessons ranging from simple three and four letter words to varieties with double vowels or consonants, words with hard C's and silent E's, and polysyllabic words. The words are common selections that a child generally associates with objects, animals, directions and numbers.

There are two approaches taken in teaching the child; tutorial and drill. The tutorial mode presents the child with the picture, then requires him to spell it within three tries. The system doesn't allow him to type incorrect letters; however, if a child makes too many mistakes, the program will prompt the child to start over. SPELLING BEE keeps track of the score with smiling and frowning faces plus good and bad sounds for right and wrong responses, respectively. The word is finally spelled correctly if the child hits an impasse. The drill mode presents the picture and tests the child's spelling ability by having him type the correct word. If he is wrong, the correct spelling of the word is displayed for him. Appropriate faces continue keeping track of the score. Words are normally less than eight letters, but if a child fools around he can blow the scoring format by typing in more than 11 characters, resulting in the system eventually going into a hang-state if over 18 characters are entered.

The teacher has access to a learning management system secreted on the disk. When the child is asked to press the space bar after viewing the opening logo, the teacher presses the arrow key. It's fairly certain that the child will discover this procedure fairly quickly. The teacher can set up a child's lesson by entering the student's name, lesson mode, number of words per lesson and number of lessons. Thus, the teacher can set the system for the child's level of learning. When a child finishes a tutorial, the teacher can access a report of his progress. In using this system, we found that although the tutorial should be presented before the drill, in fact, if this is done, the drill mode says the child has already completed his spelling bee. Consequently, the procedure for testing the child using the words presented in the tutorial is never executed. The drill does work, however, if the tutorial isn't accessed first.

SPELLING BEE is a useful concept for teaching spelling to young children. The Hi-Res pictures are extremely well drawn. Although we feel that stand-alone talking/spelling machines are better, this is the best method we have seen implemented on the Apple to date.

**SPELLING RULES**

**Company:** Micro Power & Light  
**Language:** Applesoft  
**Hardware Requirements:** 32K

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This program presents the six major rules of spelling in a clever and creative format directed toward the primary grade levels.

*Spelling Rules* contains not only drills and a review of words but a game for the child to play that reinforces his understanding of spelling concepts. Nice graphics and sound effects.
SPELLING BUILDER

Company: Program Design Inc.
Language: Applesoft
Hardware Requirements: 48K

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SPELLING BUILDER offers junior and senior high school students a series of eight spelling lessons that will help them master difficult words that stump most people. These eight lessons combined with an audio cassette voice track offer a different approach to spelling. The eight programs are described in more detail below.

1) SYLLABIFICATION — using the rules of syllabification in learning how to spell as opposed to memorization.
2) DOUBLING FINAL CONSONANT — using the rules for doubling the final consonant before adding a suffix.
3) FINAL “e” WITH SUFXES — rules for keeping and dropping the final “e” when adding a suffix.
4) ADDING SUFXES TO WORDS ENDING IN “y” — rules for keeping and dropping “y” when adding a suffix.
5) TRICKY PLURALS — drill adding “s”, “es” and “ies” to words.
6) “le or “ei” — rules for “i” preceding “e” in a word and vice versa.
7) TROUBLESOME SUFFIXES — suffixes such as “ance” and “ence” are discussed.
8) SPELLING EXERCISE — a spelling test using the audio cassette. All the lessons are helpful in aiding children (ages 10 plus) in learning how to spell. Drills are included in each lesson and methods are taught in using those difficult words which are the exception to the rules. In addition, the author has included an audio cassette which consists of 320 words for a spelling test.

SPELLING WIZ

Company: Development Learning Materials
Language: Applesoft
Hardware Requirements: 48K II/Ile

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Spelling Wiz is a missing letters game for children in grades 1-6. The player must point the wand of a wizard at the right letter or letters of four choices and then fire before the bubbles from a pot neutralize the wand. The bubbles do their work in from five to thirty seconds, depending on which speed option is chosen. The wand can be neutralized three times before the game is over. You are not penalized for misses, although they are recorded. When you make a hit, the wizard’s hat brim wiggles, there are sound effects, the letters fill out the word at the top of the screen, and a new word with blanks and letter options appears.

The game begins without instructions on screen, but the instruction pamphlet with the disk is easy to learn. The player needs to use only three keys, or a joystick/paddle and fire button to play. Happily, keyboard players have three options of three keys: ADW for left-handers, JLI for right-handers, and left/right arrow & space bar for two-handed play. My keyboard played with more certainty and speed than the Ile joystick.

At the end of the game, the program displays hits, misses, and the high score in each category for the present session. At this point, the player or teacher can change the format of the game or continue the same game. The game can be changed in five ways: speed, grade level of word list (1-6), the specific word list (3 lists of 20 words, 1 combination list), the degree of difficulty (from 1 letter to 2 or 3 missing letters), and maximum time per game (1-5 minutes). You may also eliminate the sound.

As is typical of other games in the Arcademic series by DLM, Spelling Wiz comes with a fine teacher’s manual and copy-ready worksheets, progress chart, “Strategies for Improvement” form, and a student record sheet. The manual tells the teacher how to graph hits and misses, and then how to read the graph to determine the player’s level. It also suggests appropriate extra-game work and kinds of reinforcement should the student become discouraged with his
performance, or (worse) with microcomputer instruction. The worksheets partially make up for a deficiency in the disk: there is no "readout" of words missed at the end of each game. The worksheets set up every possible game in multiple choice format so the teacher or parent can determine, independently, areas of weakness at any given content and difficulty level.

**STICKYBEAR ABC**

**Company:** Xerox Educational Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K  
**OVERALL RATING** A  
**EDUCATIONAL VALUE** A  
**VENDOR SUPPORT** B  
**EASE OF USE** A  
**DOCUMENTATION** A  
**VISUAL APPEAL** A+  
**ERROR HANDLING** A  
**RELIABILITY** A  
**VALUE FOR MONEY** A-

*Stickybear ABC* is an animated and colorful program designed to teach children ages 6-9 their ABCs. Each of the twenty-six letters of the alphabet is associated with two pictures. For example, the first time the child presses the letter P, he or she is rewarded with a penguin who climbs out of the water and waddles across an iceberg. Pressing again turns up a parrot. Airplanes fly and apples fall out of a tree for the A. Most of the pictures are animated and accompanied by cute little musical tunes. Quite a few involve the character Stickybear who juggles balls (J for juggle), kisses his girlfriend (K for kiss), and even sheds tears (C for cry). However, a very few have minimal animation (what would you expect for Yellow or Grass as suitable animation?). Finally, the pictures corresponding to each of the letters are further reinforced in an illustrated poster. This helps children quickly remember and locate their favorite pictures.

Once a child has progressed through the alphabet, he or she can begin to learn to recognize words associated with their shapes in a wonderful hardback book called *The Strawberry Look Book*. With the help of a parent or adult, this teaches the child to identify labeled objects and to recognize the word equivalent. *Stickybear ABC* is a fun and delightful program for teaching the alphabet to young children. There are twice as many pictures as any competitor's package, and it is much more colorful and animated than others. Coming in a handsome plastic binder that includes book, disk, and poster, *Stickybear ABC* is definitely an excellent educational package that combines fun with the ability to hold a young child's interest.

**SUPER SPEED READING**

**Company:** Magnum Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K  
**OVERALL RATING** A  
**EDUCATIONAL VALUE** A  
**VENDOR SUPPORT** C  
**EASE OF USE** A  
**DOCUMENTATION** A  
**VISUAL APPEAL** A  
**ERROR HANDLING** B+  
**RELIABILITY** A  
**VALUE FOR MONEY** A

*Super Speed Reading* is an instructional program designed to increase the average reader's speed from two to ten times. An attractively packaged and self-contained course, the program consists of a blue program disk and a green practice disk. The lessons on the blue disk include a test of reading speed, principles of speed-reading, and techniques for faster reading of school texts, business material, and computer programs. The lessons are well written and illustrated with excellent graphics. For example, a lesson on pacing your reading with a pencil not only explains the technique, but demonstrates it on screen with a very realistic pencil.

*Super Speed Reading* has also taken care of that bane of all reading classes and programs: keeping track of progress. The program does it for you. It also provides bar charts of your last fifteen lessons. It can even keep track of books you read on your own.
After booting the blue disk you may begin by just browsing, or as a new or current user. The choices made will determine the order of lessons or practice. Even browsing can teach you a lot, allowing you to try out each of the lessons or simply practice specific features.

The amazing part of this program is the sheer amount of text on the two disks. The green disk, for example, contains 120 pages of practice text, some phrase reading practice, and charting programs. All text is in upper and lower case, the letters being about the size type encountered in most books and magazines. To assist you in using the practice material, an adjustable pacer is provided for word grouping and a built-in metronome to build rhythm in reading. Reading speed for exercises varies from 100 to 3,000 words per minute.

The documentation contains the text of the lessons and some additional practice samples. This program focuses less on comprehension than speed, assuming that better comprehension comes with increased speed. However, it does include some comprehension practice.

The producers of this program stress that you must read regularly to become a better reader. Thus the program emphasizes consistent reading practice. This may discourage those people looking for that quicky ten minute course that will teach them to read 2,000 words per minute. Nonetheless, the principles of this program are sound. For those willing to work with it, Super Speed Reading ranks among the best speed-reading programs on the market.

**TRICKSTER COYOTE**

*Company:* Reader’s Digest Services, Inc.

*Language:* Micro Motion FORTH 79

*Hardware Requirements:* 48K

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<th>OVERALL RATING</th>
<th>EDUCATIONAL VALUE</th>
<th>VENDOR SUPPORT</th>
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<th>DOCUMENTATION</th>
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*Trickster Coyote* is a vocabulary-building game for children eight years old or older. Three playing levels are available, using a 300-word, built-in dictionary. You are first presented with the word, a synonym, a definition, and a sentence using it. You are then given an opportunity to study the words and definitions to be used in that session, and to "re-cap" afterwards.

The first game shows a child chasing the coyote across a river, jumping from log to log. Some of the logs contain words. A word and its definition are shown at the top of the screen. If the child is made to land on a log which contains a synonym of the word shown above, you continue to play. If the figure lands on a log containing a word which does not match it, it falls in the river and you lose points. To jump over a log, you must press the space bar as the figure begins to land on the previous log. This action is repetitive and dull.

The system is menu driven, and even an inexperienced youngster would have no problem with it, although an adult may find it a bit slow. The Hi-Res graphics are colorful and well done. The game can be played with or without sound effects, and up to four can play at one time. There are two different games: *Trickster Coyote* and *Trickster Tag.* My 12-year old tester found the latter faster and more fun.

The vocabulary is well chosen and challenging even for a well-read 12-year old boy playing at the third level. The game ends when you correctly guess ten words in a row. This can take a while, but the system provides for an exit to the menu by pressing Reset. The system also has a record-keeping function which saves a list of the words guessed correctly by each of the four players.

The best feature is the ability to enter new words and their definitions. Individualized vocabularies can be entered at each level to suit the particular children involved. Even words in another language can be added, as long as it uses the Roman alphabet. Words can be up to 15 characters long, definitions up to 40, and sentences up to 60. The error-trapping routine is very thorough, but it makes entry slow for an adult. The system ignores anything but the correct entry, and even pressing Reset only returns the player to the main menu.

The documentation is brief but clear. It is designed for the adult who will be helping the child or entering a new vocabulary. You need no other instructions than the very complete ones offered on the screen. *Trickster Coyote's* educational value is high; however, the game lacks action. It is perhaps a better program for the classroom and not the home, where it might have to compete with *PacMan.*
### VOCABULARY PROMPTER

**Company:** Jagdstaffel Software  
**Language:** BASIC and Binary  
**Hardware Requirements:** 48K

<table>
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<tr>
<th>Overall Rating</th>
<th>Educational Value</th>
<th>Vendor Support</th>
<th>Ease of Use</th>
<th>Documentation</th>
<th>Visual Appeal</th>
<th>Error Handling</th>
<th>Reliability</th>
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**Department:** Education  
**Sugg. Retail:** $29.95  
**Availability:** 2  
**Disk or Tape:** Disk

*Vocabulary Prompter* was developed to increase your vocabulary and, thus, improve your ability to communicate. The program allows you to store words in one language and ask for them in another. Sentences, phrases, definitions, and questions are some of the possible variations.

There is an option to study the words, take a study test, and take one of the two random tests. The study test gives a word, such as “fast.” You are then asked the German word for “fast”: “schnell.” If you answer incorrectly, the program will give you the correct answer, and you will be asked to type this answer in. After you have been given all the words in the data file, you are given a percentage score. Random Test I drills you, but it will not tell you if you make a mistake. Random Test II is the same as the first test, but it also changes the order in which the prompts are given (German to English or English to German).

You may have a maximum of 50 pairs of prompt/response options in a single file. There is an option to add, change, and save to your data files. If you have a printer, there is an option to make a hard copy. There are programs available which allow you to use *Vocabulary Prompter* in Russian (Cyrillic) and the Japanese Phonetic and Katakana character set.

*Vocabulary Prompter* is fast and easy to use. The documentation is well written, but at times it is confusing. The program is not quite crash proof, but it runs well enough. Written in BASIC, the disk can be copied for back-up purposes. For those of you interested, this is a good choice for learning new vocabulary.

### WORD DIVISION

**Company:** Ahead Designs  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<thead>
<tr>
<th>Overall Rating</th>
<th>Educational Value</th>
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<th>Documentation</th>
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**Department:** Education  
**Sugg. Retail:** $19.95  
**Availability:** 5  
**Disk or Tape:** Disk

*Word Division*, a drill and practice program, reinforces concepts surrounding the use of prefixes, suffixes, and compound words. Appropriate for grades one through four, the program asks the student to correctly divide compound words by positioning a line between the letters within a set time limit. The faster the student does this, the more points scored. Responses are visually and auditorily reinforced.

The program comes with four 400 word files on the disk with provisions for the addition of teacher-defined word lists. It also puts a great many of the important variables under your control: sound reinforcement (may be turned off), word lists (full editing and creation), response time (from no time limit to 9,999 seconds), level of difficulty (four levels), and the default word file. Password protection helps assure that only you as the teacher have access to these options.

Reports on the progress of up to thirty students are available as long as a student does not turn off the computer or RESET. Another useful feature allows the use of game paddles for input, thus making the program easier for students with certain motor disabilities. Apple IIe owners can use the program with the CAPS LOCK in the down position. The company encourages you to make a copy of the program and store the original in a safe place. A simple program that does what it claims to do, *Word Division* is an excellent value at the price.
Another of the Arcademic Language Arts series, *Word Invasion* uses the space shoot-'em-up format to teach parts of speech. An octopus tries to protect the treasure from four columns of words that get longer and more menacing as time passes. The octopus passes a ring which looks like a leaf from arm to arm under each column, attempting to fire and eliminate the word corresponding to the part of speech listed in a box at the bottom of the screen. Each correct hit changes the part of speech; each miss moves the columns an extra step lower. You want to hit the lower of two identical choices (two pronouns, for instance) to prevent the column from crunching the arm. Hits and misses are also shown, cradled in the four arms resting on the bottom, if you have eyes quick enough to check them while the alien words approach. The animation makes it appear as if the four arms of the octopus are withered by the alien force. Be careful of this since the octopus can magically grow his arms back twice during the game.

Although there are no on-screen instructions, learning how to play is easy. Three sets of movement and fire keys are provided for left-handers or right-handers. The terminate game key (T) is located away from the playing keys, although CTRL-T would have been more foolproof. At the end of the game, hits, misses, and high scores for each session are displayed. You may then press any key and wait for the program to load the same game again.

There are some minor frustrations in this game. First, you will find that clearing the screen of all words brings no immediate reward in terms of bonus points or difficulty levels. The words just keep coming. At least they don't move from side to side or drop depth charges! Second, the distance from the part of speech box at the bottom of the screen to the word columns is sufficient to cause delays while the eyes move from one to the other. Finally, the time delay between striking the movement key and the fire key is irritating.

As is typical of other games in the Arcademic series, *Word Invasion* comes with a fine teacher's manual, full of suggestions for reinforcement or improvement, and an array of copy-ready worksheets, progress reports, and recommendation forms.

*Word Race* is a competitive dictionary word game for 1 to 4 players. Words are presented to each player and he must choose the correct definition among six choices. Since the value of the correct answer is linked to a counter that is constantly counting down, the quicker the correct answer, the more points awarded. Conversely, answering incorrectly subtracts the number of points on the counter. Thus there is a strategy to the game: one should either answer quickly, or, if in doubt guess only when the penalty is minimal.

The game has three levels of play. The beginner's level is for youngsters aged 9-14. Common words like "nuzzle," "swift," "daffy," and "coast" are used. The regular level is for high school students and beyond, and it is good review for students studying for the college entrance exam. Sample words include "disdain," "paeon," "pugnacious," "charisma," and "decapitate." The really challenging level uses words that are not commonly encountered. Several of these are "larrkin," "scatch," "orioel," and "mymy." As an example, the word "scride" is given with choices like "living in hedges, dance step for horses, crawl on all fours," etc. This level requires shrewd guesswork and a go for broke strategy.

The disk contains 2000 words, or about 650 words per level. There are plans to include additional word modules and a "Famous Names" game in the future. *Word Race* might be classed more as an educational program than a game, but either way it is a painless method of increasing one's vocabulary.
Mathematics

ALGEBRA: Volumes One through Six
Company: Eduware
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: B+
EDUCATIONAL VALUE: B
VENDOR SUPPORT: A
EASE OF USE: A
DOCUMENTATION: B
VISUAL APPEAL: B+
ERROR HANDLING: A
RELIABILITY: A
VALUE FOR MONEY: B

Algebra helps students who wish to increase their knowledge of the fundamentals of algebra. It consists of six programs that start with number theory and proceed through arithmetic operators, elementary equations, graphing, roots and powers, and quadratic equations. These are only the major categories; Algebra contains much more than I could hope to list here.

While these programs do form a series, each volume may be used by itself and is sold separately (except volumes five and six, which are combined). For example, in Volume One the organization first presents an index in flowchart form and is color coded to tell you which item comes next and whether an item has been attempted, satisfactorily completed, or needs more work. This volume includes five learning units: Definitions, Number Line Operations, Sets, Evaluating Expressions, and Rules for Reducing Equations. Each learning unit includes concepts. Unit One has four: Numerals, Operators, Grouping Symbols, and Equality. Now comes the best part: the system offers you four ways to study each concept and, of course, in the order you choose. The first learning mode, definition and discussion, briefly explains the concept. Next comes rules or axioms with examples following. Finally, sample problems show you the program's solutions and then you can try your hand at it. At the end of every unit and each volume comes a test to reveal your strong and weak points. At the end of Volume Six is a comprehensive test for the whole series. This one gives you a printout of your performance (the only place that the printer is used in the program).

Algebra is a good program: complete, logically presented, and readily understandable. While not aimed at a particular age group, I would guess that students in the seventh grade and above would have no difficulty in using the program and that younger students could start on it with some coaching. The ability to choose the subject and proceed at your own pace provides a big plus. I find this an effective way to learn, for if you don't get it the first time, you can always have another go. On the minus side, the color coding of the index—although a nice touch—is useless except on a color monitor. The sample problems, although good, could be more challenging. Too simple a problem makes it easy to guess rather than actually practice the technique. On top of that, I really miss immediate feedback after doing the sample problems. As it is, you must wait until the unit test before finding out how well you did and whether you need more work on a specific technique. All in all, Algebra provides a good introduction to the fascinating world of mathematics and a good review for those of us who need it.

ALGEBRA I
Company: Edu-Ware
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: A
EDUCATIONAL VALUE: B
VENDOR SUPPORT: A
EASE OF USE: B
DOCUMENTATION: B
VISUAL APPEAL: B
ERROR HANDLING: A
RELIABILITY: A
VALUE FOR MONEY: B+

Algebra I is actually a misnomer as applied to this program since most schools teach this material as pre-Algebra in their eighth-grade curriculum. The furthest this program advances into algebra is linear equations.
This program succeeds very well in establishing a good mathematical foundation for Algebra. It accomplishes this through five study areas; definitions, number line operations, sets, evaluating expressions, and rules for equation reduction. It allows the student to choose the procedure for learning the material. As each course is selected from the menu, one is given a choice of learning by definition, by rule, by example, or by working sample problems. Thus, the student can skip learning methods that aren't helpful in his learning experience.

For example, if a student were learning set theory, the program would present the definitions of sets, subsets, union, and the intersection of two sets. Several examples are provided, after which the student works several sample problems. After mastering the course, the program provides a test. Tests vary each time the course is repeated so that a student won't be given the same question over again.

As with all course work, there is a final test to measure the student's understanding of all the material in this program. Overall, the program is well-implemented and useful for supplementing eighth-grade class work in pre-Algebra.

**ALGEBRA 2**

**Company:** Edu-ware  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
<th>EDUCATIONAL VALUE</th>
<th>VENDOR SUPPORT</th>
<th>EASE OF USE</th>
<th>DOCUMENTATION</th>
<th>VISUAL APPEAL</th>
<th>ERROR HANDLING</th>
<th>RELIABILITY</th>
<th>VALUE FOR MONEY</th>
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**Algebra 2** is the second unit in Edu-ware's algebra series, and is the first to actually deal with material presented in the traditional 9th grade algebra classes. This package contains four units: addition of real numbers; multiplication of real numbers; solving equations; and solving inequalities. The program presents each concept in each section in four parts. First it introduces the concept, then presents a rule, examples, and finally several sample problems for the student to solve. At the end of any particular unit, the student takes a progress test.

The programs spend considerable time presenting many axioms. They stress associativity and commutativity of real numbers in both addition and multiplication. The student learns that equality is symmetric (if \( A = B \), then \( B = A \)), transitive (if \( A = B \) and \( B = C \), then \( A = C \)), and reflexive. While potentially boring, these topics provide a foundation for future algebraic concepts. Once the student has mastered this material, the concepts of the multiplicative property of zero or of reciprocity become easy. Lessons are generally clear, but we do find fault with the poor choice of the variable 0 in one example which makes an equality look wrong because it appears to equal zero.

The heart of the program is the introduction of equations and their solution, called the solution set. The numerous examples and problems use transformations by both addition and subtraction, and multiplication and division. The program reduces the solution of equations to a process: writing the equation; combining like terms; subtracting terms to get the variables on one side; and finally performing inverse operations to find a solution. The concept of a function whose domain and range are related by an equation \( f(x) = 5y + 4 \) sums up the section.

The final section is devoted to solving inequalities. The goal is to determine whether an inequality with one variable and an absolute value is a conjunction (must satisfy two inequalities) or disjunction (must satisfy at least one of the inequalities), and so define its solution set.

The student can individually access each of these units and subsections. A child may repeat a section or proceed at his own rate of learning. Hitting the ESC key will return him to the submenu, then, if desired, to the main menu to select another unit. Algebra 2 presents appropriate material in logical order in a fairly clear manner for most beginning algebra students. Although we feel that a teacher should first present this material in class, the program acts as a good remedial helper for students who need individual attention that a busy teacher may be hard pressed to provide.
Algebra 3 is the third in a series of mathematics tutorials on the 9th grade subject. This unit covers the addition, subtraction, multiplication, and division of both monomial and polynomial expressions. In addition, it covers factoring in depth so that students can learn to factor algebraic expressions from simple monomials through quadratic polynomials.

As with previous volumes, Algebra 3 breaks the subject down into small manageable units and individual concepts that build in a logical sequence. All concepts begin with an explanation, followed by a rule, several detailed examples, and several sample problems for the student to attempt to solve. After learning all of the concepts the student can take a test to see if he or she has mastered the material.

This type of material is best taught by showing various examples. The package does this well in detailed steps. However, the discussions are filled with jargon that is confusing to beginning students. They sound like gobbledygook as in the following example. “To subtract one monomial from another like monomial, add the opposite (additive inverse) of the subtrahend to the minuend.” Another problem occurs when a student is solving an equation and filling in the values for each of the terms. If he makes a mistake on one term, moves to the second term, and tries to go back and correct it, he can’t.

But on the whole, Algebra 3 is a very well done package that can be a great help to students who need either extra drill or extra explanation. It takes the subject of factoring, often a difficult one for many students, and explains at length how to factor expressions that are products of binomial sums, differences, and combinations of the two. In addition, the program also covers roots or solution set as it is sometimes called.

Arith-Magic is a set of three math games designed to sharpen skills in grade levels two through nine. This program is designed for classroom use, and the teacher’s solutions to the problems are included in the documentation.

The first game, “Diffy,” tests subtraction for grades two through six. The student selects four numbers at the corners of a square, then finds the differences, which in turn become the corners of the next square. The objective is to find four original numbers which will require as many moves as possible to reduce to zero, so that the process continues until the number in each corner is zero.

The second game, “Tripuz,” sharpens either Addition/Subtraction or Multiplication/Division skills, and is designed for grades two through six. The computer chooses three numbers between 1 and 9 which form the vertices of a triangle. These numbers are not revealed to the student, but are represented on-screen as question marks. The sums, or products (whichever are specified), of the hidden numbers are revealed between the vertices, and the student must discover the hidden numbers. The teacher’s solution is derived algebraically.

Magic Squares” is designed for grades five through nine, and is the most challenging of the set. It leads the student to an intuitive understanding of averages and arithmetic sequences. The student is shown a square of nine numbers, 1 through 9, whose every row, column, and diagonal adds up to 15:

2 7 6
9 5 1
4 3 8
The student is then asked to solve for a missing number in more difficult Magic Squares. The final object is to complete a Magic Square given only three of its elements.

**Arith-Magic** is not copy-protected, though the user is asked to copy the diskette for use on one computer only. The program is menu-driven, and uses single-key input commands. Documentation is sparse, but adequate, except for its explanation of the teacher’s solution for “Magic Squares” (which omits instructions). Overall, this is a fairly stimulating educational tool for the elementary grade levels specified.

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**THE ARITHMETIC CLASSROOM; AND THE ELEMENTARY MATHEMATICS CLASSROOM LEARNING SYSTEM**

**Company:** Sterling Software  
**Sugg. Retail:** $49.00 and 499.00, respectively  
**Availability:** 8  
**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
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<th>ERROR HANDLING</th>
<th>VENDOR SUPPORT</th>
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Sterling Swift Publishing Company has produced a math series that covers whole numbers, fractions, and decimal fractions. The series is marketed in two different versions, or packages, but since the basic program formats are very similar, I will include both versions in this review.

The first is called *The Arithmetic Classroom*. Each package included consists of a single disk which covers one of several subjects listed on the documentation jacket cover. The subjects include: addition, subtraction, multiplication, division, basic fractions, addition and subtraction of fractions, multiplication and division of fractions, and decimals. Each of these disks comes in a small, three-ring notebook which contains practice exercises and the correct answers, as well as student record sheets. The price for one of these individual packages is about $50.00; the game package, however, is about $30.00.

The second version of this program is a group-package deal entitled *Elementary Mathematics Classroom Learning System*. Instead of separate packages, the programs come in two large packages. One of them contains all the whole number disks, the other all the fractions and decimals. These packages contain six disks, come in a large, notebook-size, three-ring binder, and cost about $500.00.

The main difference between the two packages is that the six-disk package includes diagnostic testing and a management system. Although the individual packages are sound, the management system disk is a very desirable feature if you are going to use this program in a classroom. As more math software becomes available, repetition is a problem. Many different companies use the same format in presenting their practice exercises. Of course, math concepts can be presented in only so many different ways. Ease of use and the management, or record-keeping system, however, can make the difference between programs that are used often and those that sit on the shelf.

This company gets my gold star in both these areas. The system is very easy to use, whether it is used by one student or an entire class. For example, I had two students work with one of the fractions disks. It took us less than two minutes from the time we turned on the computer and put their names on the role, until they were actually beginning the work. This is extremely important when there are other students waiting for your time. The programs are also easy to understand. There was little outside information given by the instructor. (An exception was that you must use the division slash bar for a fraction bar.)

The second feature that is very well designed is the management, or recording system. It is easy to follow and does not require a lot of flip-flopping between various sub-menus. After the students have been placed on the role, they are automatically given a placement test the first time they use any of the disks. The program is designed to handle up to 200 students (five classes of up to 40 per class).

A very functional feature within the management system is the reporting that can be done on the students. Three main types of student reporting are available. The first lists all the students who have used the program, followed by the results of their diagnostic tests. The second is designed for the individual student; it lists all the concept lessons and then indicates whether they have been mastered or still need work. The third form of reporting is used for...
establishing small-group instruction. This method will list all the students who need help in any particular area.

The game disk which comes with the package consists of three games. The students use these to review or sharpen their skills, while having fun in the process. All the games met with hearty student approval and were even preferred to some of the available video-arcade types.

This is a good, solid program. Since the individual packages do not contain either diagnostic testing, or recording, I can see the definite advantage of having the larger packages in the classroom. However, I don't know how many school districts can afford $1,000 worth of math software for 400 students.

**THE BIG RACE**

**Company:** Nova Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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Drill and practice programs for multiplication abound. So do programs which pit students against a foe in a race or contest. *The Big Race*, a typical entry of the type, possesses the major attraction of a modest price. However, several significant limitations may outweigh this benefit.

The initial boot of the program plays a slightly off-key chorus of “Camptown Races,” one of several sounds which the teacher cannot turn off despite its potential distraction in most classrooms. Documentation consists of a short pamphlet describing how multiplication works, how to play the game, and some tips for the game’s classroom use. Evidently the authors assume that you have more than a passing acquaintance with computers, as they offer no help on loading the program, diskette care, vendor support, or similar topics. This copy-protected program runs on an Apple IIe with the CAPS LOCK in the down position.

Unlike many programs of this sort, *The Big Race* provides no teacher utility section nor any provision for tracking student progress. Incorrect student responses result in an infinite number of “try again” messages rather than a tutorial or even a simple message to ask the teacher for help.

The object of the game is to respond quickly to multiplication problems using numbers from one through nine and thus maneuver your horse down a race track to beat the Apple’s horse. Prior to engaging in the race, you may practice the multiplication tables (one through nine). This drill presents a multiplication table in ascending order. You can also practice with a shorter version of the race, picking a level of difficulty (speed of response) for the race. Winning a race results in sound reinforcement and a low-res picture of Old Dobbin.

My copy of the program failed to respond as advertised (the command to stop the program did not work), but this provided more of an annoyance than a serious drawback. Nova Software fails to state their support policies in the documentation, but after several calls to the company I learned that they promise a thirty day unconditional guarantee, after which a $5 replacement fee applies.

Overall, this is an average entry in the field, proving once again that you get what you pay for.

**BUMBLE GAMES**

**Company:** The Learning Co.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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*Bumble Games* introduces the concept of numbered pairs, and allows the child to plot graphs or find objects on a map. This is accomplished in a series of six increasingly complex games. First, the child is introduced to the concept of greater than/less than as he attempts to guess a number between one and five. If he guesses incorrectly, a greater
or less than clue is given. Once this one-dimensional game is mastered, the child advances to a two-dimensional game called *Find the Bumble*. Here, the child must find the Bumble hidden in a 4 X 4 array. The coordinates are numbered in one direction and lettered in the other, and arrows appear as clues to the correct whereabouts. This concept is reinforced in the game *Butterfly Hunt*, in which clues appear left, right, up, and down instead of as arrows.

*Visit from Space* and *Tic Tac Toe* teach the concept of coordinate points at the intersection of two lines. In the former, a spaceship is hidden at the intersection of two lines. The coordinates are numbers on each axis. Likewise, when an X or an O is placed in Tic Tac Toe, the position is determined by typing in the coordinates for the X,Y coordinate pair. Finally, the principle of graphing a picture (somewhat like connecting the dots to form a shape) is shown in the game *Bumble Dots*. The child chooses a picture such as a boat. A dot appears on the screen. If he types in the correct coordinates separated by a comma, the computer connects the dots with a line. Otherwise, the typed coordinate pair is shown by an X on the graph, indicating the child's mistake.

*Bumble Games* is a good educational package that clearly illustrates the concepts of number lines, numbered pairs, and graph plotting. Although the games are recommended for children from four to ten years, I would say the upper limit is eight. The program, however, is overpriced.

### COMPU-MATH ARITHMETIC SKILLS

**Company:** Edu-Ware  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<th>Overall Rating</th>
<th>Ease of Use</th>
<th>Educational Value</th>
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<th>Error Handling</th>
<th>Reliability</th>
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This is the lowest level program in a series of elementary math skills programs. *ARITHMETIC SKILLS* is intended to teach counting, addition, subtraction, multiplication, and division for young children or any of the latter four skills to remedial older students. The program allows the user to pick the area to work on and then proceeds by providing first examples followed by tests of the skills being developed.

The program graphics are somewhat slow but are superbly done. The program is intended to be used by someone with little or no reading ability. The examples make use of counting apples with a hand pointing at each one as it is counted. The hand then points at the answer in a reproduction of the top row of the Apple keyboard. This probably comes as close as to instructing the young user in how to indicate an answer as is possible in a purely visual display!

The major drawback with this program is its lack of flexibility, lack of any reward mechanism, and complete lack of scoring of any sort. While one can choose what subject to work on, one cannot choose the level at which to start. Additionally, there is no easy way to make the program progress to the next level of difficulty. Because each program is rather slow, the number of drills is rather low. Unfortunately, the effort which went into the graphics seems to be substantially superior to the effort that went into making the program really functional. While a child can probably learn some things from the program (my daughter enjoyed playing with the program), COMPU-MATH ARITHMETIC SKILLS's obvious drawbacks make it questionable whether it's really worth the high price.

### COUNTING BEE

**Company:** Edu-Ware  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<th>Overall Rating</th>
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*Counting Bee* tries to teach young learners ages three to six the concepts of counting, addition and subtraction, shape discrimination, and comparative length and weight. It presents eight different learning modules in entertaining Hi-Res graphics designed to hold the young child's interest. The deliberately short lessons use sound effects and melodies to reinforce correct responses. Sad and happy faces keep track of the child's progress and also report back to the parent or teacher via the learning module.
First, the child meets the concept of counting. He must determine which of three pictures contains a certain number of blocks. To make his choice he uses the space bar to move a check mark on the screen. The second lesson reinforces the concept of “how many” by asking the child to count colored circles that roll off a platform and bounce once before stacking in a column on the left. The child learns to count each block one by one. Once he masters simple counting of one shape, he is asked to distinguish a specific shape in a field of objects of different shapes and to count the occurrences of a particular shape. If the child types in the wrong answer, the program slowly counts and identifies each of the items of the requested shape. Then it waits for the child to type in the correct answer.

The program uses graphic presentations to teach comparisons of length, height, and weight. Water rushes from a faucet into a graded container. The child must count the number of height markings to determine the water’s height. Similarly, a random number of blocks weigh down the two sides of a scale. The pupil judges which way the scale will tilt. A display of five different columns incorporates the concept of length. The player must correctly type the length under each column. Addition and subtraction enters into the games when the child must figure the sum or difference of two groups of blocks. Again, incorrect solutions are corrected before the child can develop bad habits.

The learning management module allows parents or teachers to customize the lessons for each pupil. The number of lessons, their order, and the number of problems can be preselected. The module then records the student’s progress on the selected material for later perusal by an adult. There is both a demo mode and a drill mode. The demo mode is useful for showing children which lessons are available and allowing them to help choose lessons for drill.

Counting Bee is an excellent teaching tool for young learners. It helps the child learn numerical concepts in an entertaining and non-boring way. This is a very important consideration when buying a program for children of this age group, who have a notoriously short attention span.

### COUNTING PLUS

**Company:** The Professor  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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- **ERROR HANDLING:** B
- **DOCUMENTATION:** C
- **VISUAL APPEAL:** C

**Department:** Education  
**Sugg. Retail:** $34.95  
**Availability:** 3  
**Disk or Tape:** Disk

The sequence of lessons included in this software package mirrors pre-school and primary educational progress, and is also suitable for remedial work. Concepts in counting and addition, including carrying, are presented in the same order as in school. Sixteen modules present demonstrations as well as opportunities for direct practice. The concepts are most valuable for the primary grade student. The module that explains carrying is creative and clear, and the program does offer games for reinforcement. Unfortunately, Counting Plus fails to make full use of the Apple’s capabilities. The graphics are uninteresting, especially in the counting section. The documentation is limited and omits descriptions of the modules. $34.95 is more than the package is worth.

### DECIMALS

**Company:** Control Data Publishing Corp.  
**Language:** BASIC  
**Hardware Requirements:** 48K

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- **ERROR HANDLING:** A
- **DOCUMENTATION:** B-  
- **VISUAL APPEAL:** B

**Department:** Education  
**Sugg. Retail:** $49.95  
**Availability:** 7  
**Disk or Tape:** Disk

Decimals provides drill exercises for teaching students the relative values of real (decimal) numbers for one to three significant figures. The screen displays a vertical line with several points marked by values. Colorful balloons are positioned at points whose number values are not stated. The student types in the number value of the point location of any balloon. A dart, looking like a hypodermic needle, moves from the left screen to the line. When it intercepts the line, it stops and the point’s numerical value is printed to the right of it. If the dart pierces the balloon, the balloon pops with a sound and disappears. With a little extra effort, you can pop two at once sometimes.
Mathematics

After the student masters a set with three to five balloons, he is advanced automatically to the next higher level. You select either part one or part two to play. Part one has eight levels; part two has ten levels. Basically, they vary from easy to fairly difficult, from one significant figure to three. The student can specify positive real numbers only or a mixture of positive and negative real numbers. This is somewhat ironic since the philosopher Plato, the company's namesake, did not admit to negative numbers or zero. He treated negative numbers as imaginary.

The graphics are simple but crisp and clear. Upon finishing the highest level of difficulty, the student is allowed to play more games at the top level of difficulty or to start over. Decimals comes with one backup disk.

Decimals is not a stand alone program. It requires instruction in decimals by a teacher prior to its use. It does a very small job, but it does it well. It does not teach conversion of fractions to decimals. That would have been fairly easy to include. Because it does such a small job, it may be too expensive for what it accomplishes. The manual is simple and could be reduced from forty pages to three. The manual does not go into enough detail in explaining real numbers. In fact, it does not even use the term "real numbers." Of the real numbers, Decimals gives drills on only the rational numbers. It would have been fairly simple to have included the irrational numbers at the higher levels of difficulty. There is no mechanism to record students' performances or to print them. At this price, the buyer has a right to expect that. The teacher cannot set the student's level of difficulty. Moreover, the student cannot quit and come back to his highest level of achievement since the program does not record his individual performance. Thus it could be very frustrating to some students.

The positive reinforcer, popping balloons, is weak and did not hold the student's interest at the easy levels. Children got bored quickly. The intellectual challenge of interpolating points did tend to hold their interest at the higher levels.

EDU-WARE FRACTIONS

Company: Edu-Ware
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B+
EDUCATIONAL VALUE A-
VENDOR SUPPORT A-
EASE OF USE A
DOCUMENTATION A-
VISUAL APPEAL B
ERROR HANDLING A-
RELIABILITY A-
VALUE FOR MONEY B-

Edu-Ware Fractions 3.0 is a graphically-enhanced version of the previously released Compu-Math Fractions. The problem in reading fractions formed from inverse blank spaces has been overcome by the use of a very readable set of characters and figures in a shape-table. The use of color is minimal, and not vital to the working of the programs, so that it is quite possible to use black and white monitors for this package.

There is an extensive, well-prepared Learning Manager Master Menu which is designed for the teacher/parent to set up the package and present it to the student/child. It is possible to pre-program the units to be tested (definitions and parts of the fraction, denominators, addition of fractions, subtraction of fractions, multiplication of fractions, and division of fractions). Administration of a pre-test or post-test can be chosen, as can the number of questions in each unit. Sound effects can be "on" or "off" for answer entry and correction feedback. The number of incorrect responses for a practice problem before being taken back to review the material can be pre-planned. There are other very desirable controls available as well.

A previous review pointed out a very serious flaw in the earlier package. Namely, in using the common denominators formed by multiplying all of the denominators together rather than using the lowest (least) common denominator. This has not been completely corrected. If anything, there are some additional shortcomings introduced in the current version. On parts of the package, determining the reduced form of the answer is encouraged, in fact demanded — even when the answer was already in that form. The use of zero as a numerator when the result of the problem was a whole number answer is also questionable.

In addition to the inconsistent attempt at simplifying techniques, there are serious problems with the way user-responses are accepted by the program. In an attempt to control input, fields have been established on the screen. This would be a valid approach if there was a way of controlling the length of those fields as determined by the question. For example, if the field length is set for 3 digits, and the correct response was 100, then upon pressing 1, 0, and 0, the program would automatically continue: but if the correct response is 9, the user would have to press the space bar twice before the program would accept the answer and continue. To compound this difficulty, some parts of the package do not accept input without pressing return.
The difficulty, or more precisely, the danger in allowing this package to be used by students can best be seen by an actual example:

(Note: underlining indicates my response)

1. \( \frac{2}{4} \times 1 \frac{2}{6} = ? \)
2. \( \frac{3}{2} \times 40 \div 30 = \frac{240}{120} \)

Finally the correct answer was shown:

One answer is \( \frac{2}{120} \)

What is probably most annoying is the realization that this package could have almost been an ideal tool to use in the classroom and in the home. To this reviewer, the shortcomings could have been overcome by more care in coding. The use of random problem generation is the chief culprit in producing these bizarre results. Admittedly, the program would be longer, and repetitive, but some topics require absolute control — fractions is obviously one of those topics.

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**Elementary Classroom Learning System — Whole Numbers**

**Company:** Sterling Software  
**Language:** Applesoft BASIC  
**Hardware Requirements:** 48K

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<th>Overall Rating</th>
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<th>Error Handling</th>
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**Department:** Education  
**Sugg. Retail:** $495.00  
**Availability:** 8  
**Disk or Tape:** Disk

*Elementary Mathematics System — Whole Numbers* supplements the math curriculum for intermediate grades or helps remedial math at the junior high school level. It consists of six disks, plus a manual explaining instructions for use, content, and the background of each unit.

The Classroom Management disk, the core of the system, enables the teacher to enter individual students in the program. First, however, you must enter the students’ names in a group. You can modify or delete group lists and individual names and call up all information on the students either to the screen or to be printed out. The programs on this disk also let you override the pre-test and study plans on the student disks. The disk is menu-driven so that even a novice can use the system. A single set of disks maintains records for five groups of up to forty students each.

There are four student disks: Addition, Subtraction, Multiplication, and Division. Each disk contains pre-tests, tutorials, drills, and mastery checks. The student receives frequent performance evaluation, with excellent graphics and encouraging remarks. The system contains twenty-two units (five or six lessons on each disk) which coordinate well with most math curricula. A complete outline of each lesson appears in the documentation, along with the lessons’ objectives and sequence.

For students to use the disks, they must enter their name, group number, and a password (available to the teacher through the Management disk). This facilitates individual record-keeping and student privacy.

While error-trapping is generally good, if a student assigned a specific lesson number inadvertently types that number plus Return instead of only Return after the lesson appears on the screen, the system will “crash,” and the student must re-enter the information from the beginning.

The Games disk consists of two games: “Slam Dunk” for one player and “Space War Math” for two players. Slam Dunk reinforces lessons and may be used from the beginning. After choosing the topic (addition, subtraction, multiplication, or division), the student answers timed problems shown on the screen. If he answers correctly, a little man throws a basketball into the basket, scoring points. If he answers incorrectly, the ball misses the basket and no points are scored. After a series of problems, the screen displays the number of “dunks” and the score and rates the player from “beginner” or “rookie” (low score) to the title “All Star.” Missed problems repeat during the course of play.
Space War Math is designed to follow mastery of each unit and requires game paddles. A competitive game, it requires a player to complete a problem to gain one point. Identical problems appear before both players. The first player to correctly answer three problems wins.

Although well-planned and for classroom use, the price of the initial system is high. Further copies are available at the reduced price of $295.00.

**FRACTIONS PRACTICE: DARTS**

**Company:** Control Data  
**Language:** Machine  
**Hardware Requirements:** 48K

- **Overall Rating:** B  
- **Ease of Use:** A–  
- **Documentation:** B+  
- **Visual Appeal:** C

**Vendor Support:** A

**Error Handling:** A  
**Reliability:** B  
**Value for Money:** C+

*Fractions Practice: Darts* provides a way to visually estimate the coordinates of the target and, through computer guidance, hit the target. In other words, using only your head, you try to find the location of a balloon on the number line, punch in the right number, and watch the computer skillfully peg the exact location you specified. Ten skill levels make up the game. You usually start at the third level and work your way up by popping all the balloons in a given number of tries. Once you pass the tenth level, a screen congratulates you and asks you either to play the extra games or to exit.

*Darts* also teaches divisions other than fractions. You may enter your answers five different ways: whole numbers, fractions, mixed numbers, decimals, and expressions. You can even use negative numbers if you choose.

The game functions many different ways in the classroom. Equal achievers can compete in small groups, or a single student can play until he misses and then turn the game over to someone else. *Darts* also acts as an incentive to practice for students who have finished other classwork.

*Darts* is well written with good text and graphics. The balloons vary in shape and size (from small, red, round balloons to big, blue, bunny balloons). Smaller balloons seem to add to the difficulty of the drill. The documentation includes possible practice worksheets. Last but not least, if popping balloons in math class makes too much noise, no problem; an option lets you turn off the sound.

**GERTRUDE'S PUZZLES**

**Company:** The Learning Co.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

- **Overall Rating:** B  
- **Ease of Use:** A  
- **Documentation:** B–  
- **Visual Appeal:** C

**Vendor Support:** B

**Error Handling:** A  
**Reliability:** A  
**Value for Money:** D

*Gertrude's Puzzles* is an educational package that is similar to *Gertrude's Secrets*, but it is designed for older children aged 6 and up. It too is geared to help children develop reasoning skills and logical deduction. There are six logic puzzles based on set theory. The array room puzzles require that the pieces be arranged so that each piece in any row or column differs in both color and shape. In addition, the 4 X 4 array puzzle must meet this condition on both diagonals. Likewise, the network or train puzzles are much more complicated, and the loop or box puzzles have as many as three boxes with overlapping sections.

A new puzzle begins each time Gertrude brings in the pieces. Sometimes the loop puzzles use only different shapes or colors in the non-overlapping sections, but other times, finding the proper sub-set in the overlapping sections is required. Since pieces that don't belong fall out, the child will eventually be led by trial and error to find the correct solution.

Again, this is a very good educational package that allows the child to think. It is easy to use, colorful, and challenging. However, it is overpriced, and offers only six puzzles for the money. I think at half the price the *Gertrude* series would offer an excellent purchase for parents who want to see their children learn something rather than just play games.
Gertrude's Secrets is an educational program for young children, aged 4-9, that teaches them how to think. It does this by first showing them how to use the computer, and then to analyze specific situations and develop logical problem solving strategies.

First, the child is introduced to the computer's keyboard commands. The I, J, K, and M keys guide a small box about the screen. Objects like Gertrude, a white goose, can be picked up and moved by pressing the space bar and positioning it by the direction keys. Hitting the space bar drops it. Once the child has grasped this, he has a choice of continuing to use the keys, or he can switch to a joystick. The joystick button then picks up and drops the objects.

Objects with both different shapes and colors are introduced. The various puzzles help the child to learn to identify likeness and similarity on two different levels. That is, objects can be the same in color or shape, or both. In the loop puzzle the child is asked to determine which pieces belong in which box. To do this, an object is placed in a box. If it belongs there it will stay, and if not, it will fall out. Thus the child quickly learns, for example, that only the set of diamond shapes belong in the box. This concept is then expanded to two overlapping boxes. In one box squares belong, and in the other only red shaped objects. The overlapping section, or subset, will contain a red square shape for it belongs in both sets. Although children will approach this puzzle by trial and error, most will soon catch on, showing the preliminary workings of logical deduction.

The other types of puzzles are the array puzzles and the train puzzles. These latter puzzles are boxes connected by one or two lines. Boxes connected by a single line require pieces that differ either in shape or color. Boxes connected by two lines must differ in both shape and color. The 3 X 3 and 4 X 4 array puzzles require the child to match pieces that are all the same shape or color. When a puzzle is correctly solved, the walls flash and the child is awarded a prize.

Each of the puzzles has adequate instructions, and an illustrated game example is provided in the "How to Play" room. There is also a "New Puzzle Piece" room where the child can choose colored shapes that are less geometric, more monster-like, or novelty shaped. The colorful manual that accompanies the program is designed for the child, although he doesn't need to consult the instructions beforehand since all the needed instructions are displayed on the screen.

Overall, Gertrude's Secrets is very easy to use and provides a good learning experience for young children. The program is logically organized and has high educational merit. My only regret is that it is grossly overpriced, and that few parents will buy the package as a result.
FACTS: TEACHER'S AIDE

Company: Disk Depot
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING C+
EDUCATIONAL VALUE B
VENDOR SUPPORT A
EASE OF USE C
DOCUMENTATION C-
VISUAL APPEAL C+
ERROR HANDLING C
RELIABILITY B
VALUE FOR MONEY B

Facts: Teacher's Aide allows a teacher (or any adult) to put different levels of addition, subtraction, multiplication, or division problems into quiz format for students. You set the parameters for the range of problems, number of repetitions, and time allowed for each answer. After getting the student's name and setting up his file, the computer displays the problems one at a time on the screen. Correct, correct but too slow, and incorrect responses get the appropriate visual feedback accompanied by beeps (good job), no sound (too slow), or buzzes (wrong). If the student fails to achieve mastery, the computer prints out a set of practice problems. When all answers at a particular level are correct, the computer prints out a Certificate of Mastery. It also keeps class and individual files for future reference.

The kernel of a good idea exists here. Teacher oriented, the program provides many options to individualize the quizzes. Young children would love the Certificate of Mastery: it's cute. Finally, in addition to receiving the program listing, just before exiting you are urged to "Give copies to your friends." This is certainly rare given the copy protection battles currently being fought. (The authors do ask $20.00 for updates, mailing list maintenance, etc.)

Unfortunately, the program needs a good bit of polish. For a classroom teacher to use any program, the authors should assume zero computer knowledge on the teacher's part. Here, unless you have a Citho, Prowriter, Apple, NEC, or Epson printer (I don't), you need to make some fancy changes to get the information to output and hard copy. I doubt a teacher with little experience with computers could figure out all the CHR$ adjustments necessary. Without the printer adjustments, the program doesn't work—results fly by on the screen, certificates print without taking a quiz, and so on. Furthermore, unless you pay close attention, you can sometimes get confused about just where you are in the different levels. The manual will have to be rewritten very explicitly if a teacher has any hope of using Facts: Teacher's Aide.

Aside from this serious criticism, the program is an adequate, if not exciting piece of software. I'd prefer to see the problems given in a vertical rather than a horizontal format, especially for borrowing or carrying numbers, but that may be picky. Things like a running right/wrong score would add a bit of pizzazz, though.

The final verdict: if you can get a copy from a friend, see if you can use it profitably. If you're a busy classroom teacher looking for electronic help in tracking kids' progress in simple addition, subtraction, multiplication, or division, and especially if you don't have one of the above-mentioned printers, hit the principal for $20-30 and buy something else.

MATHEMATICS FOR SCIENCE

Company: Merlan Scientific Ltd.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A-
EDUCATIONAL VALUE A
VENDOR SUPPORT C+
EASE OF USE B+
DOCUMENTATION B-
VISUAL APPEAL A-
ERROR HANDLING A
RELIABILITY A
VALUE FOR MONEY A-

This award-winning program is an ambitious series of tutorials designed to teach measurement (scale reading, including linear and vernier scales), math techniques (significant digits and rules for adding, subtracting, and rounding off), exponential notation (what it is and the arithmetic rules used with it), and a miscellaneous category dealing with metric conversion and slope. Such mathematical skills are appropriate for students from junior high school through adult.
The program embodies advanced educational principles: adequate learner control; random generation of problems; appropriate use of computer graphics, sound, and text; and error handling routines that rank among the best I've seen. The program diagnoses your responses and suggests further tutorial work or quizzes, or provides explanations of concepts which offer particular difficulty. You can switch off the sound at your discretion, thus allowing the program's use even in the most crowded classroom.

The program does not provide any teacher utilities for tracking student progress or producing records. Yet this lack does not limit the program as much as it would some, because the intended students will most likely be mature enough to record their own activities.

The documentation fails to provide details concerning vendor support, but a phone call to Merlan Scientific Ltd. revealed that they encourage making one back-up copy of each of the four program disks (COPY A does the trick). In addition, any future product updates allow for a generous trade in.

Educators concerned about the absence of high quality courseware can take heart from these programs. The Mathematics for Science series indicates that such courseware is both possible and available.

**MATHEMATICS SERIES**

**Company:** Spectrum Software  
**Language:** Applesoft  
**Hardware Requirements:** 32K

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<th>VENDOR SUPPORT</th>
<th>EASE OF USE</th>
<th>DOCUMENTATION</th>
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Mathematics Series is a set of four programs on one disk: Statistical Analysis I, Numerical Analysis, Matrix, and 3-D Surface Plotter. The programs do exactly what their titles suggest, with very few surprises or extras. The statistical analysis program does a simple linear regression on up to 160 x-y pairs. The numerical analysis program graphs a simple equation, finds roots, maxima and minima, and will plot the integral and derivative of the function. The matrix program will invert, find the determinant, and determine the solution for a 33 X 33 matrix (32K system). The surface plotter program plots up to three 3-dimensional equations on the high resolution screen.

This package is a nice set of elementary, scientific math utilities. Especially nice is the complete listing given of each program so that the user may customize to his heart's content. The problems with the package are the extreme slowness (especially for the surface plotter) and the price. This reviewer would like to see more sophisticated features, and/or faster routines for the money.

**MATH SEQUENCES**

**Company:** Milliken Publishing Company  
**Language:** Applesoft  
**Hardware Requirements:** 32K

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Milliken's MATH SEQUENCES, a program for both teachers and students, grades 1-6, consists of 12 diskettes providing drill practice in math in the following areas: addition, subtraction, multiplication, division, negative numbers, fractions, decimals, percent and the laws of arithmetic. Each sequence provides problems ranging from simple to complex which can be successfully implemented in a range of school environments and tailored to an individual student's needs. Math problems, presented in Lo-Res graphics, are stated in several problem formats with appropriate reinforcement and chances to try again if answered incorrectly. In addition, MATH SEQUENCES includes a review of concepts prior to introducing new ones.

The student's progress is constantly monitored by the computer and students are advanced only when specific achievement criteria have been met; or students can be moved back a level until mastery of the concept is achieved.
Each diskette holds a total of 100 student records and five class records. Teachers enter students’ names on each individual sequence diskette and make the appropriate assignments. When a student enters his name on the computer, it automatically takes him into the sequence and generates problems at the level assigned by the teacher. The student’s work is scored immediately and upon finishing a drill session, the program updates the student’s records and stores the information in the student’s file. Thus, the teacher may review his progress anytime. A display of the student’s progress shows where the student is in the assignment, the number of problems done, the percentage correct and, in addition, if the assignment has been started, a graph of the student’s progress will appear. A print out of the student’s progress can be obtained with either a parallel or serial printer. Upon completion of the student’s work, his/her name may be deleted, enabling the teacher to add another student in his/her place.

This program includes excellent documentation and packaging. The teacher’s guide provides a thorough explanation with regard to the use of the diskettes as well as 4 duplicating masters, and a step by-step guide to operating the computer.

Schools should give serious consideration to this program for use at primary levels.

**MULTIPLY**

**Company:** Reston Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K, Apple II+

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*Multiplay* is yet another progressive mathematics drill program with the added incentive of an Arcade-type invader’s game. In the same mold as the Lightening Software product, *Hi-Res Mastertype*, this package provides an addictive, entertaining, and educationally sound approach to what would otherwise by dull and repetitive work for a student. The game was especially designed for children between the ages of 4 and 14, but many adults could benefit with a brush-up on the simpler functions as well.

The program allows you to use the computer keyboard to answer arithmetic exercises that appear on screen in the form of “Problem Ships.” You must shoot down the Problem Ship before it destroys your Answer Base. To accomplish this, type in the correct answer to any of the problems that appear on the body of the Problem Ship. If the answer is smaller than the pre-programmed answer field’s length, press RETURN. For example, if the correct answer is 5, and the field only has a length of 2 spaces, then press 5 and RETURN. Whereas, if the answer was 10, the Problem Ship would be immediately shot down upon pressing the second digit. You solve as many problems as possible in this fashion in all 3 levels of difficulty, and try to attain the top rank in each level.

There are management options which enhance the usefulness of this package. Problem Ships can drop at two different rates: normal and lightning. Games can be played with normal sound, or a low-level sound feature (useful in classroom situations). At the end of each game, all Missed Problems (Problem Ships that escaped), and their correct answers are displayed on the screen. The problems themselves are created by a random number generator, so repeated play of the game will not lead to boredom, or give an advantage to a person with an extraordinary rote memory. One objection — at the higher levels the problems become too difficult to work out mentally...I never learned my 17-times tables!

In summary, this is an excellent package for mathematics drill at the level it is aimed (and a little higher).

**muMATH**

**Company:** Microsoft  
**Language:** Machine  
**Hardware Requirements:** 48K

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<th>Rating</th>
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*muMath*, a very powerful symbolic math processing system, allows you to perform a host of mathematical operations ranging from simple algebra to complicated differentiation, from high precision arithmetic to Taylor series expansions. All processing can be done in symbolic form so that mathematical functions can be manipulated,
simplified, integrated, and differentiated. muMath can also perform exact rational arithmetic in any number base up to thirty-six and can do factorials, fractional power arithmetic, and complex arithmetic with precision up to one thousand decimal digits.

muMath accomplishes all of this with 48K of memory because it is modular in form and replaces DOS 3.3 with a much more compact disk operating system (called ADIOS for Apple Disk Interface and Operating System). The modular construction allows preservation of adequate working space by only loading the parts of muMath needed for the operations at hand. You can load all modules, however, and still leave a useful amount of work space in a 48K machine.

The power and flexibility of muMath must be seen to be believed. Besides all of the normal arithmetic operations (plus the ones mentioned above), muMath can assign variables and find absolute values, greatest common divisors, and least common multiples. It can exactly determine the factorial of 200 in forty-five seconds. Algebraic operations include simplification, expression reordering, and cancellation. You can invoke functions to expand or factor algebraic expressions and set numerous control variables to determine the exact form of the subsequent algebraic expression. Normal simplifications and identities enable you to perform trigonometric and logarithmic operations.

The calculus modules of muMath provide for symbolic differentiation and integration. Virtually any function can be differentiated by muMath since it applies all the standard rules, but it can integrate only a limited subset of functions. The subset is reasonably large and includes most common integrals, but the program cannot, for example, perform a general integration using parts. The Taylor series module allows the expansion of any function around a point. You can then evaluate the series to find numerical approximations to functions.

In addition to all the built-in functions, muMath can also define new functions by using the “muSimp” language that muMath itself is written in. muSimp is a LISP-like language perfectly suited to the symbolic and recursive type of programming used in muMath.

The documentation is excellent but not for the novice mathematician. No attempt is made to provide any tutorial in the mathematics used, but anyone having completed one year of calculus should have no trouble with any aspect of the program. The documentation describes the muSimp language and gives examples for its use, but again, a novice programmer would have trouble with some of the concepts.

Who, then, would benefit from using muMath? Obviously mathematicians and scientists who work with complicated algebraic expressions and need to manipulate and simplify them will like the program. The factorial functions provided help in evaluating complicated problems. Complicated functions in physics and engineering are easily differentiated and evaluated. Less obviously, teachers of mathematics and computer science would benefit from muMath. In both cases it is the very structure of the program that would provoke interest. The mathematics teacher could use the program to teach rules and identities and the computer science teacher could use it to demonstrate some aspects of artificial intelligence and of a recursive programming language.

In summary, muMath is a unique, even amazing program because of its ability to manipulate symbolic expressions. The programmers who put so much power into 48K of memory deserve much praise. muMath is clearly not for everyone, but it should definitely find a place in science and education.

STICKYBEAR NUMBERS

Company: Xerox Educational Software
Language: Applesoft
Hardware Requirements: 48K

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Stickybear Numbers is the complementary package to Stickybear ABC, designed to teach young minds the concepts of counting and number recognition. Each time a number is pressed, the child is rewarded with a graphics show of that number of objects moving around the screen. If the child then presses the space bar, one of these objects disappears and the number is reduced by one. At other times the space bar will increase the number of objects and the corresponding number by one. Pressing the same number again and again generates a new picture with a different set of animated objects. With many background combinations and nearly twenty different objects such as sailboats, trains, bears, ice-cream sundaes, and stars, the program presents an endless variety of counting shows.
The package comes in a plastic binder and contains a disk, a number poster illustrated with many of the shapes in the program, and a hardback book, *One Bear, Two Bears*. It is a cute book with the number of Stickybears increasing and then decreasing as the story unfolds, thus reinforcing the concepts of counting and number recognition.

*Stickybear Numbers* is a very good educational package that teaches pre-school children the basic concepts of numbers from zero to nine. It may not be a very involved package, but it is a nicely animated and colorful one that does its job.

**Soccer Math** is a two-player arithmetic drill program for students in the kindergarten through 6th grade levels. The problems appear at the bottom of a screen displaying a soccer field. As each player answers a problem in addition, subtraction or multiplication, an animated character kicks the ball at the opposite goal. If the answer is correct, a goal is scored, music plays, and a new problem is displayed. If incorrect, the ball misses the goal and the correct answer appears.

The program has two strong points. The first is that it allows two students to compete at different skill levels. The second is the number of options available in setting up the program and monitoring the progress of the students. You may keep track of up to 35 students, select the number of problems presented during each game, and decide at which of the ten levels of difficulty the student will start. This difficulty level will then increase, decrease, or stay the same depending on the players' performances on each type of problem. You may look at each student's record, and even get a printout of the class file. I found all of the functions easy to use as everything is menu driven, and, if you try a response that the program does not recognize, it simply asks the question again. The teacher's access is protected from prying eyes (and fingers) with a simple password.

Now for the shortcomings. The first thing that struck me is that there are no division problems. I fail to see how an arithmetic tutorial can call itself that and omit one-quarter of the common arithmetic functions. Next we come to the graphics: they are dull. The little soccer player is colorful but blocky, his actions are jerky, and the "ball" is square! Even worse is that when the program is run on a black-and-white screen, it is difficult to distinguish the player from the background. The teacher utility that is supposed to turn off the music works, but some beeping remains at the beginning and end of each game. Also, I think that the student should have at least two attempts at each problem. This might allow him to recognize an error and correct it, which is a good learning technique. Finally, it is just a dull program, and I doubt that it would keep a youngster interested enough to overcome the usual dislike of arithmetic. The action is always the same, and it seems to take forever for the goal to be made or missed. Still, its strengths should not be overlooked, and it just might have the features that you need.
CHARGED PARTICLE WORKSHOP

Company: High Technology
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: B+
EDUCATIONAL VALUE: A
VENDOR SUPPORT: B

EASE OF USE: A
DOCUMENTATION: A
VISUAL APPEAL: B

ERROR HANDLING: B
RELIABILITY: A
VALUE FOR MONEY: C

Charged Particle Workshop consists of three programs simulating the motion of a charged particle under the influence of electric and magnetic fields. One program deals with a uniform electric field, one with a uniform magnetic field, and one with crossed electric and magnetic fields. The simulation appears on a high resolution graphics screen in Real-time, and provides an excellent display of the particles' trajectory. The x and y components of both the velocity vector and the acceleration vector can also be displayed.

The graphics screen format for all three programs is the same; it shows that a lot of care was taken to insure clear presentation and easy user interaction. The right side of the high resolution screen is devoted to the display of all the constants used in the particular program being run. These constants include magnetic field, electric field, initial particle velocity, particle charge, particle mass, and the time lapse between displayed positions. The range of values of the constants is easily adjustable. The bottom of the high resolution screen contains information about the plot, and shows the direction of the electric field, the particle's velocity vector, and the plot mode. You can plot without plotted points, with plotted showing the particle trajectory, with velocity components displayed, or with acceleration components displayed. All plotting can be done in single step mode. A "help" command provides the full list of program commands.

The actual simulations in Charged Particle Workshop are accurate and well presented, and it takes only a minimal amount of time to plot points. Be aware, however, that most parameters do have a very limited range, and therefore make the programs unsuitable as a general simulation tool. For instance, the magnetic field can only have 5 values, the initial particle speed 3 values, the particle mass 2 values, and the particle charge 5 values (2 negative, zero charge, and 2 positive). Even with these limitations, however, the programs provide a large range of possible particle trajectories and include all the classic charged particle motions in electric and magnetic fields. Combined with the high quality of the documentation and examples, Charged Particle Workshop seems an almost perfect piece of educational software for augmenting any high school physics program.

Alas, "almost" perfect. It is still my opinion that most of the High Technology educational software is over-priced, and Charged Particle Workshop is no exception. Even so, High Technology should be commended on their consistently high quality.

CHEM LAB SIMULATIONS #1

Company: High Technology, Inc.
Language: Applesoft
Hardware Requirements: 32K

OVERALL RATING: B
EDUCATIONAL VALUE: A
VENDOR SUPPORT: B

EASE OF USE: B+
DOCUMENTATION: B+
VISUAL APPEAL: B+

ERROR HANDLING: A
RELIABILITY: A
VALUE FOR MONEY: C

CHEM LAB SIMULATIONS #1 includes three programs which use the graphics capabilities of the Apple II to simulate experiments common to the laboratory programs of many first year college chemistry courses as well as some secondary school programs. ACID-BASE TITRATION is an example of the common laboratory procedure
used to determine the concentration of an unknown acid. **AVOGADRO’S NUMBER** and **EQUILIBRIUM CON-
STANT OF A WEAK ACID** both use acid-base titrations, followed by a second experimental procedure. Avogadro’s number is derived in the second experiment by using the titration to determine the molecular mass (weight) of a fatty acid followed by a molecular film experiment in which a monomolecular layer of the fatty acid is spread across a liquid surface. The third part of the diskette uses the titration to give the molar concentration of an unknown weak acid. This acid is identified from a selected list by determining the value of the ionization constant using the partial neutralization technique and a pH meter.

**CHEM LAB SIMULATIONS #1** is the product of a microcomputer software development program for the general chemistry program at Oklahoma State University. This package is appropriately intended for most science majors in college-level general chemistry programs. Portions of it are applicable in many other introductory chemistry courses in colleges and secondary schools.

The 20 page manual which accompanies the diskette includes an introduction describing the scope of the simulations, how to use the manual and the hardware requirements as well as the starting and running instructions. The manual also provides a theoretical discussion and an experiment notes sections for each of the three simulations. The notes provide a complete explanation of the computer operations for the simulation as well as a description of what is seen on the screen in each step. No exercises or questions are included in the manual for these simulations as the same authors have done for **CHEM LAB #2**; inclusion of such material would improve the package.

When running each of these simulations, the viewer is first presented with a brief discussion of the experiment, both theory and technique, followed by the titration simulation. The filling of the buret and beaker are simulated graphically; the user must then read and input the level of the bottom of the meniscus on the monitor before proceeding. Reading errors greater than 0.25 ml. are not accepted and another value is requested. The user selects any one of the four modes for titration (fast, slow, drops, or dropwise); the mode may be altered during the titration. The simulation includes small details such as the turning of the stopcock and the localized color which disappears as the base is added to the acid. The titration ends with the permanent change to an orange color in the beaker; back titration is not provided for in this program. The user reads and inputs the final base level in the buret. After an acceptable value has been entered, the program performs the appropriate calculation: for the first simulation, the experimental concentration of the unknown base; for the second, the molecular weight of the fatty acid; and for the third, the concentration of the weak acid solution. From an instructional point of view, a significant improvement would be to require the user to first perform the calculation and input the appropriate answer followed by an appropriate feedback for both correct and incorrect answers.

A minimum of three titrations is required for each experimental sequence before the user is given the actual value and the experimental error calculated; feedback is given at this point about the quality of the work. Here again, a student calculation and input is preferred.

Unfortunately, the deficiencies in the programmed sequences noted above can not be corrected by the local faculty user because the diskette is protected from listing. This protection appears to increase the cost of the diskette and to decrease its instructional effectiveness.

The molecular film portion of the **AVOGADRO’S NUMBER** experiment may not be entered until the titration has been satisfactorily completed. The manual includes a theoretical discussion of the second part of the experiment as well as a detailed sample calculation of Avogadro’s number using data from such a simulation. For this part, the student inputs drop and area data and the program calculates Avogadro’s number for the various possible molecular geometries. Results from this simulated experiment will be in error by no more than a factor of 100, which is relatively accurate when compared to the size of the Avogadro number, 6.02 x 10^23 1/2. As in the titration simulations, the user should be required to make the calculation and input the answer for evaluation.

The **EQUILIBRIUM CONSTANT OF A WEAK ACID** experiment simulates the use of a pH meter to determine the pH of a partially neutralized solution of the weak acid. The manual includes both a theoretical discussion and sample equilibrium constant calculations in addition to experiment notes. Here again, user calculation and input is preferred.

These simulations could be used external to the classroom for preparing the student in actual laboratory experiments. Additionally, they could profitably be reviewed after the laboratory work and used as the basis for a rapid pre-lab period presentation by the instructor. These conclusions are based on the experience of the reviewer (a credited college chemistry instructor) in running each of the three simulations using both black and white and color monitors. Further, the **ACID-BASE TITRATION** was run by an average student in a preparatory chemistry course in the presence of the reviewer. Two problems were observed with the graphics: 1.) the liquid area on the screen extends outside both the beaker and buret, 2.) it is impossible to read some of the black numbers on the white background in the inverted screen segments.

Use of these simulated experiments should improve student performance in the laboratory and, if the deficiencies noted herein are corrected, in the workup of data from actual laboratory experiments involving the techniques simulated in **CHEM LAB #1**.
CHEM LAB SIMULATIONS #2
Company: High Technology, Inc.
Language: Applesoft
Hardware Requirements: 32K one pair of paddles.

The package would be more useful instructionally if some of this material were displayed on the computer screen. Furthermore, additional questions for the student, especially those which require predictions that could be verified by the computer simulation are needed to improve the instructional utility of the package. Representative problems could also be included which require student answer responses. Appendices in the manual also contain definitions and equation problems, plus an index.

The reviewer, experienced in college chemistry instruction, ran each of the exercises described in the study guide on an Apple II computer with the expected and suggested results obtained. However, this was achieved for the second simulation only after it was noted that the right hand chamber was slightly larger than the left. When these were equalized by decreasing the volume on the right, the equal distribution of particles expected with equal volumes was obtained. Confusion results in attempting to use the original menu in which the instructions are obtained by selecting option 3; this would be alleviated by using option 1.

CHEM LAB SIMULATIONS #2 includes two programs, both involving the simulated behavior of ideal gases. Included on the diskette are simulations of common macroscopic gas law experiments as well as computer versions of the demonstration devices known as molecular dynamics simulators, which represent the behavior of these gases with molecular models. CHEM LAB SIMULATIONS #2 is the product of a microcomputer software development program for the general chemistry program at Oklahoma State University and is intended for most introductory chemistry courses in colleges and secondary schools.

The first program, IDEAL GAS LAW SIMULATION, utilizes the graphics capabilities of the Apple II to portray the behavior of an ideal gas confined in a chamber with a movable piston as one or more variables are changed. The simulation may be approached macroscopically or submicroscopically (using the molecular models). The molecular simulation consists of constantly moving, visible particles (squares rather than circles) of a gas within a container; these particles are omitted in the macroscopic case. The user is able to vary the pressure, volume, and the number of gram molecules of gas by using the paddles and selected keys. In both cases, values are shown at the bottom of the screen for the pressure, volume, number of gram molecules and temperature for the gas sample under study. Unfortunately, numerical values only are shown; the units have been omitted.

The second program, ENTROPY SIMULATION, displays a compartment divided by a barrier. In one option of this program, two gases are allowed to mix; whereas, in the second option, a single gas is allowed to expand from one compartment into an evacuated chamber. In the mobile, molecular view a gas is employed, as in the first program; consequently, the user is able to follow graphically the alteration in disorder within the system which accompanies each change. For both options, the user opens the "stopcock" between the two compartments by depressing any key, allowing a running count of the number of particles in each chamber to be shown on the screen. By using selected keys and the paddles, the user is able to start, freeze, resume or restart and end the simulation as well as change the volume of one compartment and the average velocity of the particles.

A detailed manual accompanies the diskette which includes an introduction describing the scope of the simulations, how to use the manual, and the hardware requirements, as well as the starting and running instructions. The manual provides a complete explanation of the necessary operations for the several exercises included in each of the programs, as well as a description of what is seen on the screen in each step. Directions are included for exercises to illustrate concepts such as Boyle's Law, Charles' Law, the ideal gas law, kinetic molecular theory, the gas constant and entropy (order and disorder), as well as diffusion and dynamic equilibrium. These printed exercises present instructions, pose questions and problems, present discussions, and draw conclusions related to the simulations. Answers are provided in an appendix.

The CHEM LAB #2 simulations could be used effectively by an instructor in classroom demonstrations and prelaboratory periods to accompany discussions of the macroscopic gas laws as well as the kinetic molecular theory explanations of the behavior of ideal gases, entropy, diffusion and dynamic equilibrium. It could also be used in out-of-class, individualized instruction or independent study situations. However, the attractiveness of this package is decreased somewhat by the protection from listing imposed by the "publisher". This prevents the faculty member from adding program elements or making other revisions to improve the correlation with the local course as well as overcoming the weaknesses noted in this review.
Chem Lab Simulations #3: Calorimetry is a set of interlinked programs which allows the simulation of a calorimetry experiment on the computer. You determine the heat level for three separate chemical reactions, and then use the results to demonstrate Hess’s law. The actual steps of the experiment are shown on the high resolution screen, and data taking is performed by reading an animated thermometer. The programs are self-documenting, and proceed through an introduction, experiments, calculations, and a conclusion. The user interacts both by reading data from the thermometer on the high resolution screen, and by performing calculations to reduce the data. A very thorough manual is provided which reiterates the information in the programs, gives sample calculations, and provides a short glossary.

The programs are divided into six main parts. The first part introduces the equations and describes the experimental procedure. The on-screen thermometer is read once, and then the actual experiment begins. First, the head capacity of the calorimeter is determined, then the heat of reactions are measured for HCl, NaOH, and water. The final section discusses the reactions in relation to Hess’s law and calculates the percentage error of the measured values compared to the true values. All sections request some calculations, which are immediately displayed if the input is close to being correct. Input which is too far off will be rejected twice before the calculation is shown on screen.

Chem Lab Simulation #3: Calorimetry, as well as its companions in the series (there are four), is a wonderful alternative to the traditional high school or college chemistry class. It is the perfect bridge between reading about an experiment and performing one. The simulation can provide an interesting rehearsal for the real laboratory experiment, and is simple enough to be mastered in a short time.

Chem Lab Simulations #3: Calorimetry was written at Oklahoma State University and is part of their general chemistry program. The programs which make up the simulation are well-written and provide a very good combination of information and user interaction. The graphics are very good, especially the animated sequences (such as pouring a liquid). In fact, my only complaint about the actual software is a minor one involving the short pause during program loading (a problem easily circumvented by use of one of the fast new DOS’s). A much more serious complaint involves the publisher’s decision to write-protect the software. This not only lowers its value for money, it also deprives users of the ability to modify the programs to fit their own needs. Also, since the entire series is obviously aimed at educational institutions, Hi Tech should address the problem of how to provide sufficient copies at a reasonable price to the classroom. High Tech does get high marks, however, in providing a back-up disk immediately after receiving the ubiquitous warranty card.

Chem Lab Simulations #4: Thermodynamics consists of two main programs, simulating a chemistry experiment dealing with thermodynamics. One experiment consists of the identification of an unknown liquid using vapor heat, and the other experiment uses the thermodynamics of an equilibrium reaction to determine the enthalpy, entropy,
and free energy of the reaction. The actual steps of each experiment are shown on the high resolution graphics screen, and data is received by reading a graduated scale and a thermometer. The programs are self-documenting and follow the pattern of introduction, experiment, calculations, and conclusion. A very thorough manual comes with the programs, expanding on the information and calculations.

Chem Lab Simulation #4: Thermodynamics, as well as its companions in the series (up to #4 at this time), is a wonderful alternative to high school and college chem lessons. It is the perfect bridge for the normal gap between reading about an experiment and doing one. The simulation can provide an interesting rehearsal for the real laboratory experiment, and is simple enough to be mastered in a short time.

Chem Lab Simulations #4: Thermodynamics was written at Oklahoma State University and is part of their general chemistry program. The programs which make up the simulation are well written and provide a very good combination of information and user interaction. The graphics are very good. One extra element of realism is added during the simulation of both experiments: the experiments can fail due to improper equipment preparation, or due to overheating of the sample. This makes the simulation more authentic, and at most a few minutes are lost while data is input again. In fact, my only complaint about the actual software is a minor one involving the short wait while different program modules are being loaded. A simple fix for this would be to incorporate any one of the new fast DOS's now available. A more major complaint concerns the publisher's decision to write protect the software. This not only lowers the value-for-money of the software, but also prohibits users from modifying the programs to fit their own needs. The entire series of chem lab programs (being aimed at educational institutions) must address the problem of how to provide enough copies at a reasonable price to meet classroom needs. The vendor does get high marks, however, for providing a back-up disk immediately after receiving the ubiquitous warranty card.

CIRCULAR MOTION

Company: Cross Educational Software
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B+
EDUCATIONAL VALUE B+
VENDOR SUPPORT B-
EASE OF USE A-
DOCUMENTATION B-
VISUAL APPEAL B+
ERROR HANDLING A
RELIABILITY A
VALUE FOR MONEY A

CIRCULAR MOTION is Volume 5 in a series for computer-aided programs for college physics students. This volume discusses and demonstrates the velocities and forces involved when an object revolves about another, as is characteristic of a satellite when it travels an orbital path about a planet. The program evaluates objects whose speed is constant and those whose motions are variable. It defines the components of acceleration and velocity (angular and tangential), and shows their vector directions.

The concept of an object's centrifugal force in balance against its gravitational attraction is discussed and demonstrated mathematically, during which its orbital equation is derived. The relationship of an object's orbital speed with varying the distance from a planet is clearly shown in an animated sequence, in which a satellite is placed into an elliptical orbit. The student is asked various questions during the demonstration, and must demonstrate his understanding by choosing the points in the orbit where the orbiting object has its greatest and least speeds.

Dr. Cross, the creator of this package, has devised a game that is designed to further the student's understanding of orbital characteristics. An object's orbit must be changed from an elliptical to a circular path by thrusting or braking at either the perigee (closest point of orbit) or apogee (furthest point of orbit). The student is provided with a limited amount of fuel. Although the game is easy if the student understands the concept, as the objects path approaches its circular migration, it is hard to tell where the perigee and apogee lie in the orbit. Initially, the perigee is skewed to the left, but if a student makes several orbital correction mistakes, the perigee may shift to the right or it can become offset at some angle with the center. There is the possibility that the student may become hopelessly confused at this point.

The program also discusses the solution of simple harmonic motion by using the reference circle method. Several example problems are mathematically stepped through on the display.

Overall, the programs on this disk do cover the concepts very thoroughly, both visually and mathematically. They are obviously designed to be a supplement to a standard physics textbook.
CIRCULATION is an educational program that provides information regarding the organs of the circulatory system. The following six basic parts of the circulatory system are discussed: (1) blood, (2) heart, (3) arteries, (4) capillaries, (5) veins, and (6) lungs.

The authors explain the aforementioned circulatory elements in an organized and succinct manner.

Options are presented such as the following: you may choose to learn information in all six areas, review, or play a game against the computer that tests you on the facts regarding the circulatory system.

Although actual pictures of these parts of the body are not drawn, the program does provide adequate visual appeal. Improvement in documentation is suggested.

CONSERVATION LAWS is the fourth volume in the physics series for college freshmen. The programs in this package discuss conservation concepts for momentum and energy. They accomplish this through definition, illustrative examples, and mathematical solutions to sample problems.

There are numerous examples of elastic and inelastic collisions. Although the system theoretically shows that momentum is conserved (in both cases) in inelastic collisions, in actuality, it is not. Examples display objects colliding and bouncing apart (elastic), as well as objects colliding and sticking together (inelastic). The equations for each example are defined, then solved by stepping through the mathematical solution. Other problems are presented to the student to solve on his own. Each of these problems requires a pocket calculator, pencil, and paper to complete.

The conservation of angular momentum is illustrated clearly by showing how an object’s angular velocity slows down when the radius is increased, thus changing the object’s moment of inertia. Several example problems are given to the student to solve.

A bouncing ball example illustrates that a ball’s potential energy is transformed into kinetic energy as it falls, and then back into potential energy after it bounces. Other sections discuss how some energy is lost due to friction. There are also numerous mathematical problems that are carefully developed and displayed demonstrating how and when energy is conserved. A typical example shows a weight compressing a coiled spring. The student calculates how high the weight would rise if the spring were released.

This didactic package is designed to supplement a typical college physics text such as Resnick and Halliday’s, or Sears and Zemansky’s. Although it has several very good demonstrations, most of the programs are obviously intended for students to use in reinforcing course lectures, rather than as original material for students new to the subject.
**DINOSAURS**

**Company:** Cross Educational Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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DINOSAURS is an educational program that teaches children to identify ten different prehistoric reptilian monsters. The dinosaurs are presented as Hi-Res animated shapes. The child matches them against a list of ten names and is graded on the number of correct answers. The child does not complete the test until he has correctly matched all dinosaurs.

"Dinosaur Hangman" was devised to reinforce the learning process by teaching the child to spell different types of dinosaur's names. The figure of a dinosaur slowly advances towards you on the screen for each incorrect letter chosen. One wins the round if the letters that constitute its name are correctly entered before the dinosaur reaches you. There is a time-limit involved in the advanced game levels.

"Firefight" is a game where the child plays the Tyrannosaurus. It must defend itself against attacking Triceratops, Brontosaurses, and flying Pteranodons. The player is armed with torches. The control keys are F, U, D, R, and L. They control the dinosaurs' body and head positions plus his weapon. Unfortunately, this game being in real time, young children will have trouble finding the keys rapidly, since they are spread out over the keyboard. The keys should have been grouped into a diamond pattern for easier movement control. Since the disk is unprotected, teachers with a minimum of programming ability should have no difficulty in changing the keys so that their students don't become frustrated with their positioning. It is also hoped that the teachers convey to their students that dinosaurs do not actually breathe fire.

Finally, there is an animated demo on the disk called "Bronto in the Swamp." Using Apple's Animatrix for animation, it is one of the cutest and finest demonstrations that we have seen to date that uses this technique. In summary, the program, although fun and cute, lacks a sense of learning depth. Although there are some descriptions of each dinosaur in the teacher's manual, they should have been included in the programs.

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**ELECTROCHEMICAL CELLS**

**Company:** J & S Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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Electrochemical Cells is one of fifteen chemistry programs available from J & S Software. The entire series covers most topics in a high school or junior college chemistry course.

The program presents questions to the student which test his knowledge of electrochemical cells. First, a cell is briefly described. The student is then asked to identify the anode, cathode, reducing agent, oxidizing agent, or the like. A question may require a calculation of the cell potential, or moles of reactant used. The student may request help in the form of a Hi-Res picture of the cell, or a list of relevant half-reactions. The program provides the correct explanation to a wrong answer. When the lesson is complete, the program displays the score along with words of encouragement.

As with many educational programs, Electrochemical Cells is not suited for teaching first-time material. What it provides, however, is a good drill on subject matter already presented in the classroom. Chemistry teachers will find some technical errors. Reagents are sometimes named with an improper mix of symbols and words, such as "an nitrate." Even more bothersome are instances in which the student's answer is mistakenly labeled "wrong" by the program. This occurs, for example, when the program and the student differ on how much to round-off a calculated answer.
All things considered, *Electrochemical Cells* is recommended as a learning reinforcement in the classroom. Because of its restricted subject matter the presence of a teacher will be useful, making this program less valuable in the home than in a classroom setting.

**Conduit**

**Company:** Conduit  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING** B+  
**EDUCATIONAL VALUE** B  
**VENDOR SUPPORT** B  
**EASE OF USE** B  
**DOCUMENTATION** B  
**VISUAL APPEAL** B  
**ERROR HANDLING** B  
**RELIABILITY** B  
**VALUE FOR MONEY** B

Conduit's *Evolut* is an educational program made for a 48K Apple II with Applesoft and a 13/16 sector boot. The disk is copyable; and, if desired, can be Muffined from 3.2.1 up to 3.3. Five copies of student note manuals come with the program, which also includes as Teacher's Guide.

This educational program is a complete unit of introductory work on the mechanism of evolution and population genetics. An elementary knowledge of genetics, ecology, and an ability to calculate percentages and plot graphs, is the background needed to be able to make any progress with this program. The student will be able to learn about the power and importance of natural selection in producing fluctuations in gene frequencies, and eventual specialized adaptations from random genetic combinations. A hypothetical population sample is given in which factors affecting variation are defined, and from it the student should be able to predict the course of evolution.

Using this program, the student familiarizes himself with the theory of evolution and begins to understand how natural selection operates. This also involves studying adaptations found in Darwin's finches and woodpeckers, and uses computer models of pea genetics to investigate how selection alters allelic frequencies. A knowledge of alleles, dominance and recessiveness, homozygotes, and heterozygotes (including gamete formation and fertilization), is necessary in order to be able to use this program successfully. The program is based on the pea model, and the problems posed by the program should help the student gain experience in changing various parameters in the selection of the homozygotes, and so forth.

The program allows the student to use and investigate population sizes up to 500; anything greater would be unrealistic. This is a college grade subject, and would not be of any practical use to anyone not versed in at least some basic knowledge of the theory of evolution.

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**High Technology, Inc.**

**Company:** High Technology, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING** A-  
**EDUCATIONAL VALUE** A-  
**VENDOR SUPPORT** B  
**EASE OF USE** A-  
**DOCUMENTATION** A-  
**VISUAL APPEAL** A  
**ERROR HANDLING** A-  
**RELIABILITY** A-  
**VALUE FOR MONEY** B

The *Harmonic Motion Workshop* is a set of six programs providing an easy method for observing and comparing objects in harmonic motion. The concept of harmonic motion applies to an understanding of the generation of radio waves as well as the description of motions of bodies such as pendulums, weights on springs, and others. The *Harmonic Motion Workshop* consists of six simulations dealing with harmonic motion: simple harmonic motion (SHM); amplitude and phase; amplitude, phase and circular motion; time plot of (SHM); damped harmonic motion (DHM); and time plot of (DHM). The programs appear aimed at the entry level college student in physics or engineering mechanics as well as the advanced high school student. High Technology has provided a useful section in their manual which includes exercises for the student, with discussions and conclusions attached in an appendix.

The first menu choice, "Simple Harmonic Motion" displays in high resolution graphics the horizontal motion of a pendulum swinging back and fourth. Various options allow the display of relative velocity or acceleration vectors, as
well as the relationship between circular and harmonic motion. Another shows the relative amounts of kinetic and potential energy in the pendulum at each point in its travel. One option stops and starts the motion, and a stepping function allows the display to advance through the motion one step at a time.

The “Amplitude and Phase” program lets you vary the magnitude of motion and the relative position (phase) of two bodies in harmonic motion. Velocity and acceleration vectors are available in this program with and without stepping.

In the third program, “Amplitude, Phase and Circular Motion” we see the visual relationships between linear harmonic motion and circular motion. Amplitude and phase are user adjustable, and stepping is available.

The “Time Plot” program is one of the most effective demonstrations. It compares harmonic motion with a plot of position versus time. This allows a clear display of the relationship between circular and harmonic motions and electrical phenomena. Velocity and acceleration vectors can be plotted against time, and stepping is again available. Those vectors are first plotted at the instantaneous position of the body, but are then translated to the x-axis for comparisons of phase relationships among position, velocity, and acceleration. First and second derivatives of the position function are displayed as velocity and acceleration plots.

In “Damped Harmonic Motion” you are shown a screen similar to that in the first program, except that in addition to the previous functions the user can apply a variable damping force on the harmonic motion. Velocity and acceleration vectors, stop/start, stepping, kinetic, and potential energies are all available with damping.

“Time Plot of Damped Harmonic Motion” is the most effective of the programs. Once you have mastered the foregoing basic concepts, the program allows you to plot position, velocity, and/or acceleration with or without a variable damping force. Stop/start and stepping are permitted. This selection contains the most options for displaying instructional time plots and easily lets you simulate various damping forces at or near “critical.”

While the overall presentation is outstanding, it is within the last program that one major shortcoming becomes evident. There is no provision to print the excellent graphics produced in any program. High Technology should include a “Dump to Printer” or “Save Picture to Disk” option. Some prints of the graphics are available from HGR1 or HGR2, if you have a printer interface card with a dump program built in, and by doing a RESET with the image on the screen. Also, while the program performed in an excellent fashion, there was one flaw noted during testing. Within “Damped Harmonic Motion” the graphics image got “confused” and displayed duplicate velocity or acceleration vectors if valid commands were given too rapidly. The other programs had no such problems.

While this package may have appeal in the schools, the software license agreement is a formal legal document which limits its use by serial number to one computer. This might be a disadvantage to schools or those with several computers, and the license holds employers strictly responsible for their employees’ actions with the program. The program claims to be copy protected, but is reproducible with currently available bit copiers. However, the source code within the programs is hidden to all but the most knowledgeable programmers.

Getting customer support was confusing at first. It required three long distance calls to find out that a technician is available at a different number from that given in the documentation, and then only after noon, Central time.

Overall, “Harmonic Motion Workshop” is a very good program. The menus allow the user to move smoothly through the program, and to progress without extensive knowledge of the micro computer.

The Help-menus provided at every stopping point in the program are superb; they eliminate continual references to the manual. The program is effective, instructional, and easy to operate. Its minor flaws do not detract from the overall product performance.

THE HURRICANE TRACKER
Company: Climate Assessment Technology
Language: BASIC
Hardware Requirements: 48K

OVERALL RATING B+ EASE OF USE A ERROR HANDLING A
EDUCATIONAL VALUE B DOCUMENTATION B RELIABILITY A
VENDOR SUPPORT C VISUAL APPEAL C VALUE FOR MONEY B

To borrow the words of its originator, “The Hurricane Tracker was developed for the owners of microcomputers who wish to use their hardware for the task of tracing tropical storms.” This is precisely what the program does. Given certain data about the storms, the program is able to give you detailed information about the likely
You can use *The Hurricane Tracker* to follow the path of a hurricane and keep informed of how far it is from the city in which you live. In fact, if you live in a state bordering the Gulf of Mexico, or somewhere in the Caribbean, or on the eastern coast of Florida, you can do this via the graphics of a map of the Gulf Coastal Region provided with the program.

If you want to track a storm in this region, you follow the easy to use menu for the program to establish a new storm file. This is done by responding to the program’s prompts. You will be asked to give the storm’s name, the time and date of each entry of data, the latitude and longitude of the storm, and its pressure. (All of this information can be obtained from the National Weather Service.) If the storm is within the perimeters of the program’s map, a circle will appear showing the storm’s current location.

After the storm file is initially set up you feed data periodically to the computer as long as the storm is alive. You do this by responding to the same prompts that you used to establish the file. As you continue to update your file, you can watch the path of the storm as it moves across the map and you will be advised of how far the storm is from your city.

In addition to information that you put into the files on new storms, *The Hurricane Tracker* comes complete with the tracks of five classic storms that have hit the U.S. coast in the past twenty-five years. Each one of these storms has with it a complete set of data so that it may be compared to any new storms that the user might track. These storms can also be plotted on the program’s reference map by simply pressing the letter “T.”

As you continue to build files of various storms, the information is saved on your diskette until you either copy it or erase it. You can at any time review a storm file just by asking for it by name. Also, each time you review a file you have the option to see its path displayed on the map.

When you first receive the program you need to go into the utility sub-menu to change what is called the reference city. This is the city upon which all calculations of distance are based. Every time you make an entry you are advised of how far the storm is from the reference city. In most cases this would be the city in which you live. To change the reference city you need only supply the name, latitude and longitude of the city that you want to be the new reference point.

Also on the sub-menu is an interesting section which reviews storms and how they are categorized. This is based on the Simpson/Saffir Damage Potential Scale. Hurricanes are categorized into five levels depending on the potential wind and storm surge damage. There is a brief description of each category and what you could expect to experience in the way of damage with each. These range from level 1 with winds starting at 74 m.p.h. to level 5 with winds in excess of 155 m.p.h.

Although the same company produces both *The Hurricane Tracker* and *The Weather Analyst*, the former is much more limited in scope. It does have, however, the same ease of use and well-formatted menu. If you live in the hurricane belt, you should think about buying this program.

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**WEATHER FRONTS**

**Company:** TYC Software  
**Language:** BASIC  
**Hardware Requirements:** 48K

| OVERALL RATING | D- | EASE OF USE | B |
| EDUCATIONAL VALUE | D | DOCUMENTATION | C |
| VENDOR SUPPORT | C | VISUAL APPEAL | C- |
| ERROR HANDLING | A | RELIABILITY | A |
| VALUE FOR MONEY | D |

*Weather Fronts* is an educational program designed to explain the structure, characteristics, and weather associated with cold and warm fronts. It also covers occluded and stationary fronts. It is directed toward high school science students.

*Weather Fronts* presents little more than a few pages of screen text, several screen pictures with little animation, and a drill of questions designed to test the student’s grasp of the material. Since the material is factual and requires little thought other than memorization, it could probably be better presented in a short slide presentation and accompanying lecture by the teacher. The program does little to be worthwhile.
**Lab Statistics Package**

**Company:** High Technology  
**Language:** Applesoft  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>Rating</th>
<th>Overall Rating</th>
<th>Education Value</th>
<th>Vendor Support</th>
<th>Ease of Use</th>
<th>Documentation</th>
<th>Visual Appeal</th>
<th>Error Handling</th>
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<th>Value for Money</th>
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</table>

**OVERALL RATING**  
**EDUCATIONAL VALUE**  
**VENDOR SUPPORT**  
**EASE OF USE**  
**DOCUMENTATION**  
**VISUAL APPEAL**  
**ERROR HANDLING**  
**RELIABILITY**  
**VALUE FOR MONEY**

Lab Statistics Package provides you with the tools needed to do a least-squares-fit of raw data using a variety of fitting functions. The quantities calculated by the program are fitting parameters for the function under consideration, the standard deviation and probable error for each parameter, and the statistical correlation. The fitting functions available are linear, exponential, logarithmic, parabolic, power, and a "parabolic" logarithm function. A nice piece of additional information provided by the program is how many significant figures there are for each quantity calculated.

Lab Statistics Package is primarily intended for the educational market. A small demo program is included (with reduced features) to help introduce some of the fitting functions, and to graphically represent how different types of raw data correlate with the different functions. The documentation is excellent and provides a section on basic statistical theory. A short tutorial and a large number of examples and exercises are given. The programs themselves are fairly easy to use and are very well error-trapped.

Even with the excellent features mentioned above, I feel the Lab Statistics Package has missed the mark. In working with the program I found that I learned the most from the small demo program in which both the data and the fitting function are graphically presented. The main program does all the proper number crunching, but develops no real representation of the way the data fits the function since no graphing mode is available. The only real application for the main program in Lab Statistics Package is in finding the standard deviation, probable error, and correlation for data in which the fitting function is already known. Finally, the main fault of Lab Statistics Package is that it fails to utilize the Apple's high resolution graphics.

All raw data must be initially input using the keyboard, and there is no mention of the maximum number of data points allowed. There is no discussion of how data is stored onto disk, nor is there information concerning compatibility with data from any other program.

Lab Statistics Package is a solid program, but has definite limitations as an educational aid. Care must be taken in defining your statistical needs before choosing it for either education or scientific work.

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**MECC Science Vol. 3**

**Company:** Compuware  
**Language:** Applesoft  
**Hardware Requirements:** 48K

<table>
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<tr>
<th>Rating</th>
<th>Overall Rating</th>
<th>Educational Value</th>
<th>Vendor Support</th>
<th>Ease of Use</th>
<th>Documentation</th>
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**OVERALL RATING**  
**EDUCATIONAL VALUE**  
**VENDOR SUPPORT**  
**EASE OF USE**  
**DOCUMENTATION**  
**VISUAL APPEAL**  
**ERROR HANDLING**  
**RELIABILITY**  
**VALUE OF MONEY**

This MECC educational package developed for use in the Minnesota school system contains five science programs suited for junior high school students. These programs are a rather mixed group, covering subjects in biology, astronomy, and geology. They vary widely in quality, from excellent to barely fair.

The most interesting and the best program on the disk is *Earthquakes*. The object is to teach students how to find the epicenter of an earthquake. It explains the relationships of P waves and secondary waves generated by the quake, and the lag time between these two traveling waves as recorded from three widely distanced seismographic stations. After presenting the theory, random data in graph form is generated for three stations, and the student is asked to find the epicenter using a keyboard controlled epicenter locator. The program then shows the correct location by drawing a circle showing the probable distance of the quake's epicenter as seen from each of the three stations. The intersection of the three circles is the epicenter.
Minerals is a text program that aids students in identifying twenty common minerals such as quartz, feldspar, mica, talc, and Calcite. It expects students to use paper, a steel nail, hydrochloric acid, a streak plate, glass, and a copper coin in identifying these minerals. By asking a series of questions, the program narrows the field until it picks the correct mineral. It isn’t much more than a fancy method of reading a chart of mineral characteristics and doesn’t add much to a student’s knowledge.

Ursa is a very brief introduction to identifying five northern constellations and their relationship to the north star. This relationship and their position in the night sky can be an aid in telling time. Although the program is short and could have more depth (especially in identifying more constellations), it does give a good graphic presentation and teaches students to tell time by the stars.

Fish is a tutorial on the circulatory system of animals that have two chambered hearts, such as fish. Unfortunately, this is an old program and it uses crude, Lo-Res graphics in its drawings. The organs are shown as symbols. The program shows a molecule of blood as it passes through the heart to the lungs, then to the stomach, and follows it as it returns to the heart. The program is short and you should consider it just an extra to fill out the disk.

Odell Lake attempts to teach the relative size of six different fish that inhabit the lake waters. A student chooses a fish. As the fish encounters each of the species, it has a choice of eating the other fish, ignoring it, chasing it, or escaping into deeper or shallower water. The results of these encounters determine whether the fish survives. The student can then deduce the size relationship of the sixth fish. It is a good program and the graphics are entertaining.

OPTICS is volume eight in their computer-aided instruction series for college freshmen and sophomore physics students. The programs are designed to accompany physics texts such as Resnick and Halliday’s. Much of the material on this disk is also suitable for high school physics. The OPTICS disk presents three programs about ray diagrams for both lens and mirrors, two on waves and diffraction, and one concerning laser theory. Each of the programs makes use of Hi-Res graphics extensively to illustrate its lesson.

The mirror and lens ray diagram programs first discuss the definitions, followed by the rules used in constructing ray diagrams. The program draws the rays to show where the image is formed. It then shows how to find the real and virtual images for concave and convex lens, as well as for mirrors. The program is interactive in that it requires responses from the student as it presents the lesson.

The third program consists of a laboratory session. After choosing a type of mirror or lens, the student controls the position of the real object while the computer draws the ray diagrams. The student can observe the effect on the position of the image and whether it is real or virtual, erect or inverted, enlarged or reduced. It is an excellent simulation.

Observing the waves provides an explanation (first by definition, then by demonstration) of how two waves are superimposed upon each other. There is an animated demonstration of two waves going in opposite directions and how they would form a standing wave if superimposed on one another. This demo can also be single-stepped through for a closer look. The computer can also generate the sum of five complex waveforms to show how waves are Fourier-analyzed. The system demonstrates how waves of different frequency and amplitude are used to generate sawtooth and square waves. Students can try their own combinations.

The interference and diffraction program begins with definitions. Detailed and complex derivations are left to the textbook. However, the program does derive the formula for the phase difference between two waves projecting through two slits and thus forming interference patterns. The program advances to multiple slits, then to single-slit diffraction. In each case, the intensity versus phase angle is plotted. Finally, the program combines the two subjects into one resultant plot and allows the student to choose his own test case.

There is an elementary demonstration of how lasers operate. The program carefully explains how excited helium and neon atoms turn their energy into light rays, and how the light is amplified inside the laser. The program con-
structs a laser tube and allows you to adjust the speed of the bouncing light pulses.

The entire package provides an excellent tutorial on several selected topics in optics. The programs reside on two sides of the disk. At $20, OPTICS is a bargain for computer-aided instruction in any college physics course.


**PLANET MASTER**

**Company:** Magnetic Harvest  
**Language:** BASIC and Binary  
**Hardware Requirements:** 48K

<table>
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<th>EASE OF USE</th>
<th>DOCUMENTATION</th>
<th>ERROR HANDLING</th>
<th>RELIABILITY</th>
<th>VISUAL APPEAL</th>
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Have you ever wanted to play God? Magnetic Harvest now offers you the chance. The year is 2323 A.D. The Intergalactic Greenpeace Foundation has just founded the first of a series of orbiting Space Sanctuary Satellites (SSS) in order to preserve and nurture endangered species from around the known universe.

The typical SSS is a medium-sized asteroid which has been given an atmosphere and climate similar to the Earth’s. This has been done through the art of Terraforming: the transformation of lifeless rock to a green, arable world suitable for supporting carbon-based life-forms. The method used seems to have been derived from the Genesis in *Star Trek II*.

Your mission is to take care of six groups of these species from an unlimited selection on the first SSS. Your SSS is in the shape of a perfect twelve-sided geometric figure known as a dodecahedron. It is approximately 48 kilometers in diameter and divided into twelve zones, each of which has a unique climate. The orbit and inclination of the SSS provide four seasons of thirty days each. Weather conditions vary up 25% from each season (i.e., rainfall, temperature, and sunlight).

There are four basic types of vegetation on your SSS. These genetically-engineered plants, called Flora, require different growing conditions. Duro grows well in cold regions that have little light and low rainfall. Tapi grows well in hot areas with plenty of light and moderate rainfall. Flora grows on a minimal area of land. The actual regeneration is determined by the climate. The indigenous Flora will never be completely depleted. Trace amounts of about ten kilograms will always escape consumption.

The animals are moved in groups to zones that have the right climate and the right quantities of Flora. They can only be moved once per season and only one area away from their previous home. Herbivores will eat Flora in the zone that they occupy. Omnivores will eat Flora if it is available; if it is not, they will turn into carnivores. Carnivores will eat any smaller species surrounding their zone. Diet efficiency, metabolic index, reproduction, lifespan, and hibernation are all taken into account.

You are given a rating after every season played, along with a cumulative rating. You can set the game length from one to five years. *Planet Master* is very involving, but takes a lot of time to complete. You have the option, however, to suspend the game at any time. Over 50 game screens are used with several charts and a population graph. There are Hi-Res line drawings of animals for your selection. Frontal and temporal views of a specimen’s cranium are given.

The program is written in Applesoft and BASIC Binary and text files which are unprotected for back-up purpose. Because of this, the program runs slowly, thus really bogging down the game. Nevertheless, *Planet Master* has some good points. It is very crash proof, and the accompanying documentation is excellent. Overall, *Planet Master* is very well done; it certainly has broken new ground. I hope to see more programs from Magnetic Harvest.
The Projectile Motion Workshop is a set of four programs which facilitate the observation and comparison of objects in projectile motion. The concept of projectile motion is fundamental to the understanding of all falling bodies with or without a horizontal component to their velocity. In simplest terms, projectile motion involves a body dropped from a stationary position and allowed to accelerate with the pull of gravity. In more complex situations, it involves objects shot or hurled vertically and horizontally at the same time and allowed to come to rest at points above or below their origin. The Projectile Motion Workshop consists of four simulations: Vertical Motion Only, Fire Upward, Fire Right/Down, and Component Motion. The programs address the college freshman-level physics or engineering mechanics courses and can be used by the advanced high school student as well. High Technology has provided a useful section in their manual which includes exercises and selected demonstrations for the student, with discussions and conclusions attached in an appendix.

The first menu choice, Vertical Motion Only, displays—in Hi-Res graphics—motion in a vertical direction. The body may be dropped from rest, fired vertically upward, or fired vertically downward. The position, velocity vector, or kinetic and potential energies at regular intervals of time can be graphically and numerically shown. There is a feature which allows the motion to be stopped and started, as well as a stepping function which allows the display to advance through the motion one step at a time.

The Fire Upward program demonstrates the two-dimensional motion of an object fired at an angle above the horizontal axis. The angle of fire and the initial velocity may be varied within limits. Position, velocity vectors, and kinetic and potential energies at regular intervals of time can be shown both graphically and numerically. Stepping is available.

In the third program, Fire Right/Down, you can demonstrate the two-dimensional motion of an object fired horizontally or at some angle below the horizontal. The angle of fire and the initial velocity of the object can be varied within limits. Position, velocity vector, and kinetic and potential energies can be shown both graphically and numerically. Stepping is available.

The Component Motion program shows that the motion of a projectile is a combination of: (1) the motion in a straight line at constant speed (uniform motion), and (2) the motion of an object falling from rest. The motions of an object moving at constant velocity, an object falling from rest, and projectile motion are displayed simultaneously. The angle of fire and initial velocity may be varied. Again, stepping is available.

While the overall presentation of the set is outstanding, there is one major shortcoming. There is no provision to print the excellent graphics produced in the programs. It should be firmly suggested to High Technology that there be a "Dump to Printer" or "Save Picture to Disk" option. Some prints of the graphics are available from HGR1 or HGR2, if you have a printer interface card with a dump program built in, and if you do a Reset with the image on the screen. The illustrated printouts were done in this manner and show some of the excellent graphics available.

While this package might appeal primarily to schools, the software license agreement is a formal legal document which limits the use to one computer by serial number—a disadvantage to those with more than one computer, and the license holds employers strictly responsible for the program. The program claims to be copy protected but is reproducible with currently available bit copiers. However, the source code within the programs is totally hidden to all but the most knowledgeable programmers.

Getting customer support was confusing at first. It required three long-distance calls to find out that a technician is available at a number other than that given in the documentation and then only in the afternoon (Central Time).

Overall, Projectile Motion Workshop is a very good program. The menus allow you to proceed smoothly without extensive knowledge of the microcomputer. The Help Menus provided at every stopping point in the program are superb and help to eliminate continual references to the manual. The program is effective, instructional, and easy to operate.
Rocky's Boots is a wonderful educational package designed to introduce children to logic concepts necessary in the design of computer circuits. What is generally a very difficult subject for college bound science students is presented in an enjoyable and exciting series of games in which the child designs kicking machines to score points against a particular type of target, for instance, blue balls in a field of many colored targets.

The program begins by explaining that the red cursor is like a battery and a source of electrical energy to anything it touches. An electric sign lights when the cursor touches it; an electric clacker clangs; and a boot kicks when its socket is touched. The cursor explores color and shape sensitive sensors that turn “on” (red) when a like colored object or shape passes across their surfaces. The program progresses to the concept that simple machines can be designed by linking wires to kicking boots and then the wire-boot pair to the sensor. If the sensor detects triangles, each time a triangular piece in a train of mixed shape objects passes through the sensor, it kicks the triangle out of line. If the triangles are worth positive points and the rest negative points, the child will score points or win the game. If he builds the correct logic machine, Rocky the Raccoon rewards him.

The concepts become more difficult with the introduction of AND, OR, and NOT gates. First the child plays with a NOT gate. The output is on (red) while the input is off (white). When the child touches the input by turning it on, the output magically turns off. Both the AND gate and OR gates are similarly introduced by touch. To be on, OR gates require only one "on" input, while AND gates require both. Rocky's Boots then asks the child to build a machine to kick just the diamonds and circles, but not the triangles. The elementary solution requires connecting one OR gate, the kicker, and a wire. The cursor can easily pick up the pieces, and they naturally connect to each other. A blinking arrow shows which two connections will be formed, and pressing the joystick button completes the connection. The player can correct mistakes by using a blue knife supplied for this purpose to cut the parts. The solution to the problem is obvious in that the one input node is connected to the diamond sensor and the other is linked via the wire to the circle sensor. When either one of the sensors is lit by the correct shape passing through it, the boot is activated. Some of the other eight problems are non-circles, the blues, and blue crosses. Many of these problems could be mastered by children nine or ten. I think second and third graders would need considerable guidance to understand the material.

The program doesn’t end here but becomes more difficult and involved with the introduction of flipflop, delay, and time delayed circuits. The child soon learns to delay the kicker by using a four stroke clock that activates a delay circuit every fourth cycle. It could be used to automatically knock out certain pieces if more than one entered the sensor area at a time. The flipflop is like a light switch. If you touch the bottom input it flips on to the top and vice versa. Both the delay and the flipflop can be added to circuits to solve some of the more intricate problems. If you send in the warranty card they will send you a set of solutions. I’d advise it, especially to any parent or teacher with precocious children.

Rocky's Boots is a brilliant piece of educational software, and it deserves an award for presenting a very difficult concept in a diverting and enlightening way. It is colorful and logically laid out both in flow and increasing difficulty. It definitely attempts to get a child to think in a logical manner. Unfortunately, children do not gravitate naturally to this program. I tested it on gifted students. Although they easily mastered the concepts of the AND, OR, and NOT gates, they were itching to play a game instead. This leads me to believe that the best environment for this program is the classroom. The price tag is steep, and many parents will be reluctant to buy the program to use at home. I only wish that the manufacturer would realize that there is a big need for this kind of software in the home, and parents might be more willing to buy it if the price were $39.95. In summary, Rocky's Boots is definitely a worthwhile package and possibly the best designed educational package that I have yet seen.

Note: The program’s protection works strangely with an Integer machine with an Applesoft ROM card. The Autostart must be on, and when the program reboots between sections, you usually need to help it along with a RESET.
TELL STAR is a remarkable astronomy tool for predicting and locating objects in the stellar sky for any location and time on the earth during the late 20th century. The star and planet positions are calculated accurately for the observer’s time and position. Inaccuracies, such as the earth’s precession, are taken into account during a nearly five minute calculation. Accuracy is typically within 15 seconds of an arc. The program displays a Hi-Res portion of the sky 90° wide. One has a choice of any direction indicated by N, NW, W, SW etc., plus an overhead view. The constellations in any view can be drawn in with the C key. The program is capable of locating any star or planet in its star tables. The view is shown with a blinking cross hair pointing to that object. Any key displays information like its magnitude, right ascension, declination, time rises and time sets. Alternately, the user can move the cross hair to any object and retrieve the object’s name and all pertinent information. If one tries to locate an object not yet risen in the sky, the computer will inform you of the fact.

There is a code for what different types of objects look like on the Hi-Res screen. Magnitude stars show up in different representations, as do planets and, of course, the moon, which is shown for the phase it currently is in. While trying to locate Jupiter, I saw what appeared to be a planet just below and to the left. Using the paddles to pinpoint the object, I was informed that it was the planet, Pluto.

The program comes in two levels. The difference is that the advanced version has two sets of star tables plus an additional table containing stars and stellar objects for the southern hemisphere. Level I tables contain approximately 180 stars and 13 Messier objects. Table II has fewer stars but nearly 90 Messier objects.

TELL STAR also contains a calculation program for converting equatorial coordinates to the horizontal and back; also ecliptic to equatorial. One can also calculate the locations of objects in the solar system without going to the display section of the program.

The documentation is well-presented in a 48 page booklet. Instructions are clear and the booklet contains tables of all objects seen in the program. This program is definitely the best astronomy program to date and very worthwhile for serious astronomers.
SOLAR SYSTEM ASTRONOMY

Company: Cross Educational Software
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B +
EDUCATIONAL VALUE B +
VENDOR SUPPORT B -

EASE OF USE A
DOCUMENTATION B -
VISUAL APPEAL B -

ERROR HANDLING A -
RELIABILITY A
VALUE FOR MONEY B

SOLAR SYSTEM ASTRONOMY is Volume 10 in Cross Educational's freshmen college physics series. It covers the barebone facts about the objects in our solar system. Since the package is descriptive rather than mathematical in nature, it is also suitable for high school science classes.

The program presents drawings and the latest space probe information about each of our nine planets and their moons. The facts were chosen for their interest value rather than the usual drab statistics. For instance, storm systems on Saturn have winds up to 1,110 MPH. And two moons that share the same orbit in Saturn's ring plane leapfrog over each other when they pass.

Each of the planets are shown in orbit around the sun. A demonstration of these planets in motion shows that the planets closer to the sun have a faster orbital speed. The relative sizes and their differences in composition are also shown. Perhaps the orbital characteristics of an approaching comet is the most interesting simulation, since the expanding tail is clearly shown during its closest approach.

There are also lessons about the history of the solar system and the attempts to discover life elsewhere. An adequate discussion on the greenhouse effect explains why the Earth is warmer than it might be without a cloud cover, and how an increase in the carbon dioxide content in the upper atmosphere might produce a warmer Earth.

Each of the lessons is presented with Hi-Res drawings and text. The lessons are animated where appropriate. Overall, the package is nicely-implemented but appears to be suited for a beginning college science course rather than a physics class.

TRIBBLES

Company: Conduit
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B
EDUCATIONAL VALUE B
VENDOR SUPPORT B -

EASE OF USE C +
DOCUMENTATION B
VISUAL APPEAL C +

ERROR HANDLING B
RELIABILITY B
VALUE FOR MONEY C +

TRIBBLES, by Conduit, is a copyable educational program. Made for a standard 48K Apple II/II+, the disk can be muffled from 3.2.1 to 3.3, if so desired. Five duplicate student tutorial manuals come with the program. This tutorial, attempting to introduce the student to valid scientific methods of problem-solving, sharpens the student's investigative techniques by presenting the computer-simulated puzzle of an imaginary planet called Conway. The student acts as the head of a scientific team investigating life on alien planets. A space ship is sent to Conway; and while orbiting this planet, a camera probe takes a daily photograph of the planet's surface. The surface of the planet has a gridlike pattern and on it dwells a small, round, fuzzy organism that is named Tribble, or "Tribble" for short.

The computer prints a pattern that replicates the "photographs" taken by the probe at one-day intervals. The computer then shows what happens to a set of Tribbles in a given pattern over a period of time. The student can alter the pattern and the number of days. The student, assuming that the Tribbles are like terrestrial organisms, arrives at a sound explanation for Tribble life on the planet Conway.

The manual teaches the student how to make accurate observations, how to be systematic, and how to organize his observations of the Tribble population. Guidelines, testing predictions, and step-by-step tutorials are presented in the 43 page manual. The student is taught how to summarize his or her observations using answers supplied in the manual. In my observation of this program, it is for higher level education rather than for use in primary schools. The deductive power of the student has to be sharp, and, to some degree at least, already scientifically-oriented.
THE STAR GAZER'S GUIDE

Company: Synergistic
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B
EDUCATIONAL VALUE B
VENDOR SUPPORT B

THE STAR GAZER'S GUIDE is an astronomy teaching tool used to learn and identify the major constellations and stellar objects in the night sky. The system allows you to familiarize yourself with the overall winter or summer night skies and identify constellations by outlining them. A keystroke toggles the outline on and off for easy identification. Any of 40 numbered constellations can then be viewed in greater detail.

Each constellation can be outlined in either geometrical or graphical forms and general information about the constellation is displayed on the text page. The program also has some general displays and descriptions of a galaxy, globular cluster, nebula and a double star system.

THE STAR GAZER'S GUIDE is menu-driven for easy access to all phases of the program. Its instruction book includes charts of the brightest stars and their locations and a Messier catalog locating the most common star clusters, galaxies and nebula. The program is well-suited to beginning amateur astronomers.

STATICS

Company: Cross Educational Software
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B
EDUCATIONAL VALUE C
VENDOR SUPPORT B

STATICS is Volume 2 in Cross Educational Software’s computer-assisted instruction for college physics students. This disk considers the forces and torques applied to beams, ladders, and objects at rest on inclined planes. Each program sets up a problem, then steps the student through the free-body diagram of the forces, resolves the forces into X and Y vectors, then sums the components in each direction to zero. It does this similarly for the torques acting upon the static object, then calculates the solution for the forces on the object. In the case of a hanging beam supported by two ropes, these unknown forces consist of the tension of the two ropes.

The programs require students to calculate their answers before proceeding, but they do step through the entire mathematical solution. Although the package is designed to supplement the college physics text, this program does nothing more than reiterate material already discussed. It does not offer any experimentation or exemplification that would give further insight into the subject of statics. In short, it is not as useful as some of the other packages in this series.

VOLCANOES

Company: Earthware Computer Service
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING C
EDUCATIONAL VALUE C
VENDOR SUPPORT B

Volcanoes is an educational game designed to familiarize students with the methods of predicting volcano eruptions. It puts two or more players in the role of volcanologists. Their jobs are to investigate a group of volcanoes in the mythical land of Wrangelia. Each is assigned a different area and given a limited budget with which to carry on
a scientific investigation and warn the local villagers of eminent danger. The costs and conditions closely parallel those of the real world.

There is a choice of six different investigations that the volcanologists can carry out. Some, like satellite infrared scans and electrical conductivity tests, strain their limited budgets; while seismic and tiltometer surveys, and expeditions to collect and analyze the volcano's gases, are less costly. Results are often immediate; while test results from seismic surveys take a year (that is, next turn).

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**THE WEATHER ANALYST**

**Company:** Climate Assessment Technology  
**Language:** BASIC  
**Hardware Requirements:** 48K

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<td>B</td>
<td>VALUE FOR MONEY</td>
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</table>

**The Weather Analyst** is an excellent program that appeals to hobbyists, educators, and anyone else who has a need for accumulating detailed weather data. (Note to teachers: In addition to the science class where you would normally expect to find a study of the weather, I would recommend the program to math teachers because of its outstanding format for compiling and sorting data.)

Although *The Weather Analyst* deals almost exclusively with precipitation and temperature, it does so with a wide variety of approaches. Data is entered in the form of daily high and low temperatures and daily precipitation. The data is easy to enter and edit following the menu-driven directions. Once this data is entered it can be recalled in about a dozen different formats.

You can call for the current month's temperature and precipitation and get not only the daily readings but also a monthly summary. Or, if you prefer, you can go back to a previous month for daily temperature and precipitation. You can also obtain a summary page which includes average highs and lows.

One of the most outstanding features of the program is the custom made interval summary. With this capability you can go back during the past year and ask for a custom-made summary report on any block of time from 1 day to 365 days. For example, the dates used for this test were 4/24/1982 to 5/30/1982. As soon as I entered these dates and pushed the return key, the computer started readings. Within a few seconds the screen display noted that I had asked for a report over a thirty-seven day interval and proceeded to show me: 1) the total precipitation for the period versus the normal for the same time; 2) how many days included precipitation; 3) the greatest daily amount of precipitation during that period; 4) the average temperature versus the normal; 5) the highest temperature of the period compared to the average; 6) the lowest temperature compared with the average; and 7) the number of heating and cooling degree days. The program's ability to compile this information on any given time period within the 365 days is very impressive. It's a shame that it doesn't also track such relevant weather data as barometric pressure.

Another feature of the program is its graph plotting ability. You can have a well formatted graph of daily temperatures for an eight month period, or graphs showing summaries for the year of either temperature or precipitation.

One last feature of the program unique to different geographic regions is the weather data dating back to 1951 that is part of the internal files of *The Weather Analyst*. With this information you can pick a single year or a range of years and find the total precipitation, average temperatures, and departures from the norms of each for the time period you have requested. Unfortunately, the documentation does not specify whether this data is gathered on a local, regional, state, or national level, or where it is measured.

*The Weather Analyst* comes with fourteen pages of documentation, but because of the ease of operation of the menu-driven program, a person would have little difficulty in using it even without the booklet. This ease can be of the utmost importance in the classroom where many of the users of the program are not always skilled in the use of computers.
Computer Literacy

THE APPLE'S CORE
Company: The Professor
Language: Applesoft
Hardware Requirements: 48K

Overall Rating: B
Educational Value: B
Vendor Support: C+
Ease of Use: B
Documentation: C+
Visual Appeal: C+
Error Handling: B
Reliability: B
Value for Money: C+

The Apple's Core is a software package designed to teach basic Applesoft programming to beginners. It includes one program or teaching disk, one tutorial or practice disk, and an instruction manual-text.

This package uses "modules" to teach concepts. Each module consists of three parts or sections. The first part uses the program disk to explain the concept. The second section is in the instruction manual; here you will find additional text, hints, suggestions, and explanations. The third part of the module is the tutorial disk which the learner uses to practice concepts covered in the text or instruction phase.

I found that the students who closely followed the instructions profited most from the program. Recommended procedure is to work through a section of the program disk, then go back and review that section twice before going on to the tutorial disk. Students who did not do this were repeatedly flipflopping between the two disks because they had not mastered the basic concept before trying to apply it.

Programming concepts in The Apple's Core range from variable and print statements to FOR...NEXT loops and GOSUB statements. Some other concepts covered include line numbers, editing, input and GOTO statements, counters, and multiple statements. A module treats each of these programming concepts.

The program has many good features. An invaluable one in the classroom is the continuation option. Inevitably, when a student starts on a program, time will run out before he can complete it. Usually, he has to start back at the beginning the next time he has access to the computer. Because of The Apple's Core's continuation option, the student can recommence wherever he left off.

The vocabulary of the program does not lend itself to students below the junior high level. Even at this level some students needed additional interpretation to understand some concepts. There are sections in the instruction manual-text that would benefit from a little more substance, especially if this is to be a beginner's package.

All in all The Apple's Core is a worthwhile package for the person undertaking beginning computer programming. It also makes a good supplement for the person who might be taking an elementary programming class and needs additional material, or who is attempting to learn programming from one of the numerous texts.

CDEX Training Program for the Apple IIe
Company: CDEX Corporation
Language: BASIC
Hardware Requirements: 64K IIe

Overall Rating: B
Educational Value: C+
Vendor Support: B
Ease of Use: B
Documentation: B-
Visual Appeal: C
Error Handling: B+
Reliability: B+
Value for Money: C+

The CDEX Training Program for the Apple IIe is designed to be used by either the novice, as a means of getting acquainted with the computer, or as a reference guide by the experienced user. The program consists of three diskettes and a training guide. It is a self-paced tutorial, and a new user could work through it without ever looking at the reference guide. Concepts covered in the program range from how to find the on/off switch to advanced DOS commands, additional peripherals, and utility programs such as FID. One very useful feature of the CDEX program is the selection bar which appears at the bottom of each lesson. You are given the choice of skipping a particular question, asking for a hint, reviewing, or menu which takes you completely out of that particular lesson.

The manual is very useful as a review for the person who already knows the basics of how his computer works, but
periodically needs to check on certain functions and capabilities. In addition to the basic DOS commands, the
twelve most common error messages are outlined along with probable causes and possible solutions.

The material contained in this training program can also be found in the new version of the Applesoft Tutorial.
This program offers a valuable alternative for the person who has difficulty sitting down and working through a
book step by step.

THE EUREKA LEARNING SYSTEM

Company: Eiconics
Language: Applesoft BASIC
Hardware Requirements: 48K

The Eureka Learning System from Eiconics allows an educator with no programming experience to design
lessons, tutorials, and quizzes for use on the computer. It comes with a system disk, a demonstration disk, and a book
of instructions containing detailed tutorials. The demonstration disk contains the same three lessons created when
using the tutorials. It is strongly suggested that you read the tutorials (sixty-four pages) carefully if you want to
properly use the system. One major problem with the tutorials is that while the authors show the methods of entering
information and manipulating the program, they do not fully explain them. The program also asks you to accept
information that makes more sense when you have read all of the tutorials—not an example of good teaching.

Entry of information formed into lessons or quizzes is a lengthy and complicated process, never directly
explained. From the entries you can form whole sentences, questions, and multiple choice quizzes using several
formats, including combination text and graphic answers. After entering information, all facts display for review
and correction. You can present student options (creating timed units and controlling sound and order of prese­
tation) and edit the text. Error trapping is good.

Character and shape editing procedures are provided, although difficult to use at times. The tutorials help, as does
the index of the manual and the sample lessons in the manual. Although the authors encourage you to follow chart
format, the charts provided are already filled so that you must make up your own.

You purchase a license to use the system. This entitles you to create lessons. If you wish to use these lessons as a
major part of instruction and distribute or sell them, you must sign another agreement and pay a duplication fee or
royalty to Eiconics.

For one year after purchase, Eiconics will answer questions concerning the system and provide updates. After
that, they charge a fee for maintenance, currently $100.00 per year. The warranty is essentially a disclaimer.

The system could be useful to a teacher who is certain they don’t want to learn a programming language, but the
basic cost plus the additional charges are high when a good course in one of the easier programming languages
would, for the same price (or less), accomplish the same goal while providing additional knowledge.

FACE MAKER

Company: Spinnaker Software
Language: Applesoft
Hardware Requirements: 48K

Facemaker is an educational program designed to introduce young children (4-8 years) to the computer keyboard
and the concept of programming. It does this by asking the child to construct a human face from parts: mouth, nose,
eye, ear, and hair. Each of the eight choices to the left of the face range from normal to comical. The child sequences
through the parts with the space bar and makes his choice with the return key. For instance, if a child doesn’t like the result of adding a particular nose, he can choose another. Each of the parts in the catalog appears on the face as illustrated, except the hair, which is too fine.

Once the child has constructed a face, he can have the face smile or frown, blink, wiggle its ears, or stick out its tongue. A small program can be written using simple letter symbols that cause the face to perform the facial expressions in the order desired. Thus, the letters WT-SEF will have the face wink first, then stick out its tongue and pause for a moment, then smile, wiggle its ears, and, finally, frown. It may be a primitive approach to teaching programming, but it certainly is a creative introduction.

There is a final program suitable for developing memory skills. The face, for example, will smile. The child will press the S key to indicate that the face smiled. The face will then smile and wink, and the child presses the SW keys. Each time the face makes a longer series of facial expressions. The program rewards the child with pleasant sounds for doing well, and bad sounds for doing poorly.

Facemaker is thus an excellent program for teaching computer keyboard and memory skills to very young children. It offers a cute and clever approach. The graphics are also very well-done.

**INTRODUCTION TO COMPUTERS**


*Language:* BASIC

*Hardware Requirements:* 48K

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**OVERALL RATING** | **EASE OF USE** | **ERROR HANDLING**
---|---|---
B | B | B

**EDUCATIONAL VALUE** | **DOCUMENTATION** | **RELIABILITY**
---|---|---
B | B | B

**VENDOR SUPPORT** | **VISUAL APPEAL** | **VALUE FOR MONEY**
---|---|---
B | B | B

*Department:* Education

*Sugg. Retail:* $210.00

*Availability:* 3

*Disk or Tape:* Both

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*Introduction to Computers* is a basic educational tool appropriate for the beginning computer student. It is a multi-media series comprised of four filmstrips to be used in conjunction with four twelve-minute cassettes. For each filmstrip and cassette, the Teacher’s Manual includes teacher objectives, skills that should be developed, pre-and post-filmstrip discussion questions, suggestions for classroom activities, filmstrip reading scripts, content correlation chart (cross-referenced outline of the content covered in the filmstrips and skill extenders) and a computer literacy glossary. In addition, four software programs on two disks supplement the series’ content.

The series, produced by SVE, Inc, covers such information as general computer functions and components, advantages and disadvantages of using a computer, how computer components process information, attitudes toward computers, the impact of computers on society, basic elements of computer programming, steps involved in writing a computer program, and computer careers.

The program’s documentation states that the series is designed “to help students become computer literate; to develop student interest in and awareness of computers; to familiarize students with computer parts, functions, and programming; and to increase student understanding of the impact computers have on our society.” I believe that the series’ purposes are met quite adequately. I designed and taught a course to computer novices covering the basic computer fundamentals. The filmstrips, tapes, and skill extenders were used as reinforcement to the concepts presented. I found that the program’s simplicity was appropriate for the students taking the course. The kit was not used as its authors intended. The course was written for high school students and teachers. Although classroom members were adults ranging from ages twenty to sixty, most of them concurred that the program was suitable to high school students as well.

The first filmstrip, *The Purpose of Computers*, is designed to lessen the anxiety you may have in approaching computers for the first time. The students felt less intimidated when the filmstrip emphasized that the computer is a tool for processing information as opposed to an all-knowing machine. The second filmstrip, *Hardware and Software*, is used as reinforcement subsequent to the presentation of computer terminology and operations.

*The Impact of Computers*, the third filmstrip, describes the use of computers in our everyday life as well as career opportunities. Career opportunities other than systems analyst and computer operator could have been mentioned. This filmstrip was well received. However, the fourth filmstrip, *Understanding Programming*, was unpopular. Steps in writing a computer program seem rather alien to the novice. Some students complained that the filmstrip was too technical. It would be most appropriate for a beginning programming class.
If micro-computers are available, the four programs included in the kit may be used to complement the filmstrip. The programs, which have the same title as the filmstrips and tapes, reinforce the content contained in the kit. Using the airline industry and simulations of airline tasks to show how computers execute these functions proved to be a clever idea for improving computer literacy skills. For example, the first program, *The Purpose of Computers*, provides a simulation which asks the viewer to identify the tasks that a computer could help an airline do, such as passenger check-in, mechanical check-out of the aircraft, and take-off clearance. Next, you choose the task to be simulated. For example, if you request mechanical check-out, lights, flaps, elevators and rudder are checked out on the screen with the use of a simulated airplane.

Unfortunately, the other three programs are a disappointment. They falter in graphics and execution. The graphics are dull and the programs are slow as one moves from one section of the disk to the other. Colorful simulations would have been enjoyable and exciting. Instead, definitions, attitude tests, and programming lessons are generated on the screen.

**HOW TO PROGRAM IN BASIC LANGUAGE**

**Company:** Sterling Software  
**Language:** Applesoft  
**Hardware Requirements:** 32K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>VENDOR SUPPORT</th>
<th>ERROR HANDLING</th>
<th>RELIABILITY</th>
<th>VALUE FOR MONEY</th>
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<td>A-</td>
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<td>B+</td>
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*How to Program in BASIC Language* is for people interested in computer literacy; it is a tutorial approach to learning BASIC. The instruction consists of twelve lessons in programming fundamentals. Two of these lessons list possible applications for business usage, and such handy things as computing your heart rate.

The program begins with the assumption that you have no prior knowledge about computers whatsoever, not even how to turn it on. The tutorial phase lists information and asks questions about what you have learned, requiring a single entry or a short answer. An occasional "hands on" question will require you to type out an entire line. Though not as thorough as a book, *How to Program in BASIC Language* gives a general overview of BASIC, including if/then conditionals, loops, arrays, and even Lo-Res graphics. I found it necessary to follow a standard book on BASIC programming to understand and apply the concepts taught in *How to Program in BASIC Language*. The "hands on" method is used infrequently and doesn't give you any idea of how to apply the learned materials.

The workbook reinforces the concepts you are learning and asks you to apply them on the computer. The primary difficulty with the workbook is that it is oriented toward use without the teacher. Another problem is that there are no answers to the questions asked.

Compared to other "How to" programs, it is less expensive and one of the few with "hands on" training. Using the workbook with the support of a knowledgable teacher in a classroom situation would make this program highly useful to the beginning programmer. But as a personal tutor it falls short of that goal. Learning by the book still seems to be the best way to learn BASIC.

**LINKSAMPLER I**

**Company:** Link Systems  
**Language:** UCSD Pascal source text  
**Hardware Requirements:** 64K, a modern-card UCSD Pascal 1.1

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<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>VENDOR SUPPORT</th>
<th>ERROR HANDLING</th>
<th>RELIABILITY</th>
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*Linksampler I* contains 21 example programs designed to demonstrate Pascal to programmers with some background in another computer language. All programs are of elementary level with no disk access, Apple graphics, or dynamic data management. It emphasizes heavily documented programs solving various numeric prob-
lems.

The examples range from the second most simple Pascal program, a single executable statement, to recursive procedures used to solve mazes, and a simple lunar lander program. The examples in between are designed to introduce the concepts of Pascal one at a time so that each program assumes knowledge of the previous one, and uses these comments to explain the new procedures.

The extensive use of comments in the programs deserves particular mention, since they are the core here for a beginning programmer. In most cases the comments are longer than the program itself. They are set off from the programs nicely, so there is no confusion between program and commentary. The mathematics of the example problems is well explained and intermediate results are clearly labeled. But there is no clever programming here. These programs are instead "simple" in the sense that each illustrates the use of elegant, minimally complex solutions to each problem. In fact, it seems possible that some of the problems were picked because of their elegant programming solutions.

The 67 page manual explains the use of the disk, and the structures and reserved words of Pascal using the provided programs as the examples. The documentation in the manual does not noticeably duplicate that on the disk. While not a complete text on Pascal, this would go well with any of the standard texts or the Apple documentation, providing an alternate explanation of the language with working examples. The booklet is well printed on heavy stock and spiral bound, which gives a very professional and readable look. The body of text, however, is set with typewriter type that spoils this effect, but the usefulness of the text remains intact.

Altogether, this is a well thought out package for those interested in learning Apple UCSD Pascal. Much care has gone into its editing and preparation. If the name Linksampler I is any indication, there should eventually be a volume II or III extending the concept to more complex problems.

**LOGO**

**Company:** M.I.T., Distributed by Terrapin, Inc., and Krell Software, Inc.

**Language:** LOGO

**Hardware Requirements:** 48K

<table>
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<tr>
<th>OVERALL RATING</th>
<th>A</th>
<th>EDUCATIONAL VALUE</th>
<th>A</th>
<th>VENDOR SUPPORT</th>
<th>A</th>
<th>EASE OF USE</th>
<th>A</th>
<th>DOCUMENTATION</th>
<th>A</th>
<th>ERROR HANDLING</th>
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<th>RELIABILITY</th>
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<th>VALUE FOR MONEY</th>
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**Department:** Education

**Sugg. Retail:** $150.00

**Availability:** 4

**Disk or Tape:** Disk

Logo is a computer language that incorporates a new philosophy of education that allows experimentation and provides immediate response without much, if any, formal instruction in the language. Logo has been under continual development from 1968, under the sponsorship of the National Science Foundation, largely conducted at M.I.T. in the Artificial Intelligence Laboratory and the Division for Study and Research in Education.

Logo is a "user-friendly" language that can be readily learned by even an inexperienced student, yet can provide the most sophisticated programmer with the power of a recursive, procedural, modular, interactive language. It is all of these things and more, by design.

From a child's point of view, Logo is a drawing board with a triangular pointer sitting in the middle of the screen, pointing upward. The adults want to name that object the "turtle" — silly grownups. If the child types FORWARD 100 and presses (RETURN), the turtle moves up the screen and leaves a line behind that is about ten times its own length. If the child now types RIGHT 90 FORWARD 100 and presses (RETURN), the turtle will turn to the right and leave another trail behind. If this process is repeated, the child will have drawn a square.

If the child is shown how to use the word REPEAT, and, starting with a "clean" screen by entering DRAW, types the following line: REPEAT 4 (FORWARD 100 RIGHT 90) and presses (RETURN), the turtle will move on the screen and draw a square.

If the child is allowed (or encouraged) to try different numbers for the lengths and angle measures and repetitions, the observer will see the true intent of such a language. A child will immediately experiment with this simple-to-use program, even if the child is a greying, 40-ish teacher of High School Academic Mathematics and Computer Programming.

As sophistication and curiosity grow, the user will investigate the possibility of writing "procedures." This is a simple task. Keeping with our example, to create a "procedure" we need only type TO SQUARE and press (RETURN), and we are placed in the Edit Mode where we can type our line: REPEAT 4 (FORWARD 100 RIGHT 90), and (following the instructions at the bottom of the screen) press Control-C. From that point on, to draw that square, we need only type SQUARE and press (RETURN).

Now we are progressing. It gets boring continually redrawing the same square. There should be a way to extend this idea and draw more squares, different sized squares, other figures besides squares, etc. This, of course, is the
point of the educational philosophy that generated the Logo language. The language is capable of using local and
global variables, and to allow the calling of a procedure from within itself. This recursive feature, and the ability to
pass variables to other procedures within the same workspace, makes the language comparable to some high-level
computer languages.

Logo's list of primitive commands includes many graphics commands, such as BACK, FORWARD, DRAW,
CLEARSCREEN, BACKGROUND (to change background color), HEADING (to move the turtle relative to its cur-
rent heading), LEFT, RIGHT, PENCOLOR (to change the color of its trace), PENUP and PENDOWN (to leave a
trace or not), HIDETURTLE (not to show the turtle at all), SETheading (an absolute positioning), SETXY (mov-
ing the turtle to an absolute location), SETX or SETY (moving the turtle to a particular X or Y location),
SPLITScreen or FULLSCREEN (this provides the two possible types of graphic screens), and TOWARDS (posi-
tions the turtle at a specified X-Y point on the screen). Yet Logo is not simply a Graphic Turtle-Geometry Language.
That is the deceptive part of the ads proclaiming its arrival. Logo also provides many numerical commands. These
include addition, subtraction, division, multiplication, ATAN (this outputs an angle between 0 and 360 degrees by
finding the Arctangent of two lengths, where the sign indicates the quadrant), sine, cosine, SORT (the squareroot of
positive numbers), INTEGER (which truncates any fractional part), QUOTIENT (of integers), RANDOM
(repeated output), and ROUND (which performs the correct integer rounding of positive or negative numbers),
among others.

Logo also has commands that involve manipulating words and lists. These can provide string operations com-
parable to those in many BASIC dialects, but without the usual complex syntax. For example, to output the string
OUT THERE from the string HELLO OUT THERE you type: BUTFIRST [HELLO OUT THERE]. If the string in
the brackets was the word HIT, the output would be HI. Other commands include: BUTLAST, the counterpart to
BUTFIrST; FIRST and LAST, which output the first or last word or character of a word or list; SENTENCE and
WORD, which takes a variable number of inputs (lists or words, respectively), and outputs a concatenated list or
word; and LIST, which takes a variable number of input words and creates a list, to name the most common com-
mands. Logo also has a full complement of conditional expressions, their predicates, and procedure execution
controls. These include the IF...THEN...ELSE construct (sorely missed in Applesoft), TEST...IFTRUE...IF-
FALSE, ALLOF and ANYOF commands (counterparts to conjunction and disjunction). NOT (negation of a condi-
tion), greater than, less than and equal to signs, LIST?, NUMBER?, WORD? and THING?, CO (which provid-
es pass variables

Workspace consists of all correctly defined procedures, names, and their associated values. Workspace
can be stored as files on diskettes; and it is also possible to store turtle-created pictures on the diskette. There are over
16 commands for managing Workspace, including CATALOG, ERASE, PRINTOUT, READ, SAVE, and
GOODBYE. Logo has other commands to control the distortion that some monitors produce when displaying circles
and squares. It alters vertical deflection (ASPECT). Counterpart commands to BASIC's PEEK and POKE are also
provided. User provided routines in memory can be transferred. To reclaim unused storage, "Garbage Collection"
can be made by using .GCOLL. The measure of free "nodes," the available space in the current Workspace, is
made by .NODES. You can also unlock Apple DOS commands from within Logo.

Logo also offers built-in debugging tools. A procedure can be paused during execution by pressing CRTL-Z, or by
using the command PAUSE within a procedure (disengaged by the CONTINUE command). TRACE and
NOTRACE are provided for troubleshooting a procedure. Under TRACE, each line of a procedure is executed and
then waits for any key to be pressed before executing the line.

*Logo* also offers an extensive list of specific error messages to aid the programmer. These range from diskette problems, such as "THE DISK IS WRITE PROTECTED" or "DISK ERROR" when a diskette isn’t in the drive, to tutorials such as "END SHOULD BE USED ONLY IN THE EDITOR" or "NAME IS A LOGO PRIMITIVE" when the reserved word "name" is used as a variable name.

**TERRAPIN LOGO.** The Terrapin version of *Logo*, reviewed above, also offers many extra, pre-defined procedures which provide software support for another product they offer, the Terrapin Turtle, a robot. It is a small, hemispherical object, eight by eight by five inches, connected to the computer by an umbilical cable. Your Apple must have a plug-in card and black box. The Turtle Robot has blinking eyes, beeps in two tones, draws on any flat surface with a solenoid-controlled pen, and moves on two wheels which can be independently controlled. It has a sense of touch.

The Terrapin *Logo*, with its series of additional programs for controlling the Terrapin Robot, plus some other utility procedures, lists at under $150. The Terrapin Turtle Robot can be purchased as a kit for under $400, or fully assembled for under $600. The Robot Interface for the Apple costs around $200. (Atari, TRS-80, KIM, Sinclair S-100, and other versions are also available.)

This package, as well as the two other reviewed below, offers much to the educator. It is highly recommended for all age groups, providing an almost ideal way to painlessly promote computer literacy in the schools.

**KRELL LOGO.** Krell Software, Inc., now offers their version of M.I.T’s *Logo* in two forms. It is possible to purchase the LOGO Language manual alone. Krell’s “Alice in Logoland” diskette, and a utility diskette, are available separately.

The above review covers the essentials of the language itself. The LOGO Language diskette is identical in both the Terrapin and Krell versions. The choice between the two packages comes down to whether the utilities, manuals, and other factors can sway a decision. If the purchaser wants all possible utilities, tutorials, and so on, it is possible to purchase the Terrapin version first, and then simply add the “Alice in Logoland” package from Krell. However, many of the utilities are not unique to either version if they originate from M.I.T.

The “Alice in Logoland” diskette consists of 21 workspaces which are heterogeneous in quality and usefulness. There seems to be no particular rationale for the ordering of these files. Each relates to a portion of *Alice in Wonderland*, but only superficially. The first lesson, AIL1, “On a Golden Afternoon,” purports to introduce the novice to the LOGO turtle; yet it is not a program for beginners. It requires some prior knowledge of the language in order to make sense of what seems like meaningless text on the screen. The second lesson, AIL2, “Down the Rabbit Hole,” is actually more suitable as a first lesson, for the turtle is moved about the screen with simple commands.

The third lesson, “Latitude and Longitude,” is a simulation of Alice falling all the way through the earth. This demonstration is of questionable accuracy; worse, the demonstration comes without explanation. This is followed with multiple color displays of horizontal and vertical crossing lines on a globe, ostensibly the lines of latitude and longitude. Someone should check on the meaning of lines of longitude. Their representation seems totally incorrect.

The fourth lesson, “Rule 42,” is at best a demonstration of quite advanced IF...THEN...ELSE programming, illustrated with actual program listings. Little if any useful explanation is provided. Various programs are displayed, and then executed. This lesson seems totally inappropriate as a fourth lesson in the tutorial series.

Some lessons are inane at best. For example, AIL16, “The Cheshire Cat,” loads two shapes from the diskette, Alice and the face of the Cheshire cat; and they exchange a few lines of dialogue, displayed at the bottom of the screen, while the faces remain mute and frozen. There is no attempt at animation. End of message.

In addition, there is a file called “Instant Alice,” which allows the creation of procedures using a simplified entry list of commands. There is a similar utility on the Terrapin diskette; however, this version is more versatile (it possesses 29 commands), and is probably best used as the first exposure to LOGO for a complete novice in programming.

Krell also provides 12 unique, pre-defined procedures of varying usefulness. Further, there is a workspace called “Instant Logo Tutor” which gives a somewhat incomplete listing of the commands available in LOGO, and which can be co-resident in memory with any work in progress. Finally, Krell provides 24 additional shapes to replace the “turtle” in any program. This is a nice touch, and can be very useful in distinguishing workspaces.

Krell includes a wall-chart of commands and procedure listings. It makes an attractive piece of room decoration, but it would be decidedly more practical if it had been prepared as a small reference booklet. It is the most well-written part of the package (Krell and Terrapin combined), and I recommend that it be cut up and made into a small reference booklet. Another, much smaller, chart is also provided. It lists the “Simple Logo Commands.” This is of much poorer quality, and even has two inked-in error corrections.

**APPLE LOGO.** The version of LOGO distributed by the Apple Computer Company, Inc., was written for them by Logo Computer Systems, Inc. It uses essentially the same processes and structure, procedures, interaction, lists manipulations, and so forth. However, there are decided differences between it and the other two packages.

I would recommend against purchasing both the M.I.T and Apple versions. They have many things in common, but they *do not* use the same command names and abbreviations (or meanings), the same editing keys, the same
procedure-definition process, the same syntax, the same nondestructive cursor, and the list goes on. A conflict arises in using both versions, which should be avoided.

So how do they compare? There are several primitive commands not implemented on the Apple Logo that deal with diskette access, and these are greatly missed. The calling of machine language routines, the easy insertion of remarks into a defined procedure, and a graceful departure are all missing. Apple Logo does have more primitives already in storage when the huge file is booted (and consequently it takes longer to load). There are more controls on color backgrounds, etc. And there are "tricks" that can be played when preserving and/or hiding procedures in an active workspace.

LOGO, as a language, is a useful learning tool that should be employed by any teacher interested in stimulating the creative processes in a student. Implementing either the M.I.T. or the Apple version should serve this primary purpose, though I believe mixing the two should be avoided because of the confusion involved. The M.I.T. version, in my estimation, has a slight edge over Apple's offering; but this is a very close call.

APPLE PILOT

Company: Apple Computer, Inc.
Language: Pilot (Pascal sub-set)
Hardware Requirements: 48K

Overall Rating: A-
Educational Value: A
Vendor Support: C-
Ease of Use: B
Documentation: A-
Visual Appeal: A
Error Handling: A
Reliability: A
Value for Money: A

APPLE PILOT is a specialized language developed for interactive teaching and learning. The Apple version of PILOT is very efficiently designed, utilizing the total capabilities of the Apple II. The package includes two diskettes and two manuals. It is necessary to have two disk drives in order to develop lessons in PILOT. The program requires only a single drive to run the lessons after creating them. The most important part of the system is the Author diskette, which allows one to create, print, or edit lessons. The development of each lesson is generated from the combined processing of four editors. The following describes the editors and their capabilities:

Lesson Editor

The lesson editor is the most important feature of the system, in that it creates text and brings together the output of the graphics and sound editors.

The lesson editor is a screen-oriented version, possessing some very sophisticated features which immediately impress the user. It allows all the standard editing capabilities, such as character insertion and deletion, plus search and replace functions that operate on a line as well as at the character level. APPLE PILOT further allows you to retrieve characters which might have been erroneously erased while using the delete mode. The editor has the capability of creating lower case on the screen, a feature that is almost a necessity in the classroom environment. The overall functions of the editor initially appear to be awkwardly implemented, on the first use. Each keystroke resulted in unexpected results. Frequent reference to the manuals was at first necessary; however, the major functions are soon assimilated after normal use. Essentially, during the course of a few hours spent in working with the lessons, the quick reference card that accompanies the program becomes the only necessary recall source.

The Lesson Editor is used to create the main body of the text, allowing the user to intersperse sound or graphics between the text wherever desired. The editor, in a general sense, is very similar to Pascal; both languages are highly-structured. Also, line numbers are not required, making editing a breeze. The program allows you to perform error-trapping by specifically designating the exact location of a bug. This feature will prove to be a significant help in the debugging process. Overall, the Lesson Editor is well-documented and, with reading and practice, can be learned fairly quickly.

Character Set Editor

The character set editor allows the user to redefine the keys on the keyboard to create alternative symbols for shape tables or animation. As a general rule, animation design can be a lengthy process; if one intends to do much animation using the system, the PILOT Animation Package is strongly recommended. The character editor allows the user to redefine any key, including lower case characters generated by the software. Several character sets come with the sample lessons; you may even recognize Maxwell, the friendly little man who also appears in the "Dos Tool
Kit". Incidentally, the character set is the same in the "Tool Kit". In truth, the character editor is a nice addition to the PILOT System; however it requires some patience to master.

**Graphics Editor**

The graphics editor is the most exciting feature of the PILOT package. The editor is very well constructed in terms of ease of use, documentation and help-prompting. Ease of use can be credited to the "rubber band cursor", which allows one to use the keyboard as well as the game controllers for creating pictures. The features of this editor include the ability to draw lines, boxes, frames, circles, and ovals using any of the major seven colors. The help screen is easily accessed and well-designed. Also, the ability to tell where the cursor is located in relationship to each row and column allows the user to ensure that the graphics never overlay the text windows. One of the major attributes of the system is the ability to easily intersperse text and graphics and set up viewport windows for storage. This is accomplished with a very simple one line statement. Normally, this task would require a lengthy Basic statement. One also is allowed the ability to load pictures saved from this editor by a "quick load" technique, which displays the screen immediately. The user also has the option of displaying the picture in the sequence in which it was created, thus allowing you to watch it while it is being drawn. After using both the keyboard and paddle inputs, it was discovered that the keyboard was better for detail work, while the paddles were better suited for large pictures. The graphics procedures are easy enough to understand that anyone can learn to use them quickly.

In summary, this is an excellent software package for computer-aided instruction utilizing Apple graphics, either for the classroom or for enthusiasts who wish to learn some of the rudiments of CAI programming techniques.

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**PEACHY WRITER**

**Company:** Cross Educational Software  
**Language:** Machine  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**Educational Value**  
**Vendor Support**  
**Ease of Use**  
**Documentation**  
**Visual Appeal**  
**Error Handling**  
**Reliability**  
**Value for Money**

- A  
- B

This is a line oriented text editor. It is not a word processor, but it may be used as an educational tool to introduce people to word processing. It is very easy to use, and is powerful enough to be used with any age group. The operation of the program is menu-driven, and the various functions are well prompted. Students will be able to use this program with a minimum of instruction.

**Peachy Writer** is released in DOS 3.3, but it also comes with a de-Muffin program to use a DOS 3.2 disk if you have an older system. Instructions are included on how to accomplish this.

On startup, you are given the option of using the “Big Print Text Editor” or the normal Peachy Writer. In the “Big Print,” all the letters are done in graphics and large size. This mode would be particularly useful in the lower grades. All functions work the same in both editors. “Big Print” works slower because it must create the graphics characters.

All text displays are upper case, but the actual text that is stored is lower case. To enter an upper case character, the letter is preceded by a "/." There are only four other formatting commands in addition to the upper case command. These will set the column width of your text, indent five spaces, indent to the center of the page, and center the line. You can enter Escape codes, and, as most printers use Escape sequences to perform their various functions, you can have full control of your printer.

When editing, the standard Apple “Escape-I/J/K/M” sequence is used for cursor movement. The program will also recognize the older “Escape-A/B/C/D” sequence.

When you are ready to print out a file, there are several print options for various types of printers. You may also obtain a print to the screen. However, if you have formatted for an 80-column page, you will not see your text as it will be printed out. Peachy Writer is written in Applesoft and then compiled into Machine language. The Applesoft program is still provided and may be modified and run as is. This will be a slow running program, however, but this may be preferable if it allows you to customize the operation to go with your specific printer.

I talked to the publishers about modification of the program for specific printers. They said that if I provided necessary codes, they would be willing to tell me how to modify the program. They indicated that running the source would be slower, but said that, if sent the modified source, they would compile it and return it.
Typing Programs

HI-RES MASTER TYPE

Company: Lightning Software
Language: Assembly & Compiled Basic
Hardware Requirements: 48K 13 or 16 sector (or Apple III in emulation mode)

OVERALL RATING A-
EDUCATIONAL VALUE A-
VENDOR SUPPORT A-

EASE OF USE A-
DOCUMENTATION A-
VISUAL APPEAL B

ERROR HANDLING A-
RELIABILITY A-
VALUE FOR MONEY C-

Hi-Res MasterType is yet another progressive typing program, but with a difference. It incorporates an Invader type game as it presents opportunities to practice typing skills.

The typist is in command of the space ship at center screen. In the four corners of the screen appear letters, words, numbers, and/or other combinations that the typist must quickly enter, in order to prevent their slow, but constant movement towards the ship, resulting in a collision that will produce damage. The collisions and/or the successful typing of one of the “enemy” phrases is rewarded with sound and color displays. There is a sequence of 10 such trials before a message appears to report both on the status of the ship and the speed of the typist in words per minute.

The diskette provides 17 lessons. Lesson #1 starts with the letters ASDFGHJKL, and presents each letter in this home row as an “enemy” word. Lesson #2 presents two or three letter words of that row. Lesson #3 uses three, four, or five letter words of the same row. Lesson #4 moves to the third row, with the letters, QWERTYUIOP. Lesson #5 provides short words using the home and third rows together, and so on up to lesson #17, which gives practice with difficult numbers and symbols. There is a MAKE LESSON on the diskette which allows the user to create lessons. They can be saved on the program diskette (never a wise option), or on a pre-initialized, 13-sector diskette.

Although the instructions specify that, in any mode other than Beginner, the typist should press (SPACE) to show completion of input, it is actually more desirable to press (RETURN). Another suggestion in the manual states that to correct mistakes in typing, “press the space bar and try again. You will be penalized a few points for making a mistake, but you should have enough time to type the word again.” It then states, “another way to correct your mistakes is to use the left-arrow key to backspace over your mistake and retypew it.” In a word-processing environment, the power of the computer is to simplify corrections. The use of the backspace to correct errors is to be encouraged, not avoided!

The advertising for this package implies that this form of play-teaching is effective, if not addictive. This reviewer has seen exactly such events take place — with a typing teacher and with students.

The price is somewhat high for this package. If that is not a major consideration, Hi-Res MasterType is highly recommended.
**LETTER-MAN**

**Company:** Behavioral Engineering  
**Language:** Machine  
**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>ERROR HANDLING</th>
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<th>DOCUMENTATION</th>
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<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
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**Department:** Education  
**Sugg. Retail:** $34.95  
**Availability:** 3  
**Disk or Tape:** Disk*

*Letter-Man* is a typing game played much like *Pac-Man*, but rather than moving in response to a joystick and eating dots, Letter-Man moves in response to the keyboard and eats letter characters (letters, numbers, and punctuation marks). Compensating for the loss of a tunnel, Letter-Man teleports from one corner to the opposite (diagonal) corner. Letter-Man eats "$" rather than energy pills to help him swallow gobblers.

To help beginners learn which fingers to use for which keys, a marker points to the correct finger on a display of the hands. Another option allows you to create your own maze. This is very easy to solve, but you don’t know the exact location of each word.

*Letter-Man* is very easy to use. Special, high contrast graphics are provided if you are using a black and white monitor. Speed (how fast the gobblers chase you) can be adjusted from 10 to 150 words per minute.

*Letter-Man* is copy protected, but can be replaced for a $7.00 charge. If you want to learn to type and have fun doing it, this is the program for you.

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**MICROTYPING II**

**Company:** Hayden Software  
**Language:** BASIC  
**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>ERROR HANDLING</th>
<th>EASE OF USE</th>
<th>DOCUMENTATION</th>
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**Department:** Education  
**Sugg. Retail:** $29.95  
**Availability:** 9  
**Disk or Tape:** Disk

*Microtyping II* is a beginner’s typing tutorial. There are 4 types of practice, each of which has 8 or 9 levels of difficulty. These are:

1) Letter—a random sequence of letters are displayed and typed one at a time. The module visually notes errors and response time, and calculates a rough number of typed words per minute.

2) Numbers & Symbols—follows the process as in “letters,” but with practice in the more difficult keys.

3) Words—a series of three-letter words must by types.

4) Text & Program Listings—you practice on entire paragraphs containing mixed letters and numbers.

Another special feature of this section lets you practice on strings of typical BASIC program lines. Although the number of practice paragraphs is very limited, the program does provide the facility for the user to type in, edit, and save on the disk up to 30 paragraphs of 220 characters each. Unfortunately, since the program disk is not copyable for back-up purposes, this must be done on the one and only master program disk.

This is a straightforward computerized aid to typing. There are no graphic frills, very little typing instruction, and no attempt to teach the proper fingers to be used in typing each key.
Learning to type is not the most thrilling activity; however, this arcade game improves typing skills and is more fun than mere drill. Depending on his level of ability, the user selects the speed, chooses the type of lesson he wants, and begins the game. You have the option of creating a lesson, as well as restarting a game previously saved.

Each lesson consists of a character attack followed by a word attack. For example, the first lesson covers the home key positions A, S, D, and F. First, you practice these letters character by character and then in combinations. To attack the characters you depress the keys, and the character disintegrates. The object is to prevent them from touching the bottom of the screen. In word attack, groups of words fly across the screen. Only one word is vulnerable at a time. You type out the entire word and then press the space bar to wipe the word off the screen. Upon winning the game, you receive bonus words. Each lesson begins with 100 units of energy, and the game ends when the player runs out of energy. The monitor displays the energy level and the speed at which the user is typing.

This program is never dull, but you do tend to run out of energy. Better graphics would enhance the visual appeal.

**Typing Teacher** will help you learn the letters and three of the punctuation marks on a standard keyboard. The alphabet, comma, semicolon, and period are covered in eight levels with ten exercises per level. You may start at any level, but you will always begin with the first exercise for that level. After correctly typing each exercise four times, you will advance to the next level, and so on. Your accuracy score is displayed on the screen during the exercise and again when you quit, and that is all that this program does.

*Typing Teacher* is supposed to be suitable for students in grades elementary through college, but I doubt that it would keep a child’s attention for long; nor does it adequately cover the keyboard for someone older. *Master Type* (from Lightning Software) and *Type Attack* (Sirius) both combine a game format with a tutorial which would offer more appeal to young and old alike, and *Typing Tutor* (Microsoft) has some very sophisticated features for the more mature student. Consider saving your money a little longer and buying one of these instead.

As a final note, the copy that I ran would not load using a non-Apple disk drive. As long as you are using an Apple drive, or one that is capable of “half-tracking” (check your owner’s manual), you should experience no problems.

*Typing Tutor II* is an progressive typing program that not only teaches you to type but helps you build faster typing skills. An innovative feature is *Typing Tutor’s* “Time Response Monitoring” which monitors the keyboard. This
enables the computer to monitor your speed on each key individually by checking your typing 20 times per second. The author's excellent documentation includes an explanation regarding the characteristics unique to typing on a computer, in addition to details regarding the program itself. The menu begins with the basic keys and then proceeds to numbers and symbols. The participant chooses the appropriate level and the type of lesson desired—either longer passages or a series of new letters. Progress reports and evaluations are included. Options such as "allow slower response" are offered, enabling you to adjust the response time.

While there are some differences between the Apple II keyboard and a standard typewriter, you should be able to adapt easily once you know the location of the keys.

This is a unique and useful instructional program for many purposes.

APPLE MUSIC THEORY

Company: Apple Computer, Inc.
Language: Applesoft
Hardware Requirements: 32K

OVERALL RATING B
EDUCATIONAL VALUE B
VENDOR SUPPORT C

EASE OF USE B
DOCUMENTATION B
VISUAL APPEAL B

ERROR HANDLING A
RELIABILITY A
VALUE FOR MONEY B

APPLE MUSIC THEORY is a set of educational programs that provide theory, drill and practice skills involving reading and listening to music. The programs fall into four categories: Introduction, Terminology and Notation, Rhythm, and Pitch.

Terminology and Notation contains four programs that give students practice in identifying notes, key signatures, and musical terms. Rhythm covers note types, counting, comparing written and performed rhythm and playing rhythmic patterns. Finally, Pitch contains lessons on interval recognition, sight and sound correlation, scales and chords.

Each of the lessons consists of a series of drills pertaining to the topic covered. The booklet contains a short course on music theory for that topic but doesn't pretend to substitute for a good textbook. The student may then choose a level of difficulty for his lesson. In most cases, the student is either presented with a graphic representation of the music or a range of musical tones that pertain to the question. For example, in a five note harmonic, one might be asked to identify the note by sound that doesn't match its written counterpart.

This program is meant to be used as a supplement to classroom instruction. It becomes very helpful to students who need extra practice since it allows students to proceed at their own level. In summary, the lessons are presented nicely, but the Apple's sound system leaves something to be desired.

NOTE: Apple was thoughtful enough to provide a backup disk for its protected software.

CAI PROGRAMS I & II

Company: Compuware
Language: Integer
Hardware Requirements: 32K

OVERALL RATING B
EDUCATIONAL VALUE B
VENDOR SUPPORT A-

EASE OF USE A-
DOCUMENTATION B-
VISUAL APPEAL B-

ERROR HANDLING B
RELIABILITY A-
VALUE FOR MONEY A

The CAI PROGRAMS contain six modules suitable for children in grades 3 through 6. One module includes lessons on spelling, two geography, and three mathematics. The two geography module/programs are similar; one considers a map of Europe, the other a map of the United States. A capital flashes and one must identify the state or country either by spelling the entire name correctly or by entering its first letter. If a student misses an identification,
it is presented again sometime later on (or possibly several times) until the computer is sure the student has learned that state's location or its spelling is mastered. Unfortunately, some places are difficult to spell, and a student who knows his countries is often penalized. However, from a positive standpoint, geographical spelling mastery inadvertently becomes a side-benefit. This brings us to the system's spelling program. It displays a word slowly, then asks the child to spell that word after it is erased from the screen. This is one way to utilize spelling drills without a voice card. It requires a good short-term memory, for the word is displayed on the screen for only a few seconds.

The math programs vary in quality. Perhaps the best among the modules is ADD WITH CARRY. It offers drill and practice on sums requiring numbers to be carried. It is foolproof, requiring the student to obtain a correct answer and form the proper habits in adding large numbers. MATH DRILL allows students to practice addition, subtraction, multiplication and division. Functional numbers are no larger than 12 (i.e., 12x5), with some problems involving a time limit. METEOR MATH rewards young children by shooting down a menacing meteor if they solve a simple math problem correctly. It helps the child master the simple counting procedures used to determine the sum of two small numbers by slowly lighting up the squares in the two dice-like blocks that the child is adding together.

**CAUSE AND EFFECT**

**Company:** Learning Well  
**Language:** Assembly  
**Hardware Requirements:** 48K

<table>
<thead>
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<th>OVERALL RATING</th>
<th>B+</th>
<th>EASE OF USE</th>
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<td>VISUAL APPEAL</td>
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<td>VALUE FOR MONEY</td>
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*Cause and Effect*, developed by Learning Well, supposedly meets the “apparent need for reinforcement materials in comprehension skills making use of a game approach.” It does not claim to teach cause and effect. However, if the student already has a basic grasp of these concepts, the program provides very entertaining reinforcement.

Written on a second to third grade reading level, *Cause and Effect* uses an electronic board game approach in which you and up to five others try to reach the top of a mountain first. A computer-controlled spinner dictates your moves. Along the way you encounter pick axes and camps. Pick axes advance or put you back a certain number of steps; camps present you with a written passage. The passage describes an event and a cause (or effect) based on the event. You must then choose the corresponding effect (or cause). A correct answer moves you one space forward; an incorrect answer leaves you in the same place. You can also choose various paths to take at certain junctures. Following the game a score box displays the total number of answers, correct answers, and percentage for each player of that particular game. You also have the option to see the scores of all games played since booting the disk.

The game itself is fun. Just when you think you’ve got it made, you land on a pick and go back three spaces. The passages suit the age level targeted and provide practice with a skill often overlooked in school. The documentation is excellent; the graphics and sound effects clever; the length of the game appropriate for seven to nine year old attention spans. Perhaps the greatest accolade: a seven year old who had a few minutes of free time twice chose it over *Raster Blaster*.

Unfortunately, luck can easily win out over skill. While this perhaps reflects life in general, I doubt we want to emphasize this idea in education. The fact that the winner may not have gotten more right answers than his opponent (who perhaps hit more bad picks and landed on fewer camps) strikes at the fairness held dear by this age group. The children this game was tested on quickly changed the scoring so that the child had to get to the top first and have more right answers to win; otherwise, they tied. The format does, however, allow players of unequal ability to play fairly together.

Once again Learning Well has taken an excellent tool to enliven a rather dull concept and put a $49.95 price tag on it, rather expensive for a game whose life cannot be extended. Worse, you can’t make it harder, easier, faster, slower, or in any way add to the ninety selections available. Play of any length asks kids questions whose answers they have memorized and hence reduces the amount of practice they get. You can buy a similar non-computerized version of this game through educational supply companies for $13.95. If the price for this version were lower or provisions made to add to the selections, I would have given it a much higher overall rating.
**Code Practice**

**Company:** Savant Software, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**EDUCATIONAL VALUE**  
**VENDOR SUPPORT**  
**EASE OF USE**  
**DOCUMENTATION**  
**VISUAL APPEAL**  
**ERROR HANDLING**  
**RELIABILITY**  
**VALUE FOR MONEY**

The program aims to help either the novice or the more experienced individual to learn Morse Code and to build speed and proficiency in using it. You can also make use of the printer for hard copy of the code. Whereas other code programs on the market provide user interaction through the keyboard, this program provides no opportunity for the user to participate. With this program the participant hears the code from the computer’s keyboard and views the characters on the monitor but has no chance to interact with the program.

The documentation is adequate, but provides no clue about manual practice. The author should have included a practice lesson — for instance, one in which the user hears the code and must identify it via the keyboard.

**Career Directions**

**Company:** System Design Associates  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**EDUCATIONAL VALUE**  
**VENDOR SUPPORT**  
**EASE OF USE**  
**DOCUMENTATION**  
**VISUAL APPEAL**  
**ERROR HANDLING**  
**RELIABILITY**  
**VALUE FOR MONEY**

Career classes are very popular today especially for individuals who want to make a career switch, enter, or re-enter the work force. *Career Directions* is useful when used with other aids to determine a career. It is a career guidance program designed to help an adolescent explore career interests and preferences, determine occupations related to interests, and develop a plan to enter or prepare to enter a chosen occupation. *Career Directions* interacts with the user in the same way as System Design Associates’ massive CCAPP, but it is a scaled down version, more suitable to home needs and use.

The career assessment section defines career interests through a series of exercises involving types of work, work activities, school subjects, work situations and environments, learning abilities, physical requirements, and education (how much time one is willing to spend). The responses elicited are used to search a data base and to find specific jobs corresponding to the subject’s interests and abilities. Then, you can return to career assessment in order to narrow down interests, move on to career planning and create a plan to enter the job market, or continue your education by entering college or vocational school. Relevant questions elicit pertinent information about references, education, and methods of job hunting.

This package provides excellent documentation and checks individual ratings against more than 460 occupational titles (compared to the 1200 used by CCAPP). It is extensive and well worth the money.

**Class Records**

**Company:** Educational Systems Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**EDUCATIONAL VALUE**  
**VENDOR SUPPORT**  
**EASE OF USE**  
**DOCUMENTATION**  
**VISUAL APPEAL**  
**ERROR HANDLING**  
**RELIABILITY**  
**VALUE FOR MONEY**

*Class Records* is a first class act. It combines a powerful record keeping system with ease of use, and a superior management package with unlimited potential and flexibility. It might easily be one of the most valuable pieces of software in your classroom.

*Class Records* is a complete system for recording and reporting attendance and grades. In addition to these
functions, it can combine with other disks or "modules" to transfer grades from separate exercises or test modules to the main grade book. This feature makes it unnecessary for the teacher to record individual grades as students complete these separate computer exercises.

There are three main parts to this package: two disks, and an instruction manual. One disk is the master record keeping disk which you use to start the program. The other disk is a data disk to store all student records. If several different classes are taught, then a separate data disk is used for each. These disks are easily duplicated, and you should follow the instructions to copy the data disks frequently, so that there is always a current back-up copy. The instruction manual is very well laid out and includes an in depth table of contents — a very functional road map which can get you from the main menu to any of the eight sub-menus with minimal effort.

The first order of business in using this system is to set up your class list. For departmental use a separate class list diskette would be prepared for each class. If you are using one of the complimentary exercise modules your class list could be transferred to it at this time.

The next step in using this program is to record attendance for each student, using code to indicate present, absent, or tardy; tardies and absences are divided into excused and unexcused. After attendance is taken there is a complete, full-screen review to correct any errors. Attendance can be reported in one of two ways. Records can be printed or shown on the screen, either by class for a particular day, or by individual student for an entire grading period. The grading portion of the program uses the same class list as attendance reporting. To set it up you define the general categories to be used, for example, tests, daily work, reports, lab exercises, or any other general category used in the classroom including the different subjects being taught. Categories can be added or deleted at any time. Once categories are established, specific exercises can be listed under each. The program can accept up to fifty exercises divided among the various categories. For example, in a math class one of the categories might be "tests". Under this category a test on fractions could be one exercise. Another separate exercise could be the test on percent. If "tests" is the only category, then fifty different tests could be recorded.

Grades for various exercises can be entered in one of two ways. If the teacher chooses, the grades can be completely subjective. In this case, as the class list is presented on the screen, you insert only the letter grade itself. This way you can easily enter reports and projects where it may not be feasible to have a raw score on which to base the grades. A second method of grading is to let the computer assign letter grades. The program comes with a standard 90 to 100% — A, 80 to 90% — B, and so on; or you can modify the standards to fit your particular grading curve. With this method of grading you first enter the highest possible score. Then you furnish each individual's raw score. The computer comes back with the percent correct and an equivalent letter grade. After all the grades have been entered, you review the entire class to check for errors.

One of the strengths of this program is its output, or reporting features. There are various means to report attendance. The same is true for the reporting of grades. For example, grades can be reported by exercise for the entire class, or by student for a complete grading period. This second form is especially convenient when a parent wants to know how a child is doing. Simply type in the student's name, and out comes everything the student has done for the entire grading period. Reporting is also handy using the printer option with the program. With this you can quickly run a copy of the report and hand it to the parent. The "complete report" feature combines both attendance and grades into one report to produce a total picture of the student. At the end of the grading period the program will also average all the grades that are on record.

Fundamental to the program are the Class Record and Class Data disks which contain everything needed to keep complete attendance and grade records. However, you can supplement these disks with compatible exercise or test disks such as Super Math II, also by Educational Systems Software. These supplemental disks, or modules, can be used without the aid of Class Records. Used alone, Super Math II is an excellent math program that works with addition, subtraction, multiplication, and division. It can be used "straight out of the box," or you can tailor it to fit your particular class needs, and a class list can be put on the disk to keep record of each person's scores.

There are so many fine, subtle features to both Class Records and Super Math II that a booklet would be necessary to describe them and do the program justice. This is one outstanding package. As an educator, I am looking forward to the release of more modules.

One last comment on customer support. Again, a first class act. Courteous, knowledgeable, and helpful are the first three adjectives that come to mind. None of that "you must be dumb to be calling to ask" feeling. These people have a good product and do a good job in public relations.
The **Computerized Career Assessment and Planning Program** (CCAPP) is designed to provide a step-wise planning program for students (or others) making career decisions. The steps in the program help you to discover your interests, determine the jobs that relate to such interests, and then develop a plan to help you enter the occupation of your choice. The program is largely self documentoed for ease of use, and the manual serves as a counselor's guide.

**CCAPP module one** helps the job seeker to learn something about his/her interests and needs. It presents a number of work areas and asks for your preferences. Next, **CCAPP** helps you to explore work activities. School subjects are also covered. Finally, you specify such aptitudes as verbal, numerical, motor coordination, color discrimination, and so forth. Once you have explored all areas, **CCAPP** compares your responses with a database of job clusters. It outputs several clusters that seem to best fit your needs as part of a printed report. Each refers to the *Guide for Occupational Exploration* which offers further information on deciding which of the clusters you want to examine in more detail. That information is then input into module two.

Module two filters your job cluster preferences by asking you about the work situations you prefer; the levels of involvement with data, people, and things you are interested in; mathematics and language skills; capability to handle physical work; work environment preferences; and the amount of time you are willing to devote to education. Using this information, another database identifies occupations that fit this screen. Again, each of the jobs refers to the *Occupational Outlook Handbook* and the *Dictionary of Occupational Titles*. From these references, you are able to decide which of the jobs interests you most.

Module three allows you to perform actual career planning. The questions that the module poses help you to locate information about job openings; to specify references; and to determine a timeline for preparing the documents and other items necessary to begin job interviews. A secondary output report gives you space to list job prospects, your actions to contact those prospects, and any follow-up plans you may have — in sum, a complete record of your job hunting activities.

If you do not have access to the reference documents that specify the demands for jobs, module four provides that information in outline form. For full information you should still consult the reference handbooks.

The modules are easy to use. Each is self-contained, and with appropriate preparation, takes about 30 minutes to complete. A report comes in the form of an output product of each module; and you are given the option of printing two, one for you and one for the counselor's files. Instructions for completing the next module are also output as part of the report. The **CCAPP** program, in short, is a useful tool for career planning.

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**Computer SAT**

**Company:** Harcourt Brace Jovanovich  
**Language:** Applesoft  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>ERROR HANDLING</th>
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</thead>
<tbody>
<tr>
<td>C+</td>
<td>B</td>
<td>B</td>
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</tbody>
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For years, publishers have made a living from study guides designed to help frightened high school students prepare for the SAT by showing them "practice exams." The guides are usually thick, intimidating books, more often purchased than studied. Now comes **Computer SAT**, a test preparation program for the Apple with programs on both sides of two disks, a *User's Manual*, and the familiar, thick study guide, *How to Prepare for the SAT*. The study guide is sold independently for one-tenth the price of this package, so a key consideration is what the computer program provides that the study guide does not.

The computer program consists of four parts: (1) analysis of practice test results; (2) practice with 280 verbal items;
(3) practice with 260 math items; and (4), practice with 1,000 vocabulary “flashcards.” The program is easy to load and operate; the two disks can be conveniently used independently of each other. The *User’s Manual* is a clear, easy-to-follow guide that leads you back and forth between the computer program and the study guide. For example, Disk A provides “answer sheets” for four practice tests which are actually in the study guide and not visible on the screen at all. The student simply records his answers on the computer, which keeps track of elapsed time. After completing all sections of the practice test, the computer will immediately score the test, showing which items were missed and giving both raw scores and converted scores for the verbal and math sections. Another menu option, the best feature of this program, provides a study plan analyzing what kind of item the student missed most often, thus identifying high priority study areas. Because such an analysis depends upon individual performance, this particular feature is available only in the computer program, and is not a duplication of anything available in the study guide.

The other three parts of the program are for study and review. Although the *User’s Manual* recommends taking a practice test first, one can use these sections at any time. Both the verbal program (Disk B) and the math program (Disk C) time the student, tell him immediately whether the answer is correct or incorrect, and, if desired, explain the right answer, although the explanations are very brief and sometimes of little value. The vocabulary “flashcards” are the weakest part of the program. A word to be defined flashes on the screen, but the student is not required to commit himself before seeing the definition. He simply decides for himself whether he knew the word or not. This kind of word study, outside of any context, is one of the least effective ways to improve vocabulary; yet it seems to be an inevitable part of all the study guides.

Although this program will not make up for years of underachievement in school, it will simulate the pressure of a timed test. With the computer waiting for an answer and timing the response, it is hard to be casual even about a practice test. Its greatest benefit, then, is probably psychological; the student becomes familiar and comfortable with quickly answering the kinds of questions found on the SAT. This package is most cost-effective if purchased by schools and libraries where more than one student can use it.

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**EARLY ELEMENTARY DISK 1**

**Company:** Compu-tations  
**Language:** Applesoft  
**Hardware Requirements:** 48K

| OVERALL RATING | B- | EASE OF USE | A- | ERROR HANDLING | B  
|----------------|----|-------------|----|----------------|----|  
| EDUCATIONAL VALUE | C  | DOCUMENTATION | A- | RELIABILITY | B+  
| VENDOR SUPPORT | B- | VISUAL APPEAL | C- | VALUE FOR MONEY | C- |

*Early Elementary Disk 1* contains four programs which the manual says are for pre-schoolers through second graders. However, if a child makes it through first grade without mastering these concepts, he shouldn’t be promoted. In addition there is a very useful teacher management file.

The children’s programs are:

1. **Shape Count**—matching a changing numeral below to the number of shapes presented above.
2. **Color Match**—matching a changing rectangle of color below to the prompt rectangle above.
3. **Number Drill**—matching the changing numeral below with the number word above.
4. **Shape Match**—matching a changing shape below with the prompt shape above.

The programs run quite easily. A few features, such as the word “NOW” which appears below the correct answer after three misses, are nice. Unfortunately, children who have seen Sesame Street and the like are going to find these activities dull. Furthermore, the concepts underlying Shape Count and Shape Match are better taught to young children so as to involve manipulative materials for tactile as well as visual feedback.

Certainly the best part of the disk is the Teacher Management File. Using this menu-driven option, a teacher can change the speed, number of problems presented, range of numbers allowed, presence or absence of music, and so on, for each program. It also allows a teacher to easily keep a record of all the children’s performances. This kind of teacher-friendliness is needed in educational programs. I just wish that the program offered more.
EARLY GAMES FOR YOUNG CHILDREN

Company: Learning Tools
Language: BASIC
Hardware Requirements: 48K

OVERALL RATING B
EDUCATIONAL VALUE A-
VENDOR SUPPORT B-

A positive feature of Early Games is its appropriateness for the 2 to 6 year old child. The menu consists of a series of pictures that make it easy to select the lessons. The program includes nine educational games which require no adult assistance. The young child learns how to match numbers, add, subtract, match letters, alphabetically order, compare shapes, and write his/her name. An additional feature is the “Draw Mode” which allows you to save a drawing, write a title for the picture, and retrieve the picture from the disk.

These concepts are applicable to the lessons taught in pre-school, kindergarten, and first grade. It is unfortunate that the author did not take advantage of the Apple’s capabilities to include more colorful and creative graphics, especially since the program itself is in color. The graphics are too small. The section in which the child practices writing his/her name is boring and dull. Small children enjoy rewards for their efforts (we all do); however, the reward system included in this package is practically an understatement. Parents will nonetheless find this package valuable and worth $29.95 to help prepare a child for school.

EARLY GAMES: MUSIC

Company: Counterpoint Software, Inc.
Language: Applesoft and Machine
Hardware Requirements: 48K

OVERALL RATING B
EDUCATIONAL VALUE A-
VENDOR SUPPORT B-

Children love music, and they are often eager to learn and participate in making their own music. In order to do this, however, they must know the symbols used to play the appropriate notes. Early Games: Music has been created to introduce children to the piano keyboard and to teach them basic music notation.

The program starts off by displaying the Picture Menu. All eight games are shown one by one on the screen. To begin any one of these activities, all you have to do is press a key when the desired selection is shown. You may return to the Picture Menu at any time by pressing the Escape key. You may also select a game by pressing Control-I to get the menu instructions. Then press a key to get the word menu, and press a number (1-8) to select a game.

Guido’s Quiz helps you learn the letter names of the keyboard, treble clef, and bass clef. Pressing the Return key toggles between the three. The full array of names is shown while the appropriate note is played. Then one by one, the letters become question marks which must correspond to the correct letter. When you have mastered these, the quiz becomes more difficult. If you have trouble, hints will be provided. To jump over the easy questions, press Control-J.

Perform/Record/Playback allows you to play, record, and recall tunes. The top row of numbers is used in playing notes. While each note is played, the letter of the note is displayed on the keyboard or the staff of your choice. All tunes can be saved on disk. Kaleidoscope is similar to this game, except that it draws random pictures on the screen while you play. The Return key turns the Rapid Draw on and off.

Melody Tutor teaches you songs by playing the entire tune first, and then playing the notes one by one and having you repeat them. Notes are gradually added on. Numbers are used to help play the correct notes. If you play the wrong note, the Tutor will stop you and you replay that note.

Early Games: Music is a colorful and attractive program. It is well conceived and very interactive. Note that this program does not include sharps or flats (you cannot play any black keys). All the commands are easy to learn. The program is completely crash proof, and nothing short of turning off the power shuts it off. The disk is copy protected, and there is a thirty-day warranty.
Fact or Opinion, one of Learning Well's microcomputer reading games, is designed to give children with reading levels 3.5-5.0 practice in differentiating facts from claims. The use of advertisements, ranging from concocted ones to those with a ring of familiarity (the soap that's 99% pure and floats) is an intriguing and certainly relevant approach for children bombarded by commercials. This is also a skill that gets short shrift in most elementary curricula, and when presented at all is often relegated to rather dry passages in a workbook.

The game format places up to 6 players on a shopping mall "board" with a random die roll dictating the number of spaces for each move. Landing next to a store door gets you an advertisement, or a set of three statements, which you must judge fact or opinion. Landing on two particular squares automatically moves you to a store door; land on two others and you lose a turn. A correct answer gives you one of the five presents you must accumulate before exiting the mall. The first one out, wins. At the end, a score is displayed and/or printed which gives the number and percentage of correct answers.

Some of the slogans are obvious; some are in that rather grey area of "stretched truth." For example, a travel agency ad which proclaims "Just pack your bags, we do all the rest," was called fact. Hmmm...do they take the dog to the kennel, stop the mail, have someone cut the grass, etc? Oh well, I guess that fact can be a matter of opinion.

There is much to praise in this game. It tackles a skill rarely emphasized in a school curriculum and does it using an interesting and entertaining format. The documentation is excellent; the play is fast; it has nicely done graphics and sound effects. It kept a 7 and an 8 year old occupied for an hour and brought on some interesting discussions of facts and opinions in which, occasionally, the computer was judged nuts.

There is one minor, one medium, and one serious problem with the program. First, there are a few typos, like the failure to capitalize "monday." While this doesn't detract from the substance or play of the game, it just shouldn't be part of any educational program.

Second, whoever exits the mall first wins, although he may have gotten a much lower percentage of correct answers than his opponent. In essence, luck, in the form of fewer turn losses and more frequent landings at a store door, triumphs over skill. This greatly offended the sense of fairness of all the children recruited to test this game.

Finally, although the manual states that there are over 90 reading selections, any extended play presents questions already encountered. That children quickly recognize the questions and hence the answers diminishes the amount of practice available. At the hefty price of $49.95, there ought to be a way of extending the "life" of the game. If the price were more in line with the $13.95 cost of a similar non-computerized version, it would have been rated much higher.

Juggles's Rainbow is one of several colorful (unless you are using a monochromatic screen) children's educational programs from the Learning Company. This program, advertised for children age 3 to 6, is designed around the concepts of above, below, right, and left.
Juggles the clown helps the young learner work his way through three separate programs selected from a picture menu. Each of the three programs follows the same basic format. The user starts off making simple moves using the directions above, below, right, and left. Each program ends with the creation of a colorful figure displayed as a result of the use of these four commands.

The first of these three programs is "Juggles's Rainbow." It stresses the concepts of above and below. To aid the child a blue strip of paper is placed horizontally across the center of the keyboard. This corresponds to the blue line across the center of the screen. When the child pushes a key above the blue strip, a line appears on the screen above the blue line. The experimenting child has a chance to make a few random selections to see where the lines appear.

The next portion of the program instructs the child to push a key either above or below the blue strip. If the child misses twice he is sent back to the beginning for more practice. The child is rewarded for knowing the difference between above and below in the final section of the program.

By selecting keys either above or below the blue bar the learner creates a rainbow with color coordinated raindrops. One final step of the program is to get the raindrops to match up to the colors of the rainbow that are directly above them. Again, this is accomplished by pressing either above or below the blue strip.

The second program is called "Juggles's Butterfly." It works the same way as the first program except this time the learner is working with right and left. Now the blue strip is placed vertically up the center of the keyboard so that it matches the blue line on the screen. This program ends with the creation of a colorful butterfly.

The third program combines above and below with right and left. This one is called "Juggles's Windmill," and when the user is able to distinguish between these combinations of directions the end result is a multi-colored windmill.

*Juggles's Rainbow* is a program that lets very young learners utilize the computer. It provides a colorful review of the ideas of above, below, right, and left. However, because it is limited to just these four ideas which it repeats in one format over and over, young users do not want to play with it repeatedly. The three year old who helped me to review this package found that twice through these programs, getting basically the same results each time, was enough.

In a classroom setting, where each learner has access to the program only a couple of times, the program would get sufficient use. However, if it is being purchased for the home where one or two children would be expected to use it repeatedly, I think its usefulness might be short-lived.

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**MANAGERIAL FINANCE**

**Company:** IMI Inc.

**Language:** Applesoft Basic

**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>DOCUMENTATION</th>
<th>VISUAL APPEAL</th>
<th>ERROR HANDLING</th>
<th>RELIABILITY</th>
<th>VALUE FOR MONEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
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</table>

**Department:** Education

**Sugg. Retail:** $375.00

**Availability:** 4

**Disk or Tape:** Disk

*Managerial Finance* is a computer-assisted interactive learning program designed to teach non-financial managers and executives the basics of financial statements and other business reports. It explains the language and concepts of accounting, income statements, balance sheets, cash flow, and other accounting and financial tools. Lessons take the student through each of these and explain how to read and understand the information conveyed.

The program comes with five audio cassettes, ten diskettes, and a 117-page binder. The instructions for booting the system are straightforward and clearly designed with the computer novice in mind. No previous contact with the machine is assumed.

The oral portion resembles a classroom lecture. From time to time the program tells you to move on to the next screen, done by hitting the space key. The graphics reinforce the spoken material and the manual repeats and preserves it for later reference. In addition, the computer handles some of the quizzes, scores the answers, and provides feedback. Other quizzes appear in the manual. The teaching technique of reinforcement and repetition through different media is quite effective, yet relaxing. At first the method seemed overly repetitive, but the concepts are rather sophisticated and presumably foreign to the student. The repetition serves to implant the information firmly in your mind. At the end of the course, which takes about ten hours to complete, I felt I knew a lot more about financial reporting instruments than I had before, with an efficient expenditure of time and effort.

The program ran smoothly with no errors or bugs. The tape, book, and computer portions synchronized well and I
did not get lost. I even found it easy to stop and start again later.

The presentation looked polished and attractive; the graphics were executed with Beagle Brothers' "Alpha Plot." The written material supports the other media adequately.

Since the program costs $375, I find it hard to justify for a single user. However, it is clearly intended for group use with additional workbooks costing $75. The training department of a corporation would probably make the best use of Managerial Finance, training managers and executives at their own speed. This well-executed classic of computer-aided instruction does its job quite well. I should note that one benefit for a company also considering introducing microcomputers to its managers is the chance to help them overcome their initial fears of the machines.

MAP READING

Company: Micro Power & Light
Language: Applesoft
Hardware Requirements: 32K

OVERALL RATING B –
EDUCATIONAL VALUE C +
VENDOR SUPPORT B

EASE OF USE B
DOCUMENTATION C
VISUAL APPEAL B

ERROR HANDLING A
RELIABILITY A
VALUE FOR MONEY B –

MAP READING is limited to instruction of determining distance and direction on a map. There are other skills involved in map reading that should have been included in the program and hopefully the authors will expand in this area. Visual appeal is fair — better use of the Apple's capabilities would have been beneficial. MAP READING is applicable in primary grades as an introduction to map reading skills.

MEET THE PRESIDENTS

Company: Versa Computing
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B
EDUCATIONAL VALUE B –
VENDOR SUPPORT B

EASE OF USE B +
DOCUMENTATION B
VISUAL APPEAL A

ERROR HANDLING B
RELIABILITY A
VALUE FOR MONEY B

Meet the Presidents is an educational package that teaches students to recognize the 40 presidents of the United States by both picture and historical facts. The 40 Hi-Res portraits were created by artist Saul Bernstein. They are some of the best art to appear on the Apple to date.

The package consists of four discs, ten presidents per disc. Thus the student is presented material in four periods of American history: 1789-1845, 1845-1881, 1881-1929, and 1929-1982. One has a choice of viewing the president's portraits, or taking the quiz. In the quiz, one must identify the president as rapidly as possible, while as many as eight different clues to his identity are given. The picture, meanwhile, becomes more distinct as time passes. The student gets the most points for a quick and correct answer.

The teacher has an option for changing the eight clues for any particular president, and setting the recognition code which comprise the letters and sequence necessary to identify the president. For example, the letters ADS are the minimum that a student must type to get the correct answer for Adams. This helps with students who have difficulty in spelling.

The one fault of the package, due to both the protection method and the lack of larger discs, is that the teacher has no method of mixing up the pictures between discs. Students are always quizzed on ten presidents rather than among all forty. But despite this limitation, it is certainly a good historical presentation.
**MICROZINE**

**Company:** Scholastic Inc.

**Language:** Applesoft

**Hardware Requirements:** 48K

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**OVERALL RATING** B+

**EDUCATIONAL VALUE** B

**VENDOR SUPPORT** A

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**EASE OF USE** A-

**DOCUMENTATION** A

**VISUAL APPEAL** B

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**ERROR HANDLING** A

**RELIABILITY** A

**VALUE FOR MONEY** B

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**Department:** Education

**Sugg. Retail:** $39.95

**Availability:** 3

**Disk or Tape:** Disk

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*Microzine* is a computer magazine that claims to enhance learning by making it entertaining. All programs in this premier edition are menu-driven and extremely easy to use. The documentation is equally lucid.

Four separate programs are included: “Haunted House,” an interactive ghost story adventure in which you are the principle character; “Ask Me,” an interactive interview with one of the young actors in *E.T.*; “Poster,” a low resolution, keyboard-controlled graphics and sound composition program; and “Secret Files,” a program that lets you create and manipulate a random access card file. A utility program is also included to assist in the creation and use of a data disk.

In general, *Microzine* accomplishes its objective of providing an entertaining learning medium to young users. (The manufacturer specifies a user age group of 10 and up.) Variable plot stories not only stimulate the creative imagination but allow students to exercise creativity in planning and problem solving. The simple command structure in the graphics/sound program makes it easy for beginners to quickly begin creating and controlling shapes and colors, even program simple animation sequences.

Secret File introduces important concepts in information management and is a first step in familiarizing youngsters with the creation and manipulation of databases. This program is especially attractive because it lets children experience the benefits of managing their own information, for example, in keeping records or organizing schoolwork.

Of the four programs, only Ask Me seemed to miss the mark. Question selection required a slow and tedious trip to the disk for a stored answer. (Slow response time is probably the weakest facet of the entire package, though the graphics aren’t too strong, either.) The interactive format gave me the impression of computerized “window dressing” rather than an experience of conducting an interview with a celebrity.

It always gives me pleasure to see an instruction manual that’s well written and easy to understand. In this department, *Microzine* deserves a round of applause. It also strikes me that a program like *Microzine* would probably have greatly enhanced educational potential if linked to a classroom situation.

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**MICRO MOTHER GOOSE**

**Company:** Software Productions, Inc.

**Language:** Applesoft

**Hardware Requirements:** 48K

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**OVERALL RATING** B

**EDUCATIONAL VALUE** B-

**VENDOR SUPPORT** B

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**EASE OF USE** A

**DOCUMENTATION** A

**VISUAL APPEAL** A

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**ERROR HANDLING** B

**RELIABILITY** B

**VALUE FOR MONEY** B

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**Department:** Education

**Sugg. Retail:** $39.95

**Availability:** 5

**Disk or Tape:** Disk

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*Micro Mother Goose* can be a family affair; parents and children can participate in singing along with the nursery rhymes presented. It also allows the child the independence of using the computer by himself. This colorful program is designed for the 3-9 year olds, and presents nine popular Mother Goose rhymes displayed on the monitor along with graphics and music. Three games require focused attention and good timing. “Lamb Scram” requires the child to get all of Mary’s lambs safely through the hedge and back to Mary. “London Bridge-out” contains six skill levels and a reward system of points — the object is to knock out London Bridge. The game “Splat” requires the user to catch eggs tumbling off a wall before they crash and splatter. The games require paddles or a joystick.

This program’s best features are the picture symbols used in the menu, colorful graphics, audio-visual interaction, and the documentation which includes excellent directions and suggestions as well as a free poster and color stickers. On the other hand, the words displayed on the monitor should be larger for the small child, and $39.95 is expensive for this program. However, the games provide a good challenge for children of the designated age group.
MIND BENDERS B1
Company: Midwest Publications
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING C
EDUCATIONAL VALUE C
VENDOR SUPPORT B
EASE OF USE C-
DOCUMENTATION C
VISUAL APPEAL C
ERROR HANDLING C
RELIABILITY B
VALUE FOR MONEY D

The Mind Benders series aims to sharpen deductive thinking skills by presenting a series of facts which you must organize in order to answer the questions of a puzzle.

Mind Benders B1 (Deductive Thinking Skills) is the first of the "medium difficulty" sets in a series comprised of three levels. Both the "fairly easy" and "medium difficulty" levels come on disk, but the "C" level, or difficult problems, come in written form only.

Some aspects of the program make it difficult to use. Five command keys control the games and you receive instructions for their proper use and then are told to use those keys for other functions. For example, first you read that you must press the <F> key to see facts needed to solve the puzzle, then you are told to press that key to view the next page of instructions. At the end of the instruction section, a request for additional instructions brings only a repeat of the general instructions. Most of the students who used these programs found this annoying.

The disk holds twelve problems. The problems are challenging, but presentation of both problems and facts is slow. You choose a problem number and the goal appears on the screen:

Goal: Find the pairs of twins.
Goal: Rank pairs of twins by age.

Underneath the goal one fact appears. If you request more facts about the problem, the screen clears, the goal again appears at the top of the screen, and one fact is printed below it. You must repeat this sequence many times to obtain all the pertinent facts. Once you have the facts, you can request help, comprised of a series of questions which assist you in arranging the facts so that you can deduce the answers.

To enter an answer on the chart, you must first choose "+" (true) or "-" (not true) and then the number on the chart which the sign will replace. You must give all the positive answers before you can have them checked. If your responses are wrong, the entire chart disappears, reappearing without any answers. You must begin all over again. This can be extremely frustrating—especially if a chart contains spaces for thirty or more responses.

Most students found it necessary to keep written notes of the clues in order to have enough information to form answers for entry on the chart. Younger students found the abbreviations confusing.

Mind Benders as a video workbook has major drawbacks. In spite of them, however, many students enjoyed solving the problems and in the process, used the principles of deductive reasoning.

MUSIC GAMES
Company: Howard W. Sams & Co., Inc.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A
EDUCATIONAL VALUE A
VENDOR SUPPORT A
EASE OF USE A
DOCUMENTATION A
VISUAL APPEAL B+
ERROR HANDLING A
RELIABILITY A
VALUE FOR MONEY A

Have you ever wanted to learn more about music, but didn’t want to read books or go to classes? Here is a way to learn ear training, listening skills, note recognition, and rhythm on your own computer. Music Games teaches you these topics with as little pain as possible. All the instructions display easily on the screen. This program features Hi-Res color graphics and full musical note and rhythm reproduction. The twelve programs vary in topic and difficulty. The first program, called "Bach the Younger," plays J. S. Bach’s well known “Solfeggietto.” You are first asked to set a tempo. As the computer plays the song, the key of the song appears.
“Hearing is Believing” starts with six notes on a treble staff. The Apple plays seven notes and you try to identify the note left out (no accidentals are used). You may listen to the series of notes as many times as you need. You have three chances. The correct note will be filled in after the third miss. You have two options: to leave out more than one note (up to seven notes) and to alter the speed. “Memory” tests your ability to recognize notes on the C Major and A Natural Minor scales. The Apple plays one of the two scales. You choose how many pitches for the Apple to play at one time. The Apple then plays a series of pitches while lighting up the letter names on the screen. You enter all the pitches until you reach the total. The two options are to change the speed of the notes and to have the notes played unlit (this is a real test). Both programs help your ear training skills.

For “Note Recognition” you employ “Flash Cards,” ten cards per session. You can choose to study any of the staffs, including alto, tenor, and bass. “Moving on the Staff” simply asks you whether the note displayed goes up, down, or stays the same. “Note Finder” asks you to find a note on the keyboard related to the note on the staff. Finally, “What’s My Name” quizzes you on the names of all the keys on the keyboard.

“Counting Aid” allows you to enter a rhythm. The Apple plays while showing you how all the notes fit together. In “Measure Count,” you try to get in the last note of a measure according to the time signature. The last programs are “Rhythms 1-3.” They all do the same thing but in progressive difficulty. This was my favorite part of the program. The computer displays a pattern of notes which you have to enter, via the game paddle button, in the correct rhythm. You may enter the notes at any speed you like. After you finish, the computer plays the rhythm correctly and marks any mistakes. I found this a very good and easy way to learn rhythm.

Throughout the program, most correct answers are rewarded with nice little tunes, while wrong answers get a few low-pitched buzzes.

Overall, I think this program is very good for anyone who has played an instrument for less than a year and wants to improve. The disk is copyable and written in Applesoft, so you can make changes.

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**POKER PARAT**

**Company:** Gessler Educational Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>VENDOR SUPPORT</th>
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<tr>
<td>C-</td>
<td>D+</td>
<td>C</td>
<td>B</td>
<td>B</td>
<td>C</td>
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**Suggest. Retail:** $39.95

**Availability:** 2

**Disk or Tape:** Disk

---

Do you want to know the profession of the Pied Piper of Hamlin (exterminator), or who paid for the Kongresshalle in Berlin (USA)? If so, then *Poker Parat* is for you. But if you want to play cards, this program is not for you.

*Poker Parat,* in spite of its name, is simply a multiple choice test of your knowledge of German language, history, literature, and monuments. The purpose is “to teach and review various aspects of German grammar and culture.” Other topics include Berlin, Fairy Tales and Legends, and a Wild Card drawn from topics dealing with German and Germany.

The manufacturer claims that this is a game similar to 7-card draw poker. The student is shown a hand of seven cards drawn from fourteen topics. You may discard 0, 1, or 2 cards. The discards are replaced (sometimes with the same topics), then you are allowed to choose an easy or a hard question. Twelve questions are asked (fifty-six points is the maximum high score). At the end of the hand, you start over with new topics or end the program.

Outside of a few sound effects at the beginning of the program, everything is written in straight text with no graphics or other refinements. The documentation is minimal, but adequate, and includes the text of all questions. Questions are in English or German; however, an intermediate or better knowledge of German is necessary to understand most of the questions.

The straight text multiple choice format of *Poker Parat* is a good example of the weakness of much educational software on the market today. The program might as well have been issued as a book. Why bother to put questions on a computer when all the computer does is total up your score? A book would be less expensive and would accomplish the same objective—practice in test taking.
**POKER LISTO**

**Company:** Gessler Educational Software  
**Language:** BASIC  
**Hardware Requirements:** 48K

*OVERALL RATING: D*  
*EDUCATIONAL VALUE: D*  
*VENDOR SUPPORT: D*

*EASE OF USE: A*  
*DOCUMENTATION: C*  
*VISUAL APPEAL: B*

*ERROR HANDLING: B*  
*RELIABILITY: B*  
*VALUE FOR MONEY: F*

*OVERALL RATING:*  
*EDUCATIONAL VALUE:*  
*VENDOR SUPPORT:*

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*Poker Listo* is the Spanish language version of Gessler Educational Software’s *Poker Pari*. The rules and format are the same (please see that review). Most of the questions are well designed. The grammar questions suit the level in which they appear, as do the questions on cultural and historical topics, although topics overlap considerably.

The fact that *Poker Listo* bears the name of Dr. B. Gonzalez as one of the authors should not lead you to assume, however, that the program has been edited for correct Spanish. So many grave errors crop up that I cannot advise this program for students. Because the programmers use only the capital letters of Applesoft BASIC rather than creating shape tables, they eliminated both accents and tildes. While this may work in French, it does not work in Spanish. The meaning of some words depends upon placement of the accent, and the tilde makes “n” a separate letter in the Spanish alphabet. The program also neglects to invert punctuation marks.

The single disk is protected by the same method as *Poker Pari*. The publisher states that the disk cannot be copied without ruining the program. You can buy one back-up disk for $9.95 plus $1.95 for shipping and handling. The disk can neither be write protected (to record student scores) nor can it be used on a computer network. Both factors limit its use in a school. The problems are grave enough so that it needs considerable improvement before I can recommend its use by teachers and students of Spanish.

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**SCORE, THE ACADEMIC ASSISTANT**

**Company:** Science Research Assoc.  
**Language:** Assembly & Compiled Basic  
**Hardware Requirements:** 48K

*OVERALL RATING: B*  
*EDUCATIONAL VALUE: B+*  
*VENDOR SUPPORT: B–*

*EASE OF USE: B*  
*DOCUMENTATION: B–*  
*VISUAL APPEAL: C*

*ERROR HANDLING: A–*  
*RELIABILITY: B*  
*VALUE FOR MONEY: C*

*OVERALL RATING:  
*EDUCATIONAL VALUE:  
*VENDOR SUPPORT:*

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*Score* is a set of 10 programs on which to keep records of test scores, and provide statistical information on both student and test-item performance. Its maximum capacity is 200 students per class, 20 test scores per student, 100 items per exam, and 5 options per question.

*Score* consists of three diskettes and a 37 page, loose-leaf manual. The program’s diskette is copy-protected, but a backup diskette is provided. The third diskette is for data, but any initialized, 16-sector diskette can be used. It is capable of accepting data from the following Optical Mark Readers: Chatsworth OMR500, HEI 121-4, or SCANTRON. The reader must have its appropriate interface card, and the manual provides specific instructions for interfacing each unit. Having an Optical Mark Reader, although desirable, is an option, but *Score* will function without such an accessory. In addition, it requires a printer be “on-line” at all times. You cannot access or enter data without an active printer. This can be a limitation for some users.

*Score*, when first booted, will enter a configuration mode requesting information about the printer, number of drives, and availability of an Optical Mark Reader. Two other questions, infrequently found in configuration programs, involve an access code and a termination code for the printer. The access code can pass a control letter to the printer which, in turn, activates a special feature of the printer (example: pressing control-0 will cause the Epson MX-100 to print in a compressed mode). The termination code can pass an appropriate Control Letter when exiting from *Score* (example: for the MX-100, a Control-R will restore normal printing). Unfortunately, the manual’s suggested use of the access code, namely, Control-I followed by 80N, to specify a line length of 80 characters, did not function on my printer. Instead, 80N preceded each line of printed output!

*Score*, once configured, will boot into a File Identification mode, which, when responded to, will present a Menu
of 7 items. The 7 options are: CHANGE, NAMES, FEEDBACK, EDIT, LATE, CORRELATION, and EXIT. Each of these options includes a short, descriptive explanation. CHANGE permits processing of another class file. NAMES allows the entering of student names for a new class. EXAM is used to enter exam responses for scoring, to produce a short, descriptive explanation. Item analysis, and to print student reports. FEEDBACK generates reports of performance for each student from previously stored scores. EDIT accesses disk file data for changes or corrections. LATE permits the entering of responses from a student who has made up, or retaken a test. CORRELATION returns statistical analysis reports from student scores. EXIT prompts the creation of a backup file (on a different data diskette) before leaving the program.

The above descriptions do little justice to the thoroughness of the report-generating capabilities of Score, and the well placed reminders to backup files before they are lost from memory. However, there is a serious defect in adding a name. If you wish to place a student's name at the top of the roster, there is no easy way of doing this, since the prompt for entering a new student to the list is: NAME OF STUDENT JUST BEFORE DESIRED ENTRY LOCATION?

The LATE function allows updating a stored file due to a make-up or re-test of an individual student. A grading menu is produced as in the EXAM mode, but with only those accessible menu items that are valid for a single data entry. This presents another problem: if scores for late entries are to be expressed as "T" scores, the teacher must provide the mean and standard deviation for that test as was printed on the original report for that class.

Item Analysis is possibly the most unique part of this package and deserves a more thorough description. Each test question is evaluated for its contribution to the total test as expressed in a Difficulty Index, an Item-Total Correlation, and a Discrimination Index. A chart is printed showing the student's position in class, and frequency of choice response, plus flagged comment lines to indicate the more significant findings of this process so that questions, and/or choices can be modified accordingly. Examples: a question answered correctly by more than 90% of the class or another question answered incorrectly by only 10% of the class should be discarded or modified; also, when "good" students (the top 1/4 of the class) miss a particular question more often than the less skilled students, that question should also be discarded or modified.

The use of Item Analysis techniques, Linear Regression Equations, Correlation coefficients, Scatterplots, and other advanced statistical tools, at first blush seems highly desirable. However, there is a very important limitation to the use of such tools, which is not mentioned in the Score manual. It is inappropriate, if not misleading, to use such techniques when the number of questions in a test, and/or the number of students in a class are too small. There are other techniques, appropriately named "small-sample" statistics, that are designed for this situation. The question of, "How many is enough?" is not an easy one to answer. The experiences of this reviewer point to a minimum of 50 questions per test and 50 students per class before using any advanced statistical, data-reduction techniques. This is, admittedly, a conservative view.

The Score package, in summary, is formidable. It is powerful, accurate, and well-protected from error. It can be a very profitable tool for a teacher who makes use of multiple-choice testing. The advanced statistical features are optional; but, within the limitations mentioned above, should be useful in creating better, more reliable testing instruments.

**SQUARE PEGS**

Company: Scholastic, Inc.
Language: Applesoft
Hardware Requirements: 48K

| OVERALL RATING | B |
| EASE OF USE | A |
| EDUCATIONAL VALUE | B |
| VENDOR SUPPORT | A |
| ERROR HANDLING | A |
| DOCUMENTATION | A |
| VISUAL APPEAL | B |
| RELIABILITY | A |
| VALUE FOR MONEY | B |

Square Pegs is a menu-driven, computer adaptation of a popular TV gameshow. Players are confronted with a board of numbered squares behind which are hidden words, phrases, etc. The object is to create matches by identifying related pairs. Correct answers are rewarded by an enjoyable sequence of "arcade-like" sounds and graphics.

The program is really simple to learn and operate. I read the instruction booklet after the fact. It's well written and easy to understand.

User options include the ability to configure the game for up to four players (counting the computer, which doesn't always get it right). The program also makes it easy to construct your own games based on just about any matching premise you could think of. This makes it easy for parents and teachers to apply the program to a wide variety of educational tasks. There's a utility program included that lets you create additional game disks.
If there are any shortcomings in the program, it's the lack of variety in execution. You're always guessing numbers. The right answers are always rewarded by the same series of lights, bells, and whistles. In time, delight gives way to a feeling of tediousness.

**STUDY QUIZ FILES**

- **Company:** Compu-tations
- **Language:** Applesoft
- **Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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<th>VENDOR SUPPORT</th>
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<th>RELIABILITY</th>
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*Study Quiz Files,* by Compu-tations, allows a teacher to write multiple choice tests on whatever subject he wishes. Using *Study Quiz Files,* a teacher can write up to thirty multiple choice questions and answers per quiz. All answers are displayed at the top of the screen, and questions are presented randomly at the bottom. The child types either the number of the answer or the answer itself (less confusing in math quizzes). The program randomly presents the questions; gives audio and visual feedback to correct answers; and re-presents questions missed, first with the correct answer and then again without, until the child answers correctly. Quizzes can be saved to disk or deleted; questions can be added, deleted, or revised. A summary score (percentage) is displayed at the end.

This easy to use menu-driven program holds your hand all the way through. Granted it takes some time to type in the quizzes, but no more so than making spirit or ditto masters. Plus, you'll never run out of copies or waste paper by running off more than you need. *Study Quiz Files* is a very useful program well worth the money.

**U.S. CONSTITUTION TUTOR**

- **Company:** Micro Lab
- **Language:** BASIC
- **Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>VENDOR SUPPORT</th>
<th>ERROR HANDLING</th>
<th>RELIABILITY</th>
<th>VALUE FOR MONEY</th>
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<td><strong>B</strong></td>
<td><strong>A</strong></td>
<td><strong>B-</strong></td>
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This tutorial is appropriate for students, future teachers, and any adult who wishes to learn or review facts about American government. However, it is specifically designed for junior and senior high school students who must pass the U.S. constitution test required by some states, including California. *Constitution Tutor* consists of 175 multiple choice questions for beginner, intermediate, and advanced levels. The program operates in two modes: instruction and tests. This tutorial would simply be another boring program with a question-answer format, if the author did not provide explanations of correct and incorrect answers alike. Through this technique, the user discovers the reasoning behind a question and why one answer is preferable to another. The automatic scrambling of questions each time the tests are taken is another positive feature.

The documentation includes suggestions to improve retention of the information presented. This package is definitely well worth $30.00.
Utilites

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UTILITY PROGRAMS

Utilities are an integral part of making the easiest use of Apple computers. These run the gamut from disk repair and file recovery programs to shape table builders, compilers and assemblers. Some of these programs are extremely useful, and will save you hours of tedious work as well as considerable frustration.

But what must you consider important when you look at the dozens of offerings that fill the dealers' shelves? That depends, of course, on your needs, and in which programming language you usually write. For BASIC programmers, you need a renumber utility and a good line editor. Machine language programmers need a good assembler, linkage editor, and possibly a debugger. Disk drive owners might consider disk utility programs that are capable of editing and rewriting sectors on the disk, or one to manipulate files from one disk to another. Hi Res programmers should own a good shape table maker and editor, and perhaps a graphics package for creating Hi Res pictures. For those who want to work in three dimensions, there are several programs that will create, rotate, and animate three-dimensional pictures.

For those who like languages, there are more advanced BASIC's as well as Pascal, FORTH, and C. And there are also some mathematical utilities designed to help engineers or scientists solve formulas and equations simply.

The utility program market has burgeoned in the last year, in accord with the growing number of programmers writing programs for the Apple computers. Programs which were developed by individuals to make their work easier, and which were originally traded among friends, have been refined and offered commercially. The next year should produce programs that will meet a broader range of user needs.
Utility City is a collection of 21 utilities, some useful and some not, that assist Applesoft programmers. While some have been around for years in the public domain, a few are brand new. The authors assembled what they felt were the most needed utilities, and did it at a reasonable price. The programs can be divided into several categories. I will try to describe their content as well as give a critique of each.

There are a number of Applesoft utilities that enable the programmer to hide critical code from prying eyes. While these utilities don't prevent others from copying the material, they sure puzzle other programmers who wonder how it was written. Command Zap allows invisible commands or REM statements in your program. It is simply done by control H's (back spaces) in the program. However, this only works while listing to the screen. Paper printouts show the ruse rather quickly. There is also a similar utility called REM Zap that works just with REM statements, and one called File Name Zap that can hide program names in the catalog. Another program called Bigliner renumbers Applesoft programs to lines above 63999 so that they are inaccessible to most people.

One of the more practical utilities called Screenwriter helps you format text screens that can be saved to the disk and then BLOADED for later use. You can create layouts that include NORMAL, FLASH, or INVERSE lettering. Text can be right justified or centered automatically, or even moved as a block. One nice feature is a flashing Hi-Res grid that can be superimposed over the text to help you with the formatting. All formatting and commands are made through control characters. They imply that cursor movement without typing is with the two arrow keys and the A and Z keys, but what works are the control A and control Z keys.

The package includes a utility for decimal-hexadecimal conversion that doesn't interfere with your current program. The program is EXECed into memory in a safe place, performs a few quick calculations, then returns you to your program. There is a program called Double Loader that runs another utility in memory without destroying the first. Another called Int Converter converts an Integer BASIC program to Applesoft without checking syntax. Connect allows you to join two Applesoft programs together as long as the range of line numbers don't overlap. Line Search helps one locate any particular Applesoft line in memory. It actually is only useful if your program has been somehow garaged, although several people who understand the tokens have created illegal lines. Sortfile sorts alphabetically and stores a list of items on a disk. It is good as a small database for a list with one or more fields. However, this program can only sort on the first few letters of a single line.

There are two catalog utility programs on the disk. Multi-Cat allows you to list programs several columns across to the printer or screen. The format is user specified. Key-Cat allows you to select and run programs with one keystroke from your catalog. It also gives the amount of free space on the disk.

Xlister is a utility to produce easy to read Applesoft programs either on screen or to the printer. It separates multiple statement lines into separate lines. There are even page breaks. And finally, there is a Text Dump program that will dump whatever is on the text screen to the printer. It is appended to the end of your program and accessed via a GOTO 63900.

This brings us to the subject of documentation. While errors and changes are usually provided as an errata sheet, the authors resort to a program called Buglist on the disk for this information. They missed a few. On the whole the documentation is good and is the final part of Tip Book #3, a booklet of some good and some useless programming tips. The authors also include a chart of useful Apple memory locations.
APPLE-DOC
Company: Southwestern Data Systems
Language: Applesoft
Hardware Requirements: 32K

OVERALL RATING B+
EASE OF USE B+
VENDOR SUPPORT B+

DOCUMENTATION A
VISUAL APPEAL A
ERROR HANDLING A

APPLE-DOC is an extremely useful program development and documentation package for programs in Applesoft Basic. The capabilities it provides are in the following five areas:

1. VARIABLE CROSS-REFERENCE - The program examines an Applesoft program and produces an alphabetized list of every variable referenced, together with every line number on which the variable appears.
2. VARIABLE DESCRIPTIONS - The user can optionally construct and save a database of text descriptions of some or all variables as described in 1. above. A listing of this database can provide the basis for program documentation external to the Basic program itself.
3. LINE NUMBER CROSS-REFERENCE - APPLE DOC can similarly produce an ordered list of every line number called by a GOTO, GOSUB, etc., together with the lines from which each is called.
4. LINE NUMBER DESCRIPTIONS - These can be entered into a documentation database in the same manner as those for variables.
5. GLOBAL/SELECTIVE REPLACEMENT - The program facilitates automatic global or selective replacement of variable names, constants, strings, etc. in the user Applesoft program.

APPLE-DOC is a very useful product for program development. In fact, it is currently being used by at least one software house for documentation and development of its software line.

The documentation is well laid out and straightforward, making it easy to use. There are examples for each program to allow the new user to become familiar with the program fairly quickly.

All in all, this package is highly recommended for the serious programmer, as well as for just about anyone who programs in Applesoft.

LISTMASTER
Company: Southwestern Data Systems
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A
EASE OF USE A
VENDOR SUPPORT A

DOCUMENTATION A
VISUAL APPEAL A
ERROR HANDLING A

LISTMASTER is a utility diskette that contains four extremely useful programs for APPLESOFT program development authored by Ted Birkhead and Roger Wagner. The programs and their features are as follows:

1) APPLESEED - A program optimizer that gives the user the option of shortening variable names, combining program lines, stripping out REM statements andrenumbering a program by ones. This both shortens a program and optimizes its execution speed. May be used as a pre-compiler.
2) RENUMBER PLUS - A renumber utility that offers the option of specifying parameters and specific blocks of code for renumbering. Allows the user to retain the logical structure of a program when desired and preserve logical blocks of number for routines.
3) LISTER - A program that facilitates neat and orderly program listings, allowing the user to specify name and date banner, top, bottom, left and right margins (even if your printer does not support these functions). It also provides a means for creating a text file of any APPLESOFT program for processing by a text editor. LISTER also supports transmission over a modem with the proper utility software.
4) COMP-LIST – A utility that will make a comparison listing of two Applesoft programs stored as text files and print out or store as a text file (your choice) the difference between them.

The programs are well done and very useful. The accompanying documentation is well written and easily understood. Error handling is very good, with documented error codes for RENUMBER PLUS. An excellent addition to your utility library at a very reasonable price.

APPLE SPICE

Company: Adventure International
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A-
EASE OF USE A-
VENDOR SUPPORT B

DOCUMENTATION A
VISUAL APPEAL N/A
ERROR HANDLING A-

RELIABILITY A
USEFULNESS A-
VALUE FOR MONEY A

Apple Spice is a tool to enhance the capabilities of Applesoft, making it compatible with more advanced BASICS. Essentially, what is missing in Applesoft is the PRINT USING function, the IF-THEN-ELSE statement, and a faster method for scanning string inputs for a particular string of characters. Apple Spice remedies these deficiencies by linking these routines via the & and USR functions in Applesoft.

PRINT USING is a handy feature in most BASICS that allows numeric output to be precisely formatted. For instance, this would allow columns of figures in dollars and cents to be precisely aligned at the decimal point regardless of the size of the dollar amount whether it was a positive or negative sum. This is easily accomplished by substituting the usual print statement with one using the ampersand as in the following example: &PRINT "###.##", AMOUNT. AMOUNT in this case is just the dollar amount. There is also a useful option that allows you to string together a group of numbers separated by exclamation points in one program line, and using the PRINT USING function to align them vertically according to your specifications.

The IF-THEN-ELSE function works as in other BASICS, except that when the condition fails the ELSE allows more than one program statement to be executed rather than the usual single statement. Normally when the condition fails in Applesoft, program flow jumps to the next line. This statement will allow you to execute several more statements on the same program line that follows after the IF portion of the line. Nested IF-THEN-ELSE statements are allowed in this version.

There is a string search routine that is much faster than using a MID$ in a DO loop. It returns the string and its position in the input line. This routine is useful in interactive programs where it is looking for one or more input strings on which to base its answer, such as in pseudo-psychiatric programs.

The package also contains a screen output module that allows string output to wrap on each word rather than be arbitrarily split on the right side of the screen. It can also do this on an input string. In addition, it will erase characters upon backspacing. This is handy for user friendly programs.

These routines can be incorporated into any BASIC program. These modules can be separated and relocated in memory. Normally, these routines are placed just below the 32K boundary so as not to interfere with utilities such as the Program Line Editor. However, these can be relocated by specifying HIMEM: before using the relocator.

This is a very detailed tutorial with many examples in its 48 pages. The documentation is quite good. The instructions are easy to follow and make implementation simple. Overall the package is useful and a powerful expansion of Applesoft.
A.C.E. or Applesoft Command Editor combines a program line editor with an enhanced version of Applesoft in the immediate mode. This means that the included utilities are available while entering or modifying programs. The package, which is 6.5K bytes long, effectively moves Himen down and is completely transparent to your Applesoft program.

A.C.E. is a powerful tool for speeding up the design and debugging of a new program. It includes commands that enable you to dump any portion of memory, display the number of sectors free on a disk, show the starting address and length of the last BLOADed file, give the current memory status, convert numbers from hex to decimal and decimal to hex, renumber programs, display the line numbers for which a variable appears, and dump the current variable table.

The ability to dump a variable table allows you to see the order the variables are used in the table. Obviously, if a variable that is being used often is at the bottom of the table, the Applesoft interpreter will take longer to find it and the program will run longer. Also by placing a break in your program, you can use the list as a debugger, since all current variable values are shown. We did find one annoying problem that occurs with names longer than two characters. Besides the name being shown as only two characters, trying to reference the line number associated with that variable doesn’t work for either the long or shortened variable name.

Their line editor is adequate for easily editing program lines. One can insert and delete characters, as well as jump to any point with a find command. One can change only what is needed, then have the editor accept the line as changed without having to copy over the remainder. There is also a cancel mode that will return the original unedited line if one makes a mistake. The editor also allows you to define keyboard macros. If a Control-V is defined as VTAB, just pressing that key will print VTAB while you are trying your program. With up to seven letter macros, a programmer could save considerable time by typing commonly used Basic expressions like HPLOT.

A.C.E. is a very useful utility. A program line editor is a necessity. While Synergistics may have a more comprehensive editor, A.C.E. has a debug module that is worth the price of the program alone. The program will allow you to make three backup copies.

EPF IV (extended programming facility), a powerful utility, simplifies and enhances Applesoft programming and file management on the Apple. This development system is more than just an Applesoft editor, however. It includes all the facilities you need to write programs, edit, test, file, and copy them, all in one place. There’s no need to go back and forth between diskettes, loading the program each time you boot another utility.

Its complete facilities include fast movement through the program with single-key entries, complete, full-screen text editing, keys for tabbing and scrolling, auto line number and renumber, automatic insertion of frequently-used subroutines, special “overlay” control to maximize program space, global find and change, block copy/move/delete, special REM list functions, special facilities through modified REMs, fact access to marked records, and several others.
The EPF IV program package comes with two double-sided disks with versions for 48K and 64K. The reverse of each disk furnishes the back-up for the first side of the other. The manual contains two reference cards and a keyboard guide for the number keys. The Editor features page scrolling, locate by line number, list all REMs, list all "labels," and variable cross reference by line number. It has line and character insert, full screen editing of programs, line delete, and automatic and manual renumbering with all the standard parameters. The Editor requires very few keystrokes. The over package offers a good single system for writing programs.

However, I feel that this product may have hit the market too soon. It is definitely not up to the standards normally associated with such a reputable publisher. Some problems exist in the system itself. It does not run well on the Ile or a II with lower case adapter. If you display lower case, many strange characters appear on the screen—the correct characters reappear with the high bit set. Setting the high bit redefines a different ASCII character. This should be corrected immediately. It is also an inconvenience that, with all the emphasis on 80-column development, this software does not support any 80-column cards, even on the Ile. Another problem with the Editor is that one scroll down plus one scroll up does not get you back where you were. EPF IV uses initialized disks for storage and the several-step process of initializing is both cumbersome and prone to errors. Errors in the process are sometimes hidden by the software with messages like "Done," when in reality I/O errors have occurred and the disks did not get initialized. The Configure routine uses different cursor command keys than the editor and thus favors errors. EPF IV’s capabilities, although powerful and useful, should be avoided until the bugs are ironed out.

GLOBAL PROGRAM EDITOR

Company: Synergistic Software
Language: Machine Language
Hardware Requirements: 48K

OVERALL RATING A  DOCUMENTATION A－
EASE OF USE A  VISUAL APPEAL N/A
VENDOR SUPPORT B  ERROR HANDLING A
RELIABILITY A  USEFULNESS B＋
VALUE FOR MONEY B＋

Global Program Line Editor is an enhanced version of the original Program Line Editor. Besides having one of the most versatile line editors for editing BASIC programs in either Applesoft or Integer, this version includes features that do global search and replacement within an entire program. The utility also supports lower case, and five of the most popular 80-column cards. And those that have language cards may choose to relocate DOS onto the card and place the GPLE in the second memory bank.

The Global Program Line Editor is placed into memory between DOS and the I/O buffers. Essentially, HIMEM: is shifted down 4096 bytes. While this bit cuts the maximum memory available to your BASIC program by 4K, the convenience of having the extra features is often worth it.

Normal editing commands are accessed by a Control-E, followed by a line number. This displays the line in 40-column format, and is ready to edit. Other commands allow you to go to the beginning or end of the line, insert or delete characters, pack the line if it is too long, find a character within a line, and re-edit the line if you have ruined it (a lifesaving feature). One of the newest features allows you to re-edit an Integer BASIC line that was not entered properly because of a syntax error. One of the best features of the editor lets you enter the line irregardless of your cursor position, or whether or not you have edited the line, by a simple carriage return.

The global features enable you to specify a range of lines to be edited, search for a specific string throughout an entire program, or just within a range of lines. The global replacement feature simplifies the mass change of variable names within a program. The search can be made when you monitor each replacement, or in an automatic mode.

The utility has a built-in set of macros accessed by the ESC function key. The program comes with a predefined set using nearly all of the 1152 available bytes. These include functions that will make a list and catalog a disk automatically with one keystroke. Others clear the screen, enter the monitor automatically, return the computer to page one, and calculate the start address of the last BLOADed file in memory. Escape functions can be created with limitless possibilities.

GPLE is an outstanding utility that is thoroughly documented in a thirty-two page manual. Its two best features are its logical command structure, and its extreme ease of use. It is almost a necessity to anyone who does an extensive amount of BASIC programming.
Axel Extended Editor (AXE) is a program line editor for Applesoft programmers. It greatly enhances the limited line editing capabilities of the normal BASIC editor. Besides having an extended editor with numerous features, it offers search and replace commands for both tokens and ASCII strings, auto line numbering, and complete listing control in a variety of formats.

Of course, AXE's most important feature is its editor. A line is edited by typing E# line number from the Applesoft prompt mode. You should understand first that listing control can either be by individual statements, one each per line within a line number, or in the normal packed mode. The same applies to the editing mode. Statements can be copies, or deleted by row with simple control commands if you are not in the packed mode. However, in the packed or normal mode, you can't simply press the carriage control key when you are done editing, or you will delete everything beyond the current cursor position. The Control-W key copies the rest of the line. The usual insert and delete modes apply not only in the edit modes, but when entering the initial Applesoft line. There are other commands for finding a character within a line, and for re-editing the last line you worked on. No, this does not restore a badly edited line that you made mistakes on. In that case, it is best to abort before you enter the line.

AXE has a number of features that can be directly accessed from the Applesoft command prompt. Lines can be entered in an auto number mode. The status of available memory in the Applesoft program can also be checked, or you can enter the monitor to do this.

The utility as a macro feature that simplifies the entering of repetitious code. Each macro contains up to 64 characters, and can be entered and edited with a macro editor. Many programmers save considerable typing time by inserting common keywords like PRINT or INPUT in the table. These can then be entered with a Control-K and the appropriate key containing the macro.

AXE resides just below DOS; it requires 3300 bytes of memory. It will not support an 80-column card. It offers editing features comparable to the Global Program Line Editor from Synergistics. It has some features not found in its rival product, but isn't quite as easy to use. Overall, this is a good product, very useful to anyone doing an extensive amount of Applesoft programming.

**Global AppleSoft Line Editor**

*Company:* MicroSparc, Inc.

*Language:* Machine

*Hardware Requirements:* 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>RELIABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-</td>
<td>A-</td>
<td>A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EASE OF USE</th>
<th>VISUAL APPEARANCE</th>
<th>USEFULNESS</th>
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</thead>
<tbody>
<tr>
<td>A-</td>
<td>B+</td>
<td>A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VENDOR SUPPORT</th>
<th>ERROR HANDLING</th>
<th>VALUE FOR MONEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>A</td>
<td>B+</td>
</tr>
</tbody>
</table>

**GALE,** or Global Applesoft Line Editor, is a sophisticated utility to aid the development of Applesoft programs. Primarily, it is a global line editor that greatly speeds up the design and debugging of a new program. But it also features auto line numbering, renumber, search and change, append one file to another, a variable cross reference table, hexadecimal/decimal conversion, and a user-definable set of macro functions.

**CALE** greatly enhances the rather limited capabilities of the BASIC line editor. The edit mode is invoked by a line number command. This differs somewhat from all of its competitors who use a Control E line number, but this should be of no concern to owners of their first editor. The editing screen appears as a separate screen with the line to be edited in its own text window. This produces a very clean display, with such information as the number of characters in the line, and the current edit mode shown above and below the actual line. The internal edit commands
are standard, featuring insert, delete, find character, move to the beginning or end of line, and delete beyond the left and right Arrow-controlled cursor. The restore feature puts the line back the way it was before editing. One of the features this editor has that others lack is the ability to immediately edit an input line before hitting Return to enter it in memory; just type Control G. While the edit window is clean and informative, it erases other listable information (like the surrounding lines on the main screen). This is partially remedied by a toggle screen between the two screens, but in my opinion it is better to be able to see all the information on a single screen.

The global portion of the editor allows string searches and substitutions over the entire program listing. You can make substitutions over a range of lines or on a single line. The renumber command is also very flexible in that you can renumber segments in a program. This is useful in opening gaps for line insertion.

There is an escape table macro feature that is useful for entering the repetitious code. GALE has some other useful functions. It can give you the free space on a disk or the load addresses of the last BLOADed file. It can allow you to append one Applesoft program to another. It does this by hiding the program in memory, then loading the new programs and resetting the pointers so that the programs are one. There is an Applesoft variable table lister. This can be helpful if you are trying to speed up your program and need to know if the beginning entries are the most often used.

GALE is very memory intensive. While it is transparent when in use, it generally resides between the DOS buffers and your program. While it matters little on 64K machines, it lowers the memory storage on 48K machines by 10.75K. This could be a problem when running large programs, and may be a reason for choosing one of the smaller competitive editors. Another problem you should be aware of is that the programs often don't run properly unless the editor is unhooked.

In sum, this package is a very good editor, offering enough features and ease of use to justify the price. An editor like this, light years ahead of our built-in BASIC editor, is an important piece of software for anyone doing programming. My only hesitation is over the memory loss for owners with 48K Apples. Owners of 64K machines will find this editor more than adequate for their programming needs.

**THE ROUTINE MACHINE**

**Company:** Southwestern Data Systems  
**Language:** Applesoft & Assembly  
**Hardware Requirements:** 48K

| OVERALL RATING | A | DOCUMENTATION | B+ |
| EASE OF USE | A- | VISUAL APPEAL | A |
| VENDOR SUPPORT | C | ERROR HANDLING | A |
| RELIABILITY | A | USEFULNESS | B |
| VALUE FOR MONEY | A |

**Department:** Utilities  
**Sugg. Retail:** $64.95  
**Availability:** 6  
**Disk or Tape:** Disk

**The Routine Machine** is a comprehensive utility for the Applesoft programmer that offers a simple method of incorporating one or more machine language subroutines in your Applesoft program without the usual problems of memory allocation and passing of variables. No knowledge of machine language programming is required if you choose subroutines from the included library or from other available sources. Simply load your program, add a line of code, BRUN Routine Machine, and append the desired subroutines by specifying their filenames and the names by which you wish to access them. That's it. You can now run, modify, and save your program without concern for the appended machine language subroutines and interfacing code.

The library of routines includes general purpose command subroutines which extend Applesoft as a language such as "Print Using," variable "GOTO," and "GOSUB," general string input, and a useful text output that avoids word breaks. Special purpose routines are also provided, such as turtle graphics, shape table processors, sound effects, array search, bubble sort, and data statement pointer control. A few useful utility routines such as a fast BLOAD subroutine, complete the library. Three additional libraries, available at $49.95 a piece, enhance array manipulation, screen display creation, and chart graphics.

The instruction manual is well written, but initially intimidating at over 120 pages. Fortunately, you only have to read four pages to get started and another one or two pages for each subroutine description. The balance of the manual describes other capabilities available from the menu, gives a description of how the program works, and reprints a lengthy section on variable interfacing which appeared in Softalk's "Assembly Lines" series, and was
The Book of Apple Software

obviously written for a wide range of skills. Novices may become confused if they read too much too soon. A better road map, up front, would have helped in this regard.

Bonus features available from the menu include the capability to search for ampersands, inspect (and modify) Applesoft lines in tokenized form in memory, and display a memory map in tabular form. Another bonus: you can make three backup copies from the protected disk (however, all subroutines that you need in your programs can be directly copied). Still another bonus: the special DOS adds free sectors to the normal CATALOG output, and long catalogs can be terminated by pressing RETURN. This special DOS may also be transferred to your own disks.

If your program uses Hi-Res (page one), the total program length should be limited to about 24 sectors, including the appended subroutines and the interface routine. The internal memory map display makes it easy to avoid memory conflicts, and the compact nature of the subroutines minimize memory requirements. However, the potential for crashing into page one does exist.

All in all, it is excellent software with nearly as excellent documentation. If you need the speed of machine language, but want the ease of revision offered by Applesoft, or don’t program in machine language (or don’t own a good compiler), take a serious look at this one. If the library contains the subroutines you need, and there is a good chance that it will, your problems are over.

**DOUBLE-TAKE**
**Company:** Beagle Brothers
**Language:** Machine
**Hardware Requirements:** 48K

**OVERALL RATING** | **DOCUMENTATION** | **VISUAL APPEAL** | **ERROR HANDLING** | **RELIABILITY** | **USEFULNESS** | **VALUE FOR MONEY**
--- | --- | --- | --- | --- | --- | ---
A | A | A | B | A | A | A

*Double-Take* is a collection of twenty-three machine-language routines that make your Apple more flexible and easier to use. All are loaded into the memory and "hidden" when you boot the *Double-Take* disk or BRUN the appropriate *Double-Take* program. The disk comes with a convenient keychart overlay for the keyboard; this reduces the need for memorizing the commands. *Double-Take* is also compatible with Pronto-DOS and GPLE, on or off the language card or bank-switched IIe. *Double-Take* uses the ampersand (&) vector extensively and is not compatible with other Amper utilities.

The following list gives you an overview of the utilities included in the program, some or all of which may be loaded above HIMEM:

1. New List lists each program statement on a new line.
2. Two-Way List scrolling allows you to search through listings in both directions.
3. Printer listings can be requested with a range of line numbers and a specified width.
4. Catalog with Free Sectors Remaining displays the number of empty sectors, puts blank lines in deleted file space, and allows two-way scrolling.
5. Hex/ASCII Dump displays on screen or printer the contents of a range of memory with two-way scrolling.
6. Monitor Disassemble lists assembly language instructions from the contents of memory featuring two-way scrolling.
7. Hex/Decimal Convert prints the hex equivalent of any decimal number and vice versa.
8. Monitor BASIC allows the entry of monitor commands from BASIC.
9. Append can load two Applesoft programs in memory, either hidden from each other or merged together.
10. Renumber initiates the re-numbering of all or part of any program in memory.
11. Auto-Number will prompt you with the next line number while you are entering a BASIC program.
12. Vital Statistics displays the decimal and hex addresses of various allocations of memory in running an Applesoft program: program, variables, arrays, free memory, strings, etc.
13. Variable Cross Reference and Display shows all variables sorted alphabetically, followed by the line numbers in which they appear along with their values.

If you write Applesoft programs, *Double-Take* is an outstanding aid. All of the commands are useful, and all are executed in an efficient, logical way. The program’s presentation is attractive and easy to read. Its compatibility with Pronto-DOS and GPLE greatly add to your machine’s capabilities. The Beagle Brothers are preeminent in the field of Apple utilities, and this is certainly their crowning glory.
Miscellaneous Utilities

DOS TOOL KIT

Company: Apple Computer, Inc.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: A
EASE OF USE: A
VENDOR SUPPORT: C
DOCUMENTATION: A
VISUAL APPEAL: A
ERROR HANDLING: A
RELIABILITY: A
USEFULNESS: A
VALUE FOR MONEY: A

Apple Computer Inc.'s new DOS TOOL KIT consists of five major segments:
(1) The Applesoft Programmer's Assistant
(2) Hi-Res Character Generator
(3) Animatrix
(4) The Relocating Loader
(5) 6502 Editor-Assembler

A) The **APPLESOFT PROGRAMMER'S ASSISTANT** does a number of things to assist you in writing and changing Applesoft programs:
(1) Merge files (Appending)
(2) Renumber programs
(3) Auto line numbering
(4) Display hidden control characters
(5) Length of program (number of bytes)
(6) Compress programs (removes REM statements)
(7) Additional keyboard characters: — underscore, back slash, left bracket
(8) Allows a cross reference listing of Applesoft programs (lists each variable followed by the line number)

B) **HI-RES CHARACTER GENERATOR**

This is a set of Assembly-language subroutines for displaying text on the Hi-Res graphics screen. The program's features include:
(1) Comes with 21 character sets (e.g., Greek, Katakana, Cyrilllic, Roman, etc.)
(2) The user can create his own character sets.
(3) You may display upper and lower case text.
(4) Allows intermixing of text and Hi-Res graphics.
(5) Normal and inverse video
(6) You may write text over a background.

Also, within this part of the program are three games, namely RIBBIT, SKYLAB, and MAXWELL, which demonstrate the use of the character generator and ANIMATRIX.

**RIBBIT** is an excellent animation program (arcade quality) that involves an animated frog in a pond that jumps up to catch passing butterflies. Paddles control the height of the jump, the direction the frog faces and its ability to hop after the butterfly. The entire game uses print statements with a character set that makes the figure of a frog and the figure of the butterfly.

**ANIMATRIX**
With ANIMATRIX the user can create and edit character sets for the Hi-Res character generator.

D) **THE RELOCATING LOADER**

Using this program allows the user to load relocatable Assembly-language modules from an Applesoft program so that the program can run on Apples of different memory sizes.

E) **Apple 6502 ASSEMBLER/EDITOR**

This program consists of three parts: the Editor, the Assembler and the Command Interpreter. The Command Interpreter is always in memory and is responsible for loading either the Editor or the Assembler into memory as they are needed.

(NOTE: This Assembler/Editor is described in detail in our Assembler section.)
CHART EXPLANATION

All three debuggers were found to be good packages. Finding the one that best suits your needs may be largely a matter of personal preference. Each provided unique features that might assist a particular style of debugging; and all provided the standard debugging capabilities.

The following table is by no means exhaustive. However, it does list the majority of available functions. Note that in some cases similar functions are performed in quite different ways, and so occasionally missing functions can be simulated by other means. Those kinds of differences make the table more of a guide than conclusive summary. Nevertheless, it should assist you in comparing the three debugging programs.

### DEBUGGING CHART

#### I. DISPLAY OPTIONS

<table>
<thead>
<tr>
<th>Feature</th>
<th>The Bug</th>
<th>Bug Byter</th>
<th>Munch-A-Bug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Flags</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Memory</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Breakpoints</td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Disassemble</td>
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<td>✓</td>
</tr>
<tr>
<td>Hard copy</td>
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<td></td>
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</tr>
<tr>
<td>Link to Symbol Table</td>
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<td></td>
<td>✓</td>
</tr>
<tr>
<td>Low-Res Graphics</td>
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<td></td>
<td>✓</td>
</tr>
<tr>
<td>Hi-Res Graphics</td>
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</tr>
<tr>
<td>Graphics Mode</td>
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<tr>
<td>Text mode</td>
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<td>✓</td>
</tr>
<tr>
<td>Mixed [Text/Graphics]</td>
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<td>✓</td>
</tr>
<tr>
<td>Full Screen Mode</td>
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<td></td>
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</tr>
<tr>
<td>Page 1</td>
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<td></td>
<td>✓</td>
</tr>
<tr>
<td>Page 2</td>
<td></td>
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<tr>
<td>Turn Off Display</td>
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<td>80-Column</td>
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<tr>
<td>Decimal-Hex Conversion</td>
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</table>

#### II. MODIFICATION COMMANDS

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<tr>
<th>Feature</th>
<th>The Bug</th>
<th>Bug Byter</th>
<th>Munch-A-Bug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registers</td>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Flags</td>
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<td>✓</td>
</tr>
<tr>
<td>Memory</td>
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</tr>
<tr>
<td>Enter Hex</td>
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<tr>
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<tr>
<td>Enter Opcode</td>
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</tr>
<tr>
<td>Fill</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Move</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Enter Monitor</td>
<td></td>
<td></td>
<td>✓</td>
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</table>
III. BREAKPOINT

<table>
<thead>
<tr>
<th>Feature</th>
<th>THE BUG</th>
<th>BUG BYTER</th>
<th>MUNCH-A-BUG</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEMORY LITERAL</td>
<td></td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>MEMORY TRANSPARENT</td>
<td>v</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEMORY USER DEFINED COUNT</td>
<td></td>
<td></td>
<td>v</td>
</tr>
<tr>
<td>REGISTERS</td>
<td>v</td>
<td></td>
<td>v</td>
</tr>
<tr>
<td>FLAGS</td>
<td>v</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLEAR BREAKPOINTS</td>
<td>v</td>
<td></td>
<td>v</td>
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</tbody>
</table>

*Pass pointers allow user to write code to do conditional testing.

IV. EXECUTION

<table>
<thead>
<tr>
<th>Feature</th>
<th>THE BUG</th>
<th>BUG BYTER</th>
<th>MUNCH-A-BUG</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP/TRACE</td>
<td>v</td>
<td></td>
<td>v</td>
</tr>
<tr>
<td>GO (CALL)</td>
<td>v</td>
<td></td>
<td>v</td>
</tr>
<tr>
<td>EXECUTE JSR'S FULL SPEED</td>
<td>v</td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>FULL SPEED EXECUTION</td>
<td>v</td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>VARIABLE SPEED EXECUTION</td>
<td>v</td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>DOS COMMANDS</td>
<td>v</td>
<td>v</td>
<td></td>
</tr>
</tbody>
</table>

*Allows setting range for full speed execution

V. GENERAL

<table>
<thead>
<tr>
<th>Feature</th>
<th>THE BUG</th>
<th>BUG BYTER</th>
<th>MUNCH-A-BUG</th>
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</thead>
<tbody>
<tr>
<td>RELOCATABLE</td>
<td>v</td>
<td></td>
<td>v</td>
</tr>
<tr>
<td>RUNS IN RAM CARD</td>
<td>v</td>
<td>v</td>
<td></td>
</tr>
</tbody>
</table>

*Relocates itself below DOS

BUG BYTER

Company: Computer Advanced Ideas
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B+
EASE OF USE B
VENDOR SUPPORT B

DOCUMENTATION A
VISUAL APPEAL A-
ERROR HANDLING B

RELIABILITY B
USEFULNESS A-
VALUE FOR MONEY A-

Department: Utilities
Sugg. Retail: $39.95
Availability: 6
Disk or Tape: Disk

Bug Byter is an excellent debugging tool. It is totally relocatable, or it can be run in a RAM card, making it virtually transparent to the program being debugged. A user-definable display is one of its outstanding features. All 6502 registers and flags, a definable portion of the stack, mnemonic disassembly, selectable memory locations, breakpoints, and the command line are displayed simultaneously. This feature enhances the Bug Byter's effectiveness and makes it an excellent program for anyone learning assembly language programming.

One of the outstanding features is the variable speed tracing of software while watching the Hi-Res Graphics screen, a real benefit in debugging graphics routines. Cycle counting is also provided, a great help for writing timing-dependent code, or determining the fastest way to code a particular routine.

Bug Byter does have several limitations: its excellent screen display makes hard copy output impossible; further, it lacks conditional breakpoints. Nevertheless, it provides a very good value for the money.
### MUNCH-A-BUG

**Company:** Southwestern Data Systems  
**Language:** Machine  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>RELIABILITY</th>
<th>EASE OF USE</th>
<th>VISUAL APPEAL</th>
<th>USEFULNESS</th>
<th>VENDOR SUPPORT</th>
<th>ERROR HANDLING</th>
<th>VALUE FOR MONEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>B+</td>
<td>B+</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>B+</td>
<td>B+</td>
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</tr>
</tbody>
</table>

**OVERALL RATING:** B  
**EASE OF USE:** B  
**VENDOR SUPPORT:** B+  
**ERROR HANDLING:** B+  

*Munch-a-Bug* is a 6502 debugger modeled after *DDT*, the widely used CP/M debugger. It relocates itself below DOS, or may be run in a RAM card. Only four user-defined zero page locations are required, eliminating conflicts with user software.

*Munch-a-Bug*'s unique "pass pointers" feature provides a powerful addition to its standard features. A "pass pointer" allows the execution of a machine language subroutine without affecting the main program, enabling complex conditional breakpoints to be created. The ability to define and connect a symbol table (labels) is another helpful feature.

A number of memory modification commands, a variety of screen displays, and many well-designed functions make *Munch-a-Bug* a fine debugging tool. Its convention of command followed by address (the opposite of the Apple monitor) is a minor point. *Munch-a-Bug* performs its debugging functions well.

### THE BUG

**Company:** Sensible Software  
**Language:** Machine  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>RELIABILITY</th>
<th>EASE OF USE</th>
<th>VISUAL APPEAL</th>
<th>USEFULNESS</th>
<th>VENDOR SUPPORT</th>
<th>ERROR HANDLING</th>
<th>VALUE FOR MONEY</th>
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<td>B</td>
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</table>

**OVERALL RATING:** B  
**EASE OF USE:** B  
**VENDOR SUPPORT:** B+  
**ERROR HANDLING:** B+  

*The Bug* is a powerful debugger which offers the qualities of a greatly extended monitor to the user. It can be relocated on any page boundary; or, optionally, it will run in bank 1 of a RAM card. Only 3 zero page locations may not be used by the programmer, enabling *The Bug* to be virtually invisible to user software. Perhaps the most outstanding feature of *The Bug* is its extensive breakpointing capability. Thirteen different breakpoints can be set, to halt execution upon reaching a specified memory location, or to stop either on a register or flag after reaching a particular value. Another feature is the ability to automatically execute lower level subroutines at full speed. Both of these routines are extremely useful.

Some additional commands might be welcome. However, *The Bug* is extremely powerful, and might be a best buy for those who currently do their debugging using the monitor.

### SOFTSIGHT

**Company:** Overdrive Computer Corp.  
**Language:** Machine  
**Hardware Requirements:** 32K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>RELIABILITY</th>
<th>EASE OF USE</th>
<th>VISUAL APPEAL</th>
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<th>VENDOR SUPPORT</th>
<th>ERROR HANDLING</th>
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</table>

**OVERALL RATING:** B  
**EASE OF USE:** B  
**VENDOR SUPPORT:** B  
**ERROR HANDLING:** B  

*Softsight* is a Machine language debugging program for the Apple which allows you to monitor and even change another Machine language program while it is running. While this is a valuable tool for the seasoned programmer, it can also be useful to the beginning Machine language programmer as it shows exactly what is going on inside your Apple.

To use *Softsight* you merely BLOAD your program and run it. *Softsight* understands twenty-eight commands, each comprised of a single character and an operand. For example, enter S at the command prompt and a single instruction will be executed. Among some of the commands offered are memory dump, list, alter, find, move, set break points, display stack history, and trace. *Softsight* is like a window into the 6502 chip through which you can see, control, and even alter what is happening.
You may suppress the tracing of loops and subroutines, use just part of the screen for output, switch from graphics to text pages or send output to an 80-column card or printer. A mini-assembler is also included.

Softsight is almost totally transparent to the user, and warnings about possible conflicts are mentioned in the manual. If you have a Language card, you can load Softsight into it. The manual is quite complete and has a table of contents as well as a summary of the Softsight commands and error messages. Softsight operates on a normal DOS 3.3 diskette. This means that you may make as many back-up copies as you need. Also included on the disk is a self-running demo.

If you are looking for a program to help you debug Machine language programs, or are just beginning to learn Machine language, then Softsight is worth investigating. It performs as advertised, and is competitively priced with comparable products.

THE INSPECTOR

Company: Omega Microware, Inc.
Language: Machine
Hardware Requirements: 48K Integer or Applesoft with language card

<table>
<thead>
<tr>
<th>Overall Rating</th>
<th>Documentation</th>
<th>Visual Appeal</th>
<th>Error Handling</th>
<th>Reliability</th>
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THE INSPECTOR is one of the most powerful utilities available for the Apple II. It is the first to combine an internal memory utility, which is capable of searching and editing RAM memory, with a disk utility that can read or modify data on disks. Since it is available as a ROM in the D8 socket on Integer boards or ROM cards, it is always accessible by doing a D800G from the monitor. Thus, without the necessity of loading the program, one can access anything in memory without actually disturbing what already resides in RAM.

This utility has a myriad of uses. One can easily search through a program in memory to find specific strings of data, either as a Hex or ASCII string. For example, one could find where all the paddle read routines were in a machine language program and change paddle #0 to #1, or one could track down the appropriate code to increase the number of ships available in a shoot-'em-up space game. The utility can read any sector on a disk and can be used to either repair blown disks by rewriting the catalog sectors, or one could edit the sector before rewriting it back to the disk. Since each sector can be loaded into RAM at any memory page, groups of disk sectors could be loaded into memory, and then be disassembled using the monitor, where they could be modified before writing the data back to the disk. Some semi-protected disks can also be modified. Although some examples are given to recover a protected data disk, it is an experimental method that won't necessarily work. If some disk sectors need decoding, the program's nybble reader might be of help in determining the problem.

THE INSPECTOR is a command-driven package. Therefore, one must learn the command sequences and their uses. The 22 commands are logically associated for recall: M for disk map, E for edit, etc. Omega Software has been very perspicacious in using Control W for writing to the disk. It prevents some inadvertent errors. When accessing particular sections of memory, one has a choice of display modes. Either hexadecimal or ASCII modes can be toggled for any page. The ASCII set can also be set to suppress flashing and inverse characters. Memory can be scrolled in a combination of both modes with one key stroke. The space bar will stop scrolling any time, with several speeds available for display.

The program does not output display directly to the printer. However, Omega supplies a printer driver that can be typed into memory beginning at location $300. It interfaces with the ROM by using Control-Z.

The documentation manual clearly shows how to install this chip in your D8 socket. The program is also available on disk for loading with Integer Basic into your language card for those that have an Apple II plus and a language card. This version can be a liability at times, since some programs will automatically stomp on your language card when booting.

The manual is comprehensive and gives clear examples of all functions. In many cases, screen dumps of the results are shown. There is also a good appendix which explains how nybbles are formatted and read from a disk, with examples of how various disk problems can be corrected using this program.

In summary, THE INSPECTOR is an excellent utility for the serious programmer. It is a reliable and trouble-free tool for those that know what they are doing. Its ease of use makes an excellent choice for those who like to work extensively with the internal processing of Apple disks and software.
APPLE MECHANIC

**Company:** Beagle Brothers  
**Language:** BASIC & Machine  
**Hardware Requirements:** 48K

**OVERALL RATING** B+  
**EASE OF USE** A  
**VENDOR SUPPORT** B  
**DOCUMENTATION** B  
**ERROR HANDLING** B–  
**RELIABILITY** A  
**USEFULNESS** B+  
**VALUE FOR MONEY** A+

Apple Mechanic offers a useful set of utilities presented in a very entertaining way. Included in the program are the following: (1) Shape editor, (2) Shape analyzer, (3) Font editor, (4) Hi-Writer, (5) Xtyper, (6) Shape table demo, (7) Hi-Writer demo, and (8) Byte Zap.

I found the Byte Zap program to be the most useful. It allows you to restore deleted files, recover crashed disks, and customize DOS. This is explained in detail in the manual, and illustrated by specific examples. You can also scan the disk, showing the contents in ASCII or hex, which is helpful in finding text segments in machine language files and for modifying prompts and the like.

The shape editors have several useful features, such as the ability to flip through the shapes being edited to judge animation effects; and “imprinting,” a method of drawing a shape and then redrawing it using more efficient drawing vectors. The plotting routine will be slow if you are editing a large number of shapes.

Xtyper and Hi-Writer are programs for writing on the Hi-Res graphics screens. Xtyper is used interactively to create pictures which you save to disk for later applications. Hi-Writer is a program which you add to your own, it allows your program the use of multiple fonts and multiple colors.

The disk includes an interesting assortment of fonts and shapes. The documentation is not only thorough, it is entertaining. Most important is the Key Chart, which fits above the keyboard and summarizes the commands for the Shape and Font Editors, the Shape Analyzer, and the Byte Zap programs. Most commands use the top row of keys, which, in combination with the Key Chart, provides very convenient operation.

There are drawbacks: all programs are in BASIC, cursor movements in the editors are slow, Byte Zap only works on standard 16 sector DOS (no help to pirates); and it is sometimes difficult to find what you need in the manual (there is no index). Also, the shape and font programs work only with shapes and fonts created by the editors, included in the package. In sum, if you do not have a disk utility such as Byte Zap or a good shaped editor, this group of programs will be ideal for the price.

DOUBLETIME PRINTER

**Company:** Southwestern Data Systems  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING** B  
**EASE OF USE** C  
**VENDOR SUPPORT** B–  
**DOCUMENTATION** C  
**VISUAL APPEAL** B  
**ERROR HANDLING** A  
**RELIABILITY** A  
**USEFULNESS** B–  
**VALUE FOR MONEY** B–

Doubletime Printer is an impressive looking package with a padded three ring binder for the manual, tabbed chapter dividers, program disk, a replacement ROM for the F8 ROM on the Apple mother board, and a plug circuit board (which S.D.S. recommends be placed in slot 4). The program allows you to print text, binary, and Applesoft files while the computer will work on another job at the same time (anything except run programs that send output to the printer – a second printer hooked up to the Apple would solve that problem).

The hardware installation and configuration instructions are simple and straightforward. The next step is to queue the files to be printed, and this requires that the files be renamed. Doubletime Printer has a utility which facilitates this. Unfortunately, the files are then renamed in the disk directory until you rename them using the DOS rename function. Doubletime Printer renames the files by adding a /D plus several parameters indicating the number of copies, the printing priority, left margin, and line length. There are default values for all of these parameters. In addition, all of the files to be printed must be put on the same disk.

The program is compatible with several word processing packages listed in the manual; unfortunately, my word processor was not among these. When text files made on this word processing package were printed by Doubletime Printer, all imbedded commands as well as some spurious lines at the end of the file were printed. Special commands
are needed to print Applesoft files. The manual states the *Doubletime Printer* takes up only 15% of the computer's available time in handling the printer's needs. But that 15% can be an annoyance; keystrokes may be lost and must be retyped.

The software is not copy protected, so back-ups are easy to make. The program is menu driven, but no indication is given as to how to get back to the Main Menu once the printing has begun. This is a source of confusion.

The manual lists information on compatible software and hardware, and provides programming information to adapt the package's hardware to other uses. The appendix offers sections on interrupts, the F8 ROM, and special applications processing. All of this may be of interest to programmers.

One shortcoming I found is that the menu pictured in the manual is not exactly like the menu displayed on screen. If you make a selection according to the screen and not the manual, you'll be in good stead. Error trapping is excellent.

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**Disk Utilities**

**LINKINDEX**

**Company:** Link Systems  
**Language:** USCD Pascal Codefile  
**Hardware Requirements:** 16K Language Card USCD Pascal 1.1

<table>
<thead>
<tr>
<th>Overall Rating</th>
<th>Documentation</th>
<th>Reliability</th>
<th>Vendor Support</th>
<th>Usefulness</th>
<th>Value for Money</th>
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</table>

*Linkindex* is a UCSD codefile to be installed as a regular unit in the System library. The programmer can then use the various declarations and functions of *Linkvideo* as though they were already declared. The functions provided will allow the creation and referencing of a B-tree index of any Pascal data structure. The Linkindex routines will create and maintain complex indexes. Your program meanwhile creates and maintains the datafile, using the indexes provided by the Linkindex functions. Moreover, all index file manipulation is transparent to the programmer. Since the user can define the data structures indexed, and Linkindex doesn’t access user files, the programmer has complete flexibility in writing the program.

The B-tree is an efficient way to index any files on a disk. Many books on data structures and/or Pascal have sections describing their properties and uses. The functions in Linkindex permit almost any type of database to be constructed (given the limits of the Apple memory and disks). The functions provided are:

- **OpenBTree**: (Treename: String;  
  Mode: Boolean): Boolean;
- **EnterkeyinBTree**: (Var Key: Keyfield  
  allowduplicates: Boolean): Boolean
- **RemoveKeyFromBTree**: (Var Key: Keyfield): Boolean
- **GetNextKey**: (Var Key: Keyfield): Boolean
- **GetPriorKey**: (Var Key: Keyfield): Boolean
- **CloseBTree**

In addition to the above functions, a number of datatypes are defined.

Included in the package is a 50 page booklet and a well documented program using *Linkindex* to maintain a file of telephone numbers. The booklet is fairly detailed, and tells how to use and install the unit and index organization. The effects of record (node) size on memory space, and error codes are also covered. All *Linkindex* functions worked properly when I tested them; however, I could not test all possible combinations.

This is a well thought out product. The functions work well, the documentation is good, and there is room to use the Apple memory resources in any reasonable way. The limits of the *Linkindex* B-Tree system of indexing primarily involve those of the Apple's memory and disks. Each index used requires memory and disk space. Data disks could easily be one quarter index if you got carried away in the number of cross indexes generated. Storage media with larger capacity should give considerably better performance as the indexes can be more complex without noticeably reducing space available for data. This unit promises excellent performance with an 8" floppy or a hard disk.
Energy Mizer models a building's construction to determine its heat loss or gain, and to trade off energy savings improvements in both absolute dollar savings and return on investment. The user's geographical area must be customized, and this is easily done following the instructions in the very complete documentation.

The key feature of the program is its ability to analyze the amount of heat losses in BTU's from various parts of a house, such as floors, walls, and windows. The program shows the costs of these losses as a part of your monthly utility bill based on data you input to the model. It calculates the annual savings for insulation, addition of weather stripping, changing color of draperies, or adding a solar power generator. By entering the cost of the improvement and any energy tax credits or rebates, the program computes the return on investment.

After changing data line statements of the unprotected program in accordance with the documentation's three pages of instructions, a seven page example, and 18 pages of reference tables, the model was found to be surprisingly accurate. These tables supply the necessary data on the number of heating days/month, solar BTU's available/month, and percent sunshine/month for most areas of the United States. User-supplied data takes a bit of digging and measurement. For example, the total square feet of North facing windows, cost per unit of heating fuel, total perimeter of doors, and the “R” value of existing insulation is some of the information the user must supply.

Energy Mizer is a no-frills, 41 sector Applesoft program that proves that good things can come in small packages for the Apple. Noteworthy for a program of this price is the packaging: an attractive three-ring loose leaf binder, a plastic two-disk envelope, and readable documentation. A user with an older home with little insulation will be surprised by its heat loss as well as the cost. What with rising energy costs, it's quite possible that this program will pay for itself if the user is willing to invest a little work in its application and follow through.

Sunsim4 simulates the functioning of a solar-heated and cooled house. The main menu allows the user to customize certain information about the house such as size, location, climatic conditions, and period of simulation. The user has no control over other important considerations such as heat loss or potential reductions in heat loss from various conservation methods. The house model also assumes the existence of a certain type of system which is not subject to the user's modifications: fixed solar collectors; water storage medium; conventional backup systems, and solar-heated hot water for household use. These conditions cover most solar systems, but by no means all. Before buying this program you should be sure that the model actually reflects the real-life situation which you wish to duplicate.

Sunsim4 presents an easy to read, hour by hour report of the system's functioning over the calendar period chosen for the simulation. It conveys this information through an attractive graphic design of a house arranged to picture the relation between the various figures. These figures include: cumulative energy and temperature; transfer of energy from the solar collectors to storage and use to heat or cool living area; hot water temperature; back-up energy used; and other similar values. This simulation works well, and is instantly responsive to changes in parameters.

Aside from modifying these parameters when the Main Menu first appears, however, no other user interaction with the program is possible. Sunsim4 is the opposite of "user friendly." The only way to return from the simulation to the main menu is to exit the program and rerun it. This arrangement is needlessly frustrating and time consuming. Moreover, there is no provision to print the data generated, or even to halt the progress of the simulation, then
resume it. The model at the core of the program is thoughtful and works well; we hope that Solartek will take the
trouble to modify the rest of the program to make it more accessible and user interactive.

**LOCKSMITH 4.1**

*Company:* Omega Microware, Inc.  
*Language:* Assembly  
*Hardware Requirements:* 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>A-</th>
<th>DOCUMENTATION</th>
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<tr>
<td>EASE OF USE</td>
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<td>VISUAL APPEAL</td>
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<td>VENDOR SUPPORT</td>
<td>A</td>
<td>ERROR HANDLING</td>
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<table>
<thead>
<tr>
<th>RELIABILITY</th>
<th>B</th>
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<tr>
<td>USEFULNESS</td>
<td>A</td>
</tr>
<tr>
<td>VALUE FOR MONEY</td>
<td>B-</td>
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</tbody>
</table>

*Locksmith 4.1* has been very controversial since it was designed several years ago to enable users to provide
backup copies of their most valuable disk-protected programs. Of course, any program versatile enough to duplicate
practically any disk lends itself to the illegal copying of copyrighted software. A virtual war developed between the
software houses and the makers of copy programs. At stake were the profits of the software houses against the rights
of the software buyers to have uninterrupted use of the program in the advent of disk failure. Each had a strong case.
While software vendors attempted more elaborate protection, the *Locksmith* authors began publishing parameters
to bypass these sophisticated protection methods. In the end an agreement was reached: these parameters would no
longer be published if the software vendor either included a backup disk or offered a replacement for less than $5.00.

Although *Locksmith* includes a number of disk utilities, the heart of the package is the *Nibble Copy Program.*
Extensive algorithms analyze the disk to be copied. They easily handle unrecorded tracks, non-standard markers,
trailers, and checksums that cause standard DOS to misunderstand the address and data fields. They can copy data
recorded on half tracks, or synchronized in a specific orientation to the previous track. *Nibble Copy* can also handle
disks that use a non-standard SelfSync (i.e., other than the normal $FF). This more recent protection scheme has
baffled many competing copy programs. *Locksmith 4.1* also provides the option of using sophisticated nibble counting
techniques to copy.

*Locksmith* is quite reliable. It attempts to read an entire track twice, comparing each nibble before attempting to
write to the copy disk. It even reads the written data and compares it to the original. If an error occurs, an error code
for that track appears on the screen. Below the status display there is an analysis display indicating what might be
going wrong during the copy. A person with extensive computer background can use this to set the parameter
patches that should enable *Locksmith* to copy the disk. Unless he has studied the structure of DOS to some extent, the
average user probably will not understand the documentation about each of these parameters, nor do I think he will
be able to set his own patches. Most users will resort to the list of patches conveniently provided for a large number
of commercially available programs. This list includes programs that either do not provide backup copies or ask too
much money for a replacement. Of course, no parameters appear for *Locksmith* because it comes with a backup
copy. At least no one can accuse Omega Microware of being two-faced.

The program does an admirable job copying most disks protected by older or standard methods, but it does so very
slowly. It copies track by track and makes at least three attempts to read before writing. This process takes time and
should definitely be done on two disk drives, although one drive systems can be used with seventy disk swaps per
disk. Copying on a two drive system takes nearly fifteen minutes. As I mentioned, the newer protection methods,
such as spiral tracks, defeat this program. Also, some programs juggle address and data field parameters with each
copy so that a user would need a book of parameters in order to copy the program. Thus, the average user would
have trouble setting the parameters himself.

There are several other helpful utilities such as a Hi-Res disk speed test for adjusting the speed of a disk drive. You
can choose between coarse, medium, and fine speed resolution on the resulting graph. Note that this test ruins the
data on Track 0. A disk surface certify test attempts to read and write data on each disk track. This is very useful for
finding damaged or unreliable tracks. I doubt the value of another utility to erase and degauss disks. This probably
makes no difference since all data is erased when a disk is initialized. The last utility is a nibble editor useful for
repairing damaged data on a disk. However, only advanced users will find it so because it treats data in nibbles
rather than in the customary format of 256-byte sectors.

*Locksmith* is a useful utility package. The value to prospective buyers is mainly determined by how much they
value the programs and data stored in their disk collection. The fate of user-supporting software vendors is anything
but certain in today's volatile market, and a means to permanently back up copy-protected software may be the
user's only alternative. If you are sophisticated enough to use them, programs like *Locksmith 4.1* make useful
purchases.
Essential Data Duplicator (EDD) is a powerful disk duplication utility in the tradition of Locksmith. Its publishers claim that it is "the most sophisticated Apple software duplicator program on the market today." Grand claim, but they may be right.

To test this, I took ten copy-protected programs that I had not been able to back-up using a variety of other nibble programs. EDD easily copied six of the ten with no parameter changes required. With persistence, I was able to copy a seventh. I feel confident that EDD could copy the remaining three programs if I had the appropriate parameter changes. But it is this last point that makes EDD an attractive program for the novice. Parameter changes are not needed in many cases. The publisher claims that it will copy more than 90% of the software that other copy programs cannot duplicate without parameter changes. This may seem a minor point to the experienced user, but it is an extremely important one to the person who shies away from hexidecimal notations, bits, and the workings of copy-protection schemes.

EDD will operate with one or two disk drives; however, like all copy programs, it is considerably more convenient to use with two. It has several unique features which demonstrate clear thinking in product design. For example, you must write-protect the disk to be backed-up for the program to run, thus helping prevent accidental erasure. Second, using a two drive system, the copy is placed in drive one under the assumption that it is better to have a duplicate made in the drive which will be used to boot it later. Other features will allow you to analyze the disk speed at which the original disk was created (of help in cracking difficult protection schemes), check drive speed (a variable which the publisher claims is the most common cause of failure when duplicating disks), duplicate quarter and half-tracks, synchronize tracks, and provide for automatic or manual adjustment of timing bits.

The documentation for EDD is adequate, but not as "user-friendly" as claimed. It is the one weak link in an otherwise fine product. The program comes recorded on both sides of a single diskette, a back-up feature of limited use should the diskette be physically damaged. A replacement is available for $2.00 to $5.00 (depending on the nature of the damage to the disk). Parameter changes are included for over two hundred programs, and updates are available on a bi-monthly basis to registered users. By the way, EDD will not duplicate itself.

Copy II Plus 4.3 combines a powerful DOS disk utility package with a sophisticated Bit Copy program. The disk utility package is quite extensive, containing features that are lacking in many other packages yet have been available in some of the Lawrence Hall of Science disk utilities since the Apple’s “Disk II” drive became available.

The heart of the menu-driven package is the copy programs, 3.2 or 3.3, for unprotected DOS files and disks for either a one or two drive system. They are fast routines; but their unique feature is that the copying order of individual files can be specified so that a two drive system will carry out the scheduled copy procedures automatically. Wild cards, which can be used to copy all files or files beginning with certain groupings of letters, even extend to specific types of files. DOS can be copied to the disk or removed from one. The reliability of copies, both of files and entire disks, is excellent; and the program verifies while writing. One problem: the program apparently doesn’t
look at the VTOC when copying, but only the catalog of information on that track. It has trouble copying those rare
disks where the catalog name sectors have been shifted.

As with the Main Menu, nearly all functions on the submenus are selected with the Arrow keys and confirmed with the
Return key. When files are deleted, locked, unlocked or renamed, more than one can be selected before the order
is carried out. There is even the ability to verify two identical files and look for differences. Copy II Plus has the
ability to display a track/sector map with the sectors for each file clearly delineated. It can fix the sector count for all
the files on a disk and change the boot program or HELLO program for the disk. Individual sectors can be viewed or
edited. It is a crude editor but adequate for simple changes.

Other features allows you to catalog a disk with either deleted files or hidden Control characters shown in the
name, and with the starting address and length of the file listed. These listings can be sent to the printer. There is even
a speed check routine for testing errant disk drives.

The Bit Copy utility is the more controversial part of the package. It was designed to allow you to back up any disk
you own with one or two disk drives. Since most disks are heavily protected by manufacturers to prevent the illicit
distribution of their programs, this program has great difficulty in copying disks without setting numerous
parameters in the program. The program comes with a parameter sheet for more than 100 popular programs. The
eight page list is updated periodically.

The program, if used by an expert, is capable of handling such difficult copy procedures as track arcing, changed
self sync, nibble counting and synchronized tracks. Half track and extra track protection schemes are also
supported. There is extensive documentation with various examples. In addition, a nibble editor is supplied to peek
at the protection scheme.

The bit copier is definitely much faster than other copy programs, for example Locksmith. Since it reads and
analyzes several tracks at a time, it is easier to use on single drive systems. Unfortunately, without the proper
parameters, it is less likely to be able to copy the average protected disk.

SUPER DISK COPY 3.8

Company: Sensible Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING A
EASE OF USE B +
VENDOR SUPPORT A

DOCUMENTATION A
VISUAL APPEAL A
ERROR HANDLING A

RELIABILITY A
USEFULNESS A
VALUE FOR MONEY A

SUPER DISK COPY 3.8 is an exceptional utility package that allows manipulation of all types of disk files under
DOS 3.1, 3.2 and 3.3. While the program may be unable to copy most protected disks, it is capable of copying
everything else, including Pascal and Fortran disks. It has three copy modes for entire disks; one of these modes can
copy from DOS 3.2 to 3.3 or back again and work with either one or two disk drives. 1) It will make a contiguous
copy of the contents of a disk whose file sectors are scattered over various tracks and lay them down in a straight line
contiguously on the target disk. 2) It can make a quick copy where only used sectors are copied, or 3) It can perform a
brute force attempt to copy an entire disk. There is no guarantee that a protected disk's copy will run. Other copy
modes include copying files from one disk to another (even if the disk's DOS structure is not the same) and copying
just the DOS from one disk to another.

The program has many other helpful utilities. One can alphabetize all of the file names on a disk, remove DOS to
allow more space for extra programs or data, undelete a deleted file, correct the file sizes for all the files on a disk (if
one saves a file that is shorter with the same name, the extra files are not freed in Apple's DOS), shorten the catalog
to a maximum of 70 names (tress five sectors on a 16 sector disk for data), replace strange and unseen characters in
the catalog, and produce a map of the used sectors on a disk.

This program makes the conversion of DOS 3.2 files to DOS 3.3 simple. It has the same wild card features of FID,
MUFFIN, and NIFFUM, and performs all the features of these three programs. The documentation is clear and
complete. The program does extensive error checking and will even check for data on the DOS sectors before it will
reinstall DOS on those tracks.

One would find it difficult to fault this program in any way. It combines in one program all the commercially
available DOS utilities and many of the programs that make the rounds in private circles and clubs. This is a definite
"must have" utility package.
**PIRACY PRUF**

**Company:** Kane Computing  
**Language:** Machine  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>EASE OF USE</th>
<th>VISUAL APPEAL</th>
<th>VENDOR SUPPORT</th>
<th>ERROR HANDLING</th>
<th>RELIABILITY</th>
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**Piracy Pruf** is a complex but powerful disk protection utility designed to circumvent the unauthorized reproduction of software programs. This multifaceted utility program automatically changes the formatting and encoding on the target disk in a manner that leaves no part readable by a normal DOS's RWTS. It randomly selects various combinations of coding and formatting to protect each disk differently.

The program is not for the computer novice and requires an in-depth understanding of the architecture of the Apple Disk Operating System to be fully exploited. Although the protection activities are predominantly menu-driven, considerable attention must be paid to disk organization and handling during the protection proofing process.

**Piracy Pruf** comes with a second disk in the same package and, of course, it is copy-protected. This second copy proved valuable during the review process when the first copy failed to function after booting.

The nine-page instruction manual included in the package is brief but adequate to operate the program. However, some of the procedures are not very well explained.

The reverse side of the disk contains a utility package with a HELLO program and user instructions. An EDIT program allows you to alter the error messages and the commands as a further protective measure. You can even put your name and/or a serial number on each protected disk. Other attributes include a faster DOS to decrease disk access time, the ability to select and use track 35, and the ability to autorun Applesoft programs. The program leaves all sectors usable and supports the DOS INIT command to allow your program to create protected data disks for data expansion.

All in all, this is a very effective protection program. It will be of use until the next time an inventive programmer finds the key to unlock its security and the piracy chain continues.

**MEDDLE PRUF**

**Company:** Microcomputer Workshops  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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<th>VISUAL APPEAL</th>
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**Meddle Pruf** is a disk protection program, designed to be used in the classroom. It individually protects every student's disk with over 3,900 possible combinations, insuring incompatibility between students' disks. Students may not read other students' disks or exchange programs among themselves. Thus, programs assigned for homework cannot be stolen or plagiarized. Each disk is also assigned a password to prevent unauthorized access and tampering. The student disks created will boot on Apples with any memory configuration.

This disk would be very useful in literacy or programming classes where students were working on individual programs. It could also be used in simulations, problem-solving activities, or competitive group activities where privacy of information is a factor. The program covers all conceivable classroom situations, including merging and back-up files. The documentation is helpful and prompts are given with instructions, and the teacher has full control to find and reassign passwords.
Bag of Tricks

**Company:** Quality Software

**Language:** Machine

**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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<th>VENDOR SUPPORT</th>
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Written by the authors of the best-selling book *Beneath the Apple DOS*, this companion package incorporates four machine language utility programs that go far beyond those included in the book. Although the programs occupy a level suitable for an experienced Apple user, the documentation provided contains good "hand-holding" tutorials to assist the novice in repairing his damaged disks.

A track dump/examine program ("Trax") appears first on the menu. "Trax" reads any track on a disk and displays the internal Apple disk-formatting information while flagging exceptions to standard formats. It proves particularly useful in locating the specific cause of disk I/O errors, or for learning about disk formatting. It offers several display modes, and handles thirteen-and sixteen-sector formats as well as non-standard formats.

"Init" reformats one or more tracks on a disk while preserving any data remaining on them. It supports both thirteen- and sixteen-sector formats. "Init" proves particularly useful in repairing damaged sector formats on a catalog track or in a file.

"ZAP" provides basic capabilities for reading, displaying, and updating disk sectors. Its features clearly exceed those of similar utilities on the market for Apple. It provides more than fifty commands with online Help displays to assist beginners. It offers full support for thirteen-and sixteen-sector formats, as well as Pascal and CP/M. You can reference locations either by track and sector number or, within a file, by relative record number and offset byte. You can define variables for holding disk address locations. A trace table (maintained by the system) lets you back up to sectors accessed previously. The screen displays a complete 256-byte sector in both hexadecimal and ASCII (with various translation modes available). The system provides sixteen internal buffers, with multiple Read/Write commands permitting easy movement of data from disk to disk. The novice need not fear the power offered by "ZAP" because it has a "write-protect" feature that lets the beginner experiment without damaging his disk. The system also provides full printer support with an optional audit trail of updates on hard copy.

The final utility, "Fixcat," automates the process of recovering a damaged catalog track. Not only does it retrieve lost sectors by updating the VTOC map and recover accidentally deleted files, it also scans the disk for all files which do not appear in the catalog. You can then interactively and conditionally create catalog entries for them. This final program justifies the price of the entire program for anyone who has lost a catalog on "that special disk."

I find it likely that *Bag of Tricks* will become the standard for disk utilities for some time to come. It seems almost inconceivable that any Apple II user would not find at least one of the four programs invaluable.

Disk Organizer

**Company:** Sensible Software

**Language:** Machine

**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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A disk's catalog can be customized with DISK ORGANIZER. The program will allow you to alphabetize or move single files around in your catalog. It will also allow you to undelete deleted files if the file's sectors are still free, or purge deleted file names permanently from the catalog sectors. One can even rename files using characters that would cause an illegal file name, thus producing inverse or flashing characters.

Since the entire catalog is placed into RAM memory during the editing phase, one can change his mind and abort before the catalog is rewritten to the disk. The program is menu-driven and can be used on either DOS 3.2 or 3.3 disks as well as disks formatted for Muse programs.
**PRONTO-DOS**

**Company:** Beagle Brothers  
**Language:** Assembly and Applesoft  
**Hardware Requirements:** 48K

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<tr>
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**OVERALL RATING:** A  
**EASE OF USE:** B+  
**VENDOR SUPPORT:** A

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**PRONTO-DOS** by Tom Weishaar is an excellent program at a very reasonable price. It is the latest of the DOS speed-up utilities to come out on the market. *Pronto-DOS*, which can be reconfigured while being used, offers the following capabilities (used singly or in conjunction with each other): (1) initializes new disks with itself, (2) updates existing DOS 3.3 disks with itself, (3) frees up almost one full track for data, (4) can move a DOS up into the language card for an extra 10K programming space, and (5) offers bonus utilities as an optional part of the program. The optional utilities are the following:

1. Adds a DOS Type command to automatically list text files.
2. Allows Control-C to halt a catalog without rolling the top file names off the screen.
3. Allows the Escape key to halt an Exec or Read command.
4. Quicksens the Save command by cancelling the Verify (which normally follows it).
5. Can choose not to force a language card reload upon rebooting.
6. Prints free space remaining when doing a Catalog.
7. Prints a Binary file address and length upon any BRUN or BLOAD.
8. Allows initialization without putting a HELLO file on the disk.

The program disk I tested performed flawlessly. Its cute beeps catch your attention when you press any wrong keys or try to perform an operation that is not allowed. The documentation is effective and attractive, even if it is a little technical. Be sure to read the manual, however, before you alter DOS or any commands you are used to.

However great the program is, I wonder how many Apple users actually need its capabilities. If you usually run prepackaged, prewritten software, *Pronto-DOS* will do very little for you. The time and energy required to (1) make duplicate copies of your program disks (if duplicates are possible), (2) determine if the existing DOS is compatible with *Pronto-DOS*, and (3) test your software again to determine if it functions correctly after modification, are out of proportion if you just want to load a Hi-Res picture in three seconds instead of ten. The author of *Pronto-DOS* warns that copy-locked software should not be modified at all since it will ruin the copy-locked disk. And if all your data is in test files, *Pronto-DOS* does not speed up their reading or writing.

If you program your own software or compose software for resale, you might find *Pronto-DOS* very useful. On the other hand, if you do not understand the difference between a byte and a bit, or why one would want to put DOS on a language card, or that you can't display a text file with your existing DOS 3.3, this utility will only confuse you.

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**APPLE-AIDS**

**Company:** Howard W. Sams  
**Language:** Applesoft and Machine  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
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</table>

**OVERALL RATING:** B  
**EASE OF USE:** B  
**VENDOR SUPPORT:** B

---

*Apple-Aids* is a collection of 12 basic disk utility programs. Some old favorites include format without DOS, disk map, improved directory (it isn't), undelete files, disk copy, and a very nice disk editor. Other programs allow the creation and editing of exec files, the conversion of numbers from one base to another, and a text dump to printer. The programs offer no real surprises, but are well written and easy to use. Most of the programs are fairly trivial, and one, the improved directory, is completely useless. The disk editor, however, has a disassembler built-in. There is no search feature, but most other standard disk editor features are included.

Documentation for *Apple-Aids* is excellent. Explanations are thorough, and some very useful appendices are provided which give detailed information on the disk VTOC format, the disk directory format, and the track-sector lists. The disk is unlocked.
**Menu Generator**

**Company:** Crane Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
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If you have a lot of programs on assorted disks, and you can never remember which program is on which disk, this can be a very handy utility. But, if you want to use it just to load programs with one key stroke, there are better programs on the market that are less work to set up.

*Menu Generator* sorts your programs into separate menus for different applications, such as word processing, games, utilities, etc. The menus may all be stored on one disk, and then the appropriate program loaded and run. A menu disk can store up to about 150 program titles.

Each menu can contain up to nine program names, and one of these can be another menu (so if you have more than nine programs in a given category, you can extend your list through this menu option). To generate a menu you give it a date, a name, and a title. You use the name to run a particular menu, and the title (with a full description) appears when the menu is being run. For example, a name might be WP, and a title, Word Processing Programs.

There are six entries for the individual items in the menu. First is the element number, 1 to 9. The prompt selects the program that you want to run. There is a choice of five operation types, and these identify what type of program is to be run. Type “A” indicates an Applesoft or Integer BASIC program, type “B” a Machine language program. A program that you write into the menu is indicated as a type “U,” and a program that must be booted, such as protected software, is a type “D.” Type “E” ends the menu program and returns you to Applesoft. The slot and drive numbers that the program will be run from are entered, but a type “D” will always go to your boot drive regardless of which entries you make. Lastly, you must enter the name. Once all of the information is correct, you save it on disk and have now generated your own menu program.

The program comes with good documentation. It takes you through the generation process step-by-step, and it is very easy to follow. The menu also includes a handy command summary in the back. Once you have loaded the program, you no longer use the program disk, but switch to a data disk. The disk is copy-protected, and comes with a back-up disk. A replacement may be obtained for a nominal fee. The program is effective for cataloging all of your disks and locating menus with relative ease.

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**The Manager**

**Company:** Omega Microwave  
**Language:** Machine  
**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
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*The Manager* consists of two utility programs, *Hidos* and *Solidos*. These programs increase the usefulness of one or more 16K ram cards installed in your Apple. *Hidos* creates disks which automatically load DOS into a specified 16K RAM card. This not only leaves more usable program memory, but also creates the possibility of loading DOS into one RAM card and, for example, loading integer BASIC into another. *Hidos* lets you set up the system and utilize it properly. It also allows the mastering of other disks which then automatically load the 16K RAM cards. *Hidos* has a utility program which will automatically load the update RENUMBER, FID, MASTER CREATE, and so on, so that they will be compatible with the new location of DOS.

*Solidos* will turn any 16K ram card into a 45 sector disk drive emulator. The utility works wonderfully well, and allows access to the 45 sector disk drive with a “SO,dl” command. No provision, however, is made to transfer the utility to any other disk. This reduces the usefulness of *Solidos* drastically, and turns a potentially very useful utility into a curiosity.
Diversi-DOS is an outstanding utility program with four different functions. First and foremost, Diversi-DOS is a highly modified DOS 3.3 operating system that speeds up disk access time by factors of three to five over normal DOS 3.3. In addition, Diversi-DOS can create an input text buffer and an output print buffer using a RAM card. Finally, the Diversi-DOS disk operating system can move itself into a RAM card to provide more program memory. Diversi-DOS comes with complete documentation on the program disk. The utilities are extremely easy to use, and all features are accessed through one menu driven program. The Diversi-DOS disk operating system can be written onto any normal DOS 3.3 disk in about 3 seconds without disturbing any programs already on the disk. All disk access operations are then speeded up. Here are some comparisons of typical speeds between Diversi-DOS and DOS 3.3, respectively:

- **SAVE** 5.9 versus 27.1 seconds (80 sector BASIC program)
- **LOAD** 2.6 versus 9.5 seconds (Hi-res screen)
- **READ** 12.4 versus 42.2 seconds (52 sector text file)

The increased disk access speed has one disadvantage: the Diversi-DOS disk operating system must use the normal error message space of DOS 3.3 for other operations, and therefore only gives numbers as error statements. This seems a minor inconvenience compared to the speed gained.

The other utilities provided with Diversi-DOS work on any RAM card with 16K to 128K of memory. The print buffer utility can be configured to most printer cards.

Linkdisk is a basic disk utility for those using the UCSD Pascal system. The sectors of a Pascal formatted disk can be read, displayed and modified. The contents of each Pascal block (two sectors) can be displayed as hex or ASCII or both on the screen. The screen can then be modified, and the new version stored back on the disk. A feature of this program is that it can “translate” Applesoft Basic text files to Pascal format text files. To aid in this, the program will read and display Dos 3.3 disk catalogs.

This utility comes as a codefile to be used with the UCSD Pascal 1.1 System. The command lines all follow the UCSD convention of presenting one letter commands across the top of the screen. The thin manual with the disk documents the commands in the program, but doesn’t cover any details of the directory format or give any detailed examples of its use. All documented functions work and no errors were detected during testing.

This program would be useful to a programmer using the Apple UCSD Pascal system. Without outside documentation, it would be difficult to use this program efficiently to repair damaged disks. The state of the art in disk utilities has progressed to the point where displaying and modifying the disk is automatically assumed. This program is most useful on disks that are abnormal in some way, but there are no features that would help recognize or help restore damaged disk directories. However, a damaged disk directory can be reconstructed by using Linkdisk to find all the files on the damaged disk and then entering them in the missing directory yourself. There should be some help from the utility program to do this. The program is difficult to use given the state of the documentation that arrives with the Apple Language Card system.
MULTI-DISK CATALOG III

Company: Sensible Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B+
EASE OF USE B
VENDOR SUPPORT B+

DOCUMENTATION B+
VISUAL APPEAR B
ERROR HANDLING A

RELIABILITY A
USEFULNESS B
VALUE FOR MONEY B+

MULTI-DISK CATALOG is a master catalog utility program designed to run under either DOS 3.2, 3.2.1 or 3.3. It is capable of cataloging one's entire disk collection and storing the information on a file on the disk. The file can hold 1000 program names. As each disk is inserted in the disk drive for cataloging, one gives it an assigned disk number. One can also give each program or subfile a two letter I.D. Code (ex., GA - game adventure). When all the disks are in memory, one can either ask for a complete listing or one can call for a list on any sort field, either Volume No., I.D. number, type of file - Integer, Appssoft, or Binary, or even by the number of sectors in a program. Yes, this program is the first to include number of sectors for each program. The list can be sent to either the monitor or line printer.

There is no doubt about it, this is the best and most versatile master catalog program available.

DOS BOSS

Company: Beagle Brothers
Language: Appssoft
Hardware Requirements: 49K

OVERALL RATING B
EASE OF USE B
VENDOR SUPPORT B

DOCUMENTATION A-
VISUAL APPEAR B
ERROR HANDLING A

RELIABILITY A
USEFULNESS C
VALUE FOR MONEY B-

DOS BOSS permits you to customize the DOS on your disks by allowing you to change the DOS commands and error messages. The DOS command table has a maximum total length. If one shortens several of the commands, then one could lengthen other commands; for example, RUN to START. Likewise, one can change the error messages or stop someone from saving your program with a "NOT COPYABLE" message.

DOS BOSS also allows you to customize your catalog. Catalogs can be listed by file type, in one or two column wide modes. The catalog type and volume numbers can also be customized to establish unreadable file types. In addition, the system allows you to format a menu through a program called KEY-CAT which will allow you to run or execute a program with a single keystroke.

The documentation is exceptionally well written. The authors give many hints and advice for changing DOS without the use of their programs. Both beginners and experimenters will find this program useful.

DISK RECOVERY

Company: Sensible Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING A-
EASE OF USE A
VENDOR SUPPORT B

DOCUMENTATION B
VISUAL APPEAR B
ERROR HANDLING A

RELIABILITY A
USEFULNESS A
VALUE FOR MONEY A-

DISK RECOVERY "The Scanner" is a utility program that is used for recovering disk files after the disk has failed and the dreaded 'DISK I/O ERROR' message appears. It essentially scans the disk and looks for sectors that aren't formatted correctly. It then checks each file to see which one uses those sectors. One has a chance to delete the clobbered file, thus freeing the good sectors for later use. A "bad blocks" file is written to the disk and the VTOC is rewritten so that the bad sectors are never used again.
The program is also able to reconstruct the VTOC after it detects which sectors are actually not allotted to a catalog entry. This option will sometimes free garbled sectors that weren’t freed when a shorter program of the same name is saved on the disk.

The program is entirely menu-driven and easy to use. For programmers who don’t know how to patch a damaged disk by hand, this is an excellent tool for either DOS 3.2 or 3.3 disks.

Assemblers

Merlin
Southwestern Data Systems
$64.95

Merlin is a co-resident editor/macro assembler; it is upward compatible with its predecessor, the TED II+. "Co-resident" means that both the editor and the assembler are simultaneously located in memory. This is a very attractive feature when trying to debug an assembly language source listing. You don’t have to reload the source file from disk before re-assembling. Convenience is its major advantage, but it does limit the size of the source code. Merlin uses the extra memory on the language card to store itself, DOS, and the user’s symbol table and object code. This allows source files to reach 30K, or about 1,500 lines of commented source code.

Merlin closely resembles the Apple Tool Kit’s Assembler-Editor in its functions. This is no mere coincidence, since this series of assemblers began with a crude version developed by Randy Wigginton of Apple Computer, Inc. It underwent several rewrites by Call Apple members, evolving into TED II+, and was converted from Integer BASIC to machine code by Glen Brendon. He did his best to achieve compatibility with its predecessor as well as the Tool Kit, while incorporating macros and conditional assembly.

The editor is probably the best line-oriented editor for the Apple. Every imaginable command is provided, combined with a very flexible syntax structure. A relative line numbering scheme is used; and editing command operands may be a line number, a list of line numbers, and/or a range of line numbers. Commands are provided to list, add, insert, delete, change, or copy lines. The change command can be either local or global, and it will optionally prompt the user to verify each change as it is made. Tab stops may be set, using blanks or any other character as tabs, which allows nicely formatted listings and assemblies. The best feature of the editor, however, is the edit command, which prompts the user with one or more lines, allowing him through the use of Control keys to add, insert, or change text very easily. The command modes are exactly the same as those in the Program Line Editor, making it probably the best implementation of a local editor available.

The file interface module allows the use of most disk commands, with the exception of EXEC. Binary files are used for speed. They are not compatible for use with PIE and other editors. However, Merlin will read any Apple text files, including those from other assemblers such as Apple Tool Kit. Files can then be made compatible using its advanced editing features. All source files are saved to disk with an "s" tacked on. Object files are saved under the assigned name.

The assembler is quite complete. In addition to standard 6502 mnemonics, Sweet 16 and extended branch opcodes are also supported. Zero-page addressing is handled more or less automatically, and there are several immediate operand types (hi, lo, ASCII, hex, decimal), with the decimal format being the default mode. Pseudo-opcodes include most of the standard types, plus some included for reserving space, control printing of the assembly listings, and several used for generating data constants and ASCII strings. Good support is provided for arithmetic and logical expressions. Divide and multiply operations have been reinstated in this version. Macros with conditional assembly (DO, ELSE, and FIN) have also been incorporated. Error messages are clear, and the listings can be halted or aborted at will. Symbol tables are listed both alphabetically and numerically unless the listing option is off. Chained assemblies are also supported. The PUT pseudo-opcode allows parts of a source file too large to fit in memory all at one time to be assembled. Since the allotted space for the symbol table and the object code is slightly more than 6K, portions of large object code files must be saved to disk (using the SAV pseudo-op). The ability to save portions of a program is useful in cases where there is more than one ORC. Incidentally, ORC and OBJ are independent of one another, a very thoughtful feature.

This assembler also comes with an interactive disassembler called the "Sourcecor." It can disassemble Sweet 16 code as well as 6502 code. The interactive portion of the disassembly allows you to interpret sections of code either as hex data, ASCII strings, or as two-byte words. Once the code is properly disassembled, the source code is loaded into Merlin to be interpreted and read. It is the best disassembler on the market to date.
LISA 2.5
Lazerware
$79.95

The LISA (pronounced Lî-Za) interactive assembler, written in machine language by Randall Hyde is one of the best choices in assemblers for beginning assembly language programmers. It includes extensive features and provides one of the most complete and flexible selections of assembler pseudo-ops available. Since it is structured for beginners, it is designed so that the editor and assembler reside in memory at the same time. This allows a programmer to generate a source file, assemble it, and, if there are no errors, test it in memory without having to swap files on the disk. While this is satisfactory for small programs, the trade-off is that the programmer is limited to 4K blocks of object code. Source files do not present much of a problem, with 16K available on a 48K and 26K system using a language card. It is the responsibility of the programmer to make sure that the file size does not exceed these values while ensuring that each file is linked by pseudo-ops, especially while assembling object code larger than 4K.

The LISA criterion for an optimal assembler is that speed is all important. This philosophy results in advantages and disadvantages, however. The syntax editor scans source statement lines as they are entered and "tokenizes" them (to some extent) in a way similar to a Basic interpreter. It is this tokenization (or translation of the alphabetic sequences into compressed binary representations) which makes the LISA assembler so fast. Since some of the overhead required to decode a statement is taken care of when it is typed into the editor, the assembler can run many times faster (Hyde claims 20,000 lines per minute). In addition, tokenization also implies a certain amount of compression of the source text, meaning a larger file can be held in memory at one time. This compression is limited, however (only the mnemonics and the addressing modes are tokenized), and LISA's size (over 10K) pretty much offsets this advantage. The problem with tokenization becomes apparent when one begins using the LISA editor. A rather primitive line-oriented editor is provided, offering most of the necessary commands, but no scan-for-a-string command, no global change, and no local edit command is included (one is expected to use the rather cumbersome Apple II escape sequence cursor editing). Given such a limited editor, the first thought would be to use another editor (PIE, for instance); fortunately, a mechanism is provided to do just that. However, because of tokenization, files must be converted by LISA to and from the compressed format and written as text files before PIE can handle them. LISA's and PIE's text file handling is slow enough as it is without the added speed degradation of tokenizing and syntax checking. Therefore, as long as you can stay in LISA's editor, you are fine, but should you need or desire a better one — forget it.

It is much harder to find fault with LISA's assembler. In addition to being fast, it provides more functionality (short of offering macros) than almost any other. Sweet 16 opcodes and extended branch mnemonics are provided, as are hex, decimal, binary, and character-immediate terms and data definition pseudo-ops. In the area of string definition pseudo-ops, there is a provision for almost any kind of string the programmer can imagine, from simple ASCII with the high bit on to inverse or flashing. LISA allows for invoking DOS commands from within an assembly file and provides a capability for linking multiple segments of a very large assembly-language program together as separate files. Other unique features include the production of a sorted symbol table, a "reserve space" pseudo-op, and excellent error messages.

There are a few areas in which LISA is restrictive, primarily in its syntax. A separate pseudo-op must be used to define zero-page labels, and expressions will be defined as non-zero-page types if any of the terms or intermediate computations are recognized as non-zero-page varieties. This can get confusing. Hexadecimal formatting was chosen as the default base for numerics. Although some special immediate forms are provided to save typing ('a' instead of '§a'), the long form is not allowed. Another minor restriction is that comments must begin with a "//" character even though it is not syntactically necessary. As with most assemblers of its type, LISA does not provide an easy way to save the object code generated by the assembler to disk. Not only will it not assemble directly to a binary file, but it doesn't print the starting address and length of the assembly; the ORG and OBJ pseudo-ops must be carefully dealt with to avoid overwriting LISA or the source file.

This assembler also includes three utilities. XREF/65 is a cross-reference tool for labels. It provides the line numbers for each label and the lines they are referenced by. TRACE/65 is a debugging tool, while DISASM/65 is a non-interactive disassembler for generating source files from 6502 object code. The source files for each of these programs are included for allowing the user to modify them.

On the whole, LISA is a good buy for the beginner or the low-volume assembly language programmer. If the limitations of the editor and the minor restrictions of the assembler do not bother you, LISA can be an excellent tool. For the high-volume programmer who makes many changes before a reassembly and consequently requires a new listing almost every time, speed must be traded for editing power. However for quick, iterative changes and reassemblies required by the beginner, LISA is ideal.

NOTE: LISA 2.6 now available with an improved editor and manual.
S-C ASSEMBLER II VERSION 4.0
S-C Software
$55.00 Disk Version
$45.00 Tape Version

One of the first assemblers available for the Apple II, S-C has established itself as a very popular utility for beginners. Written entirely in machine language, S-C is closely integrated with the Apple ROM, thus requiring less memory. It is also an easy-to-learn addition to the standard features of the Apple. Minimum hardware requirements are an Apple II with at least 24K (with or without a disk drive).

The primary design philosophy of the S-C Assembler seems to be to make coding in assembly language as much like Basic programming as possible. The editor provided is almost identical to a Basic line-oriented version, although there are a few differences. The cursor features of the Autostart ROM are included, even if your machine is an Integer-based Apple. It is possible to scan a program for strings, set the scrolling speed of listings to slow or fast, halt or abort listings, and renumber. There is also auto line-numbering, but it is not completely "auto." A CTRL-I feeds the user the next line number for each line to be renumbered. The editor does not support local or global change commands, nor any copy or move commands. On the positive side, the editor is fast and close enough to Basic's edition to make the transition easy for the novice.

In addition to the standard editor commands, most DOS commands are supported. LOAD and SAVE work exactly as they do in Basic. This implies that S-C will store your source code as a Basic program. This is not overly compatible with the rest of the world, especially if one chooses to use another text file editor to handle your files. Object files, however, are saved as binary files. There are also merge commands for joining multiple files in memory, and you can chain files during assembly.

The S-C Assembler itself is modest but adequate for most uses. A somewhat free-form approach is supported, although there are cases where there must be at least two blanks between fields and only one blank between op-code and operand. Sweet 16 op-codes are supported, but extended-branch mnemonics are not. Simple expressions are allowed, using immediate terms in decimal (the default mode) or hex (no binary mode). An equate pseudo-op function is provided and zero-page operand handling is more or less automatic; although, should you define your zero-page labels after their first use, it is possible to generate a non-processable program. The assembler always terminates when an error occurs. This isn't as annoying as it used to be, because assembler speed is greatly improved. It is approximately four times faster than earlier versions with the list option on, and nearly twenty times faster with the list option off. The assembler listing is nicely formatted, additionally it can be halted or aborted from the keyboard. A symbol table in alphabetical order is also provided. Some of the syntax used is hard to get used to if you are used to other assemblers. The same pseudo-op function generates both single-and double-byte data constants, making it easier to generate a two-byte value rather than a one-byte value. There is a non-standard immediate format for obtaining the most significant byte of a two-byte expression (by specifying /label instead of #/label). Thirty-two character labels are allowed; they have a function which allows local labels for more readable modular programs.

In addition to the editor and assembler, a very nice interface is provided for the Apple monitor. This feature, combined with the DOS command support means you never really have to leave S-C to do anything (except, perhaps, run a Basic program). You can load, edit, assemble, debug, run, and save a program; all within S-C. S-C's documentation is oriented to the beginner, with several examples and two demonstration programs on the distribution diskette. A reference card is included. For the price, the S-C Assembler is probably the best choice for the Basic programmer who wants to learn Assembly Language with a minimum of effort.
APPLE TOOL KIT ASSEMBLER  
Apple Computer, Inc.  
$75.00

The Apple Tool Kit's Editor/Assembler is a professional package consisting of an Editor, an Assembler, and the Command Interpreter. It is designed for editing and assembling small to very large programs in 6502 assembly language. It features a relocating loader with provision for the incorporation of Disk Macros and a Linking Loader. The program is disk-based. That is, while the Command Interpreter is always in memory, either the editor or assembler is active while the source file is saved to the disk before the other module is loaded. Although this may seem slow and tedious for debugging small programs, it allows more room for source files (30k or 1500 lines of commented source code). This method also allows one to chain files together during assembly.

The editor is very similar to that of Call-Apple's Big Mac and the earlier Ted II+; consequently, it is about the best line-oriented editor available for an assembler. Every imaginable command is provided, combined with a very flexible syntax. A relative line number scheme is used; editing command operands may be a line number, a list of line numbers, and/or a range of line numbers. Commands are provided to list, add, insert, delete, change, or copy lines. The change command can be global or local. Tab stops may be set for very nicely formatted listings and assemblies. The best feature of the editor, though, is the edit command which prompts the user with one or more lines, allowing him through the use of control keys to add, insert or change text very easily. The commands are similar to the Program Line Editor's commands.

The assembler, which is quite complete, is disk based (i.e., it will assemble only source code which has been previously saved to disk) and will store the resultant object code to disk. The assembler supports, in addition to all standard 6502 mnemonics, extended branch opcodes. Zero page addressing is handled more or less automatically, and there are several intermediate operand types (hi, lo, ascii, hex, decimal), with decimal being the default mode. Good support is provided for the expressions, (+, -, /, *). Pseudo-ops include most of the expected ones plus opcodes to reserve space, control printing of the assembly listing, and several types to generate data constants plus ASCII strings. In addition, this assembler is the only one to handle or define DSECTS, a directive to define areas of memory used for data tables or command control blocks. This procedure doesn't generate any object code. The Apple Assembler also provides conditional assembly (DO, ELSE, FIN). Additionally, assembled code can be saved as relocatable object files. It can be stored in another area of memory with the use of a relocating loader. This is useful for programs that are run in different sized machines or when they are loaded from a Basic program. During assembly, the listing can be halted or aborted at will. Error messages are cogent. Symbol tables are listed both numerically and alphabetically. The assembler supports chained assemblies.

The Command Interpreter supports multiple command entries. It also supports all direct DOS commands; for those that need help, there is a HELP command which displays a list of valid commands. Overall, this entire package (which is part of a larger package which includes Applesoft programming tools and a Hi-Res character generator) is one of the most professional of the variety of assemblers.

S-C MACRO ASSEMBLER  
S-C Software  
$80.00

The people at S-C Software have upgraded their very fine S-C Assembler II into a professional package by adding both Macro capabilities and conditional assembly, and by improving their editor. With the ability to support a 16K language card (if present), the S-C Macro Assembler becomes a powerful tool for beginners and advanced programmers alike.

This is a co-resident assembler-editor. Because everything resides in memory simultaneously, there is no tedious swapping of files when moving from the editor to the assembler and back again. This is perfect for beginning programmers, who are apt to make serious mistakes when writing their source file. Assembly in this two-pass assembler is quick, and the assembler now pauses when it encounters errors instead of aborting as it used to, a welcome change.

The assembler offers a very fine line-oriented editor. The commands for single line editing include character insert and delete, moving the cursor to the next tab stop, or to move to the beginning or end of the line. The editor has full string search, global replace, copy lines, delete features for a range of lines, and a line renumbering function. I should mention that each line number has a four digit number starting with 1000. The regular assembler requires a CRT-1 to give you the next line number. The Macro assembler has an AUTO mode as well, which gives you the line number after the Return key is pressed from the previous line. Of course, numbers can be overwritten, and you can give it any line number you wish. Text files can be 24K in length on a 48K machine, and 32K long using an additional language card. This will allow you 1,600 lines of commented source code.
The assembler is quite complete. It has Macro and conditional assembly, supports Sweet 16 opcodes, allows for local labels, and allows the chaining of files. Extended branch mnemonics are not offered. ORG and OBJ are fortunately separated, as they should be. Both default to $800; but if you are careful, you can place them in a clear portion of memory between your text file and your symbol table. The symbol table starts at $1000 in the non-language card version, and builds upward. The text file is stored just below DOS, and builds downward. Choosing an alternative ORG is important if you have a long Object file. Listings are nicely formatted, and can be suppressed if speed is of importance. The symbol table is alphabetical. Thirty-two character labels are allowed, and local labels can be used for modular programs. There are a few nonstandard formats: for example, Immediate Format, for obtaining the most significant byte of a two-byte expression. It uses a "/" label, rather than a "#/" label.

A very good monitor is included in the package. All commands are usable from inside the S-C Macro Assembler by typing a dollar sign and the monitor command. It can disassemble, display and change memory or registers, and move blocks of memory. A program can be executed beginning at a label or memory address using the MGO command. If you intentionally hit RESET while testing a program, you can re-enter the assembler through a documented re-entry point.

The documentation is very good. It is lengthy (approximately 100 pages), complete, and comprehensible. It is meant for beginning programmers, and so supplies numerous examples. The only significant lack I noticed was this: while memory usage is clearly explained, it would have been helpful if it were also in map or chart form.

In sum, the S-C Macro Assembler is one of the best choices for both the beginning and advanced programmer. Its co-resident nature allows programs to be quickly edited, assembled, and tested, entirely within the framework of the program itself. Perhaps its ease of use is its most attractive feature.

EDIT 6502
IJK Enterprises
$99.95

EDIT 6502 is a co-resident assembler-editor suited to beginning assembly language programmers. Because the package includes a comprehensive monitor along with its own DOS, it is also advantageous to Apple II Plus owners who lack the Step and Trace features in the Integer Monitor ROM. Having its own DOS is understandable, since EDIT 6502 uses a modified protected DOS yet writes source and object files to unprotected disks. Source files can either be text files or binary-like "S" files. It isn’t quite standard, but it suffices.

EDIT 6502 has an adequate assembler. Besides handling the usual 6502 opcodes, it supports arithmetic expressions with no logical operators, and no local labels. Conditional assembly is included, but macros are not. There are twenty pseudo opcodes provided. Linked files are allowed using the LNK pseudo-op. Although ORG and OBJ can be specified separately, they default to $800. It is possible to assemble elsewhere in memory using the OBJ command, but the memory map doesn’t clearly show where everything resides, particularly when more user space becomes available with the language card. However, the user can adjust the locations of the source, object code, and symbol table with HIMEM/LOMEM type commands.

EDIT 6502 has a good line oriented editor. Numerous control character commands allow insertion and deletion of characters, can quickly reach the beginning or end of a line, and search for a character. It also supports lower case during input. Other editing commands allow string search and global replace. Lines can be added, deleted, and copied.

The system monitor and disassembler are quite extensive. They include all of the Apple Monitor routines and then some. There are the usual commands: step and trace, change registers or memory, and memory moves. There is also a disassembler, a string search in HEX or ASCII, and a valuable Hex/ASCII memory dump. In addition, Monitor commands read or write a sector. The relocater command may be useful for relocating code. Unfortunately, the instructions aren’t very clear.

Speaking of documentation, I find the entire 44 page manual rather poorly written. Here is a package that could be perfect for the novice programmer in assembly language. Instead of showing examples of how to use the assembler, the author uses valuable space to explain his philosophy in programming. I’ll agree that everything is concisely documented, but it is hard to find and hard to follow. The reference card is very amateurish.

The Reset procedure for re-entering EDIT 6502 is undocumented. Perhaps they believe that their monitor, and not the Apple’s, should remain in control. While this is a good philosophy, object files don’t often run properly, and you must hit Reset to exit. Hitting Reset without an Autostart ROM in an integer machine while in this program is tantamount to starting over. The re-hook pointers should also be documented.

EDIT 6502 is an adequate assembler-editor. It is relatively fast and easy to use. It is good for a beginner-intermediate programmer who is writing short assembly language programs, lacks a monitor, yet does not need the complexity of an advanced macro assembler.
ASSN/TED
Eastern House Software
$169.95

The ASSM/TED 6502 macro assembler and text editor is an extremely powerful assembler and line-oriented editor package. Written entirely in machine language by Carl Moser, ASSM was, at the time of this review, the only assembler for the Apple II or Apple II Plus which supports macros and conditional assembly. If this wasn't enough, ASSM also produces relocatable object code and maintains internal (local) and external (global) symbol tables.

The TED editor (not to be confused with Apple's TED editor by the same name) is as powerful a line-oriented editor as one could wish for, while still maintaining syntax which is very compatible with Basic's mode of editing. An auto line-numbering scheme is supported as well as renumbering, copy lines, move lines, search for and/or count strings, and global change. A rather unique local edit command is also provided, making small changes to a line easier. Tab support is provided or statements may be entered free form to conserve space; they will be formatted in columns when listed or assembled. Upper/lower case is not supported.

TED's weaknesses show up in the file management support. TED was written to be used on either the PET, the SYM, or the Apple. Because of this, file loading and saving is complex and difficult. Although tape files are supposed to be supported, the Apple's inability to control the operation of the tape drive makes tape file access within TED next to impossible. TED stores its files on disk as if they were on a tape—there is a text file to describe the file, then one or more binary files which contain pieces of the program. The formats of these binary files is dissimilar to any which could be loaded into another, more powerful editor. Despite this restriction, all DOS commands are operable (including EXEC) and the file access, although complicated, is very flexible—parts of files may be loaded or saved. Beware, however, since it is possible to produce two lines with the same line number by doing this!

ASSM, the assembler, is loaded with a function command. Input is free format, 10 character labels are allowed, and Basic expressions may be used with any of the major mode types (decimal, binary, hex, character). Unlike most Apple assemblers, ASSM will generate its object code directly to the disk, memory, and/or tape. Using the default option, no memory object code is generated, avoiding ORG and OBJ hassles. Almost every imaginable pseudo-op is supported with the exception of a multibyte data definition (HEX). In addition, ASSM allows the specification of internal and external labels and generates relocatable object code (although the format of the object file is unusual, also a special loader must be written to run it.) If all this was not enough, ASSM also provides a modest macro capability with symbolic replacement for operands and conditional assembly. The implementation is reminiscent of the DEC PDP LSI-11 macro assemblers. The only really irritating restriction of this assembler is the fact that all zero page references must be preceded by a "*" character. Most Apple assemblers these days can automatically determine whether the operand is zero page or not. Other problems uncovered are that accumulator addressing must be explicitly specified (A is a reserved label) and most-significant-bit support is not provided for character strings.

The major failing of ASSM/TED is its documentation. The documentation provided is meant to apply to all versions of the program on any type of machine. This leads to conflicting references in the text, incorrect address boundary information, and a kind of lowest common denominator design. In addition, there are no charts or references for pseudo-ops, error messages are all "by the numbers" and one example listing to which the text refers is missing. There is very little documentation on the relocatability feature or on file chaining. If you are a novice machine language programmer, ASSM/TED is probably not for you.

All things considered, ASSM/TED is probably the most functional and well written assembler for the Apple. It is too bad it wasn't designed especially for the Apple and that its documentation didn't make it easier to use for beginners. Aside from these considerations, it is a very powerful package for the advanced and professional programmer.
# Apple II Assembler Comparison

## I — General Information

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<thead>
<tr>
<th>Name</th>
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<th>Price</th>
<th>Min. Hardware/Software</th>
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<tr>
<td>MAE</td>
<td>Eastern House</td>
<td>$169.95</td>
<td>48K, Disk</td>
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<tr>
<td>LISA V2.5</td>
<td>Lazerware</td>
<td>$79.95</td>
<td>48K, Disk</td>
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<td>S-C Assem. II 4.0</td>
<td>S-C Software</td>
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<td>24K, Disk</td>
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<td>Merlin</td>
<td>Southwestern Data Systems</td>
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<td>Tool Kit</td>
<td>Apple Computer</td>
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<td>LJK</td>
<td>$99.95</td>
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## II — Ratings

<table>
<thead>
<tr>
<th>Merlin</th>
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<th>Tool Kit</th>
<th>S-C Assem.</th>
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<tr>
<td>Overall Rating</td>
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<td>B–</td>
<td>B+</td>
<td>B</td>
<td>A</td>
<td>B–</td>
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<tr>
<td>Functionality</td>
<td>A</td>
<td>B+</td>
<td>B+</td>
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<td>A</td>
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<tr>
<td>Ease of Use</td>
<td>A–</td>
<td>B–</td>
<td>B–</td>
<td>B</td>
<td>A–</td>
<td>B–</td>
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<tr>
<td>Documentation</td>
<td>B+</td>
<td>B–</td>
<td>C</td>
<td>B</td>
<td>B+</td>
<td>D</td>
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## III — Documentation

<table>
<thead>
<tr>
<th>Merlin</th>
<th>MAE</th>
<th>Lisa V2.5</th>
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<th>S-C Assem.</th>
<th>S-C Macro</th>
<th>Edit 6502</th>
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<tbody>
<tr>
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<td>NO</td>
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<td>YES</td>
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<td>YES</td>
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## IV — File Handling

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<tr>
<th>Merlin</th>
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<th>S-C Assem.</th>
<th>S-C Macro</th>
<th>Edit 6502</th>
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<td>YES</td>
<td>NO</td>
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## V— MISCELLANEOUS

<table>
<thead>
<tr>
<th></th>
<th>Merlin</th>
<th>MAE</th>
<th>Lisa V2.5</th>
<th>Tool Kit</th>
<th>S-C ASSEM.</th>
<th>S-C MACRO</th>
<th>Edit 6502</th>
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<tbody>
<tr>
<td><strong>Run Command</strong></td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td><strong>Brk to Monitor or Monitor Commands</strong></td>
<td>Quit to</td>
<td>BRK</td>
<td>BRK</td>
<td>CMDs</td>
<td>CMDs</td>
<td>Yes</td>
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<td><strong>Reset Recovery Procedure</strong></td>
<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
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<td><strong>Useful Subroutines Provided</strong></td>
<td>Some Loader</td>
<td>Many</td>
<td>No</td>
<td>Two</td>
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<td><strong>Upgrade Policy</strong></td>
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<td><strong>Use Language Card If Present</strong></td>
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## VI—EDITOR

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<tr>
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<th>Tool Kit</th>
<th>S-C ASSEM.</th>
<th>S-C MACRO</th>
<th>Edit 6502</th>
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<tbody>
<tr>
<td><strong>Full Screen Or Line Oriented</strong></td>
<td>Line</td>
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<td>Line</td>
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<td><strong>Tab Support</strong></td>
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<td><strong>Autonumbering Or Line Collecting Input Mode</strong></td>
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<td><strong>Requires 4 Digit Zero Filled Line Numbers</strong></td>
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<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<td><strong>Stop/Abort Listings</strong></td>
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<td>Both</td>
<td>Both</td>
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<td>Both</td>
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<td><strong>Local Edit Command Or Apple Cursor Editing</strong></td>
<td>Edit</td>
<td>Edit</td>
<td>A.C.E.</td>
<td>Edit</td>
<td>A.C.E.</td>
<td>Both</td>
<td>Both</td>
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<td><strong>Replace A Line</strong></td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td><strong>Scan For String</strong></td>
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<td>No</td>
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<td><strong>Local/Global Change</strong></td>
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<td>Yes</td>
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<td><strong>Copy/Move Lines</strong></td>
<td>Yes</td>
<td>Both</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td><strong>Show Memory Left</strong></td>
<td>No</td>
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<td>Yes</td>
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<td><strong>Printer Support</strong></td>
<td>Yes</td>
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<td><strong>User Command Interface</strong></td>
<td>No</td>
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<td>Yes</td>
<td>No</td>
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<td><strong>Renumber (If Applic.)</strong></td>
<td>No</td>
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<td>N/A</td>
<td>N/A</td>
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<td>No</td>
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<td><strong>Syntax Check Input</strong></td>
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<td><strong>Tokenized/Compressed Partitioning</strong></td>
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<td>Yes</td>
<td>Hard</td>
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# VII — ASSEMBLER

<table>
<thead>
<tr>
<th>Feature</th>
<th>Merlin</th>
<th>MAE</th>
<th>Lisa V2.5</th>
<th>Tool Kit</th>
<th>S-C Assem.</th>
<th>S-C Macro</th>
<th>Edit 6502</th>
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<tbody>
<tr>
<td>Speed of Assembly</td>
<td>FAST</td>
<td>OK</td>
<td>FAST!</td>
<td>SLOW</td>
<td>FAST</td>
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<td>Standard Syntax</td>
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<td>Flexible Syntax</td>
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<td>Extended Branch Mnemonics</td>
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<td>Pause/Abort on Error</td>
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<td>YES</td>
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<td>OPTION</td>
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<td>Pause/Abort from Keyboard</td>
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<td>English or Numeric Error Messages</td>
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<td>Symbol Table Printed</td>
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<td>Object Address/Length Printed</td>
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<td>Immediate Operand Types</td>
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<td>HDM</td>
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<td>YES</td>
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<td>Default Base</td>
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<td>Term Types (HEX, DEC, CHR, BIN, MSB, LSB, OCT)</td>
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<td>HDCBM</td>
<td>HDCBML</td>
<td>HDCB</td>
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<td>Location Counter Term [*]</td>
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<td>Number of Pseudo Ops</td>
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<td>Assembly Origin Op [ORG]</td>
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<td>Object Origin Op [OBJ]</td>
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<td>Equate Op [EQU]</td>
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<td>Zero Page Addressing Handled Automatically</td>
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<td>Char String Ops</td>
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<td>One Byte Constant Op [MSB or LSB]</td>
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<td>Multibyte Constant Op [HEX]</td>
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<td>Listing Control [EJECT, SKIP]</td>
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<td>EJECT</td>
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### VII — ASSEMBLER (Cont’d)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Merlin</th>
<th>MAE</th>
<th>LISA V2.5</th>
<th>Tool Kit</th>
<th>S-C Assem.</th>
<th>S-C Macro</th>
<th>Edit 6502</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn Listing On/Off</td>
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<td>Yes</td>
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<td>Yes</td>
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<td>Link Assembly Files</td>
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<td>Save Object Code Automatically</td>
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<td>Fixed LEN</td>
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<td>Macros with Symbolic Replacement</td>
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<td>Conditional Assembly [If, Set, Etc.]</td>
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<td>No</td>
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<td>Relocatable Object Code [External/Internal Labels]</td>
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<td>Yes</td>
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<td>Object Code to Disk, Tape, Memory</td>
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<td>D,T,M</td>
<td>M</td>
<td>D,T</td>
<td>D,T,M</td>
<td>D,T,M</td>
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Compilers

APPLESOFT COMPILERS

Applesoft is the most popular language available on the Apple II computer. Because it is an interpretive language, one that requires a machine language program to supervise the execution of each individual BASIC line as it is used, it is rather slow when compared to the equivalent program in pure machine code. This is because the interpreter must scan the user’s program while actually running in order to find the appropriate subroutines to do that chore within its own program code. In addition, it must scan the user’s program for the next statement whenever it finds a branch instruction in a GOTO or IF statement. A better solution is to use a compiler to translate the BASIC program into machine code beforehand. That way the program will run much faster, because the scanning and decoding of the user’s program is done only once, during compile time.

Four separate software companies are marketing compilers. They all compile Applesoft BASIC programs into object code that runs much faster than interpreted BASIC. Speed increases vary widely, and are often dependent on the structure and length of a user’s program. In general, long programs using a large number of variables, and doing a great deal of logical branching within the program, will execute much faster as compiled object code. Programs that primarily use integer variables will also run considerably faster, if compiled by a compiler that offers an integer option. Users can expect overall speed increases of between two to ten times that of interpreted Applesoft.

Another important point, and one too often neglected by consumers, is the size of the final object code. All compilers expand the object code somewhat from the size of the original program. Machine code, by its nature, uses more memory than an Applesoft program, so you must bear in mind the tradeoff between speed and size. In addition, they all require run-time libraries. These range from 2K to 4K in size. Moderately large Applesoft programs, say of 45 sectors (10K), will expand to 20K or more depending on the compiler. It is highly likely that you will not be able to compile some programs due to lack of memory space.

There are a substantial number of differences between compilers. Their handling of strings and variables differ widely. Some allow common variable space, to make chaining possible between programs that are too large to compile in one chunk of code. All offer options through the use of “active” REM statements to control the placement of compiler code, to avoid interference with the Apple’s high resolution graphics pages, and to allow certain variables to be evaluated in true math. Because all of the compilers have their own peculiarities and individual ways of handling the compilation, they are described in much more detail below.

TASC’s Task Handling. In Microsoft’s TASC, the user controls the locations of three memory compartments: the run-time library, the program itself, and variables. In the default order of things, the library sits at decimal 2051, the program follows directly at 6020, and variables occupy the space between the top of the program and himem. Numeric variables build upward from the top of the program, and strings build down from himem. Lomen statements in the source program are not compiled, because the bottom of the variable space is defined at compile time.

If you want to avoid clobbering areas of memory with your program, you can designate a starting address other than 6020. Either enter a specific number, or type HGR1 or HGR2 to begin your program at the first byte following either of the Hi-Res pages. The program itself must be a contiguous block in memory; TASC will not JMP it around areas that you want to protect.

If you specify an alternative location for the library, you will need to take note of its new address, because the library must be BLOADed separately from the rest of your object code at run-time.

To allow modularization with shared variables, TASC employs commands embedded in REM statements in the source program. The statement REM ! DEFCOMMON A,B,C would be ignored if the program were run through the interpreter. But it would instruct the compiler to allocate memory for three numeric variables in a protected global variable area. Other modules could gain access to these variables by means of a REM ! USECOMMON statement in their source listings. DEFCOMMON initializes global variables, while USECOMMON refers to them without reinitializing them.

All modules that use a particular set of global variables have to be compiled with the same starting address for the program space, because TASC allocates its common variable area at the beginning of this space. The global block is subdivided into two parts to separate numeric globals from string globals. Modules that call upon common variables do not have to use the same variable names. One module could define common variables A, B, and C, and another could access those same variables under the names D, E, and F. What matters is the order in which these variables are declared in the source’s REM statements.
Within the common block, TASC allocates two bytes per integer variable and five per real; and it expects the programmer to keep track of what kind of variable lies where. The compiler will check to see that each module is declaring the same overall amount of space in each of the common subunits, but it won’t prevent the programmer from trying to use ten bytes of storage as five integers in one module and as two reals in another.

Hayden’s One-Way Road. Hayden’s Compiler takes a somewhat different approach to memory allocation. In the default configuration the program is on the bottom of things, at decimal 2051. This block is followed first by variables and then by strings. The strings build upward from the top of the variable compartment toward a default himem of hex 9600.

In this default scheme, the compiler draws on a library of ready made subroutines, and includes them as needed within the program space. You have the option of bringing the entire 3.3K library into memory as a separate compartment, external to the program space. Presumably, this would be an efficient, space-saving thing to do only in cases where you were going to keep several compiled modules in memory at once to be called from an Applesoft program.

Variations from this default memory scheme are effected by means of an “active REM” statement, which must be the lowest numbered line in the source program. Allocating memory areas from within the source program rather than at compile time may seem like a little extra hassle, but it has the advantage of leaving you a convenient record of what you’ve done.

Hayden offers you the following allocation options: B specifies the starting address of the program; X summons and locates the optional external library; L, for lomem, specifies the beginning of the variable space; S declares the bottom end of the string pool; and C may underline the program space if you choose.

Separately compiled modules may share variables by declaring the same lomem. As with the Microsoft compiler, Hayden’s global variables do not need to bear the same names. What matters is the order of declaration, and it’s up to you, the programmer, to keep things straight. Since Hayden, unlike Microsoft, does not wall off a separate common variable block in memory, all the variables of at least one of the modules must be shared.

To avoid an implicit clear that would reinitialize shared variables, modules may be called at their starting address plus two. Hayden’s manual recommends calling at the base address plus two, even if there are no variables in the called module, as a way of saving executing time.

At least two things are worth noting about Hayden’s approach to string allocation. First, strings build upward toward himem rather than down and away from it. This wouldn’t be possible with an interpreted Applesoft program because the variable space growing up from lomem is dynamically allocated. In a compiled program, all data spaces are static, so the compiler can set the low end of the string without fear of encroachment from the variables below. According to Hayden’s manual, the upward building approach was chosen for two reasons: it lends speed to the concatenations and arithmetic string operations; and it permits the user to alter himem from within the source program.

The second, and perhaps more important, point about Hayden’s strings is that no housecleaning takes place. If you want to compile a sizable program with a lot of string handling, you will need to sprinkle some FRE() statements into your source code, or you may find yourself out of memory.

A Moving Expedition. On-Line’s Expediter arrange memory in the following manner: a 2K run-time library occupies the space from hex 800 to hex 1100. The library is not relocatable. However, it may be BSaved and BLOADED separately from the rest of your object code as a means of conserving disk space (the normal procedure saves the entire library with every compiled program). The program itself, in the default arrangement, rises out of hex 1100; any other address above 1100 may be selected instead. Variables, both local and global, work their way downward from himem, which defaults to hex 9600. Either group of variables can be located elsewhere in the user’s options.

As with TASC, Expediter users declare global variables by means of active REM statements in the source program. The procedures are a little different, however. In TASC, all DEFCOMMON or USECOMMON statements have to appear at the front of the program, before any non-REM statements. In Expediter, the REM <G> and REM <L> commands act like switches and can be used at any point in the program. All variables following a REM <G> statement and before the next REM <L> are global variables; all variables following REM <L> are locals, and so on. As with other compilers, the programmer must keep track of the order in which global variables are referenced.

Strings in Expediter are handled in one of two ways. At compile time, users can specify either static strings, which are useful for passing variables between modules, or dynamic strings, which are much faster. When static strings are specified, the user dimensions them at compile time. The default value is 40. This figure can be overwritten globally, through a compile time option, or for individual strings by means of active REM statements in the source program.

Another option at compile time allows the user to protect up to ten areas of memory. This makes for an easy, space-efficient way to avoid clobbering the Hi-Res pages, shape tables, or whatever else you may want to protect. With this approach, you don’t have to worry about relocating entire blocks of code; essentially, you simply tell the compiler how high and it will JMP.
SpeedStar Takes Extra Lap. The ability to jump over protected areas of memory is incorporated in SpeedStar by means of active REM statements in the source program. This approach, specifying the jumps from within the source, requires a first pass through the compiler to determine the appropriate places from which to jump.

Other user-selectable memory parameters in SpeedStar include the starting program address and lOMEM. As with Hayden's Compiler, SpeedStar users can share variables between separate modules by giving each module the same value for lomem and avoiding the implicit clear on calling various modules.

SpeedStar also allows you to specify an origin different from the starting address of the program. This might be useful if you were trying to compile a program above Hi-Res and had run out of memory, because SpeedStar itself occupies the space between hex 7200 and DOS. Using the origin option, you could compile the program at some lower base address, BSAVE it, and, with SpeedStar out of memory, BLOAD it back in at the true starting address. Large programs may be compiled to disk by using the memory-efficient segmented option of the compiler.

SpeedStar's run-time library, like Expediter's, is approximately 2K. Unlike Expediter, however, SpeedStar keeps the run-time library attached to the program. One future revision that SpeedStar programmers are still considering would allow the user to relocate the library away from the program code or to strip it out altogether and allow separate modules to share the same library.

In any event, the fact that the library does not sit immovably at hex 800, as does Expediter's, is important for SpeedStar, because this compiler has some features that facilitate the calling of compiled subroutines from within the co-resident Applesoft program. Having the library attached to a relocatable program code gives the user the option of making hex 800 available for a calling Applesoft program.

To facilitate the calling of compiled subroutines, SpeedStar includes a parameter feature that allows the transfer of values from the Applesoft program into the compiled subroutine. The compiler also supports the Applesoft USR command, which allows the transfer of data from the subroutine back into the calling program.

The parameter option is selected through an active REM statement. Another active REM command allows a subroutine to be called without any implicit garbage collection taking place. Yet another active REM command, when embedded within a subroutine, provides a message at compile time giving the calling address of that REM line. This would be useful for the compiled subroutine with multiple entry points.

Arithmetic Lesson. So much for matters of memory allocation and communication between program modules. There are some other important differences among the compilers.

Microsoft's TASC and Hayden's Compiler, for example, will perform true integer arithmetic upon integer variables. Here's how this works. Applesoft allows you to declare integer variables by adding the percent sign to the variable name. When the interpreter works with your integer variable, it first converts the value to a real and then performs its customary floating point arithmetic. So, actually, you slow down your program in effect by declaring integer variables, because the values have to be converted before becoming useful as operands. The only place where declaring integer variables appears to be advantageous is in large arrays: there the savings in memory space (two bytes per element instead of five) may offset the drag on computation.

TASC and the Compiler will perform integer arithmetic to the extent they can. The Compiler will treat all numeric variables as integers until it encounters a real quality or an operation requiring a real operand, at which time it will convert. TASC will treat as integers all variables declared as integer variables, and, rather than making you rewrite your source program to put in all those percent signs, it provides an active REM option that converts real variables into integer variables.

One of the limitations of Applesoft is its refusal to use integer variables as counters in FOR-NEXT loops. You can't even write FOR I% = 1 TO 10 without getting a syntax error. The REM! INTEGER feature in TASC allows you to overcome this restriction, and the TASC manual strongly urges you to use it, claiming that loops with integer counters may execute up to two times faster than loops with real counters.

It isn't clear from the manual whether Hayden's Compiler uses integer arithmetic for loop counters. But, judging from the results of our simple loop test (in which TASC aced out the usually faster Hayden compiler), it appears that it does not.

Obedience Is Perfect In None. Not every Applesoft command has been implemented by these compilers. In particular, since the compilation eliminates the need to have source code in memory, the commands DEL and LIST have been ignored by all four compilers. CONT was passed up by everyone but Hayden: all it does in deferred execution is hang up your computer; but if you want to put it in your source code, Compiler will compile it.

NEW, which seems like a candidate for exclusion, was implemented by all four compilers. In a compiled program, NEW clears out any Applesoft code that might have been lurking in memory, without affecting your object code or variables. Oddly enough, Hayden's Compiler requires you to terminate the source program with NEW, rather than with END. Your Apple may behave peculiarly if you don't.

Commands relating to cassette use (SAVE, LOAD, RECALL, STORE, and SHLOAD) have been almost universally ignored. The only exception is Expediter, which includes SHLOAD.

TRACE and NOTRACE were excluded from implementation by Microsoft and Hayden on the reasonable grounds that debugging should be done with the interpreter before the program is compiled.
Users of Expediter and SpeedStar have the option of enabling line tracing features, but at a considerable cost in code size and execution speed. The overhead of Expediter's line trace option is seven bytes per source line, in return for which you get error messages, stops, and CTRL-C breaks identified by program line number. You also get to TRACE in deferred execution. SpeedStar imposes a higher overhead. A numbers option, which tags your stops and error messages, costs eight bytes per source line. If you want to TRACE, you pay an additional three bytes per statement (not per line). On the other hand, SpeedStar allows you to select these features only for specific sections of a program, something not possible with Expediter.

The two compilers that did not implement TRACE and NOTRACE did implement RESUME. With TASC, there's an option available at compile time that will enable the compilation of RESUME; the price is three bytes for every source statement capable of generating an error. If the source program does not use ONERR GOTO statements and the RESUME option is selected, run-time errors will be reported, with line number, making this feature useful as a debugging tool.

With Hayden, the support of RESUME is automatic. If the compiler encounters a RESUME, it generates an additional three bytes for every statement in the source program. SpeedStar did not implement RESUME.

The Dimensions Of It All. Dimension statements are handled differently by all four compilers than by the Applesoft interpreter. All arrays are dimensioned statically, which means that DIMS with variable arguments will not compile, and only one dimension statement is permitted for a given array.

With Hayden and Microsoft, the latter constraint also applies to defined functions. These compilers will permit only one DEF FN statement per function name. Expediter and SpeedStar, on the other hand, treat DEF FNs exactly as they are treated by the interpreter.

One other interesting tidbit: Expediter, since it uses static string allocation and does not require the collection and disposal of garbage, has redefined the FRE token. FRE (X) in an Expediter source program will, on compilation, return the address of variable X.

Of the four compilers, Microsoft's TASC is the most disk-based. Each of three compiler passes has its own large binary file on disk, and there is constant I/O activity during the compilation process. As a result, TASC takes more time to compile a program than any of the others; a large program may take as long as twenty minutes.

During pass one, the compiler acknowledges active REM statements and displays each line of source code as it is processed. If any fatal errors are encountered, the compiler halts, displays the source line, and points to the offending syntax. At this point, you have the option to continue pass one to find any additional errors. Non-fatal errors—syntax that cannot be compiled, like an extra colon, or a statement following on the same line with processing—will display the source line and point to the offending syntax. The compiler will halt, displays the source line, and points to the offending syntax.

During pass one, the compiler acknowledges active REM statements and displays each line of source code as it is processed. If any fatal errors are encountered, the compiler halts, displays the source line, and points to the offending syntax. At this point, you have the option to continue pass one to find any additional errors. Non-fatal errors—syntax that cannot be compiled, like an extra colon, or a statement following on the same line with a GOTO—get a beep and a warning.

After compilation, TASC displays the ranges of each memory block: library, program, local and global variables, and the compiled addresses of each source line. A CTRL-D PR#1 command at the start of compilation sends all of TASC's output to the printer.

The Race That SpeedStar Wins. At the other end of the spectrum, SpeedStar, in its default configuration, will compile even a relatively large file in a matter of seconds. That's because the compiler is entirely memory-bound, unless you specify otherwise. If you wish, SpeedStar will list your program as it goes, showing the compiled address of each line as it encounters it. Following the compilation, SpeedStar displays the address and length of two blocks: the program and library together, and the variables. Entering PR#1 before you load the source program will provide you with a permanent record of the compilation.

Hayden's Compiler does its work almost as quickly as SpeedStar, though it has to go to disk occasionally during the process. Curiously, though the compiler sends the screen a running account of its every activity, it doesn't provide a convenient way to record this output on paper. At the end of the compilation, your screen will show the addresses and lengths broken down as follows: literals, constants, main code, runtime modules, end of binary file, scalar space, array space, string pool, and initial himem. Questionable or faulty parameter specifications show up on this map in inverse video.

Expediter, like SpeedStar, will display or print a running list of source program lines and compiled addresses. The same list includes the locations of all variables as they are compiled, and the amount of source code remaining.

At the end of the compilation, statistics are displayed or printed: a symbol table; the start, end, and length of procedure, global data, and local data; the number of lines compiled; the number of variables; the number of data statements; the amount of temporary storage used by Expediter; and the number of forward references resolved during the compiler's final pass. The compiled code may be unreliable if the last figure exceeds 600. Expediter now has an option to pause on fatal errors; otherwise the compiler merely identifies them and moves on.

Conclusions. All of the compilers perform as advertised. For general use, and for programs involving heavy floating point calculations or integer variables only, our recommendation would be to try Microsoft's TASC compiler. While it's not the fastest compiler, it usually has the most compact object code, it is the easiest to use (especially when declaring local and global variables for chaining programs), and it comes with excellent documentation. Its only major drawback is that it compiles programs very slowly.

Both Einstein's Expediter II and Hayden's Applesoft Compiler produce slightly faster code for all but those pro-
grams using an extensive amount of integer math. *Expediter* excels in string manipulation. Yet they are both less convenient to use than *TASC*. They require much disk-swapping on one-drive systems, and in Hayden's case, requires a system boot before every compilation. Code expansion is normally more than double with both programs, although there is a memory compression option on the new *Expediter* that can produce object code only 1.5 times the length of the original Applesoft file. Large Applesoft files may or may not be a problem with either compiler.

*SpeedStar*, unfortunately, produces moderately slow compiled code. Large files will simply not compile, due to a large expansion of the object file. This is frequently true even when using the compile-to-disk option. *SpeedStar*, however, is very easy to use, and compiles faster than the rest. It has the advantage that it can reside in the Apple's memory in a transparent way, and can do its job in a matter of seconds. And yet only in rare cases would its advantages outweigh its disadvantages.

In sum, do not expect any Applesoft compiler to provide the best of both worlds. You sacrifice size for speed, or vice versa. They are helpful in programs that are marginally slow, but cannot help games that need to run in Real Time. For help in this area you will need to learn to program in Assembly Language.

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**NOTE:** This Apple Compiler report is an update of an article that originally appeared in *Softalk Magazine* (September 1981). Reprinted with the kind permission of *Softalk Magazine*.

## APPLESOFT COMPILERS

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<th>SPEEDSTAR</th>
<th>EXPEDITER II</th>
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<tr>
<td>MANUFACTURER</td>
<td>Hayden</td>
<td>Microsoft</td>
<td>Southernwestern Data Systems</td>
<td>The Einstein Corp</td>
</tr>
<tr>
<td>PRICE</td>
<td>$175</td>
<td>$160</td>
<td>$135</td>
<td>$150</td>
</tr>
<tr>
<td>LANGUAGE</td>
<td>Machine Code</td>
<td>Compiled APPLESOFT</td>
<td>Machine Language</td>
<td>Machine Language</td>
</tr>
<tr>
<td>FORMAT</td>
<td>Two-16 sector disk</td>
<td>One-13 sector disk, can be copied to 16 sector</td>
<td>One-16 sector disk: + hardware key, plugs into paddle ports</td>
<td>One-16 sector disk</td>
</tr>
<tr>
<td>LICENSE TO USE COMPILED PROGRAM</td>
<td>Yes</td>
<td>Free</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>SPEED OF COMPILATION</td>
<td>Fast</td>
<td>Very Slow</td>
<td>Very Fast</td>
<td>Slow</td>
</tr>
<tr>
<td>SPEED OF PROGRAM</td>
<td>4-6 times</td>
<td>3-5 times</td>
<td>2-3 times</td>
<td>4-7 times</td>
</tr>
<tr>
<td>SIZE OF COMPILED PROGRAM</td>
<td>2+ times</td>
<td>1.5 times</td>
<td>2.5 - 3.0 times</td>
<td>1.4 times</td>
</tr>
<tr>
<td>SIZE OF RUN-TIME LIBRARY</td>
<td>3.3K</td>
<td>4K</td>
<td>2K</td>
<td>2.3K</td>
</tr>
<tr>
<td>INTEGER OPTION</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CHAIN PROGRAM</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>OVERLAY VARIABLES</td>
<td>Yes, but cumbersome</td>
<td>Yes, easy</td>
<td>Yes</td>
<td>Yes, easy</td>
</tr>
<tr>
<td>INTERFACE TO APPLESOFT PROGRAM</td>
<td>No</td>
<td>No</td>
<td>Yes, object code can be APPLE-SOFT subroutine</td>
<td>No</td>
</tr>
<tr>
<td>DOCUMENTATION</td>
<td>27 pages, 3-ring binder</td>
<td>97 pages, 2 ring binder</td>
<td>54 pages, 3 ring binder</td>
<td>30 pages, paper cover</td>
</tr>
</tbody>
</table>
Galfo Systems has introduced an Integer Basic compiler that produces very fast and efficient machine code on the Apple II. While many may wonder why anyone would want to write code in as limited a language as Integer Basic, this compiler may provide the reason. First, the code is fast. Galfo claims seven to fifty times decrease in program execution time (consider ten times as a realistic average). Second, the code expansion is kept to a minimum; often it is less than twice the memory required for the Integer Basic Interpreter and can be closer to the same size if compiled under the least-memory-usage option rather than minimum speed. Third, this compiler has added many extensions that interpreted Integer Basic lacks. It supports Hi-Res graphics, strings longer than 255 characters, and the CHR$ function. Fourth, it allows you to overlay memory so that variables can share the same locations.

### SPEED & SIZE TESTS

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<th>MICROSOFT TASC</th>
<th>TASC INTEGER</th>
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<th>EINSTEIN EXPEDITER II+</th>
<th>SDS SPEEDSTAR</th>
</tr>
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<tr>
<td>1000 Prime Numbers</td>
<td>1</td>
<td>4.9</td>
<td>10.8</td>
<td>5.1</td>
<td>7.3</td>
<td>3.1</td>
</tr>
<tr>
<td>Deal &amp; Evaluate 100 Random Poker Hands</td>
<td>1</td>
<td>3.2</td>
<td>--</td>
<td>3.8</td>
<td>3.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Matrix Invert</td>
<td>1</td>
<td>3.0</td>
<td>4.6</td>
<td>4.9</td>
<td>5.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Sort Numbers</td>
<td>1</td>
<td>3.5</td>
<td>8.1</td>
<td>4.8</td>
<td>5.0</td>
<td>2.4</td>
</tr>
<tr>
<td>String Comparison &amp; Sort</td>
<td>1</td>
<td>3.6</td>
<td>7.9</td>
<td>5.0</td>
<td>5.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Kilobaud Test</td>
<td>1</td>
<td>3.0</td>
<td>4.9</td>
<td>4.4</td>
<td>4.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Includes Integer Arithmatic Subroutine Call and Comparison</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Average Shape Of A Waveform</td>
<td>1</td>
<td>2.9</td>
<td>9.1</td>
<td>4.2</td>
<td>4.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Compile Little Brickout</td>
<td>28</td>
<td>39 Sectors</td>
<td>--</td>
<td>60 Sectors</td>
<td>48 Sectors</td>
<td>60 Sectors</td>
</tr>
<tr>
<td>Including Runtime Library</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compile Yahtzee</td>
<td>45</td>
<td>75 Sectors</td>
<td>--</td>
<td>100 Sectors</td>
<td>65 Sectors</td>
<td>unable to compile due to size</td>
</tr>
<tr>
<td>Including Runtime Library</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### INTEGER BASIC COMPILER

**Company:** Synergistic  
**Language:** Machine  
**Hardware Requirements:** 48K  
**Sugg. Retail:** $150.00  
**Availability:** 2  
**Disk:** Disk*

**OVERALL RATING**  
**EASE OF USE**  
**VENDOR SUPPORT**  
**DOCUMENTATION**  
**ERROR HANDLING**  
**RELIABILITY**  
**USEFULNESS**  
**VALUE FOR MONEY**  

*Galfo Systems has introduced an Integer Basic compiler that produces very fast and efficient machine code on the Apple II. While many may wonder why anyone would want to write code in as limited a language as Integer Basic, this compiler may provide the reason. First, the code is fast. Galfo claims seven to fifty times decrease in program execution time (consider ten times as a realistic average). Second, the code expansion is kept to a minimum; often it is less than twice the memory required for the Integer Basic Interpreter and can be closer to the same size if compiled under the least-memory-usage option rather than minimum speed. Third, this compiler has added many extensions that interpreted Integer Basic lacks. It supports Hi-Res graphics, strings longer than 255 characters, and the CHR$ function. Fourth, it allows you to overlay memory so that variables can share the same locations.*
The compiler's processing procedure is fairly simple. It takes programs output from in the Integer Basic Interpreter as input, then checks for proper syntax, after which it compiles the codes into either one of two forms. Galfo has developed a stack-oriented code called GSL (Galfo Stack Language). It is much more efficient than Pascal's P-code. It optimizes program execution speed by employing data exchange procedures and manipulation of the 6502 stack. It also achieves enhanced speed by using special op-codes to handle common Basic statements and by incorporating an improved 16-bit arithmetic capability. Additionally, the computer's generation of mixed GSL and 6502 code is used for maximum speed. Mixed code is 20-50% faster than pure GSL code; however, pure code takes much less space.

Space problems are the usual bug-a-boo of most compilers. This one does require a run-time module that normally resides at location $8800 and is $800 bytes long. The module can be relocated to any page boundary by a memory move. It is completely transparent to the user. The compiled Integer Basic program will load this module if it isn't already in memory; the compiled program can then be moved adjacent to the run-time module and saved together as one file. The compiled program can also be relocated at run-time. In addition, one can alter the setting of LOMEM. Normally, the compiler begins allocating memory at $800. One might want to establish allocated memory at a higher location if machine language routines reside in the bottom end of memory.

Speed is probably the prime consideration for using the compiler. While increased speed is often determined by program length and what functions are performed during arithmetic processing, it is safe to state that on the average a 10 times increase in speed can be realized. Obviously, long programs that have branches to line numbers and subroutines located near the end of the program would run faster than the stated average. We tested this assumption by performing several speed tests. The first one involved doing a factorial calculation with carry-over digits. The exponential/regression calculation, 50! (i.e., 50 x 49 x 48 ...), expands into a series of descending-value cascade iterations (This algorithm involves numerous multiplications, divisions and additions.). Integer Basic took 47.2 seconds, the compiler 5.6 seconds. The source code occupied 675 bytes, the compiled code, 1258 bytes. When compiled for optimum space, it took 682 bytes and 5.9 seconds to execute. As a worst case, we compiled a Lo-Res program that output a random blue dot on the screen, tested to ensure that the space hadn't been used before, then output another one to the display until all 1600 dots filled the screen. We discovered that around 11,000 execution cycles were required. We inserted 1600 print statements for tracking the program's progress. The original program took 156 seconds, the compiled version 51 seconds. This is a paltry three times increase in speed; however, this result can be attributed to the extensive use of Integer ROM routines and 1600 print displays to the screen. The benchmark tests that the system supplies for a sample program produce results showing 10 times the throughput at maximum speed and 8 times that figure when optimized for space.

The compiler's extensions are quite nice. They use the DSP specification to access commands which are designated by keywords. For example, DSP HI turns on Hi-Res graphics. To draw a line from screen locations 10,12 to 260,140, one would write DSP LINE: PLOT 10,12; PLOT 260,140. Hi-Res shape tables are also supported, as well as the primary six colors. Other DSP functions are HOME, INVERT, FLASH, MIXED, LO, and H2. Additional functions are GET(0) and KEY(0) for detecting if a key has been pressed and which key it is. The CHR$ (0(expression), and extensive string manipulation with strings longer than 255 characters are also included in DSP's repertoire.

As to be expected, the program isn't the ultimate panacea for programmers. We've found that one can't chain compiled programs together because when the second program starts, it initializes the variables. The user should be aware that Integer Basic does not initialize variables to zero. This is a user responsibility because the compiler doesn't initialize them, either. However, it does manage to initialize non-array elements to zero.

The compiler resides on two protected disks. One is the system disk, the other contains the compiler, itself. The run-time module and several sample programs, (including one in Hi-Res) can be transferred easily. The documentation is very clear; it defines all functions of the Basic Integer Language and how the compiler handles them. While we were not impressed with any of the Applesoft compilers, we would whole-heartedly recommend this integer compiler.
Languages

LAZER PASCAL

Company: Lazerware
Language: Assembly
Hardware Requirements: 64K

OVERALL RATING C
EASE OF USE B
VENDOR SUPPORT B

DOCUMENTATION C-
VISUAL APPEAL C
ERROR HANDLING C

RELIABILITY B
USEFULNESS C
VALUE FOR MONEY C-

Lazer Pascal is a curious mixture. On the one hand, it bears a strong resemblance to standard Pascal. On the other, it seems to be a machine language/monitor program. Be advised that in the first instance it is a "tiny Pascal." Some of the more common features of a full Pascal are missing: no real numbers are allowed, no TYPE definitions are permitted, and no records or sets are allowed.

The author of Lazer Pascal defines the language as "a systems programming language." He further states that "it is not intended for applications, business, or scientific programming." This is a fair assessment, but not something you would expect to find out after you had purchased the program and started to dig into the voluminous and hard to follow manual. Another surprise awaiting the purchaser of Lazer Pascal is the sales pitch given for another product by the program's author. Anix, an operating system, "is highly recommended," and the manual for Lazer Pascal "assumes that you know how to use" that system.

Included on the two-sided disk are the compiler and a simple editor for creating Pascal source programs. Incidentally, the manual for the editor fails to disclose how one terminates an insertion, and you won't get very far if you don't know how to do that (try shift-control-P). System programmers may indeed find some value in this language, especially the extensions that have been added which permit examining memory addresses directly from a Pascal program. The average Apple user probably won't get very far with these extensions.

INTRODUCTION TO FORTH

FORTH is a structured language that is ideally suited for systems and applications programming on a microprocessor system. Because FORTH is usually several times faster than BASIC interpreters, it provides considerable advantages for any application where execution speed is important, such as data acquisition, process control, animation, and video games.

The basic element of the FORTH system is termed a "word," which is comparable to a subroutine or a function key on a calculator. To perform a function, you simply type the word. For example, typing BELL followed by a carriage return will ring the system bell. Before a word can be executed, it must have been defined in the FORTH "dictionary." The dictionary is a linked list of words containing each word's name and its actions.

Like many calculators, FORTH uses Reverse Polish Notation (RPN) and Last-In First-Out (LIFO) stacks to process arithmetic expressions and manipulate data. Therefore, arithmetic expression must be specified in RPN, with the arguments preceding the functions. For example, typing 2 3 + will leave a 5 on top of the stack. The + is the name of a word that adds the first two values on the stack and leaves the result on top of the stack.

Programming in FORTH consists of defining new words in terms of words already included in the dictionary. These new words can be tested and then used to define even more complex words until finally the most complex word becomes the application program. There are several ways to define new words and remove old words from the dictionary. The language even provides a facility for defining words whose function is to define words! This extensibility allows you to tailor the language to your own needs.
TRANSFORTH II states in the introduction that “Although there are some structural similarities, TRANSFORTH II differs from other available FORTH languages. Among the differences are that floating-point numbers and scientific functions are available, a sophisticated data structure and operating system are provided and the programs created with TRANSFORTH II are fully compiled for maximum speed”. It is very true that it differs from the 79-Standard. Several non-standard word names are used. Therefore, TRANSFORTH programs will probably not run on other 79-Standard FORTH systems. There are no integer arithmetic operations; all math operations are performed in the floating-point format (Applesoft ROM routines are used). For many applications, this could slow things down. The data structures lack sophistication as compared to 79-Standard or “Fig-Forth”. The words, CREATE (or BUILDS) and DOES are missing; thus, you are limited to CONSTANT, VARIABLE and ARRAY specifications. Apple DOS is used and there is no BLOCK option. A vocabulary structure is not supported; additionally, there is no assembler. All input and output is done in base 10. This is a JSR-type FORTH; that is, JSR machine code is used instead of an address interpreter. Their editor is very similar to BASIC. It has an AUTO line number command, but no search or search-and-replace commands.

The documentation states that an Apple II is needed, but this is only true if an Applesoft ROM card is installed. Insoft should have specified that an Apple II+ is required, also, the disk will not boot directly into Transforth if a language card is installed. There is no mention of how to handle this in the manual.

An attempt was made to run the BYTE Magazine benchmark (Sept. 81, pg. 190). Several modifications to the routines were required. Compiling them caused the system to crash without any error message.

TRANSFORTH II comes in a three-ring notebook with 53 pages of documentation. Of these, two pages are devoted to the introduction, eight consist of a tutorial on the language, six explain how to use the editor, eight apply to data structures, two pertain to data display and transfer, two describe floating-point number operations and display (including a list of error messages), three apply to high and low resolution graphics and three pages involve internal structures. There is also a four-page “annotated dictionary”, which is more like a reference card than a full explanation of how each word is to be used, followed by a two page ASCII character chart with numeric equivalents. Finally, 11 pages of demo routines are included, along with a memory map.

This program appears to be a hybrid of FORTH, BASIC and an HP calculator, but most of the important features of each are missing, thereby limiting it's usefulness to the serious programmer.

FORTH DEVELOPMENT SYSTEM

This adaptation of the FIG-FORTH 1978 model to the Apple II includes a screen-oriented editor and Bill Rassdale's 6502 built-in assembler with macro capability. Included is a well-written 131-page manual. Example screens are provided for Apple-specific functions such as Lo-Res graphics and tone generation. It is Hi-Res-compatible, but no plotting functions are supplied. It has 16-bit integer math, with double-precision math provided. There is no way to enter the important left-square bracket (“[”), even though it is documented in the glossary. A handy FIG-FORTH reference card is included. The glossary is complete but difficult to use as a reference manual because there is no way to look up words by their function. Little information is given about the FORTH internals. There is a memory map. Apple DOS is not used and the disk access is quite fast. The disk is only 13-sector compatible and is not locked. While this FORTH has been available for over a year, there has been no on-going software support for the user in the form of enhanced software packages, newsletters, etc. There is a direct Hotline to the system developers. You may call for 15 minutes of free advice; after that the charge is $50 per hour.

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GraFORTH is a powerful language for working with both two and three dimensional graphics. As a variant of the language FORTH, it is extremely fast, about half to a third as fast as machine language. Although GraFORTH compromises the language by exploiting the unique characteristics of the Apple, and by using standard DOS text files for source files, it is indeed a very powerful version and relatively simple to learn by non-FORTH users. It's use of "words" as part of the language, and the ability to create new "words" allows the user to customize GraFORTH to suit his needs. As a dialect of FORTH, it lacks BLOCK, DOES, VOCABULARY, IMMEDIATE, and some other features of regular FORTH.

The package comes with an extensive and well written 220 page user manual. The author, in an attempt to make the language user friendly, allows you immediately to begin typing commands that draw on the screen. There is also a program called PLAY that allows the user to take a three dimensional object and rotate it, reposition it, or scale it on any one of its three axes. There is a very commendable attempt to involve first time users rather than scare them off. There are even a number of impressive demos to show the capabilities of this package.

The usual method of entering programs is through a line editor. There are two versions of this editor, one for regular machines and one for 16K cards. The regular version allows storage of 2000 bytes of source code (50-100 lines). With 64K you can write a source file of 11,500 bytes. The line editor is somewhat similar to the BASIC editor but allows the insertion of characters within the line. There is also a renumber feature for these numbered lines. The editor is clumsy, so many users may prefer to use a word processor to edit these standard text files. Then, after these source files are written, they are compiled.

The two-dimensional graphics are similar to Applesoft Hi-Res, and have the following enhancement: colored diagonal lines are never broken in color. You can examine any of the Hi-Res screen's 49,152 points. There is a color fill mode, and you can either draw in the Or or EOR modes. All commands are by word: e.g. 50 25 PLOT 100 100 LINE will draw a line from 50,25 to 100,100. The language also supports Turtlegraphics as used in the LOGO language. It supports the MOVE, TURNTO, TURN, and MOVETO commands. Although you can specify any of 360 angles, the calculation actually supports only 256 different angles.

The language also supports character graphics; and, in normal text, supports lower case. There is even an editor for modifying character sets. These characters can be printed in any size and any color. These redefined characters or text characters can be mixed on screen with any two dimensional drawing.

Perhaps the best use of the language is for drawing and manipulating three-dimensional objects. This means that after defining shapes with an interactive image editor, they can be rotated, translated, positioned, scaled, and put in color. The image editor, while powerful, does not allow insertion or deletion of points except the one last worked on.

The user can use up to 16 shapes within a program. The objects can be manipulated by program or keyboard control. Although GraFORTH does not support paddle inputs, there is no reason why one cannot do a CALL to a user-defined machine language routine that will read the paddle. There is even a reference to such a routine on pages 5-31. One of the unique features of this language is the ability to retain perspective control in a three-dimensional shape. There is a scale factor in the Z axis that allows the user to adjust the perspective to his liking.

GraFORTH has many uses but the most suitable is for 3-D arcade game design. The software can be incorporated into one's commercial product at no cost: only written permission is required. The package is not copy protected and is clearly documented so that it doesn't interfere with your code. I should mention that the package also includes a very fine music editor for including music in your programs. In summary, this package is one of the most powerful and user friendly packages on the market. Its ability to produce compiled, FORTH-like code that is nearly as fast as machine language makes this product very worthwhile as a development tool.
**FORTH-79, VER. 2**

- **Company:** MicroMotion
- **Language:** Assembly and FORTH
- **Hardware Requirements:** 48K
- **Sugg. Retail:** $99.95
- **Availability:** 2
- **Disk or Tape:** Disk

*Forth-79 Version 2* is an upgrade of their original package. The most notable improvements have been the addition of Hi-Res graphics and floating point arithmetic. At this time, this is still the only version of FORTH for the Apple that conforms to the International FORTH-79 STANDARD. The FORTH dictionary comes with more than 400 words. It has 16 and 32-bit integer arithmetic operators, including +, -, /, MOD, and MOD. The 32-bit integers can handle a range of $-2,147,483,648$ to $2,147,483,647$, and can be printed in the dollars and cents format. You can create your own special data types with the words CREATE and DOES. There are string commands similar to Applesoft BASIC. Lo-Res graphics words are provided for plotting and line drawing. Memory is reserved for Hi-Res page one. There is an option package that includes Floating-Point Arithmetic and Hi-Res Turtlegraphics. The floating-point vocabulary uses the 32-bit format of the 9511 processor; and log, trig, and hyperbolic functions are included as well. Floating-point numbers can be displayed with a floating decimal or in scientific notation. The Turtlegraphics vocabulary is similar to the one in Apple Pascal. You can set up a VIEWPORT that clips any drawing outside a specific area. In addition to the normal color choices there are colors such as REVERSE, NONE, and WHITE1 and WHITE2, which allow you to draw true white vertical lines. There is no facility to output Hi-Res text.

The editor is a full screen editor with 27 editorial commands. Editing is done in the standard format of "screens" of 16 lines by 64 columns. The command keys and screen display are very similar to PIE Writer from Hayden, but can be redefined to correspond to the editor to which you are accustomed. There is a provision for lower case entry and 80-column cards.

A 6502 assembler with macro capability is included. The macros are created using the full facilities of FORTH for calculating, branching, looping, etc. The assembler uses numeric labels for branching and looping. Also, a structured approach is used with words like IF, ELSE, and THEN. The assembler is useful for writing small time critical-routines.

The operating system allows multiple disk drives. It is not compatible with the Apple DOS files, however. Disk access is quite fast. Disk is semi-locked; that is, it cannot be copied with the Apple COPYA program, but the "Grandfather" disk allows you to make as many working disks as you like.

All registered owners receive periodic mailings which contain errata notices, bug fixes, applications notes, and new product announcements. Overall, this is the best of the FORTH language implementations on the Apple.

**THE VISIBLE COMPUTER: 6502**

- **Company:** Software Masters
- **Language:** Assembly
- **Hardware Requirements:** 48K
- **Sugg. Retail:** $49.95
- **Availability:** 6
- **Disk or Tape:** Disk

*The Visible Computer: 6502* combines a 140-page tutorial with thirty progressively more difficult disk programs as a package instruction which leads the beginner, step-by-step, in understanding and using the fundamental concepts of Machine language programming.

Chapters 1 through 3 are preparatory background on what Machine language is, binary and hexadecimal numbering systems, and computer hardware. Later chapters acquaint you with The Visible Computer (TVC) including boot up procedure, display terminology, parts of TVC, and general rules for entering commands; it also shows methods of examining and changing memory contents.

Chapter 15 provides three programs which illustrate the main purposes for using Maching language—sorting, Hi-Res graphics, and tone generation. Chapter 16 concludes the tutorial by providing you with a suggested reading list, a list of available Assembler and Machine languages, and pointers to further your skill in Machine language programming.

The package is one of the best on the market. Documentation is clear, the learning progression is logical, and the display is visually appealing. This is definitely a good buy for the beginning Machine language programmer.
RELOCATING LINKING LOADER
AND LANGUAGE PLUS+ (2 volumes)

Company: Micro Lab Inc.
Language: Machine
Hardware Requirements: 32K

OVERALL RATING EASE OF USE VENDOR SUPPORT
C B C

DOCUMENTATION VISUAL APPEAL ERROR HANDLING
B C B

RELIABILITY USEFULNESS VALUE FOR MONEY
B C C

The Relocating Linking Loader and the Language Plus+ utility programs are purchased as a twin-pack and come as two individual disks. Procedures for their use are amply detailed for the experienced programmer in a two-part operator’s manual. The RLL program allows you to establish and maintain a versatile library of handy utility routines. These can be loaded into different memory locations and can be conveniently linked into a larger program or programs.

The RLL program was originally designed for use with the Language Plus+ programs, enabling you to select desired modules from an already established library of Ampersand routines and to combine them into a single Binary file on the disk suitable for use with your own Applesoft programs.

The RLL has two separate functions: a relocation function and a linking function. The relocation process involves the construction of a memory map based on the numbers and sizes of the modules you plan to include in the output file. Once loaded, the files are automatically scanned. Each module is examined to identify any addresses and/or internal pointers that must be changed. The addresses and pointers are then recalculated and rewritten into the file. The RLL program was designed to be used in conjunction with relocation files generated by the Apple DOS Toolkit Editor/Assembler. Turning to the linking process, it involves only those modules that include references to other modules. For example, the modules used to construct one large program might need to share some variables contained in yet another module. You can use the linker to resolve all of the addressing problems involved in this kind of operation.

The handiest feature of this program is the summary, which provides a CRT screen or line printer output representation of the memory map filled in with all of the file names, addresses, and labels used by each module. This data can prove to be an indispensable aid in debugging newly created modules. The Language Plus+ disk consists of twenty utility program routines which are invoked by the use of the Applesoft Ampersand (&) command, hence their name “Amper” routines. Operational Notes describe how each of the routines function when you invoke them. Programming Notes provide hints on how to best use the routine in question.

Amper CATALOG  Amper INSTRING
Amper COMPACT  Amper INVERT
Amper DATE CONVERT  Amper KEYIN
Amper DEALLOCATE  Amper MATCH
Amper FIX  Amper QUICKSORT
Amper FREE MEMORY  Amper STRING LEGAL
Amper GARBAGE COLLECT  Amper SUBSTRING
Amper HELLO  Amper SWAP
Amper INPUT ANYTHING  Amper TRIM
Amper INPUT/OUTPUT  Amper WORD
CLOSE
CREATE
OPEN
READ
WRITE

Although clearly not for the novice, these two programs are handy tools for the seasoned programmer to have available in his software library. The documentation included in the twin-pack is adequate and clearly stated. Numerous examples are provided to assist you through those areas which could prove to be too confusing or difficult.
**DESK CALCULATOR II**

**Company:** Telephone Software Connection  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING** A  
**EDUCATIONAL VALUE** N/A  
**VENDOR SUPPORT** B  
**EASE OF USE** A  
**DOCUMENTATION** B+  
**ERROR HANDLING** A  
**RELIABILITY** A  
**VISUAL APPEAL** B  
**VALUE FOR MONEY** A

This is the most comprehensive calculator program available. It literally turns your Apple into a pocket calculator that has functions ranging from trigonometry and statistics to metric-decimal and hexadecimal-decimal conversions.

The display is a graphics representation of a large pocket calculator. The left hand side is the main calculator with alphanumerical display at the top. The right hand side shows 10 memories and 12 keys that can be redefined by the right arrow key.

These keys include statistics — both one and two dimensional arrays, factorials, permutations and combinations; rectangular to polar conversions; degrees to radians; trigometric, hyperbolic and logarithmic functions. There is also a comprehensive series of metric-English conversions and for computer programmers decimal to hexadecimal conversions and the display of the HI and LO bytes of the address. The program allows user-defined functions and during normal calculations allows the use of parentheses for evaluating simple expansions like 6*(3+4) = . If a print-out of the calculations is needed, the printer can be toggled from within the program.

The program is completely self-documented. It has an excellent error checking routine that will indicate an error in the display for impossible calculations.

**MATHEMAGIC**

**Company:** International Software Marketing  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING** B  
**EDUCATIONAL VALUE** B  
**VENDOR SUPPORT** B  
**EASE OF USE** B  
**DOCUMENTATION** B  
**ERROR HANDLING** A  
**RELIABILITY** A  
**VISUAL APPEAL** A  
**VALUE FOR MONEY** B+

MatheMagic is just what everybody claims to want — a way to turn the Apple into a super calculator. The program allows you to create free form expressions (equations) which are up to 240 characters in length using standard math symbols and conventions. It allows you to pre-define variables, or have the system ask for a value each time the expression is calculated. The program contains pre-defined functions for trig and log conversions. It also supports base conversions (i.e. hex to decimal, decimal to hex).

When calculating an expression, you can request that each calculation that the system performs in solving the problem be shown; or you can let it run quickly to completion. You can change variables, or change the expression itself, allowing you to do a certain amount of “what if” evaluation.

You can store equations and/or variables to disk for later use. The program has the ability to pass or receive information from outside programs or data.

The display is well laid out on the screen, providing you with a menu for the operations currently being performed and a display of the current expression, as well as a “workspace” where the actual calculations are performed.

The program is easy to use because it includes several help displays which can be activated at any time during the program’s operation. The documentation is reasonably complete, and includes a set of sample application and technique guides useful in learning the program.

All in all, this reviewer feels that MatheMagic has potential in two areas: first, for those who wish to have a sophisticated calculator-like program; but, more importantly for the student, to have the step-by-step evaluation method available, enabling him to see how a problem is solved — extremely valuable in the learning process. An additional feature that is supported in this mode (step-by-step) is the printing of these steps on the printer for later review.

In summary, as educational programs go, this is an excellent package. It seems to be well written, reliable, and, does what it claims to do.
mSPEED system contains essentially three packages. First and foremost, mSPEED supplies an arithmetic processor board to handle all integer and floating point calculations. Secondly, it provides Applesoft and Pascal booster diskettes for booting up Applesoft or Pascal to utilize the arithmetic processor. Finally, mSPEED offers a FORTH language system coupled with the arithmetic processor board. All of the above features are excellent, and any one justifies the cost invested in the system.

The documentation is readable, color-coded, complete, and fully indexed. There are some minor holes in the documentation, but nothing so serious that a few hours of actual use can’t solve. Examples are clear and well explained; they show the novice how to apply the concepts of FORTH to problem solving. But I found a knowledge of Hewlett-Packard calculator programs helpful, as well as some previous exposure to FORTH programming.

The advantage of this FORTH over many others is its ability to quickly handle single and double precision integer calculations, both high and low resolution graphics, and floating point calculations involving, for instance, sines, cosines, squaring, and other exponentiation. Once you understand the theory of stack operations, and as long as you remember that the floating point stack can only contain four values, programming is simple and straightforward.

As if this weren’t enough, the text editor is superb. Two editors come with the program. The line editor lists or deletes a specific line using the Apple edit commands, inserts lines, finds a specific string in the text, and changes a string. The screen editor displays a full page of text and allows you to edit anywhere on the screen with the use of twelve Control codes. Both have their individual advantages and are helpful for inputting and editing a file.

The graphics verbs (call statements) are self-explanatory. mSPEED conveniently uses the same verbs as Applesoft. Moreover, Turtle graphics verbs are also available.

The two booster diskettes come without instructions, but they are easy to use. Instead of booting with the standard system master diskettes, you should utilize the appropriate Booster diskettes. However, to use either of the Booster diskettes, a language card must be available for the storage of Applesoft and Pascal. Once you have installed this card, the system appears exactly as any other Apple II system. The BASIC statements are the same, and access to and from the disk is the same. In fact, programs predating your installation of mSPEED will still load and run. The increase in speed due to the arithmetic processor is amazing and must be seen to be believed.

Applied Analytics has brought the Apple II into the world of Real-time control, scientific number crunching, and simulation. This accomplishment, along with the superb documentation, copyable disks, and ease of use, makes this package a must for anyone who is tired of waiting forever for their BASIC programs (even when compiled) to run and yield answers.
CALFEX

Company: Interlaken Technology Corp.
Language: Applesoft BASIC
Hardware Requirements: 48K

OVERALL RATING  B+
EASE OF USE  B+
VENDOR SUPPORT  B
DOCUMENTATION  A
VISUAL APPEAL  C
ERROR HANDLING  B
RELIABILITY  B
USEFULNESS  B
VALUE FOR MONEY  B

CALFEX is a menu-driven software program intended for use by engineers, scientists, mathematicians, students, and others who deal with mathematical equations. It is a specialized program, so its value depends on your particular needs.

This program is targeted for the technician who has a frequent need to examine the “What If?” questions relative to an equation with a number of variables. It provides a preprogrammed format for problem solving and does a great deal of tedious work for you.

You enter your equations into the CALFEX format. You are then walked through the procedures, step-by-step, of identifying the variables, assigning labels, and determining input values. One or several sets of values can be stored and used later in the analysis activities. Simply pressing a few keys initiates the calculations and provides the answers. Entries can then be changed and the variables investigated. The labels are always displayed so you don’t have to remember which is which. Up to 120 independent and 120 dependent variables can be used as simple or array variables.

The software package is easy to use since everything is progressively accomplished starting from a single Main Menu. There are no unique symbols or commands to be learned or remembered. You soon learn to operate the program quickly and effectively without depending on the menus. Error trapping/handling is well thought out and has been designed into the software at the most appropriate places. Single key entries are the usual requirement, and are often made unnecessary by an automatic response to an acceptable data entry.

Progress through an equation can be easily and quickly documented via the printer function. Inputs and answers are printed complete with labels so anyone can read the printout. Space is provided to allow the addition of the user’s name, the date, and any additional comments. A very useful feature automatically provides maximum and minimum figures when you are using the Variable Exchange mode and there is no direct solution for your desired equation.

Other features that merit mention include user definitions and the inclusion and storage of frequently used constants, functions, and subroutines. Up to ten simultaneous equations can be solved. Numerical integration for any function can be performed. With this you can choose the limits for integration and decide on the number of intervals to be analyzed.

The screen presentations are adequate but unimaginative. Utility seems to be the primary thrust. The program is well documented, offers step-by-step instructions, and reflects a great deal of professionalism throughout. A large number of pictures reinforce the learning process as it progresses. Where necessary, you are diverted to detailed appendices for further explanation of a specific concept or technique.

The plush binder notebook contains the usual storage pockets for added notes and memos. A package of Log Sheets lets you record the theories behind the equations. The variables and explanations can be written down and maintained for future reference.

The program disk is copy-protected and cannot be backed-up. Interlaken Technology has, however, included a duplicate copy of the program disk on the reverse side of the master which can be used in the event of a problem with the original. This method of back-up protection leaves a lot to be desired.
\textbf{uCAP}

\textbf{Company:} Spectrum Software  
\textbf{Language:} Assembly  
\textbf{Hardware Requirements:} 48K

\begin{tabular}{l|l|l|l}
\hline
OVERALL RATING & B- & DOCUMENTATION & B- & RELIABILITY & B- \\
EASE OF USE & A- & VISUAL APPEAL & N/A & USEFULNESS & C+ \\
VENDOR SUPPORT & B- & ERROR HANDLING & B- & VALUE FOR MONEY & C \\
\hline
\end{tabular}

\textit{uCAP} allows you to analyze various types of electronic circuits. The analysis includes transient analysis and ac/dc analysis. The major advantage of this package is its simple presentation of circuit development. The graphics are excellent, showing you the circuit as it is being developed. The other advantage is the database that comes with the package. Although the database does not list all of the latest components, it includes a good variety.

The major disadvantages of the package involve its limited error handling capability and its use of a game paddle jumper. Because many of the devices are multi-input devices (transformers, op amps, transistors, etc), there are certain conventional connections for these devices. A crossed connection will result in errors which are very difficult to trace, especially if transformers are used.

A protection key is included which jumps the game paddle I/O port. If you have used this port to give upper/lower case capability in \textit{Wordstar} or other text editors, then every time \textit{uCAP} is run, the jumper for the text editor must be disconnected. Thus, the Apple II cannot accommodate \textit{uCAP}, and I found this very inconvenient since I use the text editor frequently. The directions did not indicate any alternatives to this procedure.

Overall, the program is well thought out and provides a valuable service to those interested in analog and electronic circuits. It will not perform digital circuit analysis. Aside from its drawbacks, the package would be helpful to any engineer working on circuit design.

\textbf{LOGIC DESIGNER/LOGIC SIMULATOR}

\textbf{Company:} Spectrum Software  
\textbf{Language:} Applesoft  
\textbf{Hardware Requirements:} 64K

\begin{tabular}{l|l|l|l}
\hline
OVERALL RATING & B & DOCUMENTATION & C+ & RELIABILITY & B \\
EASE OF USE & A- & VISUAL APPEAL & B+ & USEFULNESS & A \\
VENDOR SUPPORT & B+ & ERROR HANDLING & B & VALUE FOR MONEY & B \\
\hline
\end{tabular}

\textit{Logic Designer/Logic Simulator} is a good, solid program which allows the design and simulation of digital logic circuits. Like most Spectrum Software, it does exactly what it says it will do and does it well (if not always in the most elegant or professional manner). \textit{Logic Designer/Logic Simulator} will appeal mainly to the engineer who cannot afford to run a digital simulation on a mainframe computer, but the program also offers some intriguing possibilities as an educational aid.

The logic simulator part of the package is the heart of the system, and allows the user to simulate a logic circuit consisting of up to 999 gates and 18 digital source patterns. It can monitor the digital output of up to 34 (CRT) or 70 (printer) nodes, accommodate 16 user-defined logic gates, and add 16 shift registers of up to 32 bits each to the simulation. The logic gates directly supported are NOR, NAND, EXCLUSIVE-OR, OR, AND, D FLIP-FLOP, T FLIP-FLOP, and JK FLIP-FLOP. The input of any circuit or source pattern is made easy by the well designed editors. Running a simulation is also simple, and produces a table showing the state of all monitored nodes for each clock time. Simple circuits run very quickly and, according to Spectrum Software, even the most complex circuit should only take 2 to 3 hours to simulate (for 256 sequential clock hours).

The real power of the software, however, is in the logic designer. This part of the program creates a "breadboard" of 6 high resolution pages, each holding 77 logic gates. Pages can be interconnected so that a large circuit can be graphically constructed. The editor lets you place and interconnect all logic components. In addition, the entire circuit can be saved to disk and used as the input for the logic simulator part of the program.

The documentation provided with \textit{Logic Designer/Logic Simulator} is very good on the technical aspects of the program, but is curiously deficient in one or two places. For example, the manual tells you to boot the disk and pick
any option, but does not mention the fact that you must initialize a data disk and that this can only be done from one particular option. Also, there is no mention that disk initializing takes from 2-3 minutes. I was convinced that the program had bombed before the initialization was complete.

The program itself lacks some polish. A little more concern for error trapping, and a little more attention to error messages would be appreciated. The program would also benefit from the use of a fast DOS. The program disk is copyable for backup purposes, and Spectrum Software should be commended for that.

Educators might also find the program interesting. Logic Designer/Logic Simulator could be used to test whether a student can predict the output from simple logic circuits, or could be used as an inexpensive alternative (or preliminary) to a digital logic design lab.

**FAST FOURIER TRANSFORM**

**Company:** CompuDyne  
**Language:** Applesoft  
**Hardware Requirements:** 32K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>B+</th>
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<th>RELIABILITY</th>
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<td>VENDOR SUPPORT</td>
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<td>VALUE FOR MONEY</td>
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*Fast Fourier Transform* performs a Fourier transform on a set of points. The points may represent amplitude versus time, or may be frequency components. An inverse transform is provided, and the program properly handles the complex component of any frequency components. Both the input points and the resulting transform are plotted on the high resolution screen. Since the Fast Fourier Transform algorithm requires the number of data points to be equal to a power of two, larger data sets are limited to 128, 256, and 512 points. Little attempt, however, seems to have been made to accommodate large data sets, and 256 is the limit for a 48K machine.

Other utilities included with the main program help to create data from functions, and to convert *Appleplot* data files to *Fast Fourier Transform* data files and vice-versa. The execution speed of the program is slow (90 seconds for 128 points, 4 minutes for 256 points). This is almost inexcusable since public domain Fourier transform routines are available for the Apple which transform 256 points in 3 seconds. Nonetheless, *Fast Fourier Transform* is a nice (if slow) scientific math utility. One easy improvement to the program is to compile it. After having compiled the program using the TASC compiler, the execution time was cut in half.
**THE SOURCE**

**Company:** Source Telecomputing  
**Language:** N/A  
**Hardware Requirements:** 48K, modem, printer

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<th>DOCUMENTATION</th>
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**The Source** is a timesharing system, rather than a specific program, for microcomputers. With this system, you have access to a large number of programs and databases housed in several mainframe computers located in Virginia. The $100 price noted above is the signup charge, which gives you a manual and a password. In addition to this, there is a $10.00 per month subscription fee and hourly charges which vary by time of day, data storage fees, and baud rate used. Both 300 and 1200 baud are available through the local TYMNET or TELENET data network. The Source is a subsidiary of The Reader’s Digest Association, Inc.

There are many features of The Source. These include several modes of communication: electronic mail, chat (realtime conversations), post (a public bulletin board), voicegrams, and mailgrams. The information services included: Source*Plus (added cost features), business databases, shopping by catalog, education and careers, government and politics, home and leisure, news and sports, science and technology, and finally, travel, dining, and entertainment.

The Source*Plus features Media General, a way of obtaining historical and current performance comparisons for common stocks. The commodity News Service tracks activity in the major future markets. Management Contents, Ltd. makes abstracts available from 27 business publications. Comp-U-Star is a discount catalog electronic shopping center.

With the business programs you are able to access current stock information and create portfolios that may be kept up to date on a daily basis. In addition to those functions available through Source*Plus, the Unisox database of UPI is available. Command files will access this database automatically. For general information, The Source accesses the UPI business news and obtains opinions from Raylux Financial Services. In addition to the Comp-U-Star database, you are able to use the Source to barter, order records and tapes, order books, and get tapes of classic radio programs. There are educational programs ranging from simple counting drills to sophisticated computations in math and science. Methods of obtaining college financial aid are on The Source for callup. Finally, for employers to access, there is a database of resumes of people looking for work. You can keep track of the government on a daily basis through many of the UPI entries. If you wish, you may even set your computer up as a teletype and get a running UPI newswire on your desk (of course, computer hookup costs will be running!). Further, many games may be played through The Source. There is also a home medical guide where you respond to a variety of general questions and the computer returns descriptions of various ailments. Should you be interested in traveling, The Source can help you plan your trip. Both international and domestic air schedules are in the system. When you have your trip set up, there is a travel club through which you make your reservations and get the tickets via regular mail. Once at your destination, use The Source to find a good restaurant or learn about what local wine to order. For after dinner entertainment, you may consult The Source for the latest movie reviews. If you are interested in doing something out of the ordinary, The Source allows you to create your own files and programs in several languages. Text editing may also be performed, with very professional results. Some users offer other services, such as typesetting, so using The Source you can write, edit, check for spelling, and then transmit to a typesetter. You will be returned a camera ready copy of your work. The Source also encourages public use of the system for information exchange. To that end, they have set up a public area where users establish “magazines.” As other users read the material, the original publisher is credited with a royalty from the reader’s usage fee. The Source is now experimenting with a computer conferencing capability termed PARTICIPATE. It is only now in the experimental stage, but promises to provide users with common interests a forum for conferencing and exchanging ideas.
COMPUSERVE

Company: Compuserve
Language: N/A
Hardware Requirements: 48K, modem, printer helpful

OVERALL RATING: B
EASE OF USE: B
VENDOR SUPPORT: B
DOCUMENTATION: D
ERROR HANDLING: D
RELIABILITY: B
USEFULNESS: A
VALUE FOR MONEY: A-

Compuserve Information Service is a subscription service which any microcomputer owner can use if he has a modem and has received his password from a Compuserve representative. Like The Source, Compuserve has a one-time subscription fee. At the present time, the fee for a non-prime time user is only $39.95, and thereafter you are charged $6.00 per hour for on-line service. Non-prime time is reckoned to be after business hours, or after 6 pm in your particular time zone.

The hourly fees of Compuserve are less than those charged by The Source, and Compuserve does not charge a monthly minimum, as The Source does. At the time of this review Compuserve had more subscribers, less expensive rates, and faster response time than The Source—and yet remains less well-known. In addition, Compuserve gave three free hours to every subscriber when he first signed on. (It isn't clear, however, whether this "free time" policy will be continued indefinitely.)

Compuserve offers similar services to those of The Source: electronic mail, electronic catalog shopping, education, games, Dow Jones updates, word-processing, entertainment—in fact, over 1,200 different functions are available to subscribers. These services are all easy to access and use on Compuserve. One feature that Compuserve offers which The Source does not is a simulation of "CB" radio channels. People on the service can talk to each other via keyboard, just as CB radio users do over the airwaves. The user has over 30 channels to choose from and can talk to anyone across the continent who happens to be on the "CB" at the same time.

Compuserve users must re-subscribe to the service if they wish to have the ability to use the Compuserve Services during the day. At the time of this review, Compuserve subscriptions were available through Radio Shack stores (or call direct toll free, 800-848-8990, if you are interested). The reference manual for The Source is a model of good documentation, and unfortunately Compuserve's users' manual falls far short of this ideal. But, like The Source, Compuserve makes extensive use of help menus which more or less make the reference manual unnecessary.

Currently, Compuserve appears to be very good value to the microcomputer owner looking to explore the realm of telecommunications and information service networks.

HAYES TERMINAL PROGRAM

Company: Hayes Microcomputer Products, Inc.
Language: Machine code
Hardware Requirements: 48K

OVERALL RATING: B-
EASE OF USE: C+
VENDOR SUPPORT: B+
DOCUMENTATION: A
VALUE FOR MONEY: B-
ERROR HANDLING: A+
RELIABILITY: A

The Hayes Terminal Program is designed to work directly with the Hayes Micromodem in the Apple computer. It is sold with the modem card, or as a standalone terminal program. The three formats most often found with the Apple computer (DOS 3.3, Pascal, and CP/M) are all supported on the data disk used with the Terminal Program.

The program is menu driven. Communications commands include the ability to originate, answer, and terminate calls. File commands create, receive, send, and list files. System configuration is also controlled by menu commands. The entire communications environment may be controlled by the user (with the changes allowed for one-time use or permanently recorded to disk).

Sending files may be done with one of three protocols: stop/start, line, and verification. The stop/start uses the standard CTRL-S and CTRL-Q (or any other characters you define). Line protocol will send each line and wait a defined interval before sending the next line. Verification protocol works between two Terminal programs, and sends blocks of data repeated one or more times until data transfer is guaranteed, or the defined number of tries is exceeded.
M I C R O - C O U R I E R

Company: Microcom, Inc.

Language: Applesoft

Hardware Requirements: 48K; modem

OVERALL RATING B
EASE OF USE A
VENDOR SUPPORT B+

DOCUMENTATION B+

VALUE FOR MONEY B-

VISUAL APPEAL A

RELIABILITY A
ERROR HANDLING A

The MICRO-COURIER program is advertised as being able to solve the electronic mail problems of modern companies. To some extent, the program accomplishes these goals, but only in a limited way.

So long as the user recognizes that this system is obviously designed to be specifically utilized as an electronic mail program and that it best communicates only with another MICRO-COURIER program, then, at that point, a decision can be made on its use for your application. If the user sees this software as a new terminal program applicable to all uses of a modem, he is in for a disappointment. That said, the main features of the program and commentary on them follows.

The package comes with one disk and an instruction manual. Replacement disks are free to registered users within 90 days; the cost is $35 after that period. There is no provision for a backup copy, so you will be without the program during the period of replacement. You are in effect buying a license to use the software and not the software itself; consequently, a backup copy would provide you with two disks to use and therefore violate the licensing agreement.

The main menu describes the major tasks that the program performs: create and edit mail files; review and address outgoing mail; send and receive mail; review incoming mail; perform mailbox directory maintenance; switch to terminal mode operation; and run system utilities.

The create/edit mail files is the word processor portion of MICRO-COURIER. You are allowed to create files, edit them, and print them. There are two major limitations of the editor: messages are limited to 4,000 characters and only upper case is supported. The editor is only good for outgoing messages that you create unless your incoming mail is in the form of a text file of less than 4,000 characters. Text is entered without regard for the screen size and words will split at the end of the screen. Formatting is performed by the print program. The return key signals an end of paragraph to the program. Cursor control for editing purposes are paragraph, line, word and character-oriented rather than screen-oriented. The control keys are nicely arranged for remembering their functions. The delete character function has a "lock" on it; you must use it twice to delete anything.

The second main menu function allows you to address messages (log them into the system), review the log of all messages (ready to send or sent), review the log of all messages sent, delete mail, or print copies of messages from the send log. When you log messages to send, you have the choice of sending them to a specific person or to a list of addresses. Each individual on your "mailing list" is given a mailbox ID number (see mailbox directory maintenance below). Distribution lists are made up of a number of individual mailbox IDs. Essentially, what this section does is link the mail boxes you have established to the files you have set up and allows you to determine when you want what sent to whom. The files sent do not have to be files created by the MICRO-COURIER editor. Any DOS 3.3 file in any machine-readable form may be sent (including binary files). The previously described editor simply helps you create messages for sending. With a clock card, you have the option of specifying when (date and time) you want the files sent. Routine maintenance functions consisting of review, deletion, and printing of the logs are provided. If you do not have a clock card, messages will be sent immediately upon entering the send message mode of operation from the next option.

Sending and receiving mail is the heart of the program and what makes this a different terminal control program. Up to 100 messages may be queued for automatic transmission at any one time. For each, at the specified date and time, MICRO-COURIER will dial the destination and transmit a message. The program is supposed to try dialing repeatedly if the destination line is not available. It will do so only if you have a clock card. If, instead, you are expecting mail, there is a mode for receipt of messages where the program will answer the phone and a mode for accepting incoming messages and files. An interesting feature of the program is its ability to operate in both accept and answer modes at the same time. A third option presented to you is "send and receive", where your messages will be sent at the predetermined times (or as closely thereafter as possible) and, when not sending, will receive incoming messages. If you expect much incoming mail, a second disk drive is essential, since the program disk must remain in drive one. The system logs all activity for later recall and review.

One important point needs to be made about this system's transmission and receiving limitations. The sending and receiving functions of MICRO-COURIER are specifically designed for machines with only the MICRO-COURIER software. There are no provisions for automatic log-on to a system which requires identifications and passwords to be sent before message traffic can take place. This means, for example, that you should not buy this software and ex-
pect to be able to automatically transfer messages to the SOURCE or any other such timesharing system! Provisions are made to do this manually (see terminal mode description), but you must control the operation yourself.

The display mail functions are what you might expect from a mailbox system. You may display and/or print the mail, print a log of the mail, and, if you are in a hurry, dump mail from selected addresses only. To keep files apart, all received files are stored with an internally assigned filename. A counter is kept and incremented for this purpose, allowing you up to 90,000 messages before the counter is reset, at which point files will be deleted automatically. Well before that time, you should have reviewed the incoming log for renaming and storing those messages and files that are important to you. Of course, you have the option of messing things up, since Apple DOS will allow you to rename a file to a name that already exists, giving you fits on any attempted recovery.

The mailbox directory maintenance function allows you to establish or edit the identification(s) of users you want to send mail to. There are 99 mailboxes available in the system. You may fill any or all mailboxes with telephone numbers and names of users. These are then linked to files as described above. Each phone number may be up to 36 characters long (including numbers and pause characters). This should handle most, if not all, of the combinations of access and user codes, plus phone numbers that you might come across. The pause character (\(\ast\)) allows a delay for two seconds when dialing for the purpose of automated switchboard function changing. The program was checked with a Hayes Micromodem and advertising support for “...most autodialing, Apple-compatible modems.” You would be wise to check program operation in the store if you have other than a Hayes Micromodem.

Other functions of mailbox directory maintenance allow printing of the directory, plus adding, changing, or deleting entries. Distribution lists may also be created with this function.

For manual control over the information transfer, MICRO-COURIER provides a terminal mode of operation. In this mode, you may directly transfer information to and from a remote computer, or you may manually send DOS files (with some limitations). If you are NOT connected to another MICRO-COURIER program, then only text files will be handled. You must be connected to a like program for binary and program files to be sent. Standard baud rates are supported; the program was tested for up to 300 baud. Either half- or full-duplex is supported.

There is one rather serious error in the implementation of the terminal mode of operation. The manual correctly describes full- and half-duplex modes, but the program implements them in the opposite manner. If you want full duplex operation, you must tell the program to give you half-duplex! This is not difficult to remember, but certainly annoying.

For the terminal mode, escape sequences are provided for the symbols that do not occur naturally on the Apple keyboard. One other minor annoyance is that all escape and control characters received go into the receive file. There is no option for rejecting these.

The utility section allows you to catalog a disk, reconfigure the system, set a date and time, and perform file maintenance (copy and delete files). For a one drive system, the copy file routine will only make a duplicate file on the same disk; there are no provisions for disk swapping — consequently, this utility is of little use.

In general, the MICRO-COURIER program is well implemented. All functions are menu driven and all prior menu titles are shown above submenus — a handy feature for determining how you got to where you are. Except for transfer of non-text files, this reviewer questions the claim of the company that there is “almost non-existent” competition for this product and, what competition exists, requires a large investment. Electronic mail, using the SOURCE as one example, is perfectly capable of doing many of the same functions at reduced cost in equipment, since only a small terminal is required.
**P-TERM (The Professional)**

**Company:** Southwestern Data Systems  
**Language:** Pascal 1.1  
**Hardware Requirements:** 64K, modem, Language Card

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<tr>
<td>A</td>
<td>B+</td>
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**OVERALL RATING**

**EASE OF USE**

**VENDOR SUPPORT**

**DOCUMENTATION**

**VISUAL APPEAL**

**ERROR HANDLING**

**RELIABILITY**

**USEFULNESS**

**VALUE FOR MONEY**

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P-term (The Professional) transfers files to or from another computer. Modeled after the Z-term CP/M modem program, it can transfer files up to 17K normally and larger files with the auto-save feature. It provides unattended remote access and has password protection. Macro support allows for easy log-ons or often-used commands. It follows the conventional slot assignments of Pascal and supports a variety of modems. Some features, however, can only be accessed with more complex modems.

The modems supported by the program are the following:

1. Hayes Associates Micromodem II
2. Apple Communications Card
3. SSM AIO Board
4. CCS Asynchronous Serial Board 7710a (or D)
5. ESI Apple LYNX System
6. Novation Apple CAT
7. Novation Apple CAT Externa Bell 212 1200 Baud
8. Hayes Associates Smartmodem (with compatible interface)
9. Mountain Computer, Inc. CPS Card

Other cards, if Pascal compatible, should present no problem since you can easily redefine much of P-term. Lower case capability, using the game paddle Shift-key modification is supported.

There are two modes of operation: command and terminal. Terminal mode sends anything you type to the computer, and anything returned prints on the screen (and printer if active). You can only give commands to P-term from the command mode, which contains two menus. With some of these commands you hear a short click each time you type a key or adjust the screen width by having P-term issue a carriage return after a certain number of characters have been received. This will help 40-column users or terminals that don’t issue a return on the eighteenth character. If your modem has the capability, you can change the transfer or baud rate. You can view the directory of the disk in any drive, as well as any text file on the disk. A copy buffer will save all incoming data as well as keyboard input in a 17K buffer. When full, this buffer can be cleared or written as a file to disk.

You can dial another system manually or with macros. P-term can also re-dial the number until connection is made and will automatically log-on when using macros. Macros are a powerful feature that allow the use of one to several keys to replace often-used, lengthy, or complex commands. P-term allows up to twenty-six sets of macros to exist with sixteen macros in each set. On cold boot, macro set A is the default, but you can easily change this to another set. A nice safety feature is that the program will not exit until the buffer has been cleared manually or has been written out to disk, which clears it automatically.

A few negative points surfaced. The disk cannot be removed from its boot drive. Because it is such a large program, it has to swap in segments from the disk when necessary. This means that single-drive users will be limited to the amount of files they can store on disk. In addition, several of the command options can be forgotten while in terminal mode yet are not listed on the command mode menu. Such things as which key speeds up or slows down the sending of a file, which key returns you to command mode, or which key displays the current macro set can be found in the manual, but it takes time. A command card would probably help.

The program comes with a thorough 108-page manual that explains in detail all the commands available and the transfer modes used for uploading or downloading files. You can change many of the features and defaults. Explanations and examples are provided for creating your own macros. A list of the features available for each modem definitely supported is also included.

P-term is thorough and complex. Its ability to transfer files in several modes, including Christensen protocol, allows it to communicate with a variety of systems. Unattended remote operation allows P-term to act as a host for remote use of the computer, while the use of macros simplifies use. All in all, this is an excellent program.
DataLink is a communications package operating in Pascal that has been designed to work with a variety of hardware and communications applications. Some of the features include communication configuration for a specific system, macro capability, and internal telephone directory.

DataLink comes with a seventy-page spiral bound book. The material is complete and laid out in a logical manner. Each aspect of the system is discussed, and the appendices detail even more specific information, such as a glossary of terms and specific examples of system operations. All discussion in the manual assumes a good working knowledge of Pascal.

Chapter two is designed to get most people up and running with a minimum amount of difficulty. It does not describe all of the features of DataLink, nor does it necessarily do things in the most efficient way. Rather, its goal is to get you operating quickly. It should be noted that there is no discussion of the command or terminal mode, and once you are up and running, you are on your own. If you elect to do this, you will have to refer to later chapters to find out how to toggle the capture buffer, hang up the phone, and other essential items. The remainder of the material describes in greater detail the DataLink command system.

Once initialized, you will be presented with a status line indicating you are now in command mode. In command mode, all input is to DataLink and not to the system on which you may be logged. In the command mode, you select the configuration that you want DataLink to operate. Specific data format, communication protocol, 40 or 80-column, and the other required modes. You can then call a remote system for DataLink to log-on. With a Micromodem or Apple-Cat, the DataLink will display its telephone directory on the screen and ask you to make a selection from one of those or type in a phone number by hand. There is no way to bypass the loading of this telephone directory, and every time you want to dial a number, you have to wait until the disk access to the file is complete. This is annoying, particularly if the system you dialed was busy and you want to immediately dial another number.

Another problem is the inability to configure the system for your specific modem. For example, to enter a number to dial for the Apple-Cat, you must preface it with a T to direct DataLink to use touch-tone dialing. For Apple-Cat owners, this is another keystroke that is unnecessary if the program would allow for specific configurations. In the command mode, you can also quit, go back to terminal mode, or set your system up to auto-answer an incoming call from another system.

In the terminal mode, all characters typed by you are sent to the remote computer. The exception is the ESC key which is the prefix key for DataLink for a local command. If you had to send the ESC key to the remote, you would simply press it twice. Using the ESC key, you can toggle the various operating modes of DataLink, including the Break command, copy buffer on or off, save a file to disk, and receive or transmit a file from disk.

With DataLink, there is no way to clear the buffer other than writing it to disk or going into the Pascal editor and deleting it. There is no editing allowed of the buffer unless again you go to the Pascal editor. If you do go to the editor, the communications session is terminated and the line hung up. The inability to access the buffer and delete/edit portions of it while still connected is a severe handicap.

Overall, DataLink is a complete communications package for a Pascal based system that lacks some of the important features that other communication packages have, such as a resident editor, buffer review and edit capability, and, most importantly, a large buffer. The Link Systems claim that DataLink was designed to be almost universally compatible with many systems. By doing so, they failed to take advantage of many of the features of the Apple, and, consequently, the package is not as powerful as it could be, nor as flexible.
**Z-TERM**

*Company:* Southwestern Data Systems  
*Language:* 8080 Assembly Language  
*Hardware Requirements:* 48K, 1 Drive Z80 Card, Micromodem or Equivalent Modern Communication Hardware

**OVERALL RATING**  
A  
**VENDOR SUPPORT**  
B  
**ERROR HANDLING**  
A  
**RELIABILITY**  
A  
**USEFULNESS**  
B  
**VALUE FOR MONEY**  
A

Z-Term is another outstanding, simple-to-use communications package from Bill Blue. The main purpose of this program is to communicate via modem with other computers whether they are micros, minis or mainframes. Z-TERM provides several useful functions such as facilities to upload and download files, and pre-defined macros and terminal emulators. It also supports 80-column boards.

Z-TERM is capable of receiving a file (download) up to 36K in length with no outside intervention. For files that are greater than 36K, you are instructed how to transfer your information in 36K blocks. While receiving a file you are also given the option to print what you are receiving as it is being received. In transmitting a file (upload) the file size is limited by the diskette. In this function four modes of transmission are supported: variable speed data flow, variable delay after carriage return, adjustable handshake, and adjustable character flow.

The macro capability allows you to define character strings that can be used to dial the phone (for Hayes-type modems), to log-on to another system, or to send special protocol/log-on information.

The terminal emulation section allows you to set up Z-TERM so that your Apple appears to the host system as a specific terminal (i.e. DEC VT52). This is very useful in communicating with certain computer systems in which clear screen and cursor position codes are sent back to the Apple.

This program is menu driven but requires some set up, depending on your hardware configuration. If you are not using a Micromodem, the system starts in a terminal mode and you must enter a command to get to the menu. But with a Micromodem the system "knows" the command and starts with the menu.

The program is relatively easy to use and the documentation explains the commands well, so that the average user should have no difficulty in communicating with other computers. All that's required is the phone number and access codes to the computer you want to talk to. If you are looking for a good, low cost terminal communications package, then Z-TERM may be the answer.

**Z-TERM "The Professional"**

*Company:* Southwestern Data Systems  
*Language:* Assembly Language  
*Hardware Requirements:* 48K, 1 Drive, Z80 Card, Micromodem or Equivalent Communication Hardware

**OVERALL RATING**  
B  
**VENDOR SUPPORT**  
A  
**ERROR HANDLING**  
B  
**RELIABILITY**  
A  
**USEFULNESS**  
B  
**VALUE FOR MONEY**  
C

Z-TERM "The Professional" (nicknamed Z-Pro) is an expanded, enhanced (although the authors claim not an updated) version of Bill Blue's program Z-TERM. It supports all the functions of Z-TERM (see review elsewhere in The Book) plus numerous special features, such as auto answer and unattended file transfer when used with Novation's Auto CAT or the Hayes Micromodem.

The major enhancement is in the area of file transfers. Not only can this package handle a wider selection of file types, it seems to do it more effectively. The claim is that it will handle file transfers at 1200 BAUD, but I was unable to verify this due to lack of equipment.

Z-Pro supports both the Christensen and Pan transfer protocols, which gives the CP/M user a great flexibility in file transfer between other CP/M systems such as Bulletin Board. But I felt that a very important protocol, XON/XOFF, was left out. This protocol is supported by many minis and mainframe time-share systems as well as the IBM PC Asynchronous Communication package, and I believe there is a great need for a program supporting this protocol.

Another improvement over Z-TERM lies in the area of printing what you are receiving. A problem that apparently exists in Z-TERM is that characters can be lost when the printer is turned on. Supposedly, this flaw has been corrected in Z-Pro (but let me note that I've experienced no problems in printing a file with either program).
One clever feature, although I cannot comment on its usefulness, is the "CHAT" option: this allows the operators on both ends to "talk" to one another by typing back and forth, presumably to facilitate file transfer.

The documentation for Z-Pro is well laid out, bound in a tabbed 3-ring notebook. I found the sections containing the explanations of protocol and programming considerations interesting and very worthwhile.

My major disappointment was that, in order to protect this program from software piracy, Southwestern Data Systems felt it necessary to include a hardware "key" that is inserted into the game I/O socket. This method does allow you to make as many copies of the diskette as you want, but requires that the "key" be in place in order for the program to function. In order for the "key" to work properly it had to be inserted in the socket on the motherboard, not in an expanda-port socket. This means that if you have another program requiring a different "key" you would have to continually switch a fairly fragile piece of hardware (the pins can easily be bent) before you can run your programs. In itself "the key" is enough to keep me from purchasing the program. Z-Term is adequate for my purposes, and I use it on a regular basis.

In summary, I feel that although this is a professionally written and presented package, the extra features do not rate the increased price and increased security. But for those who require a little more sophisticated package than Z-Term, or require the special communications protocols, this is your package.

**ASCII EXPRESS II**

<table>
<thead>
<tr>
<th>Company</th>
<th>Southwestern Data Systems</th>
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<tr>
<td>Language</td>
<td>Applesoft &amp; Assembly</td>
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<tr>
<td>Hardware Requirem</td>
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**OVERALL RATING**  
A-  

**EASE OF USE**  
B  

**VENDOR SUPPORT**  
B+  

**DOCUMENTATION**  
B  

**VISUAL APPEAL**  
A  

**ERROR HANDLING**  
A  

**RELIABILITY**  
A  

**USEFULNESS**  
A  

**VALUE FOR MONEY**  
A  

**THE ASCII EXPRESS II** is a complete package to upload, download and edit files for all data types associated with many types of computers — both personal and mainframe. A line-oriented editor is included, as well as a system of terminal-oriented keyboard MACROS and an index system to help keep track of system phone numbers and automatically accessing associated MACROS.

Upon booting the program, the user must perform a two-step configuration procedure. The first step is done by a configuration program, the second step by editing one line in the main driver program. The manual has a detailed explanation of the parameters which makes this task relatively easy.

The terminal software is primarily designed to be used with the Micromodem by Hayes Computer Company (formerly D.C. Hayes), but the program works well with the communication card and acoustic coupler. Features used with the Micromodem include: auto-answering of the phone, dialing up a system (a MACRO can be used to dial a pre-stored phone number), hanging up the phone and a system check to make sure there is a continuous connection.

The file retrieval system consists of routines to upload, download and edit files. In sending a file to another system, options are provided for transmitting it (line by line or character by character) and whether to look for a prompt character or not. In receiving a file, the system operates in slave or master mode (master is used most often), sends system commands to other systems to control their dump, and asks if an append to existing buffer file is desired.

The editor is a line-oriented version with limited character replacement ability, although adequate for this application. The editor is a separate program that is chained into memory when needed and then re-chained back to the terminal program when no longer needed.

Files are stored in a memory buffer until they are saved to disk. Files can also be loaded back into the memory buffer from which they can be transferred. This buffer is fairly large. During our evaluation, we downloaded a 20K file; however, caution must be taken since the program does not inform you when the buffer is full, possibly resulting in data being lost.

There are additional programs included with the package that will allow the user to send and receive Apple binary files, Integer and Applesoft programs in addition to the text files.

The disk is protected but contains a limited copy program which allows four back-up copies to be made.

In our evaluation, we found it impossible to really bomb the program even though one can obtain strange results. In spite of this, everything we encountered was easily recoverable. This is one of the best terminal programs available. We used it to communicate between the following systems with no difficulties (we used both the Micromodem and the communication-coupler combination):
Apple to two different CDC timeshare systems
Apple to a PDP 11/70
Apple to Cromemco. (280/CPM)

ASCII EXPRESS "THE PROFESSIONAL"

Company: Southwestern Data Systems
Language: Machine
Hardware Requirements: 48K; micromodem or communication card
& acoustic coupler

Strange how a communications package of such power and scope can fail so miserably in its documentation. It would seem that experts in communications would see the necessity of providing clear, precise, step-by-step documentation. This is not the case with ASCII Express, "The Professional," or ASCII PRO as it is called in the computer stores. No doubt the authors believed that they were providing an easy to follow manual. At least their manual does have tabs to help the user find his or her way around. However, the tabs are actually useless until one has already mastered the program; at which point a manual is no longer necessary. But, the poor documentation aside, AE PRO is a well written and well conceived program of comprehensive magnitude. It can be an extremely useful tool once it is understood.

Upon first boot of three copies of this program this reviewer found himself "dumped into binary," which effectively means the program failed to run at all. The instructions in the manual indicated a text file was acting as a boot-up program. For some reason, my Apple failed to boot my copies. I was forced to write a simple, basic boot-up program to make AE PRO work for me; something the novice computer owner might have trouble with. Perhaps this problem will soon be cleared up, but it would be a good idea for the buyer to test his copy in the store before taking it home.

AE PRO does support a full range of 80-column boards, modems, and printer interfaces. In some cases, special features of individual modems can be made active simply by installing them in the hardware start-up section. AE PRO has a built in memory management system which will relocate DOS into a 16k card, if one happens to be in the machine, increasing the buffer size by 10k. This feature is extremely helpful. The program will also allow one to "Auto Save" a program larger than the memory of the Apple by saving the data in sections with extensions to the main file name. This effectively gives the user a limit of information retrieval equal to the size of the disk storage space.

AE PRO has its own modest capacity text editor. This can prove useful at times when it is either impossible or inconvenient to use your word processor program. It is a functional text editor with insert, delete, and other basic features. Though not as powerful as a good word processor, it is handy.

In addition, AE PRO features Macros and a number file. These can be set up to make dialing and sign-on procedures automatic. Here again, a more intelligible manual would have been helpful. This reviewer has used ASCH EXPRESS, the predecessor to AE PRO, and was still baffled for quite some time in figuring out how to load and save the Macro Library.

Perhaps the reason AE PRO was so frustrating to begin with is the fact that it is a very powerful yet flexible program with simply too much information to be covered in a single manual. It is definitely one of the most comprehensive pieces of communication software on the market. However, the user must be a communications professional with expert knowledge of that field in order to fully utilize the full power of ASCII EXPRESS, "The Professional."
The basic purpose of the CONTEXT CONNECTOR is to allow the user to get information from other computers and transfer it into "Visicalc" models. You can also combine results of several "Visicalc" models into a consolidated model. In the process, you are also allowed to format text files created in any manner (as well as those residing on disk as Applesoft text files) and enter these files into "Visicalc" models. This program operates on any text file – it does NOT have to be in the Data Interchange Format (DIF).

With CONTEXT CONNECTOR, the "Visicalc" program capabilities may be expanded greatly and used for a variety of very large accounting applications. You may create accounts on individual forms and then feed the results of these into a general ledger format. In this way, for each accounting period, summaries are produced on blank forms created to receive them. "What if" questions regarding the ledger may then be asked for planning purposes.

The CONNECTOR program also comes with a communication interface for transmitting files to and receiving files from a remote computer. With this feature, stock reports may be obtained from The Source, stored on disk and then later formatted for entry into "Visicalc". The communications interface cards supported are the Hayes Micromodem, the Apple Communications Card with modem, or the SSM/AIO board with modem. (See the comments below relating to this feature.)

The CONTEXT CONNECTOR comes with either DOS 3.2.1 and DOS 3.3. Both versions are provided – one on either side of a disk. There is a reference card consisting of the text for each menu in the program. The final item provided is a rather skimp y manual outlining some of the features of the program, but by no means all.

Initial testing of the basic conversion capabilities demonstrated that the program performed as advertised. In the example, files provided you include the capability of transferring two lines from one "Visicalc" model and two from another into a third blank format. The program accomplished this simple task correctly; there is no reason to believe that it would not do so for larger files up to the limits of memory.

In another test, a text file was formatted for entry into "Visicalc". Again, the test was a success, although this particular method of generating "Visicalc" formats is quite time-consuming. The model changed was 33 lines long by seven columns wide, requiring some three minutes to convert. Large models will take quite a bit longer; therefore, this type of conversion should only be used if you can spare the time or if it is inconvenient to create DIF files for direct entry into "Visicalc".

CONTEXT recognizes the relative lack of speed in the program and has provided several suggestions on how to organize files and formats to increase the transfer rate.

Problems occurred when the communications features of the program were tested. First, the program’s ability to handle lower case was attempted (the claim is that it will). Both the DoubleVision and the 40-column lower case display are supported. This reviewer uses the Videx; while attempting to fool the system, the program bombed. As a backup, this reviewer also has a Paymar board (which is supported). Lower case was displayed as the default mode. Unfortunately, this is not pointed out in the manual and there is no discussion of how to shift to upper case on either a single letter entry or locked-in upper case. In this mode, this reviewer was not able to log onto The Source. A successful log-on is accomplished only when the default setting is upper case operation only. We are told by the manufacturer that a new version will be coming out which will support the other 80-column boards. That should solve the problem noted above.

Two other comments must be made about the communications portion of this program. The program appears to implement half- and full-duplex in a manner opposite to that which is correct. This is because the program displays what actions will take place when you execute a command, not the status. (For example, if the instructions say half-duplex, it means if you push the key, you will switch to half-duplex, etc.) This takes some getting used to, since most other such displays show the status and not the option. There is a choice of on formatting: "on" or "off". The line formatting feature, when on, will cause a wordwrap should the output exceed 40 characters. Finally, when an attempt to save a captured file was made, it could not be saved and was ultimately lost. There was no description of the error message appearing on the screen. As it turns out, the attempt to save the file was made to a second disk drive. The program does not now support two drives. We are told that the next version will.

This program could ultimately be quite useful if it could be speeded up considerably (perhaps by using an Applesoft compiler or rewriting in machine language) and if the bugs found during review testing were fixed. The manual could stand extensive rewrite as well.
Transend 2 is one of three well thought out telecommunications programs from Transend Corporation—Transend 1, 2 and 3. Unlike many other 300/1200 baud programs, Transend endeavors to make itself understandable and useful to the first-time telecommunications user. The manual, although it borders on the technical, is useful and well organized. Once you are familiar with it, you can easily find the answers to your questions. The manual begins with the assumption that you know little or nothing about telecommunications and moves along from there. It walks you through each step of a series of different transmissions, discusses in detail its verified file transfer mode, and contains an extensive installation program to make set-up easy for the various Apple configurations.

Transend 2 is also one of the most "menu-happy" telecommunications programs I have ever seen. It seems to have a menu for everything—a great help for the first-time user. When you are more familiar with the program, you can use toggle switches to turn off these menus.

Transend Corporation also offers other features that make their program attractive. Extensive customer support and an upgrade/update program (if you own Transend 1 you can upgrade to 2, or if you own 2 you can upgrade to 3). You also get a free subscription to the Source with your purchase.

The only truly objectionable feature of Transend 2 is the inability to make back-up copies. The package includes two copies of the program, but the number of parameter sets you can store on the diskettes is limited to eight per disk. Your own applications may never require more than eight, but if they do, this program is not for you.

I had a few minor problems configuring Transend to run on my system. Once up and running, however, it performed well and fulfilled the promises made in the documentation. Also, like many of the better programs on the market, Transend allows you to do more than just send and receive data from one Apple to another. Transend 2 also gives you the estimated transmission time of a file transfer, another useful tool for estimating costs. Transend 2 can send or receive virtually all text formats including all DOS 3.3 file forms. It also supports X-ON/X-OFF protocol—a very useful feature for talking to other systems at 1200 baud and now practically a standard in the field of telecommunication for file exchange.

All in all, Transend 2 is an intelligently designed and implemented telecommunications product that should appeal to both novice and experienced users alike. Its high quality makes Transend's misguided copy protection policy all the more deplorable.

Visiterm is Personal Software's entry into the communications area. The program uses the Hi-Res screen for display of both upper and lower case letters plus special character sets like that associated with APL or any others you might want to create. All of the standard communication cards are supported and the program is flexible enough so that it should support future cards.

Like all programs on the market recently, VISITERM supports sending and receiving text files. The internal buffer limit is 18,000 characters or anything smaller that you specify. There are provisions for disk operations which will allow sending and receiving larger files.
Connection is established in standard ways through an acoustic coupler or via direct dial if you have the Hayes Micromodem. There are no provisions for automatic dialing from stored numbers if you have the Micromodem.

The program is driven by various escape sequences. Prompting for all of these would fill the screen so it is advisable keep the quick reference card handy until you memorize the ones you use most. A status line is provided at the bottom of the screen and all commands entered are reflected there as a double check for you.

The long “break” signal required by many timesharing systems is supported and you have the capability of changing the length of the signal.

One strength and weakness of the VISITERM program is its options section. This is a strength because of the large number of options available and a weakness because the large number of options requires the users to really know what they are doing if anything other than the defaults are picked.

Some of the features available are listed here:
1) Change data format and communications speeds.
2) Create and use keyboard macros.
3) Adjust and use protocol characters and auto-acknowledge characters for block data transfer.
4) Vary character appearance and switch character sets.
5) Completely change the screen characteristics, scrolling, etc. for viewing suitable to you.

For all of these operations you may save them to disk for later use. You should save the options you find useful rather than changing them every time. The default mode for the operation is half-duplex. Every time you change options you are sent back into the half-duplex mode and you must change it if it is not saved. For full-duplex users like this reviewer, this can be a pain if many options are used (like when the program was being reviewed).

Since the Hi-Res screen is used for character display, any character set you want may be used. Several sets are provided; for the adventurous, there is a character editor within VISITERM. With it, you could create a graphics character set, transmit it to a friend; with an Apple and use VISITERM to trade pictures.

It would be wise to learn how to use the character set generator provided. This reviewer found that the sets provided (all of them) were very hard to read and use. Most of them use proportional spacing, so computer output does not line up at all with most received data since spaces are inserted by the transmitting computer for tabbing purposes. The mono-space character set provided has letters that are quite small and hard to read on my Hi-Res monitor — they probably could not be read on a regular television with a modulator.

Another distinguishing characteristic of VISITERM is its ability to define and use protocol characters on file transfer. You can set the EOB, ACK, STOP, and START characters. Many programs support the START/STOP protocol, but few also support block operating and the EOB/ACK protocol. One problem with this is that the protocol is only supported during file transfer operations and not during normal terminal operations.

With VISITERM, there is a 256-character type ahead buffer for use while data transfer operations are taking place. The only problem with this is that the default communication mode is half-duplex and you can’t see what you are typing until the character are sent and/or echoed by the other computer.

VISITERM supports keyboard macros of up to 249 characters each. The manual states that the macro space has a fixed capacity, but doesn’t state what that is. The prompt within the macro section says that the limit is somewhat over 1,000 characters. An interesting use of macros might be to redefine the keyboard. This can be interesting if you know or use the newer KVORAK keyboard configuration.

Only text files can be transferred using VISITERM, but there are utilities on the disk which allow converting Applesoft programs and binary files to text form. Another utility exists to return text files to binary form and EXEC will reconvert text files to Applesoft.

A good addition to the manual in this case is an appendix titled “A Primer on Data Communications”. Included in it is a good description of the basics of data communication using a modem. If you don’t know anything about data communications, this is a good place to start reading the manual. Another appendix outlines the various hardware configurations supported by the program while a third presents everything you ever wanted to know about ASCII characters.

**TEKTERM**

**Company:** Fountain Computer Products

**Language:** Applesoft

**Hardware Requirements:** 48K, modem

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<thead>
<tr>
<th>Feature</th>
<th>Rating</th>
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<tr>
<td>EASE OF USE</td>
<td>B+</td>
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<tr>
<td>VENDOR SUPPORT</td>
<td>A</td>
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<td>DOCUMENTATION</td>
<td>A</td>
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<tr>
<td>VALUE FOR MONEY</td>
<td>A+</td>
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<td>VISUAL APPEAL</td>
<td>B</td>
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<tr>
<td>RELIABILITY</td>
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<td>ERROR HANDLING</td>
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**Tekterm** is an impressive new addition to the communications software market. Due to its special ability to emulate a Tektronix graphics terminal (hence the name Tekterm), this package will actually be the only terminal
program suitable for people whose needs include graphics communications. In addition to the Tektronix emulation, there is a host of other features offered the user: data capture, keyboard re-mapping, 70-column (with upper, lower case) display with no hardware modifications, macros, and many others.

There are two major modes of operation: the command mode and the terminal mode. In the command mode, a menu of 20 one-letter commands and 8 status indicators is displayed. These commands allow you to toggle terminal modes, automatically capture everything read by the terminal onto disk, replay the saved files, transmit text files, toggle, merge, or clear pages 1 and 2 of Hi-Res, select upper/lower case, and turn a second menu page. The second page of menu supports the usual operations of the Hayes Micromodem II. Tekterm also supports the Apple Communications Card, CCS 7710, and the Apple CAT II. For the terminal modes, you can either choose a regular Apple text display (with lower case in inverse), or a 24 line by 70-column display with upper and lower case, and descenders. In the regular text mode, you can communicate up to 19,200 baud while the 70-column mode is limited to 600 baud. Both terminal modes include extra characters not normally generated by the Apple keyboard.

The Tektronix terminal is an industry standard for computer graphics. There are thousands of programs written using the Tektronix graphics format, and Tekterm will allow access to most of these programs without any modification. Tekterm emulates the Tektronix 4010 by trapping for the Shift-Control-M character which turns on the graphics mode. In this mode, all subsequent characters to the terminal are interpreted as Tektronix graphics commands, and are re-translated into Hi-Res instructions for plotting on either page 1 or 2 of a Hi-Res screen. What about the loss of resolution? The actual Tektronix screen is 780 x 1,024, which is ten times greater than Apple’s Hi-Res screen. However, the full-scale information is not lost, but can be captured by Tekterm. Then, the textfile transfer command can be used to plot the data on a plotter (such as the Tektronix 4662 plotter) for a hard copy.

Only one major problem showed up in all the testing of the program. Tekterm does not react kindly if unable to locate a program on a disk (especially while executing a macro); cursor control is lost, and the computer has to be turned off. Aside from this one problem, there are only minor irritations: the support for the Micromodem II is only minimal, menu layout is confusing, the cross-hairs feature does not seem to work, and the documentation, while good, could use more examples. In addition, there appears to be no assigned card number for the Apple Cat II. Finally, it is a little puzzling that while the graphics can zip along at 4,800 baud (the test limit) the 70-column terminal display is limited to only 600 baud even though both use Hi-Res screens.

In summary, Tekterm is a professionally written, very powerful communications package that contains several unique features. When one compares the price of Tektronix with the cost of an Apple with Tekterm, the emulation ability alone may prove the program’s strongest selling point. Tekterm is certainly not far from being what it claims, “the most powerful and versatile communications package on the market.”

A-C-C-E-S-S
Company: Desert Technology
Language: Applesoft
Hardware Requirements: 48K, Hayes Micromodem

OVERALL RATING C + DOCUMENTATION B
EASE OF USE A VALUE FOR MONEY C
VENDOR SUPPORT B VISUAL APPEAL N/A
RELIABILITY B ERROR HANDLING B

The A-C-C-E-S-S (Automated Computer Communications Electronic Service System) software is designed for the handling of data at any time, using standard phone lines. The data handling can consist of a bulletin board, an electronic mail handler, a message center, a system for direct entry of orders for goods and services, etc. It operates in much the same way as all bulletin board and message systems. Its low rating comes from the excessive (in this reviewer’s opinion) cost. For $2,500, the program should do something really exotic or special.

Be advised that this software is NOT a terminal program in the sense that it will not accept long files from other systems for downloading purposes. This is a message system only, with the messages being line limited.

The system is user friendly, in general. If you desire, you may use the system to obtain specific information for orders; additionally, you may set up the prompts for the information in advance. With password access to the system, you can set things up so that only selected salespeople have access for entering specific information. Or, by eliminating most prompts and deleting the need for password access, the system can be made a general user bulletin board or mail system. The operator controls all aspects of system use through set up file(s).
Roughly 100 average length (16 line) messages can be supported without excessive delays; additionally, up to roughly 150 messages can be supported at any given time. For general use as a bulletin board or as a message center for a large number of people, this message limit can be a constraint if the system is not cleared often by the operator.

After logging on, the system asks questions much the same as the Apple Bulletin Board program. That information is logged into a user file (if desired), then the system goes on to display its welcome message and any bulletins you have defined. Because there is a mail function, make certain that when you logon to the system, you do it the same each time. If not, you may not get your mail.

Within any subsystem of the program there are several control characters that may be used for different text manipulations. These include scrolling through the text at a faster rate and display stop. Other commands retype all or portions of the text and kill the current function.

The subsystems (functions) supported by the program are 24 in number and range from simple set up (Apple 40 column mode) to mail and subject search routines. There is a help function for the newcomer.

One advantage that this system has over others of a similar nature is the input to the system for external sources need not be from an Apple and similar software. Any standard terminal will do. The outside user has the option of having lower case supported or not, depending on his/her terminal configuration.

The system also supports differentiation between new and expert users of the system. The user, through a function command, can declare expert status and be spared some of the prompts normally used by the system. This is an important feature for those that use the system often.

The message function is well organized. On leaving a message the user must identify a category and subject. The program will then allow other authorized users to scan through the messages by category. The operator defines the allowable category. Users may also simply scan all entries. After scanning through the messages, the user may then call up individual messages to print in full. These are called up by their unique message numbers and assigned by the system upon message entry.

There is a help function available to system users. It describes such items as how to use the system and what categories are available for messages.

After logging on, the system searches the message file and looks for any messages addressed directly to you. The message numbers are returned for later downloading and answering by you. Through the mail subsystem, you may send mail to any other user.

In the forms and orders subsystem you are given a form to fill out. Several forms may be stored on the system and a help command exists which will print out the list of forms.

The operator is given several options for system maintenance. These include the ability to print the logfile, packing the message file to conserve disk space, and deleting messages. The frequency of performing these operations should be geared to the intensity of system use. There is no opportunity to do statistics on the logfile; this should be provided to determine the most active user(s).

One item not specified in the hardware list, but one which is a virtual requirement for running the program, is the Applesoft language in ROM. When running the program and setting things up, the master disk boots several times. Thus, with a language card and Apple II with Integer Basic in ROM, the user must reboot with the DOS master disk and then run the bootup program on the A-C-C-E-S-S disk. This is not explained anywhere in the manual and causes a great deal of disk swapping.
The Apple II Business Graphics program is an extremely flexible program which will easily and accurately produce complex business data graphs. This program supports all graphics formats that you may need. In addition, the program offers a rather sophisticated curve fitting and statistical features, which, once applied to the data, appear on the graph line along with the raw data.

The program displays graphs in black and white, or in color. Multiple sets of data may be plotted using different characteristic point styles. You can graph single or multiple bars (up to four per label), in either horizontal or vertical format. You may also combine any of these forms, and fill in the area under curves for greater visual impact. Apple II Business Graphics draws a variety of "pie"-type charts as well as line and bar graphs. Data points are stored in Pascal files, entered manually with a program editor. Alternatively, you may create programs which build correctly formatted files. A third feature offered is INTERCHANGE, which lets you read files created by VisiCalc, and files produced by Apple Plot. However, INTERCHANGE only proceeds in one direction. You may not create files for transfer back to standard DOS format.

Many mathematical operations are built into the program, including the ability to manipulate current data in the workfile, and also to add, subtract, multiply, and divide numerical data in files. Statistics, such as mean and standard deviation, may be obtained from your data points.

Another very useful function in the Apple II Business Graphics program is curve fitting. Four modes are available: straight line, logarithm, parabola, and sine. The program reports the standard error for each curve fit, so that the best result may be obtained. Moving averages are also available. With labels sufficiently extended beyond the given data points, you may use the curve fitting functions to make future projections.

Once you have created graphs to your satisfaction, you may save them in Pascal files, either as a simple text file containing the data points, or as a binary screen dump to disk. One poor feature of the program is that the text file does not store all of the formatting information, axis titles, or floating titles. Information on these items is available on the screen at the time the graph is created. If you copy it down, relatively straightforward recreation of the graph is possible.

You can also dump the screen image to one of a small number of designated printers: the Apple Silentype or the Qume Sprint 5/45. In addition, you may use one of two plotters: Hewlett Packard 7225A or Houston Instruments' HIPLOT (DMP 3 or DMP 4).

The complete program package consists of a manual, two copies of the program disk, a data disk incorporating a tutorial guide, and one blank, uninitialized disk. The manual is excellent, but if you lose it, or the quick reference card supplied with it, you will still be able to operate the program since there are built-in help instructions.

The program runs as described in the manual; only one item was not covered by it, the assumption that there is no terminal card in Slot #3. With such a card, you must continually shift between the 80-column display mode and the normal Apple screen. This was not mentioned. Further, with the 80-column card in Slot #3, the Clear Screen command does not work for the graphics screen.

The program is relatively easy to use. Most other graphics programs are menu driven, but this one is command driven. The commands are in simple English, and, with a bit of practice, easy to remember. If you like, you can create a command file which will produce and/or display graphs unattended.

Apple Computer also offers what seems to be an identical package called Apple III Business Graphics under their Special Delivery Software label. For it, you need an Apple III with 128K of memory and at least two disk drives. A color monitor is helpful (up to 16 colors may be used in graphics displays); and this package supports the same printers and plotters noted above.

If you require complex graphs of business data, then these programs are likely to meet your needs. Consider them seriously.
VISIPL0T (Version 1.0)
Company: VisiCorp
Language: Apps0ft
Hardware Requirements: 48K

NOTE: VISIPL0T is advertised to be compatible with "Visicalc." It will only directly interface with the 16 sector version of "Visicalc", not the 13 sector version.

VISIPL0T is a highly-touted plotted package that has some rather unique features plus some possibly restrictive characteristics. You encounter the first unpleasant feature on booting. If you have a language or 16K card, you must first boot the DOS 3.3 system master disk to load Apps0ft into the card and then RUN INIT on the VISIPL0T disk. Apps0ft should have been installed on the VISIPL0T disk for loading the card directly.

The program itself is menu-driven, with a clever 3-line menu that in fact allows you to choose among many options. Most of the options are relatively easy to interpret without having read the manual (the sign of a good menu structure); however, there are some tricks to using all the features of the program. Therefore, the manual should be carefully read before use.

The documentation is structured as a tutorial that takes you from booting the system through all of the program features. In spots, the manual may seem elementary, but stick to it; going through all of the examples is well worth the effort in learning the program. There is also a summary card and reference section included.

Data are stored in groups, each of which is termed a series. In each series, you may store up to 150 points. You are allowed to have several series in memory at the same time (up to 645 total data point limit). One or more series of data may be then combined and stored to disk as a file. In this way, the same data points may be used in several files for different combinations of data. When loading files into memory from the disk, you are allowed to add a new file without erasing memory (up to 645 point limit). This is useful for transferring all data you want to manipulate into memory when moving from the file handling program to the plot program.

When storing data, you are given the option of doing so in a normal fashion or in the DIF format, which can be read by new versions of "Visicalc". In addition, all functions that affect files are verified in case you made a mistake. You are given ample opportunity to reverse yourself. The program even checks the disk to determine if you have any VISIPL0T programs on disk you wish to initialize. In short, the error trapping and handling is excellent.

The plotting program is well done and has many features for use in business. Graphs may be formatted using the entire screen or the screen can be split horizontally or vertically. Several data series may be overlaid on the same graph if the scaling of the data will permit all of them to fit within the visual separation. Line, bar, hi-low, and pie charts are available with overlays and full-titling features as well.

Title-making ability is particularly impressive. You may add one title to the top of the chart, one to the left side, three to the bottom and any number you want to the body of the chart. The movable titles can be placed anywhere in either normal or inverse characters. The only caution is that once placed, a movable title cannot be changed - you would have to redo the graph from the start.

Graphs are automatically scaled by the program. The data are searched and scaled so that the graph produces a pleasing configuration with round numbers along the Y-axis. If for some reason you want to change the scale, you are given that option. On rescaling, the program checks for obvious errors for what you have specified and corrects.

For example, if you put the minimum value above the maximum, the program will reverse them for you. One rather serious problem with the program that limits its usefulness in areas other than business is assumption that X-axis data is somehow related to time in years and parts of years. If the X-axis data is serial in nature (from 1 to 99), this is not too much of a problem, but if it goes above 99 the scaling and display function may yield strange results. In one example included with the program, the X-axis read as follows: 0 .. 14 .. 28 .. 42 .. 56 .. 70 .. 84 .. 98 .. 12 .. 26 .. 40. Assuming that the data represented years, the last three numbers were truncated from 112, 126, and 140 to those shown. This can be confusing.

One of the unique charts that can be prepared with this program is the pie chart. Each segment of the pie can be individually colored and, with the movable title feature, labeled. Observe carefully the constraints on labeling, since errors cannot be corrected and you must start over.

Another charting capability that is provided is the scatter plot. With this option, you may plot one set of data against a second set over a given period of time. Each point on the chart represents a given point in time and the chart represents progression through time.
Any of the charts and graphs produced by the program may be printed directly on several graphics capable printers. The program is set up for the Apple Silentype, but printer drivers are also available for other machines such as the IDS 440/445. Instructions are provided that show one how to change the driver used by the program and short programs are listed in the instructions which show how to use the drivers in other programs that you might write.

The main program allows you to edit data in memory or enter new data. One series of data points may also be merged with another under certain conditions. Given a set of data, points may be inserted or deleted. One caution should be stated. When you have set up your time series in the X-axis and want to insert a point, the time series does not change, only the data relative to the series changes. Use caution.

The edit function also has an option called UNDO. When this option is exercised, everything you have done since the start of the editing session is undone. That includes all data entered if you have not returned to the main menu ahead of time.

One especially bad feature of the edit subsystem is the print function. Print only dumps what is on the screen to the printer. At a minimum, the option to dump the entire data series should be given. As written, the only way to get a complete printout is to print the screen, move the data down, print again, move the data down, etc.

All in all, VISIPLOT is an interesting plotting program with quite flexible characteristics. The buyer is cautioned that it does have some unusual features and should study them carefully in light of user requirements.

VISITREND (with VISIPLOT)

Company: Visicorp
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B +
EASE OF USE B
VENDOR SUPPORT A -

DOCUMENTATION B
VALUE FOR MONEY B +
VISUAL APPEAL N/A

RELIABILITY A
ERROR HANDLING A

VISITREND is effectively an extension of the VISIPLOT program; consequently, the two are marketed in a combined package. (Refer to the review of VISIPLOT elsewhere in this copy of THE BOOK.)

Using VISITREND, you may perform the following operations on a data series:
1) Data smoothing using moving averages, percent of change, leading, lagging, and cumulative functions.
2) Data transformation using sums, loss, or any other mathematical or logical transform.
3) Linear multiple regression (least squares).
4) Trendline forecasting of raw, smoothed, or transformed data.
5) Major multiple regression statistical measures including the T-statistic, R-bar squared, F-statistic, and the Durbin-Watson statistic.
6) Other statistical measures such as minimum, maximum, mean, variance, standard deviation, and correlation coefficient.
Assuming you have loaded your series into memory from the VISIPLYT main menu, entry into VISITREND requires only four keystrokes (right arrow, space bar, return, and Y to confirm). The menu within VISITREND follows the same outstanding format as the parent program.

One important thing to note is that memory for data storage is limited. VISITREND creates a new series with many of its functions. Filling memory is rather easy. Use the “lookup” feature to check memory often.

Once a series is created and displayed, you may print the data. The same complaint is noted here as with VISIPLYT; you may only print what is on the screen. There is no way to print the entire series as a unit.

After the series is created, the “analyze” function will perform a statistical analysis and display the results. This is copacetic as far as it goes. Unfortunately, to save the results, you must copy them down or print them. There is no way to save them to disk for use by other programs (like “Visicalc”). It would seem that the results could be placed into the DIF file for transfer and use by other programs.

Regression calculations may be performed on the raw data or on transformed data. Be patient during this period. Calculations may take up to a minute depending on the number of data points. Again, you must print or copy the results in order to save them.

From the regression function you are able to create a forecast as a linear extrapolation of the analysis.

The moving average and smoothing functions can provide useful information from noisy data, but you should know what you are doing. The program will do what you tell it to, but cannot evaluate the adequacy or usefulness. Remember the maxim which states that statistics are a great way to fool oneself.

A unique part of the VISITERM program is its ability to transform data. This “xform” function lets you write your own formula (limited to 80 characters) using all Applesoft operators and functions. When using a basic function, you are allowed to insert a series name as the value the function which it operates on. For example, LOG (SERIES NAME) creates a new series with each data point being the natural logarithm of the original series. Take care that you follow the instructions when inserting the series name. If done incorrectly, an error results.

VISITREND is a useful addition to the VISIPLYT program which could be made more useful by the ability to save the results for use by other programs. You must know what you are doing. There is an old saying that statistics don’t lie, but liars use statistics, in addition to the capability of bamboozling yourself, as mentioned above.
DATA PLOT

Company: Muse
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING C+
EASE OF USE C
VENDOR SUPPORT C
DOCUMENTATION B-
VISUAL APPEAL B
ERROR HANDLING B-
RELIABILITY B
USEFULNESS C+
VALUE FOR MONEY B

DATA PLOT is a graph plotting program that allows you to display numeric data as either bar charts, line graphs, scatter diagrams or pie charts. It allows you to enter, edit and save the data tables for plotting and display at a later time. It also supports hard-copy for either the Apple Silentype or Trendcom 200 line printers.

DATA PLOT allows up to 99 points to be plotted on all but the pie chart, which only supports a maximum of 25 points. The program automatically scales the charts for the user, but this feature can be disabled. Multiple charts are allowed and labels in addition to your axis labeling may be added to give your charts a finished look. However, these extra labels can't be saved as part of your data file, but can be saved as a finished Hi-Res picture.

The program also offers a statistical package. A simple keypress will show the mean and standard deviation of the data points on your bar charts, scatter diagrams and line graphs. Likewise, percentages are given for the slices in your pie charts.

The program comes on a protected 3.2 disk. Muse's protection scheme also produces a protected data disk. This precludes interfacing directly with the data files from any other program like "Visicalc". However, one can enter the data by hand. Another problem involves using a printer other than the two mentioned above. Although it may be possible to use Ctrl-C to get out of the program, then type in a driver program in hex and save it to the protected disk, Muse doesn't specify how.

The program is quite comparable to Apple Plot. Its editor is easier to use than Apple's and has the added feature of statistical computations. However, as mentioned above, it is restricted in interfacing directly to other program's data files.

VERSAPLOT

Company: Spectrasoft
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B+
EASE OF USE B
VENDOR SUPPORT A
DOCUMENTATION B+
VISUAL APPEAL A
ERROR HANDLING A-
RELIABILITY A
USEFULNESS B
VALUE FOR MONEY B+

Versaplot is a flexible, easy to use graph plotting program. The program is menu-driven by single stroke commands. Bar, pie, scatter, and line plots are all available. Three dimensional bar plots, error plots, and overlay charts are easy to produce with a small amount of planning. Although comparison bar plots are possible, three or more bars cannot be plotted side by side. Shading of bars is easily done in an attractive manner. Labels can be changed or moved about, but the movement is awkward, and labels cannot be rotated. There is no limit to the number of labels (a fact that the manual does not make clear). Two sizes of lettering are available. Also, a second copyable disk provides extra disk storage, a demo program, as well as a slide show routine.

The documentation is attractively packaged in a three ring binder. It is clear in most places and comes with a good index. However, the organization forces you to read a large part of the manual before making graphs with the program. In the long run, this becomes an advantage because information is easy to find when you return to the documentation.

Graphs are stored in a DOS format which means that you can easily print multiple pictures. The print routine easily allows the input of printer strings. The program accepts DIF files, facilitating interchange with many other programs and files directly from Statistics and Daisy. In summary, Versaplot is a flexible and user-friendly graph plotting program at a reasonable price.
The Graphics Magician is an outstanding and creative graphics package written by three gifted programmers, Mark Pelczarski, Chris Jochumson, and David Lubar. They combined their expertise to produce a series of editors and machine language routines that will allow the intermediate BASIC language programmer to produce arcade style animation in his games or Hi-Res drawings for use in his adventure games. The philosophy is to have the users treat the graphics routines as a mysterious black box that can be controlled by several input parameters from a BASIC program. While a minimum of explanation is provided to aid the user in his choice of which black box might work best.

There are three main parts to this package. The first is the animation package. This consists of three editors: the shape editor, the path editor, and the animation editor. The shape editor allows you to create a set of seven shifting shapes that if moved across the screen horizontally would produce very smooth animation. When shapes are drawn using the I, J, K, and M keys for cursor movement and other keys for locking and unlocking the plot and erase modes, seven shape tables are generated on the screen simultaneously. Any one or several at once can be drawn independent of the rest of the shapes. Therefore, the motion of a man walking could be drawn in seven stages. The body and head would be drawn first for all seven shapes, then the arms and legs independent for each frame. These shapes can be in color if color rules are followed in what is an every other column color-alternation on the Apple's Hi-Res screen. Shapes are then compiled into bit-mapped shape tables, and if the user wishes he can then watch his animated shape as it moves across the bottom of the screen.

Once you have created a shape, you use the path editor to tell it how to move on the screen. Eight keys decide the direction, and the size of the move can be as large as three units in any one direction. Since each direction move uses one memory byte, a long and complicated path could use a lot of memory, especially if you are planning several dozen shapes in your game.

The animation editor allows you to combine as many as 32 shapes with their associated paths. You can specify the starting coordinates for each shape and can use the same shape a number of times. There are other options that will allow you to stop an object or erase it from the screen when its animation cycle is over, or loop back and continue another cycle. Also, the user can preview the animation before saving it to the disk.

The picture/object editor allows you to create colored pictures and objects in a form that takes amazingly little space in memory or on the disk. While pictures normally require 34 disk sectors, the average space required is only 2 or 3 sectors, and a very complex picture only 5 sectors. These pictures can be used from your program using a BLOAD, two POKEs, and a CALL.

Each move that creates your picture requires memory. A byte counter is displayed at the bottom of the screen. A line can be drawn in your choice of color by setting a start point with paddle button one, then drawing that line to another point by pressing button 0. The user can choose any of 108 colors from a palette of colors and fill in any closed boundary with that color. Of course, most of these colors are checkerboard combinations of the six primary Apple colors. It is often best to use a non-spring loaded joystick when positioning your cursor. And more accurate control is offered allowing more controllable motion over a narrower range. The program also incorporates an editor that will allow you to step through your drawing procedure. Thus, mistakes can be corrected or instructions added and deleted without having to start over.

The third part of the package allows you to create super shapes which are very similar to Apple shape tables but with added features. Since scale and color can be changed in the middle of your shape, large shapes can be condensed in memory by using a larger scale. You must realize that using this procedure is much slower than using bit-mapped shapes developed in the first section of this graphics package.
The Graphics Solution is a sophisticated and powerful animation package that is useful for creating business and educational presentations when animation is needed to enhance or to hold the viewer’s attention. It essentially lets you animate multiple-colored shape tables combined with text on the screen on a frame-by-frame basis.

Because a powerful package like The Graphics Solution requires a great deal of practice to become familiar with all of its features, the package comes with an extensive tutorial. The tutorial is divided into eight lessons, each lasting about fifteen minutes to half an hour.

The program is very straightforward to use. The main shape editing is done in a Lo-Res mode, then transferred to a point that you choose on the Hi-Res screen. The A, D, W, and X keys, which are set in a cross, move the cursor. Depending on the mode, the cursor will move, draw, or erase the enlarged pixels. Pressing the H-key transfers you to the Hi-Res screen where those same cursor keys move the shape around. The P-key will transfer the Lo-Res shape to the Hi-Res screen. Multiple copies can be made. The background surrounding the shape will be retained. Conversely, it is also possible to take sections of the background screen and transfer it to the enlarge Lo-Res window. Sections can be modified and either replaced or moved elsewhere. Any of these window shapes can be saved to memory and recalled when needed.

The program does have a “macro” command feature. Any series of up to 256 commands can be defined as a macro. This allows you to execute all of those commands repeatedly by pressing only one key. While this is useful, only one macro can be stored at a time.

The real power of The Graphics Solution lies in its ability to take snapshots of the Hi-Res screen and put a series of these “frames” together to form an animated movie. The screen is saved just by hitting the Control-Z key. The show mode lets you view your movie just by pressing the M-key. The movie can be stopped at any time and single-framed either backwards or forwards. Since the projection speed affects the rate of animation, the speed can be set for either portions of the show or for the entire show. Once you have verified that everything is correct, it can be saved to disk. These movie presentations can be interfaced to run from your BASIC programs. There are sufficient examples in the manual to help you do this, but they are generally difficult to follow from the standpoint of the novice programmer.

Shapes are generally moved horizontally in jumps of seven pixels. In order to smooth the animation, entire shapes smaller than the Lo-Res window can be scrolled horizontally. Vertical scrolling is also possible as is the possibility of creating mirrored shapes. The editor also features elongation and compression commands. This is helpful since the Lo-Res shapes appear compressed horizontally when viewed in Hi-Res.

You can also add text. While text is normally static, animation is possible by capturing the letters in the Hi-Res window and using them as shapes. The text is an improved version of the standard Apple character set.

While this graphics package is very powerful for creating stunning animated visual presentations, that is its only use. Games can’t be designed with it since collisions aren’t implemented and interactive paddle control is not possible. With practice The Graphics Solution will produce good animated presentations. Practice is the key word for this package, requiring a lot of your time and effort. Those who master it, however, will be pleasantly surprised at the results.
HI-RES SECRETS attempts to unveil the clandestine aspects of fast Hi-Res shape animation using the techniques of block shapes (raster graphics) and Hplot shapes. The package also includes routines involving scrolling, color fill, music and sound, and a superfont character generator.

The package consists of a 260 page loose-leaf book and 4 disks containing both LIZA-compatible assembly language source listings for the programs discussed in the book and utilities to aid your shape generation and animation. Two of the disks are unprotected and two are protected. This does create some problems, in that there is a proper sequence in transferring files created by utilities on the protected disk to unprotected disks. And since there are so many small programs on the disks, the author's introduction to various sample programs can leave you somewhat breathless and confused.

The author assumes that his audience is Applesoft programmers and that they would choose to access the routines directly from that language. Therefore, he opts for a convention that is convenient for the BASIC programmer but is non-standard for block-shape machine language animation, particularly as is done in arcade animation. The author clearly states that this is his preferred method. While Hplot shape animation has no set convention since no one uses it for animation, block-shape animation is too important a subject to be left to the whims of an author who feels that animation consists of cartoonish figures resembling little people walking across the screen.

The book presents the three types of shape routines used for animation. Vector shapes, which are Apple shape tables, are glossed over since what one really needs to generate them properly is a shape table generator, which isn't included on the disk. Why? Because every few pages the author mentions that what one needs is his SUPER SHAPE DRAW package which he created. This costs an additional $40. The fact that you have paid for this package is no consolation. His presentation for Hplot shapes is much clearer and his method is satisfactory. I think programmers will have no trouble with it if they plan to use it in their programs. Except for some special cases, these shapes are rarely used, since they access the Applesoft Hi-Res routines directly.

The block-shape routines, as this reviewer mentioned, are non-standard. However, they do work. The presentation is not very clear and the book does not spend enough time unveiling the mysteries of the screen clearly. In fact, the entire text is at times very muddled and consequently very difficult to follow. The source listings for the assembly language routines do not contain comments in the listing; the comments are instead listed in pieces on the several pages which follow the source listings. One has to constantly flip back and forth between the pages in an attempt to follow his code.

The disks contain numerous examples and utilities. One can convert Hplot and vector shapes to block and Hplot shapes and block shapes back to vector shapes quite easily. There is a utility for generating block shapes and one for viewing shapes saved as a text file. There are also numerous shape tables on the disk for demonstrating how shapes are animated by moving sequences of them across the screen (e.g., people walking). Both single screen and dual screen examples are shown for smoothing animation. There are programs that scroll the screen and those that generate color fill within any enclosed shape boundaries.

The highlight of this package and its main redeeming feature is its color fill routines. Although they aren't capable of filling oddly-shaped areas completely from an initial single starting point, they are fast. Any enclosed space can be filled with multiple starting points. There is also a utility to double the width of the lines in any Hi-Res drawing. Disk #4 contains the entire set of color fill algorithms in a menu-controlled package. Advanced programmers who may want to incorporate the color fill routine in their adventure programs should try to understand the author's algorithm or at least learn how to use it directly. It, like the rest of his routines, is documented, although described in his usual vague writing style.

Overall, this package is more suited for beginners than advanced programmers who would like to learn arcade programming. Its major drawback is that it is difficult for beginners to follow. The routines work if one uses them in a cookbook fashion, and they can be accessed either from Applesoft or machine language. But I think these graphics routines will remain a puzzle to most readers. The package is certainly not worth the price.
**Shape Drawing Programs**

**ALPHA PLOT**

**Company:** Beagle Brothers  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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**EASE OF USE**  
**VENDOR SUPPORT**  
**ERROR HANDLING**

**OVERALL RATING**  
**EASE OF USE**  
**VENDOR SUPPORT**  
**ERROR HANDLING**

**Availability:** 4

**Sugg. Retail:** $39.50

**Disk or Tape:** Disk*

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Alpha Plot is a Hi-Res graphics utility package that creates colorful drawings combined with text. It resembles many of its competitors' packages, with two important differences. Images or parts of a screen can be merged with another located on Hi-Res page two; and the program adds true, proportionally spaced text that can be placed anywhere on the screen. This means that you are not restricted to the usual character position placement, and that you can start the next character by overlapping the last, or part of a previous character row.

The drawing mode allows you to quickly plot lines, dots, boxes, and ellipses. (A circle is a special case of a round ellipse.) These shapes can be drawn in any one of the six available Hi-Res colors. The shapes can also be filled with a color, and this may contain a mixture of two Hi-Res colors. The working cursor for performing these operations can be controlled by either keyboard or paddles. When using the keyboard mode, the speed of cursor movement, or the number of pixels the cursor moves can be selected. The cursor in a normal mode forms a box from the initial position, or it can act as a rubber band cursor, showing a stretchable, projected line. The latter is helpful for viewing the line before you actually draw it.

The text mode can be in upper or lower case. Letters are proportionally spaced and you may vary the leading or spacing between letters. Type comes in four type sizes, with larger type in color. Type can be placed sideways for labeling graphs, or even typed upside down for a mirror effect.

Alpha Plot has several merge features that allow portions of Hi-Res screen #1 to be merged with Hi-Res screen #2. The merger can be done in four ways. Images can be ORed, XORed, ANDed, or compared/combined. Each method produces an entirely different effect, and experimentation is advised. Portions of pictures can also be relocated or duplicated within a Hi-Res screen. Of course, all creations can be saved to disk.

Alpha Plot is certainly a versatile product, and one that is easy to use. It has features that some packages don’t have, yet lacks others. It is clearly documented and works well with another of their Tip Books. The package also includes a picture scruncher that allows pictures to be compressed on the disk to save space. The graphics package is a good value.

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**GRAPHMAGIC**

**Company:** International Software Marketing  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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**EASE OF USE**  
**VENDOR SUPPORT**  
**ERROR HANDLING**

**OVERALL RATING**  
**EASE OF USE**  
**VENDOR SUPPORT**  
**ERROR HANDLING**

**Availability:** 7

**Sugg. Retail:** $89.95

**Disk or Tape:** Disk*

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The GraphMagic package has the potential to be an excellent and versatile graph utility. The resulting pie graphs, line graphs, or bar graphs and/or their data may be stored on disk or output to a printer. GraphMagic also interfaces with other software, such as MatheMagic and VisiCalc to create graphical representations of variable sets and DIF format files. The main menu gives the user a choice of system setup, variable, line graph, bar graph, pie graph, printer, and help submenus.

The system setup submenu has two choices. First, it allows you to select the disk slot, drive, volume, and user numbers for data storage. The user number, appended to every file, permits up to nine people to use the data disk without creating file name conflicts. Second, it allows you to choose the correct printer slot, printer column width, and one of seven printer types. The configuration of the system may be saved to the disk. Upon reboot, the parameters need not be reset.

The variable submenu is accessible from the main menu or from any of the three graph submenus. Files may be created, edited, saved, loaded, changed to DIF file format, deleted from disk, or cataloged from disk. Variables and their values, within each file, may be ordered, erased from memory, or displayed on the screen.
From within the menus of all three types of graphs the user is able to draw, view, save, load, add Hi-Res text, erase from memory, and delete any graph from disk. The user may also go to the variable submenu or catalog the data disk files. Common options of the line graph and bar graph submenus include the ability to label the X and Y axes, to draw the graph on a vertical or horizontal grid, modify the default range of either the X or Y axes, and to choose a display color. While the line graph also provides the user with three different modes of display, the bar graph submenu allows the user to justify the bars to the left, right, or center, so that a graph may overlay another for comparison and analysis. A unique option of the pie graph submenu is that it highlights any one of the slices of the pie; and the printer submenu, finally, permits the user to print out the graph or the variables and graph values.

Although the visual appeal of the documentation is just fair, the reference manual is easily read, useful, concise, and informative. There are some especially good features, among them the section on the interfacing of GraphMagic with other products, including an Applesoft BASIC program which allows you to write a MatheMagic format variable file from numeric data created by other software. Another section deals with error messages and their recovery. Concluding the booklet is a useful glossary of terms with cross-referencing.

I indicated that GraphMagic had the potential to be an excellent package. All but one option, but an important one, worked to produce sharp screen graphs. After setting up the system as required for my Epson MX 82 printer, drawing a graph, and trying out the many options, the program crashed when I attempted to print a hardcopy. A hardcopy is not merely a nice option, but a necessity. Repeated attempts produced the same disappointing results.

Finally, there are two areas which, although they do not directly affect the run of the program, need improvement. First, the incorrect spelling of several words (including GraphMagic) in the help submenus needs to be corrected. This shows a lack of editing polish. The second area deals with visual appeal: the menu and submenu titles should be made more distinctive, possibly by the use of inverse or bold print to make them stand out. But all things considered, GraphMagic is still a very appealing package.

THE COMPLETE GRAPHICS SYSTEM
Company: Penguin Software
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A-
EASE OF USE A-
VENDOR SUPPORT B

This graphics package is an impressive group of utilities that creates and draws Hi-Res pictures, creates shape tables, edits character fonts, allows text to be added to your pictures, and allows you to create and manipulate 3-D figures. It performs some of these functions exceptionally well, while others only just adequately.

The 3-D graphics module is extremely versatile. First, it is intended only to create, view and manipulate figures. These objects cannot be used in other programs for game design. Its best use is for viewing 3-D objects from various angles and then saving them as Hi-Res pictures which can be later colored. The graphics editor is very easy to use for entering, changing or adding points and their associated line segments (e.g., Point 2 to Point 4).

The 3-D objects can be rotated about the center in any plane, or about any particular point as the center. Any axis can be distorted or any individual point can be moved independently of the rest of the object. Objects can be scaled or viewed from close up or far away. Line clipping is performed. One can also add several smaller objects to one graphics file. They also include a utility that would allow one to make individual sections of a 3-D object and put them together in one complete 3-D picture.

The shape table creator produces very easily defined shape tables. One can move or plot a shape by paddles or keystrokes in a defined size shape. The algorithm creates a shape table from the entire block. Although this method is easy for beginners, it creates overly-large shape tables. Drawing a shape which has much empty space around it destroys too much background on the Hi-Res screen.

The font editor for small and large letters is nicely implemented. One could define an entirely new character table and then place these characters or shapes anywhere on the screen. The character generator can be saved into one's own program.

THE COMPLETE GRAPHICS SYSTEM's drawing program for Hi-Res pictures is the weakest module on the disk. Although it has a nice auto-fill mode in some 100 color shades and it can easily draw line segments using paddles, it lacks the ability to quickly draw geometric shapes such as parallelograms and triangles. (See E-Z Draw.) However, it can do circles and ellipses. The program has a paint brush mode of various widths.

Overall, THE COMPLETE GRAPHICS SYSTEM is an impressive package. The documentation is thorough and easy to understand. If one is fascinated by manipulating 3-D objects or one lacked several of the appropriate utilities, it will be a good value.
RAINBOW GRAPHICS

Company: Rainbow Computing
Language: Machine
Hardware Requirements: 48K, joystick

OVERALL RATING B+ DOCUMENTATION A– RELIABILITY A
EASE OF USE A VISUAL APPEAL B+ USEFULNESS A
VENDOR SUPPORT A ERROR HANDLING A VALUE FOR MONEY A–

Here is a way to draw pictures on your computer and never even touch the keyboard. Rainbow Graphics lets you draw pictures and a whole lot more. Using a joystick, you are able to choose options from the menu. The options are divided into two groups: pictures and utilities.

Using options from the Picture category, you may draw freehand, draw lines, dots, frames, boxes, circles, and polygons. Color Burst allows you to take a color and either fill in an area (freehand) or sweep across the screen creating many different colors and hues. Color Fill lets you fill in a specific outlined area with a certain color. You may also write labels using one of the five styles. One of the nice features is the ability to zoom in on an area and toggle individual bits of color.

The Utilities menu allows you to do many things such as change pen colors (green, violet, orange, blue, and two whites and two blacks). Also, shape tables may be made, scaled, and rotated. There are even options to make precise shapes and outline shapes.

The disk is copy-protected and cannot be used to store pictures or shape tables. Rainbow Computing does make many services available, such as replacing defective disks for free, replacing damaged disks for $10.00, and providing free updates to registered owners when revisions are due to programming errors. In addition, you get a free subscription to Softalk Magazine.

Rainbow Graphics is similar to Penguin’s Complete Graphics System except that it does not have a 3-D mode nor as many colors or textures. Even so, Rainbow Graphics is a bargain considering its reasonable price.

THE POOR MAN’S GRAPHICS TABLET

Company: Rainbow Computing
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B+ DOCUMENTATION A RELIABILITY B
EASE OF USE B VISUAL APPEAL A USEFULNESS A
VENDOR SUPPORT B ERROR HANDLING A VALUE FOR MONEY A

This is an excellent program if you write programs that require graphic displays. By graphic displays I do not mean bouncing balls and such, but electronic schematics, room layouts, and so forth. You can easily generate these diagrams and implement them into your program with the help of The Poor Man’s Graphics Tablet.

The documentation is very complete. Written in tutorial form, it takes you through the program step by step. An appendix covers all the commands. The end of each chapter summarizes the commands covered.

When you boot up the program, you have three options. The first option allows you to look at pages of the manual on screen. These “help” files are always available. They enable you to use the program effectively without the manual. The second option, the main part of the program, is the graphics editor. You can generate any kind of drawing and save it as either a shape table or a picture, to be included in your programs. The last option, the color editor, lets you color a black and white picture and save it. Only pictures can be colored however, so to include any colored graphics generated, you must save them and run them as pictures rather than shapes. I do not see this as a limitation. Given the features available with this program, I would say that it will meet the needs of the average programmer just as effectively as a graphics tablet costing fifteen to twenty times as much.

Is The Poor Man’s Graphics Tablet worth the money? I feel that the average programmer can’t get a much better deal.
Graphics Processing System (Professional Version) is a powerful graphics tool for the Apple. It incorporates some very sophisticated graphics processing features and does a creditable job of reproducing some features found only on much more expensive, larger computers. However, before describing what GPS can do, let me say a few words about what it cannot do. GPS is not a plotting program, even though Stoneware shows a nice bar graph in their advertisements. GPS is not a high resolution text writer. Putting text on the screen using GPS is extremely slow. Don’t use GPS if the only input devices available are joysticks or paddles. The capabilities of the software are such that a high quality input device, such as a light pen or graphics tablet, is needed to take advantage of its powerful features. And finally, I am very sorry to say, GPS is probably not a good software choice if its main purpose is to drive one of the plotters it supports. The plotter support is awkward to use, and seems to have been added to GPS as an afterthought.

Here’s what it can do. GPS is a true graphics processor, much like a word processor, using picture units instead of word units. Objects can be drawn on the high resolution screen, rotated, moved, scaled in x or y, colored, duplicated, modified, erased, zoomed in on, or saved to disk. You can assemble the objects into groups, and manipulate the groups as you do the objects. The groups make up the picture, and you can manipulate the entire picture. You can create objects either in a freehand mode or in a line mode. You can zoom in on the entire picture by a factor of 16, giving an effective resolution of 4480 by 3072 points!

The power of this method of dealing with graphics information should not be underestimated. You can quickly and easily create very complicated pictures. They can be stored to disk quickly and efficiently, since only data on the endpoints of lines are stored. And finally, you can transfer the pictures very naturally to other graphics devices, such as plotters, since the information is already in the proper format.

Command input to GPS is through a series of menus which appear at the bottom of the high resolution screen. Each menu has a list of commands, and you can activate any command by putting the graphics cursor (or the light pen) over the actual command word. This is a nice way to input commands, as the keyboard is completely bypassed. You can quickly complete a series of graphics operations. You only use the keyboard for typing the disk file name of the finished picture. Almost all graphics operations are done without keyboard interaction. For example, you can duplicate an object by choosing the Duplicate command, positioning the cursor over the object of interest, and pressing an “activate” button (such as paddle button 1). Move the cursor to a reference point on the object, press the button, and then move the cursor to the new location. If you press the activate button at this point, the object will be drawn in the new location, but the drawing isn’t permanent until the cursor is moved completely off-screen and the button pressed. This allows easy repositioning of the object.

GPS allows you to save pictures either in the GPS format (stored as coordinates) or in the standard Apple format. Pictures stored in the Apple format cannot be manipulated again, but they can become background for another session with GPS. A disk called “special features” accompanies the program. The “special features” disk has a utility program called “grid maker” on it, as well as all the Apple keyboard characters saved as both objects and as groups. With “grid maker” you can create x-y grids that can be stored in the GPS format. The Apple keyboard characters can be loaded at any time into a picture in progress and used to make text. The object-sized characters are small (about normal text size) and the group-sized characters are quite large. Using either set is difficult, however, because each separate character must be loaded and moved around separately. Also, the characters generated are totally unsuitable for plotting on any of the plotters supported.

GPS provides direct support for the Apple graphics tablet; Symtec light pen; Houston instruments HiPlot DMP 3, 4, 6, and 7; HP 7470a plotter; Strobe 100 plotter; IDS 460 and 560 printers; and the Epson MX80 with Graphtrax. The software interface to the HP 7470a (the only output device I have) certainly works, but the process of dumping your picture is anything but straightforward. Instead of being able to access the interface directly from the main program,
you have to exit the program, boot the main disk again, and choose the correct output option. Why couldn't the
program create a configuration file and access it directly from the main program? The user interaction for the output
seems very crude compared to the main graphics program and is very disappointing after the sophistication of the
main program. Only the Silentype printer is supported directly from the main program.

GPS is a good program with excellent documentation and should find many applications where picture processing
is important. It is not such a good program for putting text on pictures, and should not be used if data plotting is an
important application. Hopefully, an improved version of GPS will include better text features and a better interface
to output devices such as plotters and printers. These improvements would make GPS one of the most powerful and
easy-to-use graphics packages on the market.

**THE ARTIST**

**Company:** Sierra On-Line

**Language:** Assembly

**Hardware Requirements:** 48K

| OVERALL RATING | B | DOCUMENTATION | B+ |
| EASE OF USE | B | VISUAL APPEAL | B |
| VENDOR SUPPORT | B | ERROR HANDLING | B+ |

**Department:** Utilities

**Sugg. Retail:** $79.95

**Availability:** 6

**Disk or Tape:** Disk

*The Artist* is a graphics and animation system for Apple II owners. With it, you can design colorful Hi-Res
displays that include text, or shape tables (Apple or raster) that can be animated using the drawing routines included
on the supplied routine disk. In addition, the appendices in the 150 page user manual, a reprint of Ken William's
graphics series in *Softline*, provide the user with some background on how the Apple's Hi-Res screen works.

The module for drawing on the screen allows joystick input. You can toggle between free style drawing and
straight line drawing modes. Colors and brush widths can be varied. The color fill routine allows 21 different Hi-Res
colors and permits you to repaint over an existing color fill if you change your mind. A zoom lens mode allows you to
look at a magnified view of a small screen section. Color pixels can be individually corrected in odd or even columns
by joystick cursor. The color control bit, which is shown between groups of seven bits can also be toggled on and off
to change a byte from violet-green to blue-orange. Groups of changes can be magically undone with a flick of a
single key.

Text can also be added to your Hi-Res pictures before they are permanently saved to disk. Although an included
font editor can edit the fonts, text is available in only standard sized letters. It can, however, be positioned on any
scan line and not just in the standard 24 starting line positions. The font editor allows single bit shifts on characters
so that smooth animation is possible using character sets. The package includes a very good example of an *Invaders-
like* game written in BASIC.

The package is much more useful for creating Hi-Res shape tables using either standard Apple shape tables or bit-
mapped shape tables. The program makes it easy to save a shape. Once the upper left and lower right boundaries are
chosen, everything within that block is converted into a shape for your table. This is not an efficient way of storing
shape data when using Apple shapes, but is a suitable method when working with bit-mapped shapes. The package
also includes a shape viewer for looking at any shape in a standard Apple shape table. You may set the scale, color,
and rotation.

The routines on the second supplied disk, an unprotected disk, are useful for doing extremely fast Hi-Res
animation. Two of the routines are for animating B & W shapes, and two for colored shapes. One each from the two
sets has a built-in collision detector. The B & W routines use 255 points along the X-axis, and the color routines use
140 points. Shapes can be moved in a smooth, flicker-free manner both from BASIC and machine language. For
those who prefer to do their animation from assembly language, LISA-compatible source files are provided. BASIC
users are provided with adequate documentation and several short examples of how to interface the machine
language routines.

*The Artist* is a decent package. It does an adequate job of creating Hi-Res screens, although it lacks many of the
bells and whistles and special effects available in other packages. It does, however, offer high speed drawing
routines useful to both BASIC and assembly language novice programmers unfamiliar with the idiosyncracies of Hi-
Res graphics.
APPLE PLOT

Company: Apple Computer
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: B
EASE OF USE: B-
VENDOR SUPPORT: B

DOCUMENTATION: B+
VISUAL APPEAL: B
ERROR HANDLING: B

RELIABILITY: B
USEFULNESS: B
VALUE FOR MONEY: B-

APPLE PLOT provides the user with an excellent method of utilizing the Apple II's superb color graphics capabilities for displaying information. It is a menu-driven program which may be used to generate custom graphs of up to 100 data points in each of two data sets. The plot techniques can be selected from six formats:

(1) Standard graph — line graph of one data set.
(2) Standard graph with data overlay — line graphs of two data sets.
(3) Bar chart — one data set.
(4) Multiple bar chart — two data sets.
(5) Scatter plots — unconnected dots.
(6) Mixture — consisting of bar charts and standard graphs.

The data entry and editing routines are very straightforward. One enters the point number, followed by the X and Y coordinate values. The drawback is that a return must be entered after each data entry since each piece of data (not each data point) is stored as individual segments in a sequential data file. Editing allows insertion or deletion of a complete data point or changes in any X or Y value.

The program features automatic scaling and labeling of the axis. One can also insert two additional labels inside the graph. Graphs can be saved to disk as pictures to be presented in slide show fashion or for dumping to a printer. The program supports Hi-Res screen dumps to both the Apple Silentype and Qume Sprint 5 printers. APPLE PLOT also includes a program for converting VISICALC data to a format used by its plotting program.

The program is much more suited to business rather than scientific applications because of its 100 data point limitation. As compared to Muse's Data Plot, this package is more expensive and doesn't offer pie charts. However, unlike its competitor, it maintains data on disks using standard DOS. This may be a real plus for interchanging data between programs.

THE SHAPE MAGICIAN

Company: Dynacomp
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING: B
EASE OF USE: B
VENDOR SUPPORT: C

DOCUMENTATION: B
VISUAL APPEAL: B
ERROR HANDLING: A

RELIABILITY: A
USEFULNESS: B-
VALUE FOR MONEY: C+

THE SHAPE MAGICIAN is a graphics utility program that facilitates the construction of shape tables. While there are many commercial packages that do this, the SHAPE MAGICIAN has some advantages as well as some limitations over others.

The author has defined a grid — an oversize plot pad 25 units per side — for accuracy in plotting a shape. One can use the cursor for plotting or not plotting in any direction using simple keystrokes. Mistakes can be corrected by backtracking through as many vectors as one wishes with an asterisk keystroke. The program's algorithm allows one to travel upwards in the non-photo mode without regard to the rule that you can only move two spaces without moving sideways before continuing. While one plots on this 5X scale grid, a normal size shape is displayed in the upper right hand portion of the screen. The number of bytes used is displayed on the lower right side of the screen. The program limits you to 30 shapes per table. A shape's size cannot exceed 150 bytes or 300 vectors. Of course, one is limited to a shape not larger than 25 units by 25 units.

The program has an editor, but it isn't suitable for constructing a new table — just for either redrawing a shape or adding new shapes. The feature for redrawing a shape comes in handy because it leaves you with the cursor exactly where you finished; thus you can use the asterisk key to backtrack to correct your shape. You can even erase the shape completely and start over.

The program is very handy for constructing complicated yet accurate shapes that you have plotted on graphic paper. Its documentation and screen layout is very clear.
THE COMPLETE GRAPHICS SYSTEM
and SPECIAL EFFECTS

Company: Penguin Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING  A–  DOCUMENTATION  B
EASE OF USE  B–  VISUAL APPEAL  N/A
_VENDOR SUPPORT  A  ERROR HANDLING  A
_RELIABILITY  A–  USEFULNESS  A–
_VALUE FOR MONEY  A–

The Complete Graphics System II and Special Effects is one of the most comprehensive packages of graphics utilities available. The main menu includes graphic modules of drawing, text, 3-D graphics, shape tables, panel drawing for 3-D files, and shrink submenus. It also includes special effects for painting, tricks, packing, viewstring, and font, and picture converter modules. Three other options (color bars, a disk command, and quit) complete the main menu.

The submenus, of the single or double character command line type, let you view the operations being performed. The disadvantage of the command line menu is learning what operation the letter or number selects within each submenu. In this package, for example, the letter “s” may mean shape mode, scale, use small font, shrink, or create a string.

The drawing module options let you load, save, clear, or draw a picture or shape table. You can draw lines, arcs, circles, or ellipses; fill an enclosed area manually or automatically with the Apple hi-res colors or with 100 other colors selected from a viewable palette; use nine shape table brushes to draw or highlight; rotate, scale, and plot a shape from a previously loaded shape table; and exchange black and white areas for filling.

Using the paddle or joystick is difficult at best until you discover the use of the briefly-mentioned “z” key. On detailed irregular shapes this key allows you to zero in on a small section of the screen and draw fairly accurately.

Returning to the main menu and selecting the text module permits you to position and type on your picture with a normal sized character set or a larger set with characters twice as big. You can type the larger set with any of 108 colors over the existing background color or with the text background color reversed or placed over a black background at the cursor (destroying the background color). This module also allows you to edit an existing font or create your own.

With the 3-D module you can build a table representing a figure of up to 512 points using x, y, and z coordinates and joining the points with a table of up to 512 lines. The figure may then be rotated, moved, scaled, distorted, or edited at points while viewing. It does not stop there. You can load other figures, view, edit, and manipulate them individually or as a group. Another options lets you add a figure by entering its coordinates and line end points.

The panel utility draws a two-dimensional surface and stores it with three-dimensional coordinates (the depth is assigned the value of zero). You can then use the panels in the 3-D module, and draw 3-D figures without building a table. This is much quicker; the disadvantage is that it uses more memory.

The tricks special effects module makes it possible to load a picture, flip it over left/right across the screen, or mirror the left side onto the right, right side onto the left, top onto the bottom, bottom onto the top, or turn the picture upside down. A second trick allows color groups for every byte to be swapped—green for orange, blue for violet. Color group and alignment also change—black for white, orange for violet, blue for green. Another trick option takes any rectangular portion of a picture from either page 1 or page 2 and moves it to any portion of the picture on page 1 or page 2. The new section scrolls upward or downward into place. It is also possible to move an entire picture from page 1 to page 2 or vice versa.

One of the best features of this package is that it is not copy-protected. Penguin backs up the technique with numerous informative, well-illustrated programming notes to help you incorporate the routines into their programs.

The documentation has room for improvement. There are two poorly-bound booklets, one for The Complete Graphics System, the other for Special Effects, with hard-to-read print. Menu items were hard to locate within each chapter. Underlining would have made the learning of the command line letters much easier. Nonetheless, these minor irritations cannot detract from this useful, inexpensive, versatile package.
3-D Graphics

3-D SUPERGRAPHICS &
GAME DEVELOPMENT SYSTEM

Company: USA Software
Language: Integer & Applesoft
Hardware Requirements: 32K

OVERALL RATING C-
EASE OF USE C-
VENDOR SUPPORT C-

Department: Graphics
Sugg. Retail: $39.95
Availability: 5
Disk or Tape:Disk*

RELIABILITY B+
VISUAL APPEAL B
ERROR HANDLING B
VALUE FOR MONEY C

The 3-D SUPERGRAPHICS package by Paul Lutus is a tool for animating games or demonstration programs. It allows one to define 3-dimensional shapes either in black and white or any of Apple’s Hi-Res colors. One can move these objects around the screen, rotate them about their X, Y, or Z axis, change the scale overall or stretch the shape by scaling the axis unequally. Supplementary text can be placed anywhere on the Hi-Res display in any scale or color.

The machine language algorithm for rotating objects using matrix transformations is quite fast. The technique of ping-ponging between two graphics screens provides flicker-free animation. Because of the extra calculations required during color display, the animation frame rate for large databases tends to slow down considerably. Lutus provides two versions of the program. The one in black and white is for faster framing. Of course, one wonders exactly how fast is his package compared to others like Budge’s or Sublogic’s. If the user’s driver package is in machine code, then it’s probably a toss-up between Budge and Lutus’ B+W version. The color version is definitely slower. In Integer or Applesoft, Lutus’ B+W is faster because he provides commands for executing loops within his code rather than the traditional FOR-NEXT loop. As usual, one has to be particularly careful with an object near the edge of the screen. This package has no line clipping; therefore, objects tend to wrap around near the edge of the screen. And for those users that need missile algorithms, there are none. One must also be aware that the package places 3-dimensional objects on a 2-dimensional screen. There is no Z axis. The effect of objects moving away from the viewer is accomplished entirely by scaling.

Lutus includes a graphics editor for entering values for the data base. It is not a very good editor; USA Software recommends using the editor in their sister product, “Apple World”. They handily include a program for translating between the two packages. They do give a listing of the editor in this package for modification to suit the user.

To use and manipulate the created shapes with a Basic program requires print statements with a format of the following form.

ex. PRINT “%ND, NW, SH28736, SC5”
PRINT “%PX10, PY52, RY0TZ0SZ”

which simply says: “Draw a new shape starting in memory location 28736, scaled to 5, position it at X = 10, Y = 52 rotate around axis from 0 to 20 stepping Z. It may throw beginners at first but it can be learned.

The documentation, which is in a nice binder albeit poorly printed, is somewhat difficult to understand. In an attempt to write a sample program, this reviewer completely misunderstood the difference between translation and position as explained in the booklet. While positioning an object to a particular place on the screen was simple, when I tried to move it across the screen with the translate command loop, I wrapped the object around the center of the screen. Rereading the documentation didn’t help, but a phone call to NYC did. Apparently, my definition of translate and theirs is not the same. In short, I found the documentation frustratingly difficult to follow. Even their demo with their multi-command structure was difficult to understand.

The disk is protected so that if one wants to use the package in his own program he will have to load the graphics package from the disk. If one wants to incorporate the package into a commercial program, he will have to arrange for a royalty use fee with USA Software. Unlike Budge’s graphics package, commercial use of this one is not free. In summary this package has applications for game programmers, especially if they prefer their graphics in color. However this package is somewhat more difficult to understand and implement in one’s own game design than the Budge package.
Bill Budge's 3-D GRAPHICS SYSTEM allows one to design a Hi-Res three-dimensional game with relative ease. The graphics editor enables the user to create up to 16 different 3-D shapes and view them. This database is then saved to the user's unprotected disk. A machine language module that manipulates this data is also saved to that disk. All that the user has to do is write a game control program in machine language or either Basic language.

The graphics package is at least twice as fast as another package on the market. It ping-pongs between graphics pages to minimize flicker. It also allows one to mix text with the graphics and has missile algorithms to shoot an object down in 3-D (not available in Applesoft).

But speed has a price, and that price is no line clipping at the edge of the screen, so one must be careful to keep any part of the objects from ever crossing the boundary. Although each of the 16 objects are rotated in a true 3-D space, they are placed individually in a 2-D plane. There is no Z axis on the TV set. The actual appearance of an object coming at you is accomplished by changing the scale. The same thing happens when one shoots a missile. One is actually firing from one x,y to another x,y.

The package is excellent for game animation. Budge has well-documented instructions and a game example.

Sublogic's A2-3D1 three-dimensional graphics package uses true machine language algorithms to draw and project objects using a 3-D graphics data base onto a two-dimensional television screen. It is the only package that defines all of the objects within the data base in relation to each other. Essentially, each of the object’s points are defined in precise X,Y,Z locations, while the user’s viewpoint is moved around an X,Y,Z coordinate system environment. Objects tend to advance, recede or even rotate as one circles an object while viewing it with a specific pitch, bank, and variable heading. This approach to 3-D graphics lends itself to applications like flight simulators, architectural drawings, and even games.

The program is quite fast (approximately 150 lines/sec.). Obviously, frame rates are dependent on the user’s driver software and the number of lines drawn on the screen during one frame. A2-3D1 includes smoothing techniques for allowing the ability to draw on one graphics screen while viewing the other (ping-ponging) and for accomplishing array smoothing. The latter does all its calculations and stores its projection data, including the option for clipping lines, before drawing to the screen. It is almost like dumping to the screen as opposed to forming an image line at a time. Image flickering still occurs, but all the lines are on screen for the same amount of time. The viewer’s frame of reference can be anywhere within (+) or (-) 32767 limits in any of three axis, with the user having full-circle freedom of pitch, bank and heading viewing. There is also a variable field-of-view command which changes the viewpoint to wide-angle or telephoto.

Data bases are generated with a utility called “Develop”. Versions are supplied in both Integer and Applesoft. The program allows you to choose op-codes for either a start point, continue point, ray, etc., and to enter the proper values for the its X,Y, and Z positions. This is done for each data point and all objects in the database. The utility isn’t very versatile since it lacks the ability to later edit, insert or delete data points. However, it does offer a view function that allows one to see what is created. It is not interactive, although one can move the eye position for better viewing. When finished, the data bases can be saved to the disk for later use.
The Book of Apple Software

Utilities

The most difficult and crucial step in working with this program is implementing a machine language or BASIC driver program. The driver is actually an elementary program that moves the eye around the data base, while adjusting its coordinate position, pitch, bank, and headings. One simply pokes values into the memory locations for the eye and then calls the 3-D package. The view as seen by the moving eye produces the screen animation.

The documentation leaves a lot to be desired. It is very complete but lacks clear explanation of how to implement many of its functions. There are actually two manuals. The short “Load and Go” manual tells how to use the “Develop” package and offers several BASIC program examples as drivers. The main documentation is a reference manual which details the program’s main functions and all its op-code structures. It is better suited to machine language programmers; definitely not for beginners.

This is an extremely powerful graphics package. It offers more flexibility than its competitors’ products. It lacks several useful features; however, these have been added in the A2-3D2 enhancement.

A2-3D2

Company: Sublogic
Language: Machine
Hardware Requirements: 48K

OVERALL RATING: B
EASE OF USE: D+
VENDOR SUPPORT: C+

DOCUMENTATION: C+
VISUAL APPEAL: B
ERROR HANDLING: B+

RELIABILITY: A-
USEFULNESS: B
VALUE FOR MONEY: B+

Department: Utilities
Sugg. Retail: $24.95
Availability: 7
Disk or Tape: Disk

Sublogic’s A2-3D2 package is an enhancement of their original A2-3D1 package. It offers two substantial changes: 1) five color graphics plus twice the resolution in the black-and-white mode and 2) independent object manipulation. It also frees the memory constraint of the 32,767-byte environment from the consequential inherent overflow which occurs when the graphic’s values are rotated and exceed the limit.

The ability to perform independent object manipulation is this package’s greatest strength. One isn’t limited to sixteen objects as in the competitive packages; therefore, the user may multiple-call or even nest the objects. When objects are nested and then rotated on their axis, other attached objects also rotate in unison. The independent object, which is defined as a block, is called by an op-code in the data base. This op-code contains the location of the independent objects’ coordinates, plus its pitch, bank and heading. It also includes a countdown feature, so that if, for example, it were a photon torpedo, it would disappear after so many screen cycles. Thus, an object could be moved around the screen by a BASIC program which poked new locations into that calling op-code. This can be done simultaneously while your viewing perspective is moved independently within the 3-D data base or world.

To state that the package is powerful is a mild understatement. It is approximately 10% faster than the previous version while operating in the normal B & W mode. The documentation is thorough (but difficult) for beginners. This system is supposed to be combined with the A2-3D1 package to work but, in fact, it works by itself. However, there are important points that are referenced only in the original package’s documentation; thus, ownership of both versions is suggested.

A2-GE1 GRAPHICS EDITOR

Company: Sublogic
Language: Assembly Language
Hardware Requirements: 48K

OVERALL RATING: B
EDUCATIONAL VALUE: B-
VENDOR SUPPORT: C+

EASE OF USE: B-
DOCUMENTATION: B+
VISUAL APPEAL: B+

ERROR HANDLING: B-
RELIABILITY: B
VALUE FOR MONEY: B+

Department: Utilities
Sugg. Retail: $39.95
Availability: 5
Disk or Tape: Disk*

A2-GE1 Graphics Editor is a utility package for creating and manipulating three dimensional data bases that use the A2-3D1/A2-3D2 graphics packages. It includes an Object Editor program, a Motion Programmer, and a Slide Show Programmer. The latter two make previously created objects and scenes, manipulate them, and later play them back as either movies or slides. Also included in the package is a BASIC interface which illustrates how one can control an A2-3D1/A2-3D2 data base from a BASIC control program.

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The Object Editor is an interactive editor that allows users to construct three-dimensional data bases while viewing them. The user controls a cursor that moves in three dimensional space on the Hi-Res screen. Four lines of text at the bottom give the cursor's current coordinates and the type of data base command entered. The user can position the cursor, continue point, or ray. The cursor is moved using the X, Y, and Z keys; and is decremented or incremented from its last position. Likewise, the location of the user's eye can be changed by first toggling into the eye mode, then incrementing or decrementing the eye's position. All mistakes in the data base can be corrected by scrolling backwards through the data base using the arrow keys. One must be careful to change the proper data point, or the entire data base could be lost, requiring data to be re-entered from the initial processing phase.

The Object Editor, while easy to use for people who have trouble visualizing three dimensional objects, has several drawbacks. It is not suitable for entering large, predefined databases. Nor does it have delete or insert capabilities, and it is unable to use the A2-3D2's powerful commands such as independent object call, page switching, or array generation, to produce a smoother, flicker-free picture. It does, however, use the color features, and can set the resolution of the picture.

The Motion Programmer allows one to load up to six object data files and manipulate them, each independently of the other. This is accomplished through the independent object call feature of A2-3D2. One object must remain stationary, but the others may be given arbitrary velocities and rotations along the axes. This is done interactively as you view the objects, and thus is great fun. Assuming you mastered control of all the objects, the motion recorder feature of the program can be turned on. This will record the entire session much like a video recorder, and can be played back later using the MPLAY program on the disk.

The documentation, which was one of the weaker points of the first two packages, is well-written, for once. It is directed towards the beginner. One of the most helpful sections, that makes up for deficiencies in other packages, is the description of the BASIC interface to the A2-3D2 package. It explains how objects that are created by the Object Editor can be loaded into memory, and animated under control of a BASIC program.

While this graphics editor is a great help and is easy to use, it lacks the important features of a true data base editor that would allow the user to unlock the potential of the A2-2D2 graphics package. Hopefully, a future version of this package will include a true database editor.

APPLE WORLD

Company: United Software of America
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING C +
EASE OF USE C
VENDOR SUPPORT C -

DOCUMENTATION C
VISUAL APPEAL B
ERROR HANDLING B

RELIABILITY A -
USEFULNESS C +
VALUE FOR MONEY C

APPLE WORLD is a three-dimensional graphics package especially useful in architectural design and for animation. The package is capable of showing three-dimensional objects in a predetermined series of moves specified in advance by the user. The boundaries of this system is a cube about 64,000 units on a side.

The program is relatively easy to use, as it virtually has a text editor for entering data that makes it simple and the program avoids forcing you to understand any technical aspects.

Data is entered by specifying a start point for the object in X, Y, and Z coordinates, then a point to continue that line in relationship to the previous point (ex. +100X, -10Y). Once an object is completed and entered, one can view it by specifying a scale, a viewing position, plus angles (both horizontal and vertical) to point the viewfinder at the object.

Created objects can be saved for later animation or can be used as basic building blocks for more complicated objects (e.g., chairs in a conference room). One can also save at any time the current view on the screen.

APPLE WORLD's main disadvantages are that the program lacks real-time interactive control such as an interface with the PDL input-output for game animation and, as the number of projected lines increases, the animation speed bogs down (speed is approx. 100 lines or points/sec.).
The Printographer is a utility designed to dump the graphics screen to a printer or to disk as one of several formatted files. All popular printers are supported, and the program is supposed to work with any printer (although I could not test it with all). The Printographer will dump the Hi-Res screen, or some portion of it, to a printer. You select which section of the screen to be printed. In addition, there are two built-in formats: a cameo oval and a diamond. These formats can be superimposed as needed on whatever portion of the Hi-Res screen you have outlined.

When printing graphics, the program allows you to select a magnification power from 1 to 9. Routines are provided for your use in printing from programs that you write. In these, you may magnify the picture up to 127 times.

The program allows you to save the printing sequence to disk instead of sending it direct to a printer. This can be very useful if you wish to transfer a Hi-Res picture from one machine to another via a modem. It is also handy for “spooling” pictures to a printer while some other program is running, or at a later time when the computer is not in heavy use. My particular configuration includes an Apple II with Diablo printer driven by an Apple Serial Card. The sequential file produced on disk for a small portion of the Hi-Res screen was 85 sectors long, versus 33 sectors for the complete picture as a binary file! If you use this option and a daisy wheel printer, be certain to have plenty of disk space open.

The Printographer will save any Hi-Res screen to disk in a compressed format (using the “S” file). This may produce a significant saving. But unless you have this or a similar program, you won’t be able to recover those pictures. Perhaps in future revisions Southwestern Data Systems may provide a short stand-alone routine to allow you to recover compressed pictures in programs of your own.

The program generally worked well. One nice feature is the provision of the FPBASIC file on disk for those who have older Apples with 16K expansion cards. Another valuable feature is that the Page I Hi-Res screen survives the boot process. Normally, a Page 1 image is damaged during boot up. The program appears to do this by moving the picture to Page 2 during boot up, and then copying it back afterwards. Page 2 Hi-Res does not survive boot up.

Two features of this program did not work well. The menu indicated that one could shift between the Hi-Res display and the instructions by using the “?” key. This would not work. Once the Hi-Res display was brought up, the only way I could get back to the Help Menu was to exit the edit and re-enter through the menu which asked where the picture was to come from.

The second poor feature, and this was a more serious one, involved the difference between printing normal and printing inverse images. The program is designed to help you by examining the screen and determining for you if printing would be best as “normal” or “inverse.” While its decisions may largely be correct, you never know for certain what the program has done until actual printing. There is an indication of what the program has picked, but it is not always correct. The simple fix is to display the screen exactly in the way it will be printed. This is quite easy to implement, and should be.

Although this is a good program, on the whole, it could be significantly improved with a little added work.
ZOOM GRAPHIX

Company: Phoenix Software
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A
EASE OF USE A
VENDOR SUPPORT B

DOCUMENTATION B-
VISUAL APPEAL A-
ERROR HANDLING B-

RELIABILITY A
USEFULNESS B
VALUE FOR MONEY A

Zoom Graphix allows any printer that supports graphics to print out pictures that reside on either Hi-Res screen. It can print an entire screen either vertically or horizontally; or print a portion of a screen in an expanded form or in your choice of screen proportions.

The program supports 21 printers. All of the Epson, IDS, and Adadex printers are included, as well as the Qume, Diablo, Xerox, Prowriter, NEC PC-8023, MPI 88G, Silentype, Spinwriter, and Starwriter. It will work with 20 interface cards virtually all that are currently available.

This utility is menu driven and it has excellent error trapping features. When a user wishes to print a portion of a picture, he can choose the coordinates of each edge, and the computer will show exactly what will be printed. He can easily change any value, or by hitting return, simply use the current setting of each boundary. The user can specify the proportions of the width and height relationship of the printing. A picture 2 dots high by 3 dots wide is the recommended setting, but one can stretch the width with a 5 dot wide by two dot high setting, or similarly squash the width with a 3 dot wide by 6 dot high setting. The program also incorporates a print delay at the end of each line so that print heads don’t overheat when printing pictures with a lot of black areas. Pictures can be inversed if desired. There is no doubt that this is the most versatile of the many Hi-Res screen dump programs that are available for the Apple. The printing is certainly as dense and as dark as that offered by the Graftrix package, yet has many additional features.
The Amperdump program for the II+ and IIe provides a hardcopy dump of the Hi-Res graphics display—page one or two—by reading the memory of the Apple and transmitting the image to your printer via the interface card. Amperdump can be used either in a menu-driven mode, or directly from an Applesoft program. The Amperdump disk is not copy protected, and thus the utility can be transferred easily to other program disks. At present the program supports the following hardware:

**PRINTERS**

- **Apple:** Dot Matrix
- **C. Itoh:** 1500
- **Epson:** 8510A/B
- **NEC:** PC-8023A-C

**INTERFACE CARDS**

- **Apple**
- **Epson** Type 2
- **Epson Type 2**
- **Grappler**
- **Interactive Structures PKASO**
- **Mountain Computer CPS**
- **Microbuffer II**
- **Tackler**
- **Tymac**

There seem to be at least three situations where a software dump program versus a firmware board must be used to print graphics. First, suppose you are using a protected disk program where the code cannot be modified and the program itself generates graphics. The manufacturer has chosen not to design a printer dump program that will work with every combination of interface card and printer. The author may have thought that such investment of time and money might have adversely affected the price of the program. However, if the program does save the screen graphics to disk, you can dump them to your printer through your interface card using your graphics dump program. Theoretically, you could save the cost of Amperdump each time you bought a program where the author chose not to write his own dump routines. Second, you will want to own a graphics dump program if you own one of the non-firmware boards. You may have no other choice for printing graphics other than using a software program. Third, this utility offers many features which are not available in other graphics dump routines, either in software or firmware. In particular, this package offers (depending on your hardware, of course) up to nine different vertical magnifications, i.e., dimensions of your graphics image—0.88" to 8.0"—and up to seven horizontal magnifications—1.75" to 7.78"—in any horizontal and vertical combination. The utility can also provide inverse (black on white) and normal (white on black) printing and position the image horizontally on the page. It also solves a minor irritation in using firmware boards: you will see no unsightly Applesoft “Syntax Error” message just below your freshly printed graphics dump.

The program works in two modes: from a menu and from within Applesoft. The menu-driven program lets you choose from all the printing variables available. It also allows you to load the graphics from disk and view them (in Apple full-screen dimensions) before printing. The Applesoft mode of the program is accessed by “&:DUMP” or “CALL 37500” from within your program. You may change dump parameters with modifiers placed within the above statements. The program loads just under DOS in memory and therefore competes for memory space with some Applesoft editor programs and others. However, it gives a warning before loading if HIMEM is not at its normal location. Then upon loading HIMEM, it is moved from 38400 to 37499. Alternatively, if you require unusual memory allocations, you will find the program relocatable. This is covered in the manual.

As an added point, Madwest Software also markets the program Ampergraph, which I have not yet seen. The two programs are claimed to work smoothly together in creating and dumping graphics images from within Applesoft programs.
Amperdump is a very good program. Even the beginner will have no trouble using it. If you do not intend to use its Applesoft capabilities, this program will be very useful in its menu form. The author, however, failed to provide examples of Applesoft uses. For instance, the inexperienced programmer could benefit from a brief sample program on which to practice dumping the graphs. Also, the program lacks one feature which keeps it from totally replacing the firmware graphics dump interface card—there is no provision to print graphics that are rotated ninety degrees on the page. This eliminates any use of the “strip chart” type of output offered by firmware cards.

Frame-Up is a utility which allows the display of text screens, low resolution graphics screens, and high resolution graphics screens in a “slide projector” mode. The features are extensive and include a text screen editor, the manual or timed sequencing of displays, forward or reverse presentation order, and unattended operation. The documentation is excellent, and includes the standard Beagle Brothers booklet plus a slide show tutorial which graphically shows all of the program’s main features. The utility is easy to use, and is made even more attractive by the inclusion of a Beagle Brothers keyboard reference chart.

I can imagine no better utility than Frame-Up for the Apple user who wants to display a series of text or graphics screens. The combination of ease of use, speed, and capacity make it a good choice for a large range of display applications. High resolution images can be changed in two and one-half seconds, and text frames (or low resolution graphics) can be changed in an amazing one-quarter of a second. This even allows for some limited animation. Seventeen high resolution frames, or 136 text frames, can be stored on one disk; and each frame can be programmed to stay displayed for a given period of time to create text screen tutorials (as is done on the program disk itself).

It is hard to fault Frame-Up. The price is low and, as with all Beagle Brothers programs, the disk is not locked. It looks like another winner for the Beagle Brothers.
GRAPHTRIX 1.3

Company: Data Transforms, Inc.
Language: Applesoft and Machine
Hardware Requirements: 32K & Graphics Printer

OVERALL RATING  B  DOCUMENTATION  B -  RELIABILITY  B
EASE OF USE  B+  VISUAL APPEAL  B  USEFULNESS  B
VENDOR SUPPORT  B  ERROR HANDLING  B  VALUE FOR MONEY  C

GRAPHTRIX is a graphics printer utility package that offers some new features unique to the microcomputer industry. This package is a menu-driven edition that implements Hi-Res screen dumps from either disk or memory (page 1 or 2) and supports all current matrix graphics printers used on the Apple II.

This package specifically can be used with the following printers: Anadex 9000/9001/9500/9591, IDS 440G/445G/460/560, Centronics 739, Epson MX-70/MX-80/MX-100, MPI 88G and the Silentype. The interface cards that are supported are: Apple Standard Parallel, Apple Centronics Paralles, Epson APL Standard, and the C.C.S. 772B. The newest version incorporates support for the SSM AIO, Mountain Computer CPS, and the TYMAC (for Epson) interface cards.

GRAPHTRIX also allows Applewriter owners the luxury of placing graphics or pictures in their letter files, as well as inclusion of footnotes either at the bottom of the page or at the end of chapters. There are capabilities (if the particular printer supports them) for using three sizes of magnification, cropping of both top and bottom of screen, superscripting (with limitations) of footnotes, and a utility to quickly shift from one Hi-Res screen to the other. There are appendices for each printer manufacturer which provide information to the programmer for utilizing GRAPHTRIX capabilities in BASIC programs.

Error handling is accomplished by using Control-C for halting execution and re-running the program. Not very elegant, but effective nonetheless.

All in all, GRAPHTRIX is a most useful utility for the Apple owner who wants to fully utilize the graphics capabilities of his printer. The program is priced right and allows for easy backup, which is a blessing in this age of copy-protected diskettes.
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Entertainment

One of the significant advantages of owning an Apple computer is the fact that the Apple has a dual personality. On one hand, the Apple is an extremely powerful personal computer capable of performing a variety of practical tasks. On the other hand, the Apple, with its color and sound capabilities, is a fun machine well suited to games.

Games have evolved from simplistic Lo-Res animation into lengthy integrated Hi-Res simulations and high-speed arcade-quality displays. The days when the Hi-Res screen was a mystery to all but a few, and Lo-Res was the only viable alternative to the average game programmer have passed. Today's programmers are more sophisticated and adept at using all of the Apple's capabilities. Innovators and competitors have provided challenges in setting new standards for game programming. Economic considerations have played a strong part in this process. The public, which has been spoiled by some of the best of the Apple game-oriented software and arcade game-playing experiences, is always looking for something better, new, and more challenging.

Programmers who design games can be likened to writer creating works of fiction. There are hundreds of fictional books written each year, with perhaps only a handful of plot types. Regardless of how well they sell initially (whether they sell because they are different, the author is hot, or they are widely-promoted and/or have a flashy cover), few editions will sell for a period exceeding a year; most will quickly fall by the wayside. However, a few will become classics and sell to newcomers year after year. In the computer world we have a similar handful such as Adventure, Invaders, Asteroids, Pac-Man, and Frogger which have achieved this rank. We see inklings of new programs that might make it, but technology is advancing very rapidly. Even our classics may someday be considered primitive.

Meanwhile, games are increasing in magnitude as programmers attempt to give the public something for their money. With game prices steadily creeping upward, how fast you tire of a game is an important consideration, especially when games can no longer be traded because of protection methods.

Games are also becoming more graphics-oriented. The classic adventure type game now has graphics. Many games now include modules for creating or modifying the basic game to suit the players' tastes. Shoot-'em-up games have been enhanced by using true perspective, faster action, and even 3-D effects. Very realistic 3-D games have been introduced. Programmers like Budge and Artwick have written games using their own graphics packages. These types of games may become the rule rather than the exception in 1984.

Thus there is a potpourri of entertainment programs available today. The sheer multitude of titles suggests that most people use their computer in large part for entertainment. As one can see from our table of contents, the programs are divided into many categories. Within any section, we have tried to group similar games together. We have attempted to show both their similarities and their differences. In some cases, grouping is based on whether one likes paddle controls versus keyboards or long games over short ones. And just because a game is in Lo-Res doesn't necessarily mean it is inferior. There are cases where Lo-Res is perfectly adequate and Hi-Res would not have been an improvement. A better criteria for evaluation may be whether a game possesses sound strategy and is playable (even addictive) rather than how it looks. Finally, you should choose entertainment programs primarily on the basis of how many times you will play them.
Adventure And Role Playing Games

Did you grow up in the company of the Brothers Grimm, Snow White, the Red Fairy Book, Flash Gordon serials, the Three Musketeers, the Knights of the Round Table, or any of the three versions of the Thief of Bagdad? Have you read The Lord of the Rings, The Worm of Ouroboros, The Incomplete Enchanter, or Conan the Barbarian? Remember Tom Swift? Have you ever wished you could cross swords—just for fun—with Cyrano or D'Artagnan, or stand by their sides in the chill light of dawn awaiting the arrival of the Cardinal's Guards? Ever wondered how you'd have done against the Gorgon, the Hydra, the bane of Heorot Hall, or the Minotaur? Would you have sailed with Sinbad or Captain Blood, sought passage on the Ship of Ishtar, or drunk of the well at the world's end? Did Aphrodite make Paris an offer you couldn't refuse? Would you seek the red-hued maiden beneath the hurtling moons of Barsoom, or walk the glory road with "Dr. Balsamo," knowing it might be a one-way street? Have you seen the Star Wars trilogy and imagined you were fighting beside the rebels of the Alliance?

If any or all of your answers are "yes," then you're a player of role-playing games—or you ought to be. (If all of your answers are "No," then you have either stepped through the looking glass by mistake, or Fate knows your destiny better than you do.)

Role-playing games allow you a chance to step outside a world grown too prosaic for magic and monsters, doomed cities, and damsels in distress. Through them you may enter instead a universe in which only quick wits, the strength of your sword arm, and a strangely carved talisman around your neck may be the only things separating you from a pharaoh's treasure or the mandibles of a giant mantis.

The standard (non-computer) role-playing game is not, in its commercial incarnation, much more than a rule book—a set of guidelines used to create a world colored by myth and legend, populated by brawny and intelligent heroes, skilled swordsmen, skulking thieves, cunning wizards, hardy amazons, and comely wenches, and filled with cursed treasures, spell-forged blades, flying carpets, rings of power, loathsome beasts, dark towers, and cities that stood in the Thousand Nights if not in The Outline of History.

Role-playing games are not so much "played" as they are experienced in the mind. Instead of manipulating an army of chessmen about an abstract but visible board, or following a single piece around a well-defined track, collecting $200 every time you "Pass Go," you venture into an essentially unknown world with a single piece—your alter ego for the game, a character at home in a world of demons and darkness, dragons and dwarves. You see with the eyes of your character a scene described by the "author" of the adventure—and no more.

The adventure-type games reviewed here run the gamut from scenarios of ancient times to the far distant future (occasionally in one game), from fantasy to murder and war. Some are "all text adventures," and some mix text with Hi-Res visuals to enhance your imaginative experience. In sum, selections from these programs will provide you with many hours of enjoyment and exercise for your imagination.

1Our thanks to EPYX/Automated Simulations for allowing us to excerpt from the booklet accompanying their fine program, Temple of Apshai, comments concerning Adventure Games in general.
“Typical” Adventure Map
A "TYPICAL" MONSTER YOU MIGHT ENCOUNTER DURING AN ADVENTURE
Fantasy, adventure, role-playing, and maze adventure are all names applied to the type of game that gives the player certain attributes in order to accomplish a certain goal or task. *Temple of Apshai* is a good example of this type of game. The player must utilize his attributes such as dexterity, intelligence, fatigue, etc., to fight his way through a maze populated with monsters and other untoward dangers.

This is the longest and most versatile of the Dungeonquest series. The Dungeonmaster program allows one to create his/her own characters; alternatively, one can let the computer choose character traits and abilities at random. The player explores the rooms of a multi-level dungeon on a Hi-Res screen. Your character moves around from room to room, confronts monsters and battles them with his various weapons. All this is done with shape tables, including fight sequences complete with sword thrusts. The game has a choice of numerous difficulty levels and play options. Games can easily last for hours.

The author has shown as much thought in preparing the documentation as in writing the program. The documentation includes a "Book of Lore" which not only relates how to play the game, but provides the player with the background and mechanics of fantasy role-playing games in general. This is an outstanding Hi-Res game, with thoroughly readable documentation and packaging.

Although MORLOC'S TOWER is not as elaborate as the "Temple of Apshai", Automated Simulations has provided yet another entertaining and challenging adventure game. The object of the game is to find and kill the mad wizard, Morloc. One spends his time wandering through the six floor dungeons battling monsters and finding treasures.

A plus to this game is that every time you play this adventure, the traps, monsters and other surprises are found in different locations. In addition, you can compete against your friends or your own past performance. The game is appropriate for beginners as well as advanced players since there is no "right" way to win.

Documentation is excellent. The authors provide a very attractive layout with clear and concise instructions including helpful hints. As a last resort, the player may wish to read some of the "answers" which disclose where Morloc may possibly be found.
HELLFIRE WARRIOR is a full-length Hi-Res adventure game that almost literally starts where “Temple of Apshai”, also by Automated Simulations, left off. It has no time limit as does the shorter “Morloc’s Tower”, “Datestones of Ryn”, and “Rescue at Rigel” programs but it does have the same system commands and overall format as does the longer Temple of Apshai.

The game requires exploration of Levels Five through Eight of the “Temple of Apshai”. Your character explores the 60 rooms of each level in search of treasures and a sleeping Brunhilde. Naturally, a multitude of monsters are encountered and must be dealt with. The level number is proportional to the strength and power of its inhabitants, so if you’re brand new to the Automated Simulations series, you might consider the Temple or, for the general flavor of the game system, the faster playing “Morloc’s Tower”. On the other hand, if you liked the predecessors, you’ll love HELLFIRE WARRIOR.

DANGER IN DRINDISTI is the second expansion module for Hellfire Warrior, which you must have in order to make use of this program. You will encounter over 100 caverns, chambers, catacombs and a devilish array of monsters and demons. Getting started requires booting Hellfire Warrior and awakening your existing character, or creating a new one. Be warned, however, that a weak warrior will not long survive the four levels of Drindistil.

The King of Drindistil has summoned you to purge the Kingdom of four of his arch enemies. Each of these villains has unique and dangerous powers and magical treasures which you must return to the King. The Glass Wizard will be encountered first, but only after you find your way through the glass maze. The Illusionist of the next level is even harder to find and dispatch, since all things are not always as they appear. The going gets tougher with the next combatant, the Demonmaster. But the last assignment is the most difficult. You must enter the mysterious and dangerous Realm of Mist, and slay its demigod ruler. You may find a sage to help you find your way, but the going is tough; this level has demons so powerful that your warrior may be killed just by being in the same room as they are.

Adventuring is accomplished in the same manner as the original Hellfire Warrior. This disk contains only the data sets for an expansion, and care must be exercised against accidentally saving a game from the new disk onto the original Hellfire. Such action irrevocably overwrites the original, making it exceptionally difficult to try to play thereafter.

Game technique is the same as in Hellfire Warrior, and, as before, the action is viewed from above. Each room and treasure is numbered, and must be looked up by the numbers in the documentation. There are some very difficult mazes, part of which are made of glass, and are, therefore, invisible to the eye. Testing these walls can sometimes be detrimental to the health of your warrior.

Danger in Drindistil is a worthy addition to the Hellfire Warrior series. Fans of that program will enjoy this one; however, it’s a toughy, and is not recommended for beginning adventurers. Even those who are ready for a good challenge have their work cut out for them.
ODYSSEY

**Company:** Synergistic Software  
**Language:** Integer and Applesoft version  
**Hardware Requirements:** 48K

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**ORIGINALITY**  
**DOCUMENTATION**  
**HOLDS INTEREST?**  
**VALUE FOR MONEY**

B  
C  
B  
B+

ODYSSEY is an epic extension of its forerunner, "Wilderness Campaign", also by Synergistic Software. As with "Wilderness," the object is to overcome the bad guy in the castle by trekking through plains, swamps, mountains, and deserts, collecting men and material by negotiations with merchants and doing battle with sundry monsters. In Wilderness, there was one outstanding Hi-Res multi-color display that held your attention for the duration of the game; ODYSSEY provides two such outstanding displays, a third that's almost as good, and a quasi-Hi-Res maze that smacks of "Dungeon Campaign".

The initial ODYSSEY display is that of an island, where graphics are even enhanced over Wilderness by individually small but collectively significant improvements. Similarly, other aspects of this phase are improved; better sounds, fewer total repetitious battles, a simplified and cleaner battle display. The documentation is jazzed up, and the program runs better from the standpoint of error trapping. Much remains the same, however; the game is pure escapism in all phases, no real thought is demanded and the few puzzles are trivial. What is demanded is endurance, made enjoyable by the display quality and bearable by the Save Game command.

The second Hi-Res display is of your small ship in the big ocean. This phase is less polished than the first land phase, but has several neat "special effects" that are fun. It's a challenge to learn to sail your ship as the wind and current change frequently, but after you learn which of the other visible islands is your final port, the sea phase progresses more rapidly than the initial island actions. On all islands, save one, you can encounter a wizard guarding an old temple. You need to convince him to allow you to pass in order to venture into a Hi-Res maze of basements, again doing battle with or running from assorted monsters while in search of the magical Orb. These game phases are not as well error-trapped as the island phase, thereby allowing the ability to spend "negative" money and deal with fishermen whom the text lines told you sailed off several moves ago.

The final Hi-Res is artistically done. It presents only five simplistic obstacles to overcome until "you reach your final objective." At this point, the game disappointingly ends with a simple text tabulation of your net worth, adversaries killed and general summary. After the time investment necessary to get to this point, it seems a shame to forego the snazzy type of ending available in "Wilderness Campaign".

Overall, ODYSSEY is an improved and lengthened "Wilderness Campaign", interesting by virtue of sight and sound, that can become tediously repetitive. Kids will love it, others may lose interest, but it's fun until that happens.

A last comment: there are still a couple of programming errors to watch out for, similar to those found in "Wilderness Campaign".
Apventure to Atlantis is a smoothly animated, High Resolution game, complete with nicely done sound effects that neatly blend elements of adventure, arcade, and fantasy games into a single package. The object is to find and destroy the island of Atlantis, hopefully escaping alive. The game strongly resembles Robert Clardy's earlier Odyssey and Wilderness Campaign, except that this has a variety of new and novel ideas.

There are four distinct phases to the game. During the first phase on the island of Lapour, the player encounters and fights various monsters. The outcome is determined by a combination of strength factors and dice rolls. Obtaining an additional army, destroyed in these battles, is as easy as returning to the castle. The player also randomly encounters wizards who can be enticed into joining your party by the offering of spells. Monsters are small and very hard to see on the island's Hi-Res map display. Play during this phase quickly becomes tedious.

Game control during the sea phase (the second phase) is by a combination of keyboard and paddles. The ornicopter's movement is difficult to control and requires learning to fly against varying wind currents, navigating over islands, and fighting off strong monsters with a number of paddle controlled weapons while your fuel dwindles. Play during this real time phase is hectic; and if you have chosen a fast reaction time, nearly impossible.

Phase three takes place in buildings on the islands. Although boring and repetitive, this phase allows you to refuel and gain the magical spells required to cope with the perils of Atlantis. The buildings have puzzles and traps in them to overcome. For example, there are three notes in each building that contain clues to magic words which will open secret doors to other rooms. There are also opposing warlocks and trogs to combat. Eventually a room will be found that will enable you to refuel your craft and leave the building. Spells needed on Atlantis can be obtained by using the magic "detect spell" on some of the treasures. All buildings contain the same rooms, furniture, and traps. They are simply put together randomly on each island.

If the player feels that he has acquired sufficient magical spells, then he should try to fly his ship to the island of Atlantis for the fourth and final phase. The scenario is played out on an island map containing a prominent volcano. Exploring the island is a game within itself as you map the maze-like terrain. As the island's maze guides you toward the Crack of Doom, you encounter many Hi-Res puzzle-type drawings. Solving these leads you to inaccessible portions of the island that you were unable to map, and one provides a clue to your escape route. There are many dead ends and hazards to prevent you from completing your quest. It will take all of your best spells to succeed.

Synergistic provides an excellent Hint Sheet with extensive documentation. However, it lacks a listing and description of valid commands in the various phases. Upon beginning each new phase, be sure to press "?" and study the command capabilities carefully, or you will never escape from an island. The stop-action "Suspend" command is always available and should be used to study a situation, as the real-time element of an attack poses a danger requiring a response speed proportional to the selected degree of difficulty (Arcade freaks will go for "9"; staid Adventurers should opt for "0").

The game is long, repetitive, and often frustrating; buildings on each island all have the same 21 rooms (rearranged on different islands), with the same traps to overcome. Use of a Magic Orb is a neat form of an internal save-game feature, especially if you lose a key wizard. A single scenario may be saved to the protected disk. A limited vocabulary is nicely overcome by using single keystrokes that produce all acceptable action verbs. One bad feature is that the game will not check for using the same name twice; but the capabilities of the second name then are "locked" out by the first. Also, at the Crack of Doom, be sure to DROP, rather than USE the Orb!

The puzzles are not at all difficult, being of the trial and error type (a la Odyssey). The mapping of maze-like Atlantis is an exception, however, and is a fun challenge. The game will especially be enjoyed by fans of Clardy's earlier games, and is noteworthy for its excellent documentation and several new gaming concepts, innovative command structure, and the Hi-Res display of Atlantis that "colors" itself in as it is sucessfully explored.
ULTIMA
Company: California Pacific Computer, Co.
Language: Applesoft & Assembly
Hardware Requirements: 48K

OVERALL RATING A DIFFICULTY B
PUZZLE QUALITY C EASE OF USE A
TEXT QUALITY A VOCABULARY B
GRAPHICS QUALITY A+ SAVE/RESTORE A

Ultima is an adventure game of truly epic proportions, consisting of three neatly integrated major games, each with a subset and end game thrown in for good measure. The game starts in the Medieval period. Armed with daggers and leather shields, and progressing through the space age with blasters and reflective suits, your Ultima role playing character evolves in experience and attributes through fifteen levels, finally arriving at the “ultimate confrontation” after a trip through time.

Ultima is perhaps the best of the maze adventure role-playing games for the Apple, in that a variety of characters can be created and evolved. It is not a particularly thought-provoking or logic-puzzle game. The puzzles included are straightforward. The adventure's object and approach are easily deduced from the clues within the game. The challenge lies in its sheer massiveness and sequential evolution.

The above-ground and space graphics are excellent, but the below-ground game is a slightly modified Alkabeth. (Hint: keep a record of which level certain types of monsters appear.) The game could be improved by holding the number of monsters in each sea, dungeon, and land area to a fixed number so that one could eventually roam around more freely in order to finish the adventure more quickly once the novelty of the encounters has worn off. The game can (and should be) saved rather frequently; however, unfortunately, a game cannot be recalled except by hitting RESET or turning off the system power. Also, the “Q” key, which saves the game, is disadvantageously located close to ESC, another often-used command key.

Considering that the game involves eight castles, eight monuments, some 32 cities and dungeons, and an 8 by 8 sector space setting, it’s too bad that there couldn't have been some slight differences between each object within the group. Interestingly enough, it’s possible to steal an item that has not yet been invented from an Armourer or Weapons Dealer and which, therefore, he doesn’t carry in stock. Despite these minor aggravations, Ultima represents a superior achievement that can be as much fun to play the second time around as it is the first.

FRACAS
Company: Quality Software
Language: Integer and Applesoft
Hardware Requirements: 32K and Disk

OVERALL RATING C DIFFICULTY C
PUZZLE QUALITY N/A EASE OF USE B
TEXT QUALITY C VOCABULARY N/A
GRAPHICS QUALITY C SAVE/RESTORE C

FRACAS is a light-hearted and fairly amusing medieval-days-of-combat and get-the-booty program with a few new twists. The diskette provides the identical game in both Integer and Applesoft versions. The game permits from one to eight players to independently move about and do battle with each other, as well as with the computer's own menagerie. Under some conditions, these computer characters are perfectly happy trying to kill each other off, while you are free to watch or get their ducats and then take on the survivor. The use of sound has been effectively coupled to the seemingly unending and repetitious combats on a Lo-Res field of well-thought out and colorful displays. (It is not recommended for a B & W display.)

The game is simple to play and character generation is well prompted. Game commands are few and simple. There are no puzzles, mazes, or mental challenges. The game objective is in the mind of the player(s), and several interesting alternatives are suggested in the documentation. The multiple-player concept and extreme simplicity make FRACAS a lot of fun for a group of small children, while the ease of creating a new player character or committing hari-kari make it a perfect party game for your non-computer friends. On the other hand, it won’t cause them to run out and buy an Apple or provide you much reason to play "solitaire" against it more than once.
Ultima II is the long awaited follow-up to the original Ultima, a fantasy role playing game by Lord British. It seems that we veterans of the earlier game were mistaken: when we finally killed Mondrain, we didn't find and deal with his apprentice, Minax. Now that she has come of age, she is even more powerful than her predecessor; so too is Ultima II compared to its already classic predecessor.

More than a simple successor with new maps and a new challenge, Ultima II's three disk sides take you to several towers (upside down dungeons), villages, five time periods, and ten planets, in addition to the towns, castles, and dungeons that players of the original game will remember. This time, towns and castles, as well as villages, are in the colorful, multi-screened scrolling form that so distinguished Ultima. Each of their layouts and contents are different, except that one of the castles appears in two time zones. There are time portals, horses, ships, airplanes and rockets to ride around in. Fewer dungeons and towns provide a more balanced game.

The commands are generally the same, but have been streamlined by dropping those which were seldom used and adding two more useful ones: an interrupt, (Y)ell, to permit taking a breath or for thoughtful planning, and a (V)iew command which provides an excellent single screen graphic of the location in which you are currently scrolling your merry way. Without it, Ultima II would be a mapmaker's ultimate challenge; as it is, mappers will have plenty of action in the dungeons which seem to go on forever. The command execution time is also pleasantly speeded up over the original. The game even comes complete with a neat cloth map representing most of the time portals on a “from-to” basis; it's pretty, but not much use in the game.

To achieve the goal and rid the universe of Minax, your fantasy character (your choice of four races, three types, two sexes, and six allocatable attributes) faces many hours of searching, interrogations, and monster whomping. The monsters serve as a source of gold, and there are many ways and means to spend your hard earned loot; many are mandatory if you are ever to succeed in winning. You only need to obtain two objects to defeat Minax, but both take time, thought, and money — so it's back to whomping monsters above, on, and below ground.

There are a few bugs, but none fatal. As a hint, load up on Strength at the outset, as it's the one attribute that can't be increased. Also, don't exit the town if any attribute goes over 99, unless you're rolling in gold. My only gripe is that it has the same save-game routine as in the original Ultima. While you can save it at any point to your player disk, it can be recalled only on Drive 1 through the lengthy rebooting cycle. And you will be restoring this game frequently. Yet such defects pale in the face of this graphical tour de force. Whether you played the first version or not, this one is a must.
WIZARDRY

Company: Sir-tech Software, Inc.
Language: Pascal-P Code
Hardware Requirements: 48K

OVERALL RATING A
PUZZLE QUALITY B
TEXT QUALITY B
GRAPHICS QUALITY A
DIFFICULTY B
EASE OF USE A
VOCABULARY N/A
SAVE/RESTORE C

DIFFICULTY B
EASE OF USE A
VOCABULARY N/A
SAVE/RESTORE C

WIZARDRY is a sophisticated and professional Dungeons and Dragons game that realistically follows the original board game. Put another way, it's a program that combines the better features of Beneath Apple Manor, the Eamon/Swordthrust series, (parts of) Ultima, and Dragon's Eye, in addition to throwing in a number of new ideas of its own to produce a very detailed and interactive "kill the monsters and get the gold" type of game.

The two-sided disk provides a Program Master and Scenario I entitled the King's Proving Ground. The clear implication is that there will be more scenarios to come. Written in Pascal (the P-Code does NOT require a Language Card), this multi-menu game is very fast in its response to commands and is only occasionally disk interactive.

The game provides the player a degree of control over character selection and control seldom found in a computer game. Up to six characters at a time are put in play, chosen from five races, three alignments (good, bad and evil); each may be of eight different classes, with its own unique capabilities and limitations. Monsters are many and varied, magic spells abound, and the dungeons are seen in 3-D perspective in one corner of a well laid-out and informative screen. Inherent in the game's design is an excellent save-game concept, whereby different players can store many characters, each protectable by a "password".

All is not peaches and cream, however. The game is long and involved, while providing little insight into how the interactions are designed. It also requires considerable time and effort to develop characters that can survive in the dungeons long enough to advance to a higher level where new spell capabilities and character attributes are garnered. Despite unusually informative displays and complete documentation, the combat phases will require repeated reference to both the spell lists and the player's notes. While an option to run from combat is provided, it usually results in total destruction of your party, as the monsters flail away at you during your attempts to flee. No breaks.

WIZARDRY has too many options and character preparations to rate highly with young kids. It is directed more towards serious D&D enthusiasts. There are no puzzles to be solved, but planning and thought are mandatory, as is the mapping of the dungeons. Even if you've been put off by earlier Apple D&D versions, you should give WIZARDRY a long, evaluative look as it's a complete and legitimate fantasy role-playing game.

KNIGHT OF DIAMONDS

Company: Sir-tech Software, Inc.
Language: Pascal-P Code
Hardware Requirements: 48K

OVERALL RATING A
PUZZLE QUALITY B
TEXT QUALITY B
GRAPHICS QUALITY A
DIFFICULTY B
EASE OF USE A
VOCABULARY N/A
SAVE/RESTORE C

DIFFICULTY B
EASE OF USE A
VOCABULARY N/A
SAVE/RESTORE C

Knight of Diamonds is the second scenario in the already classic Wizardry series. This dungeon offers new puzzles, objects, monsters, and traps, and adds six challenging levels, requiring careful mapping and considerable patience to conquer. General operation of Knight of Diamonds is identical to the first scenario, Proving Grounds of the Mad Overlord.

The object is to find and return the Staff of Gnilda to the City of Llylgamyn (whoever said you have to be able to pronounce what you play?). There is much more to explore and learn than just recovering the staff, and careful and probed mapping is required to discover them; it may be easier to discover secret doors when its "Very Dark," which simply says you've got something to kick about! To get started you must have developed characters from the Proving Grounds and then transfer them to the new scenario, using the Utilities on the Boot Side.

It is recommended that characters be at the 13th level or higher; the need for this will soon become painfully obvious. It is possible to encounter the "disaster" of having your entire party paralyzed and lost forever (i.e., back to
square one on scenario one), although the unexplained “Disband” command appears helpful in avoiding this final-
ity. Unfortunately, there is no documentation with Diamonds, and unless you have a late version of the Proving Grounds, the subtle differences can be bothersome. As with later versions of Proving Grounds, a Utility permits you to make a backup of the scenario side, to which you can then transfer your characters. Although this reviewer had two disk failures on Proving Grounds, the first scenario copy of Diamonds survived through the final awarding of the letters.

In the dungeon you will meet with the No-See-Ums before too long. Their number (4 groups of up to 9 in each group), may get your heart beating and take forever to end their turn, but then there is always “Tiltowait”! Much worse than these pests are some of the evil creatures that love to take all but one hit point away from your favorite members. But what is really final is the setting off of a Teleporter and being transported into solid rock, of which there seems to be much more than in Proving Grounds.

Knight of Diamonds is the maze-type adventure at its best. As with the original Proving Grounds, it can be played with from one to six people (with one person acting as the Dungeon Master at the keyboard), and will provide many more interesting hours of game fantasy. The bottom line is that Knight of Diamonds is just like having levels 11 through 16 added to your initial Wizardry scenario disk.

WIZMAKER

Company: ARS Publications
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A
GAME CONCEPT N/A
CREATIVITY N/A
GAME DEPTH N/A
CONTROLLABILITY A
SKILL INVOLVED N/A
CHALLENGE N/A
GRAPHICS A
ERROR HANDLING A
DOCUMENTATION A
HOLDS INTEREST? N/A
VALUE FOR MONEY A

Wizmaker is a character editor for the fantasy game Wizardry and its two sequels, Knights of Diamonds and Legacy of Llylgamyn. What it essentially allows you to do is cheat. Ethics aside, a substantial need for such a utility exists. The Wizardry program keeps track of all characters and their status on the disk. While the authors have always advised keeping a back-up character disk using their utility, most players don’t heed the advice. I, for one, not reading the instructions carefully and forgetting to buy armor for one character, managed to disband before entering the dungeon. Well, my characters certainly weren’t lost in the dungeon, although they were listed as “out.” Fortunately, I wasn’t too attached to my characters so I didn’t mind the loss, but others who have trained and fought with characters that they considered “family” are sometimes deeply grieved at a character’s death. This character editor can resurrect the dead and recover lost characters.

Wizmaker can change nearly any character’s features. This includes in/out status; whether a character is dead, paralyzed, stoned, evil, good, etc.; its alignment, age, experience, attributes, and hit points. You can modify your name, password, race, and class. The editor can alter the number of spells available for each level and gives you the choice of which spells the character knows. Thus you can easily create characters of super-hero status (ten thousandth level).

The program is simple to use. It is completely menu-driven. Most values remain unchanged with a simple carriage return. The entire set of twenty disk characters reads into memory at the same time. After analysis, the program allows you to display all the characteristics either to the screen or line printer. You can then enter the modification mode to change their characters any way you please. Upon completion, the twenty characters are written back to the disk. Error trapping and reliability are excellent. While unlikely that the program will ruin an original disk, you should probably modify a duplicate scenario disk, made with the Apple copy program on the DOS master.

While purists will call such a program blasphemy, the frustrated Wizardry player who has been unable to venture past dungeon level two will find this program a blessing. And for those itching to play Knights of Diamonds, the Wizardry sequel that requires thirteenth level characters, this program provides a quick shortcut to creating some. The program includes maps to several of the dungeon levels for the first scenario.
**ALI BABA AND THE FORTY THIEVES**

**Company:** Quality Software  
**Language:** Assembly  
**Hardware Requirements:** 48K

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<thead>
<tr>
<th>Overall Rating</th>
<th>Difficulty</th>
<th>Ease of Use</th>
<th>Vocabulary</th>
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*Ali Baba and the Forty Thieves* is a major update to Quality Software's earlier *Fracas*. The changes are so major, however, that even *Fracas* gamesters will find it a new game with familiar concepts. Chief among the additions are colorful, shape-tabled Hi-Res graphics, and an often-played rendition of several bars of Scheherazade (which mercifully can be cut off). There are also completely new layouts and characters, as well as room and text descriptions. Basically, *Ali Baba* remains a game of beating up on the monsters (or vice versa), finding treasure to buy more effective weapons and armor, and, with the addition of a definite quest, rescuing the Princess Buddir.

There is a degree of puzzle content, but it’s not really sufficient to classify *Ali Baba* as an adventure game per se. Hints, either obtuse or bluntly direct, are found in Runes. These cause your disk to wake up when encountered; other than that, there is no disk interaction in the entire 60-plus room game. New Hi-Res displays are nearly instantaneous, but the unfortunate byproduct of this is a very slow response in the interminable sequence of combative encounters. These delays are only slightly offset by the humorous text accompanying the encounters. Even with the Monster Regeneration Factor (i.e., difficulty control) set to zero, there seems a near endless procession of assult-minded thieves and assorted monsters. Mitigating against this, but again at the expense of longer delays before it is once more your turn, there is the ease of calling in a veritable army of allies, including yourself or any favorites that may have just been killed off. This multi-player capability also simplifies the difficult task of mapping, made complex by the extensive use of one-way doors and teleporting locations.

The game may be played either from the keyboard, for one or two players, or with a paddle control; paddle control is the easier, as there is an overuse of I, J, K, and L as command keys on the various sub-menus, where each letter has a widely diverse command function. Nine games may be saved to the protected disk, and bunches more to a scratch disk initialized from the program disk. Warning: on one sub-menu, “J” is the Save command, and the adjacent “K” is the Initialize command. However, the documentation, which is thorough, insists that one cannot damage the master disk (this reviewer didn’t have the nerve to try).

A particularly novel and amusing feature that is brought forward from *Fracas* is that the baddies, all being played by the Apple, are not too particular whom they clobber, and will gladly pile onto other baddies. It’s sort of fun to start a fight and then sit back and watch your enemies beat the daylights out of each other! This feature, together with the multi-player capability, make *Ali Baba* a lot of fun. Somewhat tedious perhaps, but fun nevertheless that the younger set, especially, will enjoy.
In CRUSH, CRUMBLE and CHOMP you can play one of six featured monsters (or one of your own home-grown creatures) to attack the city of your choice: San Francisco, Washington, D.C., New York City, or Tokyo Harbor. With your fiery breath you can burn entire cities or smash them underfoot. You can block roads with your webs and escape underground where tanks dare not tread. Your monster can tear apart bridges with its tentacles, emit an ultrasonic scream as you grab the populace and fly over a city of smoking ruin.

Of course, being a monster isn't easy. You're always hungry. A good rule is: if it moves, it's edible. And the city, played by your friendly computer, has an arsenal of police cars, tanks, artillery, helicopters, National Guard, and your indomitable mad scientist.

You control the monster with a variety of keyboard commands. All monsters have a basic command structure that controls general direction, head position, and movement. Some monsters can burrow, one can fly. All can crumble buildings or grab fleeing crowds. Each has its specialty, like (A)tomize or (U)ltrasonic Scream, (B)reathe Fire, (W)eb (weave obstructing web), or (Z)ap flying units with ray gun. Control, at least if your monster hasn't gone berserk with hunger and you're not sure if it is really paying attention, is rather sluggish. This is because you're taking turns with the computer and it's not ready for your next command. Be patient; it has to update the screen and attack before you can make a next move. Impatience, unfortunately, causes you to enter too many commands; consequentially, one often overshoots a destination or misses a target.

One can monitor the game as you move around sections of the city on a Hi-Res map. Your monster's health, his hunger status, head position and general direction are all displayed on the right side of the screen. The head position is displayed in all its living facial monster horror. It keeps you aware of who or what you are.

Yes, this game is for real and it actually can be fun to play once you get used to the keyboard controls. It is certainly a way of releasing your aggressions and no different than those shoot-'em-up games where you play the good guy and kill the aliens.

I think the major disappointment lies in the graphics. The display map and animation are done with well-constructed Apple shape tables, but the display update is slow and cumbersome. While some of the newer games have switched to raster shape tables and machine code to produce smooth, instantaneous Hi-Res scrolling on their maps, this game laboriously draws a new map once the monster goes off the edge of the screen. In a game that essentially runs in real time, this is somewhat distracting. The game does offer a lot of creativity, is challenging, and is well documented in a lengthy but humorous vein.

Beneath Apple Manor — Special Edition

Company: Quality Software
Language: Assembly
Hardware Requirements: 48k

OVERALL RATING B+
DIFFICULTY C
Puzzle Quality D
Ease of Use A
Text Quality C
Vocabulary N/A
Graphics Quality A
SAVE/RESTORE A

ORIGINALITY A
DOCUMENTATION A
VALUE FOR MONEY B+
HOLDS INTEREST? A

Beneath Apple Manor is a neat update to the original BAM (The Book, 1982, p. 241), and now features colorful Hi-Res graphics. When released in 1978, it was one of the first fantasy adventures for the Apple; and has since become a classic, even though there are no puzzles or a true mystery to the game.

The concept of BAM is simple: find the Golden Apple, hidden deep in a multi-level cavern. The monsters encountered become more powerful in the lower levels, but by then you've searched out the magical items and gained the experience that you need to cope with them. Applers not familiar with BAM may be disappointed in this
simplicity, but it is just this quality that gives BAM its strength, staying power, and variety of approach strategems. The full range of original options is still available — up to ten rooms, and a one-to-ten level of difficulty. In the "standard" game of five rooms or less, the new shape-table Hi-Res graphics adds an interesting new dimension. The familiar Lo-Res display of the original can be used for any number of room configurations, and must be used for six to ten room games due to screen size limitations. BAM devotees will be pleased that the new assembly language version is lightning fast in its response, has switchable sound effects, and embodies a save-game feature which permits a game to be saved to a scratch disk each time you buy a "scan."

The Special Edition also has three new magical items and two new types of monsters, a fairly easy to handle Invisible Stalker, and a Vampire that is nearly as difficult to handle as the Dragon. Even without these additions, owners of the original BAM will find the improvements in the game worth the price. Those who have never played Beneath Apple Manor before will find it to be undemanding of fast reflexes or a lot of thought — it is escapism, pure and simple, and an untiring form of fun.

**EMPIRE I-WORLD BUILDERS**

**Company:** Edu-Ware Services, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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*Empire I-World Builders* is an improved and enhanced version of Edu-Ware's earlier *Space II*. This version uses Hi-Res graphics, so-so shape tables, some animation, greater variety, and enough complexity to keep a player busy for some time.

*World Builders* allows you to develop a character, and then choose among three possible career paths: Planet Miner, Missionary, or Homesteader. Miners dig in 2D Hi-Res animation, creating tunnels (and cave-ins) in search of wealth. Missionaries must gain the trust of their followers, overcome assassination attempts, and successfully pass "tests" in order to rise up through the religious hierarchy. Homesteaders must husband the earth and their herds using high-technology farming, and be able to understand the rainfall pattern in order to prosper. Failure of all types of characters is a very frequent occurrence.

Character generation requires, as do many of the other game phases, a repeated pounding on the space bar to stop the random generator. Even one's sex is random, and if you don't like the character that was created, tough! Characters enter the game at the age of 18, and, surviving mishaps, bad luck, disputes, space travel, and combat, may grow to a ripe old age, but longevity is as hard to attain as is a truly successful character. Characters may be saved, but to do so requires returning to the initial starting point of the game, which can be a number of moves away. Unfortunately, a true save-game feature is not provided.

Game play is straightforward, but demands that one keep the Player's Guide handy. This very complete guide must be referred to almost constantly to understand the shapes that keep popping up as well as their meaning. *Empire* has distinct phases in which the allowable vocabulary also changes. To the credit of Edu-Ware, they have included a complete, alphabetized list of the game's vocabulary together with each word's meaning; it would be nearly unplayable without this feature, but with it, it can be fun. At the frequent game phase changes, *Empire* is disk interactive, and for the most part is typically "Applesoft" slow.

The game concept is interesting and challenging, but its application could have been improved by better graphics, a means of determining one's state of health in phases other than combat, requiring less reliance on the Player's Manual, and more consistency. However, *Empire I* will provide Sci-Fi fans a number of enjoyable hours of escapism into the future.
DUNGEON
Company: TSR Hobbies, Inc.
Language: Applesoft and Assembly
Hardware Requirements: 48K

OVERALL RATING D
GAME CONCEPT A
CREATIVITY D
GAME DEPTH F
CONTROLLABILITY C
SKILL INVOLVED D
CHALLENGE D
GRAPHICS

ERROR HANDLING B
DOCUMENTATION B
HOLDS INTEREST? C
VALUE FOR MONEY D

Dungeon is an old-fashioned “whomp-the-monster-get-the-gold” fantasy game. The primary display is a Lo-Res colored maze, switching to a shape-tabled Hi-Res display and a touch of animation during monster encounters. The object is to be the first player (eight are permitted) to gain the required quantity of gold and to return to the starting point. Each player chooses one of four character types, each having certain advantages and a specified amount of necessary gold.

The colors require a color monitor; the shading on a monochromatic display makes it impossible to detect your character’s block. There are six levels to explore, higher levels having tougher monsters and offering greater rewards. On each level are rooms with a variety of monsters, all itching for a fight and guarding a treasure, a map of “hidden” doors, a magic sword, an ESP medallion, or a crystal ball. You initiate combat by pressing any key to “roll the dice.” If the dice total the same or more than the number shown on the displayed table for your particular character, you win. If not, you may lose one or more treasures, which are recoverable if you defeat that monster in a succeeding turn.

Dungeon is less challenging, but easier to play than Super Dungeon or Dragon Fire, and involves only seven command keys. There are magic spells but no puzzles or mysteries in this straightforward game. The text is sparse and to the point, but the graphics are archaic. A save-game feature is neither required nor provided since the game is relatively short. It might have been a winner in 1979, but with today’s degree of sophistication, it is doubtful that even the younger kids will want to play it more than once.

PRISONER 2
Company: Edu-Ware Services, Inc.
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B
PUZZLE QUALITY B
TEXT QUALITY C
GRAPHICS QUALITY B
DIFFICULTY A
EASE OF USE B
VOCABULARY C
SAVE/RESTORE

ORIGINALITY A
DOCUMENTATION B
HOLDS INTEREST? B
VALUE FOR MONEY B

Prisoner 2 is a Hi-Res update of the original Edu-Ware near-classic simulation of the 1960’s TV series. It is the same game as its predecessor, but materially improved by good graphics, toned down sound effects, and some effective animation. It is still a psychological assault on the senses, but isn’t as rasping or depressing to play as the original. However, it is still intentionally, agonizingly slow at times, and fraught with near unending frustration.

At the beginning, you are kidnapped to a near escape-proof Island and left in a 13 X 13 maze in a Castle; explore it fully if you wish to succeed. Each of the Island’s twenty locations provides a separate experience, be it searching a maze, a game of hangman, or an encounter with possibly treacherous allies. Meanwhile, the Caretaker will stop at nothing in order to learn your secret resignation code. All too often, you will be zapped back to your Castle maze just when you are on the brink of success.

Prisoner 2 lacks a true save-game capability, substituting instead an interrupted game option. Unfortunately, this means that only one family member at a time can beat his brains against the wall. This option exits the game at any place at any time, but on rebooting, you again find yourself in the Castle maze. This is one more bit of intentional mental aggravation, but fortunately there is a shortcut to escaping. Do not despair; gradually your experience level will build to where you will be successful. There are many objects to find and manipulate, but only two are finally needed to escape. Determination and patience are demanded.

You may not think you’ve accomplished anything of consequence until the very end, except perhaps to shut off the sound. But there will be no doubt when the end does come. With shocking suddeness, you will be staring at an Applesoft cursor, waiting for your heart beat to return to normal, thankful that there isn’t another game around like this, but sorry that it’s over. After escaping, it becomes clear that some of the clues were so obvious as to make them vague. Prisoner 2 is not a light-hearted or humor-filled game, but it is unique to say the least. The game is a must for all adventure nuts, but don’t tackle it if you are a beginning adventurer, or are easily frustrated.
## Adventure Games

### ADVENTURE

**Company:** Apple Computer  
**Language:** Applesoft/Assembly  
**Hardware Requirements:** 48K

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Apple's ADVENTURE joins the ranks of Rainbow, Programma, and Microsoft in releasing the original PDP-11 ADVENTURE; it is identical to Rainbow's, except that it runs slightly faster. Microsoft's and Programma's, being in assembly language, both run faster. The major clue, "Plover," given in Microsoft's version, is absent, as is the clever addition of the "Software Den," where micros, minis, and maxies are available free (?) for the taking.

As with the other Adventures, the computer represents your eyes and hands, dutifully responding to your instructions as to which way to go and when and how to manipulate the objects you will encounter. ADVENTURE starts simply enough at the "end of a road," describes in text form what you can see, and awaits your order to enter the house you can locate, or move off to the N, S, E, or W. With any kind of luck, you'll find your way to the enormous, beautifully described underground caverns. The many rooms and passages contain treasures for you to find, a variety of none-too-savory inhabitants to outsmart, and pitfalls to be discovered and dealt with. While violence and warding off monsters is not a major part of ADVENTURE, you can manage to kill yourself; the snares are not random between games, and once you learn how to deal with the trolls, dwarves, the dragon, the pirate, etc., you are better armed for your next inevitable bout with them.

ADVENTURE is highly addictive. Many hours can be spent in getting ALL the treasures and attempting to become a Grand Master, after which you are borne off on the shoulders of the cheering elves. Winning is perspective in the eye of the beholder, but the score is accumulated as you progress. This game, which can take hours, can be saved at any point, although Apple's version requires a separate disk, while Microsoft permits two different scenarios to be saved on the game disk.

In summary, ADVENTURE is a great game, although we would have liked to see (especially since it is an Apple Computer Inc. release) more attention given to better documentation (e.g., with background data, scoring and playing tips).

### ADVENTURE

**Company:** Adventure International  
**Language:** Assembly  
**Hardware Requirements:** 48K

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Scott Adams' Adventure International is the fifth company to release the original and classic ADVENTURE. Although the colossal cave and the game itself are essentially identical in all versions, this one has several unique and highly desirable features.

1. Lowest Cost: The disk version is $4 less than the least expensive competition and $9 less than the Microsoft version, which has been this reviewer's preference. A tape version at $14.95 is an excellent value, as instructions are provided for transferring the game to disk.
2. Response Speed: Unlike the other versions, which are highly disk interactive, Adams' is entirely in memory. The resulting response speed is nothing short of fantastic, a major advantage in this game.

3. Flexibility: The Apple and the Microsoft versions are protected; this version comes with an internal copy program for producing a DOS 3.2 backup copy. It also provides instructions on copying the disk to DOS 3.3, making it the only 3.3 version on the market. Also, NINE save-games scenarios can be saved onto the parent disk.

On the negative side, this version omits the significant word "Plover" from the Scenic View description, which may not have been in the original PDP-11 version, but is important. Similarly, there is not a warning provided either for the loss of battery power or an impending transition into a Master's Game phase. In these regards, the Microsoft version is more "playable."

In summary, and despite a near-saturated market, there is a definite place for this version of ADVENTURE. Every Apple owner should have a copy of ADVENTURE, and dyed-in-the-wool Adventurers having other versions should delight in the flexibility and speed of this version.

**CYBORG**

**Company:** Sentient Software, Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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*Cyborg* is an imaginatively written, all-text science fiction adventure game. You must guess the object, which doesn't become clear until late in the game following a surprising arcade-like (and very effective) Lo-Res graphics interlude. At the outset, all you know is that you are a Cyborg, half-human, half-robot. Having an unusually cohesive plot, the game is more like a novel than an adventure.

*Cyborg* is big, similar in size to Michael Berlyn's first game, *OO-Topos*. There are 130 mappable locations, including two maze-like areas. Mapping is required; each area must be explored (in ten directions) as the text does not always indicate the exits. The text, while generally well written, is distracting in some spots. Except for the Droid, the text has little humor or sidelights. The 28 or so objects are well scattered, but do not present a difficult inventory management problem. Many of them are either eaten or worn. The well laid-out screen display, obtained by entering Full Scan (one of four scan types available), clearly shows your inventory, what is being worn, and a description of your location.

One of the game's challenges is its sheer size; you must find the proper sequence to successfully attack it. To get off on the right track, consider using SW, S, D, and E as your first four moves. The actual puzzles are few—more would detract from the novel-like nature. Several, however, are difficult, and clues are limited to the remarks of the small Droid (that comes close to stealing the show), although a Help command occasionally comes through. With the exception of clearing the Cargo Hold, the puzzles are not too involved or interactive. The puzzles are usually logical, but who ever heard of a Cat's Cradle playing Iguana?

The game is disk interactive, but is a little slow for a text game. The two-word syntax is supported by a generally adequate vocabulary. A single save-game may be written to or called from the protected disk at any time, although a three-scenario capability would have better fit the size of the game. Fortunately, with the exception of the Lo-Res area of the game, it is relatively difficult to get killed off. Should this happen, the game permits a reincarnation—not far from where you are killed with your objects remaining at the site of your demise—which effectively adds another save-game capability.

All in all, *Cyborg* is an interesting challenge, dominated by the, "what, where, and why am I?" theme, and a well-developed plot with a few surprises and twists along the way. The game is highly recommended for the intermediate to advanced adventurer; the puzzles, definitely secondary to the excellent plot, are made difficult by the size of the game.
ZORK
Company: Infocom
Language: Assembly
Hardware Requirements: 32K

OVERALL RATING A+
PUZZLE QUALITY A
TEXT QUALITY A
GRAPHICS QUALITY N/A
DIFFICULTY B
EASE OF USE A
VOCABULARY A+
SAVE/RESTORE A+

ORIGINALITY A
DOCUMENTATION A
HOLDS INTEREST? A
VALUE FOR MONEY A

ZORK is THE definitive adventure game. Only the original Adventure program and the Scott Adams' series are comparable in challenge and complexity. It has the monstrous scope, fundamental tenets and beautifully descriptive prose of Adventure, plus a complex enough “puzzle” structure to warm the heart of any Adams fan.

The scenario is familiar, but the specifics are totally new and different. Not surprisingly, one starts at a deserted house which leads (in hopefully short order) to a cavernous underground complex, replete with varied and sundry treasures, a hungry Cyclops, an audacious Thief, a testy Troll, enchanted items (like mirrors and certain knives), an underground lake, dam, and a river, to say nothing of the coal mine, chapel, maze, and on and on ad infinitum, even unto the very Gates of Hell.

The split-screen, all text and silent display is neatly formatted and scrolls very well. The vocabulary is out of this world; by far is the most extensive yet encountered. Compound and multiple commands are accepted and individually acted upon: for example, “Take all but shovel and pump. Enter the boat. Examine Scarab” is a valid, single command line. It will even answer a few abstract questions such as “What is xxx?” and “Where is yyy?”.

Through it all, the speed of the game is satisfyingly fast. Well conceived system commands permit diagnosis of your state of health, control over the degree of text verbosity, enabling/disabling a printer from within the program, and saving a game’s status (only one) to a separate disk.

ZORK will require at least the same amount of time (probably more) than was required to achieve a perfect score in Adventure. For those of fainter heart and lesser patience, Personal Software’s well written documentation advises that a price list is available for various hints and maps. But whether you tough it out or not, the best news is that this is only Part II!

ZORK II
Company: Infocom
Language: Assembly
Hardware Requirements: 32K

OVERALL RATING A+
PUZZLE QUALITY A
TEXT QUALITY A
GRAPHICS QUALITY N/A
DIFFICULTY B
EASE OF USE A
VOCABULARY A+
SAVE/RESTORE A+

ORIGINALITY A
DOCUMENTATION A
HOLDS INTEREST? B
VALUE FOR MONEY A

ZORK II comes reasonably close to filling the rather large shoes left by the first “Zork”. It continues the all-text, split-screen adventure, starting in the Stone Barrow where “Zork I” left off. There is another 400 points worth of treasures to find and tricky activities to accomplish before achieving the primary mission of becoming Master of the domain which is currently under the senile control of the Wizard of Frobozz. Whereas “Zork” was quite faithful to the original mainframe “Zork”, significant changes have been included in ZORK II to the extent that it is almost a “new” game for players expecting the inclusion of the “second-half” of the mainframe game. The changes are revealed in the inability to return to the White House, although you may get a final glimpse of it, briefly and from afar.

ZORK II has the same outstanding command flexibility, wry humor, and word recognition of “Zork”. A well-conceived addition incorporates eight game scenarios which may be saved and quickly recalled at any time, whether you’ve been killed or not. The overall interest-holding ability may not be as intense as the original due possibly to a certain jaded attitude acquired from too much quantitative adventure game-playing by this reviewer. The initial phase of the contest seems to drag a bit, until the Dragon is conquered and a riddle is completely solved. An especially interesting challenge, at which time a “save” is suggested, occurs at the point in which the demon is ready to do your bidding.
In comparison to "Zork", this game is somewhat smaller (by about 75 rooms) and has only one small but unmappable maze, which presents one of the more difficult puzzles. Even after you amass your 400 points, there is still a final puzzle to solve before you become a Superior Adventurer. At that point, you also learn of the pleasant surprise concerning the fact that ZORK III is coming! Additionally, there is a rumor that the next phase will follow the story line of the last part of the mainframe version.

**ZORK III**

**Company:** Infocom, Inc.

**Language:** Assembly

**Hardware Requirements:** 32K

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Zork III completes the classic all-text adventure originally written in 1979 on the DEC PDP-11. Like its predecessors, there is a considerable amount of "new" material incorporated not present in the mainframe version, all written in the graphically imaginative style with which even the Apple's Hi-Res pages cannot compete.

When Zork III begins, you are at the bottom of a long staircase (which should strike a responsive chord to those who have completed Zork II), equipped only with your lamp and your imagination. At the end, you are in the Treasure Room with all of the treasures of Zork at your disposal, including a controlling interest in Frobozzco International. In between, you may hear, or see and hear, the fabled Dimwit Flathead, glimpse into a ritualistic scene from a to-be-hoped-for Zork IV, and speak with — or even command — the omniscient Dungeon Master himself. All along the way you will enjoy the excellent save-game implementation, command parser, and vocabulary characteristic of Infocom programs.

Zork III, with its 58 mappable locations (excluding the 8 by 8 matrix "Royal Puzzle"), is slightly smaller than its predecessors; but it is rich in subtle detail. It is perhaps the most entertaining of the three, with very logical, highly interactive puzzles. It is possible to successfully complete the game and still miss much of this detail; you may never find that peculiar set of conditions which can cause a sign to change in its inscription, hinting gently that you may have gone astray. There are numerous, amusingly tongue-in-cheek responses to inputs that otherwise get you nowhere. Overall, the game is somewhat more difficult than Zork II, due to several individually difficult puzzles, and also because of their high degree of interaction. You can easily find yourself in a no-win situation, a condition you may not realize until the game is replayed, making alternate life-and-death decisions which are available only once.

The conclusion provides an unexpected and novel twist, but to get that far requires an equally unusual approach as far as most adventures are concerned. Don't count on the seven point score system giving you any real guidance as to your true progress. It is relatively easy to have all seven points and yet find yourself in another no-win situation. The points, like other elements of the game, only prove that things are not always what they seem. Indeed, the toughest puzzles award no points, and several toughies remain unsolved even once all the points have been awarded.

Zork III represents a highwater mark for subtlety and logic, and is a Four Star must, not only for previous Zorkers but also for anyone who enjoys adventure games or pleasurable mental stimulation. The game is a separate and complete game unto itself, requiring no knowledge of Zork I and Zork II. However, for maximum enjoyment and imaginative continuity, it is recommended that they be played in sequence.
Scott Adams' Adventure Series

Company: Adventure International
Language: Assembly Language
Hardware Requirements: 32K

OVERALL RATING A-C
Puzzle Quality A-C
Text Quality B
Graphics Quality N/A

DIFFICULTY A-C
Ease of Use A
Vocabulary B
Save/Restore A

ORIGINALITY B
Documentation C
Holds Interest? B+
Value for Money? A-

(Note on Grading: This is a series of 12 games, and the rating above represents an average. The difficulty of Adventures 1-6 is a "C"; Mystery Fun House and the two parts of Savage Island rate an "A" level of difficulty; the Pyramid of Doom is a "B"; Mission Impossible, Golden Voyage, and Strange Odyssey were each given a "C." The Overall Rating of most adventures was a "B," with Strange Odyssey, Mystery Fun House, and Savage Island I leading the pack with two "B+"s and an "A-", respectively. Savage Island II fared rather less well, given a "C.")

Scott Adam's Adventure Series are puzzle games, each set in a different fantasy adventure scenario. The all-text display states what you can see and where the visible exits are. Two-word instructions lead you through a 20 to 30 call matrix, permitting manipulations of the various objects you encounter and leading to an eventual solution. The puzzle aspect, much more prevalent than in other adventure games, comes from using the objects to further your progress or avoid being killed. (Doesn't everyone know that a mummy lurching for your throat can be put to sleep by pouring water on his burning terra leaves? You did bring along the water, didn't you? The water was easy to find, but the empty object to carry it in was either somewhere else or hard to find.)

You may be able to solve a game in four to eight hours if you are lucky, clever, and take advantage of the "Save Game" command periodically to avoid having to retrace all the correct steps you made up to the point you were suddenly wiped out. If you enjoy resolving a myriad of interactive, thought-provoking exercises in deductive logic and have the patience of a chess master, it's easy to become helplessly addicted to those challenging games.

The program responses are exceptionally fast and often humorous. Hints and clues, when given, are always obtuse. There are no graphics or sounds, and little use is made of color. As of this printing, the series includes 12 full length adventures, all devilishly devious, delicately intricate, and deceptively involved. One hopes that Scott Adams' imagination will continue to produce more in the series and at his current level of quality.

ADVENTURES 1, 2, and 3

Adventures Land. This game has the distinction of being the first of the good puzzle-adventure games. There are thirteen treasures, above and below ground in this adventure's 29 mappable locations. Some treasures just lie around for the taking, but you may end up scratching and screaming lunatic before you can truly deal with the bear. Overall, not too difficult, and a good introduction to the tougher games in the series.

Pirate's Cove. You must magically travel between a London flat and an island on your way to locating two treasures. It offers a smooth storytelling style, and its 25 locations are populated by such wacky characters as a talkative parrot, a mongoose that becomes a failure in life, and a drunken pirate who continually wanders off. The task of building a ship on the first island is a good example of a well done interactive puzzle. It is roughly as difficult as Adventure Land, in slightly different ways, and fun to play.

Mission Impossible. You must stop the saboteur from bombing the Nuclear Reactor. To complicate matters, you are a walking time-bomb, and the saboteur dies before you get very far. Three differently colored rooms must be entered in a specific sequence in this 21 location game. There's nothing new or particularly difficult here, but things pick up in the last of the rooms, and the game can have either an explosive or rather watery finish.

ADVENTURES 4, 5, and 6

Voodoo Castle. You are assigned the not-so-simple task of removing a curse from the Count Christo. The puzzle takes place in the 24 rooms, hallways, and darkened dungeons of Voodoo Castle. There is a Kachina Doll, a Juju Man, a book for removing curses, and much more. There are a few tricky spots, but the puzzle is solvable. It is very well done and fast moving, with the best story line in the entire series.

The Count. While this game has only 19 locations with which to contend, the new element of time has been introduced. Activities must be time-phased over several days and (parts of) nights in order to kill Count Dracula. It's slightly less complex in format than other games, but unique in that "things change" between night and day, and between successive days.
Strange Odyssey. You're on an alien planet in a damaged spaceship. You need to find five treasures, fix your spaceship, and return to home base. The first four treasures aren't too hard to find, once you figure out how to really move about in the 22 locations of this game. But finding the fifth treasure is a dog of a job, and it might be a pretty cold day before you get it, even after you learn what and where it is.

ADVENTURES 7, 8, and 9

Mystery Fun House. Spies have hidden secret plans that must be retrieved from a carnival Fun House, which consists of 37 locations and a rather messy four-element maze. Mystery Fun House is devilishly clever, fun to play, challenging to unravel, and difficult to bring to a successful conclusion. It is tricky to get in, easy to get thrown out, and more than one door may prove frustrating. It's this reviewer's choice for the best of all twelve in the series.

Pyramid of Doom. Thirteen treasures are scattered about in an unexplored Egyptian pyramid. This 26-location game starts out simply enough, but gets very difficult in spots; one treasure, for example, is in a logical spot where you cannot see it, while others are guarded by a stone-hearted Iron Pharaoh. Have fun. And good luck with the Purple Worm!

Ghost Town. The locale is an Old West ghost town, complete with saloon, hotel, telegraph stations, jail, Boot Hill, and a piano-playing ghost. Again, there are 13 treasures to find. It's difficult in some phases, but unique in having a game within a game. Once you've solved this 39-location adventure, try doing so again by finding the optimum sequence of moves that will earn you the maximum bonus. In a typical Adams' switch, there is also opportunity for revenge on the Purple Worm.

ADVENTURES 10, 11, and 12

Savage Island, Part I. If you aren't already familiar with this Adventure series, then this game isn't the one to start with. This one is for aficionados who easily solved Fun House and casually breezed through Ghost Town! Adams' saga is more devious, treacherous, involved, tricky, and underhanded than ever. Savage Island is a long succession of extraordinary puzzles, and entails considerable retracing of steps in and around the island. The object is to obtain the one "password" to permit entry into Part II of this game.

Savage Island is more intricate than most games, and some parts move quickly and easily. The difficulty lies in getting to the easy part, which follows one of the toughest and most intricate sequences that Adams has yet conceived. To help you get into the tough part (before you reach the dinosaurs, UFOs, pirates, and force fields), remember that some sickly animals can be cured with a dose of salts.

Unfortunately, Adams has somewhat flawed a potentially perfect masterpiece by inhibiting the save-game feature during the early, surprisingly difficult part of the game. This, coupled with two very dangerous killers who appear at random (like the Ice Hound of Strange Odyssey), often prevents you from getting back to the place you had previously been in order to deal with your tormentors. The resulting frustration kills much of the interest and perseverance required to solve any Adams adventure. It can be done, however; and with the restoration of the save-game aspect, Savage Island, Part I could become the type of fun and challenging adventure enigma to lead this excellent series.

Savage Island, Part II. The second part of this game starts out with a bang, so to speak, while displaying the admonition that "Part I was a piece of cake compared to what you are about to go through." Playing was so tough that it required 30 minutes of struggling just for this reviewer to survive the first move, another 30 minutes for two more moves, and another three hours to get up to five moves! Note that Part I must be conquered in order to gain the necessary password to get into Part II (although the reason for this isn't clear, since the games have relatively little in common, except for the Pirate).

Golden Voyage. This game is another matter. It's one of the easiest of Adams' puzzle games almost to the end, and then it becomes only a little harder but a lot more interesting. You are given three days to find the potion required to restore the aged king's youth. It runs a bit slower than earlier games, and as a consequence the upper screen display is quite jerky in updating. The reason for these deficiencies may well be that Adams has used a common assembly language shell for all his adventures, resulting in certain execution inefficiencies, at least in this particular "patched-in" game.

In general, newcomers to Adams' puzzle games would be better advised to cut their teeth on earlier editions; although Golden Voyage is close to being complex enough to provide the necessary "training." Even then, the Savage Islands are almost too tough, except for the dedicated and somewhat masochistic expert adventurers.
**ADVENTURELAND SAGA #1**

**Company:** Adventure International  
**Language:** Applesoft & Assembly  
**Hardware Requirements:** 48K

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*Adventuredland Saga #1* is Adventure International’s re-release of its original all-text adventure game which has been spiffied up with Hi-Res graphics, and much improved documentation. Several command option keys have also been added: the “Z” key toggles the graphics mode on and off, speeding the game considerably and producing an all-text version identical to the original release. They’ve added a four position save-game option, as opposed to the single position on the original version. It is a bit messier to use, however. The documentation is complete with at least a partial list of recognizable key words — a major breakthrough in adventuring.

As before, the object is to resolve the puzzles so that you can find and retrieve thirteen treasures, only some of which are easy to locate. A significant novelty (not evaluated), is that the “V” key toggles a Votrax (if you have one), to provide spoken feedback from the game. The same key was used, however, to toggle a printer and get a running hardcopy of the game text. A dump of the graphics is also possible, provided you have a Grappler or Microbuffer card and an appropriate printer.

The graphics are pleasant and colorful, but are often painfully slow if a number of shape-table objects must be drawn and filled in. “Inventory” is a particularly slow process, after the novelty of watching a graphical “bag-dumping” wears off. This recalls the old expression of “Z” before “I” (or is it “I” before “E”)? The two-sided disk boots off one side, and eventually plays the game there. The flip side of the protected disk, through which one must pass, carries a plethora of AI promotions, including long demos of three games and a multi-screened graphical statement against pirating/Unauthorized copying, complete with a dour-visaged Scott Adams staring balefully from the CRT.

If you have played the lower priced text version, you’ll find the graphics add little to the enjoyment of the game. Personally, this reviewer preferred the original, as the graphics detract from the degree of imagination that is needed to be successful. If you haven’t played the classic AI text adventures, then you’ll have a treat in store — graphics or no, these games are a must for any serious adventurer.

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*TRANSYLVANIA*  
*PIRATE'S ADVENTURE*
KABUL SPY

Company:  Sirius Software Inc.
Language:  Applesoft & Assembly
Hardware Requirements:  48K

OVERALL RATING  C
DIFFICULTY  B
EASE OF USE  C
VOCABULARY  C
SAVE/RESTORE  D

ORIGINALITY  B
DOCUMENTATION  C
VALUE FOR MONEY  C
HOLS INTEREST?  C

Kabul Spy is a Hi-Res adventure that can't make up its mind whether to be a "serious" spy mission, or a treasure-collecting fantasy complete with magic words and Gruds. The mission is to cross into Afghanistan, search for, and find a professor captured in May 1981. It is possible to get him, and yourself, out alive, as well as to play for score and the five treasures that are found lying around.

The graphics of the 95 mappable locations are well-detailed and colorful. Between locations, the screen change time is fast, even though the disk is interactive; equally impressive is the coloring speed in the frame. The command parser is also unusually good, similar to that of the Zork's, complete with printer output, and multiple command capability. These features work as advertised, but are not really needed as detailed descriptions are not involved. Nor does the vocabulary match the parser; responses like "Unknown Verb" (or noun) and "Nope" abound in response to synonyms to the specific word. Oiling a door and flying an airplane are challenges only in finding the precise two words. "Hints," at 10 points a pop, vary from dead give-aways to little help.

If only Sirius had also used Zork's save-game technique rather than the poor alternative that was chosen, the game would have been better. Ten scenarios may be saved, but an option for two-drive capability is very much needed. However, the resume capability is a disk-flipping nightmare. Kabul Spy is a two-sided single disk, and recalling a saved game produces a third side. Resumption of an in-process game requires almost a minute to cycle through all three sides. From a cold start, or after being killed off, almost two minutes are needed to run through four disk cycles. May Allah have mercy on your soul if you don't hit the specified buttons; there is no error trapping in this sequence!

This same disk-flipping is also required a minimum of six times during the course of a full game. They occur without warning; the options are: "do as told" or "start over." As to content, the beginning and late-middle parts are almost too easy — no options and zero puzzle content. Other phases have rather tough puzzles almost back-to-back. A clever, well-camouflaged surprise is hidden among the almost humorless balance of bland responses and several poor, minor mazes. Twenty seven objects are around, and most have a one-time use. Thus, property management is a big part of the game as only nine may be carried at a time. In four locales, a single, valuable response can be obtained from speaking with the characters, and two require doing so in a foreign language; so don't head into the bars without the "Rosetta paper." But several characters are mute, notably the professor. No amount of pleading, logic, threats or cajoling can elicit a single word from him, causing frustration enough to (unnecessarily) shoot the poor SOB. Then too (and in poor taste), it is necessary to shoot a mute priest.

PIRATE ADVENTURE SAGA #2

Company:  Adventure International
Language:  Applesoft & Assembly
Hardware Requirements:  48K

OVERALL RATING  B
DIFFICULTY  C
EASE OF USE  B+
VOCABULARY  B
SAVE/RESTORE  A-

ORIGINALITY  B
DOCUMENTATION  A
VALUE FOR MONEY  C
HOLS INTEREST?  B

Pirate Adventure Saga H2 is Adventure International's re-release of their second adventure. As is the case with Adventureland Saga #1 (see above), Saga H2 has been dressed up with Hi-Res graphics, and much improved documentation, with a the separate Hint Sheet thrown in to boot. In general, the commentary for Saga #1 is equally applicable to Pirate Adventure.

The game itself is identical in all respects to the play of the original all-text version. There are two treasures to locate and collect, but getting them isn't quite as easy as it may seem. In conjunction with the hint sheet, and since Pirate Adventure isn't one of Adam's more difficult puzzles, it is especially recommended for beginning adventurers and young children whose parents are willing to "lose" them for several days.
The significant addition is the graphics, which are pleasant enough but rather limited in scope due to the relatively small size of the game. The display format is same used in the Curse of Crowley Manor, and may bother a few players as it switches from graphics to text display as soon as a key is pushed and then back to graphics on hitting Return. The objects are in shape table form, and take forever to get up on screen. This delay detracts from the flow of the game, especially when compared to the near instantaneous response of the Assembly language game itself; the command Z permits the game to be played in the all-text mode. At least the graphics do not materially detract from the imagination required to solve the game, as they do for many other all-test adventure game conversions.

Transylvania has no gimmicks, mazes, animation, or anything fancy, but it is a well-balanced, tongue-in-cheek (but not very funny) game with a lot of “rustling noises,” howling wolves, cackling witches, and fluttering bats for atmosphere. It offers a few good hours for the adventure player, it's not too hard for the beginner, and interesting enough for the more advanced player.
**CRANSTON MANOR**  
(Hi-Res Adventure #3)

**Company:** Sierra On Line Systems  
**Language:** Assembly  
**Hardware Requirements:** 48K

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**Department:** Entertainment  
**Sugg. Retail:** $29.95  
**Availability:** 8  
**Disk or Tape:** Disk*

CRANSTON MANOR (Hi-Res #3) is actually On-Line Systems' fourth Hi-Res Adventure game. It follows the traditions, drawing form, and puzzle content of Mystery House, Wizard and the Princess, and Mission Asteroid. The object is to return 16 treasures from the multi-roomed Manor so that the town can be restored to its former glory (actually, the conclusion extends congratulations and designates you a Class 3 Adventurer!).

It's not hard to get in the Manor and find the treasures, but there are a few sticky puzzles to solve, and they get stickier if you don't read the Kitchen's description carefully on your first entry! The game is the same general size as Wizard and Princess, but except for the town and grounds (where there is relatively little action), CRANSTON MANOR is all indoors — upstairs, downstairs and basement. Mapping is necessary as there are several interesting interconnections. The inability to reliably restore or restart a game after being killed off is an aggravating program bug; the computer will be totally hung-up and requires powering-down in order to get back to any of the 15 save-game positions. One nice feature is the command "Init Disk" which provides a DOS 3.2 initialization process.

If you enjoyed the previous Hi-Res adventures, you will find CRANSTON MANOR enjoyable, but perhaps not quite to the same degree. There are few surprises, (excluding the fact that there are no bathrooms in the Mansion). There is a feeling of being somewhat crowded within this game, despite its size. Unfortunately, some of the imagination and freshness which so marked Princess is also missing.

**ULYSSES**

**Company:** Sierra On Line Systems  
**Language:** Assembly  
**Hardware Requirements:** 48K

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**Department:** Entertainment  
**Sugg. Retail:** $32.95  
**Availability:** 9  
**Disk or Tape:** Disk*

ULYSSES is a Hi-Res adventure game that rivals "The Wizard and The Princess" in overall concept. Your mission is to find and return the Golden Fleece to the King, thereby gaining a kingdom of your own, plus 300 bags of gold and the designation, "Level 2 Adventurer". This mission is fraught with dangers and obstacles (i.e. tough puzzles) before riding home on Pegasus, surfeited with riches.

ULYSSES is a better-conceived game than its immediate predecessors; it is also much harder to solve, in part due to a disturbing lack of recognition of many words, synonymous with text patterns which the computer will accept. The game also suffers from several bugs and logical shortcomings (e.g., range errors, fireproof wine, inconsistency when reentering rooms where an event or puzzle has previously occurred). The most flagrant anomaly is the carry-over problem from "Cranston Manor": the lengthy powerdown and reboot process required after being killed off. The 15 save-game capability on a scratch disk is great; scenarios may be made or called in at any time as long as you are alive; just don't get killed! (Hint: Save the game upon first encountering a major puzzle or obstacle, then restore the saved version at that position after three or four unsuccessful attempts to solve that puzzle; also, don't bypass the Isle of the Sirens, even though it is possible to do so).

There are almost 150 locations to be mapped, including many near-mazes in jungles, oceans, and forests. The majority of these are cleverly constructed to lead you to the next "correct" location. ULYSSES is long and difficult but generally maintains one's interest, provided one doesn't get disgusted with the rebooting requirement and a limited vocabulary.
The WIZARD AND THE PRINCESS may well set a standard by which future adventure games will be judged. This game is much more involved, longer and complete than was On-Line Systems' initial Hi-Res adventure game, "Mystery House".

As an adventure game, the puzzles are much less involved and devious than are the Scott Adam's text games. There are several extremely difficult and illogical hurdles which must be overcome, such as at the very beginning which requires the crossing of several chasms. The Hi-Res graphics are excellent and, with the exception of the initial maze, are easily mapped. Color is effectively used, with various stylistical and well-designed shapes for the nearly 100 different primary pictures (not counting variations due to object presence).

The object is to find and return a Princess, who has been bewitched by a wicked wizard and spirited away to his remote castle. It's tough just to get started. One must bypass a coiled snake; most rocks that you might conceivably use to kill it are loaded with scorpions. After that, other formidable obstacles must be conquered: a desert, a wide canyon, a wooded beach area, two tropical islands, a rickety bridge, a thieving gnome, a pirate, a giant, a wandering merchant, and an labyrinthian and magical castle. Along the way, various objects will be encountered; some useful, some not, and some possessed with strange powers.

The game is straightforward and easy to play. Up to 15 different positions may be saved on a scratch disk. Considering the unforgiving and dangerous nature of the terrain and its inhabitants, a frequent "save-game" command is highly recommended in order to catch your breath and regenerate your derring-do.

Both kids and adults will find THE WIZARD AND THE PRINCESS to be a very entertaining and a somewhat challenging game that will take some doing to successfully conquer. This adventurous rouser may cause some ego-bruising in a familial atmosphere, however, as the game-hardened precocity of youth will probably be the first to solve the problem in getting around the snake.
**TIME ZONE**

**Company:** Sierra On Line Systems  
**Language:** Assembly  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**PUZZLE QUALITY**  
**TEXT QUALITY**  
**GRAPHICS QUALITY**

**DIFFICULTY**  
**EASE OF USE**  
**VOCABULARY**  
**SAVE/RESTORE**

**ORIGINALITY**  
**DOCUMENTATION**  
**VALUE FOR MONEY**  
**HOLDS INTEREST?**

---

*Time Zone* is a twelve-sided monster of a Hi-Res adventure game covering the period of time from 400,000,000 BC to 4082 AD. The mission is to use the Time Machine in your backyard to travel into the future to Neburon, deal appropriately with the evil Ramadu, and destroy his Ray Gun, which is about to demolish the earth. It is also necessary to return safely home in order to receive the accolades of friends and relatives and garner the Apple-ation of the Ultimate Adventurer. The graphics are excellent in detail and color, and their response time is much faster than earlier games, such that the disk interaction is hardly noticeable.

To achieve that rank requires traveling through 24 of the 39 accessible eras (although it can be done in 23). In each of the zones, there is usually one, sometimes two objects that need to be appropriately used to solve a puzzle — somewhere. The game clearly is something more than an evening's work; even knowing the optimum sequence of travel, proceeding directly to the destination, and then assaulting Neburon with all requisite objects, takes almost eight hours.

In the final analysis, only dynamite and matches are needed, and they aren't overly difficult to find. However, in order to apply them, some 54 other objects must be employed, of which 14 must be brought into Neburon to enable you to fight your way to the Ray Gun. You must use some objects more than once. While some 18 objects are expend-ed, traded, or disappear, they are fortunately used but once; to further complicate matters, a few are not used at all, and a few (like a kite) are only set off to your detriment. The major problem is that none may be carried back in time prior to its invention. Should you try to do so, that object will disappear forevermore, which can be most disconcerting to say the least. Even though it might be nice to blast a caveman with a ray gun, don't try!

*Time Zone* is a map maker's delight; the final product will literally fill a book. The maze content is just about right, with the final one in Neburon being a monster. Generally, the mazes, like the main maps, are rectilinear; that is, if you go North from one location, you can return there by going South. Most lands average 20 to 30 locations, with some going into the 50's and a few with as little as six.

Neburon is another matter. It's a game unto itself, with almost 135 mappable locations. Neburon's game content and plot make up perhaps the best single Hi-Res adventure yet; it is fast moving, cohesive, well written, and full of challenge — much better than other complete Hi-Res games and most ancillary lands of *Time Zone* which must be unraveled before mounting an effective offensive. Some players may enjoy hitting Neburon first, just to find out what items are needed. Although this is not a recommended procedure, it is indicative of the game's charm — if you get stuck in one place, there are other, independent places to work on.

As you might expect, there are many puzzles to be solved, and there is no help or hint option. Neither is there an abundance of humor or witty responses. Fortunately, the majority of puzzles are more frustrating than difficult or tricky. Several will drive you up the wall, largely because the vocabulary is just barely adequate. What hints there are are often contained in the lines of text below the picture, and the picture and text may be toggled back and forth by use of the RETURN. The command syntax is two words only, but the game does permit use of "Get All" or "Drop All" — a great time saver, and worth trying should the text note an invisible item (a bug encountered at four locations under some conditions on a Neburon disk).

There are a multitude of places, ways, and means of getting killed. Sometimes the explanation as to your demise suggests the action which would have avoided it, but usually death at a particular location is unavoidably consistent, regardless of the direction from which you enter or the action which you might take. A quick death is often a feature of an otherwise barren area, useless, that is, to the eventual solution.
The Dark Crystal is a two disk Hi-Res fantasy adventure, the sixth from On-Line and Roberta Williams. The game is based on, and generally faithful to, the movie produced by Jim Henson, of Muppet fame, who also wrote the story. The plot is exceptional, but having seen the movie is neither a help nor a hindrance in solving the game.

Jen, our Gelfling hero, is your alter ego. You control his actions in his quest to find and replace the missing shard of the Great Crystal, a deed which must be done at the instant of the triple conjunction of the Three Suns. The great prophecy states that only a Gelfling can accomplish this task, and Jen is one of only two who escaped the slaughter of his race by the evil Skeksis. Failure means that the Skeksis and their robot-like killers, the Garthim, will control their world forever. Success means both the end of the Skeksis rule and a return to peaceful harmony in the world of the Gelfling and Pod people. If he succeeds, Jen will live happily ever after with Kira, the female Gelfling, whom he meets halfway through the game.

The game’s disk-interactive graphics, which employ two novel and exciting techniques, are good but not overwhelming. In the beginning, Jen appears a bit too often. In each frame, he is the starkly white character against the colorful, detailed background. Later, after Kira is found, she and Jen neatly overlay the same backgrounds that he had previously traveled alone. Other figures, also all white (presumably due to the overlay requirements), can also occupy the same backgrounds with Jen and Kira on certain occasions. Despite the large game area, mapping, while recommended, is not mandatory. There are no tricks or mazes in the regular, symmetrical layout. There are approximately 94 mappable locations at which actions are possible. Also, about a dozen scenes, which automatically appear as a consequence of a previous action, serve as intermediates to the next location. This technique adds materially to both the flow of the story and the fast-action, “animated movie” feeling that comes through in the later phases of the game.

Some liberties had to be taken regarding the movie in order to improve the game’s puzzles, which, while not particularly interactive or difficult, demand that you read the text very carefully and use a degree of imagination normally only demanded by an all-text adventure. Some objects and actions are neatly concealed. While you are not too likely to get killed off in the first half of the game, matters get stickier and more dangerous later on. Often only one move is permitted before unfortunate consequences take place.

The syntax permits only two words, but involved expression is not necessary. Similarly, the vocabulary is quite adequate and has good synonym recognition. Only in one spot—toward the end of the game, where several minor glitches are found—is specific word usage a problem (try “Use Hook”). Fifteen different save-game positions may be made to a scratch disk, which must be initialized from the game disk. While a game may be recalled at any time, it is necessary to reinsert Disk 1B if you get killed off. Combined with the sudden demand to insert another game side, there are often five disk sides with which to contend in a disk-flipping nightmare. This program is sophisticated in many ways; yet it’s too bad that On-Line hasn’t learned how easy it would be to optionally permit two drives to be used.

The Dark Crystal has little deliberate humor, but it’s lighthearted, done in good taste, and fun to play. The game anticipates your actions and commands unusually well. Quite a number of descriptive responses to the hardest things add materially to making the game playable and interesting, although they have little bearing on the game’s solution. The game is easy enough for beginners and captivating enough for more experienced adventurers. Despite a few rough edges, it is one of the best Hi-Res adventures to come along for some time.
Escape From Rungistan is a B & W Hi-Res adventure that includes some arcade-like action. The object is to escape from a prison cell, and cross the border of the dictatorial Rungistan into the safety of Nuggyland. Naturally, a full scale search is immediately launched by the Rungistanees; apparently, if you aren’t shot in the morning, they get to fill in for you in front of the firing squad. In effecting your escape, a number of easily solved puzzles will be encountered, some involving considerable time.

Generally, puzzles must be solved in a series before you can go on to the next of the 64 game locations. None interact with other puzzles, and usually the necessary object to solve a puzzle is found close by. Mapping is not really required, as there is usually only one possible direction to move. There are no mazes, and if there is more than one direction to move, the “map” is logical and symmetrical. In the arcade arena, the only one requiring any real skill involves skiing between seven or so sets of rapidly approaching trees.

There are two tough puzzles (though probably not designed as such). Given four numbers and a combination lock to open, the syntax requires the first of the two words to be “Use,” with three of the numbers then entered without spaces, commas, or dashes. (Consider the “4R” as a hint, as opposed to a number entered into the computer.) The second is a guessing game, where it may be safely “predicted” that you’ll not succeed by giving, using, or reading any object. You’ll be on the right track with the latter, however. To complicate matters, you are allowed only a few chances (often just one) to input the correct words before seeing a two-line text screen dully announce that you have just been killed, or that you have won the game.

Compared to Sirius’ first adventure, Kabul Spy, Escape is poorer as a game, but better in implementation and easier to play. The graphics are not as crisply drawn, but the game plays faster without the color-fill delay. Rather than major disk swaps occuring at illogical locations in the game (as far as the plot is concerned), Escape completes a logical phase, and only then does the disk swap occur. A single save-game position can be made to, or called from, the protected disk at any time. In the second and third phases, the player is given an option of restarting the game. Only if the phase is changed do you have to wait out a lengthy read cycle.

All in all, Escape is somewhat like Chinese food — filling but not satisfying. While there is animation and music, it’s unfortunate that the game can’t make up its mind as to what it wants to be when it grows up — an adventure or an arcade. Right now it excels in neither.
**DEADLINE**

**Company:** Infocom Inc.  
**Language:** Assembly  
**Hardware Requirements:** 32K

**OVERALL RATING** A+  
**DIFFICULTY** B  
**EASE OF USE** A  
**DOCUMENTATION** A  
**ORIGINALITY** A

**PUZZLE QUALITY** A  
**EASE OF USE** A  
**DOCUMENTATION** A  
**ORIGINALITY** A  
**HOLDS INTEREST?** A

**TEXT QUALITY** A+  
**VOCABULARY** A  
**VALUE FOR MONEY** A  
**HOLDS INTEREST?** A

**GRAPHICS QUALITY** N/A  
**SAVE/RESTORE** A  
**VALUE FOR MONEY** A  

*Deadline* is the first in a series of all-text mystery adventure games from the Zork bunch. Totally engrossing, you are seemingly pulled directly through the CRT, and right into the mansion with the suspects. You, as the Detective, are called upon to investigate the apparent suicide of a wealthy and philanthropic industrialist. There are no monsters, treasures, mazes, wizards, magicians, fantasy, or sound effects, just seven characters with you in a house with grounds having some 48 mappable locations. Sounds simple? Guess again! There are several tricky puzzles, a very involved plot, an abundance of well-written text, characters moving independently of one another (and of you), a second suicide/homicide of one of the characters (under certain conditions), and the possibility of twenty-five different endings, including your own early demise.

Like any good mystery, *Deadline* unravels slowly, and is complete with false leads and subplots. You have 12 hours to establish your case and resolve the conflicting issues. Don’t try to do it all in the first hour; events transpire at specific times which will alter your suspicions or influence your investigation. Because of these events, a complete solution is not possible until early in the afternoon, even if you know exactly what needs to be done. Physical evidence, also time dependent, is hard to come by, despite a multitude of objects.

Regardless of which of four principal suspects you attempt to convict, it is necessary to prove the motive, opportunity, and means. When you believe you have enough proof, you may arrest your suspect(s). A summary letter advises you of the result, ranging from dismissal by the Grand Jury, to conviction by the Trial Jury. Some endings come with shocking suddenness, while others are quite a surprise or contain a strange twist or clue for your next attempt. While some are simply variations of others, there is one “complete” solution, distinguished by a three-screen analysis of the crime by the author.

The game suggests the quality, feel, and humor of its Zork predecessors, from which Deadline’s flexible, multiple command parser has been adapted. The vocabulary and synonymous word recognitions are excellent, although there are a few “missing” words which a good detective would use; for example, Who, Why, When and Where. Then too, there is a fast sequence of events near one ending that is illogical, in that someone should have been able to be seen at a crucial point. Lastly, there is an obscure but fatal bug — don’t shake a bottle known to be empty unless you have made use of the eight-scenario save/restore game feature.

The response time of the game is excellent, and the disk-interactive nature of the game is hardly noticed. *Deadline* will play on a 32K system, run faster on a 48K system, and really zip on a 64K configuration. While the puzzle quantity and difficulty level are moderate, the puzzles are quite involved and interactive, requiring more deductive logic than is usually called for in adventures. After seeing the many screens of possible responses and descriptions, perhaps the biggest single puzzle is, how did Infocom manage to get all that text onto one disk?

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**THE WITNESS**

**Company:** Infocom, Inc.  
**Language:** Assembly  
**Hardware Requirements:** 32K

**OVERALL RATING** B  
**DIFFICULTY** C  
**EASE OF USE** A  
**DOCUMENTATION** A  
**ORIGINALITY** A

**PUZZLE QUALITY** B  
**EASE OF USE** A  
**DOCUMENTATION** A  
**ORIGINALITY** A  
**HOLDS INTEREST?** A

**TEXT QUALITY** A  
**VOCABULARY** B  
**VALUE FOR MONEY** A  
**HOLDS INTEREST?** A

**GRAPHICS QUALITY** N/A  
**SAVE/RESTORE** A  
**VALUE FOR MONEY** A  
**HOLDS INTEREST?** A

*The Witness* is the second in Infocom’s series of all-text mystery adventure games. Following *Deadline* as it does, it is only natural to compare it to that near-classic. The scene is Los Angeles in 1938, where the wife of a noted millionaire businessman has taken her own life. Your alter ego is a police detective, summoned to the residence of the tragedy by a telegram from the businessman who now fears for his own life at the hands of his wife’s vengeful lover.
Before long, you have a murder on your hands, committed before your eyes, and your task is to bring the perpetrator to justice. Whodunnit—the Lover, Butler, or Daughter? It evolves that all three may have a motive for the killing. You must question the suspects, search for physical evidence, piece your case together, and arrest the suspect. As with Deadline, there are several endings, though none are as satisfying as in the original. There is but one complete solution.

The implementation techniques of Infocom's other games has been carried forward with their excellent parser, game-save, and recall capabilities. The imaginative text and expansive, detailed prose, another hallmark of Infocom, are present in full force, making the game a lot of fun while it lasts. The trouble is that it doesn’t last long enough. The game starts falling into place as soon as an obvious object is examined, and resolves itself completely when the object is checked out. Part of the game’s brevity is because there are only four characters, and it is difficult to develop a real case against several of them.

The puzzles are imaginative, detailed, and reasonably interactive, but there are not enough to contend with. The storyline holds your interest and is well done as far as it goes. The vocabulary is also excellent in most regards, but it is flawed by the omission of the key words associated with the strong Asian theme that is dominant both in the house and the documentation’s newspaper article. While these cultural differences have no real bearing on the game, they could have been the basis of an excellent idea that never came to life. In particular, the character of Phong could really have been brought to life.

Crime Stopper

Company: Hayden Software

Language: Assembly

Hardware Requirements: 48K

OVERALL RATING C-
PUZZLE QUALITY D-
TEXT QUALITY B
GRAPHICS QUALITY N/A

DIFFICULTY C-
EASE OF USE B
VOCABULARY B
SAVE/RESTORE A

CRIME STOPPER

Company: Hayden Software

Language: Assembly

Hardware Requirements: 48K

OVERALL RATING C-
PUZZLE QUALITY D-
TEXT QUALITY B
GRAPHICS QUALITY N/A

DIFFICULTY C-
EASE OF USE B
VOCABULARY B
SAVE/RESTORE A

Crime Stopper is an uninspired, all-text mystery adventure game. You are Al Clubs, Private Investigator, and on your 7:00 AM arrival at your office, find that you have been retained to recover a kidnapped heiress. You have until midnight to complete your task, and until then you spend a seeming eternity in the subways of your city.

The game leads you along to a reasonably apparent solution; on three occasions, you are given instruction by telephone—there are three to be found within the game; just be sure that your speaker is connected! Receipt of the first call will lead to your first subway trip, assuming that you have thoroughly checked out your office first. The only real mapping that is required is to annotate the map found in each of the thirteen stations in order to learn how to get from point A to point B, transferring trains frequently, and remembering what complex is located above each station. Be sure to gather all the reading material that you can—it passes the time in the subway and pretty much tells whodunnit. En route to the final solution, you will encounter two dead bodies, and either do in three others, or become one yourself. (Justice on the Apple can be swift.)

There is a lot of text to digest, but it’s a pretty light meal. The puzzle quality leaves much to be desired; most are disjointed entities which have no real relation to each other, and several have absolutely no bearing on the plot line whatsoever. They require solution, however, to set an internal program flag which allows a key messenger to appear at the appointed time. The command parser is good, permitting multiple commands on the same line. The vocabulary is generally adequate, but does not include the names of some characters. It is most aggravating to have but a single move at your disposal before being shot by “Joe,” receiving a message “Shoot Joe,” getting the response, “I Don’t Know a Joe,” and then “Joe Shot You Through the Head.” Fortunately, you can recall one of the three saved-game scenarios on the program disk at any time. The program, in short, is not well error-trapped, and has several bugs in it, so saving frequently is suggested.

Novice adventurers will find this game a straightforward and reasonably entertaining experience. However, if you were hooked on Deadline and look forward to the next all-text mystery, you’ll be advised to wait. Crime Stopper is a good testimonial to Hi-Res adventures, a neat trick considering that the only graphics are in the title page.
Starcross is a science fiction, all-text adventure game that continues to offer the quality and enjoyable features expected of Infocom, including the excellent save-game capability, command parsing, and vocabulary. It's long ago and far away, when suddenly the “strident alarm” of your one-man spaceship awakens you to advise you of the presence of an uncharted mass in space. Naturally curious (if you weren't it would be a very short game), you rendezvous, effect an entrance, map the 80 or so locations of the game, encounter both living and dead remnants of preceding alien civilizations, advanced technology, religious superstition, and past tragedy.

With a few exceptions, the puzzles are more of a singular nature than the interactive kind. While the game is somewhat less difficult than its predecessors in the series, there is a relatively difficult sequence which involves obtaining one of the twelve differently colored control rods. Thereafter, it becomes a matter of following through on the logic of the game, placing the rods in appropriately colored slots, and devining the real purpose of your presence there. Hopefully, you will be accorded the salutation of Galactic Overlord.

Unfortunately, the game ends at its high point, where suddenly everything comes together and all becomes clear. This final scene could well have been the basis of a game complete unto itself. Along the way to that scene are several clever side issues; for example, the Ray Gun may be fired at just about anything. Most responses are unique, and frequently have a humorous twist to them — even when you end up getting killed yourself. Throughout, the true use of the Ray Gun, which is required to successfully complete the game, is neatly disguised.

While the prose is a bit less vivid and expansive than in the Zork series, the plot and storyline are excellent, perhaps the best yet seen in any computer adventure. Like a good book, Starcross stimulates the imagination by not entirely explaining the situation as to all that must have happened in the generations during which the huge artifact ' has drifted. It is almost a shame to waste the story on kids, who will simply enjoy it for its puzzles, and who just might embarrass Dad with some questions about the Periodic Tables, Newton's Third Law, and Solar System basics. And in the event you get stumped you can go outside and play Flying Saucer Frisbee with the packaging.

Suspended is a Science Fiction all-text adventure game in which you are the central mentality of a planet. Normally, three underground filtering computers keep conditions stable and under control. In an emergency, you may manually control the filtering computer functions to minimize surface casualties, while you repair the damage that woke you from your 500-year sleep. Should the populace suffer drastically while you attempt these repairs, "talking mechanisms" will quickly replace you.

Each robot perceives his surroundings differently; thus, each robot's report regarding the contents of a given room may be wildly different. Only Iris can see, only Auda can hear, and Sensa perceives the state and patterns of electromagnetic energy. Waldo has a great gift of touch and is handy at fixing things. Whiz can get clues for you from his four-computer peripherals. While not infallible, Poet can touch an object and tell if it is working or not; his "way-out" reports give him a fresh personality that steals the whole show.

The few puzzles, complex and highly interactive, must be solved in a minimum number of moves. The initial puzzle is pretty obvious: Iris can't see. Subsequent puzzles are not so obvious, except that an errata sheet needed to
cover a bug advises you that some filtering computer cables must be replaced. Sadly, only one puzzle requires the use of two robots working together; this is regrettable, considering the potential of the concept. After rebalancing the repaired computers, you receive a two-screen conclusion summarizing the casualties and move requirements. You also get a relative efficiency score of one to seven and an appropriate reward, ranging from being burned in effigy to being considered for a home in the country and an unlimited bank account.

The best strategy is to march each robot around and discover his limitations and visualizations; after this, the game will start to make sense. Use the computer peripherals to get information on the objects that are encountered. Then, when you attempt to "solve" the game, watch for opportunities to conserve moves; for example, if you need two robots to arrive at two locations at the same time, order the one farthest from his destination first. As new robots come into play, those commanded earlier will continue toward their specified goal, advising you when they arrive.

After you get a grade of three (savior of the planet) or four (a candidate for a frontal lobotomy), other levels of difficulty await. In Advanced, events move faster and only five of the robots are available to you. In Configure, you define the starting setup. You can "cheat" a smidge by starting with Iris fully functional and your robots better positioned. In the Impossible mode, it's two moves and zap! To add variety to replays, the computer reset codes change from game to game, or during the game if you try to cheat. A real challenge for the replays would have been to change the color or lengths of the four replacement cables which can be found among the eight used in the system.

Mapping the 61-room complex is not necessary; a nifty map board is supplied. Just take good notes on what each robot sees in each room. The game shares the superlative parser and save-game feature of the other Infocom adventures; the latter should be used frequently to promote efficiency. Note that a robot must have the "attention" of the area which you wish to investigate more closely. In light of this fact, the fine vocabulary is occasionally marred.

Suspended has a superb plot, features, and concept; however, the game has not exploited its concept to the extent that it could have.

### PLANETFALL

**Company:** Infocom, Inc.

**Language:** Assembly

**Hardware Requirements:** 32K

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| DIFFICULTY    | B |
| EASE OF USE   | A |
| VOCABULARY    | B+ |
| SAVE/RESTORE  | A |

| ORIGINIALITY | B |
| DOCUMENTATION| A |
| HOLDS INTEREST? | A |
| VALUE FOR MONEY | A |

**PLANETFALL** is a science fiction all-text adventure in which you are an Ensign 7th Class of the Stellar Patrol. You soon find yourself marooned on a planet, uninhabited except for a robot named Floyd. Other than wanting to get back to your Galactic Union, the game's purpose isn't clear until much later, when a computer within your computer provides some much needed detail on various aspects of your newly found world. Along the way, you will find four subsystems to repair, and disease, hunger and radiation poisoning to overcome before one of the alternative endings makes everything clear. The different endings may indicate that you failed to do something necessary to achieve the optimum solution.

The puzzles are generally clever, but not quite as interactive as other Infocom games. There are several "choke points," particularly early on in the game, that block alternative actions until they have been solved. The vocabulary is quite good, as one expects from Infocom, although it seems that an excess of typing is required at times just to prove the point that the game has a multiple word parser. In some regards, the parser seems restrictive and unnecessary for precise syntax.

**PLANETFALL** isn't quite as tight a game as its predecessors; there are numerous rooms in this game that are just window dressing, in which nothing pertinent to the game can be accomplished or learned. To "compliment" this, there are a number of red herrings, which, with one exception, are not developed enough to seriously mess you up. Inventory management may be a problem, as there are a plethora of objects to manipulate, many of which are irrelevant and have absolutely nothing to do with the few that are the keys to the game. The puzzle is to determine which is which.

Floyd is a pleasant enough character to have around as a traveling companion, but somehow he's not quite the same show stealer as are several of the robots in **Suspended**. All in all, **PLANETFALL** is an interesting adventure, suitable for both the novice and for the experienced player, but not quite in the same league as some of the other recent Infocom releases.
SECRET AGENT: MISSION 1

Company: Jor-And
Language: Applesoft and Assembly
Hardware Requirements: 48K

OVERALL RATING B-     DIFFICULTY B-
PUZZLE QUALITY B     EASE OF USE C
TEXT QUALITY C     VOCABULARY C
GRAPHICS QUALITY B+     SAVE/RESTORE C-

ORIGINALITY B
DOCUMENTATION B
HOLDS INTEREST? B
VALUE FOR MONEY B

Secret Agent: Mission 1 is the first game of what Jor-And hints will be a series of black-and-white Hi-Res adventures. Your mission, which is crisply described in the internal documentation, is to locate and deactivate a near-ultimate weapon, and escape before the waiting bombers pound the island (and you) into a pulp. There are many puzzles between the beginning, where you are in an airplane about to be shot down, and the end, where you reach the waiting helicopter and safety. Included are a difficult maze, and many straightforward but limited puzzles, most of which are one-on-one and non-interactive. The objects needed are never too far from your position and are cleverly presented.

The graphics are crisp and above average in detail and overall quality; even a bit of animation is thrown in. The disk interaction before each move is quick, and does not detract from the continuity of the game. The text is sparse, to say the least; and although the plot won’t win any awards, it does maintain one’s interest throughout the game, presenting several interesting twists along the way. The two-word syntax and limited vocabulary have been unusually well integrated into the game’s design. Rather than detract from the game, they actually add to its speed and enjoyment. Mapping of the 67 locations in the game (excluding the maze) is helpful, but not really mandatory.

A single save-game position may be written to or recalled from the protected disk any time that the command cursor is available to you. The only drawback is that a single save-game position simply isn’t enough. A minimum of three should be available, as you will get killed off numerous times. The puzzles, while not individually difficult, demand immediate solution. Also, there is a strict time limit on the game, each move taking two minutes; thus, you must be efficient in working toward the solution if you are to succeed. After being killed or when your watch beeps, that’s it. There is no option to restore the last position, and you must suffer through a lengthy boot cycle.

Aside from this last minor frustration, Secret Agent: Mission 1 is a pleasant surprise from a new source. With the exception of the 10x10 maze which demands patience to map, this game is a lot of fun for the beginner. It is also involved enough to maintain the interest of the more advanced adventure aficionado. All in all, Jor-And’s is an excellent first shot into the adventure arena, worthy of more.

SNOOPER TROOPS #1

Company: Spinnaker Software
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING B+     DIFFICULTY C
PUZZLE QUALITY C+     EASE OF USE A
TEXT QUALITY N/A     VOCABULARY N/A
GRAPHICS QUALITY B     SAVE/RESTORE N/A

ORIGINALITY B
DOCUMENTATION B+
HOLDS INTEREST? B
VALUE FOR MONEY C

An educational program that teaches an organizational approach to deductive reasoning along with a bit of map-making doesn’t always have to be dull and tedious learning. Spinnaker proves the point with a new series of interesting educational programs called Snooper Troops. The first, a mystery called The Granite Point Ghost by Tom Snyder, is well suited to students in grades four through eight. Besides the general learning value that it imparts in the process of solving a mystery, it is great fun to play. In fact, many of the parents will become involved solving the mystery too.

The game, in Hi-Res graphics, takes place in the town of Granite Point. The mystery involves a family that has moved into a large mansion in a small town. For several weeks strange things have been happening late at night. Some say the house is haunted, but maybe someone is just trying to give the family a bad scare. Now that a valuable Siamese cat is missing from a locked bedroom, a Snooper Troop detective has been called in on the case. You play the detective.
The detective gets to drive around town in his “Snoopmobile,” mapping the town as he goes, and taking statements from suspects. He can make telephone calls from booths to suspects, informers, or the infamous Mr. X. He can even snoop or search a suspect’s unoccupied home.

The house snooping is possibly the most enjoyable part of the entire game. The houses are dark, but you have a flashlight. When you enter, the screen displays the walls of the house and the clues along with question marks. You must move to the question mark and take a picture with your “Snoopmatic” camera, then exit without being caught. It’s rare to be caught (you usually plan the search on a night when the suspect is known to be out); but if you are caught, you simply start over the following night.

Each of the suspects has three clues to give, each phone contact another three, and each home searched yields a final three. All are numbered, and you must write them down in your clue book. Additionally, there are special message clues that you get through the “Snoopnet” computer at headquarters, so you must hurry back before the end of the day to pick up your messages. Drive carefully and not to fast, for if you crash, you’ll end up losing valuable time at the tow yard.

The mystery is very structured. Once you’re ready to make an accusation, you do so. However, you must eliminate every other suspect by identifying the clue that exonerates him or her, and then name the means and motive of the guilty party. This is not a simple guessing game, but a serious challenge for the child.

The game is played on the keyboard using the A, W, D, X keys for steering, the S key for stopping, and the space bar for entering and leaving headquarters, phone booths, and houses. The space bar also turns the flashlight on and off and takes “Snoopshots.” As our Snoopmobile travels around town, the screens change from one view to the next. Although the game isn’t in real time, and is the same each time you play, a clock ticks off the hours and days of the week. Messages interrupt frequently with news and tips. Sometimes I think these messages are distracting, but this is true in all police and detective work. Incidentally, there is no game save option.

The game is exceptionally well-done. It is cute, obviously appropriate for children, and not too difficult. Although this is not geared for a classroom environment, it certainly is useful for teaching the art of solving a mystery in the home.

**DEATH IN THE CARIBBEAN**

**Company:** Microlab

**Language:** Applesoft & Assembly

**Hardware Requirements:** 48K

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<tr>
<th>OVERALL RATING</th>
<th>DIFFICULTY</th>
<th>EASE OF USE</th>
<th>VOCABULARY</th>
<th>SAVE/RESTORE</th>
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**DEATH IN THE CARIBBEAN** is aptly named. You are guaranteed to get killed off numerous times before this game is solved. You find yourself on an island, separated in two parts by a fast flowing river. You’ve come here in search of buried treasure.

The two-sided, Hi-Res graphics of this game are sharply defined, fill very quickly, and even show up on a monochromatic screen better than they do on a graphics printer. Good graphics permit you to recognize objects which you come across or have dropped, as in most cases the text does not point out that you have come across it. The puzzles, while not particularly interactive, are tough, and are in keeping with the Microlab standards set in Madventure and Palace in Thunderland. The difficulty is increased by the clever addition of several “puzzles” that beg for a solution, though there is none. Other games have used red herring objects, but in this game there are red herring puzzles.

The story line is thin and the text is sparse, but these deficiencies are more than overcome by the difficulty and toughness of the puzzles. The two word parser is demanding due to a limited vocabulary. For example, climbing the rope at the cliff is satisfied only by Climb Down. Nine games may be saved to a scratch disk. However, the game is difficult to play as it does not support two drives; you are guaranteed to get killed off many times, and will often wonder which of the three disk sides to use next. This factor was complicated, on the review disk at least, by occasionally bombing out in the restart cycle.

Discounting the shortcoming, **Death in the Caribbean** is a challenging adventure and will hold your interest. If you frustrate easily, or are new to adventure games, you may wish to defer tackling this baby for awhile. However, if you enjoy a good solid adventure and have been looking for a good Hi-Res adventure, look no further.
THE QUEST

Company: Penguin Software
Language: Assembly and Applesoft
Hardware Requirements: 48K

DIFFICULTY: D
EASE OF USE: D
VOCABULARY: C
SAVE/RESTORE: C

OVERALL RATING: D
PUZZLE QUALITY: D-
TEXT QUALITY: C
GRAPHICS QUALITY: C

The Quest is a two-sided Hi-Res color adventure of immense proportions but little content. You are the King's Advisor and have been given the task of ridding the Kingdom of a rampaging dragon. Corn, the King's loyal but slow-witted champion, is your companion on this mission which will have you in blazing deserts, dark tunnels, and near endless plains, totaling some 250 locations. Later on, Lisa will join you if you find her, but never to be seen again (unless you end up in the dungeon).

The simplistic puzzles are few and far between, averaging perhaps one minor puzzle every 40 locations. Two puzzles present some difficulty: one because it's a red herring, and the other because of the specific syntax requirement. (You can't Cover, Wrap, Protect or Shield an object with the Oilskin, but you can "Put" something in it). In the balance of locations you visit, there is nothing that can be done except look at the rather bland and often repetitive graphics. Mapping is necessary only because of the game's size, but all save two near-adjacent locations (perhaps a programming oversight) are totally predictable and rectilinear in nature.

The text is also generally flat and bland, but there are a few scenes in which both the text and the graphics have their moments, including a degree of animation. The vocabulary is terrible, and while the multiple word parser does accept more than two words, it acts only on key verbs, totally ignoring modifiers. Any number of games, named by the user, may be saved to a scratch disk. The game does not support two drives, and considering that a scratch disk and two frequently-flipped disk sides are involved, this constitutes a messy series of disk swapping.

If the Value Ratio were based on rooms for the buck, The Quest would be a real winner. However, despite its low price, the shortcomings are such as to leave a lot to be desired.

INFIDEL

Company: Infocom, Inc.
Language: Assembly
Hardware Requirements: 32K

DIFFICULTY: A
EASE OF USE: A
VOCABULARY: A
SAVE/RESTORE: A

OVERALL RATING: A
PUZZLE QUALITY: A
TEXT QUALITY: A
GRAPHICS QUALITY: N/A

Michael Berlyn, author of OO-Topos, Cyborg, and Suspended, has another winner in his new release, Infidel, an all-text adventure from the wizards of Infocom. You are a modern "archaeologist" (a polite term for grave robber) bent on finding the vast treasures from an Egyptian Queen's pyramid, rumored to be buried beneath the sands of Egypt. Above ground, there are thirteen locations and an infinite number of desert locations, but it's not too tough to find the pyramid. The fun really begins once you're inside the pyramid, where there are a myriad of rooms between you and the Queen's sarcophagus (things really get exciting when you get close to her final resting place).

The puzzles are neatly put together, and are pleasingly interactive. The text is well written and draws you cleverly to its unique end. Here and there in the pyramid are "signs" that give you clues and suggest puzzle solutions. The "signs," however, are in hieroglyphics, and you may not be able to decipher them until you've solved all the puzzles.

If you've played any other Infocom games, you are aware of their superb parser and save-game features. The vocabulary of Infidel seems even better than its excellent forebears, and a variety of wise remarks await the adventurer who goes off on the wrong track. This game is a must for fanatics of adventure games.
## TREASURE QUEST

**Company:** Adventure International  
**Language:** BASIC  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>GAME CONCEPT</th>
<th>CREATIVITY</th>
<th>GAME DEPTH</th>
<th>CONTROLLABILITY</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
<th>GRAPHICS</th>
<th>ERROR HANDLING</th>
<th>DOCUMENTATION</th>
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<td>C-</td>
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*Treasure Quest* is an example of an adventure game that has potential but falls flat in several areas. The adventure takes place in 1760 on the sailing ship Zombie. The object of the game is to find the hidden treasure. *Treasure Quest* makes use of limited graphics—a low-resolution map with a dot symbolizing the location of the ship. The player, as captain of the ship, commands his crew to do such things as sail the ship in a given direction, anchor the ship, dig for the treasure, and so on. The large number of commands listed in the documentation makes the game confusing. In addition, the player is supposed to base his commands on such factors as wind condition, high or low tide, and the weather. What also adds to the confusion is how these conditions are explained (“Wind speed is 15 for 1!”), and how the captain is supposed to order the ship to sail in a given direction (by listing degrees instead of indicating the direction). It would be much more enjoyable if the game used less sailing jargon and more simple English. The documentation, though detailed, does little to dispel the confusion.

This adventure game, unlike many of the others written by Adventure International, is in BASIC, which may explain why there are so many problems with it. Although the concept behind *Treasure Quest* is a good one, the confusion surrounding direction and commands make it a disappointment.

## ENCHANTER

**Company:** Infocom, Inc.  
**Language:** Assembly  
**Hardware Requirements:** 32K

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<th>OVERALL RATING</th>
<th>DIFFICULTY</th>
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Marc Blank and Dave Lebling, creators of the *Zork* trilogy, have again joined forces and brought forth *Enchanter*, an all-text adventure worthy of its ancestry. You start as a neophyte wizard, hoping to be accepted into the Circle of Enchanters, armed with but four simple spells. Your wizened mentor, Belboz, has concluded that only an innocent fledgling can hope to succeed in dispelling the great evil wizard, Krill, and then only with inherent cunning.

Schooled in the basics of enchanting, you now must find and correctly apply the spells contained in the missing magic scrolls. Some locations are obvious, others may be seen in dreams, some are tough and need the help of others to obtain. The threat of a sacrificial death lies heavy over you, until you learn to accept your Karma for the betterment of your future. Indeed, the fourth scene from *Zork III*’s Scenic Point will now be experienced in full context.

There is frequent humor to be found amid the expansive, but forbidding text. The puzzles are imaginative and tricky, and several are downright tough. They are pleasantly interactive, and permit considerable exploration while you become a master enchanter, ready for the final assault on the Translucent Rooms and the Winding Stairs.

The multiple command parser, vocabulary and save-game capability, all hallmarks of Infocom, are here in all their glory. There are a few minor breakdowns of the parser when combining certain commands on one line, and there is one spot where the usually outstanding vocabulary should "reach in the hole" of its synonym recognition a bit further.

The quality and feel of *Enchanter* are such that few seasoned adventurers would have objected to its name being *Zork IV*, although there are no elements of commonality in the play itself. No higher compliment can, or need be made. This one is a must for all adventurers, but beginners beware!
THE MASK OF THE SUN

Company: Ultrasoft
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING C
PUZZLE QUALITY C
TEXT QUALITY C
GRAPHICS QUALITY B

The Mask of the Sun is an animated Hi-Res adventure set in the Aztec ruins of Mexico. You play Mac Steele and must find the legendary Mask to cure a mysterious malady held in check only by the limited number of pills which you must always carry. Two of the three pyramids in the game must be explored on this two-sided disk, but fortunately, there are only two disk flipping interruptions required to complete this 50-ish location game (excluding mazes).

The emphasis here is on animation, which is far from smooth, but initially captures your attention. Much time is spent on the road in a bouncing jeep, and even more time is spent in a bouncing sort of walk through drab tunnels similar to Dakin5's Alkemstone. The graphics themselves are moderately well detailed, often colorful, and several of the animation sequences lend both enjoyment and a degree of real-time command responses.

Only the graphics, however, set Mask apart. The vocabulary and word recognition are average at best. The puzzles are bland and generally of a one-on-one nature with very little interaction; however, you've had it if you don't have all the necessary objects on entering the final pyramid. The save game feature requires a separate scratch disk for each scenario, permits saving or recalling at any time, but does not provide for a two drive option.

The Mask of the Sun offers several challenges not found too often in adventures. A real-time, semi-arcade like lava pit must be hurdled, and any one out of three riddles must be answered correctly in order to get through two locations. By far the most difficult task is unraveling the mystery of the maze, actually two mazes separated by a room that is ready to fall in on your ears. Both are manageable, but require patience as the standard of dropping an item to mark a location demands that you "LOOK" for it at each location. The first maze is really a rather clever ten room maze, but the second sort of cheats as far as adventure mazes are concerned, and may well cause many players to give up out of sheer boredom. There are 52 locations in this one, but mapping, while a challenging possibility, is neither required nor recommended, as the next significant display appeared randomly in the four games played. Unfortunately, it may take well over a hundred moves of rocking back and forth through colorless tunnels (at 12 to 15 seconds per move) before you need to wake up.

As an adventure, Mask is average, with a higher than average degree of difficulty due primarily to the mazes. There are several well done animation scenes here which are promising for the game's future. But for the present, animation for animation's sake in the form of herky-jerky traveling, soon becomes irritating.

SERPENT'S STAR

Company: Ultrasoft
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING C
PUZZLE QUALITY C
TEXT QUALITY B
GRAPHICS QUALITY B

Serpent's Star is the second animated Hi-Res adventure game from Ultrasoft. It borrows heavily from the concepts developed for The Mask of the Sun, the game in which Mac Steele, your alter ego, was first introduced. The setting is Tibet, and your mission is to find the last three scrolls which lead to the fabled Serpent's Star gem and steal it. To accomplish this dastardly deed, you must visit two monasteries, buy and give away objects, initiate a few quick actions, dodge through an avalanche, answer a series of questions, map and navigate the maze, and even solve a puzzle or two.

The graphics on this two-sided disk are sometimes blandly repetitive; there are, however, a few excellent screens and sequences. Except for the "traveling screens" shown between locations where actions are possible, there are some 65 locations which can be mapped. There is less emphasis than before on animation; nevertheless, several
animated sequences are superbly done, notably the resurrection of the Kara-Koram Monastery. Fortunately, two command keys now permit the sound to be cut off and the transit time between screens to be speeded up by about 10 seconds. The average time spent bouncing between screens is still a lengthy 15 seconds in the fast mode. A major improvement over *The Mask of the Sun* is the save-game feature, which now supports a second drive, one scenario to a disk.

The puzzles are generally part of a series; either you solve them or get stuck where you are. Most of them are obvious, but a few are difficult because they require the word “Search” of the right object, which may prove frustrating to all but seasoned and determined adventurers. Unfortunately, *Serpent's Star* is “riddle-happy.” Three of the five riddles are more of a test on basic Buddhist and Yogi tenets, and you only get one chance to correctly answer each question. If you don’t, by the Yin and Yang of Dragon and Man, you restart the stored game you quickly learn to make.

The text of the scrolls is interesting and maintains a good plot, although they don’t have any significant bearing on the game’s solution, nor do they contain any real clues. For that matter, there are no clues to the tougher puzzles or questions, making *Serpent's Star* an uneven adventure game that many may start but few will complete before giving up in frustration.

### LABYRINTHS OF CRETE

**Company:** Adventure International  
**Language:** Assembly  
**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
<th>PUZZLE QUALITY</th>
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<th>GRAPHICS QUALITY</th>
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<th>EASE OF USE</th>
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<th>SAVE/RESTORE</th>
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*Labyrinths of Crete* is an all-text adventure game in which two independently controllable characters, Jason and Hercules, represent your alter ego. Their mission is to recover the Golden Fleece. Doing so they earn the respect of the inhabitants of Mount Olympus, are granted access to that exclusive area, and are praised with several bars of a pretty good arrangement of “The Hall of the Mountain King.” Interspersed with the text are a few Hi-Res displays which suddenly appear, and fortunately can be turned off.

In attaining their goal, your characters will explore 108 locations in three different worlds, solve a plethora of puzzles, and encounter most of the gods, goddesses, and creatures of Greek mythology. A knowledge of the adventures of Zeus, Athena, Apollo, and Tantalus isn’t necessary to the game, but neither will you learn anything about mythology (unless you are driven to look up the names in a dictionary).

The plot maintains your interest in the game despite the undeveloped, terse text. The puzzles, all in series and generally non-interactive, often have interesting twists. Not all need be solved if you are a good guesser, for all that you miss will be a clue to the next series element. The number of individual puzzles is staggering, but it is the few character-interacting puzzles that are the most fun. Jason will get into a fix—like being turned into a statue or a lump of gold—and needs Hercules to come to his aid. When the Minotaur strikes, don’t despair for sorcery will help. When Hercules helps out an ungrateful Atlas, Jason must lie in wait.

Unfortunately, the game’s implementation falls short of its conceptual promise. The two-word syntax veils an atrocious vocabulary. The majority of the puzzles can be solved simply by Giving or Dropping the right object at the right location; most objects are only used in the world in which they are found. Often, an object will disappear when used properly, and with a few exceptions, each has only one use per location. The program does little self-checking for changes. Difficulties in inventory management can occur if you succumb to the temptation of getting a second copy of a once-used object. Indeed, poor Jason can get turned to stone any number of times if he is dumb enough to go back and try again. In the midst of the game, the single save-game capability seems insufficient; however, it’s pretty hard to go wrong or get killed off (for good) or get into an irreversible situation, except at the Medusa.

The game is long, not too difficult, and reasonably fun to play. The new concept of interacting characters who combine their talents to solve a given puzzle opens new doors in adventure games and is bound to be extensively copied and exploited by others. Too bad that more wasn’t made of it here, and that the finer points of a better vocabulary, a more developed plot, and implementation in general weren’t up to the quality of the concept.
The Blade of Blackpoole

Company: Sirius Software
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING B
PUZZLE QUALITY B
TEXT QUALITY C
GRAPHICS QUALITY C

DIFFICULTY B-
EASE OF USE B
VOCABULARY B
SAVE/RESTORE B-

ORIGINALITY C
DOCUMENTATION C
HOLDS INTEREST? C
VALUE FOR MONEY C

The Blade of Blackpoole is a Hi-Res adventure set in the rivers, lakes, and countryside of a non-specific, medieval magical fantasyland. The object is to find and return the Sword of Myraglym. Standing between you and success are talking plants and idols, several riddles, a booze-happy monster, a tough-hided lizard, and a variety of ways for you to come to a premature end. A secondary object is to gain the maximum of 500 points for solving the puzzles; it is distressingly easy to receive the final accolade of having your name proclaimed throughout the land only to find that you have but 499 points. While most points come in clumps of about 40 a crack, the anticlimactic challenge is finding which object is worth that extra point.

The two-sided game requires only one flip during the boot cycle, with the entire game then played (and saved) on the second side. The assembly language program is pleasurably fast in its response and color-fill time, even though there is a degree of disk interaction. The game involves 60 locations, including a six room maze. The puzzles are not particularly logical in their solution, but are interactive and fun nevertheless. The vocabulary and synonym recognition are good, but differentiation between unknown and inapplicable words leaves much to be desired. The command parser permits the use of multiple words, and the save-game implementation permits 10 scenarios to be quickly saved or called up at any time. Should you get stuck, the friendly “Help” command may occasionally come through, either with a blatantly obvious or oblique hint.

A principle challenge is inventory management: only six of the 23 total objects can be carried at any one time. Several traditional objects (vital to other adventure games) are present, but not necessary to this one. Most have a specific application, while several objects have multiple uses, including one which must be left in a general area in anticipation of its use later in the game. As the game involves two distinct play areas, and returning from the second isn’t overly practical, the sequence of property management thus becomes an interesting blend of logic, trial, and error.

While there is nothing novel or innovative in The Blade of Blackpoole, and its storyline and graphics are only so-so, it is imaginatively done and fun to play. The overall difficulty level is slightly on the tough side; ideal for average adventurers, not too tough for novices, and yet presenting experienced adventurers with an interesting and enjoyable diversion. All in all, The Blade of Blackpoole is Sirius’ best adventure to date.

G.F.S. Sorceress

Company: Avalon Hill
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING C
PUZZLE QUALITY C
TEXT QUALITY D
GRAPHICS QUALITY N/A

DIFFICULTY C
EASE OF USE D
VOCABULARY C
SAVE/RESTORE C-

ORIGINALITY B+
DOCUMENTATION A
HOLDS INTEREST? B
VALUE FOR MONEY C

G.F.S. Sorceress is a science fiction, all text adventure game that is the first of the “continuing saga of Joe Justin and Selena Sakarov” aboard the spaceship G.F.S. Sorceress. This time, they meet in outer space where Justin has been set adrift in a “regenerating” spacesuit, after a trumped-up court martial, to drift alone for the rest of his days. Seems that there are meteors stuck in the ship, both fore and aft. You must make appropriate repairs before using the ship to find the evidence needed to prove your innocence.

An excellent story provides the background for the game, so it’s unfortunate that the game doesn’t live up to the expectations it creates. As it is, only the interest generated by the writing will keep most users glued to the machine to see how everything comes out. The game plays with painful slowness, like an Applesoft program with SPEED#5, which is especially surprising since the Assembly language program loads quickly and is not disk interactive. Coupled
with this drag is a seemingly endless opening, closing, and entering bunches of colored hatches. There are no clues in the game itself; they are all in the writing. This approach is carried to sad excess, as all the evidence you will find is four books, each of which only refers to a particular part of the “Officer’s Manual,” one of the two background documents.

After getting the Sorceress in fighting and flying trim, your task takes you to five planets, all conveniently named by the only destination buttons on the Control Console. Since Earth doesn’t count until the very end, you can hit the other four in any order that appeals to you. As a hint, save Altair for the last. In each planet, there are about seven locations, all essentially strung in series so that mapping is not required. Two have only one object to find, while the third has four, all in plain view and relatively easy to retrieve. Altair’s puzzle is different and well-done. You will probably have to make the trudge from the ship several times, each through the abominably slow-move process.

Only one game can be saved to a scratch disk, but it can be made or called at any time; about three would have been just right. The vocabulary and parser are barely adequate for the minimal demands placed on them. The ending comes abruptly when you and your little black book return to Earth for a re-trial and a big assist from Selena (who has only been seen in a handful of earlier moves). All in all, the game would have been a real dud were it not for its story; nevertheless, I look forward to the next of the series.

Telengard

Company: Avalon Hill
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING
PUZZLE QUALITY
TEXT QUALITY
GRAPHICS QUALITY
DIFFICULTY
EASE OF USE
VOCABULARY
SAVE/RESTORE

F
F
C–
F
C
F
M/A
D

ORIGINALITY
DOCUMENTATION
HOLDS INTEREST?
VALUE FOR MONEY

F
F
B
D

Telengard is a black-and-white fantasy adventure game that has taken the best elements of Wizardry, Ultima, and Temple of Apshai—adding nothing new—and squashed them into a 110-sector Applesoft program. The basic concepts survived, making for a decent game, but the implementation is atrocious. Your character is an “X” on a text-page approximation of Apshai’s overhead view of the dungeon, with your attributes on the right. The symbol # marks the monsters, three cryptic letters mark various features, and $ . . . well, you know. There is no stated goal, although the writers try to help you create one. Just head for the dungeon, whomp monsters, get whomped, find gold and magic objects, and gain experience—as well as spell levels—so that you can go and whomp some more. You’ll get killed often at the outset, but it’s easy to build yourself into fighting shape by sitting below an inn and letting the monsters, gold, and magic objects come to you. Then pop up and save your character at the inn, where your hit and spell points are restored. The only trouble here is that you are then kicked out of the game.

Telengard was apparently written for a different computer; no one would ever have designed it this way for an Apple. No typing of any words is required. The command keys use A, W, D, and X for West, North, East, and South. The program also uses both P, H, S, and Control P, H, S. There are six levels of magic spells and six spells per level. You cast a spell by pushing a number for the level and then a second number for the specific spell. These curious mixtures prevent the commands from ever becoming automatic. The game is played in real time. If you don’t move fast enough, a move-in-place is made for you, giving monsters a free shot. Even the Help command display disappears after a certain time. If you are in combat and you aren’t fast enough, the monster gets a free shot. If you evade combat, the computer moves you randomly away.

While the game plays in real time, the worst part is that you must wait an eternity for the move cursor to return. The game is very slow. The Apple’s one-key rollover can really confuse you. Following each move, the screen clears, is slowly redrawn, with you in your new location, and the move clock starts. These unnecessary complications make the quasi-mandatory mapping of the various levels difficult. For that matter, getting the timing down to play this game just isn’t worth the effort. However, the packaging is nice.
Queen of Phobos is a black and white Hi-Res adventure game in which the object is to board a long-lost Martian spaceship and retrieve the legendary golden mask of Kuh-Thu-Lu. You must find it and escape with it before one of the four looters (who destroy your spacecraft when they board) can ambush you. If you’re clever enough, you can (and should) get them before they get you.

The puzzle content is interactive, of sufficient quantity to maintain interest, and is amenable to a logical solution (except for guessing which of the many weapons will work on each of the looters). The disk interactive graphics are drawn very rapidly and are toggled off by pressing Return and entering an all-text split-screen mode. This mode is nearly instantaneous, and is recommended if any nut (like this reviewer) wants to map out the 100+ stateroom maze, which must be traversed. Properly mapping this game can be as interesting as solving it; “North” is always in the direction of the center of the ship— which is round. If you are not inclined to mapping, however, a map through the maze is available for the finding.

While several key objects are always found in fixed locations, the majority are randomly placed for each new game. The objects are generally found in the 39 room periphery, and none are ever in the maze; should the randomizer place a key object in the ship’s five room central area, the game can become involved. To avoid this problem, consider making several “new-game” starts to develop a map of the periphery and a list of the randomly placed objects. Until that is done, there is little need for the save-game feature, which will save one game to a scratch disk, and is unusually fast in the saving and restoring process. The vocabulary is adequate for the game, with clear responses to unknown words.

Queen of Phobos continues Phoenix Software’s fast acting, nicely paced adventures, and is accurately rated by them as being of average difficulty. However, it is above average in quality and implementation. Beginners will find its logic easy to follow, while experienced adventurers will spend an enjoyable Saturday in solving the puzzles and drawing the complete map.

Sherwood Forest is a Hi-Res fantasy adventure game aimed at the beginning to intermediate adventurer. It’s Robin Hood’s wedding day, but several puzzles lie between your shooting off to the Honeymoon Suite with the fair Maid Marion. Plot line and text displays aren’t the long suits of this game, but it is one of the more professionally implemented to come along for some time.

The Hi-Res graphics are average in artistic detail, but unusually colorful, and with nice touches of eye-blinking animation. The most significant touch is the almost instantaneous scene switching and color fill time. These are almost as fast as the screen change of a text adventure, a mode also available in Sherwood. The command parser supports multiple words, but use of two words will easily handle all puzzles, so don’t try to be too fancy. The save game implementation is excellent; up to ten scenarios may be quickly saved or called in from a scratch disk, but best of all, it provides a two-drive option. The only problem I encountered was in coming up with the word “insert,” over “get,” “put,” “place,” “set,” or “drop.”

Sherwood Forest moves quickly on several paths through its compact, thirty-eight location, mazeless map. The puzzles aren’t too tough, but are cleverly interactive and have several amusing twists. The authors have humorously anticipated some “wrong” answers. It will be necessary to crisscross from one side of the map several times to unravel the sequence of puzzles.

Phoenix’s rating of 3, as being of average difficulty, is slightly overstated. The game is excellent for the beginning adventurer and youngsters, and yet is clever enough to maintain the interest of more advanced adventure aficionados.
**CRYSTAL CAVERNS**

**Company:** Hayden Book Co., Inc.  
**Language:** Integer & Assembly  
**Hardware Requirements:** 48K Apple II or II+ w/16K Card

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Crystal Caverns is an all-text adventure in which you become an Apple Caverns Estate Landlord after finding 16 treasures in and below an old Victorian Mansion. There is no true plot, but the text is imaginatively stimulating and a pleasure to read.

Generally, the puzzles are not too difficult, once you have found them. For instance, there are three places to dig - just look for the likely spots. If you're carrying the right tool, you may think some of the puzzles are too easy, but if you DON'T have the right object, the response is simply, "You can't do that;" hints aren't exactly too abounding. On the other hand, useful objects do abound, and while most are used but once (only one was found for which there was no use), three are used twice, and one is used three times, making inventory management a bit tough at times.

Most puzzles are mildly interactive, and there is one, associated with getting the computer up and running (without crashing your disk) that is a masterpiece. The printer output that you end up with is anticlimactic, but at least you will have a map of the 16 room maze, which isn't as logical as the rest of the map, and could be drawn without the computer's help. Generally, mapmakers will have a ball with the 122 rooms (excluding the maze), which provide an interesting and necessary challenge to this game.

Although disk interactive, the delays are minor and do not interrupt the flow of the game. Three save-game scenarios can be quickly made to or called from the disk at any time. Also, for a pleasant change in these games, you have to sort of work hard at getting killed off (like jumping on the rickety bridge - twice). Together with the excellent text, these features make Crystal Caverns the type of an enjoyable experience in escapism that continues to keep good all-text adventures so popular.

**CASTLES OF DARKNESS**

**Company:** The Logical Choice  
**Language:** Assembly  
**Hardware Requirements:** 48K

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Castles of Darkness is an uninspired and humorless Hi-Res adventure game that moves ponderously and develops even more slowly through its 85 locations. The object is to overcome the might of the evil wizard, Grinnacht, by discovering the power behind his curse. There are 85 rooms in two castles to be explored; some with treasures, others with fixed-position monsters or clues, and many with nothing at all. When all is done, you will also have amassed 200 points and incurred sore fingers from constantly typing all the letters of the words like "explore" and "inventory". Finger fatigue isn't helped any by having to search for acceptable verbs that are recognized by the game, despite its contention that there is a 200+ word vocabulary.

There is a degree of animation and an occasional spoken word, like "beware", but the graphics leave much to be desired: rooms are almost unchanging in form and content while objects are of microscopic size, requiring constant disk interaction and at least 13 seconds to move from one location to the next. The option of saving up to 7 games on the disk at any point during play is nice; however, this feature is something of an overkill, in that one really has to work at getting annihilated. On the other hand, a saved game can only be restored at the very outset of the contest, after going through the lengthy startup cycle. The worst feature of this adventure is that on entering each new location, five lines of text are displayed at the bottom of the screen, one more than can be directly seen; thus, an "ESC" is needed to flip to the text mode in order to read the description.

The combination of slowness, limited vocabulary and response choices from the computer overshadow a rather good puzzle design. A clue sheet can be purchased for $2.00, but a list of recognizable verbs would help much more
THE CURSE OF CROWLEY MANOR

Company: Adventure International
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING D PUZZLE QUALITY D TEXT QUALITY D GRAPHICS QUALITY B DIFFICULTY B EASE OF USE A VOCABULARY A SAVE/RESTORE A

The Curse Of Crowley Manor is a gory and humorless Hi-Res mystery adventure with the emphasis on the supernatural. As Inspector Black, you start in your Scotland Yard office (from which you cannot leave until the phone rings). You are summoned to Crowley Manor by an officer (later found gruesomely mutilated), to investigate the murder of Lord Crowley.

The graphics are distinctive, crisply drawn, and colorful, but are not overly artistic. From any Hi-Res display, the next keyboard entry flips the screen to an all-text page, which shows the current six item inventory as well as a description of the location and a list of visible objects (those which can be manipulated and don't appear on the graphics). This technique speeds the display time, but takes some getting used to since there is no text history as to what was just tried while searching for a valid combination of words. Any keyboard entry, even one resulting in the incomprehensible, all to often seen, "Huh?" flips you back to graphics. While the game's puzzles aren't difficult per se, finding a combination that elicits a response is frustrating and tough.

Crowley alludes to having a dynamic parser and an extensive vocabulary, making it my turn to say "Huh?" The parser does allow for multiple commands and full sentences; in some cases, it demands them. When facing a plywood wall, "Chop hole" gives the response, "Huh?" so try "Chop hole in wall," and "Get (don't Take) The Golden Key (not Key)." In effect, Crowley is a guessing-game where it is all too easy to get stuck at one location, looking for THE word combination. There are no alternative or parallel aspects to work on, look at, or from which to gain additional information. Fortunately, there's a good save-game feature minimizing the aggravation of oscillating between one command, getting killed, and having to restart. A single save-game position can be made to or called from the protected disk at any time, even after being killed off or torn apart.

A.I. should take a page from their Pirate's Treasure documentation and hint sheet, and expand the internal documentation which does list a few of the acceptable words. The disk also has another A.I. demo and a four color bar calibration page to adjust your set to properly reproduce the 108 colors claimed. After considerable cranking on the color, hue, and brightness controls, two TV's and a color monitor all had their turn to say, "Huh?"

ADVENTURE IN TIME

Company: Phoenix Software Inc.
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING A PUZZLE QUALITY A TEXT QUALITY B GRAPHICS QUALITY N/A DIFFICULTY C EASE OF USE A VOCABULARY B SAVE/RESTORE C

ADVENTURE IN TIME is a novel adventure game which involves time travel, a helpful robot, and an interesting but not too difficult scenario of puzzles. The all-text, split screen display reacts quickly to commands, and is crisp and neat in the mold of Scott Adam's earlier games. The object is to locate the bad guy, Nostradamus, who is somewhere in time, and kill him before he can assemble the ultimate weapon and destroy the world.

The almost 60 mappable locations are split into five areas, four of which are set in different time periods. By using well-written descriptions, the player is partially guided through the sequence of locations. There are no mazes, but there are traps and puzzles that will keep an experienced player busy for several hours. Phoenix classifies their games in Novice, Rookie, Average, Experienced and Expert categories. Adventure in Time is labelled as being for Experienced Players, but it is by no means too difficult for beginners.
Computer Ambush is a vastly improved version of one of the first Apple war games. As before, the game pits an American and a German infantry squad of up to ten men against each other in a devastated French village during World War II. Five single games (with the computer commanding the German troops), six two-player games, and a free-form scenario are now provided. (The sequence of the original game was 3-3-1.) All the games except for the first single one (NCO Training) prompt you to select the number and deployment of the troops. Strategic Simulations, Inc. makes recommendations for both in all scenarios.

At the beginning of each turn, you are prompted to specify the number of time points (one to 250) for that turn. Each time point is equivalent to 0.1 second of "real-time" action. A series of orders are given to each squad member; each action requires a specific number of time points to execute. Once both sides have defined their orders, these are executed against a constant time base, permitting simultaneous action to take place. You can control the degree of difficulty by using "unlimited" or "blind" visibility—the latter involving a complex set of probabilities—and by seven different performance characteristics for each man.

If this review sounds familiar, it's because up to this point it's very similar to the initial 1981 review. The packaging, logo, graphics displays, music, sound effects, and all of the old commands are identical to those of the original version. For that matter, the game itself is identical, except for several added frills. The principle difference is that this version is much more playable due to a faster resolution of the orders by the computer. While the original version took at least 5.5 minutes for six men to execute three seconds of action, the new version breezes through the same three seconds in twelve seconds of computation, no longer interrupting the game's continuity. It is easy to become—and to remain—interested and involved with your men and the tactics. The new documentation, better organized and better written, has more detail and examples. Nevertheless, it is not easy to follow, for the game is complex. The documentation should remain close at hand for at least the first few games. Despite the improvements, several confusing factors remain. For example, there is no mention of any difference between a rifle, an automatic rifle, and a machine gun regarding different rates of fire, although different accuracy and weight factors are specified.

You may save a game position at the start of each turn. Prior to that, you may create a customized squad, complete with names of your choice. A disk management menu at the start of a game allows you to initialize a save-game disk as well as to catalog and delete games or squads from the scratch disk. The characteristics of the squad taken into battle may be dumped to a printer for reference during the game. New commands, such as dropping a weapon or looking for and getting a dropped item, have been added. Despite the new features, the game has a few weaknesses. One is the irksome necessity of having to order a man to reload his weapon and fall down before starting to crawl. Neither has the original, unsatisfactory conclusion been changed. After the simple text announcement that a certain side has won, it is possible to review the last turn, but there is no information as to the status of the computer's men. This is so despite a major emphasis on giving you a feeling for all combatants as individuals rather than as faceless opponents.

The game is well worth the time needed to learn it. Despite a few remaining quibbles, the degree of improvement in this version of Computer Ambush is nothing short of miraculous. What had been an impossibly slow game with an excellent concept is now interesting and challenging, with that same concept brought crisply to life.
SHATTERED ALLIANCE
Company: Strategic Simulations Inc.
Language: Applesoft, Assembly
Hardware Requirements: 48K

OVERALL RATING  C+
GAME CONCEPT    C
CREATIVITY       B
GAME DEPTH       B

CONTROLABILITY   B
SKILL INVOLVED   A
CHALLENGE        B
GRAPHICS         C

ERROR HANDLING   A
DOCUMENTATION    C
HOLDS INTEREST   B
VALUE FOR MONEY  B

SHATTERED ALLIANCE is a tactical war game simulation pitting groups of mythical tribes with varying capabilities against similar opposing forces. Winning is less a matter of destroying opposing forces than it is breaking the opponent's unit and army morale through combinations of encounter results. In many regards, this game is similar to a scaled-down version of SII’s “Operation Apocalypse”. SHATTERED ALLIANCE is in a completely different setting, however, and uses a new move allowance concept, Time Points, as an alternative to incorporating any number of squares in a single move for different types of units.

This Time Point concept is both the strength and weakness of this game. Its strength lies in using this approach to speed-up the true game and, perhaps, making for a finer degree of modeling. Its weakness requires the player to react to a near real-time game, demanding faster reflexes, knowledge of the keyboard, and total concentration on the tactics and strategy being used. A greater weakness is that it leads to one-on-one combats, in which adjacent forces provide neither offensive nor defensive support. Time Points definitely take considerable getting used to, and according to SSI, will be the basis of a series of programs yet to come.

SHATTERED ALLIANCE features four scenarios for one or two players; well-done shape tables and text characters, using combat units which are difficult to relate to and differentiate between, especially on a B&W display; two map scales, both of which are adequate but very uninspiring; and a Demo game that is very difficult to follow, even after a thorough study of the documentation, as it seems to go on, and on, and on. The extensive documentation is light on game specifics beyond describing the screen displays and symbology, examples of combat situations, and information that would make the game more playable. It is heavy on mood-setting “background”, as well as detailed descriptions of the various move and factor charts and rule Errata, both of which are included in the program and on a separate card.

There is a consistent emphasis on J.R.R. Tolkien-type characters, names and combat situations which Bilbo and Frodo fans will find both unsatisfactory and insulting. The game is difficult to learn to play with facility, perhaps more so than “Apocalypse”, which is a better albeit more expensive game. Once learned, however, it perhaps is the fastest playing war game yet introduced.
### NAPOLEON’S CAMPAIGNS

**Company:** Strategic Simulations  
**Language:** Applesoft and Machine Language  
**Hardware Requirements:** 48K

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**Department:** Entertainment  
**Sugg. Retail:** $59.95  
**Availability:** 7  
**Disk or Tape:** Disk

*Napoleon’s Campaigns: 1813 and 1815* is an historical, strategic simulation war game for one or two players. Each player is in command of a grand army, with units divided into corps. Communication between the corps is implemented through a dispatch system. Two scenarios are offered, Waterloo and Leipzig, each with its own Hi-Res map display, map board, and counter sets. The monitor display has a Zoom option which allows you to “zoom in” to a particular area for close up views. The screen graphics, while good, could use some improvement; but the graphics of the mapboard, counter, and rule booklet are very nice indeed. There are variable troop movement allowances, weather effects, and hidden movements to add to the realism of the conflict. Games in progress may be saved to a scratch disk for resumed play later, a welcome feature since it takes a number of hours to conduct a campaign.

Strategic Simulations claims that this game “set a new standard of historical realism” on the Apple. It does achieve this, primarily through the implementation of the dispatch system for issuing orders to your units. An unbroken “line of communications” must exist between the HQ command post and the particular unit in question to provide a good chance that your message will get through. Even then, there is no guarantee. It may take several turns before a dispatch reaches its destination, by which time the corps may have moved. Not only may messages be lost, there is the possibility as well that the corps commander will ignore the orders. This is an effective, accurate historical touch. Whether or not the orders are implemented enhances the realism of the contest, the “fog of war” atmosphere under which you play.

Book-keeping is a necessity, because you must keep track of previously issued dispatches. This, coupled with the rather lengthy computation time of the program itself, makes for long sessions of war. The Apple, incidentally, when pitted against the solo player, does not seem to experience the same communications difficulties and so plays an excellent game. In effect, it cheats, so be warned. You must be considerably more cunning to overcome its advantage in this regard.

The rules could stand to be re-written, since they are terse and unclear in spots. If you are the type who likes to get involved in the action, then this game may prove tedious: as in real life at the command post, there are considerable stretches where you feel more like a spectator that a participant. But, taken altogether, *Napoleon’s Campaigns* is an involving implementation of a strategy game from an interesting period in the history of warfare.

### FRONTLINE

**Company:** Sublogic  
**Language:** Assembly  
**Hardware Requirements:** 48K

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**Department:** Entertainment  
**Sugg. Retail:** $29.95  
**Availability:** 6  
**Disk or Tape:** Disk

*Frontline* is a real-time war strategy game for either one or two players. In some respects it plays like an arcade game, but the similarity is limited. You command three regiments of infantry, anti-aircraft pieces, and airplanes set up along the enemy’s frontline. Your troops and guns are directed to attack the enemy in each battle frame lasting less than three seconds. Orders are given with three columns of keyboard keys. One key directs an infantry unit to fire on the enemy, another launches a plane; one key sends the aircraft on a bombing mission across the line, and the last fires the anti-aircraft guns on an attack plane. Only one order can be given per frame or round. Thus you must develop a strategy to maximize your resources. While you don’t actually command a particular unit to fire on a particular enemy, you do command the front in a general way.

There are definite probabilities of success and failure in any conflict. If you can breach the front in any zone you will be certain of victory. The computer opponent can be fearsome, but with the several difficulty levels even beginners can enjoy this game. It is certainly less complicated than many of the classic, set-piece war games, and is a fair to good introduction to computer wargaming.
TACTICAL ARMOR COMMAND

Company: Avalon Hill
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B
GAME CONCEPT B+
CREATIVITY B
GAME DEPTH B
CONTROLLABILITY A-
SKILL INVOLVED B
CHALLENGE B
GRAPHICS B
ERROR HANDLING B-
DOCUMENTATION B+
HOLD'S INTEREST? B
VALUE FOR MONEY B

Tactical Armor Command places you in command of a WWII armored combat team whose units are selected from German, Russian, American, and British troops. Your opponent is the computer (Major Al Logarithm) or another player; any two nations can fight one another. Over forty tanks, assault guns, field guns, and infantry units have been rated for various factors, such as movement capability, acceleration, gun traverse, and armor thickness. The battlefield employed for all battle scenarios measures 2,000 meters by 1,800 meters and consists largely of open, grass-covered plain interrupted by small wooded tracts. A single game turn, which represents about 30 seconds of real time, proceeds through a search phase when visual sighting of both friendly and enemy units are reported, and a maneuver and fire phase when units move and fire their weapons.

Interestingly, pressing four keys (the cursor Control diamond), determines the direction that vehicles and infantry travel. After the opponents complete both phases of a turn, the computer resolves combat and reports results. After becoming familiar with basic play, a commander can employ special combat tactics, such as over-runs, close assaults and firefights, as well as implement various defensive measures, including the detonation of smoke shells, the placement of mines, and the construction of improved defensive positions.

Because of its fast-paced action, diversity of movement and combat situations, and good graphics, the game is very appealing. Unlike most similar games, even those uninitiated in the art of war games can easily master the procedures and rules of play. I was able to complete most games in fewer than several hours (or they could be saved to disk for subsequent play). The game's worse feature is the failure to inform the commander that pressing the next key will set an armored vehicle in motion. Unfortunately, you must anticipate this in the sequence of prompts. It is maddening to have your tank unexpectedly lurch forward without you at the driving controls. This feature can seriously interfere with tactical play and unduly influence the outcome of the game. Despite this shortcoming, T.A.C. is worth owning and can be recommended particularly to the arcade player who wishes to sample the wargame genre.

PURSUIT OF THE GRAF SPEE

Company: Strategic Simulations
Language: Applesoft
Hardware Requirements: 48K Apple II

OVERALL RATING B-
PUZZLE QUALITY C
TEXT QUALITY B-
GRAPHICS QUALITY B-
DIFFICULTY B
EASE OF USE B+
VOCABULARY B
SAVE/RESTORE N/A
ORIGINALITY C-
DOCUMENTATION D+
HOLD'S INTEREST? C
VALUE FOR MONEY B-

Pursuit of the Graf Spee is a World War II war game simulation. It offers four levels of difficulty, and you can start the game on one of two dates. The object of the game is to catch and sink the German “Pocket Battleship” Graf Spee by December 25th. It can be played by two people against each other, or by one player versus the computer. When playing the solitaire version of the game, you are in command of the British Navy attempting to corner and destroy the computer-controlled Graf Spee. In the two-player mode, you have your choice of who commands the English and who the German forces.
Each player is equipped with a data card. Among other things, this card contains all the strategic information about the ships in your navy. This information includes the hull strengths of the various warships, deck armor, size and strength of any guns, and structural strength. Each ship has a maximum fuel capacity, and registers a current fuel amount. You have to watch this carefully, since it’s rather embarrassing to run out of fuel in the middle of the Atlantic Ocean.

The game takes about two hours to play the solitaire version, and at least four hours to complete a two-player game. Pursuit of the Graf Spee is marked as an intermediate level game; but once it is learned, a beginner will have just as much fun as the more advanced player. To be able to carry out a good campaign you will need to read the baffling instructions very carefully, then play the game once or twice to get a feel for it (notice how the ships move, and how the computer reacts to certain moves). As you improve, simply increase the difficulty and/or lessen the time period allowed in which to accomplish your mission.

If you think the odds are a little unfair (there are 12 British ships against 2 German ships), take a closer look. The British must catch the swifter German ships, and the strengths of the juggernauts offset the numbers. In a battle between three British ships and the Graf Spee, for example, the Graf Spee sank two of the three and crippled the third while the Graf Spee suffered only minimal damage.

On the whole, Pursuit of the Graf Spee does a creditable job of carrying on the Strategic Simulations’ war game tradition. But the game’s instructions leave a lot to be desired. They are unclear regarding some options, and assume in places that you already know how to play the game. The documentation is the weakest point of this package.

**TIGERS IN THE SNOW**

** Company:** Strategic Simulations Inc.

**Language:** Applesoft & Assembly

**Hardware Requirements:** 48K

**OVERALL RATING** | **CONTROLABILITY** | **ERROR HANDLING**
---|---|---
C | D | B

**GAME CONCEPT** | **SKILL INVOLVED** | **DOCUMENTATION**
---|---|---
C | B | C

**CREATIVITY** | **CHALLENGE** | **HOLDS INTEREST**
---|---|---
C | C | B

**GAME DEPTH** | **GRAPHICS** | **VALUE FOR MONEY**
---|---|---
C | B | C

**Department:** Entertainment

**Sugg. Retail:** $39.95

**Availability:** 7

**Disk or Tape:** Disk*

TIGERS IN THE SNOW is a Regimental to Divisional level war game simulation of the 1944 Battle of the Bulge. It offers two rather similar scenarios, differing in length and victory conditions; either or both sides may be played by the computer, and one or two players may compete. The familiar SSI hex grid system and Move Point concept are back, somewhat simplifying the learning process. The game features variable weather, supply and fuel conditions, which influence the Move Point allowance of each unit. Happily, there is no need for the opponent to ever “turn away” from the screen. It also involves artillery support, reinforcements, optional attacks on each unit by any or all adjacent forces, the probability of independent command actions overriding your orders, and a save game option.

TIGERS is one of the faster war games to come along and is only disk interactive between turns. The game speed is also a problem, in that the status displays flash by too rapidly for planning or understanding. The “hold action” commands of “Operation Apocalypse” are sorely missed. Indeed, there are only three keyboard commands other than the direction numbers, and Yes or No responses. TIGERS is not as tightly modeled as some of the SSI’s other games, making extensive use of the randomizer which leads to a wide range of battle results for a given set of tactics.

As with many SSI games, the documentation is very confusing; be sure to read the “Apple Player’s Aid Card” at least twice before even opening the documentation! It is especially poor in defining the meaning and interactions of the various combat commitments that the player is called on to make. TIGERS has a variety of other aggravating flaws. One is not able to select the sequence in which the units are moved, check the status or location of units, control the air power when it is available. Symbols to name the historic and game significant towns, for example, could have been easily added.

Compared to “Operation Apocalypse”, TIGERS IN THE SNOW is almost as difficult to learn, but is much faster in set up time and response. It is also easier and simpler to play. It is not as versatile or interest-holding as the more expensive “Apocalypse”; however, it is a superior war game to the equally priced “Computer Conflict”. As a minimum, the simplicity of play permits war gamers to enjoy and concentrate on the tactical planning associated with this simulation.
VC
Company: Microcomputer Games (Avalon Hill)
Language: Applesoft & Assembly
Hardware Requirements: 48K ROM Applesoft

OVERALL RATING C
GAME CONCEPT C
CREATIVITY C
GAME DEPTH D

Controlability C
Skill Involved C
Challenge C
Graphics C

Error Handling C
Documentation C
Holds Interest? B
Value for Money C

VC is a Hi-Res war game of the same genre as Avalon Hill’s previous war games. Hi-Res shape table graphics, some sound, and animation have been added; but it’s still a random, number-happy game that is far from being a tactical simulation as it contends. However, as a war game, it does capture some of the frustrations of the war.

You are in command of ten Vietnamese Republic army units (ARVNs), a U.S. helicopter gunship, and a U.S. artillery unit. You find yourself in the middle of a 13 x 13 element map of Vietnamese straw hat shapes, initially representing neutral civilians, Viet Cong units, or North Vietnamese Army units. While there may be as few as four enemy units at the outset, political recruitment can swell those ranks rapidly. ARVN forces can make friends and allies among the civilians by moving through them; friendlies are marked by a blue straw hat shape with a small “F” dangling on it.

A turn consists of being allowed to move one piece, and, optionally, firing your artillery.

The game ends abruptly, either when half of the civilian population has been killed (i.e., you lose), or when you have successfully dealt with all the baddies. Since games do go quickly, often in as few as ten moves, a save game feature is neither required nor provided. The speed of play is excellent, due in part to the original Applesoft program having been compiled on the otherwise unprotected disk with the TASC compiler by Microsoft.

Contrary to your initial reactions, VC can be beaten (even on the fourth and highest level of difficulty), but it takes strategy and a lot of luck. Watch the screen carefully after your initial move; the “hats” may change, and flashes may permit you to deduce where the VC are hidden among the civilians. While this permits use of your artillery, be sure that you guess right. Should you guess wrong, neutral civilians get shelled and you will lose most of your carefully cultivated allies, while promoting VC successes.

VC will hold your interest, at least until you learn to beat it. Beyond that, however, there isn’t much to it.

COSMIC BALANCE
Company: Strategic Simulations
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B+
GAME CONCEPT B
CREATIVITY B
GAME DEPTH B

Controllability A
Skill Involved A
Challenge A
Graphics B-

Error Handling B
Documentation B
Holds Interest? B+
Value for Money B+

Cosmic Balance is an action-strategy war game whose concept is similar to that of Warp Factor, another game by Strategic Simulations. Cosmic Balance not only allows you to pilot many different-sized ships, it also allows you to design your own style of ship. There are many scenarios for play: a deep-space encounter, a planetary raid, a commerce raider invasion, a dogfight, or a surprise attack. One person can play this game against the computer, or two people against each other. In the first case, playing ship to ship, the game lasts from 30 to 60 minutes. In the second case, also ship to ship, playing time is two hours. You can save the game after every turn; and these easy exits allow you to return at a later time. You can also continue your game after a save, which lets you try a tricky maneuver without losing the game structure you have built up.

There are six technical levels and six different sizes of ships. You pick your level and size. Then the computer assigns an appropriate number of “spaces,” which you use for building equipment, weapons, firing angles, and more. For example, a photon torpedo takes two space units to build. Now you have a photon torpedo, but where does it fire? Well, the ship is divided by 45-degree angles, creating eight firing arcs. After you have paid for the weapons—the photon torpedo, for example—you must then pay for each arc you wish to fire through. Your shield is
also set up with the same arcs. There are up to twelve weapons with which you can fight, as well as up to five ships you can have on your side.

The graphics are average, but they serve the purpose of this game. *Cosmic Balance* is an action game, because it responds visually as it goes through your maneuvers and it fires when you tell it to. It is a strategy game because you plan a very tricky maneuver to set a trap for your opponent. You can coordinate an attack when you are using four or five ships at one time.

If you like competition, you will like this game. No ship is perfect, and it takes more than hand-eye coordination to do well. Winning combines your piloting skills, ship design, firepower, shield strength, maneuverability, planning, and, of course, luck. With this game, you can challenge a friend to a space battle—to the death.

**SOUTHERN COMMAND**

**Company:** Strategic Simulations Inc.

**Language:** Applesoft & Assembly

**Hardware Requirements:** 48K

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*Southern Command* is a battalion level simulation of the 1973 Israeli and Egyptian engagements at the Suez Canal. Two historical scenarios, differing only in the number of turns, and a free-form setup version are offered. All combinations are available for both solitaire and two-player games, with four degrees of difficulty for any scenario. The hex-grid system is unlike that of SSI's new *Tigers In The Snow*. Whereas *Tigers* has but two keyboard commands, other than the six numerical direction commands, *Southern Command* is a button-pusher's delight with over 30 commands, 3 command modes, and 5 movement/combat modes. Other bells and whistles include air-strike and directed artillery fire capabilities, hidden units (ambush time), and lots of scrolling.

The plethora of commands makes SSI's typically hard-to-learn games almost impossible. The documentation helps by starting out with an example of the keystrokes of part of a typical move, but only up to a point. Beyond that, it's typical SSI detail without discussion. Trial and error, and using the command card, are the only ways to learn the control complexity.

*Southern Command* uses the same, excellent menu format not seen since *Operation Apocalypse*, to which it bears a stronger resemblance than to *Tiger In The Snow*. It is exceptionally fast, both in initial setup and in response speed. In fact, the screen reaction speed is so fast (especially during the computer's scrolling and play of the Egyptian forces) that it is impossible to follow or comprehend. For the same reason, the demo game, which runs like a rabbit for over an hour, does little to instruct and much to confuse.

The graphics are very complete and well done, with both a strategic and a twelve-screen tactical display available. The strategic display is useful only to provide a frame of reference regarding which section of the tactical map has been scrolled in. With the exception of the initial Israeli move, combat between adjacent forces cannot be avoided, taking place immediately after the initial move, and being signified by an audible buzz and generalized adjectives (heavy, medium, and light) to describe the relative forces of the opposing units. Thus, it is difficult, to say the least, to determine the relative losses and unit strengths. But then, difficult is the name of this game.
DARK FOREST

**Company:** Sirius Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**GAME CONCEPT**  
**CREATIVITY**  
**GAME DEPTH**  
**EASE OF USE**  
**SKILL INVOLVED**  
**CHALLENGE**  
**GRAPHICS**  
**ERROR HANDLING**  
**DOCUMENTATION**  
**HOLDS INTEREST**  
**VALUE FOR MONEY**

B  
B  
C  
C  
B  
C  
B  
B  
A  
C  
B  
B

DARK FOREST is a Hi-Res game of strategy and conquest designed for one to six players. It is similar in concept to "Global War", but with several new twists. Each player's objective is to find his three hidden treasures by searching the six castles in the land chosen for that game (there are four lands to choose from). Searching a castle will also show the others if one of their treasures happens to be in that castle; naturally, you must have conquered that castle before you can search it. The castles are separated by territories which may also belong to others, and which will have to be overrun by your (hopefully) superior forces.

The similarity to "Global War" lies in the conquest of the territories and in being awarded an extra man for each territory that is under your control at the end of each turn; the difference is in DARK FOREST's far greater ease of play. The reason for this involves a simpler, uninspired map, but one which directly shows just who controls each territory and with what size army. Extensive use of prompts leads a person through each turn to further simplify the play. The strategies are not quite so simple, however; a wide variety is possible with the challenge involved directly proportional to the skill of the opposition.

In the single player game, the opposition is provided by computer-controlled Gruds, militant creatures who are also present in a multiplayer game, only to a lesser degree. The higher of the eight possible degrees of difficulty entail greater activity and involvement by the Gruds, who can be a very aggressive foe. A game scenario can be saved to the game disk following any full turn without the necessity of leaving the game.

DARK FOREST should appeal to a wide age group of players, and is fun for a single player as well. While a few random functions are around to spice up the game, the dominant theme is strategy and outthinking the opponents. All in all, this is a very enjoyable game without any major flaws.
This is certainly the year of the medical game as Strategic Simulations releases a strategy oriented game in which a swarm of deadly meteorites infected with a deadly virus are pelting the Earth. You assume the role of director of the Center for Disease Control where you are in charge of the forces battling the spread of the virulent disease.

During the first phase you must size up the path of the incoming meteor and decide if a rocket should be launched against it. Since you only have three options in any one turn, you can’t just shoot down every meteor. They will eventually overwhelm you. Besides, many of the meteors impact harmlessly over water.

The second phase gives you a chance to inspect the fourteen world areas in detail and administer one of twelve remedies. The arsenal of curative methods available includes interferon, vaccine, X-rays, gamma globulin, gene slice, martial law, and clean suits. Each is effective over different periods of time and at different rates. While none will cure the disease completely or immediately, the object is to keep the disease static. This status prevents the disease from reaching the more contagious airborne, or "pneumonic" level. The area can’t be recontaminated by another meteor strike, and it keeps the virus from spreading to adjoining areas. If you can surround the seriously infected areas by making them static, then you can contain the spread.

If an infected area becomes "pneumonic," then you need to resort to other control methods. You can use cloud seeding, microwaves, aerial fire storms, and in dire emergencies, killer satellites. If things become totally out of hand, you can decimate an entire area by nuclear bomb. Since your final score is based on the number of dead, this is a drastic method and to be used only as a last resort.

The game lasts between fifteen and thirty turns depending on level of play. In the harder levels the disease spreads faster and you have only two options instead of three. Your final score is given between 0 and 1,000 points. There is a save-game option.

_Epidemic_ is an interesting game on a strategic level. It is not played in real-time, so there is ample opportunity to think out strategy. The game has some graphics, mostly maps of the world showing meteor positions before they enter the atmosphere, and one showing the status of the world's contaminated areas. The rest of the game features charts. Overall, the game is entertaining and offers something completely different from the rest of Strategic Simulations' war games.
Tactical Space Games

THE WARP FACTOR
Company: Strategic Simulations Inc.
Language: Applesoft and Assembly
Hardware Requirements: 48K

OVERALL RATING C -  CONTROLABILITY B
GAME CONCEPT C -  SKILL INVOLVED C
CREATIVITY C -  CHALLENGE B
GAME DEPTH B -  GRAPHICS B
ERROR HANDLING B -  DOCUMENTATION C
DOCUMENTATION C -  HOLDS INTEREST C
HOLDS INTEREST C -  VALUE FOR MONEY C

Strategic Simulations has applied its tactical war gaming techniques to a Trek-like encounter in outer space. Your mission is to inflict maximum damage to the enemy; hopefully, without being destroyed yourself. The game has the same familiar feel, strengths and weaknesses of SSI's earlier programs, especially in regard to slow playing speeds.

The dominant element of the game is the management of a tight energy budget, intentionally made rather restrictive. The rules and requirements for this task are extensive, but in order to become a proficient player, they must be learned by experience. Beyond that, a movement phase, including three sets of combat commands, and an interminably long computer movement/combat resolution phase carries you through to the start of the next move. After checking your status, looking at a so-so Hi-Res situation map, it's back to allocating your energy again.

Four solitaire and one two-player scenarios are available, with the player having his choice of 12 types of ships, each with its particular armament, protection, and (to a degree) performance characteristics. The above similarity with the more highly-modeled war games, such as Air Combat and Bismark, ends rather abruptly. The game is a rather long, two-dimensional, outer space "attack" game, but without a save-game option which would have been helpful for avoiding a rather bored feeling that develops after several turns.

If you liked Computer Conflict, you will enjoy this game, but don't expect it to compare with the more highly modeled, and more expensive war games from SSI. Similarly, space freaks, interested in something a little different, will enjoy it; don't look for the whimsy of planets, black holes, stars and related galactic saga trappings. Rather, it's a moderately sophisticated, slow-moving, straightforward game that requires some thought and planning.
The Book of Apple Software

Tactical Space Games

**STARQUEST / STAR WARRIOR**

**Company:** Automated Simulations  
**Language:** Applesoft & Assembly  
**Hardware Requirements:** 48K

**OVERALL RATING:** B  
**GAME CONCEPT:** B  
**CREATIVITY:** B+  
**GAME DEPTH:** B  
**ERROR HANDLING:** A  
**DOCUMENTATION:** A  
**VALUE FOR MONEY:** B

**CONTROLABILITY:** B+  
**SKILL INVOLVED:** A−  
**CHALLENGE:** A−  
**GRAPHICS:** B−

Compared to Automated Simulations’ earlier programs, STAR WARRIOR is more like a Shoot-'em-Up, real-time game (especially at the higher difficulty levels), and seemingly faster paced. It is difficult to beat, while presenting even experienced players with a significant challenge during each new game.

As a futuristic and well-armed space warrior, you have your choice of two scenarios and three types of armored weaponry (plus a customizing capability). In one scenario, your mission is to create a diversion while your unseen compatriot attempts to clandestinely locate and assassinate the tyrannical Military Governor of the beleaguered planet Fornax. In the second scenario, you assume the assassin’s role. In either case, you will have your hands full locating (or evading) nine different types of mobile, armed units, two forms of fixed weapons, and three types of fixed installations, including “Civilian” which is a no-no for your attacks. At your command are three potent forms of weapons, semi-invisibility and the ability to fly, jump and move through four types of terrain, all the while managing a limited energy supply.

The background and the game-specific documentation are excellent, as are the Hi-Res graphics. The commands are sufficiently varied and inclusive to fully control your “destiny,” and make for a very challenging game, even at the lowest difficult level. While bearing strong resemblances to Rescue at Rigel and Dunjonquest, STAR WARRIOR is faster-paced and provides a greater degree of personal involvement.

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**STARSHIP COMMANDER**

**Company:** Voyager Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING:** C+  
**GAME CONCEPT:** C  
**CREATIVITY:** C  
**GAME DEPTH:** B−  
**ERROR HANDLING:** A  
**DOCUMENTATION:** B  
**VALUE FOR MONEY:** C

**CONTROLABILITY:** A−  
**SKILL INVOLVED:** C  
**CHALLENGE:** C  
**GRAPHICS:** B

*Starship Commander* puts the player in command of the USS Ranger in an extremely detailed space combat simulation. As commander, one must manage a crew, navigate, allocate power, maintain shields, and fire weapons at up to three enemy vessels. While lacking any real time urgency in giving orders during battle, the game adds a richness in detail not found in other games of its type.

The game can be played against one to three enemy ships. The computer can either choose the positions and types of enemy, or you can choose them to your liking. All enemy Vegan movements are tracked on a motion detector display. Once close contact is made, the commander has a choice of many options including bluffing them into running away. But the usual method is direct attack. This involves getting a fix on the enemy position, scanning their ships, and loading positrons or torpedoes and firing them. The actual battle is shown from your viewpoint in a perspective Hi-Res display.

The battle is never one-sided. Your ship often takes direct hits and sustains damage. Crew are killed and others have to be assigned damage repair. A map of the damaged ship is displayed to help in your decisions. Energy, especially in a damaged ship, must be allocated to life support, engines, shields, or weapons depending on what is needed at the moment.

All orders are input via the paddle. When a particular order needs to be given, the choice is made by turning the paddle. Only valid choices are indicated, and the selection is made by pressing the button. There is no need to remember obscure order codes which are typed in with other games. In this regard the game is a pleasure to play.
but the slowness in switching between programs on the disk (there is one for each mode: combat, navigation, engineering, etc) makes a slow and tedious game. Yet if a war game player doesn’t mind a slow game if the detail is good, then this tactical game, which requires at least an hour to play, will be worth the time. And if you lack the time to finish, there is a save game option.

Galactic Gladiator is a tactical shoot-'em-up game in which two teams of futuristic aliens battle each other using lasers, disruptors, and hand-held guided missiles. Each team first enters the commands for his gladiators: move, dodge, attack, change, or reload one of two weapons. In the action phase, the first shot goes to the fastest draw — perhaps nailing the key man in the opponent’s attack, and temporarily or permanently putting him out of action. Combat normally continues until a team is eliminated, or surrenders; although some options have a “capture the flag” variation.

The main strength of GG, as it likes to call itself, is its ease and speed of play. Well prompted, single keystrokes define actions for the gladiators, display the options available (which includes a save game feature, as some games can become lengthy), or show a readable set of current attributes. With two opposing players, or with one controlling both teams, the speed of play is pleasantly fast. In a solitary game, there is a noticeable decrease in speed. The computer can be a very formidable foe; the documentation provides some insight on the strengths and weaknesses of the computer’s game, which an opponent may use to his advantage (i.e., to cheat!).

GG features several variations called in during the many-menued, start-up procedure. A player may choose from 6 game scenarios, to indoor or outdoor arenas of three different sizes (with or without grid marks), 15 species of gladiators, 11 types of weapons, and two degrees of armour. It is also possible to merge previously-saved teams. You can also change just about anything you wish, even to the point of creating your own game and monsters.

Either an in-process game, or the victorious team can be saved to a separate disk, initialized from the SSI disk. The otherwise good documentation is weak in describing how to use this feature, which takes a some getting used to, what with all the menues and options. The graphics also leave something to be desired; although exploding characters following a hit add a touch of satisfaction (or dismay). While some shape tables dot your screen, all the sizes and types of the play fields bear a marked similarity to a low resolution display. There is some animation, color, and sound — none being a strong point of GG.

Despite the many variations, GG wears thin after the first several games; there is a certain similarity to all the games, with insignificant variations. One last detail: don’t be misled by the sexy (?), embattled female on the cover; that’s the last you ever see of her!
The authors of Odin wish to offer a program that can teach the intricacies of Othello as well as offer a formidable opponent. Formidable isn’t the word, for this program plays a devastating game of Othello. Fortunately, it offers fourteen levels of play ranging from beginner to super expert, so that players of all skill levels will find it a worthwhile test of ability.

Since Odin had been touted as the definitive Othello type program for the microcomputer, I felt that Odin should challenge the previously top rated program, QS Reversi. Therefore, I arranged a match between the two programs. Although the two programs were run on different micro’s — Odin on the Apple and QS Reversi on the Atari 800 — the similarity of microprocessors made the match even when each of the programs was set on a level that used the same ply (turn) lookahead. They were both set to analyze their moves six full turns ahead. In other words, QS Reversi was on level eleven, one level beneath the highest; Odin played on its level eight, fully six levels below the highest. While it would have taken an Othello expert to analyze the positions as the game progressed, by midgame it appeared to be a virtual tie in both of the games. Both were attempting to secure control of the four center squares while avoiding control of most of the border squares. But in both games of the best out of three series, Odin took a clear cut lead at the end and trounced its opponent by scores of 41 to 23, and 46 to 18.

Othello, in case you don’t know, is a strategy game played on a 8 x 8 board where the object is to control the most squares. Each player must place a colored tile on a square that will trap at least one of the opponent’s pieces between two of his pieces. All of the opponent’s trapped pieces are then “flipped” to his color. The game is simple, but difficult to master.

Odin normally plays against an opponent, but can also be used to monitor play between two players. All input is by paddle, or, for those lacking a game controller, by the arrow and return keys. Turning the paddle moves a cursor on the Hi-res board through all of the positions, or legal moves, and a menu of other options displayed at the bottom of the screen. Pushing the paddle button chooses that move or selection, if it is an option. The menu, unfortunately, is in the center of paddle rotation. Thus, you move from legal moves to options back to legal moves. This is both unnecessary and confusing.

Most of the menu options were designed for educational purposes. EXPECT shows you what the computer thinks is your best move based on look-ahead analysis of its previous turn. SCORES, on the other hand, shows the relative strengths of all the moves open to you in an immediate analysis. This only tells you the relative number of moves to be gained or lost by your next move. If you’re still stumped you can try the MOVE command which will allow the computer to take over your position and make the move. It can teach that even a hopeless looking position has a solution.

Other useful options allow you either to take back your most recent move, or to replay the entire game from the start. The former, although bordering on cheating, does allow you to test different strategies. If you don’t like the results you can take back the move and try something different. You could even use the RESTORE option to take back your move and then have the computer make your move via the MOVE command.

The excellent documentation is well organized; it presents each option in alphabetical order and with screen diagrams. There is a bit of history of the game’s evolution and a good discussion of strategy, based on the computer’s approach to the game.

Odin is the definitive Othello program for both the Apple and Atari computers. Beginners will find it an excellent teacher, and experts will discover it to be a worthy opponent.
QS REVERS! may well be the Othello champion of the Apple II. Although the game hasn’t been entered in tournaments as yet, preliminary bouts against Hayden’s “Reversal” while playing at similar advanced levels based on response times, has resulted in QS REVERS! victories almost consistently. The play is brilliant at times, like two masters sparring against each other. We don’t know why one can beat the other, but this version obviously has a much more efficient algorithm.

The program’s graphics display and input routines are comparable to those of “Reversal’s”. The Hi-Res board is normally visible, but the text page, with its play-by-play listing, can be toggled by control keys. The move-entry routine is foolproof. Only legal moves, which are displayed via a blinking square whose movement is controlled by the arrow keys, can be entered. The computer waits for you to accept its move before allowing you to continue.

QS REVERS!, in addition to offering 12 levels of play, allows you to back up one or more moves so that alternative strategies can be tested. It also offers a tournament entry mode, which requires input for specifying the location of the letter column and number row. One can also handicap either the computer or oneself by giving one or more corners away. One last note: although this program can run on a 32K machine, advanced levels 10-12 require a 48K machine.

The ancient oriental strategy game of Go has been implemented on the Apple computer. The object of the game is to control as much territory on the board while losing as few of your stones (pieces) as possible to your opponent. The strategy is to place stones on the intersecting lines of the 19 x 19 board so as to completely surround one or more of your opponent’s stones without leaving vacant intersections in the closed area. Unlike Othello, a somewhat simpler game, captured pieces are removed rather than flipped.

Stones are placed one at a time on the board by keyboard control. If you make a mistake it can be corrected in the edit mode. The computer and its opponent, or two opponents, take turns. While a two-opponent game is played in silence, the computer will sound a warning if it is one stone short of surrounding one or more of your pieces, and the word “Atari,” an equivalent to “check” in chess, flashes on the screen.

While the game appears simple in concept, it is difficult to master. The number of stones captured is no indication of how well you are doing since the final score is based on the number of vacant points surrounded minus the stones captured by your opponent.

Go is not a very popular game in this country, so it was difficult for me to find a suitable opponent to test the computer’s skill level against. However, I can say that the computer opponent is not dumb, doesn’t fall for traps, and is certainly above the novice level. It is a challenging opponent and teacher for any beginner who has trouble finding a human opponent.
L.A. LAND MONOPOLY

Company: Continental Software
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING  B+
GAME CONCEPT   A  
CREATIVITY      B  
GAME DEPTH     B+

CONTROLLABILITY B
SKILL INVOLVED C
CHALLENGE      C
GRAPHICS       B

ERROR HANDLING B
DOCUMENTATION B
HOLDS INTEREST? B+
VALUE FOR MONEY B

L.A. LAND MONOPOLY is a special Hi-Res adaptation of the familiar game made especially for the Apple computer. Two to six players either create a monopoly game of their choice or play the L.A. version which has local street names, freeways instead of railroads, and chance cards that reflect local folklore.

The create your own game module allows the players to invent their own game for any city or town where they live, whether it be San Francisco, Kalamazoo or Atlantic City. Two different game modules can be saved to the disk for later play.

The game is played on an animated Hi-Res color display board. The dice are rolled on screen, then each player’s token automatically advances around the board. As in the real game one may buy, sell or mortgage properties and houses. The computer acts as banker and keeps track of money, property ownership and rental charges. All standard rules apply although the players may choose variations at the start. In addition, a game can be saved at any time for later play.

The computer has excellent error checking routines for catching illegal transactions. The documentation is thorough and clearly explains all rules. It also includes charts showing return on investment for various properties. Highly recommended.

*NOTE: AVAILABLE FROM ARS PUBLICATIONS AFTER 1/1/84
Chess 7.0 is the definitive chess game available on the Apple and Atari computers. While it is difficult to accurately judge its chess rating, it appears to be at least 1650 or more life points. More important to the user, it has a significantly faster response time than Sargon II and performs well in the end game — a weakness in most other micro-computer chess games.

This implementation of the ancient strategy game is designed both for ease of use and for teaching the player to improve his game. The pieces on the playing board and all the options displayed at the right side of the board are accessed by either a paddle controller, or by moving the right and left keyboard arrow keys. Moves are made by first selecting the desired piece and then choosing the legal move. Confirmation is by paddle button or return key. Only legal moves are shown by the cursor. This is true even if a king is in check and the player wants to move a rook to block it (only the rook's one move that actually blocks the check is allowed). A wrong move can easily be retracted, but once the piece is actually moved, you will have to wait for the computer's response in order to enter the option mode to retract.

This extensive option mode allows you to change levels, set up special problems, play blindfold chess, save games to disk, retract moves, switch sides, replay all the moves in a game, and get advice on your next move. The computer can even play both sides in a demo game, or play one of forty famous chess games from the past. These are all stored on the disk.

The computer can play at various chess levels from beginner to advanced. Response time is important in choosing a level of play. Either time-limited levels or depth-limited levels are available. For example, in the evaluation of this program I used level six — an advanced one — which takes between two and six minutes to look three and six ply (half moves) ahead. Depth-limited levels can range up to eight ply ahead, but this can take from five to twenty hours. There is even a mate finder mode which will look eight moves ahead to solve special end game problems. This too takes several hours. The program does attempt to speed up the response time in the beginning of the game by using an opening library of nearly 4000 moves. This gives it a definite advantage against any beginner.

I tested Chess 7.0 against a chess player with a rating of 1800 life points. The first game was played on level four, which looks two to four ply ahead, and has an average response time of ninety seconds. The player found the program to be a good intermediate opponent with a sound but limited strategy. The computer obviously wasn't looking far enough ahead to anticipate moves; however, it made no obvious blunders. The second game was played on level six, which has an average response time of four minutes and looks three to six plays ahead. Using the Dutch defense as its opening, the program proved a very challenging opponent. It was virtually a tie throughout the five hour ordeal. The player finally developed a one pawn advantage by endgame, but because the passed pawn was a rook pawn, it nearly resulted in a drawn game. The computer played exceptionally well. My only complaint was that it still took four minutes to respond to an obvious move, and therefore the game play was unduly slow.

The program comes with excellent documentation. It is logically presented, has clear explanations and diagrams, and offers extensive coverage of the game's history and strategy, and the computer's programmed strategy. Both experts and beginners will find Chess 7.0 an exceptional chess program, both as teacher and opponent. It is certainly the best chess program that I have seen for any microcomputer.
SARGON II
Company: Hayden
Language: Machine
Hardware Requirements: 48K

OVERALL RATING A
GAME CONCEPT A
CREATIVITY B+
GAME DEPTH B+
EASE OF USE A
SKILL INVOLVED A
CHALLENGE B+
GRAPHICS A
ERROR HANDLING A
DOCUMENTATION A
HOLDS INTEREST B+
VALUE FOR MONEY A

SARGON II is one of the best and most powerful chess programs available for the Apple or any other microcomputer. This game and its earlier version have won most of the microcomputer chess tournaments since 1978. Only recently has a Z-80, CPM-based challenger beaten it. (See “Mychess” review.)

SARGON II offers six levels of play, an excellent Hi-Res board display, the ability to set up chess problems, and a kibitz mode for players who need a suggestion for a best move. The computer’s response time is not exceptionally fast on the higher levels of play. While the first level of play takes only 20 seconds, very advanced levels take an hour or more. However, most advanced players would be humiliated at levels with a response time of from two to six minutes.

The program is very easy to use. Initially, the text page and the board can be toggled by the ESC key, even in the middle of a move. Chess notation is not standard; however, it is perhaps simpler for beginners. The board is lettered horizontally (A-G) and vertically (1-8). Moving the king’s pawn two spaces is accomplished by entering E2-E4. Although no hard-copy of your moves is made available, the last 20 moves are always displayed on the text page.

SARGON II is a very worthy opponent for any chess enthusiast. It is currently rated at 1400 life points. Because of its style and ease of use, it has to be rated as the finest chess program to date for anyone with a standard Apple.

CHECKERS
Company: Odesta
Language: Machine
Hardware Requirements: 48K

OVERALL RATING A
GAME CONCEPT B+
CREATIVITY B+
GAME DEPTH A
CONTROLLABILITY A
SKILL INVOLVED A
CHALLENGE A
GRAPHICS A
ERROR HANDLING A
DOCUMENTATION A
HOLDS INTEREST B+
VALUE FOR MONEY B+

Checkers is an excellent checkers game for the Apple. It has 16 levels of play, and is suitable for both novices and experienced players. It has very nice graphics, and utilizes game paddles for movement of the board pieces. The options are numerous. For instance, the program plays against itself, you can turn the sound off, ask for advice, choose a two-player mode, take back a move, and utilize a replay feature which allows an entire game to be replayed move by move. The lower levels of play are made challenging by the speed of play and the seeming infallibility of the program. The higher levels of play take geometrically longer time for a move (about 3 seconds a move at level 5). A feature provided for the true expert (or for the artificial intelligence experimenter) is the ability to change certain parameters that the program uses for decision making.

The program is not without fault. One feature omitted is a save-game option. This could be especially useful at the higher skill levels. The price is also a bit high for the average checkers dabbler. For the serious player, though, or for someone serious about learning the game, this program is excellent, and could be the definitive checkers game for the Apple.
From Quality Software Co. comes a “Quality” Backgammon Game. The Hi-Res Graphics are very good—response time and error checking are also superior. Quality Software makes no claims that Fast Gammon plays an expert’s game, and it doesn’t. Overall, it is an excellent learning program for beginners to average players, and will provide challenge and practice for better players. Although it has a strong midgame, it has a weakness in its end game. Its major strength is its speed of play. One nice built-in practice feature is the ability to replay a game with the computer repeating its previous moves.

MICROGAMMON II

MICROGAMMON II is an improved version of Softape’s original Backgammon game. Both the user interface and the graphics have been greatly improved. Playing ability compares favorably to “Fastgammon”, with Microgammon’s design approach involving use of the doubling cube.

Perhaps its best feature is its ease of use. Keying the space bar shifts a diamond cursor over your legal moves only. Entering the value of the die from the keyboard actually causes the piece to shift. However, the cursor always appears on the piece just moved so that one may have to shift it almost completely around the board in order to move a second piece.

Moves can also be taken back if you change your mind before your turn is over.
### 3-D SKIING

**Company:** Continental Software  
**Language:** Machine Language & Applesoft  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>C+</th>
<th>CONTROLLABILITY</th>
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<td>C</td>
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<tr>
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<td>CHALLENGE</td>
<td>C</td>
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<tr>
<td>GAME DEPTH</td>
<td>C-</td>
<td>GRAPHICS</td>
<td>C-</td>
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**Error Handling:** N/A  
**Documentation:** C-  
**Holds Interest?:** C  
**Value for Money:** C

3-D SKIING is a Hi-Res color 3-D game package containing two winter sports games. Both games incorporate the Budg 3-D graphics package as driver routines but have been obviously modified to incorporate color backgrounds.

**SKI SLALOM** is a fast action arcade style game in which a player maneuvers his skier down a regular slalom racing course. The object is to run the staggered gates in the fastest time. The player views the course as if he were closely following a 3-dimensional skier that can be turned side to side. The gates advance rapidly towards the player in true perspective as the skier advances down the course. As expected, there are crashes when he collides with a gate or runs off the course into the trees. The dynamic action is very much like real skiing. When the skier is turned slightly sideways by paddle control, the skier's velocity is braked slightly while he begins traversing sideways. Further turning causes a greater braking effect until a full stop is reached. Since the clock is running, braking will produce slower times. However, skiing too fast is very dangerous. The game does take a little time to master and this reviewer was often disqualified for hitting or missing a gate before the finish line. There are short and long courses as well as three levels of difficulty. The fastest time display is a goal for each player to beat. This game employs very fine state-of-the-art graphics; great for those inveterate ski devotees who're laid up with a broken limb or who would pass an evening in the lodge competing in simulated practice.

**SKI JUMPING** is a 2-dimensional Hi-Res version of the classic sport. One to four players take turns jumping for the longest distance on a 70-meter jump. There are actually three take-off positions at the lip of the jump. The game requires careful timing in using the paddle button to hit the middle or best take-off point for an optimum trajectory. Once airborne, the player can adjust the skier's lean for the maximum jump distance. Falls result from leaning too far over the ski tips and for not straightening up on landing. The three farthest jumps are displayed during competition. The game is cute and fun to play. It is also a game in which players tend to devote a considerable amount of time in attempting to maximize jump distance.

**NOTE:** Available from ARS publications after 1/1/84
COMPUTER BASEBALL

**Company:** Strategic Simulations

**Language:** Applesoft, Assembly

**Hardware Requirements:** 48K

**OVERALL RATING** A  **CONTROLABILITY** A  **ERROR HANDLING** A

**GAME CONCEPT** A  **SKILL INVOLVED** C  **DOCUMENTATION** A

**CREATIVITY** A  **CHALLENGE** B  **HOLDS INTEREST** A

**GAME DEPTH** B  **GRAPHICS** B  **VALUE FOR MONEY** A

An owner of SSI’s BASEBALL might be surprised to hear that there was a 1983 Major League strike, since he could watch games between any of the 26 World Series contenders while immersed in baseball on the Apple. Excellent versatility marks this game; the computer can manage one or two teams or let the Apple handle both while permitting demo, solitaire or two player games. Its demo mode on the menu pits the 1980 AL and NL champions against each other; however, any teams can be called into play in this mode. For any of the modes, you select any two teams you wish, set up your own teams (cheat by having nine .400 hitters), or have one team play against itself using different pitchers or batting orders.

This is not a high-action game, but rather one involving managerial skill, with Hi-Res animation definitely taking a back-seat. The playing field display, however, is attractively and efficiently laid out. Action for each batter requires a single “pitch,” which he may hit, be struck out by, walked, or reach base on an error. The batting, pitching, and fielding averages and characteristics of each player are unique, with each handled accordingly. Even good fielders will occasionally make an error, sluggers may pop up, and pitchers will tire (who, by the way, require a warm-up period). Each “Manager” controls his bull-pen and bench of pinch hitters and, like a real-life manager, once the decisions have been made, can do nothing more than sit back and watch.

A major achievement of BASEBALL is the simplicity of command required in playing a simulation of this complexity. Complete control is provided by use of a single paddle (as well as from the keyboard). BASEBALL’S versatility and low price for this well-modeled simulation result in a very realistic game that would be a bargain even at a higher price.

COMPUTER QUARTERBACK

**Company:** Strategic Simulations, Inc.

**Language:** Applesoft

**Hardware Requirements:** 48K

**OVERALL RATING** B  **EASE OF USE** A  **ERROR HANDLING** B

**GAME CONCEPT** B  **SKILL INVOLVED** C  **DOCUMENTATION** B

**CREATIVITY** B  **CHALLENGE** C  **HOLDS INTEREST** C

**GAME DEPTH** B  **GRAPHICS** C-  **VALUE FOR MONEY** B

COMPUTER QUARTERBACK is a real-time simulation of an NFL football game that makes good use of Strategic simulation’s modeling techniques used in their war game programs. A single black-and-white display compactly presents a well-annotated football field, a score board, last play results, and both offensive and defensive team alignments. Paddles are used to select offensive/defensive plays (which are also shown on the score board by numbers), and to put the ball into play.

Two players may compete in either a Semi-Pro or Pro version, which differ as to the team selection and capability determination and the relative number of play selections. Alternately, a single player may compete against the Apple Robots in a Semi-Pro setting. The game plays reasonably quickly, despite rather distracting delays between plays, and quite easily against a real-time clock, and develops a good sense of player involvement.

Despite a rather awkward and involved booting and start-up process, the game can be learned quickly and easily. It is much more difficult to master and understand the probability determinations or to assess the accuracy of the modeling interactions. Certainly, the same offensive plays produce a variable result against a given defense, and in the single-player game, the Apple employs a reasonable and varying set of play selections as a function to field-position, time remaining, and score.
If you are looking for a trivial football game with colorful displays, sound effects, and a superficial play selection, then try a different program. However, if you are an arm-chair football freak, COMPUTER QUARTERBACK is an excellent value that will provide a high level of non-repetitious challenge.

OLYMPIC DECATHALON

Company: Microsoft
Language: Machine
Hardware Requirements: 48K

OVERALL RATING A -  CONTROLABILITY B +  ERROR HANDLING N/A
GAME CONCEPT A  SKILL INVOLVED B +  DOCUMENTATION B
CREATIVITY B +  CHALLENGE B +  HOLDS INTEREST B +
GAME DEPTH A  GRAPHICS A  VALUE FOR MONEY A

OLYMPIC DECATHALON provides the excitement and competition of the greatest and most demanding of all athletic competitions: the 10-event Decathlon. Normally a two day event, it requires participation in running, jumping and throwing contests that include the 110-meter hurdles, the discus throw, pole vault, 100 meter dash, the long jump, shot put, 400 meter dash, high jump javelin throw and the 1500 meter run.

The competition involves up to six opponents. Each event is presented with excellent animated graphics. The events are in real time and one must interact via the keyboard or paddles to manipulate the figures on the screen. As in real competition, the victor needs stamina, coordination, reflexes and timing. Points are awarded for each event and they are based on a comparison to actual Olympic standards.

Several of the events require running by alternately pressing two adjacent keys repeatedly (e.g., right and left arrows). The player who can do this the fastest using two fingers can win the 100 and 400 meter dashes. The longer races will test one’s finger coordination and stamina, as cramps do occur. The javelin and pole vault also require reaching a maximum speed. However, coordination and timing also play a part as one must press a key to plant the pole, another to do a proper handstand and the return key to push the pole away before it hits the bar on the pole-vault.

Although some of the events are relatively simple, perhaps the high hurdles and the shot put are the most difficult in requiring good coordination. The hurdles require pressing each paddle button in sequence to successfully clear the barrier. Deliberately running through two hurdles is cause for disqualification. The shot put requires coordination of force levels. It soon becomes obvious that if the triceps aren’t exerted slightly before the shoulder muscles, the shot put can be thrown almost overhead or even backwards.

The discus throw requires good hand-eye coordination while the long jump and high jump requires precise timing.

Any event can be practiced before the decathlon. Once the competition begins it doesn’t end before the ten events are concluded. It takes about one hour to play with three people; about 15 minutes are added for each additional person. It is best to compete in even numbers of players (2, 4, 6) as the running events are paired and an odd player has to compete alone in several events while his opponents have the advantage of direct competition.

Microsoft was very thoughtful in preventing accidental resets during competition. Entering 3DOC will allow you to continue; for those with an autostart ROM the game continues without interruption. Microsoft also allows you to make one backup of their protected disk with a built-in copy program.

Overall, the graphics are excellent. The animation is smooth and the animated figures professionally styled. My only concern is that players, especially children, don’t abuse the keyboard when switching to two-handed finger pounding during the excitement of competition in the running events.
Hi-Res Computer Golf is both a challenging and a well-implemented game. Excellent documentation is provided to ease the learning (perhaps it should be called "training") phase. Even if it isn't a rainy day, good golfers could get hooked into staying in front of the Apple, to say nothing of everyone else in the family.
Gambling & Card Games

Strip Poker makes an excellent party game. Several people can take turns in an attempt to win the clothes off either of two pretty young opponents who play in very different styles. Suzi plays terrible poker. She bluff continuously, raises a lot, and rarely has a decent hand. Melissa, on the other hand, can usually beat an opponent whose luck isn’t with him.

The object of the game, of course, is to beat either of the two girls in Draw Poker. If either of the opponents runs out of money, he or she trades a piece of clothing for $100. If they win money back, they may repurchase the clothing. There are four Hi-Res screens; the last shows the girls completely naked.

The cards are dealt to the player and appear beneath the opponent’s picture. All choices are made with the two arrow keys, confirmed by pressing the space bar. Players can drop, stay, or bet. They can discard one or more cards in hope of getting a better hand. The computer doesn’t cheat. However, there is a bad flaw in the Applesoft random number generator: each time the game begins the order of the deck of cards and the opening hands are identical. You are always dealt a pair of twos, a three, a four, and a six. Your opponent always beats you with three aces.

Overall, the game is entertaining and fun to play and contains some good graphics. It holds your interest through more than one play, if only until you strip both girls.
**Pro-Poker**

*Company:* Quality Software  
*Language:* Assembly  
*Hardware Requirements:* 48K

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<tr>
<th>OVERALL RATING</th>
<th>CONTROLLABILITY</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
<th>GRAPHICS</th>
<th>ERROR HANDLING</th>
<th>DOCUMENTATION</th>
<th>HOLDS INTEREST?</th>
<th>VALUE FOR MONEY</th>
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<tr>
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<td>B+</td>
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</table>

*OVERALL RATING*  

- **GAME CONCEPT:** B+  
- **CREATIVITY:** B  
- **GAME DEPTH:** C

Pro-Poker is a fast-playing Hi-Res California Draw Poker game involving eight hands of poker. Some or all of the hands may be played by you, or automatically played by the computer. If desired, players may be given names. While a save-game option is not available, there are a variety of alternate options available to control the game speed and, in effect, the degree of realism and difficulty. Any option may be invoked at any time without resetting a player's stakes or deal.

The program checks and raises, will occasionally bluff and can be bluffed, and won't show the winning hand unless it has been called (but does show openers). Holding a pair of kings or queens, the program will not open that hand if it's "under the gun," but will open if four previous players have passed. In the last position, it will open with a pair of jacks. A subsequent raise will cause that hand to fold. With three of a kind, it may or may not open, possibly hoping to raise on another opener. The generally conservative line of play makes more sense if all hands are played face up—one of the options—since the odds don't favor drawing a desired card because 40 cards have already been dealt. The only criticism of the playing rules is that a disproportionately high number of four-card flushes seem to get filled, but there is no indication that the computer "peeks" or favors any hand.

The Hi-Res cards are well-sized, realistic, and clearly legible on a black-and-white screen. In the face-down mode, a player's cards are concealed unless it's his turn to bet or draw, thus providing a degree of privacy for multiple players. There are three speeds of play and an Auto-Stop option to speed up slow operations if you wish. In the fast mode with the Auto-Stop off, over ten rounds of eight hands are played in less than a minute, permitting you to view the long-term money flow. Best of all, there is a Kibitz command which suggests what you should do with your particular hand and shows the probability of someone else having a better hand than you. Pro-Poker, the best poker simulation game on the market, is a rarity in that it's one of the few that effectively tutors you in becoming a better player.

**Solitaire**

*Company:* Computek  
*Language:* Applesoft/Assembly  
*Hardware Requirements:* 48K

<table>
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<tr>
<th>OVERALL RATING</th>
<th>EASE OF USE</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
<th>GRAPHICS</th>
<th>ERROR HANDLING</th>
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*SOLITAIRE* provides four versions of Hi-Res solitaire card games, including two not previously seen by this reviewer. The most popular game, "Klondike," is presented with two variants; the multiple pass consisting of rolling three cards off the pile with as many passes through the pile as desired or until the pile is depleted, and the single-pass, in which one card at a time is removed as favored by the gamblers. The two other games included are "Picture Frame" and "Pyramid." In the former, the object is to place all picture cards into specified locations in the "frame"; in the latter, the object is to remove all cards from the "pyramid." The rules for each game are summarized in the sparse but adequate documentation.

All Hi-Res playing fields are neatly laid out, and while some color is displayed, the game plays more easily using a B&W display which better emphasizes the contrast between the red and black suits. The square card representations are reasonable in size, but are not overly artful in design. The games are fun to play, and respond quickly to the easily learned single-key commands; so easily in fact, that a degree of playing addiction can result.
Computer Gin Rummy plays a wicked game of rummy in this slick version of the classic game. Actually the computer plays three versions of the 10 card game. *Gin* allows the opponent to lay-off cards on the declared hand if a knock is made with a hand containing 10 points or less of unmelded cards. *Knock* allows the player to knock immediately or at any time in the game. There are no lay-offs in this version. *One-Meld* requires a completely melded hand for a player to *GIN*. This requires a hand consisting of 4, 3, 3, or two 5 card runs.

The outstanding feature of this game, besides its fine graphic display of the Hi-Res cards, is the game’s ease of use. The game operates entirely by one stroke key commands. The player’s entire hand, including the drawn card, is displayed with letters A-K beneath it. Thus, if a hand is to be rearranged, one simply indicates where a particular card is to be moved, or if a card is to be discarded, which card. A mistaken discard can even be taken back if the order is countermanded with another keystroke before the computer displays the discard on the pile (3 seconds). Any additional prompts, such as rearranging your hand if needed after the computer gins, or for laying off on the computer’s hand, are automatically supplied.

The computer provides a very good opponent. While it is difficult to judge a computer in a game that requires luck, this program apparently knows the odds and definitely knows when to knock. The program has a very good algorithm for arranging your hand to give you the lowest possible point count if you lose. It saves you considerable time in rearranging your hand during the game. In fact, if you were to gin with a completely unarranged hand, the computer would know if this were legal.

One additional feature available in the game *One-Meld* is the display of all cards including those from the deck that haven’t been drawn. This is offered because the computer doesn’t display its losing hand. And while the instructions assume you already know the rules of the game, for those that don’t, there is always Hoyle’s “Rules of Games.” Do remember that aces are always low in rummy. In sum, *Computer Gin Rummy* is the best and easiest to use of the Gin Rummy games on the market.

The Olde Gin Parlour plays the classic card game of gin rummy where knocking is allowed if the total point count of all unmatched cards is less than ten. The first thing that one notices is that although the computer arranges the player’s hand by rank within a suit, cards require a considerable amount of rearranging. The computer program isn’t smart enough to automatically determine which cards are grouped to form melds. Each of the three groups are arranged in the three rows below the dealt hand. All cards that aren’t paired are left in the first row. Fortunately, all input is by single keystroke without the use of the return key. But each card must be specified by rank and suit. This slows things down considerably in what is usually a fast and spontaneous game.

The Hi-Res graphics are rather plain. Rather than using large detailed cards that require overlapping to fit on the screen as in a real game, the author chose smaller cards that only show the rank and suit.

The computer, as an opponent, plays a mediocre game of gin rummy. Although the program is worthwhile, the user interface and necessary rearrangement of cards does not make the game pleasurable to play.
Ken Uston's Professional Blackjack is intended to teach the blackjack player three different point-counting strategies that are covered in the author's book Million Dollar Blackjack. It is based on the theory that even when the casino is using several decks, the character of the deck constantly swings favor from the house to the player and vice versa. For example, if all four aces have been played, no one can get a blackjack. Since the house pays 3 to 2 for a blackjack, this is unfavorable to the player. Likewise, fives favor the dealer, for house rules require him to hit on 16 or less.

Those who just want to have fun should learn the simplest of the three strategies. Those who wish to have a good time without losing any money should learn the “simple plus/minus” card counting system, and those who want to make money at it should learn the “Uston Advanced Point Count” strategy.

The program offers several drill sessions where cards are dealt and the player practices his point-counting strategy. This is one of the best blackjack simulations that I have seen. Six players, either human or computer, can sit at any of the six positions at the table. The table can be any casino in the United States. The disk has all of the special rules stored for each casino and plays blackjack by those rules. For example, if you choose to play in the Reno-Lake Tahoe area, you can choose between Harrah's Circus Circus and other local casinos. During play a high tone alerts you to whether you have made a strategic error. If you press the space bar, you can refresh your memory with the running count, true count, betting true count, and the status of aces. If you just want to play for fun you can turn off the error prompting sounds.

The disk comes with two separate manuals. The first is a sparse but adequate instruction manual to run the program. The other is a detailed explanation of Ken Uston's point-counting strategies. This book contains valuable colored charts that tell you whether to hit or not depending on your point count and what face card the dealer shows.

This package is higher priced than many other blackjack strategy programs, but it is perhaps the most comprehensive learning tool available to anyone seriously interested in learning to play blackjack for money. Ken is living proof that his strategies work, because he is banned in virtually every casino in the United States where point counting is illegal.

Blackjack Strategy is the first Apple Program to consider the casinos' post-counting strategy, and to help you develop alternative approaches to bring the odds back to your favor; it is a combination of three different programs: a game, a tutor, and a simulator. The game program pits you against a computer dealer. The tutor reads a strategy file that you have created (or the one provided) and then tests you to see how well you follow your defined strategy during game play. Finally, the simulator reads playing and betting files and then uses the rules defined in the files to play a number of games. Statistics from the games are displayed so you can determine how well your strategies work.
The idea behind this program lies in so-called “zero-memory” strategies for playing blackjack. These strategies have been developed since casinos started using multiple decks and random shuffling in order to discourage card counters. With zero-memory you are not required to know what cards have been played or what cards might still be in the deck; only the cards showing enter into play. Unlike card counting, which has a single set of rules, there are many zero-memory strategies. To accommodate these, the program has a video editor which makes creating command tables easy. You can check any number of these strategies using the simulation function.

Game play with Blackjack Strategy is fast and straightforward. Only one player is allowed and all the rules of the game, including the ability to surrender, are included. Card images are easy to read, and the program adds up your score to save you the trouble. Play commands and a running total of your money appear on screen at all times.

The simulator and the tutor both use strategy files. Each does its job and, if you are interested in testing your own zero-memory ideas, could be of use. The BASIC code is difficult to follow, so I could not determine if the Applesoft RND function was used properly for shuffling the cards. Much has been written about the RND function and how it is not truly random. Three identical simulation runs of 100 hands using 5 decks of cards produced significant differences in the statistics, indicating some modification of the basic RND function.

Documentation for the program is very poor. A fancy three-ring binder is used with professionally typeset text — there just isn’t any meat on the bones. Each topic is given only the barest of discussion, and the concept of zero-memory strategy development is not discussed at all. You are told how to fill out the command tables, but not how to develop the information that goes into the tables. The documentation should, at a minimum, describe completely how the provided tables were derived (the logic behind derivation, not the mechanics of entry).

An interesting program, but I don’t think they will allow your Apple to be a partner at the gaming tables in Las Vegas.

**KING CRIBBAGE**

**Company:** Hayden Software

**Language:** Applesoft/Assembly

**Hardware Requirements:** 48K

**OVERALL RATING** C+

**DIFFICULTY** B

**EASE OF USE** C

**GRAPHICS QUALITY** C

**TEXT QUALITY** C-

**VOCABULARY** C

**SAVE/RESTORE** B

**ORIGINALITY** A

**DOCUMENTATION** A

**HOLDS INTEREST?** C

**VALUE FOR MONEY** C

Hayden’s King Cribbage is the third solitaire cribbage game presently available for the Apple, competing with On-Line’s Hi-Res Cribbage, and Rainbow’s Cribbage. Reviews of these programs are on page 304 of The Book, 1982. There are no significant new features offered, but it does have its own distinctive personality, including both the good and bad.

The playing algorithm is quite good, comparable to Rainbow’s, and plays an even, steady game with few weird hands. Keyboard operations are the simplest of the three, although the other two are not at all difficult. The game has a consistent and steady pace easily controlled by the player, unlike Rainbow’s, which tends to push one along.

The display field is attractive, but does not compare to that of On-Line’s. The serpentine shaped playing board, although arty, makes it difficult to know where the Skunk line is, and it does not provide a numerical indication of the points by which one is ahead or behind. A scoring summary is easily available on a separate text page. The cards are the largest and best drawn of all; but the game is difficult to play on a B&W set since the blue peg used by the Apple becomes a very difficult to see shade of gray. On-Line still has the best overall layout, appearance and functional display, but Hayden isn’t too far behind.

For the beginner, Rainbow’s tutorial documentation and on-screen scoring possibilities may well be worth $29.95. At $24.95, Hayden affords a better layout, an equal playing algorithm, an option to shut off the monotone sounds, and an option to permit the player to count his own hand (Muggins). For the more advanced player, provided he can tolerate a rather high rate of weird hands, the On-Line game, also at $24.95, is still on top. Apart from its better layout and its on-screen scoring summary, it is the only one to provide tournament and save-game capabilities as well as having a clever use of sound. It is also the only one to permit the player to retract the first card placed into the Crib, a feature used surprisingly often. However, Hayden’s King Cribbage runs a close second, and should give the others a good run in this three-way race for your money.
**SINGLE'S NIGHT AT MOLLY'S**

**Company:** Soft Images  
**Language:** Applesoft  
**Hardware Requirements:** 48K

**OVERALL RATING** A  
**GAME CONCEPT** A  
**CREATIVITY** A  
**GAME DEPTH** B  

**CONTROLLABILITY** B  
**SKILL INVOLVED** B  
**CHALLENGE** A  
**GRAPHICS** A  

**ERROR HANDLING** A  
**DOCUMENTATION** A  
**HOLDS INTEREST** A  
**VALUE FOR MONEY** A

Single's Night at Molly's consists of two unusual and challenging Hi-Res solitaire card games which demand much more skill than luck. The first, Royal Flush, starts with a blank 5 X 5 matrix, into which you play the cards from a standard 52 card deck. The object is to arrange the rows, columns, and major diagonals to produce the best possible poker hands. The scoring generally follows the relative ranking of poker hands, except that straights and flushes have been reversed in point value, because flushes are easier to arrange. Four game options are provided by two functions: Mobility, which permits pairs of cards to be relocated after all 25 cards have been played; and Bypass, which permits a maximum of five cards to be thrown away when they are dealt.

The second game, Sly Fox, uses two decks to play an interesting variation on the familiar four-pile build up. Only here, one simultaneously builds up from the aces and downward from the kings of each suit. The game starts by automatically laying out the aces and kings on the left and right of the screen, dealing 20 cards to a 5 X 4 "wastefile" in the center, and filling the wastefile (playing into the build files where possible). It then builds automatically on the files using cards from the wastefile. At this point, some 28 to 40 cards of the 104 card deck have been used, with perhaps a few blank wastefiles. Now you start to play; the up card must be played into the wastefile in such a manner as to permit its later retrieval and play into the build files after you have played 20 cards. Following an automatic build phase, another 20 cards are played, with the sequence continuing until all cards have been played. When decisions arise during any one building phase, a prompt requests which wastefile to play, or if the play should be to the ascending or descending pile. Sly Fox also has four options provided by two functions: Tally, which displays the number of cards in each wastefile; and Slot, which adds another single-card only wastefile.

The cards play rapidly, are neatly drawn and easily read, but the B&W display makes differentiation between the suits difficult. A score is provided after completion of either game, a numeric and detailed breakdown for Royal Flush, and "Awful" to "Fantastic" for Sly Fox. If you think you can better your score, or wish to have several persons play competitively, you may replay the same game with the same card sequence. But don't expect to sit back and play these games without having to think. The variations from hand to hand, and within one hand, seem endless. It's possible, for example, to play one hand of Sly Fox many times, even using pencil and paper to track the cards in the wastefile, and get perhaps the worst score on the last attempt. Similarly, moving card pairs around in Royal Flush to better your score can go on for numerous tries. All in all, it's tough and mentally fatiguing, but it's also different and a lot of fun.

**GO FISH**

**Company:** Dynacomp Inc.  
**Language:** Applesoft  
**Hardware Requirements:** 32K

**OVERALL RATING** C+  
**GAME CONCEPT** B  
**CREATIVITY** C  
**GAME DEPTH** C  

**CONTROLLABILITY** A-  
**SKILL INVOLVED** C-  
**CHALLENGE** C  
**GRAPHICS** C

**ERROR HANDLING** B+  
**DOCUMENTATION** C  
**HOLDS INTEREST** C+  
**VALUE FOR MONEY** C

Go Fish is the computer version of the classic children's card game of the same name. Basically, it is a game against the computer that is very good at improving memory skills. Two opponents, who have been both dealt five cards, attempt to form groups of four for the rank of the cards that they hold in their hands. They accomplish this by fishing for them from their opponents cards. If successful, they can try again; otherwise they take a draw card from the deck.

The game is very simple to play. The cards are shown graphically, and automatically arranged by rank in the player's hand. The keyboard inputs are single key, and the computer will not allow illegal inputs. Thus, a young child of six or seven will have no trouble using this program. As to the computer's skill: it plays a mean game of Go Fish. This is expected, because computers, like elephants, never forget.
BRIDGE
Company: Dynacomp, Inc.
Language: English
Hardware Requirements: (less than 48K, but ?)

OVERALL RATING C+
GAME CONCEPT C
CREATIVITY B
GAME DEPTH C
CONTROLABILITY B
SKILL INVOLVED C
CHALLENGE C+
GRAPHICS B
ERROR HANDLING D
DOCUMENTATION C-
HOLDS INTEREST? B
VALUE FOR MONEY A

Bridgemaster is the successor to DYNACOMP's Bridge 2.0 and is the best of the four known Bridge games currently available for the Apple; unfortunately, it still leaves a lot to be desired. Bridgemaster offers 1,000 different hands on a neatly laid out, B&W, all-text playing field; duplicate scoring; and running score sheets for different players. It does not provide a "Claim" feature, so all hands must be fully played out.

At present, the disk is provided in DOS 3.2 only. However, it is not protected and may be MUFFINed up to DOS 3.3, and may also be revised to suit your whims and programming ability. The review disk suffered badly from several syntax errors, one of which bombed the program whenever N or S tried to open the bidding. The verified fix from DYNACOMP is to copy down lines 850 and 910 of the program SET DEAL, and replicate them exactly as lines 850 and 910 of DEAL.

The documentation is somewhat long on hype and short on game bidding conventions and menu descriptions. It supports doubles, pre-emptive bids, Blackwood, and Stayman (read the documentation carefully on this one). Given the proper holding, your partner will jump overcall or jump shift your opening bid, but he will seldom overcall an EW opener, even when holding an opening hand himself. North is not prone to shift suits or support your second rebid of a major, even when holding three small cards. Your North partner loves to bid four card suits - again and again, even if he has two other biddable (and higher ranking) four card suits. He seems to keep bidding on the basis of combined point count, pushing his suit until he reaches the correct level, with the proper suit being left to you as South.

Bridgemaster plays EW hands offensively as well as defensively, but the play is conservative and predictable. When NS is defending, the computer plays the concealed North hand. All closed hands have the unfortunate penchant of leading aces and kings off the top, although an ace may be underled against No-Trump contracts. Against a suit contract, an EW declarer always pulls trump, even at the cost of losing trump control; an offensive cross-ruff algorithm is not provided. The game plays without finesse, so why should you? At least it will usually play second hand low.

The speed of play to each trick is excellent; there is a five second delay after the last card to each trick is played, and a lengthy delay before getting on to the next hand. Preset hands are supported, but can't be saved. Bridgemaster won't take the place of a good instruction book on learning the game; but it is a step in the right direction, and will give a novice good play as well as practice in getting upset with his partner. Intermediate players will be astonished to find that their game has suddenly improved. Advanced players will have to wait awhile for a good challenge.
Shoot-'Em-Up Games

OLD IRONSIDES
Company: Xerox Educational Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING A–  GAME CONCEPT A  CONTROLLABILITY B–
GAME DEPTH C  SKILL INVOLVED B+
CREATIVITY B  CHALLENGE A–
GRAPHICS B

Department: Entertainment
Sugg. Retail: $39.95
Availability: 7
Disk or Tape: Disk

ERROR HANDLING N/A  DOCUMENTATION A–
HOLDS INTEREST? A  VALUE FOR MONEY B+

Old Ironsides is an arcade game of skill and strategy in which two players maneuver three-masted ships in thundering combat. The arena is a square area of sea surrounded by fog. The ships are equipped with six cannons on both the port and starboard sides. They can fire broadsides at the enemy as they maneuver with the wind. The rate of fire is limited to the speed at which powder can be brought to the gun decks as well as to how fast the guns can be reloaded. While the cannons fire automatically from the side facing the enemy, you steer the ship by paddle control. Old Ironsides accurately portrays how large sailing ships maneuver slowly in the wind. Since they are sailing ships, they can’t sail directly into the wind, which constantly blows south to north (from the bottom of the screen to the top). A ship attempting to sail directly south will become becalmed, a strategy that is sometimes useful. Tacking back and forth is the only way to head south.

There are several ways to sink a ship: by cannon fire, ramming, blowing up the powder magazine, dismasting it while it drifts off screen into the fog, and losing direction and remaining in the fog too long. The ships mostly exchange cannon fire as they pass each other. Damage is usually light. An occasional cannon is sometimes lost, or the ship sails off smoking as one of its sails burns. There are two damage indicators, one showing the amount of damage and the other showing which cannon are left. Dismasting one of the three sails slows the ship down and makes it less maneuverable. An occasional accurate shot with all six cannons will sometimes take out a row of cannons or even blow up the powder magazine. The opponent who loses his cannons on one entire side needs to do some fancy sailing in order to keep the enemy ship facing his only cannon. Ramming is also possible, if the two ships strike each other exactly perpendicularly.

Fog plays a strange part in this game. Everything off screen is fog. When a ship sails off screen, it is invulnerable to enemy fire, but it can fire on screen. However, the ship can only stay off screen for a short period of time. An audible tone gets higher in pitch as the time runs out. Each captain is equipped with a compass to help him steer back. Since this instrument also alerts the enemy to his direction, an experienced captain has the option of turning it off. Sometimes games are won by forcing the enemy off the screen.

Old Ironsides is extraordinarily realistic. The ships are portrayed in beautiful, detailed Hi-Res graphics, with each of the masts showing clearly. Cannon volleys indicate the number of balls in the trajectory. If the distance between ships is too short, the shots splash in the water. The burning ships even emit smoke. The two ships are slightly difficult to tell apart. While one has white sails and the other red, they look amazingly alike on the screen. It isn’t really a problem, however, since you rarely lose track of your own ship. Control, which is deliberately sluggish, is frustrating. Sometimes you initiate a turn, and the enemy is just moving in range. You press the button hoping for an instantaneous response, but the cannons are still loading. Two seconds later, they fire just as the ship turns.

Old Ironsides is an excellent skill and strategy game that accurately simulates combat between two old warships on the high seas. Although a little slow, it is, nevertheless, an exciting game which holds your attention for a number of repeat games. A great game for two players!
Stellar 7 is a three-dimensional tank game that is similar to the arcade game Battlezone. The object is to battle an army of tanks and flying crafts that inhabit the seven worlds of the Arcturan Empire. Each of the worlds is connected by a Warplink that appears after you have destroyed a sufficient number of enemies.

The game is remarkable for its realistic three-dimensional graphics. It is a real three-dimensional world where objects have form and shape. They appear larger as you approach and rotate as you move around them. Since they act solid when you bump into one, you can hide behind an obstacle and feel safe from an enemy tank on the other side.

Your Raven tank is either joystick (regular or Atari) or keyboard controlled. Joystick is naturally best. The tank turns and moves forward or backwards rapidly. It has a Gravitic Scope (radar) at the top right of the main screen to help locate enemies and obstacles. This is helpful since the main view is only about 20 degrees field of vision. The view screen also has a toggled magnified mode for long distance fighting. Protonic Shields protect your tank while you seek and destroy the enemy with your nuclear powered cannon. Finally, there is a cloaking device that can confuse the enemy, but this uses vast amounts of fuel. There is a fuel bay on the third planet and possibly others, but that is a long way away.

Stellar 7 is a good, solid game with excellent playability for the experienced arcader. It plays much like Battlezone at a slightly slower pace. There isn’t so much a deliberate attempt to immediately knock you out as in the arcade game. However, the flying Skimmers, which often remain too high to hit, have a nasty habit of attacking from the rear as they fly past. Most of the other armored vehicles on the planet Sol are not too dangerous. The enemies on Antares, are another story. There are several stationary objects there—like the Pulasar and Laser Battery—that if not destroyed immediately will quickly deplete your shield energy. This planet with surrounding mountains is less stark but very deadly. The remaining planets must be incredibly difficult, but I have yet to defeat the forces on Antares.

Stellar 7 is definitely the best three-dimensional game to appear on the Apple. It is an excellent tank warfare game, very reminiscent of Battlezone but with much more depth of play. The graphics are smooth, flicker-free and realistic. In all, it is a game that I would recommend to any seasoned arcade player.
Caverns of Callisto

Company: Origin Systems
Language: Machine
Hardware Requirements: 48K

OVERALL RATING: C
GAME CONCEPT: C
CREATIVITY: C+
GAME DEPTH: C+
CONTROLLABILITY: B–
SKILL INVOLVED: C+
CHALLENGE: C+
GRAPHICS: B–
ERROR HANDLING: N/A
DOCUMENTATION: B
HOLDS INTEREST?: C
VALUE FOR MONEY: N/A

Caverns of Callisto is a visually attractive scrolling arcade game in which the object is to recover forty stolen parts, including an ion drive, from an enormous cavern on the planet Callisto. It seems that the mutated life forms that exist on that planet have ravaged your patrol ship while you were out on a mission. The cavern is divided into chambers sealed off by large doors that require keys to pass.

Your joystick-controlled hero is equipped with a jet pack for flying through the chambers. It is powered by fuel, so it is important to locate fuel canisters strewn about the chambers. He also has a High-energy Plasma Rifle to destroy the hundreds of alien mutants that inhabit the cavern. The Plasma Rifle has a tendency to overheat, so use it sparingly. The gun only fires in the direction the trooper is facing; he is turned with one of the two fire buttons.

The game is basically a variation of those "collect-the-treasure, kill-off-the-alien" games. It is a dull and repetitive game requiring little strategy. The skill mostly involves careful flying to either avoid the numerous creatures or good aim to kill them. The game is lengthy with a large, involved map of the cavern to get through. Winning is neither quick nor easy.

The graphics present some very smooth, full-screen scrolling that is rather unusual for Apple games. Animation is well executed and adds some cuteness to the role of the hero. In sum, the game, although lengthy, is too repetitious to hold the player's interest for the entire time it takes to succeed in finding the ion drive.

Triad

Company: Adventure International
Language: Machine
Hardware Requirements: 48K

OVERALL RATING: C–
GAME CONCEPT: C
CREATIVITY: C–
GAME DEPTH: C
CONTROLLABILITY: C
SKILL INVOLVED: C+
CHALLENGE: C
GRAPHICS: C
ERROR HANDLING: N/A
DOCUMENTATION: C
HOLDS INTEREST?: D+
VALUE FOR MONEY: D+

Triad combines the usual shoot-'em-up arcade-style game with Tic-Tac-Toe. Each of the nine game squares has the picture of one of nine different alien creatures that you have to battle. These nine types are randomly put into each of the squares to offer game variety. If you manage to defeat the bugaboo pictured in that square you receive an O. If you lose, the computer draws an X. Three X’s or three O’s in a row wins, just like in Tic-Tac-Toe.

Each of the nine bugaboos has a different attack pattern. If you don’t learn the attack pattern which is described in the instruction book, you may never defeat them. For example, arrows which are moving to the right are invulnerable to your missiles. But if you can hit the arrow just as it enters the screen, it will turn and travel to the left. (This is one strategy you will probably never deduce by trial and error.) Some creatures have to be hit head-on to kill them, others from the side. Killer bees can only be destroyed by horizontally-moving arrows. The chessmen are the most interesting. If hit, the pawn will split into a knight. If hit again, it will become a rook, and finally becomes a queen which can be killed. The pieces that were traveling horizontally or vertically will begin traveling diagonally and vice versa.

The game can be played by one or two players using a joystick. In the two-player mode the player who succeeds in defeating the bugaboo will capture the square. He can’t win by default as in the one-player game. The graphics are mediocre, but the game play is intriguing and somewhat challenging. Possibly it’s too simplistic to be of any long term interest, but it is still worth considering as a purchase.
**PLASMANIA**

**Company:** Sirius Software  
**Language:** Machine  
**Hardware Requirements:** 48K

<table>
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<tr>
<th>OVERALL RATING</th>
<th>CONTROLLABILITY</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
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<th>VALUE FOR MONEY</th>
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<tr>
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In *Plasmania*, a translation of the Fox/Sirius VCS cartridge *Fantastic Voyage*, you control a miniaturized laser-equipped ship injected into the bloodstream. The patient is dying from a blood clot constricting the flow of blood to the brain. You try to reach the clot as rapidly as possible and destroy it. As the ship travels through the zig-zag blood vessels, the upper portion of the screen scrolls downward. An oscilloscope at the bottom monitors the patient’s heartbeat.

The ship faces many enemies or obstacles in the ever-narrowing vessels. White cells and antibodies try to ram the ship. Red blood cells block the ship’s path. The laser can safely destroy the enemy cells, but collisions with the wall by either the ship or the laser cause internal hemorrhaging. Destroying red blood cells also contributes to rapid patient death. The heartbeat becomes irregular with time, and you race against the clock to reach and destroy the clot before the patient dies.

*Plasmania*, although a simplistic shoot-'em-up game with little depth of play, is not a bad game; it does have elements of interest, suspense, and is fun to play for a short time.

**TUBEWAY**

**Company:** Datamost  
**Language:** Machine  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>CONTROLLABILITY</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
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<th>ERROR HANDLING</th>
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*Tubeway* is a nicely implemented version of the popular arcade game *Tempest*. Your ship is trapped in a forcefield on the edge of a geometric tubeway by aliens seeking to invade your world. You fight an unequal contest from a ship which is no match for a civilization that keeps its ultimate weapon caged. Seekers and Homers begin traveling up toward the rim of the tube where your ship with its deadly lasers and Super Zapper is making a last stand.

A paddle controls your ship in this thirty-two level game. Mobility is near instantaneous as you move from one section of the tube to the next to lay down a barrage of laser fire at the enemy swarming up the tubes in this game of fast reflexes. The aliens are mobile and can easily elude your gun turrets as they shift from one section of the tubeway to the next. If they reach the outer edge, they can pursue you along the rim. Your Super Zapper appears as a white line rotating around the outer rim, and this time-released weapon is the only one that can destroy them. You detonate the Super Zapper by shooting through it as it passes your ship. Moreover, it needs to recharge, and the time line at the right of the screen marks the time until it reappears. Once you have killed all the aliens, you advance to the next geometric level.

The first four levels are child’s play with only Homers and Seekers entered into the contest. They shoot back, but if you are quick they miss. The S.U.'s join the fray in level five, and when they are destroyed they turn into a pair of the other two. By level seven aliens race up the tubeway leaving behind deadly spikes. When the last alien is destroyed, these spikes shoot up the tube at once. The deadliest alien is the Destroyer who is kept in a cage. You can do nothing, I repeat nothing, to destroy it. The Super Zapper can only temporarily return it to its cage.

*Tubeway* is an esoteric game of lightning fast reflexes. It is basically a shoot-'em-up game that requires minimal strategy, and it will appeal to many precisely because it demands high concentration and little planning.
**AXIS ASSASSIN**

**Company:** Electronic Arts  
**Language:** Machine  
**Hardware Requirements:** 48K

<table>
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<th>B–</th>
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<td>HOLDS INTEREST?</td>
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<tr>
<td>GAME DEPTH</td>
<td>C</td>
<td>GRAPHICS</td>
<td>C+</td>
<td>VALUE FOR MONEY</td>
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**Department:** Entertainment  
**Sugg. Retail:** $35.00  
**Availability:** 7  
**Disk or Tape:** Disk*

Axis Assassin takes the perimeter-shooting style arcade game one step further. It allows the player’s joystick controlled Axis Assassin to enter any one of the corridors of the more than 100 geometric battlefields. The opposition is tough. Spinners weave traps and Drones methodically lay down webs that prevent you from moving over sections of the grid. You can free up space if you shoot fast enough. In addition, there are Hunters that pursue you relentlessly, and Spores that will split into a pair of Mutant Guards if they reach the bottom of the screen.

Surviving an attack is difficult. The best strategy is to hold your position along one of the end corridors about 1/3 of the way in. The enemy will attack from all sides, but if you are careful, you can whirl around and fire from the rear. Eventually, when enough fighters have been dispatched, the Master Arachid appears. You have to blast away the rest of the web and detonate your Pulse Bomb as you thrust from the grid in order to reach the nest. You only have one Pulse Bomb per level, so only use it in emergencies or to reach the nest.

The Master Arachid holds one of your Axis Assassins prisoner inside his fortress. Your attack vehicle drives like a car and can elude the dozen or so fighters left over from the previous grid. The object is to blast a hole through the Nest cavity and link up to the trapped Axis Assassin. It may look easy, but you are bound to lose two ships for every one you manage to save.

The joystick control seems to default backwards on the up and down axis. It corrects if you press the J key, but this isn’t documented. The game is tough and will please the true arcader. Many will find the battle more than they can handle, and most will prefer the less demanding and more reflexive Tempest clones. The best part of the game is the rescue portion, but if you don’t fire the pulse bomb at exactly the right moment, you will never get there. With only three ships, it’s soon over.

The game’s graphics are very plain and lack color, but this is not a complaint. The absense of enough starting levels and a save game feature may annoy the skilled player. In sum, Axis Assassin is a good, reflexive shoot-'em-up game with more play depth than any of the other Tempest clones.
 Shoot-'Em-Up Games

TUNNEL TERROR

Company: Adventure International
Language: Machine Language
Hardware Requirements: 48K

OVERALL RATING C+  GAME CONCEPT C+  CREATIVITY C-  GAME DEPTH B-
CONTROLABILIT Y B  SKILL INVOLVED C  CHALLENGE C  GRAPHICS C+
ERROR HANDLING N/A  DOCUMENTATION C+  VALUE FOR MONEY C  HOLDS INTEREST? C

The Book of Apple Software

Tunnel Terror is a very abstract game based on the arcade game Tempest. It is a game of quick reflexes, where the object is to destroy shapes and ships that move towards you in a circular ring of channels or tunnels. As you move your spaceship about the perimeter of these tunnels by paddle or keyboard control, you unleash a barrage of fire until all the enemies have been destroyed.

Each successful encounter advances you to the next level of difficulty. The number of tunnels, starting with three, increases by one for each level. Whether this is true for each of the 61 levels is unknown since this reviewer hasn’t advanced beyond level 9. The enemies must be destroyed before they reach the top of the tunnel. Although some of the enemy shapes will retreat, the walker-carrier will split into two walkers, which proceed around the circle in an attempt to destroy your ship. You can usually kill them by holding down the fire button while moving in a sweeping pattern, but only if you have allowed your shots to regenerate. The game only allows eight shots down the tunnels at any one time. On higher levels “crazys” appear. If they reach the top and pursue you, you must avoid them, hoping they will retreat before you are trapped. There is no Super Zapper in this version.

Tunnel Terror as a game is novel and challenging, but as an imitation of an actual arcade game, it is hampered by the Apple’s technology. The hyper warping through one tunnel to the next set of tunnels, which carries the original game’s theme, is missing. Thus the use of spikes in this game becomes totally meaningless. The game’s paddle control system allows one to circle the tunnel twice, and gives a warning marker when you approach either end of your paddle range — a good compromise to the absence of continuously turning paddles on the Apple. Overall the game has merits, and should appeal to players who like games that require quick reflexes rather than strategy.

JELLYFISH

Company: Sirius Software
Language: Assembly Language
Hardware Requirements: 48K

OVERALL RATING C-  GAME CONCEPT C  CREATIVITY C-  GAME DEPTH D+
CONTROLABILIT Y D+  SKILL INVOLVED C+  CHALLENGE C  GRAPHICS C
ERROR HANDLING N/A  DOCUMENTATION C  HOLDS INTEREST? C-  VALUE FOR MONEY C-

Jellyfish is an underwater arcade game in which the mission is to recover nuclear waste capsules from the ocean floor. Either one or two players can compete in the endeavor. The submarine Dogstar is equipped with a mechanical arm for latching on to each of the capsules. It also has torpedoes for blasting deadly Jellyfish and octopuses that are intent upon your destruction.

The game is controlled by either keyboard, paddles, or Joypot. Four keys are used for positioning the submarine, and one for firing. Keyboard control is not a very good mode, and the paddles are even worse. It amazes me that the direction of motion must be determined by how far the paddle is turned. It is very difficult, if not impossible, to get used to. Of course, if you elect to purchase an expensive Joypot, you can play the game with Atari joysticks that use the more natural up, down, left, and right movements. But the game isn’t worth the added expense.

The one-player game that pits you against those deadly sea creatures that forever dog your every step, isn’t much fun. However, the two-player game is somewhat more challenging, as each player can lure the sea creatures into his opponent’s path, or kill his opponent in the upward rain of fragments that float towards the surface.

The game, finally, has eight skill levels and three levels of control responsiveness. It is fun for two competing players, but is a slow and tiresome game for one.


RANDAMN

Company: Magnum Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B
GAME CONCEPT B
CREATIVITY B-
GAME DEPTH B+

CONTROLLABILITY C+
SKILL INVOLVED B
CHALLENGE B+
GRAPHICS C

ERROR HANDLING N/A
DOCUMENTATION C-
HOLDS INTEREST? B
VALUE FOR MONEY C+

Randamn is a shoot-'em-up game that takes place on seven different worlds. It is unique in its method of choosing opponents to challenge you. On each of the worlds—The Graveyard, Underseas, the Swamp, Snow, Stonehenge, and Hades—there are seven stages to the battle. A slot machine chooses your opponent—one for stage one, two for stage two, etc. Thus, opponents may all be different or the same. It is just a matter of luck. Each opponent has different characteristics. Some are more deadly than others and some take many hits to destroy. The first scene—the Graveyard—confronts you with ghouls, pumpkins, ghosts, bats, and others. The second level—the Underseas world—confronts you with submarines, depth-charge-dropping destroyers, octopuses, and deep sea divers. The harder worlds supposedly have more formidable creatures, but increasing difficulty is not linear from world to world. Some, like the Underseas world, are quite difficult; while others, like the Swamp, didn’t seem to be as challenging. The last, Hades, is a definite ballbreaker.

The game is controlled by a joystick—although you can play it with user defineable keys from the keyboard. The man is moved about the screen by pressing joystick button #1, and he can aim his gun and fire in eight directions when using button #0. Screen obstacles not only block his movement, but also act as cover from opponents’ attacks.

Each world has a background screen in which the battle occurs. The man and the opponents lack smoothness when moving, but this doesn’t detract from the game. The game should be played on a color set since some of the aliens are nearly invisible against the background screen on many B & W monitors.

The game has good depth and playability. Part of its appeal lies in the randomness of the opponents. You get to see who your opponents will be on each round. You sometimes cringe when more than one of your most deadly opponents appears on the wheel of fortune. The other appeal is the curiosity involved in reaching each of the different worlds. Once you defeat a world, you are given the password to the next level so that in future games you don’t have to start from the beginning. This combination of play factors makes this a good game.
A.E. (Japanese for stingray) is a shoot-'em-up game in which the objective is to chase out-of-control pollution control robots from the city to the farthest reaches of the galaxy. As in most games of this type, your adversaries attack with a vengeance, and in this case in waves of six against your mobile gun position at the bottom of the screen. But unlike most rapid fire games, A.E.'s firing system requires a sense of precise timing since your time-delayed projectiles detonate only when the trigger is released. Thus, targets can be hit when they are specks in the distance, or when they appear close up & loom menacingly large.

The graphics are great. Movement slowly transforms the aliens from tiny specs in the distance to full sized rays in the foreground, as they dart behind planets or in and out of buildings to create a three dimensional effect. They gracefully swirl and dive in a variety of patterns before unleashing bombs on your gun position. Sometimes they play follow the leader; at other times they attack in pairs or groups of three. The explosions are nearly syncopated — one of your well placed shots causes a ripple effect, and one ray after another follows the first to its death.

You must kill at least three complete sets of attacking rays before you advance to the next level. Soon you will be chasing them through the solar system out to the farthest reaches of space where killing them is even tougher. While A.E is in many ways more difficult than its competition and offers great graphics and animation, it otherwise differs little from most shoot-'em-up games. It does require a little thought beyond mere reflexes, and should be considered by the dedicated arcade player.

**Mating Zone**

Company: Datamost, Inc.

Language: Machine

Hardware Requirements: 48K

OVERALL RATING C+  CONTROLLABILITY B  ERROR HANDLING N/A
GAME CONCEPT C  SKILL INVOLVED C  DOCUMENTATION C
CREATIVITY C  CHALLENGE C+  HOLDS INTEREST B
GAME DEPTH C-  GRAPHICS C+  VALUE FOR MONEY C+

*Mating Zone* is a "shoot-'em-up" game that is surprisingly interesting due to the strategy necessary to score points. Fifteen harmless aliens, shaped like hexagons, squares, and circles, drift towards a mating zone at the top center of the screen. If you kill them before they mate, you score no points. Therefore, you must wait until they mate and then begin to attack from your paddle-controlled gun position at the bottom of the screen. You can kill them at that time, or you can allow them to reach the bottom of the screen where they give birth to a duplicate.

When two fertile aliens of different shapes meet, they turn into an egg. You can score up to 3,000 points by shooting the egg before it hatches. If you are late, however, the exploding eggshell fragments become deadly missiles which you must avoid. After four trips to the ground, the aliens mutate, developing flashing eyes and antennae. These creatures are more deadly, but worth more points. When you kill all the aliens on any one level, you reach a more difficult level with more mating zones for the aliens to spawn.

The game's strategy is based on how many points you want to gain. It may be worthwhile waiting for an egg; by that time, however, there may be too many deadly aliens in the air for you to reach the egg before it hatches. *Mating Zone*, a pleasant game that is evenly paced, can be easy or hard depending on your strategy. It has good graphics and can be fun—even addicting—to play.
**JUMP JET**

**Company:** Avant-Garde  
**Language:** Machine  
**Hardware Requirements:** 48K

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The object of *Jump Jet* is to protect your fleet of Harrier-type aircraft from torpedo boats, submarines, and kamikaze planes. Your crafts, which have the ability to take off and land vertically from a small aircraft carrier, are equipped with a limited number of bombs and fuel. The plane can fly at two speeds, but the faster speed burns more fuel.

The attack begins with an armada of torpedo-firing ships. They protect themselves with an intense missile barrage that, with practice, is easy to evade at high altitude. The problem here is that you have to be quick because they fire torpedoes as they move in close. The torpedoes are small and difficult to hit with your limited number of bombs. In fact, it becomes hopeless to save one of your eight ships once the torpedoes get close, for they have disengaged your ability to drop bombs while near or over your fleet.

The submarines are next to attack. These vessels are smart enough to dive when you get close, especially at high altitudes. Your attack must be at low altitude where you can contend with their artillery fire. This is where you need to be quick and agile and a great bomber. If you waste too much time, your fleet will be sunk before you get back.

If you defeat the subs, you get to face the kamikaze planes. Fortunately, they don't shoot, so if you survive their dead-on attacks, you can reach the enemy's headquarters on a nearby island.

The game is played with a joystick. Landing the plane is the toughest part, but it isn't that difficult once you realize that the plane must remain stationary over the carrier as it descends. The graphics are mediocre to poor in this scrolling game, but this does not detract from the action, and the action is what this game is all about. It isn't a particularly easy game; it forces you to play quickly and takes some practice to master. Its main fault is that there is little game depth and it becomes boring after only a few plays.

**NIGHT FALLS**

**Company:** Omega Microwave, Inc.  
**Language:** Compiled Applesoft  
**Hardware Requirements:** 48K

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*Night Falls* has injected a little strategy into a game that could have been just another reflex shoot-'em-up in which the sole object is to protect a city as long as possible from an alien attack that is reducing it to rubble. When night falls and the sky turns the buildings a pale green, aliens swoop down bringing death and destruction. Only daylight brings a respite, and you seem to wait an eternity for it as the battle rages from the rooftops of the city.

A lone paddle-positioned gravity cannon constitutes your sole defense; it appears instantaneously on the roof of any building where you position it. A main reactor core at the base of several large buildings powers the cannon. This reactor, which must be protected at any cost, loses energy with each missed shot, but absorbs energy when the gravity cannon makes a direct hit on any alien ship. Building up excess reactor power is very important in this game, for it is this excess power that allows you to rebuild the damaged city when day breaks. Thus it is important to aim carefully while shooting as rapidly as possible.

The alien fleet consists of a few large mother ships, numerous UFO's, and an occasional stellar vortex which only appears when the main reactor core has lost energy. The alien ships above the city launch numerous X-bombs which slowly drift to the ground. While it is imperative to destroy these, strategy dictates that the main ships also be
destroyed quickly before they can use their death rays. These latter weapons can reduce an entire skyscraper to molecular rubble and leave a gapping crater where your gravity cannon can't operate. Timing the destruction of either an alien ship or stellar vortex can maximize your reactor core energy. The longer you wait, or the closer the vortex comes to detonation, the more energy you garner with a successful hit. However, if you wait too long or miss, good-bye city.

The city's reactor core must be protected at all costs. If the enemy breaches the protective buildings, you should immediately use excess reactor power to rebuild the city. You can suspend the game during attack for just such a purpose. Also, if the reactor should begin to overheat from accumulating too much energy, or from being hit, you must begin rebuilding on an emergency basis before detonation.

The game has numerous levels of difficulty. On the lowest levels the alien fleet will pose little threat to the city for at least ten days, but it can very quickly overwhelm you on the higher levels. The game is well documented with strategy hints and tables of attack factors. These are especially helpful if you have any interest in modifying the program. The disk includes the original Applesoft program before compilation with TASC. If you have a copy of the compiler, there are complete instructions listing the options to use to compile your modified version.

Night Falls improves the overworked shoot-'em-up theme of most kill the alien games. However, it is not a game that requires much thought during play. It is basically a game of quick reflexes where the aliens attempt to overwhelm your meager defenses. Timing of your shots often makes a difference in how long you survive, but in the end fast reflexes and accurate shooting count. The game has merit, but it isn't one that will hold your interest over many repeated plays.

**PENTAPUS**

**Company:** Turning Point Software  
**Language:** Machine  
**Hardware Requirements:** 48K

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*Pentapus* is a fast action, “shoot-'em-up” game similar to a combination of *Space Invaders* and *Galaxian* with one important difference: your joystick controlled laser cannon is free to roam the screen. Your cannon, which in actuality is a floating crosshair-like window protected by a shield, can destroy only what it touches. It comes in two sizes. The larger, standard size is easier to aim but also more vulnerable. The smaller size is less vulnerable, but can only be activated for a few seconds before it returns to normal. Each time either gets hit, one shield layer evaporates until the ship itself implodes.

The fact that you need to plunge right into the formation to wipe the aliens out is dangerous. You can't sit back from afar and shoot. While it is comforting to know that the aliens shoot downward on the first screen, when the aliens disperse into their random patterns on the latter screens, laser bursts are everywhere. Since it is hard to keep track of all the enemy shots against the moving star field, survival appears to be a matter of luck. For those who do manage to get by the assorted Drangles, Nagas, and Whirrs on the first three levels, they face the dreaded Pentapus, a five-armed octopus. It unleashes a fury of laser fire from its tentacles and is hard to approach. But if you are using your small-sized cannon, it only takes a small gap in the nearly constant barrage to reach and destroy the creature. If you can survive to the twelfth screen and destroy that last Pentapus, you can save the universe.

I can't say it is a good game. Conceptually it is flawed, for the player's cannon is never safe during the attack. It appears that survival is more a matter of luck than skill. Since the player doesn't fire from a distance but has to make a direct approach, there is no time to duck an enemy shot. Actually, the crosshair window is so large that nearly any nearby alien is liable to knock out one shield layer before you are even aware that they fired. Thus, the game goes from easy to impossible much too quickly. I think the concept of freeing the ship from the confines of the bottom of the screen is good, but it should have been more like *Robotron* where the player's cannon can shoot safely from afar while alien formations attack. At least the player can choose to alternate between a defensive and offensive position rather than being forced to play strictly on the offensive.
In summary, the game fails to convince you that it is winnable by skill rather than luck. The graphics are smooth, but there is some noticeable flickering when the square, black boundaries surrounding the shapes overlap. The three different screens are too alike, and the game becomes boring very quickly.

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**ARCADE MACHINE**

**Company:** Broderbund  
**Language:** Assembly Language  
**Hardware Requirements:** 48K

**OVERALL RATING** A+  
**EASE OF USE** A+  
**VENDOR SUPPORT** B  
**DOCUMENTATION** A  
**VISUAL APPEAL** A–  
**ERROR HANDLING** A  
**RELIABILITY** A  
**USEFULNESS** B  
**VALUE FOR MONEY** A

The ability to create or customize a fast-action arcade game is beyond the programming abilities of the average Apple II owner. Even with the help of several good texts on the subject, good assembly language programming skill, and the patience of Job, it is a formidable undertaking. Broderbund comes to the rescue with a new graphics package called *The Arcade Machine*. This program generator designs a type of arcade game known as the shoot-'em-up. A user can design and customize an old classic arcade game like *Galaxian*, or use his imagination to design something new and unique. Best of all, it offers valuable insight into how a game is designed by having you design one yourself.

There are several factors that make this outstanding program an easy and fun one to use. It is entirely menu driven, requires no programming ability, and displays results immediately. In addition, *The Arcade Machine* offers considerable flexibility in allowing the user to incorporate nearly all of the features that he has seen in commercial shoot-'em-up games.

Since designing a game requires attention to a tremendous amount of detail, the author has resorted to the tutorial approach using a working game as an example. The user is encouraged to modify a sample "space invasion"-type game that the program defaults to upon bootup. Although the modification options are nearly endless, they begin with the altering of shapes. There can be as many as 24 different enemy shapes on the screen. These shapes are organized in four groups called blocks. Each block consists of six small objects, or three medium sized objects, or two large objects. In addition, there are shapes for tanks (player controlled ships), and explosions. The menu controls the sizes and types of shapes, and displays these in a chart.

Editing of shapes is similar to that used in the author's *The Complete Graphics System*. A series of seven boxes, one each for the seven shifted shapes, is arranged on the screen. Drawing takes place by keyboard cursor control simultaneously on one or more active shapes. Thus, objects can be animated as they move horizontally across the screen by changing one or more of the shapes slightly. NOTE: Animation does not work vertically on screen using this approach. Shapes can be drawn using any of the six Hi-Res colors. Also, different shapes can be activated for each of the five game levels.

Probably the most enjoyable feature of this program is the path creator, which animates your shapes and then lets you run the game option to watch the results. Ten different paths, each containing 254 instructions, may be programmed. This does not restrict the ten objects to ten paths. Each object is assigned to a particular path, and there are conditional jumps that allow an object on one path to jump to the same position in the next higher numbered path.

The paths are programmed on a screen with a keyboard controlled crosshair. Each of the objects following a particular path has an initial starting position. These are set later while choosing the level options. Two outer rectangles show screen boundaries, one relative to the other. Each move with the cursor programs the shape to move a set distance at a fixed rate of speed. Both these parameters can be varied initially and during the programming. Shapes can also be instructed to drop a bomb in a particular direction when they reach a set point in their path, or transform to the next higher numbered shape when they reach that point. Additionally, a shape can remain stationary while objects perform up to 30 extra instructions, or they can make a conditional jump based on the position of the player's tank. Insert and delete commands let you edit the path. The commands in the path table can be viewed individually, backwards, or forwards, with the use of the arrow keys.

Game variations can be set with the game options. For instance, a game can be played with either one or two players (two player games cannot have joystick movement). You can also include a time limit, barriers on the bottom that will be eroded when struck, bouncing bombs, random object bombing (an alternative to setting bomb drops while programming the path), and have the objects explode when they hit the bottom of the screen (useful in a game where you must catch falling objects). Sound effects can also be changed. They can be customized for duration,
pitch, and frequency. Scoring point values can be selected for each type object and for each level. Finally, you can position your object at any starting point in the path table. This is extremely important if you are designing a winding path where objects that start in different screen positions follow each other. If objects start their paths at different places in the path table for each level, the game, as you can imagine, will look substantially different on those levels.

An insight into this program's versatility can be had by choosing "Level Options" from the main menu. Several parameter charts are displayed for editing. One includes the values for star movement, speed, density, tank speed, movement limits and accuracy, missile speed, type, number and drift, and bomb speed and type. These can be adjusted for each of the five levels. Under "Miscellaneous" is another option page that allows you to choose items like smart bombs, steerable missiles, free tanks, and whether or not missiles should stop when they strike a background object with the color "White 1."

Once a game is completely designed and the background and title screens have been created, it can be saved to a data disk. Data for parts of a game can be saved at any time. But once an entire game is completed, you have the option of generating a bootable game disk that does not require The Arcade Machine program. Imagine the surprise of your friends when a game is played that is new and different and has your name on the title page.

The documentation is clear and concise. The 38-page booklet explains each of the menu options, and a limited tutorial helps to get the beginner started by re-programming the sample game. Five other example games, which can be loaded from files on the reverse side of the disk, show the versatility of the program.

The wondrous thing about this program is its ease of use and immediate feedback in viewing your creation. Programs can be created piecemeal, or carefully planned. They become immediately playable. There is little frustration in designing a game, and although the program is extremely versatile, it produces games of a set type. Don't, however, expect it to be able to generate maze games, or even games that are commercially saleable. Yet with your imagination, it can help create games that are different, fun to play, and best of all, uniquely your own.

**HORIZON V**

**Company:** Gebelli Software  
**Language:** Machine Language  
**Hardware Requirements:** 48K

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Horizon V is a three-part space game done in superb three-dimensional graphic style. Your spaceship hovers over a planetoid swarming with alien craft which are visible on your radar screen. The ship, equipped with shields and torpedoes, can be maneuvered about the planet in pursuit by either keyboard or joystick control. The ship, however, has an exhaustible supply of fuel. It must be steered to a position on the planetoid that has a time warp. This position is indicated by two arrow sets that show your relative position in relationship to the hole. When they are both zeroed for four seconds you enter a time tunnel or port.

This tunnel is a swirling vortex filled with aliens who appear and attack your ship. Although they are hard to hit as you sweep back and forth through the tunnel, your ship is invulnerable to their attack. The display is probably the most impressive and imaginative graphics that we have seen to date. The effect of roll and forward or reverse travel is entirely controllable, and with practice you can learn to hit these aliens quickly. But most of the time the success of your attack seems to be blind luck.

Upon killing all of the tunnel aliens, your ship emerges into space where a set of floating rings defines the entrance to a vortex-like supply ship. This part of the game is very abstract, but the skill involved is in lining your ship up with the very center of these floating circles for at least several seconds. Success is rewarded with a refueling and a return to the planetoid.

Unfortunately, this game is not at all challenging. The alien craft on the planet rarely shoot back, and thus are easy to kill off. You can always activate your shield in plenty of time to block their projectiles. Of course the aliens in the tunnel never shoot back. The biggest challenge in the game is to reach your fuel base before exhausting your fuel supply. Although the joystick mode would seem the easiest in a three-dimensional game, the stick (non-spring loaded if used), is much too sensitive over a narrow range of joystick movement. It is nearly impossible to hold position on the planet for the four seconds required to enter the tunnel. Keyboard mode, regrettably, is much easier. In summary, this game is easy to play, has impressive graphics and animation effects, but lacks excitement.
SNEAKERS

Company: Sirius Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B+
GAME CONCEPT B+
CREATIVITY B
GAME DEPTH C+
CONTROLABILITY B
SKILL INVOLVED B
CHALLENGE B+
GRAPHICS B

SNEAKERS is a whimsical invader type game with eight separate groups of characters or targets at which to shoot. Its variety makes this program a cut above its predecessors. Perhaps the most endearing characters are the sneakers and the fangs. Sneakers are cute half-shelled characters with shoe-clad feet that move up and down as they scurry about the screen while attempting to land on your moveable gun turret at the bottom. There are creatures that move in a rocking pattern at the top of the screen, occasionally turning into fangs that plunge to the bottom in an attempt to pierce your gun. Flying saucers that shoot back, cyclops that move lower and lower on each horizontal pass, a meteor shower, and, finally, the deadly scrubs; all inhabit this game.

Some of the creatures are easily defeated while others are dreadfully hard to destroy. If you manage to survive long enough to defeat each of the nine groups of creatures, you advance to a more difficult level. The object of this game, like others of its type, is to score as many points as possible with six expendable ships. Highly entertaining.

ZAXXON

Company: Datasoft
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B+
GAME CONCEPT B+
CREATIVITY B
GAME DEPTH C+
CONTROLABILITY A
SKILL INVOLVED B
CHALLENGE B
GRAPHICS B+

When Zaxxon first appeared in the arcades in the spring of 1982 it caused a sensation. The colorful three-dimensional view of a fighter attacking a highly detailed, diagonally scrolling space fortress was a showpiece in computer graphics. The fighter, able to maneuver in three dimensions, could bank on turns and swoop down toward the target as it fired its forward cannons. Its shadow on the fortress below and an altitude gauge on the side helped the fighter judge clearances. The huge multi-screen fortress was protected by laser gun ports, rockets fired from underground missile silos, and force field barriers flew under or over. Targets were numerous including radar dishes, fighters on the runways, gun ports, and fuel tanks worth extra fuel for your ship. And when you finally flew past the end of the fortress, an entire armada of fighters engaged your ship in battle with the intent to stop your ship from reaching a second fortress. Those who managed to negotiate and survive a more formidable defense eventually confronted the megalithic robot Zaxxon himself who stood armed with heat seeking missiles. It took several accurate hits in his vulnerable gun port to win.

The Apple version uses a more simplified background on the space fortress that has remarkably smooth scrolling. The brick walls and the force fields are in fine detail, but the large buildings, colorful runways, and the hexagonal grid have been replaced by solid blue. The radar, missile silos, rockets, planes, and gun emplacements are in detailed raster graphics.

The spacecraft is well drawn, and joystick control is very smoothly implemented. The ship climbs, dives, and banks left and right just like a real airplane. Beginners need to either watch the altitude gauge on the right, or determine their height from a combination of shadow placement and laser strikes.

The outer space fight sequences allow full freedom of movement. The enemy craft change altitude as they approach which gives the effect of side to side motion. Like your ship, these crafts appear to become smaller as they drop in altitude. These sequences lack smoothness, but this doesn’t detract from the game. In fact, this portion is a definite challenge that ends when twenty ships have been destroyed.
The second fortress is much more difficult than the first. The real challenge is flying through the narrow gaps between the wall and the force field above. After six or seven of these sections your craft stops directly in front of Zaxxon, a detailed robot who fires a heat-seeking missile that slowly homes in on your craft: there is no escape. In order to survive you must shoot the missile down, preferably just as it’s fired. A direct shot into the launch tube will destroy the robot.

The Apple disk version compares very favorably with ColecoVision’s cartridge—similar graphics but finer scrolling. Buyers want the arcade game and that takes more memory than many of their machines have. This version of Zaxxon is a compromise, and barely lives up to its reputation in the arcades. But it is a good game that is both playable and enjoyable. Neither version is what I would call addictive, but the game will hold your interest until you master it.

Eliminator is a very fast action space shoot-em-up game, where the object is to destroy as many alien objects as possible. Your joystick controls a laser-equipped fighter. Thus the ship’s direction can be easily reversed, thrusted, and vertically guided while battling a screen full of aliens.

In a token attempt to simulate horizontal scrolling, several moons move opposite the ship’s direction. But the effect of ground scrolling that would have added to the illusion of motion is missing since the game is set in deep space. The aliens, however, move correctly in relation to your ship’s thrust and velocity. These aliens shoot back at you during your attack. Your ship’s shields can withstand sixteen hits before destroying, but a direct collision with an alien costs you a ship. Survival is the key, and if you can last long enough, you warp to a tougher level where more types of aliens in greater numbers are sure to make mince meat of your three ships. One nice feature allows you to start at one of three advanced levels. Arcaders might like the extremely fast action of this game.
Norad pits an enemy barrage of intercontinental ballistic missiles against your anti-ballistic defense system. The enemy missiles, surging in waves over the polar route, are aimed directly at the largest cities of the United States. The object is to intercept them with anti-ballistic missiles launched from one of 10 scattered bases.

The game is a totally new approach to the usual missile command genre. It features a map of the United States as seen in perspective from above the equator. One has a clear view of incoming missiles over the Arctic from this angle. The missiles are guided by the arrow keys, and detonated by the space bar. However, only one missile can be controlled at a time, although one can launch missiles simultaneously. Destruction of useless ABM’s becomes a key part of the strategy.

Once a missile wave has ended, damaged cities are rebuilt and missile bases are resupplied. It does take a certain number of surviving cities to maintain an adequate defense posture. If you survive enough attack waves, Congress will appropriate a mobile MX base that can’t be hit. A nuclear firing submarine comes much later.

Norad offers a much more strategic game than the usual missile defense games that you have seen or played in the arcades. The game incorporates three levels of play and offers a challenging and fun experience.

ABM, which stands for Anti Ballistic Missile, is the Apple version of the Missile Command arcade game. Your job is to defend six East Coast cities against massive nuclear attack, presumably by the Soviets. Your defense consists of five missile bases, some armed with two-kiloton warheads; others, five-kiloton warheads. As the incoming missiles begin their descent, one positions a target crosshair (a joystick is almost a necessity) and fires either of the two types of anti-ballistic missiles. The computer, depending on the crosshair’s position and range, decides which missile actually fires.

The strategy is to destroy the incoming warheads as early as possible, since they accelerate as they get closer to earth. There is also the possibility that some of the missiles are MIRV’s (or multi warheads) that split as they descend into six or more separate warheads, each armed for different cities. The game becomes harder as you score more kills. The onslaught of incoming missiles becomes intense and soon some missiles change course in midstream, while others carrying MIRV’s split, sometimes splitting again. Soon, as city after city is destroyed in massive fireballs, you’re left defending one lone city and maybe one or more missile bases. By then you notice that all the missiles are heading towards your last city.

This game makes nuclear war almost fun. For those who are always trying to impress their friends with their latest high score, which may cause doubt, this game writes the high score on the disk. The program also incorporates a paddle-adjust routine, otherwise it could prove difficult to reach all points of the screen with your cross-hair if your paddles or joystick don’t have a full range.
**Bandits** is an innovative variation of the familiar Galaxian game, at least in the beginning. You have a ship, one of five that is paddle maneuverable at the bottom of the screen. Each ship has a limited amount of replenishable shield energy. Shield energy is effective in units of time. Pressing the space bar twice activates the shield for two time periods. The remaining shield energy is shown at the bottom of the display.

In the first two levels, formations of Phalanxes attack singly or in groups of twos, threes and fives. In themselves they are easy to beat, if you avoid their heat seeking missiles. However, if they get past you, they steal your supplies of food or equipment which you are guarding. There is yet another chance to save the purloined supplies if you shoot accurately as they attempt to escape to base.

When you reach level three, these easy-to-beat Phalanxes are accompanied by deadly Menaces. While the Menaces don't steal your supplies, they preoccupy you, and their missiles are even more deadly; but there is no use in killing the last of these reappearing creatures until all of the Phalanxes are dead.

The next level is a little tricky. This fourth level is a confrontation with the not so friendly Carriers. They look like colorful jacks from a jacks and ball set. The problem is that when one is hit, it breaks up into four bouncing Nutiants. This is when using shields becomes necessary. If you manage to defeat these guys, then comes the snake-like Torrents, who attack in centipede fashion. You must kill every last part or they repeat their napalm assault.

**Bandits** sounds simple except there are 28 levels. All the rest of the levels are combinations of attacking creatures. The game becomes hectic when you are simultaneously confronted with seven Phalanxes, two Menaces, one Carrier, and snake of Torrents. That's just level six, so level 28 must really be a wonder to behold, and a surefire challenge to the local arcade champion.

The game is either paddle or keyboard controlled. However, it is moderately difficult to handle a paddle with two hands while pressing the space bar to activate shields. So many players resort to two player team play to control the game satisfactorily since the game requires fast reflexes. It is too bad that the game can't be played on a joystick with two buttons to control fire and shields because two player control is not a good solution unless two minds are synchronized. Overall **Bandits** is definitely fast, fun, and a challenge to play.
The Marauder arcade game is a two level assault on a well-fortified alien city set on a distant planet. The city is defended by a fireball launcher, two aerial mine launchers, two missile bases, two or four turret lasers, and a shield which encompasses the entire city. The object is to destroy all defenses, then enter the city through the crater beneath the fireball launcher. Once beneath the city in part two, the player must navigate the robot guarded passages in the labyrinth in search of the power station. Each of the two parts of the game can be played separately or as a two part mission.

Attacking the city's defenses in part one can be relatively easy, or impossible, depending on the difficulty of the setting. There are nine levels. The easiest levels have a stationary shield, two turret lasers, and fireballs that don't track you. The more difficult levels have moving shields, more lasers, and fast-moving fireballs and aerial mines that home in on your position almost immediately. You have to be quick and alert, and must develop a strategy to deal with each of the weapons. For instance, following a gap in the moving shield is more effective than continually trying to blast your way through in a stationary assault. And the fireball launcher must be destroyed relatively quickly, that is if you can avoid being trapped between two lasers by a descending aerial mine. Overall this first level is an excellent arcade game by itself.

The second level is similar to the Berzerk arcade game, with the additional goal to find and destroy the central power station, then escape alive before being trapped by a labyrinth's falling ceiling. The maze of rooms consists of a number of exits and passages guarded by deadly robot guards. These guards appear only if they are in your line of sight. You must be particularly careful when rounding a corner since a robot might be hiding out of sight. Your 9 marauders (3 in each ship) are each armed with a laser. Each time it fires, the trajectory of the last shot is cut short. Thus if your shot is on target, you must wait until the shot kills the robot before firing again. The biggest problem with this level is that the marauder fires his gun off-center, as if he were firing from the shoulder. This would be no problem except the head isn't always above the body. The orientation of the marauder's body changes with direction. The body would rotate clockwise if you moved the figure first to the right, then down, then left, and finally up. If you switch directly from right to left, you find the marauder upside down. The bullet fires from near bottom, while a moment ago it fired from near top. As you can see this is very confusing and, in this case, deadly, as the shot misses a nearby, quick-reflexed robot.

The game itself is fun to play and will be liked by those who enjoy navigating multiroom mazes. But with the rooms rearranged after each succeeding level, a player is unlikely to master a route to win quickly in this game.
WAVY NAVY

Company: Sirius
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING C -
GAME CONCEPT C
CREATIVITY C -
GAME DEPTH C

CONTROLLABILITY B
SKILL INVOLVED C -
CHALLENGE C
GRAPHICS B

ERROR HANDLING N/A
DOCUMENTATION C
HOLDS INTEREST B -
VALUE FOR MONEY D

Wavy Navy is an arcade shoot-'em-up game that in many ways resembles Space Invaders and Galaxian. The paddle controlled gun turret at the bottom of the screen has been replaced by a ship that rides the rolling seas represented by large, slowly scrolling waves. The attack forces are waves of barely intelligent aircraft topped with a row of deadly attack helicopters that home in on your position. The entire attack force remains aloft in Space Invaders formation with one or two aircraft breaking out of formation to attack. These dumb aircraft are sitting ducks, and can be lured into a fatal crash dive. The helicopters are another story — they must be dealt with swiftly.

Upper levels become progressively harder. Level two adds a floating mine that inhibits movement by forcing you to keep out of the troughs and up to the crest of the wave. The fourth level adds a persistent bomber who saturates the air with bombs, and somewhere beyond him are missiles that love to skim the wavetops. While the levels do become harder, each level has a boring, repetitive quality to it. The graphics are adequate, but the game is nothing more than a simple rehash of the old Invaders theme. It is a game you wouldn't have expected from Sirius.

REPTON

Company: Sirius Software
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING B
GAME CONCEPT B
CREATIVITY C
GAME DEPTH B -

CONTROLLABILITY B
SKILL INVOLVED C +
CHALLENGE B -
GRAPHICS B

ERROR HANDLING N/A
DOCUMENTATION C
HOLDS INTEREST B -
VALUE FOR MONEY C +

Repton is a scrolling arcade game that in many ways resembles Defender. Instead of protecting individual humans your assignment here is to protect the entire city of Repton from Quarrior spaceships that are draining the city of power, and are stealing pieces of the city to build a base station. Your keyboard or joystick controlled ship, which is armed with lasers, nuclear devices, and shields, is your planet's only defense.

The game has a very good feel in its play. It can be played in a relaxed, defensive posture, or as a hectic shoot-'em-up game with your ship on the offensive throughout. There are plenty of targets and considerable return fire, but the enemy is more concerned with depleting your city and quickly building a base than with harassing you. This doesn't mean that you are safe, for you can see them closing in on you if you watch the tactical radar at the top of the screen. While it is beyond hope to expect to last more than a few levels even with extensive use of shields, it is important to stop Quarrian raids on the city's energy supply. When warning flashes, you must rush to break the Drayne ship's beam.

In these type of games, victory is usually slight at best. While it is possible to stay on level one for an extended period of time and shoot at waves of missiles launched from the Quarrior's hastily built base, sooner or later deadly single ships will prelude an armada intent to wipe you out. Sometimes it is safer to kill the last enemy ships and advance to the next level, although the war might best be won by losing Repton.

When the city is destroyed the battle shifts to the underground caves beneath the city. The object here is to destroy the Quarrior nerve center. You can no longer freely fly left and right, but proceed along a narrow tunnel against impossible odds. The ship can move up and down, but the left and right joystick movement only changes your position within the scrolling field by slightly speeding up or slowing down your ship. Clouds of ships attack, and dense packs of missiles endanger your advance.

The game's smooth graphics are very good; the detailed radar display is helpful throughout the game. While the game is not as fast and exciting as the real Defender, there is always plenty of action, and objects maneuver about the screen. Repton certainly offers a more relaxed and playable game with a choice of tactics.
**U-BOAT COMMAND**

**Company:** Synergistics Software  
**Language:** Assembly Language  
**Hardware Requirements:** 48K

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**Department:** Entertainment  
**Sugg. Retail:** $29.95  
**Availability:** 7  
**Disk or Tape:** Disk

**U-Boat Command** puts you in command of a submarine in this strategic, arcade action war game. The object is to pursue an enemy aircraft carrier before it can escape to the high seas. Enemy destroyers, patrol boats, and freighters also patrol these waters. All are dangerous in any encounter, and must be quickly destroyed. Enemy aircraft also pose a danger to your surfaced sub, if the aircraft option has been selected at the beginning of the game.

Your submarine has a periscope, sonar, compass, engines for cruising, batteries, an air supply for remaining underwater, machine guns, torpedoes for sinking the enemy and destroying his planes, and a sizable crew. All ship functions can be easily monitored on the Hi-Res display. The view out of the periscope can be swapped for a coastal map which shows the location of your submarine and the fleeing aircraft carrier. Other enemy ships and your own supply ships do not appear on the map. Your submarine's course can be altered using the A and D keys.

Vessels periodically encounter your submarine. They can be monitored on the sonar screen, and be seen through the periscope. Determining whether a ship is friend or foe can sometimes be quite dangerous. You have to keep your joystick controlled sight on the ship until it is close. Most ships look alike, and you don't want to sink a friendly supply ship. However, sometimes they return fire before you have had time to fire off a torpedo. When your ship is damaged, it pays to dive deep.

Staying submerged uses up battery power and a limited air supply. If you are being pursued by a destroyer, it will drop depth charges. These can be seen through your periscope as they float downward and explode at the same level as your submarine. There is little hope by this time to escape alive, for if you stay down too long and your batteries fully discharge, you're stuck. Although it is suicidal to surface, you might get lucky and put a quick torpedo into the destroyer before you are sunk.

The game involves very little strategy. Depending on which difficulty level you play, it is either an easy pursuit of the carrier, or you're continually delayed and harassed by enemy ships and planes. And as an arcade game, it doesn't take much skill to sink ships. The game is much more of a simulation than a true arcade or strategy game. The graphics are good, but the control system is illogical and very hard to remember. For example, they use the X key to surface, and the Q key to turn the motor on. It would have been more logical to use S for surface, D for dive, and possibly Q for motor off. I realize that it doesn't take long to learn their command structure, but many people have innumerable games, each having different commands. It would be nice if there was a logical approach to remember some of these. But overall, **U-Boat Command** is much more interesting than those old, two dimensional, shoot-'em-up "submarine versus destroyer" games.
GORGON

Company: Sirius Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B GAME CONCEPT B CREATIVITY C+ GAME DEPTH B

CONTROLABILITY B SKILL INVOLVED C+

CHALLENGE B GRAPHICS B

ERROR HANDLING N/A DOCUMENTATION B

HOLDS INTEREST C+ VALUE FOR MONEY C+

GORGON is Nasir’s version of the arcade game, Defender. Armed with three laser armed ships, your assignment is to defend the Earth and it’s last remaining humans from four breeds of villainous aliens that materialize in the sky. Although most of the creatures are bent on destroying your ship, one bird-like creature, a gorgon, swoops down to the ground to steal humans. With a series of nicely timed keyboard moves, one must kill the kidnapping bird, catch the falling person in midair, and deposit him safely on the ground.

Your ship is maneuvered over a scrolling battlefield with the two arrow keys for direction control. At the top of the screen, a sensor display, fed by orbiting satellites, shows the location of enemy invaders in relation to your ship. It is a useful tool, since one often flees from a screen full of monsters or from the floating mines that one creature releases, after which you need their location again for a future battle. The game is further complicated by the considerations of a limited fuel supply. Refueling is almost a game in itself as you maneuver your ship through twelve orbiting satellites to the mother ship.

GORGON lacks the high speed excitement of the original arcade game, but instead offers the challenge of winning in a more strategy oriented game. Control, which is entirely by keyboard and takes a lot of practice, would have been better on a joystick. The keyboard controls require pressing the arrow keys constantly to key the ship in motion. Nasir’s graphics are superb. He has brought the monsters to life with flapping wings and bird-like sounds. The game will certainly offer players a challenge.

NEPTUNE

Company: Gebelli Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B GAME CONCEPT B + CREATIVITY B GAME DEPTH B

CONTROLABILITY B SKILL INVOLVED B -

CHALLENGE B - GRAPHICS B +

ERROR HANDLING N/A DOCUMENTATION C

VALUE FOR MONEY B HOLDS INTEREST? B

Neptune is an undersea scrolling arcade game with a mission to destroy enemy robot amphibians that have invaded neutral waters. The depths are inhabited by Neptunians, pupfish, jellyfish, Octonians, and sharks. Most of these creatures can be destroyed either with your lasers or dropped bombs, but the Octonians must be avoided.

The ship is maneuvered easily back and forth and up and down by joystick control. Keyboard controls are also provided for those brave souls who shun electro-mechanical aids. The undersea terrain, consisting of rugged underwater cliffs and caves that sometimes dead end, are scrolled smoothly beneath your ship. Pacman shaped deadly bubbles tend to keep your ship from venturing too close to the bottom. The bombs that you drop, once caught in the water’s drag, tend to arc and go realistically backwards. The caves, which have two entrances, can be somewhat of a problem. One entrance proves to be a dead end and results in a loss of a ship. Traveling past the Octonians is definitely the hardest part of the game since your weapons are inhibited. Although there are several places to hide along the edge of the caves, a sudden burst of tiny bubble bombs forces the Neptune back in the path of the deadly Octonians. If you can maneuver past them, fuel is available in the motionless cave.

Level two of the game is strangely upsidedown. That means the ship is upsidedown and bombs fall upwards. While it is more difficult to navigate perceptively, it is not much more difficult than level one. Level three, however, adds a shark, and the Pacman-shaped deadly bubbles reach almost the midpoint of the screen.

Overall the game is quite enjoyable to play. The graphics are excellent and smooth except for an occasional flicker of the submarine which is caused by feedback from the two paddle read routine necessary for joystick control. Although it isn’t a super fast shoot-’em-up game, it has enough variety and depth to hold one’s interest.
**SEA DRAGON**

Company: Adventure International  
Language: Assembly  
Hardware Requirements: 48K  

OVERALL RATING  
GAME CONCEPT  
CREATIVITY  
GAME DEPTH  

CONTROLLABILITY  
SKILL INVOLVED  
CHALLENGE  
 GRAPHICS  

ERROR HANDLING  
DOCUMENTATION  
HOLDS INTEREST  
VALUE FOR MONEY  

Sea Dragon is a scrolling underwater arcade game in which you must guide your submarine past deadly mine fields, through narrow tunnels guarded by laser gun turrets and moving force field barriers, and along stretches of water inhabited by deadly eels and other sea creatures. Your goal is to destroy the dragon imprisoned by walls of scrolling bricks at the end of the forty-four screen long underwater tunnel.

Your submarine, the “Sea Dragon,” completely maneuverable by joystick or keyboard control, is armed with an unlimited supply of torpedoes and a sonic deflector. The latter is actually an annihilator, for it destroys everything on the screen. It is useful in some difficult sections, but it uses 500 units of air each time you fire it. Since you start with only 6,000 units, you should use this weapon only in emergencies. Besides, you aren’t awarded any points for killing anything with it. Each time your ship is hit or collides with the walls or mines, it receives a percent damage and begins again at the last checkpoint it has passed. While you only have one ship, it can sustain damage of between 10 and 15 percent per hit, and thus is equivalent to between seven and ten ships in other games.

Sea Dragon is very difficult with considerable depth. While the use of the sonic deflector will make it somewhat easier for beginners to see more of the game, it still takes an inordinate amount of time to develop a pattern and skill to defeat each of the obstacles. You have to gain ground literally inch by inch over a period of days or weeks. While this reviewer has never ventured beyond a quarter of the cave’s length, it seems that you would probably run out of air before reaching your goal. The obstacles are very unpredictable, especially the moving blinking force field. It doesn’t move smoothly enough for you to bypass it when it blinks off. The tethered mines are also confusing, as they too release upward to collide with your sluggish submarine.

The graphics are a little crude; moving dots, for instance, mark the boundaries of the tunnel. You need to be careful along the edge as these dots are always shifting with the contours of the tunnel as it scrolls left. Considering the difficulty of scrolling the screen, this graphics technique is a fair compromise. The game also talks when it boots up and initializes the system. It’s cute, but hard to understand as it says, “Sea Dragon” and “Aye, Aye, Captain.” It even announces “Approaching maximum damage” at appropriate points in the game.

Sea Dragon is an enjoyable game once you get the hang of it. Unfortunately, since it is very difficult it can frustrate beginners. There is certainly enough challenge and depth to attract and keep the expert player for a long while.

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**LUNAR LEEPERS**

Company: Sierra On-Line  
Language: Assembly  
Hardware Requirements: 48K  

OVERALL RATING  
GAME CONCEPT  
CREATIVITY  
GAME DEPTH  

CONTROLLABILITY  
SKILL INVOLVED  
CHALLENGE  
 GRAPHICS  

ERROR HANDLING  
DOCUMENTATION  
HOLDS INTEREST?  
VALUE FOR MONEY  

The whimsical creatures who populate Lunar Leepers hold a number of your cohorts captive. The object of the game is to rescue your friends from the Leepers and transport them to the safety of the cliffs before they become dinner for these long legged creatures. The creatures look harmless enough when you approach in your joystick controlled rescue craft, but don’t be deceived; they are quite capable of outjumping any of the Calabassas County jumping frogs. They extend their long legs as if they were spring loaded and leap almost to the top of the screen. They can digest metal, so if your ship gets in the way, they grab it, shake their heads several times, and swallow you whole.

Your ship lacks brakes and has a bit of inertia to it. Once you learn to control it, outwitting the Leepers still takes practice. Their leaps are predictable and, of course, you have guns activated by one or the other joystick buttons,
depending on which direction you would like to shoot. Although you can learn to kill them easily, they happen to be
worth more alive than dead. You get twenty points for killing one, but one thousand points for each one left alive
after you've rescued all your men.

The strategy is to learn to outwit them. You can't just rescue a captive and fly high to avoid the Leepers, for they
invariably manage to steal the guy you're carrying beneath your ship. You can't even take your time during the
rescue, because when lunchtime comes a Leeper slowly creeps over and eats one of your friends, whom he regards as a
gourmet morsel. Your rescue strategy must also consider refueling. You have to outfly those leaping Leepers and
return to one of the two bases before you run out of fuel. The bases are on either side of the terrain; a radar gauge at
the bottom of the screen tells you the distance from them. When you have rescued all the hostages, or killed all the
Leepers, you advance to stage two.

Now your mission is to destroy the gigantic Queen Trabant at the end of a long tunnel beneath the planet's
surface. Of course, an army of smaller Trabants, as well as strategically placed laser beams, guards the queen. It's
actually an easy mission on the first level of difficulty if you don't run out of fuel before you dispatch the enemy. The
Trabants don't shoot back until level two, and by then several Trabants escaped from the cave have filled the above
ground rescue scenario. They now make your mission a real challenge. On upper levels, the little buggers even shoot
back in the caves. The game allows you to choose your own starting level.

Lunar Leepers is a silly but thoroughly enjoyable game. The animation is cute and the slow paced action is a good
meld of a straight rescue game and the typical shoot-'em-up scenario.

### PEST PATROL

**Company:** Sierra On-Line  
**Language:** Assembly  
**Hardware Requirements:** 48K

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<th>ERROR HANDLING</th>
<th>DOCUMENTATION</th>
<th>HOLDS INTEREST</th>
<th>VALUE FOR MONEY</th>
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<td>C+</td>
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<td>C+</td>
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<td>C</td>
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Pest Patrol is a shoot-'em-up game against a variety of garden pests that attack your spray can (gun) in patterned
attacks that differ on each of forty levels of difficulty. The grouping of creatures and attack mode may vary, but the
intent to destroy you with four types of bombs remains the same. Six different types of creatures may drop bombs
that simply explode on impact, bombs that home in on your position horizontally, time bombs that sit on the ground
before exploding, and last but not least, homing time bombs.

Each different creature requires a different number of hits to kill, and some are greater menaces upon landing
than while in the air. The numerous fleas pose little threat, but the beetles when they touch earth slide across the
ground in the direction they're facing. You can't avoid them. On the other hand, careful timing will permit the
hopping spiders to hop over the can and back and forth across the screen several times before disappearing. It
requires three hits to kill one. The slow moving worms require four shots to die, and if you don't kill them within a
certain time, they metamorphose into killer butterflies which you need five shots to finish off. They are especially
dangerous because they home in on your can. However, if you manage to kill one, it is worth 250 points whereas the
others are only worth between three and ten points. The snails are the most intriguing because they are totally
immune to the can's shots, and they act as a shield for the other creatures that swirl above them in attack formation.
In the end the snails get their just desserts as they die upon contact with the spray can.

The attack techniques vary from level to level. Sometimes the pests fly in a swirling pattern, at other times in an
undulating or dive bomb pattern. Sometimes they play follow the leader, at other times attack singly, occasionally
bounding off the bottom. While each level is different, they don't necessarily become progressively harder. There
appears to be a scattering of easy and hard levels throughout the first thirty levels that I've seen.

Fortunately Pest Patrol offers a practice mode where you are allowed to choose your starting level among the first
thirty. This allows the player to practice techniques against the creatures on some of the harder levels. In fact, you
can practice for a long time because they give you nearly eighty guns. Using the + and - keys, you can quickly
change levels. Gun control is by keyboard, paddle, or joystick.

For a shoot-'em-up game, Pest Patrol offers the player good variety. Like Threshold, its sister product, Pest Patrol
provides a considerable challenge and stirs the player's curiosity to reach the upper levels. If the game proves too
easy for the hardened addict, he can always choose the fast mode.
**THE BOOK OF APPLE SOFTWARE**

**Company:** Southwestern Data Systems

**Language:** Machine

**Hardware Requirements:** Machine

**OVERALL RATING**

- **GAME CONCEPT:** C-
- **CREATIVITY:** D+
- **GAME DEPTH:** D-

**CONTROLLABILITY**

- **SKILL INVOLVED:** D+
- **CHALLENGE:** D+
- **GRAPHICS:** D+

**ERROR HANDLING**

- **DOCUMENTATION:** D+
- **HOLDS INTEREST?:** F
- **VALUE FOR MONEY:** D-

---

This “shoot-em-up” alien game is a good lesson in how to market a mediocre game in such a way that the public will take notice of the product. It is reported to be written by an alien; the instructions and scorekeeping are, of course, in the alien tongue. The object is to invade Earth and, upon landing, destroy tanks and a fleet of intercepting space shuttles. Phase one is elementary. You must shoot all the shuttles coming at you and not let any get by. If any do, you advance to the ground battle in part two.

Your joystick-controlled ship has at its disposal a rack of two mines and two rocket launchers. You can move up to the rack, take a mine, and place it in the path of an oncoming tank, or, instead, grab a missile and fire it vertically at a tank. Although you have an unlimited number of missiles, only two mines are available. If a tank strikes a mine, it appears again in the rack. Otherwise, it remains immovable on the battlefield. The game ends when you lose your only ship.

When the game ends, it leaves you with an empty feeling. You aren’t sure how well you have done. This is not to say that the score is unreadable, just mysterious. I’m sure that if you take the time, you can figure out the character set. The game’s concept and depth are shallow and do not hold your interest. It is a game that should have graced the pages of a magazine, not a commercial software company’s catalog.

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**THRESHOLD**

**Company:** Sierra On Line Systems

**Language:** Machine

**Hardware Requirements:** 48K

**OVERALL RATING**

- **GAME CONCEPT:** C
- **CREATIVITY:** C+
- **GAME DEPTH:** B+

**CONTROLLABILITY**

- **SKILL INVOLVED:** B
- **CHALLENGE:** B+
- **GRAPHICS:** B+

**ERROR HANDLING**

- **DOCUMENTATION:** C
- **HOLDS INTEREST?:** C+
- **VALUE FOR MONEY:** C+

---

THRESHOLD closely resembles the arcade game, “Astro Blaster”. The object is to destroy waves of attacking aliens with a paddle controlled space ship. It’s the usual scenario, with this exception: the game offers substantial depth and variety. There are 24 types of attackers. Some present easy targets while others consist of vicious kamikazes, which are very durable and elusive. Some fly in formation, while others bounce around the screen erratically. Each has a personality and shape of its own. There are flying fish, revolving spaceships that turn smoothly on their axes, maple tree helicopters and Volkswagen bugs.

The player has five expendable ships that he can use for battle. Aiming and shooting is precise and effective, but one’s gun may become overheated from rapid firing. If this occurs, one must bide his time dodging bullets while the guns cool.

The graphics animation is exceptionally smooth. Objects have no problem passing in front of each other. The only complaint is that the moving star field can be confused with the rain of alien bullets. The bullets on a color set appear as colored objects; but they should be made to appear more distinct to distinguish them from the star field, if not larger. However, there is an option to eliminate the star field for those using a B&W monitor.

The game will appeal to many dedicated space game fans. The contest has many levels, so that only a few players will reach the end; yet most, driven by curiosity, will make the attempt as the pseudo-addictive aspect takes hold.
ICE DEMONS
Company: Morning Star
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING   D
GAME CONCEPT     D+
CREATIVITY       D
GAME DEPTH       D+
CONTROLLABILITY  D+
SKILL INVOLVED   C-
CHALLENGE        C-
GRAPHICS         C-
ERROR HANDLING   N/A
DOCUMENTATION    C
HOLDS INTEREST   D
VALUE FOR MONEY  D

Ice Demons is a one or two player shoot-'em-up game in which the object is to kill all of the Ice Demons living in the cavern depths beneath the ice packs of the frozen North. Sensing your presence, they lurk just beneath and emerge to surround and destroy you. Each of these creatures is endowed with magical power. The Slime, by far the most numerous, shoot arrows that track you and can temporarily paralyze you if they strike home. Plebes, of which there are fewer, can teleport anywhere on the ice field. The Widowmaker may be impossible to kill, and the Willowisp moves with lightning speed. Their icy touch is usually fatal, although sometimes playing possum will save you.

You maneuver your man, who carries an unlimited supply of arrows, about the ice field using a single paddle controller. He moves in the direction of his pointed nose when you depress the button, and shoots an arrow when you press quickly. While this prevents you from moving and shooting at the same time, and sometimes isn't responsive enough when you need to shoot quickly, it is the only control method on the Apple suitable for a two player game.

Two magical aids appear periodically. A giant magic arrow helps you fire more rapidly, and the Teleporter aids your escape from the overwhelming enemies by transporting you to a deeper, harder level much closer to the High Master whom you have vowed to kill. In addition, a magic dollar sign bonus appears. It can be collected for points, but hitting it causes it to shatter into a deadly barrage of sixteen arrows mortal to the ice demons.

If two players play this game, they can choose between playing cooperatively or competitively. In team mode, your arrows can't harm each other, as you both maneuver simultaneously about the icefield; however, in the competitive mode, players score for killing each other. Both team members need to use the transporter to reach the next level, but when playing cutthroat, only one does.

The game requires much strategy to outwit the demons, and some experience to determine what is effective against them. The player's nose is very effective in stopping arrows or fireballs, and sometimes quite effective at bumping them back into the holes as they emerge. While the game concept is fine, Ice Demons itself lacks any true excitement and suffers from mediocre flickering graphics and poor sound effects. The control system is barely adequate. It is a good idea that lacks polish.
GUARDIAN
Company: Continental Software
Language: Machine
Hardware Requirements: 48K

You play the Guardian of the sacred “Emerald of Syrinx” in this space western action arcade game. Your mission is to safely deliver the gem through six levels of the Dungeons of Kailyn. This is not an easy task, for the evil creatures from all your favorite arcade games pursue you in the maze-like levels.

Starting in the center of a maze of harmless walls on level six, you guide your hero by either joystick or keyboard control. You aim and fire your laser pistol by holding down the button while aiming the gun. The hero squats and aims while the button is depressed, and fires when it is released. At first the creatures ring you and prevent you from reaching the stripped teleportation chamber at the corner. After firing one shot, they immediately converge. Most are stopped by the maze walls, but a few ooze right through the walls. It becomes a fast and furious fire fight as you race to the nearest teleport chamber, which just happens to change position to another corner with each alien killed. The time limit on each level doesn’t let you dawdle.

The lower levels of the dungeon are more difficult. Levels three and four have lethal walls indicated by red, while levels one and two have walls that vanish after about five seconds, leaving you with a dim memory of where they were. Any contact with these walls means instant death. Killing all the aliens on any one level adds to your high score, but in an odd sense of logic, killing that last one gives you another screen full. The best strategy is to kill only those that block you from completing your mission. However, winning the game with a low score can be as meaningless as not winning at all. While it is not very difficult to complete the mission in normal play mode, the expert mode is much more challenging in that the game doesn’t end when you survive all six levels. The expert mode allows you to shoot for a high score. In sum, Guardian is a diverting game for dedicated arcade fans.

BATTLESIGHT
Company: Versa Computing
Language: Applesoft
Hardware Requirements: 48K

Battlesight is a real time tank warfare simulation that was developed by an Army major and several programmers. Taking the approach that real tank warfare involves the time and efficiency of the tank crew in reloading the main gun, the inaccuracy of shelling at long distances, and slow turret slew rates, the programmers produced a 3-D game that lacks the excitement of an arcade game yet is somewhat realistic. With gun reload times approaching ten seconds, you’re essentially a sitting duck when five or more Russian T-62 tanks are approaching below your hillside position. The strategy becomes: shoot first, fast, and move often.

Unfortunately, the simulation is not as realistic as the authors would like us to believe. The viewfinder, in all tanks, has a rather narrow field of view, more periscope in nature or similar to the view in the arcade game Battlezone. This game, on the other hand, has a rather wide field of view showing three to five tanks abreast. Actual tank turret slew rates are much faster than in this game. Also, one of the most important factors in firing shells is the enemy’s range. This is totally ignored here, although the program is less likely to award a kill at greater distances. As I said, the graphics are three dimensional in that tanks will move off screen as the tank turns, but the background unrealistically remains stationary. Only three size tank shapes are used for the display. Tanks moving forward suddenly grow in large, discontinuous jumps.

The game begins with five defending tanks situated on a hillside overlooking a major artery for the invasion. Several columns of tanks appear in the distance. You can aim the tank turret with a joystick, or drive the tank either by turning the tank on its treads or moving up and down along the hillside edge by depressing button #1. Button #0 fires the main gun and the space bar fires machine guns for downing surveillance aircraft. Enemy helicopters firing Sagger anti-tank missiles must be downed quickly with the main gun before the missiles reach your position.
As in all tank warfare, it is best to conceal and protect the tank by maneuvering behind the grassy knolls which may possibly be blasted away in the heat of the battle. Don't squander ammunition, since it takes time to reload, and firing reveals your position to the enemy. It is often best to wait until the enemy gets closer. But this, too, has its disadvantages as there may not be sufficient time to kill all the enemy before they get past your position. The game ends when either five tanks escape or you lose your five tanks.

Battlesight has five levels of difficulty, and one can opt for night fighting for an added challenge. This option reveals enemy tank positions during the brief flash of the enemy's return fire. Although levels one to four get progressively harder as the number of enemy tanks increases, level five is essentially for beginners. This level allows one to shoot rapidly: every two seconds for inefficient crews, and every second for efficient crews. This level, although more arcade like, offers virtually no challenge. The other levels require much more decision making for survival. Should one risk stopping to repair a damaged turret, for example, or attempt to aim the gun by maneuvering the tank treads?

Overall the game has considerable merit with elements of realism. While some arcade players have liked the game, others found it slow and boring. Despite its weak graphics, I think the game will appeal more to war game enthusiasts than to arcade game players.

HADRON

Company: Sirius Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING: B+
GAME CONCEPT: B
CREATIVITY: B
GAME DEPTH: B+

CONTROLABILITY: B
SKILL INVOLVED: B
CHALLENGE: B+
GRAPHICS: B+

ERROR HANDLING: N/A
DOCUMENTATION: B+
HOLDS INTEREST: B+
VALUE FOR MONEY: B

HADRON is an excellent three-dimensional space arcade game. It is a definite improvement over the author's earlier game, "Epoch". The object, as usual, is to destroy as many of the enemy's fighter craft and surveillance ships as possible before running out of fuel or ammunition. The goal is to follow the returning fighter craft back to their fuel base and destroy it. Accomplishing this mission results in refueling and rearming your ship while advancing you to a higher level wherein fighter craft are different and deadlier.

What sets this game apart from the homogeneous shoot-em-up is the variety of animated enemy spacecraft and the skill required to destroy them. Each craft is vulnerable only in certain spots, which are clearly indicated in the HADRON foe chart. Patrolling fighter craft are vulnerable if hit in the engine exhaust ports. There are optical sensing craft that play peek-a-boo using their susceptible-to-destruction gear, plus relay stations that can be destroyed with a direct hit on their rotating antenna. Included, also, are about twenty different targets, with a high speed saucer being the most difficult to hit. There are also fields of asteroids that must be blasted away or avoided and several undocumented space craft.

The control system defaults to joystick control; keyboard play is also possible yet not recommended. One joystick button accelerates, the other decelerates. Pressing both simultaneously fires your gun. The steering sensitivity can also be adjusted, using the numeric keys 1 through 5.

There is a considerable amount of return fire from patrolling enemy fighter craft. One can reduce this by quickly destroying many of the enemy fighters. A direct hit on your shields by either enemy flack or collision reduces your energy by nearly 200 units. Fuel is also expended by steering and speed changes. While conserving fuel is important if one attempts to attain a high score, there is an adequate supply for a game lasting from five to ten minutes.

The graphics are very good. Although some may be disappointed by the block-shaped asteroids and space craft, as ships get closer they acquire an amazing amount of detail. The three-dimensional display is realistic, with closer objects hiding parts of background objects. The only criticism extended concerns objects which leave the screen edges and don't reappear even if one returns to the point at which they vanished.

The game's concept is very sound, as well as very enjoyable to play for extended periods of time. It is not an extremely fast action game but it is one in which the player becomes totally involved. The game offers plenty of variety and requires precise sharp shooting skill. It comes highly recommended by this game-playing reviewer/fanatic/addict (choose one).
**STAR BLAZER**

**Company:** Broderbund Software  
**Language:** Machine Language  
**Hardware Requirements:** 48K

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<tr>
<th>Overall Rating</th>
<th>Controlability</th>
<th>Skill Involved</th>
<th>Challenge</th>
<th>Graphics</th>
<th>Error Handling</th>
<th>Documentation</th>
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**Department:** Entertainment  
**Sugg. Retail:** $31.95  
**Availability:** 8  
**Disk or Tape:** Disk *

*Star Blazer* is a five level scrolling arcade game, where your mission is to destroy various ground targets on each level by low level aerial bombing. The mission takes place over arid oil field terrain replete with oil derricks and cactus. What sets this game apart and elevates it to star category is the game’s fine detail and technique required to kill a target or simply to stay alive.

The fine detail in the game is outstanding. Bomb bay doors open when your plane descends to low level bombing, and bombs hitting trees or cactus either get snagged in the branches or bounce off the tops and spin end over end before ploughing into the sand. A collision with a tall oil derrick shears off the structure and results in fragments of your plane arcing slowly to Earth. And while you’re trying to maneuver under a spare fuel tank parachuted to you by a friendly supply ship, you watch the chute cords cut by enemy craft, and then, just barely missing the catch, you view the high octane fuel explode on impact with the ground. Then there is the sheer beauty of watching one of those tank-fired, ground-to-air, heat seeking missiles just miss the rear of your bomber as you perform a quick but subtle maneuver, and continue to watch in amazement as it arcs overhead, does a 180 degree turn, and attacks from the front while you desperately try to down it with your pulse cannon.

Developing a technique to deal with each of the targets in the five missions is the key to winning this game. Bombing the radar in mission one is relatively easy except that the radar is often under a tree or the far side of an oil tower. This requires pulling up fast and lobbing the bomb in. You’ll lose many planes perfecting this trick. Bombing the supersonic tank on level two has many solutions. Everyone who plays the game has a favorite strategy, since no matter how fast you fly or how far you lure the tank towards you, the bombs miss target. Some claim the cactus slows the tank just enough to catch it, others try altering the bomb’s trajectory through clever flying, while some kill it by burying it under a falling fuel tank. The third level requires care and patience to either shoot the aerial mines and slow transports, or play cat and mouse with them while awaiting your ICBM target. The trouble is that they tend to keep you away from your target. Dealing with the missile and tank on level four isn’t as bad, but avoiding two missiles fired nearly simultaneously on level five — no way.

*Star Blazer* is played with a joystick or by keyboard. The game is very enjoyable using a joystick, and definitely addicting. I only wish there was a quick way to reach level five, because I need the practice.
**ZENITH**

**Company:** Gebelli Software  
**Language:** Machine  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**GAME CONCEPT**  
**CREATIVITY**  
**GAME DEPTH**

B  
B  
C  
C +

**CONTROLABILITY**  
**SKILL INVOLVED**  
**CHALLENGE**  
**GRAPHICS**

B +  
C  
C +  
B +

**ERROR HANDLING**  
**DOCUMENTATION**  
**VALUE FOR MONEY**  
**HOLDS INTEREST?**

N/A  
C +  
C +  
B -

*Zenith* is one of those Nasir space games that has interesting graphics, yet is predictable and not very challenging. The object is to protect a partially built space city from alien attack. Your fighter plane is highly maneuverable and armed with a laser. The enemy, flying oddly shaped geometric ships, often bail out over their own territory, and with skill can be captured and traded for fuel and repairs. The trick is to capture and trade aliens quickly, for they turn blue and disintegrate after only a few minutes of captivity.

The graphics display, a view of the terrain out of the front cockpit, is extraordinarily fast for an Apple computer. The view, as in a flight simulator, banks back and forth rapidly in response to your joystick control. You can swoop and soar like a space jockey without worrying about crashing. The action is so rapid that you can become nauseous while playing the game on a six foot screen.

The enemy’s tactics are to set fire to your buildings. Burning buildings appear as flashing lines on the display or as fires on a map that can be requested by pressing the ESC key. The aliens also shoot at you, but their fireballs are so slow that they can easily be dodged. Your job is to repair these buildings by flying over them and pressing button #1. This same button is used for capturing aliens, while button zero is for laser fire.

The game is much easier to play with joystick control than with the slower keyboard control system. One gripe I have is that you are never sure if you made a kill. The alien often vanishes whether you hit it or not, often because you flew past it. However the score reveals the real results. I wouldn’t say the game has much depth or will hold your interest for long; it depends on the individual. The game does have merit, but I would recommend trying it before buying it.

**CROSSFIRE**

**Company:** Sierra On-Line Systems  
**Language:** Machine  
**Hardware Requirements:** 48K

**OVERALL RATING**  
**GAME CONCEPT**  
**CREATIVITY**  
**GAME DEPTH**

B  
B +  
C +  
C  

**CONTROLABILITY**  
**SKILL INVOLVED**  
**CHALLENGE**  
**GRAPHICS**

D +  
B  
B +  
B

**ERROR HANDLING**  
**DOCUMENTATION**  
**VALUE FOR MONEY**  
**HOLDS INTEREST?**

N/A  
C  
B  
B +

*Crossfire*, a shoot-'em-up contest in which you defend a city’s streets from attacking aliens, has its roots in the arcade game, “Targ”. But where “Targ” allowed you to shoot only in the direction towards which you traveled, *Crossfire* has expanded the possibilities, resulting in a much more complex game. However, the ability to travel and shoot simultaneously in different directions requires a keyboard-controlled game. This makes for a contest that is difficult to play, requiring considerable practice. A pianist might be more suitable as a participant in the exercise involving control-key arrangements (pyramidally-arranged E,S,D,F keys for firing, I,J,K,L for moving, and the space bar for stopping).

You patrol the block-like, grid-oriented streets of a city surrounded by alien creatures. Your guns contain 35 missiles. As you play cat-and-mouse with their advancing forces, you move into an intersection and fire. If you hit one, it metamorphoses into another creature worth more points. Occasionally, a bonus shape appears on one of the central streets. If you can reach it before firing six more rounds, it is worth points; otherwise, it disappears. When your ammunition runs low, a fuel depot appears somewhere in the city. At that, it isn’t easy to reach, with more than a dozen laser armed creatures gunning for you.

*Crossfire* is a very challenging game with effective, fluid graphics; however, it unfortunately suffers from what most will consider an impossible control system. Playing a game like *Crossfire* requires the player to have excellent multifinger-eye coordination. A minimum of at least half an hour’s practice will normally be required in order to score more than a few hundred points. Those lacking a modicum of patience will probably move on to another game which is more fun and easier to play before even giving this game a chance.
FALCONS is a remarkable and faithful version of the popular arcade game, Phoenix. The game has five levels of depth. It begins like any Galaxian game: formations of aliens peel off and attack (except these birds visually fly back up). In level two, they combine into a different formation with more cunning attack strategy. Levels three and four present you with rotating spiral targets which grow from small dots to large eggs that hatch into giant deadly Phoenix birds. Defeat these birds and you get to attack the giant mother space ship. It is protected by swarms of attacking birds. Your object is to blast a hole through the hull into the central control room. Good luck; this game is a doozy!

One can use paddles, joystick or even an Apple III keyboard. You’re given three paddle- or joystick-controlled ships that move across the bottom of the screen. One of the joystick buttons shoots, the other creates the shields. Shield use has its penalty. One can’t move during its five second effectiveness and it can’t be reused for the same time afterwards. The problem is that these enemy birds are “intelligent”. They seem to know when you are most vulnerable, like when your shields drop off. The birds drop below the bottom of the screen and sometimes fly right into you from below. While this doesn’t seem fair and is frustrating, it makes it even more challenging. Also the amount of maneuvering room under the space ship is much narrower than in the real game. The birds are always too close and give you little reaction time. The screen in the arcade is very long from top to bottom and has plenty of room. Finally, there is one annoying bug in this early version. Sometimes a bird isn’t completely erased when killed during the attack on the ship. If this happens below the central core, the shape blocks the shots. Hopefully, it will be fixed before you read this.

In summary, the game is very well executed and visually attractive (more so on the upper levels than on the first two). However, it is a very difficult game that can become frustrating after continuous and lengthy ignominious defeats.
PEGASUS II

**Company:** Sierra Online Systems  
**Language:** Assembly  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>GAME CONCEPT</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
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**OVERALL RATING:** B+
**GAME CONCEPT:** B+
**SKILL INVOLVED:** B–
**CHALLENGE:** C+
**GRAPHICS:** B+

PEGASUS II is the Apple version of the arcade game Scramble. It incorporates some of the smoothest and fastest Hi-Res horizontal scrolling to date. The object of PEGASUS II is to attack an enemy's ground targets and defense installations located on the landscape below your flying ship. The player is armed with laser cannon and bombs and has a limited fuel supply. As you fly over the enemy terrain, the enemy launches rockets at your ship. Flying dragons block your path to your refueling base, and birds and flying saucers attack in waves when you get further into their defense zone. There is even the inevitable tunnel defended by tunnel killers, but that is so far into the game that beginners won't see it for some time.

Controllability is of prime importance in a game as fast as this. Our test-case players have had mixed reactions. Initially, the game gives you a choice between joystick and paddle. The joystick mode (self-centering recommended) is definitely easier for maneuvering the ship up and down plus back and forth along the left side of the screen. However, activating the A and S keys for shooting and dropping bombs while holding a sensitive joystick with the other hand requires the dexterity of the renowned one-armed paper hanger. Firing has to be so rapid that one wonders if the keyboard will survive the pounding. Some players resorted to having their friend do the shooting while they maneuvered the ship. A better solution would have them use the joystick buttons. On the other hand, it seemed easier for one person to use the paddle mode.

The control change incorporates the space bar for toggling the ship to move forward and backward; hitting it again will stop movement. The paddle, which is very sensitive and uses only part of the range, is better for maneuvering through the asteroid field. One fault of the control system is that if your paddle is turned too far in the direction pertaining to the ground, one crashes repeatedly into the terrain before the ship is moved upwards again.

The program is novel in that it allows you to generate your own landscape. Twenty-one frames can be created using a paddle. They are assembled at random when the game begins. Defense facilities require that at least one third of the terrain be level.

The game graphics are superb. The scenario is one of the longest of any arcade type game we've seen. The contest is somewhat difficult to control but definitely an addicting and worthwhile game.

Lasersilk is a game where a spider defends his territory or web against annoying insects and deadly bugs. These bugs, which become momentarily caught in the web, must either be captured and spun into a bundle, or be shot from a distance with lasersilk. If the bug isn't dispatched quickly, it will likely tear a piece of web off as it escapes. These gaps may likely leave your spider stranded, and prey to deadly attack spiders and the darting electrode bug. Beetles and ants that steal your bundled prey and inflict considerable damage to the web are the other dangers.

The game is played with either keyboard or joystick controls. Lasersilk fire is only left or right, so that the spider must maneuver carefully when attacking his prey. Of course, bundling is worth more than just killing, and enemy spiders aren't harmed at all by lasersilk. The game is tiresome to play, especially while trying to remember which of the ten different bugs are safe to bundle and those that are deadly. The game on lower levels is quite easy, but you can start as high as level nine. In summary, although the game has some merit, it does not hold any lasting appeal.
Occasionally an arcade game comes along that is so unique, so well executed, and such a joy to play that it can be considered a masterpiece. *Choplifter* is such a game. The game involves flying a helicopter into the desert in order to rescue sixty four hostages held prisoner in four barracks. One of the barracks has been blown open and sixteen of the prisoners are waiting patiently for your arrival. Unfortunately, tanks are patrolling the area so the hostages are reluctant to stray far from the burning barracks.

Your helicopter (there are three) is warmed up on the heliport next to the post office near the border. The helicopter responds to the up, down, and sideways movements of the joystick. Although helicopters can fly backwards in a limited fashion by pitching the direction of the rotating blades, control is provided for turning the helicopter around in order to aim its guns. Holding button one down reverses direction, and pressing it momentarily puts it into tank attack position directly facing you on the screen. The helicopter is easy to fly, and impossible to crash on level one.

It is important to set the helicopter down as near to the prisoners as possible without landing on one. The shorter their run to the copter the better, for tanks are always moving up on your position, and you often have to make a quick getaway. It is always best to destroy a tank quickly, but first lure it away from any prisoners still on the ground, for they are often killed by exploding shells. The animation in these sequences is incredible. These prisoners actually run towards your chopper. The chopper’s blades are rotating and the craft is bouncing slightly as if you were gunning the engine in anticipation of a quick takeoff. As the moving tanks lob shells closer to your craft, the exploding shells sometimes kill a running prisoner. When the prisoners are aware of your leaving, or if your chopper is full, they wave goodbye. There is detail in their motion as they run after your hovering helicopter, or as they run from an advancing tank. You’ll watch in amazement as your helicopter is hit by an enemy shell just after it lifts off and it turns into a ball of fire and descends as flaming wreckage.

After rescuing as many as sixteen hostages (the copter only holds sixteen), you return to your base and the second level of the game begins. Enemy jet fighter craft guard the airspace above your advancing craft. They turn and bank sharply while firing rockets at your chopper. Sometimes it is best to maneuver into position and try to shoot them down. Just flying along is like being a sitting duck. A quick attack on a barracks usually frees another group of hostages. Rescue is more difficult at this point as missiles can still hit you from above. The only consolation at this point is that enemy aircraft stay on their side of the border. However, on level three, enemy drone air mines that are capable of homing in on your craft don’t care what side of the border you’re on.

The helicopter is extremely easy to fly. You do have to be more careful of your descent rate on the upper levels or you will crash the copter. The maximum score is obtained by rescuing all sixty four prisoners. Since this is a formidable task, I would consider this a very challenging game. Overall, the concept, graphics, and animation make this a delightful game. If you are seeking something novel and a game that doesn’t quickly bore you, then buy *Choplifter!*
Two fun-loving Zerks have escaped from their game machine in this madcap romp through the local arcade. The object in *Spare Change* is to fill up the token bin with enough tokens to see one of the slapstick cartoons in the Zerk Show. The problem is that you must simultaneously keep the Zerks from collecting 5 tokens in their piggy bank as you collect your tokens or you lose the game.

The arcade runs on a token economy. There are four token machines and you have to race from token dispenser to your bin and back again. Speed is essential, as the Zerks are also collecting tokens. The playful Zerks stomp around for awhile and even toss the token back and forth between them before flipping it into the piggy bank. This gives you a good chance for an interception. Sometimes they even miss.

The token machines require money, which you must get from the cash register. If the cash register is emptied, you need to get money out of the safe. Even some of the token machines will run "Out" and need to be restocked. With all this running around, combined with the Zerks knack of stealing from your pile, the game becomes frantic.

Lucky for you, the Zerks are easily distracted. These toe-tapping creatures can't resist dancing deliriously if you start up the jukebox. This keeps them occupied while you gather a few more tokens. The popcorn machine and the pay telephone are other means to distract them on some of the upper levels. They are incurable gabbers.

You have to prevent those Zerks from filling their bank. If it looks like they are about to win and you have at least ten tokens saved in your bin, you can sacrifice seeing the cartoon by entering the Zerk Show Door. You won't see the show, but everyone loses their stash, including the Zerks.

The game is either joystick or keyboard controlled. A joystick is almost necessary, especially for the kids who are most likely to take this game to heart. The game can be adjusted in difficulty by altering up to seven characteristics of the Zerk's behavior patterns. Thus, the game can be made quite easy for a seven year old or incredibly challenging for a seasoned teen.

*Spare Change* is a light and humorous game with great animation and zany characters. It is likely to amuse the younger set because it is cute, different, and full of surprises. There is a slapstick cartoon reward at every level featuring, you guessed it, those two zany Zerks, Ozzie and Zeke. The kids will play this game until they have seen all of the cartoons. *Spare Change* is pure entertainment.
APPLE CIDER SPIDER

Company: Sierra On-Line Systems
Language: Machine
Hardware Requirements: 48K

OVERALL RATING C−  CONTROLLABILITY C  ERROR HANDLING N/A
GAME CONCEPT C  SKILL INVOLVED C  DOCUMENTATION D+
CREATIVITY C−  CHALLENGE C  HOLDS INTEREST? D+
GAME DEPTH C−  GRAPHICS C+  VALUE FOR MONEY C−

Apple Cider Spider is an arcade game in which you guide a spider through three levels of an industrial building that manufactures apple cider. The object is to navigate your way through the working machinery past random frogs and wasps, all the way to the attic without getting crushed or eaten. While you are busy methodically climbing, apples are moving down chutes, along conveyors, through crushers where their juice flows down to the bottles set below. You can barely get through even if you time your ascent carefully and use many of the pre-hung webs dangling from strategic places to reach the top of each screen.

This is a game that apparently has only one solution. It may take some players considerable time to master it once, but it isn’t a game to replay. Control is satisfactory by either keyboard or joystick, but the trick is precision in jumping and climbing. The graphics are satisfactory and interesting yet they do little to enhance the lack of depth to this game. It is a nice little game, but one that you will tire of quickly.

LODERUNNER

Company: Broderbund
Language: Machine
Hardware Requirements: 48K

OVERALL RATING A  CONTROLLABILITY A−  ERROR HANDLING N/A
GAME CONCEPT A  SKILL INVOLVED A  DOCUMENTATION B+
CREATIVITY A  CHALLENGE A  HOLDS INTEREST? A
GAME DEPTH A  GRAPHICS B  VALUE FOR MONEY A

Loderunner is a challenging game with 150 different screens or levels. The game is one of those climbing, jumping, ladder and platform style games in which the object is to recover the gold scattered about in the various treasury rooms. Each treasury room is guarded by three or more bumbling Empire guards who aren’t very bright and can be easily trapped by your unarmed Intergalactic Commando.

The game is joystick or keyboard controlled. The commando can climb ladders, jump down from any height, walk across platforms, and travel hand-over-hand across the bars spanning high spaces. He is equipped with a laser drill pistol to drill passageways through fissured bricks in order to reach hidden gold in sealed chambers or jump between levels. These pits are also the only way to kill or trap a guard.

Each of the Loderunner levels presents a fresh challenge, but many require a bit of strategy to master. Some appear unsolvable even after playing them for a long time. They are all solvable but often they build on clues found in earlier levels. Although you can play any level by using the documented cheat keys, there is a certain progression to the game that begins on the first level. These cheat keys also let you play more men, but if you use the cheat keys, you can’t save your high score—a fair tradeoff.

With the inclusion of a screen editor to create your own levels, the author elevates a game with good depth to one with unlimited depth. This editor allows you to easily create storage disks with 120 different levels. It is the simplest game generator on the market. The cursor is moved about the screen with the I, J, K, and M keys. Choosing one of the number keys places floors, ladders, handbars, trap doors, gold chests, enemies, and the player anywhere you please. The 0 key erases mistakes. The Control-S key combination saves the board before you play-test it. Fine tuning each board for playability becomes the hardest part of the game design.

Loderunner is a definite winner. Its graphics offer good animation and it has surprising depth. Strategy is emphasized over outright violence, and the game is won only through planning and strategy.
Miner 2049er is a ten screen arcade game in which the object is to claim or capture each mine station in a mine inhabited by mutant organisms. In some ways the game is similar to Donkey Kong in that the player, Bounty Bob, climbs and jumps about on a building framework. But the game is certainly no copy and, in fact, is much more involved since each mine station has a different set of hazards and requires a different technique to beat.

As your player moves about the mine station, the framework beneath his feet turns to a solid color. To claim a station and advance to the next, you must fill in every section of the framework. The framework is often connected by ladders, and Bounty Bob can leap across sections at the same elevation. However, if you fall too far by miscalculating a jump, it can mean instant death. Deadly mutants also roam the framework, but you can dispose of them if you touch one of the apples scattered about. The mutants, who turn green for a few seconds, are then vulnerable. In addition, most of the mine stations have a hazard, like the radioactive pool on level six, and the stomper on level nine.

Miner 2049er is a race against time. A timer constantly ticks down while you try to fill the floor on each section of the framework. If it runs out, you die; but if you're successful, the remaining time is awarded as a bonus.

Either an Apple type or Joyport compatible Atari joystick can control the game well. The entire game "feels" cohesive because it has a consistent design scheme, rather than a conglomeration of separate ideas for each level. Each of the stations is consistently harder. The first two or three levels are sufficiently easy for beginners to complete, and only slides complicate the matter. The upper levels, on the other hand, require dexterity and timing because some have moving platforms or elevators that you must leap upon at precisely the right moment. One level has an elevator to assist you, while another uses a cannon to propel Bounty Bob to the proper platform. If you load too much TNT, it's "Good-bye, Bounty Bob!"

The game's graphics are very good, flicker free, nicely animated and colorful. The sound effects are minimal. Overall, Miner 2049er has considerable depth and challenge. If a player manages to complete all ten levels he can try to repeat them faster for even more bonus points. This game is a definite winner and should offer arcade fans hundreds of hours of enjoyment. Definitely recommended.
Cannonball Blitz is a clever takeoff on the popular arcade game Donkey Kong. The object is to capture the enemy flag at Cannonball Castle on the third level of the game. This is a formidable task since you must first scale multi-tiered Nutcracker Hill where cannonballs continually roll down. If you’re skillful you can jump them, or take advantage of one of the seesaws that can propel you upwards to the next higher platform when a cannonball drops on the opposite end. Then there is the balloon that appears occasionally and holds the key to success or failure.

Level two tests a combination of your coordination and deductive power. Obviously, there is some pattern to avoiding the cannon on each level of the platform. Although you can leapfrog a moving cannon, and there use a hammer near the top that will help you destroy them, these cannons are able to shoot as well as climb or descend ladders. If you can manage to knock out all of the pins that hold the entire structure together by running across them, the guard that patrols the entrance to level three will fall to his death.

The third level (like the arcade version’s) is a Rube Goldberg contraption of continuously moving elevators, one up and one down, that connect a series of platforms which you have to leap between. Perfecting the timing required to make the leaps would be difficult enough for some players, but add several cannons chasing you up and down ladders, and cannonballs bouncing down the stairs, and you have a nearly impossible situation.

The game certainly challenging and, like an adventure game, requires trying numerous combinations until you find a pattern that gets you by a certain obstacle. Like the arcade game, it takes a lot of practice, and a feeling that whatever you did wrong was just a fluke, and you’ll get it right next time. Yes, it’s addicting.

The game’s graphics and animation are smooth and professional. Control is either by keyboard or joystick. A spring loaded joystick is recommended. However, the settings shown in the instructions for the TC Joystick are wrong. If you center the trim pots, your man will always move to the right when you let go. Falling off the platform in these situations costs you a man. Adjustment should be made to the far left. The same is true for up and down motion, or you will have trouble climbing ladders. The push button causes your man to jump. In summary, the game is clever, well executed, has depth, is addicting and fun to play.
**CRISIS MOUNTAIN**

**Company:** Synergistic Software  
**Language:** Assembly  
**Hardware Requirements:** 48K

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*CRISIS MOUNTAIN* is a fascinating, entertaining, and original arcade game that takes place in the caves and tunnels beneath a periodically active volcano. It seems that a group of terrorists in their hurry to evacuate the cave left behind their weapons, tools and several nuclear devices. You must defuse these bombs before they explode and cause a full scale eruption.

The view is a cross section of the caverns where two volcanic vents bubble molten lava. Boulders, some large, some small, spew to the very top of the cave from where they roll or bounce down the passageways to seek their lowest potential energy. Should a boulder head toward a player, he must jump to avoid it, a la *Donkey Kong*. Joystick control is best, although paddles can be used.

The player begins with three men, each of whom has a strength rating of three. If a boulder hits him, his strength drops on one point so that he can no longer run but walk, and if hit again, only crawl. Time heals, so he soon is mobile again. If he is hit too many times in a row, he dies.

To reach many of the bombs and bonus objects in the cave, the player must often leap across the lava pits themselves or crawl through narrow passageways. This takes some dexterity and practice. While it is best to be careful and wary throughout, time is of the essence. Retrieval of the shovel will speed up your digging, but it is randomly sited, often at places difficult to reach; and, if you are struck by a rock, it drops to a new location in the cave. To dig, the player must drop to his knees, and dig quickly through the surface to the bomb. A counter shows the amount of time left on each detonator.

When a level is completely cleared there is a bonus run. The time left on the bomb clock is added to your bonus time. You are free to collect treasures and supplies until you either run out of time, or are hit by a rock or Bertram the Bat. When you have cleared all of the supplies, you enter the Nova round. Novas are worth extra points if you pass over one. Two more appear, then three. If you have at least one man left after this round, you go on to the next level and a new cavern.

The game is excellent and a lot of fun to play. It is slow moving, but there is always enough going on to hold your interest. Enough randomness both in game set up and dangerous obstacles makes the game challenging. It is also fairly easy for a beginner. The graphics are nicely animated and will please spectators who are awaiting their turns. An average game takes fifteen minutes, so friends will have to buy their own computers to get much game time. This arcade game, finally, ranks high on my list of must-haves.

**ALIEN MUNCHIES**

**Company:** Gentry Software  
**Language:** Machine  
**Hardware Requirements:** 48K

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*ALIEN MUNCHIES* is an arcade game with the least depth of play that I have seen in a long time. It is a single screen game in which the player performs the mindless task of catching falling Munchies with his portable barbecue grill. The Munchies that you miss land on the ground and hamper the barbecue’s horizontal movement until they eventually disappear. If the barbecue touches one, scratch one grill. The grill also uses propane. The player wheeling the barbecue has a pistol to shoot at the floating propane tank. If you hit it and catch it, it refuels the propane supply. The player loses another grill if the propane supply runs out.

There is nothing to this downright boring game. *Alien Munchies* was released as part of a major software company’s low end line, but this game should never have been released.
THE LAST GLADIATOR

Company: Electronic Arts
Language: Machine
Hardware Requirements: 48K

OVERALL RATING C GAME CONCEPT C CREATIVITY C GAME DEPTH C
CONTROLLABILITY C+ SKILL INVOLVED B+ CHALLENGE B GRAPHICS C
ERROR HANDLING N/A DOCUMENTATION C- HOLDS INTEREST? C- VALUE FOR MONEY C

The Last Gladiator is an arcade-styled game in which the player is assigned the role of a gladiator in a Roman colosseum. The player has a choice of weapons depending on his skill level. Guns are the easiest to use, clubs and pitchforks harder, and nets and boomerangs the hardest. Each opponent is released from cages at the top of the screen. There are snakes that can be hacked in half, spiders that can entangle the gladiator in their webs, robots that fire a terrible death ray, a lizard with fiery breath, and a vampire that must be turned into a bat before it can be killed. They are released one at a time, but if the first isn’t dispatched quickly, the second and third will soon make life quite dangerous. Some of the levels have obstacles for hiding behind. Sometimes you can maneuver an enemy between, say, the gladiator and the robot, and when the robot fires his death ray, the enemy is fried.

While the first two levels offer the beginner an easy game, the upper levels take considerable skill to master. Even on level three, where a sword is used, the gladiator can only kill directly to his side. Any enemy approaching directly in front will score a victory upon touch. Using weapons like a net or boomerang requires even more skill. The gladiator is controlled entirely by joystick movement and one button.

The Last Gladiator has smooth graphics. The game requires skill on a low action level. Gladiator contests were never meant to be fast: large, hulking monsters don’t move quickly. Even the gladiator can only run so fast within a stadium. Fast action arcade buffs may tire of this game quickly because it offers a repetitive contest on a single screen. The excitement only mounts if the gladiator begins to get behind and becomes the underdog. Then, with three enemies closing in and no place to hide, he actually has to fight for his life with consummate skill.

SAMMY LIGHTFOOT

Company: Sierra On-Line
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B- GAME CONCEPT B- CREATIVITY B- GAME DEPTH C
CONTROLLABILITY B+ SKILL INVOLVED C+ CHALLENGE B GRAPHICS B
ERROR HANDLING N/A DOCUMENTATION B- HOLDS INTEREST? B- VALUE FOR MONEY B-

Sammy Lightfoot is a cute game in which you must hone Sammy’s gymnastic skills so that you can guide him safely through three different screen scenarios covering twelve difficulty levels. Much of the game involves bouncing on trampolines, swinging on ropes, and jumping across chasms.

Each scene presents different obstacles. A rolling circus ball plagues the uncoordinated in scene one. Platforms disappear and blocks fall in scene two, and a block of moving spikes and a flaming pit threaten our hero’s hair.

The game, which you can play with either a keyboard, paddle, or joystick, is easy to master on the lowest levels. You need only learn the pattern to reach the objective on any screen. While the second screen remains a mystery at first sight, the rest are obvious. The elevators activate on cue, and carefully timed leaps from one moving block to the other allow you to cross to that last elevator for a ride on the flying carpet. Moving on the carpet advances you to the third screen. You can reach upper levels, which are more difficult, from the option page. On level two our gymnast must leap over two deadly circus balls. More appear on higher levels.

Sammy Lightfoot is a fun game, but there isn’t much depth to it. Three screens aren’t enough; some of today’s games offer as many as ten. The graphics are well done, with Sammy’s hair flying up and down as he bounces on the trampoline. His hair spins completely around when he loses one of his three lives. In sum, Sammy Lightfoot, a game slightly above average, holds your attention because it is cute, not because it’s challenging.
Track Attack's game concept is both novel and challenging. Picture a railroad switching yard where a train is shuttling gold loaded at the freight yard's depot. You, the train robber, have a souped up 1982 Pierce Apple that is capable of ramming the side of the train's boxcar. The trick is to catch the train as it passes a road crossing, ram it, and make off with the gold. You must deposit it at your storage area at the lower right on the screen. It sounds simple, but I forgot to mention that a night watchman patrols the freight yard in his green 1952 DeSoto. If he catches you, you are a dead man. He shoots first and asks questions later.

This watchman is a sneaky devil. He sometimes discovers your gold and attempts to take some of it back to the depot. If he succeeds, you lose the value of that gold plus a penalty of 100 points. However, you can try to steal it back by ramming into him. You can reach bonus levels by aligning your car with the train as it heads north on the track on the screen's left side. At that point you press a button (if your playing with a joystick), or the space bar (if on keyboard controls), and you jump on the train.

Jumping and running from car to car in an attempt to gain control of the engine is actually easier than it at first appears to be. The animation in this segment is superb. The thief jumps and summersaults from one car to the next. When he has control, the game advances to level three. This is a bonus level. The train robber, in a twist of fate, tries to recover eleven pieces of gold scattered on the tracks. He steers the train while the night watchman attempts to prevent the train robber from collecting all of the scattered gold by derailing the train.

As cute and novel as the game is, it suffers from a somewhat crazy control system. It is impossible to reverse the direction of your car, and turns must be executed well in advance of an intersection. If you don't make a turn, the car's steering automatically goes into a series of default turns. Thus, your car appears to be on some random course irrespective of your desired goal. Add this to the randomness of the night watchman's car and a somewhat random train, and the game appears to be playing by itself. Beginners' scores don't appear to improve when they are steering their car or when they aren't. There is no doubt that this game takes getting used to regardless if you are playing by keyboard or joystick control. Despite the excellent graphics and game concept, this is not likely to catch on with the general public.
Wayout is a three-dimensional maze game in which the sole object is to find the shortest way out of the maze. Fortunately, you're supplied with both a compass and a mapmaker which will help you find the often elusive flashing rectangle that marks the exit. While it sounds like an easy task, it isn't. Although you can sometimes see the exit as in the introductory maze, there is a stiff wind blowing from it that prevents your moving directly toward the exit. You'll find that the only way to reach it is to sneak up from the side, if you can find the correct corridor in the maze. It wouldn't be much of a challenge if it weren't for the Cleptangle, a playful sneak thief who is your nemesis throughout the game. Each time it touches you, this revolving orange and white critter steals either your mapmaker or compass, sometimes both. To get them back you have to corner the thief in a cul-de-sac of the maze.

The graphics in this game are outstanding. The walls of the maze, presented in mouse-eye fashion, move in a fluid manner as you travel or turn, using either keyboard or joystick controls. The screen is divided into two portions, the upper two-thirds showing the three-dimensional interior view, and the lower portion showing the areas of the maze that your mapmaker tool draws as you explore. A blinking dot shows your present whereabouts. Compasses in the two upper corners show your direction of travel when they are working, and an odometer at the top counts your steps.

The strategy is to explore the maze rapidly before your first encounter with the Cleptangle. There is a warning buzz when it is in your vicinity, and you can often see it when it is in front of you, so you can try to avoid it. However, it finds you fast, and many of the corridors are dead ends, so be prepared to lose your tools early. The best bet is to give chase and recover your tools quickly, for you'll never find the exit without them. Encounters with the Cleptangle are numerous enough to be annoying. There are a number of fireflies floating through the maze on wind currents. They are supposed to help you find the exit, but actually provide little help.

There are twenty-six different mazes on the disk. Some are easy to solve with an expected exit on the periphery, while others are diabolically difficult with exits hidden in interior U-shaped hallways. Although you may figure that once you learn a maze it is useless to play it again, you will still find it a challenge since many of the mazes look alike from the inside. Besides, you can try to find the exit in fewer moves.

The game features a save game option for multi-night, long puzzles. It also has a very useful option that allows you to save nine locations in the maze so that you can automatically return to those spots at will. You aren't just teleported there, but escorted through the corridors in a moving panorama.

Wayout is a very interesting game that proves to be more frustrating than challenging. In some ways it appears to be not so much a game as a graphics tour-de-force in search of a game. I think beginners will find it extremely irritating to play. At least some of the easier mazes should have the option of eliminating the Cleptangle. I shouldn't, however, leave readers with the impression that Wayout is just a so-so game with great graphics. It is a puzzle game and although it has the fluid motion of an arcade game and an enemy to thwart your every turn, there are no thrills. Instead, it requires an extraordinary amount of patience and perseverance.
Microbe is a colorful Hi-Res game based heavily on the movie Incredible Voyage. You are the commander of a four man micro miniaturized submarine designed to perform otherwise inoperable surgical procedures. You are injected into a patient’s leg vein and must navigate through the body’s blood vessels to the interior of an injured brain. To put it mildly, the interior of the human body turns out to be a most inhospitable place.

There are a multiplicity of available patients, each with different problems lying deep within the brain. Three levels of difficulty are provided by controlling the Physician’s capabilities and by adding to the already busy Technician’s workload. Further, each patient has varying allergy and pre-existing problems, all designed to further complicate an already difficult trip. Hitting tissue walls or blood cells can damage your fragile ship and its contents, and injure or kill vitally needed crew members.

A single saved-game may be put on the protected disk, but only when you decide to (Q)uit the game. Recall is permitted only in the boot cycle. Even so, frequent saves are recommended after successful “hookups” in the major organs, before defibrillating the heart, and at all major arterial branches. The chances for ship and crew damage increase materially as you near your objective, where veins get much smaller, and maneuvering gets tricky, especially just before escaping to the rather sudden and abrupt ending.

Microbe is billed as an educational experience as well as a game. Perhaps so, for medical students who have time for games, but not for laymen. The Physician’s Reference is heavy on polysyllabic names of immunogens, bacteria, parasites, viruses, fungi, drugs and medical supplies. Some are even complete with meaningless abbreviations and initials, but there is not a hint or explanation on any of these “things” in layman language.

This is a minor shortcoming of the seemingly complete and extensive documentation, for the average user can use “magic words” from a look-up table as well as the next guy. More disturbing are the omissions of the (I)ventory and (?) commands, the latter providing a full list of usable commands. Also, there is no discretion of the vitally important need to refill fuel and oxygen tanks, (U)se 1 or 2 (Return), and there are significant differences between the heart’s and lung’s on-screen appearance with that of the documentation.

The graphics quality and control responsiveness combine with the fascinating theme to more than compensate for these difficulties. Indeed, Microbe has something to offer a wide range of age and interest groups, even a crazy maze in the lungs. After getting the feel of this game, its challenge will lure you back for more.
AZTEC is a fascinating game that cleverly melds the arcade and adventure genre into a dangerous treasure hunt. A great golden idol has been lost in an Aztec temple located somewhere within a large pyramid in the jungles of Mexico. It may be just a legend, but that is only because no one has ever returned to tell the tale. This temple swarms with deadly, poisonous creatures, and numerous pits and traps from which no mortal has ever escaped alive. The bones of decayed treasure hunters and their supplies lay buried in the rubble.

Aztec is a keyboard controlled game that is well animated like the author's previous game, Swashbuckler. There are direction keys for turning around, and various movement keys for walking, crawling, climbing stairs, and for jumping. There are keys for opening chests, looking in them, and for digging in the rubble. In addition, there are another set of keys for fighting. There are about twenty keys in all to learn, but fortunately only a handful are used at any one time. This game takes practice before it becomes pleasurable to play; beginners will find it frustrating, but fortunately mistakes are rarely lethal. For example, your man doesn't get hurt if he accidently falls from one level to another through a hole in the floor.

Each of the randomly picked temples consists of a maze of sixty-four rooms over eight levels. Scattered about are items from chests, or objects hidden beneath rubble piles. Often you will find useful weapons such as pistols or machettes. Pistols are very handy against monsters, if you have bullets. Beneath the rubble you might find TNT (hopefully not lit).

This maze is full of surprises and traps, sometimes offering logical solutions and sometimes not. Sometimes a room seals after you enter it, sometimes the walls begin to close, and some rooms have been known to fill with water. Perhaps the TNT could help. There is, however, always an escape.

Monsters are everywhere and they protect their territory. Alligators move in a menacing yet realistic manner. Then there are poisonous snakes and scorpions, giant spiders, and several man-eating tyrannosaurus rege. Their size indicates they're probably just babies, but don't be fooled: they are ferocious. And the most dangerous creatures are cannibals. The ones wielding axes are tame compared to those with poisoned tipped blow guns.

Aztec is a very well designed game that offers both beginners and experts considerable challenge and variety. There are eight levels of difficulty with 32 different game possibilities. The goal of finding the golden idol and escaping alive can become a formidable task. There is no save game option, but games shouldn't take longer than half an hour to play. Aztec has successfully bridged the two distinct game types of adventure and arcade in a fun and memorable manner.
**Arcade Style Games**

**Spy’s Demise**

**Company:** Penguin Graphics Software  
**Language:** Assembly  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>GAME CONCEPT</th>
<th>CREATIVITY</th>
<th>GAME DEPTH</th>
<th>CONTROLLABILITY</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
<th>GRAPHICS</th>
<th>ERROR HANDLING</th>
<th>DOCUMENTATION</th>
<th>HOLDS INTEREST</th>
<th>VALUE FOR MONEY</th>
</tr>
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<tbody>
<tr>
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<td>D</td>
<td>D</td>
<td>D</td>
<td>C</td>
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<td>C</td>
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<td>D+</td>
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</tbody>
</table>

**OVERALL RATING:** D+

**GAME CONCEPT:** D

**CREATIVITY:** D

**GAME DEPTH:** D

**CONTROLLABILITY:** C

**SKILL INVOLVED:** C+

**CHALLENGE:** B

**GRAPHICS:** C

**ERROR HANDLING:** N/A

**DOCUMENTATION:** C

**HOLDS INTEREST:** D

**VALUE FOR MONEY:** D+

*Spy’s Demise* is a mindless arcade game in which you attempt to guide a secret agent, disguised with dark glasses, trenchcoat, and briefcase to the top of a twelve story building while guards try to crush him with the elevators in which they ride. You use either a paddle, Atari joystick, or keyboard arrow keys to guide your figure from one side of the floor to the other past seven dangerous ascending and descending elevators. At the end of each floor is a lift to take him up one level. Maneuvering past the elevators is tricky since there is no stop position, and to remain relatively still requires you to change directions quickly. An Atari joystick using a Joyport accessory is the best control. A regular joystick substituting for a paddle is another good control device since to stop and turn, the paddle movement must be lightning quick.

The points you get for each level depends on how much time is left on a digital display at the top of the screen. You really can’t dally, but occasionally a flashing decoder ring, worth 100 bonus points, may tempt you to risk one of your six men in order to retrieve it. There are other bonuses for objects that you pass over, such as a gun. These objects have no other use during the game. Finally, when you reach the top of a building you get part of a coded message. If you somehow manage to reach the top of all nine successively shorter buildings, you will have all the clues needed to solve the cryptogram and win a free T-shirt.

*Spy’s Demise* is a stupid and difficult arcade-style game. It has little depth and is unlikely to hold a player’s interest for long, although it probably will exercise a mild attraction on those who get past the frustrating control system.

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**The Spy Strikes Back**

**Company:** Penguin Graphics Software  
**Language:** Machine  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>GAME CONCEPT</th>
<th>CREATIVITY</th>
<th>GAME DEPTH</th>
<th>CONTROLLABILITY</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
<th>GRAPHICS</th>
<th>ERROR HANDLING</th>
<th>DOCUMENTATION</th>
<th>HOLDS INTEREST</th>
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</tbody>
</table>

**OVERALL RATING:** C-

**GAME CONCEPT:** C

**CREATIVITY:** D

**GAME DEPTH:** C-

**CONTROLLABILITY:** B

**SKILL INVOLVED:** D

**CHALLENGE:** C+

**GRAPHICS:** C-

**ERROR HANDLING:** N/A

**DOCUMENTATION:** C

**HOLDS INTEREST:** D+

**VALUE FOR MONEY:** C-

*The Spy Strikes Back* can be likened to an arcade adventure in which you hunt for nine clues that are hidden somewhere inside a German fortress. These clues lead to the location of Dr. X’s terrorist operation.

The fortress consists of five floors, each divided into twenty-four vaulted and guarded sections. Each section contains sixteen smaller rooms where you hide from the electronic guards that patrol the halls. The vaults are sealed from each other in the beginning, but finding a flashing ring will open a door between any two adjacent sections. A flashing elevator inside one of the rooms leads you to another floor. The upper floors are the most dangerous. Since you often need to go down or up a floor to cross over to another section, it is best to map the floors.

Game play is rather mechanical. It is easy to avoid the robot guards by ducking inside a room. However, your bonus is automatically halved once the guard sounds the alarm. Once in a while a spy shape shows up in place of the ring. This is one of the nine clues which altogether form a coded puzzle.

The graphics are mediocre with identical screens throughout. The sound effects on a normal Apple are dull and need to be enhanced through a Mockingboard sound board which this program supports. (The Atari version of this program has excellent musical selections that play throughout the entire game and contribute to the fun.)

*The Spy Strikes Back* is an interesting game for those who like to find and decode clues to a puzzle. It offers a diverting challenge to adventurers who aren’t looking for a real thinking text or picture-style adventure game.
The Page of the Book of Apple Software

PINBALL CONSTRUCTION KIT
Company: The Budge Company
Language: Assembly
Hardware Requirements: 48K

So you have played Raster Blaster, Midnight Magic, and Night Mission, and you think that they'd be a little more exciting if only the programmer had added another bomber, perhaps another spinner, and a drop target for added scoring potential. Close your eyes and imagine the perfect electronic pinball game. It has two sets of flippers at the bottom, the second pair offset wider above. Lane lights alternate with spinners above a forest of bumpers that give extra action and thousands of points as the ball or balls carom endlessly around the playfield. Drop targets...

Perhaps the best way to describe the ease of this process is with the term “exceptionally human engineered.” You can manipulate any of five tools solely with a joystick and one push button. You will use the hand tool most often. By positioning it over the component to be moved and depressing the button you can place the component anywhere on the playfield to the nearest pixel position. If you change your mind, just move it again, now or later. You can remove parts from the board as easily as place them. You simply move them back to the vicinity of the parts box, and they disappear once you release the hold button.

The first thing you'll need to do is to put some of the basic pinball parts into place. You'll need a ball launcher. It doesn't have to be in its traditional spot; it can be on the left, in the center, or even near the top. Then add a pair of flippers to keep the ball in play. Two different sized flippers can be added either in pairs or singly. You can have two or three pairs of flippers; they all work, no matter where you place them. In fact, all of the parts work no matter how many you place or where.

You have a practically unlimited choice of parts: two sizes of round bumpers and four rectangular ones; kickers and knockers to kick the ball selectively; and two drop target sets to turn on as each of the four parts is struck and then reset. A ball hopper catches balls; it can hold two, and will free all the balls for multi-ball play when it catches a third. There are also lanes and gates to direct balls, rollover lights, a spinner and targets for more scoring, and a magnet that holds on to a ball for a second or two. Last but not least, a ball disintegrator, or hole, eats balls.

The set contains a number of tools to help with the finishing touches. Most pinball games have obstacles to keep the ball within certain boundaries whether on the edge or in the middle of the playfield. You can place a square obstacle anywhere, color it with the paintbrush, and then stretch its shape by dragging the boundary knobs with the painter tool. The hand tool can even move the obstacle about. A polygon with four knobs isn't very useful, so you can add more with the hammer or delete one with the scissors. The entire process is simple, but you must remember to color the polygon while it is still a square shape or you will have a stretched polygon with lots of knobs and no way to fill it in.

No pinball game would be complete without the name scrawled on an empty section of the playfield. A special paintbrush with a magnifier makes it possible to add the fine artistic touches. You can pick a small area to paint on the playfield, then move the joystick controlled paintbrush to the magnified view on the right side of the screen where the parts box used to be. Any of the Hi-Res colors are available, and there is even a grid option.

Of course, pinball pieces come from the parts box with preset values for sound and scoring. You can use the joystick cursor to change these by selecting the AND GATE icon. When you select a piece on the playfield, the score and sound are highlighted. You can change these values from the displayed menus. You can also select the conditions to allow a player to score a bonus. Moreover, you can decrease or increase gravity, the ball speed, the kick strength of the bumpers, and the elasticity of the collisions between the balls and the polygon surfaces.

Once you have completely designed a pinball game, one to four players can play with either two paddle buttons or both buttons on a single joystick. You can also save it to another disk in the form of a BRUNable file. You are free to do with the game as you like, which means you can give the game away to your friends, or sell it.

In sum, Bill Budge has created a remarkable program that is well engineered and a delight to use. The Pinball Construction Kit can create pinball games of a variety only limited by the user's imagination. Although I've met a considerable number of game players who don't enjoy electronic pinball, the vast majority were totally fascinated with the construction of their own games. The package is reliable in every sense, one of the best designed programs we have ever seen, fun to use, and definitely worth owning.
PINBALL CONSTRUCTION KIT

RASTER BLASTER

Company:  Budge Co.
Language:  Machine
Hardware Requirements:  48K

The sensation of playing an actual pinball machine is now available with the introduction of RASTER BLASTER. Bill Budge worked for over six months to faithfully reproduce the Bally's pinball game, Firepower. His attention to detail is astonishing. The rubber bands on the bumpers jump and the action of the claw mechanism and the spinners act like their electromechanical counterparts. Tilt has even been included for those who like to shake the machine.

The paddle buttons activate the pair of flippers. The tilt mechanism and strength of the spring ball launcher is controlled by Paddle 0. Tilt is somewhat awkward using paddles, but works effectively on a spring-loaded joystick. The ball behaves amazingly like that of a real game. Except for an occasional freaky bounce, the ball is true. Aiming the shot is a little harder with the flippers than in the real game. Judging the strength of a shot is nearly impossible unless you trap the ball with the flipper.

The game is for one to four players with two levels of play. On "easy", the side chutes are closed, while in the "hard" mode, they close after you activate two sets of center targets. Filling all six center targets enables the RASTER BLASTER claws. Any balls shot into enabled claws are caught and the player is given another ball. If all three are caught, they are released simultaneously for multiple ball play. There are lane lights at the top, a set of targets on the right side and, of course, a spinner.

Budge's Hi-Res raster graphics are superb. He has included numerous sound effects to enhance the simulation of the newer electro-mechanical pinball machines. It is positively the definitive pinball game for the Apple. Hopefully, Budge will convert other popular arcade pinball games to the Apple.

OVERALL RATING  A-  CONTROLABILITY  B  
GAME CONCEPT  A  SKILL INVOLVED  B  
CREATIVITY  B  CHALLENGE  B  
GAME DEPTH  B  GRAPHICS  A  

ERROR HANDLING  N/A  DOCUMENTATION  B  
HOLDS INTEREST  B  VALUE FOR MONEY  A  

The Book of Apple Software
A2-PB1 Pinball, the most realistic pinball simulation yet to appear on the Apple, will please the hard core pinball fan. This version, called Night Mission, follows the classic design features of modern pinball games, yet does not attempt to copy any one machine. Overall, with its five bumpers, seven standup targets, nine rollovers, two spinners, a dive bomb chute, and a hole kicker, it makes a very exciting game. The actual layout is also well designed, with no dead spots.

Bruce Artwick went a long way in the realistic design of this game. He includes features not normally expected in a computer version, but features that are nonetheless an integral part of a real machine. He includes a quarter coin slot and start procedure for multi-player play identical to that of an actual machine. In addition, he includes the match feature for a free game. By studying and measuring the features of numerous mechanical pinball games, he concluded that there was no average set of parameters that would suit a majority of players. Thus, rather than compromise, he allows the player to adjust the parameters to suit himself.

Thirty-three individual parameters can be adjusted. The variations are so different that ten of the modes are preset with easy access by setting only the mode number in the FIX mode. Others that the user can specify can either be set for one time play, or be saved to a separate disk. (One mode and one high score on a disk.) For example, you can vary the impulse and time delay of the hole kicker, the tilt sensitivity (yes there is tilt triggered by the keys on the left and right side of the keyboard), ball speed and trails, bumper impulse, flipper power, spinner friction, and forward incline of the machine. There are others that affect the sound and the scoring. One adjustment called “ball trails” gives a “cosmic effect,” in which the ball appears as a slinky as it bounces around.

You can hook up for sound with either the Apple's small speaker or by running the cassette output port to your stereo. The sound effects are very good in this game. Sounds range from the sound of an airplane engine, to high pitch whistles and explosions. After all, this game follows the theme of a B-17 on a night mission over Japan where various cities are the targets. That is why the game’s layout includes a bomb release line (vertical chute), and a dive bomb chute (U-shaped tunnel with a spinner at the end).

The graphics are stunning and rich in fine detail. There is a considerable amount of fine, detailed writing on the playfield that shows up clearly on a color monitor, and doesn't interfere with the drawing of the ball.
While it is hard to judge a particular setup for ease of play, many of the preset modes act, and more importantly feel, as if one is playing a real game. I personally didn’t like the play of the competition mode because it felt like the machine was almost playing by itself with its high speed ball and strong bounces off the kicker. However, the easy mode and medium difficulty modes were realistic. One nice feature that has been lacking on other simulations and works as expected, is a still or quiet ball held by an activated flipper. I know many people who complained about balls that oscillated in other pinball versions. The balls appeared as if they were about to escape from the flipper.

In summary, I should say that Night Mission is the most versatile of all the pinball games for the Apple.

**DAVID’S MIDNIGHT MAGIC**

**Company:** Broderbund

**Language:** Machine

**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>CONTROLABILITY</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
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<tr>
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<td>A</td>
<td>B</td>
<td>A+</td>
<td>N/A</td>
<td>A</td>
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David’s Midnight Magic is a spectacular, double-decker pinball game. It is absolutely realistic in its approach to pinball games like Black Knight. These games, which have both upper and lower sections, are interconnected by ramps. There are sets of flippers on the bottom and top levels. These flippers respond as accurately as any of their electromechanical equivalents, with no erratic bounces.

The game is action-packed, with a variety of targets included on both levels. There are various drop targets, some of which enable the Magicsave, which can save a ball that falls through at the side chutes. Unfortunately, these are activated from the keyboard, as is Tilt. This makes things somewhat awkward in use, and requires you to hold two paddles and their buttons. Other targets trigger the multiple bonus feature, or release balls that are trapped in the upper ball collector. If you can trap three balls in this S-shaped collector, all three balls can be played simultaneously. There is also a loop that connects one level to the next. This is worth extra bonus points. Kicking a ball through the loop after obtaining a 5X bonus results in being awarded an extra ball.

High scores can be saved to the disk if it is unprotected; otherwise, high scores are maintained only temporarily for the evening’s play. There is also a pause control in case the phone rings; fine, if you are going for a record score.

The simulation and graphics are great. If you are a pinball fan or loved Raster Blaster, this game is worth owning.

**BRAINTEASER BOULEVARD**

**Company:** California Pacific Computer, Co.

**Language:** Assembly

**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>CONTROLLABILITY</th>
<th>SKILL INVOLVED</th>
<th>CHALLENGE</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
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<tbody>
<tr>
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<td>C</td>
<td>D–</td>
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Brainteaser Boulevard is similar to Frogger. It also has a title that alludes to more than the game delivers. The object of this game is to cross a treacherous eight lane highway to rescue three stranded old ladies. You have to escort these ladies back through heavy car and truck traffic to the safety of the sidewalk on the near side of the highway. There are two levels of difficulty: three ladies with slow cars, or five ladies with fast cars. You can play the game with keyboard, joystick, or joypot. While the joystick mode is easy to use, it does tend to over respond. The game’s graphics are only fair, and there is no music. The game itself lacks creativity and long term player interest--it’s not worth buying.
FROGGER
Company: Sierra On-Line
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING C–  GAME CONCEPT B  CREATIVITY C  GAME DEPTH C
CONTROLLABILITY B  SKILL INVOLVED C+  CHALLENGE B–  GRAPHICS C–
ERROR HANDLING N/A  DOCUMENTATION C  HOLDS INTEREST? C–  VALUE FOR MONEY D

Frogger, the official translation for the Apple of the popular arcade game of the same name, pales by comparison to its namesake in the arcades and on the Atari. The object of the game is to move your frog in a limited amount of time across four lanes of traffic, then jump across a pond on the backs of diving turtles and moving logs to reach the safety of home. Moving either the joystick controller or four keyboard direction keys causes the frog to jump in any of four directions. Success is strictly a matter of timing; traffic moves in opposite directions in alternate lanes, while the turtles and logs move in opposing directions and at different speeds. When all five frogs have reached home, the game advances to a more difficult level of play, and after five levels you are rewarded with an extra frog. In addition, escorting a lady frog home and gobbling insects results in bonuses.

While no one expected the Atari version to become such a masterpiece, this version, because of the Apple’s hardware limitations, falls far short of expectations. The game’s graphics and sound are disappointing in this version. In fact, it isn’t even as well done as a banned competitive version called Ribbit. Frogger lacks detail. The logs are plain, and the diving turtles are likely to vanish with no warning. The frog looks like a chess pawn with a black border. Such sloppiness is inexcusable. It is not very difficult to OR the frog shape with the background if the background has been previously saved to a dummy shape table in memory. The sound is limited to several beeps and sorely lacks the Frogger theme music except during boot up. Too bad because the excuse that music takes up too much processor time doesn’t hold water anymore. Consider, for instance, the maze game Microwave, which plays music throughout the game.

Frogger is an addictive yet simplistic game, especially designed for children. Unfortunately, much of the appeal of the original game lay in its graphics and music; the charm of these elements completely disappears from this dull and mediocre Apple version.

Congo
Company: Sentient Software
Language: Machine Language
Hardware Requirements: 48K

OVERALL RATING C–  GAME CONCEPT C  CREATIVITY C+  GAME DEPTH D
CONTROLLABILITY C+  SKILL INVOLVED C–  CHALLENGE C  GRAPHICS C
ERROR HANDLING N/A  DOCUMENTATION C  VALUE FOR MONEY D  HOLDS INTEREST? C–

The object of Congo is to rescue stranded adventurers as you steer your raft down the swift flowing and dangerous African river. The premise is that your boat has broken up along the river’s rapids and that your fellow adventurers have washed downstream, where they cling to islands or the marshy but unfriendly shoreline. You must rescue and escort them to a safe harbor.

You steer your raft by joystick or keyboard controls. The scenery moves one way, while your raft remains relatively stationary to produce a nice scrolling effect. When you want to stop or move up stream, the drift keeps you going downstream but at a much slower rate, while the side to side motion varies with your direction. Obviously you have little effect against the current or when floating with it, but you have good control while paddling with the current. There are many hazards that you must avoid. Rocky islands frequently block your progress, and warlike natives are always traveling along the river. Alligators and cheetahs patrol the shoreline, while spouting hippos and an occasional water snake swim upstream right in your path.

The game has cute animation effects using a funky artistic style. The graphics work to the extent that you appear to float downstream in a raft. However, the game has little depth and doesn’t offer much of a challenge. Definitely a kid’s game.
In Artesians, a maze game, you must collect empty bottles on the first three levels of the brewery maze and fill them at the big cask on the fourth level. Artesians on all levels slow you down, a hungry dog barks to call the guard, and a guard eventually comes down from his fourth floor office to arrest you. You move about the first floor maze using either a joystick or keyboard control. The joystick (a bit of a pain) slows you down at turns. Unfortunately, the character on screen doesn't respond unless you move the joystick to the edge of its range either vertically or horizontally. Diagonal movements bring no response at all. The result—a lag—ensures that you are almost always caught on turns. Keyboard control is better. However, being caught by the Artesians only slows you down. The guard is the only real threat. As the character moves, he leaves footprints on the floor. Unlike most maze games, you want to leave as few tracks as possible because you have to sweep up all of the footprints with the broom found on the fourth floor before you can escape the maze. Three of the four floors can be considered mazes, but the second floor consists of a series of moving conveyers that alternate in direction much like the moving autos in games like Frogger. You have to avoid the barrels or you go back to level one. The third level has a series of gears that you have to hop onto to get between maze sections.

In sum, I considered Artesians hard to play primarily because of the control problems discussed above. It has some original ideas, but is largely a rehash of several other games. Perhaps the game wouldn't be so frustrating if a decent control system were devised.

In Boa, a rather simple game, you steer a snake through the passages of a multi-level maze using a joystick or keyboard. The snake tries to eat all of the white mice and large rats that inhabit each level of the maze. The small white mice grow into large, vicious rats that eat the snake's tail after they eat a piece of the magic cheese at the center of the screen. When the snake eats a rat, his tail becomes longer and less maneuverable. As you advance from level to level, the number of mice and rats increases, making the snake's job harder.

An enchanted frog called Frizzard randomly materializes and dematerializes in the maze. If the snake manages to kiss it by your pressing the joystick button, he advances to the next level. When he reaches the tower room in the maze (where the jewel is kept), the king rat releases a reserve guard of white mice. However, when the snake eats all of the mice and wraps around the jewel, you win the game.

The animation in this game lacks the smoothness common to hi-res graphics arcade games. This doesn't necessarily detract from the simple game play. The manufacturers pride themselves on the game's continuous musical score, a little jingle only six seconds long that begins to wear thin after several minutes of repetition. Take my advice and shut the sound off. Game play is simplistic and thus more suited to beginners or young children. Finally, the concept of capturing a treasure is definitely not a new one.
Lady Tut, one of the more intriguing maze games I have come across, asks you to search through the various levels of a pyramid to find the sarcophagus belonging to Lady Tut, the mother of the fabled Boy King. Spiders, serpents, and the disembodied spirits of Lady Tut's palace guards (represented by skulls) inhabit each level of the maze. You are unarmed (at least on the first levels) and must recover the gems and keys necessary to unlock interconnecting doors using skill alone. You play the game with either joystick or keyboard control. Numerous pivoting sections that revolve when you run into them make the structure of the maze itself fascinating. As it turns out, your only chance for survival depends upon the continually altering maze floor. While your enemies won't follow you persistently, there are too many of them to avoid for long, but with proper timing, you can shunt them down alternate passageways as you escape through the pivoting walls. Sometimes you really need that temporary refuge.

By the time you reach the third or fourth level, you will have stumbled upon a gun shaped like a diamond ring. The computer flashes the word “gun” to tell you of your find. At this point you realize that all of the gems that you have found so far will buy ammunition. Each additional gem that you find increases your cache of blast charges by ten. You need a great many charges, because Lady Tut’s ghostly cronies thickly inhabit the rest of the maze. From this point on depends upon your slugging it out. Masters of shoot-'em-up contests will enjoy this part of the game. After a few more rounds, victory is almost within reach. You must make your way through a total of nine mazes, all different, but not necessarily more difficult.

Lady Tut is not a particularly difficult game to master, but its numerous revolving doors and resulting changes in scene make it fascinating. The concept first appeared in the arcade game Lady Bug, but this game takes it to an extreme with over half of the walls able to revolve. These walls used as allies add an element of strategy lacking in most games; however, this only holds for the first three levels. Once the game changes from one of wit to one of fast shooting, it loses some of its appeal. Overall, I found Lady Tut fascinating and fun to play.
SUPER TAXMAN 2

Company: H.A.L. Labs  
Language: Assembly  
Hardware Requirements: 48K

OVERALL RATING B+  
GAME CONCEPT B  
CREATIVITY B  
GAME DEPTH C

It is obvious that PacMan fever has not subsided at H.A.L. Labs. They have taken their popular clone version, upgraded and changed it somewhat, made our little round friend a tax collector and the ghosts angry citizens, and produced a new version called Super Taxman 2. This eat-the-dots version for one or two alternating players incorporates a choice of four much larger and interesting mazes that have six power dots rather than the usual four. There are a choice of ninety-nine levels of play that progress in speed and difficulty. Every third level is an ultrafast “challenging stage.” Five different cartoons provide a nice intermission between levels. An option allows these cartoons to be viewed before the game.

The primary control system is by keyboard, unless owners have purchased a “gizmo” for $10 from H.A.L. Labs that will enable them to interface an Atari style joystick. Unfortunately, this unit is not Joyport compatible. Apple type joysticks don’t work either. The player’s only consolation is that the keyboard direction control keys are user definable.

If you like the PacMan style game, you’ll like Super Taxman 2. The graphics are smooth and flicker free. It works well on either a B&W or color monitor, and now has music in addition to sound effects. The game is a definite improvement over Taxman. Now, if this version could only use a regular joystick...

MOUSEKATTACK

Company: Sierra On Line Systems  
Language: Machine  
Hardware Requirements: 48K

OVERALL RATING C-  
GAME CONCEPT C  
CREATIVITY C  
GAME DEPTH C

Dreaming up variations of the ever popular maze games has become a profitable endeavor for software authors. Mousekattack reverses the strategy of endless consumption. You play Larry Bain, ace plumber. Your job is to lay pipe in a rat infested maze where rats are bigger than your trusty cat. Cats will scare off the mice — well, most of them, except Super Rat. He has a big red S on his chest. He eats cats WHOLE. Then there are your two traps which can temporarily hold a rat until it gnaws its way through the mesh. If you’re quick, you can beat it over the head with your pipe wrench. Of course, if a mouse gets you, you’re a dead plumber. Fortunately, you have three plumbers on your staff.

The game can be played by either one or two players. The single player game can be played by either keyboard or Apple joystick. Control keys can be user-defined. However, the two player game requires a Joyport for joystick control. Keyboard control is standard for two players. The game’s controls are rather simple. The button allows you to pick up your cat and set it down wherever you like. The cat can be placed in a strategic position that will allow you refuge from those killer rats. Laying pipe is generally easy, except when you’re rushed and you make mistakes. You often need to double back to repair bad plumbing joints that leak.

The game is not as simple as it sounds. Many will find that two players are a better match against rats of this size and ferocity, especially if you plan to complete the task and advance to the next level. In summary, Mousekattack is just an average maze game with a slightly different twist. In some ways it is harder than most games of its type, and it is the only maze game to date on the Apple that allows a friend to play simultaneously.
The Maze Game Construction Kit allows you to design your own maze game. You can design a number of different mazes to be played in sequence. You can also edit the character shapes in the game and set the individual intelligence of each character. The program allows you to save all of this information to a data disk for later replay.

Editing a maze is a two-step process. First, you need to design (or edit) the maze itself by moving the cursor about the screen with the joystick. Button zero draws or erases line segments. When the cursor moves horizontally, line segments are horizontal. The same applies for vertical lines. By creating borderless mazes, or mazes with holes in the border, you can move off one edge and reappear on the opposite side. Once the maze is designed, you switch the cursor to a crosshair by pressing the space bar. You can then grab such things as one-way tunnels and bonus objects and place them in the maze. You can adjust the starting place for each of the two players and, by filling in sections of the monster cage, determine which direction they exit the cage. The second step is to place dots on the maze floor. Button zero draws and erases the dots. If you make any mistakes, you can always clear the entire maze with one keystroke.

There is a character editor for creating or changing shapes. It is basically a dot editor that you control with a joystick. You can select any of the shapes at the bottom of the screen and edit them. There are three shapes for each of four directions. This allows you to animate them as they move. To make the process simpler, there are commands to rotate—or “flip”—the shapes. When you are finished, you can save them to the lower portion of the screen.

The game editor puts the mazes and character sets together to form a playable game. It allows you to choose which of five mazes you are going to use in your game. There are ten possible games on the disk, and you can choose to modify any one of them. Then you can adjust the game intelligence so that individual monsters are dumb or smart in their ability to track you. You can also adjust the intelligence of the bonus so that it can be extremely hard to catch.

The Maze Game Construction Kit is completely menu driven and easy to use. Unfortunately, maze game design isn’t as creative in this program as it is in the Pinball Construction Kit. The plain graphics are adequate for the package. All in all, if you love maze games, this package is perfect.

SNACK ATTACK is a variation of the Pac-man arcade game. The object is to steer a winsome whale complete with rotating tail through corridors of a ghost-infested maze. One scores points by eating the dots on the maze floor (yum yum!). There are doors located in the maze that you can go through which the ghosts can’t and doors that they can go through that you can’t (turn-about’s fair play). The game starts at a slow pace, but picks up as you clear each level. Also included in this amazing melange are three more different mazes, one for each of the first three levels.

The game is quite responsive using the keyboard’s four direction keys. The contest is supposed to include a joystick option, but it wasn’t available in the preliminary version that we tested. The graphics were good and in color. The game seemed more challenging than “Gobbler”, but less so than “Snoggle.”
Catching bank robbers is the object of this arcade-style game called *Crime Wave*. You steer your trusty police car through the grid of One Way streets lined with banks just waiting to be robbed. The view, luckily, is from overhead, or you could never tail the suspect's car. Suddenly, the car stops, the alarm sounds, and a robbery is in progress. You quickly turn towards the bank, hoping to nab them in the act, but those damned One Way streets slow you down. Seconds later, the chase is on and you try to nab the robbers before they reach their hideout at the outskirts of town. If you are lucky and catch them, you tow them to the police station at the bottom of the screen. However, if the robbers make it back safely to their hideout, they equip themselves with ramrodders that make them invulnerable to everything except bombs. You can carry one bomb and lay it as a trap, but the chances of a robber striking it is minimal.

This is a very repetitious game which frustrates the player. The numerous One Way streets gave you the feeling that the computer is rarely obeying your joystick or keyboard commands. Add this to a bunch of smart thieves who seem to know where your blue police car is (you do need a color set to differentiate between the blue and red cars) and you have a game that becomes outright irritating after several games. There is a second view available in which you try to foil the robbery while it is in progress; but your police car would have to be right behind the robber in order to reach the bank during the two seconds that the robbery takes place. Overall, the game has merit, but it isn't entertaining nor much fun to play.

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*Serpentine* is an arcade game involving two rival teams of snakes that pursue each other in a closed maze. The object is to chase each other's tails, biting pieces off, until the enemy is smaller and can be attacked head on. You control one snake at a time against three computer-controlled snakes that initially are larger than yours.

The first priority in a game like this is to eat the frogs that hippity hop around the maze. Every time you catch a frog, your blue snake grows larger by one length. Your snake begins three lengths long, while the enemy snakes are seven lengths long. When, and if, they become smaller by persistent tail attacks, they turn green and then can be attacked from the front. Tail sections aren't nutritious, and don't help you grow in length; however, attacking the snake head on will increase your length by one. Snakes can never grow beyond seven lengths.

Once you have disposed of the three enemy snakes, more of the speckled eggs can hatch, and you advance to the next level. If any of your white eggs remain at the end of the level, they hatch and increase your reserve of warrior snakes.

The game can be played either on the keyboard or with a joystick. The springloaded joystick mode is exceptionally responsive. The graphics are very good, and the game is well-conceived and fun to play. It has that arcade quality of almost being an addictive game.
JAWBREAKER II
Company: Sierra On-Line
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING C GAME CONCEPT B CREATIVITY C GAME DEPTH C-
CONTROLLABILITY B SKILL INVOLVED C CHALLENGE C GRAPHICS C+

ERROR HANDLING N/A DOCUMENTATION C- HOLDS INTEREST? C VALUE FOR MONEY C

Jawbreaker II is a completely revamped eat-the-dot arcade game. A chomping set of teeth is still loose in a candy factory, but the locale is no longer a maze. This time the candy shop features five parallel corridors with moving doors between them. Each corridor has a patrolling happy face that is out to pull your teeth. You have to be quick to gobble a few pieces of candy, then use either keyboard or joystick control to pass through those moving doors in order to avoid the grinning faces that are closing in on you. Four corner energizers allow you a few seconds in which to pursue and kill those faces. When you consume all the scattered candy, you advance to the next level.

The game is easier than the maze style eat-the-dots games. There are fewer dots, and the adversaries are more predictable. You must be careful to avoid the edges since an off-screen happy face might suddenly reappear. On the other hand, game play is more tense, since escape is a matter of timing rather than strategy. The four power dots are more than enough to help you clear the beginning levels. I can say the game is different, fun for awhile, but very shallow.

POLLYWOG
Company: Top-Notch Productions
Language: Machine
Hardware Requirements: 48K

OVERALL RATING D- GAME CONCEPT D CREATIVITY C GAME DEPTH D+
CONTROLLABILITY C SKILL INVOLVED D CHALLENGE D GRAPHICS D

ERROR HANDLING N/A DOCUMENTATION C- HOLDS INTEREST? C VALUE FOR MONEY D

Pollywog transcends game playing into what I would call visual entertainment—a moving tapestry of color. To accomplish this, the author resurrected an ancient but colorful Apple graphics mode called Lo-Res.

The object of the same is to survive. A school of 12 purple pollywogs must eat the abundant algae until they become mature frogs and lay eggs themselves. The meanies in this game are the white killer fish and the orange and yellow creepies. A bite is enough to injure or kill one of your pollywogs. While the adult frog can eat a creepie if the creepie doesn't eat him first, the killer fish are invulnerable and are to be avoided. Sometimes a blue egg hatches. If it grows up to become a frog prince, it rewards the player with a bonus batch of eggs.

The joystick is used to move the pollywogs in any direction. The bottom button keeps the creatures together while the top button scatters them in case of danger. When all the green algae is eaten on any one level, you advance to a harder level. The next level is based on the number of pollywogs remaining. Thus, if there were six pollywogs remaining, you could advance six levels.

The visual effect is interesting. The creatures are moving blocks of color that overlap in peculiar ways as creatures pass each other. It is downright difficult to tell what object is what except for the color. Just to give you an idea of how vague identification can be, the instructions explain that when a pink dot appears on one of your large pollywogs, you have a frog.

The sound is strange. It plays a peculiar syncopated beat throughout that blends somewhat into a tune. This strange music is peculiarly appropriate.

In sum, Pollywog isn't much of a game for gameplayers, but it is visually entertaining, especially on a large color projection set. Potheads might even enjoy it when throwing a party. Incidentally, don't even consider buying the game for a black and white monitor; it's unplayable.
Free Fall is an arcade game in which you must guide a character falling from the top of the screen through a variety of objects, some worth bonuses, others deadly to the touch, to escape through one of four holes at the bottom of the screen. As in Frogger, each hole, once used, fills up, and you can grab onto a number of horizontally moving girders to help move your man easily from one side of the screen to the other.

As you fall use paddles or joystick to change direction, or you can grasp the girder with both hands. It will transport you in the direction it is going. However, if you leave the left side of the screen you lose one man. Moving to the right deposits you back in the elevator shaft to be transported to the top of the screen. Most of the time when you reach the bottom it is easy to guide your man through the opening in the floor. If a hole is orange at the time, you win an extra man.

On the first screen some of the girders transport bonus prizes as well as bombs. The latter are harmless to the touch, but if the bouncing ball strikes a bomb when you are nearby, it’s curtains. Your other nemesis is the piercing needle that floats upward in an attempt to impale your falling body. This first screen is a nice warm-up level for beginners.

Bip-Bobs appear on the second level. They’re harmless, unless the bouncing ball strikes one. Falling here is like playing Russian roulette. There are fewer girders to hang onto in this level, and these change direction when they hit the sides.

The third level resembles the first, except for the two Gunners that move independently up and down on the left side of the screen. They only shoot when their paths cross, and you are still safe from their projectiles if you happen to be hanging from one of the girders. When you have cleared all four holes at the bottom, you advance to the next harder level of play, again on the first screen.

Free Fall nicely implements both graphics and concept. While it lacks the cuteness of a Frogger clone, it is different and innovative enough to be considered a game in its own right. It is fun and has some of that addictive quality that makes a game worth owning.
Assembly line work has never been much fun in real life, but Pie-Man illustrates the comic aspects of an out of control bakery assembly line reminiscent of a silent screen comedy. You are the baker's assistant in charge of putting the whipped cream topping and cherry filling on pies arriving on a conveyor belt. Just before they reach the end of the line they must be transferred to the oven. It sounds simple. After all, it is only a three step process, and the baker can move quickly from the supply bins to the conveyer belt and oven, at least if you use a joystick to control him. Those who prefer keyboard control had better be well coordinated, as the right hand must control eight direction keys while the left contends with three action keys. Trust me, use either a Joyport compatible joystick or a standard one.

It is a sane game — at least, at first. Pies come at regular intervals, and you have plenty of time to do your job. But as you proceed, someone spills grease on the floor and stacks flour sacks in your way, and sometimes a tipsy wedding cake baker dances around you with his creations and steals your pies if you get in the way. Oh, I forgot to tell you that they must have put an extra guy on making pie crusts because suddenly two pies will appear. Decisions, decisions, decisions. Should you do the two cherries first on each of the pies, or complete the first pie before starting the second? The second pie might go splat as it falls off the end of the conveyer just as you are about to put on the cherry. Now you're stuck with the topping that you can't put on the pie before the filling, and there is another pie just coming into view. Work fast and frantically before seven pies fall off the conveyer belt or the game ends.

Pie-Man is a well animated game. The concept is simple, yet very funny. It is a child's game that some adults may find amusing for short periods. Although it holds little long term interest, it is fun to watch and you have to try it at least once, if only because it is so different.

Star Maze is a multi-directional scrolling game in which the object is to find and recover nine power jewels on each of sixteen levels. As your ship accelerates in this joystick or keyboard controlled game, the entire screen smoothly scrolls around the centered ship. While the average game player may not appreciate such speed and smoothness, Sir-Tech has produced an admirable piece of programming on the Apple.

Control of the ship's speed is the most difficult part of the game. The ship accelerates in the direction of thrust, and must be retro-thrusted to slow down. The ship harmlessly bounces off the walls at a 90 degree angle, but must be slowed down to a speed of less than 200 to pick up a power jewel, and down to less than 100 to dock with your base to return the power jewels, or refuel. Since fuel runs out rapidly, it is both important to remember where in the huge maze your base is and to learn how to quickly decelerate your ship to a crawl. This far from easy task requires considerable practice. Loss of ships is usually due to a depletion of fuel rather than enemy fire.

As a shoot-'em-up game Star Maze sports good scrolling and colorful graphics. With practice, it's fun to play.
**HIGH RISE**

**Company:** Micro Lab  
**Language:** Machine  
**Hardware Requirements:** 48K

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**Department:** Entertainment  
**Sugg. Retail:** $30.00  
**Availability:** 7  
**Disk or Tape:** Disk

In our childhood days, many of us delighted in stacking different shaped blocks to form a high tower. The object was to see how high we could pile the blocks until the tower fell over. The concept of *High Rise* is similar, but the game has become computerized and the shapes of the blocks have become complex.

*High Rise* is a keyboard controlled game. A man chooses the bottom block from five columns. He takes the block and positions it in one of six positions on the springboard. He can put more than one block on the springboard at once. Pressing the Return key launches the blocks on top of the pile on the far left. In all cases, the stack must remain stable or it will fall over. Thus, the center of gravity of any block must be distributed over the blocks beneath it or be supported at the ends. When the column reaches the arrow, the man climbs up to a harder level. The amount of points awarded is based on the time remaining on the clock. When the clock hits zero the game ends.

The complexity of the game increases with each level. The pieces are nice, solid shapes on the first level, but become more geometric as the game progresses. One of the difficulties is that there are only five different sized pieces to choose from. It requires thought in how to arrange them on the springboard so that perhaps only two different towers are built simultaneously. I did find a trick. If a block is on the right end of the springboard, signifying that no other piece can be added, and you don’t launch it right away, any piece you take from the column will fall through the floor. This is a handy method for getting rid of your useless pieces.

The game, while appearing simplistic and childish, can become addicting. The game is a geometric puzzle that many adults find fascinating. Yet the pace is slow enough on easier levels to absorb the interests of children as well.
Evolution is an arcade game linking six distinct variations on an evolutionary theme. Starting as an amoeba, the object is to advance up the evolutionary ladder to evolve first into a tadpole, then a rodent, a beaver, a gorilla, and finally the "highest" life form, a human being. To advance from one level to the next requires instinct and quick reflexes to survive with five lives intact. What makes this game stand out from the competition is the diversity and creativity of several of the individual games developed by the two teenage programmers.

One begins as a lowly one-celled amoeba. The object is to eat all of the immobile DNA cells on the screen, while avoiding the spores, microbes, and antibodies attempting to catch you. You can move around freely by either keyboard or joystick control, but if any of your attackers touches you, you lose a life. Your only defense is to use one of your few shields. When all the DNA is eaten, you advance to the next screen, and an entirely different game. In this scenario you are a tadpole who can jump and catch the water flies hovering fleetingly overhead. The trouble is that fish moving slowly from left to right descend toward the bottom of the pond to eat you. Although the flies are unpredictable, the fish are not. Besides, if you're agile you can leapfrog over them. Fortunately, neither of the first two games are difficult even for beginners, or you would never advance to screens three through five which include some of the most intriguing levels of the game.

In screen three you are a rodent who must burrow around in a network of caves to obtain random pieces of cheese. A number of snakes hotly pursue your tasty body; they will eat you if they catch you. Although you can kill a snake by dropping one of your three dung piles, the best strategy is to dig many intersecting passageways and some cul-de-sacs as quickly as possible. This will disperse the snakes and allow you time to reach the five cheeses you need to advance to the next level. The digging portion resembles Dig Dug.

Becoming a beaver in part four holds both rewards and perils. You need to swim across an alligator infested river to retrieve five sticks needed to complete the dam you are building. In a very simple game you dodge moving alligators. Screen five, where you become a gorilla, is the best animated of the six games. You are a rare orange gorilla who must protect the last three oranges located in the vines overhead from a swarm of thieving monkeys. The object is to hurl coconuts at the monkeys overhead and dislodge them from the vines before they steal the oranges. The simplistic theme is well animated.

The human level is a shoot-'em-up game where you fight genetic mutants. Naturally, they shoot back and you must use a laser gun to dispatch ten of them to witness the end of the human race.

The game has three difficulty levels. The intermediate level, which is faster and has more numerous adversaries, starts on level seven. The expert mode begins on level thirteen. Evolution's concept is very good and provides good depth of play. The graphics are well animated and the sound effects are pleasant. I think that potential buyers will find the game fun to play and appealing to players of all ages. It is an arcade game of lasting value.
**THE BILESTOAD**

**Company:** Datamost  
**Language:** Machine  
**Hardware Requirements:** 48K

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_The Bilestoad_ is a unique and intriguing arcade strategy game in which two robots, controlled either by humans or the computer, battle each other. These robots, called “meatlings,” battle on a number of rectangular islands, featureless except for irregularly spaced grid lines. Four “shyben” each possess different functions. The star-shaped shyben transports the robot to another shyben elsewhere on the island. The one with two small circles allows the robot to move at accelerated speeds. The Mondstrall, symbol of Man’s darker nature, is the major objective of the weaker opponent, called the “forsher.” The Zonenstrall is the major objective of the stronger robot, called the “yayger.” When the robot reaches his objective, the battle begins anew on a different island.

While this might sound like an interesting game, playing *Bilestoad* is another story. You control each robot with one paddle button and nine keyboard keys set in a block. The upper three keys control the axe; the middle three, the head or body; and the lower three, the shield. The leftmost key turns the part counter-clockwise and the rightmost, clockwise. The center key stops it. The button moves the robot in the direction it is facing. The best method of learning to play is to set the game up for two people and then manipulate the parts, learning to swing the axe and steer first. This is not simple. Once two people are involved, one robot is sure to move offscreen and then the view begins to alternate between two different areas. Three windows on the right side of the screen show a less magnified view of the battlefield. You can steer your robots by watching the blips on these screens.

In actual play, one robot is likely to be damaged rather than killed, perhaps losing an arm or leg. A color monitor best displays this game. A damaged robot, especially one lacking a weapon, may run with the chance of finding its objective before being cornered and killed. Those that choose to play against a computer robot are bound to lose in any direct encounter.

This game has fascinating possibilities, but unfortunately, is nearly unplayable. You need dedication and coordination using keyboard-controlled games to even play this game. None of the teenagers that I tested could achieve enough coordination to control the robot successfully. In fact, I know of only one adult who had even moderate success with the game, and he likes it solely for its blood and guts aspect. This game might seem fascinating to watch, but it is impossible to play.

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**BILESTOAD**

**CROSS COUNTRY RALLYE**
**Swashbuckler**

**Company:** Datamost  
**Language:** Machine Language  
**Hardware Requirements:** 48K

**OVERALL RATING**  
GAME CONCEPT: B  
CREATIVITY: B  
GAME DEPTH: C

**CONTROLABILITY**  
SKILL INVOLVED: N  
CHALLENGE: B  
GRAPHICS: A

**ERROR HANDLING**  
DOCUMENTATION: B+  
VALUE FOR MONEY: B  
HOLDS INTEREST?: C+

*Swashbuckler* brings the romantic flair of sword fighting to the Apple screen. The encounter takes place aboard the most wicked pirate ship ever to sail the seven seas. You have to fight your way from deck to deck past a whole crew of motley pirates, evil villains, poisonous snakes, and trained killer rats.

You start with three lives and a trusty, silver sword. Using keyboard controls, you can maneuver your man back and forth, turn him around, and manipulate your sword with lunges, thrusts, and parries. Two villains surround you on each level, with each succeeding deck offering more of a challenge. A villain slowly inches closer from behind as you drive the other back with repeated lunges and thrusts. The villain raises his weapon for the kill just as you make a fatal lunge through his chest with your sword. You turn just as a large trained rat goes for your leg. A quick, low parry killing the vermin enables you to face the other pirate before others arrive to take the dead man's place.

After killing twenty pirates, you advance to a tougher set, and to a higher deck until you eventually reach open air. After 25 dead, you are awarded a new life. The villains on the first two levels are overweight clods and easy to beat. When you get to the real swashbuckling types, the game gets harder.

The keyboard controls are relatively easy to master. The A and D keys move your figure left and right while the S key turns him around. The I, J, K, M keys control parry high or low, on guard and thrusting. Since the game is slow paced, you rarely foul up with the keys. With no perceptible keyboard lag, the game's response seems realistic. When you think you have penetrated, your opponent fails. The graphics and animation are first class and many people will buy the game for these qualities. But the game does get repetitious with continued play. A high score, which is always saved to disk, encourages players to beat their previous record. Although the score has room for a five digit number, skilled players have mentioned that the score wraps back to zero after 255. This may have been fixed since we received this copy.

**Juggler**

**Company:** Innovative Design Software  
**Language:** Machine  
**Hardware Requirements:** 48K

**OVERALL RATING**  
GAME CONCEPT: B+  
CREATIVITY: C+  
GAME DEPTH: C

**CONTROLABILITY**  
SKILL INVOLVED: C  
CHALLENGE: B  
GRAPHICS: B

**ERROR HANDLING**  
DOCUMENTATION: N/A  
VALUE FOR MONEY: C+  
HOLDS INTEREST?: C

Being a circus juggler has always required a good sense of coordination and timing. Good hand and eye coordination is required to master this computer version called *Juggler*. Keeping six balls or other objects aloft is the object of this paddle controlled game. One can either juggle objects by using hands or by bouncing them off of discs tossed into the air. Don't worry, you don't have to catch the discs for they just vanish after traveling a set distance towards the top of the screen. More points are given for bare handed juggling than for juggling with the help of these discs. As an added challenge, there are several bonus compartments on the sides that you can attempt to nudge the tossed objects into. They also help in limiting the number of objects that you are actually juggling at any given moment. Miss one object, scratch one juggler. You have three. After a certain time limit the game progresses to a harder level where the size of the tossed discs becomes smaller.

*Juggler* certainly keeps you on your toes while you juggle six objects simultaneously. The animation is smooth yet simple, and the action is very controllable. The game is cute and an interesting diversion for those who enjoy a game that requires lots of practice to achieve a high score.
RUSSKI DUCK

Company: Gebelli Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING  C+
GAME CONCEPT  B
CREATIVITY  C+
GAME DEPTH  C+

RUSSKI DUCK could be considered a real time adventure game, for it combines the problem solving characteristics of an adventure with the animation of an arcade game. You're a CIA agent. Your country's MX missile plans have been stolen and hidden in a Russki Duck that is packed in a shipping crate awaiting transport to Moscow. Your mission is to find those plans and return them to the CIA vault.

You play on a main map consisting of two parallel streets separated by a park and highway. Various shops, government buildings, and embassies line the two streets. Your player, represented by a red dot, is maneuvered across traffic and into buildings by keyboard control. Upon entering any building (some have several rooms), the view shifts to a room containing various objects and wandering KGB agents who are intent upon killing you. These agents meanwhile steal objects and deposit them in other buildings.

Players accumulate points by recovering the MX plans, and by playing good samaritan, recovering stolen goods and returning them to their rightful owners. The mission has its perils. Besides death by assassination, you can be killed by speeding cars, or blown to bits by bombs hidden in packing crates. You have several lives, but must start over again in the CIA building. Your only weapon against enemy agents is a hammer, but you can fool them by wearing a mask.

The strategy is to work rapidly, in finding and using the necessary objects to solve the next piece of the puzzle before the KGB agents move them. You may be opening crates with a hammer when you suddenly find a bomb. Because you can only carry one object at a time, you have to rush out to find a screwdriver to disarm it, but by the time you return, the bomb has exploded and the unopened crates and your hammer are scattered in other buildings on the streets. Start searching.

The game is not very difficult, and is more suited for children. The graphics are simple but cute and appealing to the young mind and spirit. Although the Russki Duck has a random start, the game takes on a repetitious flavor after playing it several times.
INTERNATIONAL GRAND PRIX

Company: Muse Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING: B
GAME CONCEPT: B
CREATIVITY: C+
GAME DEPTH: C

OVERALL RATING: B
GAME CONCEPT: C+
CREATIVITY: B
GAME DEPTH: C

OVERALL RATING: C+
GAME CONCEPT: B
CREATIVITY: B
GAME DEPTH: C+

OVERALL RATING: N/A
GAME CONCEPT: C
CREATIVITY: D
GAME DEPTH: N/A

INTERNATIONAL GRAND PRIX is a very realistic, Hi-Res racing game on a “Grand Prix” type course. The object is to run the selected number of laps in the least time. One is given a choice of automobile with five speed manual transmission and a specific amount of fuel. The race course is displayed from the driver’s perspective, with side markers of the roadway trailing off in the distance. As the car negotiates, the markers move towards the screen, providing 3-D effect.

The driver’s instrument panel includes a speedometer (with a reading of up to 200 mph), a gear shift indicator, tachometer, an edge detector which shows the relationship of the car’s front and rear wheels to each other and to the sides of the road plus lap times. Steering, accelerating and shifting is done entirely by one paddle. Pressing the button accelerates the car. An automatic transmission will shift to the next higher gear at a certain speed but is incapable of decelerating the car rapidly on a turn. With no brakes this is not the recommended technique. The manual transmission has to be hand shifted. When the RPM’s are varmaxed, pressing the button rapidly will upshift. At lower RPM’s, this technique will automatically downshift.

Warnings for all hazards or turns are given prior to actually seeing the turn. Obviously, you can’t do a hairpin turn at 130 mph without spinning the car out or running off the course. Hitting the outside marker costs time in accelerating from a standstill in addition to assessing fuel penalty. Also, running the engine at the red line burns excessive fuel.

With a difficulty level that can be varied from a car that sticks to the road like a vacuum cleaner to one that drives on ice, this game can be made as challenging as your driving ability.

FORMULA 1 RACING

Company: Gentry Software
Language: Machine
Hardware Requirements: 48K

OVERALL RATING: D+
GAME CONCEPT: B
CREATIVITY: C
GAME DEPTH: D+

OVERALL RATING: N/A
GAME CONCEPT: C
CREATIVITY: D
GAME DEPTH: N/A

Formula 1 Racing is perhaps the best looking auto racing game to appear on the Apple computer. Much like Pole Position in the arcades, it puts you in control of a race car on a curving race track with the perspective viewpoint of being 50 feet behind the car as it races around the track. The scrolling horizon adds visual realism as the car turns. The roadway has signs on the edge of the macadam that become obstacles to careless drivers, and there are other cars to contend with on the game’s two difficulty levels.

The unfortunate thing about this game is that it neither lets you go fast enough around turns to become truly dangerous, nor gives you enough race cars as obstacles to avoid. In short, it presents little challenge to all but the klutzy beginner driver. Crashes do occur but they are infrequent and rarely keep you from finishing the course. Also, you don’t get the feeling that you have placed anywhere within the top contenders since a numerical score is your only indication of success. In sum, Formula 1 Racing looks good but misses the mark.
**Saturn Navigator** illustrates how spacecraft are maneuvered from one planet to another. The goal is to leave Earth orbit and link up with a space station in a circular orbit inside Saturn's inner ("A") ring. The trip is made in four stages: trans-orbital flight from Earth orbit to Saturn; Saturn approach and injection; and rendezvous. The mission must be performed within the constraints of the available fuel supply.

The program is quite realistic, and is both a game and an educational tool that does well in both regards, but excels at neither. The user receives a visual and painless introduction to the laws of orbital mechanics, in which the multi-variant mathematics are neatly hidden from view. As an educational tool, more could have been done with little effort; Hohman (minimum energy) transfer orbits, nodal crossings, and orbital periods are inherent in the program and the documentation, but are not noted (although less important aspects are dealt with in moderate detail).

Each stage bears directly on the later phases. Fuel depletion and ring plane collisions necessitate starting over, which may be done at the last orbit update (without using the save game feature), or at the beginning. Ring plane collisions are a common but major disaster, due to poor ring graphics and an inadequate definition of the ring gaps.

After choosing a trans-orbital velocity and leaving Earth, several mid-course corrections are performed. Each provides a view of Saturn and your "aim" point, and allows retargeting of the approach. At Saturnian injection, overhead and plane views show your inclination and projected ring plane penetrations. At any phase, trial adjustments for velocity changes may be evaluated before having to commit to them.

When you accept your approach maneuver, the view screen shifts to a 3-D display. Its like watching a step-frame movie as Saturn and its rings get closer and closer. The B&W meridian-line graphics update in a jerky manner every three seconds. Assuming you successfully attain Saturn orbit, and get the display of the space station, the hard part of the game starts: rendezvous. Unfortunately, neither ranging data nor the success criteria are provided; if you think you've linked up but don't get the congratulatory text ending, you aren't close enough.

Despite some minor shortcomings, **Saturn Navigator** offers a notable concept and achievement. While children without adult supervision may find it frustrating at first, they cannot help but learn in the process. Adults will learn even more, and may even get competitive with the game.

**NOTE:** Earlier versions of this program sold for $24.95, but required ownership of the A2-3D1 graphics package. This newer package incorporates the graphics package into the program.
FLIGHT SIMULATOR
Company: Sublogic
Language: Machine
Hardware Requirements: 32K

OVERALL RATING A
GAME CONCEPT A
CREATIVITY B+
GAME DEPTH B

CONTROLABILITY B+
SKILL INVOLVED B+
CHALLENGE B+
GRAPHICS A

ERROR HANDLING N/A
DOCUMENTATION B
HOLDS INTEREST B+
VALUE FOR MONEY A

Sublogic's FLIGHT SIMULATOR is a real time, 3-D program that simulates a pilot's sense of flying a plane using the television monitor as the pilot's windshield for a visual field. The flight instruments are displayed on the lower half of the screen. The player actually flies by using keyboard or paddle controls to interact with a 3-D data set at a frame rate of between three and five frames per second. The plane follows aero-dynamic equations; thus you can land, take off, perform aerobatic maneuvers and play a wargame against a German fighter squadron. (The Germans always get it in these air combat altercations, don't they?).

The program has recently upgraded from tape to disk availability. The disk version has several added options. There is now a bombsite view for accurate visual bombs-away on the enemy fuel depot. There is also a low level altitude indicator. An often heard complaint of the tape version was that it was impossible to determine when one crashed. That has been corrected by a flashing crash sequence and a reset procedure to start several seconds later. Also, one's plane isn't slightly crippled in a dogfight, but is really demolished, spiralling into a tailspin. No breaks here. In all, an excellent program, a new standard in 3-D simulation and a deservedly popular program.

AIRSIM-1 FLIGHT SIMULATOR
Company: Mind Systems Corporation
Language: Applesoft and Machine
Hardware Requirements: 48K, paddles

OVERALL RATING D
GAME CONCEPT B+
CREATIVITY B+
GAME DEPTH C-

CONTROLABILITY D+
SKILL INVOLVED C
CHALLENGE B
GRAPHICS D

ERROR HANDLING D
DOCUMENTATION A-
HOLDS INTEREST? B+
VALUE FOR MONEY C-

For anyone who would like the opportunity to fly the New York/New England crash corridor without leaving the safety and comfort of your living room chair, the AirSim-1 Flight Simulator may be your ticket. The authors spent a great deal of time making the documentation very clear, but unfortunately failed to provide any visual references for most of the area you are meant to fly in other than the horizon. In addition, as the manual points out, you are free to fly through any obstacles that do not appeal to you.

Control is the greatest deficiency of this program. You are meant to be able to use either a self-centering joystick or paddles. The joystick was hopeless. I found that the only way to keep the plane almost stable was to use paddles. (Rumor has it that you might be able to control the simulator better if you have paddles which you can trim.) With paddles, you can at least set the roll axis at neutral, and control the climb and descent rate until you are airborne. Most disheartening is the fact that the screen is only updated once a second, so control inputs are a very delicate matter indeed. The most critical input seemed to be the turn, or roll. I found myself repeatedly spinning the plane into the ground after making only minor course adjustments.

When you exceed one of the flight parameters considered acceptable in the program, you are sent out of control and cannot recover. You must wait for the crash or press Reset. I was highly amused watching the altimeter and climb indicator alternate between almost vertical climbs and steep descents, the compass spin wildly through 1250 degrees (that's right, one thousand two hundred and fifty degrees), and the horizon situation indicator display almost back-to-back 90 degree turns. But apart from this sort of entertainment value, the program seems to be a good idea that somehow took a nosedive.
**RENDEZVOUS Version 1.1**

**Company:** Edu-Ware Services, Inc.  
**Language:** Applesoft & Assembly  
**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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*RENDEZVOUS Version 1.1* is a Hi-Res simulation of the docking of a Space Shuttle with an earth-orbiting space station. It is a more graphic and complex treatment of *Saturn Navigator*'s somewhat more educational program. Four separate and distinct phases are required to successfully complete the mission: boost phase, orbital rendezvous, approach, and docking. Piloting proficiency and time are further challenges; the less time, the higher your rank (from Swab to Fleet Admiral). An earlier version, 1.0, is identical in graphics and play, but does not have the extensively updated tutorial and documentation.

When the state criteria have been met, each phase links into the next, often with shocking results. The phases become progressively more difficult, as there is less room for error in the latter phases. This is not to say that the first phases are a snap. Proper energy management is a key element. You can achieve at least a partial earth orbit without using any of your third stage energy; but if you use very much, you may not have enough for docking maneuvers.

The trickiest parts of *RENDEZVOUS* are “real world” (or perhaps “real space” would be a better term). The concepts of space flight take some getting used to. For example, to catch-up to a spacecraft, you must be in a lower orbit; to get into a lower orbit you need to slow down. Thus, to go faster, you have to slow down! Also, if adding up-and-down velocities to the front-back and left-right perspective of ground-bound travellers isn’t too mind boggling, try adding the three altitude vectors of roll, pitch, and yaw, and things start to get tough. In space, there is nothing to prevent you from charging straight down the road sideways, upside down, or spinning like a top.

*RENDEZVOUS* does reasonably well in 6-D controllability, and a 3-D representation on a 2-D video screen, although the optical illusions can be troublesome. All six axes may be joystick or keyboard controlled (12 keys, or 1 joystick). The keyboard isn’t as sporty, but provides better incremental control. A joystick is easier on the brain and more realistic, but much more disaster prone. Don’t despair, for in each of the four phases, ten saved-game positions may be saved to the program disk. On recalling a game, only the positions for the current phase are displayed. Unfortunately, there is no delete capability until you fill all ten positions. To avoid total chaos, keep notes on the status of each game when it is first saved.

The game may be entered at the start of any phase, either from a saved position or from a user-defined set of initial conditions. “Easy” setups are postulated in the documentation for getting the feel of the game. The game will also return you to your initial position in your present phase without having to save it. If you intend to dock successfully, then heed well: keep cool, don’t use high rates, and above all, don’t make like a jet-jockey and maneuver with rates in more than one axis at a time.

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**HIGH ORBIT**

**Company:** Gebeilli Software  
**Language:** Machine  
**Hardware Requirements:** 48K

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*HIGH ORBIT* is a rather imaginative and unique game where the object is to build space stations from nodules sent up from Earth. The nodules are picked up and positioned on top of one of the rotating station points with a tractor beam. You have to be quick, because the tractor beam only has a limited amount of energy before it has to be re-energized. If you position the nodule successfully, the station crew will take over with their own tractor beam. When all nodules are in place, the station, in a beautiful geometric graphic display, moves into position to be.
energized. This final step is accomplished by moving another nodule into the center, then zapping that nodule with your phaser.

While constructing a space station sounds like an easy chore, you must guard the station from enemy alien craft that wreck parts of the station and kill the crew. You are armed with a phaser. Unfortunately, patrolling the area takes valuable time, and time in this game is not a luxury. You only have a thousand units of time before the mission is aborted. However, if you succeed, the crew will abandon it and the station will be launched into high orbit. Then you must protect the crew while a shuttle picks up the crew for a return to Earth. Your next mission is to build an even larger station with one additional node.

The game’s skill level can be considerably adjusted. You can start with a space station consisting of only three nodes, or one that has over ten. Although this game can be played with either keyboard or joystick, joystick control is definitely recommended.

While the game itself at first appeared to be rather esoteric both in concept and graphics, it soon caught on among the neighborhood children. The graphics, although mostly colorful geometric shapes, are stunning when the space station is launched into deep space. As a whole, the game combines the necessary shoot-'em-up aspects of arcade games with one’s tinkertoy builder’s instinct to make *High Orbit* a very enjoyable game, but only offers a challenge at the highest difficulty settings.

**HARD HAT MACK**

**Company:** Electronic Arts  
**Language:** Machine  
**Hardware Requirements:** 48K

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*Hard Hat Mack* is a jumping, climbing arcade game in which our hero tries to construct a building while avoiding the OSHA inspector, falling rivets, and other construction hazards. There are only three screens in this joystick-or keyboard-controlled arcade game.

The first screen shows an unfinished five-story building. You must first place girders into the holes in the framework. Having done this, you must rivet them into place with the rivet gun, which you have to chase to catch. All this is extraordinarily difficult because the OSHA inspector is chasing you, and deadly rivets are constantly falling around you. You can travel between floors by climbing the chains, riding the elevator, or jumping on the springboard on the left side of the screen. If you don't rivet the girders in place before you die, you have to put them in again with your next man.

The second screen is a little easier and has more interesting graphics. The object is to collect all the toolboxes scattered around the many uncompleted floors of the building. A girder on the hoist will move you from floor to floor. Several of the toolboxes are easy to get. Nevertheless, you must time yourself carefully when you leap past an opening and closing contraption and sneak past the inspector, who is standing guard on the street level. Once you have gotten all the toolboxes, you have to time your ride to the top so that the big magnet will pick you up and transport you safely past the last conveyor belt.

Your mission on the third screen is to grab all the steel blocks that are scattered about the five-story structure and put them into the rivet machine. This is not at all easy because there is an abyss between the right and left sides of the building. You must cross over this chasm by carefully falling onto the twin springboards. There is also an elevator-type conveyor that can transport you up and over the top, but not around the bottom. It sits dangerously over the chemical toilet. Adding to the danger are the exposed wires on one of the conveyor belts and the riveting machine itself.

You need a long period of time to master this game. "Master" perhaps isn't the right word because the objects that you collect are placed at random during each game. However, you can learn the technique of finishing each level. The three screens, though a real challenge, are not enough. The first screen is the most frustrating, difficult, and least interesting. You can start the game on other screens if you press the number 2 or 3 before you press the joystick button to start. The animated graphics and the game design are top notch. *Hard Hat Mack* is definitely an arcade game that will challenge the best of players.
This arcade-style maze game is rooted in mythology. King Minos built a maze on the island of Crete to contain the Minotaur, the ferocious offspring of his wife and a bull. The maze also contains numerous creatures, fiends who do the evil bidding of the Centaurs and Minotaur. Playing Theseus, son of Aegeus, chief hero of Attica and one of the Argonaunts, you are sent into the four level maze to slay the Minotaur with your laser sword.

The maze levels are interconnected by stairways, but the corridors are guarded by ferocious hall creatures, scouts from the Minotaur. They include Furies, Charon, and Skeletons, and they can reappear once you kill them. On the other hand, room creatures are confined to one area and disappear when killed. These monsters include Centaurs, dragons, spiders, snakes, cyclops, and Momus. Depending on the strength of the creature, they can inflict serious damage, taking away several of your 99 lives.

Of course it isn't quite a one-sided battle. Various items can help in your quest. Skulls and virgins give you more lives, clubs help you smash through walls, and wings give you the power to fly so that you can see greater portions of the maze than from the ground. There is also an elixir that allows you to wander through walls, free of your body. But beware! Charon is the one creature who can kill you in your spirit form.

The game is best played with a joystick, although keyboard and paddle modes are available. The game is involved and keeps you interested for some time. The game is like a real time puzzle, yet it makes a fast shoot-'em-up game. The graphics are very good and novel in the way the maze has a variable shrink factor when one is flying. Normally only about one twentieth of the maze is visible at any one time. When flying much more of the maze becomes visible until (if high enough), the entire maze is visible. Since the game isn't difficult to beat, killing the Minotaur leads you to a different maze. There are 32 different mazes, more than enough to gain a very high score and a long, pleasurable afternoon.
BEER RUN is a strategy-oriented arcade game, wherein the object is to climb to the top of a brewery by out-maneuvering the building's wandering guzzlers and patrolling bouncer, catch a blimp from the roof to the Olympia brewery, then catch one of those elusive Artesians. The game, with its floors connected by a chain of ladders and little guzzler characters in constant pursuit of you, bears a strong graphic resemblance to the game, "Apple Panic". In this game, however, the only defense against the guzzlers is your wits and the ability to reach an elevator adjacent to the next set of floors. However, not all elevators lead upward. The ladders are easy to climb, but can only be descended one level at a time. Although the building is only 30 stories high, the roof isn't easy to reach. The real kicker involves levels 21-25, where a single ladder on one floor often becomes a deadly trap when being pursued by five drunken beer bozos and a mean bouncer. If you get caught, you must start over at the bottom of the building, minus one of your three men.

The game and graphics are nicely implemented. The characters are humorous in appearance — especially your man, who looks like he is either drunk or traversing a narrow ledge. The game is either paddle- or keyboard-controlled. The paddles control the players' horizontal direction, while the paddle button causes him to either climb or descend a ladder.

The mysterious Artesians are always just beyond your grasp. Messages inform you that they are on the levels just above you, but these imaginative creatures may be just that — creatures preying on your, by this time, frazzled imagination.

BEER RUN is a fun game. Beginners might find the contest initially frustrating, since it is a game that is easy to learn, yet hard to master (in which case, if you are of age, just relax with a couple of beers, then sublimate yourself back into it).
Monster Smash, a keyboard-controlled arcade-style game, takes place in a graveyard. A grid of gates (toggle controlled) allow the monsters passage either vertically or horizontally. You try to trap them inside the grid so that they must move horizontally past the tombstone smashers which destroy them. At the same time, any visitors, such as children, must pass through unharmed. On the lower levels all the columns operate in tandem, but on higher levels the number keys (1-4 for gates and 6-9 for tombstones) act independently.

On the easiest levels, Monster Smash is a mindless reflex game of wanton destruction and little variety. It isn't much better on the higher levels except that you have a choice of destroying the snake eggs or letting them pass harmlessly by. If you choose to smash the egg, a snake appears which you then must smash. Although worth a lot of points, if one escapes it counts as three escapees. You lose when ten monsters escape from the graveyard through the opening at the bottom.

Because of repetition, the game becomes boring. I considered writing the game off as a total loss, but discovered after extensive play that the game does have some redeeming value.

Castle Wolfenstein is the first game to combine an adventure scenario with a real-time, arcade-type game. The Germans are holding you prisoner in the dungeons of Castle Wolfenstein. A dying cellmate gives you a gun and ten bullets. The object is to find the war plans for Operation Rheingold and escape from the castle.

As one wanders from room to room, one encounters various chests, patrolling guards and, sometimes, SS storm-troopers. Some of the chests contain items you need; a German uniform, a bulletproof vest, and, at times, even ammunition. The chests require time to open. You can replenish your supplies by searching the dead guards.

Your protagonist is controlled by either keyboard, paddles or joystick. The joystick provides the best control method. Your player can be directed with ease with the joystick and, if it is self-centering, your player will stop when the joystick is let go. When button #0 is pressed, the joystick aims the gun. Button #1 is used for firing. Keyboard control is similar; however, it uses two groups of nine keys. The center key of the block of movement keys stops motion. The problem with the keyboard control method is that you must make sure your fingers are always in the right position. If you don't press the stop key quickly, you will crash into walls. Paddle control is simply a disaster. Apparently, Muse has calibrated their game to work with a particular paddle. You're supposed to be able to judge the direction of movement by marking the paddle. With both the TG and Apple paddles, it doesn't work. Turning them very slightly shifts movement from straight-up to diagonal-right. Consequently, one is always going the wrong way; this is frustrating in a real-time game.

The game is quite good and fun to play. There is some sound implementation for the guard's voices - German vocabulary, of course. There is variety in this game, too, although the castle layout will stay the same until you escape or you choose to generate a new and random castle before escaping. This gives you a chance to learn or map a particular game. If you win and advance in rank, the difficulty factor increases.
**STICKYBEAR BOP**  
**Company:** Xerox Educational Software  
**Language:** Machine  
**Hardware Requirements:** 48K

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*Stickybear Bop* is a charming and well animated shooting gallery styled game that was meant to appeal to young children. The object is to shoot at various objects that float across six different playfields. A ball shoots out of the left side and lands on the lower end of a teeter-totter. You shoot it by catapulting it upwards to bop on one of the targets. The teeter-totter is paddle or keyboard controlled. Animated targets like ducks, hats, planets, and even Mr. Stickybear himself, float by on three different planes.

You start out with ten balls which are stored in a container on the left side of the screen. If you miss a target, you lose one of the balls. The game ends when all ten balls are gone. If you manage to reach the sixth screen, the birds that aren’t bopped can steal a ball from the box.

The graphics are outstanding and animated on all levels. Level two features Mr. and Mrs. Stickybear juggling balls, stripes, and apples. The juggled objects must be hit at the top of their arc. Ones that are hit elsewhere are bopped, but you don’t lose a ball for hitting them. Stickybear flies across the screen in a hot air balloon and drops sandbags on your teeter-totter. You can gain extra balls on this round. The fourth level features Mrs. Stickybear bouncing a ball across the screen with rabbits, hearts, birds, stars, and flowers above her. The fifth features another juggling act, while the last features a flock of ball stealing birds. Levels beyond this are the same but feature more of everything.

*Stickybear Bop* is a fun shooting gallery game that may fascinate parents as well as children. It is a beautiful looking game that has some of the best animation available on the Apple.

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**BELLHOP**  
**Company:** Hayden  
**Language:** Assembly  
**Hardware Requirements:** 48K

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*Bellhop* is a mundane game in which you’re a bellhop in a hotel. You earn your tips by toting seven pieces of luggage to seven different suites on the sixth floor. A tip meter determines the tip that you will receive. This meter starts at $60 for the first round, but rapidly runs down as time progresses.

In this game time means money so you have to hustle. You grab the first available elevator and rush to the top with the first piece of luggage. If you’re not quick at dropping the luggage, you’ll miss the elevator when you return. You’ll soon learn that the fastest way down is to ride the elevator to the fifth floor and jump into the nearest empty shaft for a quick but harmless fall to the lobby. When you have finished delivering all the luggage, the remaining tip is saved. The game ends when you have finished all four rounds or run out of tips on any one of them.

There isn’t much depth to *Bellhop,* although beginning at the third level a sneaky little hotel ghost begins to swipe luggage and return it to the lobby. His every move causes you to lose money on your tip meter. Other than that, this keyboard controlled game requires nothing more than a little dexterity. It isn’t much of a game. If it were written in BASIC, it would be good to type out of a magazine, but you would be hard pressed to explain why you bought it.
To simulate the game of pocket billiards accurately with 15 balls and a cue ball bouncing around the table in real time is an incredible feat. The programmer's attention to detail is to be commended. He offers variable friction, strength of shot, type of English on the ball, and four types of pool (straight pool, eight ball, nine ball and rotation).

On the break, or after one's opponent has scratched, one can place the cue ball into position for the shot. Aim is accomplished by a paddle control. A dotted line with the shape of the cue ball's position against the target surface (ball or cushion) is moved about the table. Once a target is chosen, control can be shifted for a finer aim before the shot is taken. While there is a lot of fine adjustment for timing during close shots, it is somewhat less accurate for shots across the table due to the geometry of the problem.

Those who play pool regularly will find the dynamics or physics of the game amazingly accurate. Balls strike and bounce off each other according to Newton's laws of motion. By adding a choice of nine types of English for a shot, one can control the final resting position of the cue ball as in the real game. A nice feature is that if one is practicing a trick shot and misses, the shot can be tried again with all balls in the same place.

The graphics, which are excellent, can be used on either a color or black and white screen. One can toggle between showing the balls with their numbers or in two colors. Actually, on a black and white screen, the colors show up as stripes and solids depending how good your monitor is. The game's instructions can always be reached by toggling the ESCape key. The game comes with a demo mode, with which you can break with the friction set to 1 (minimal). The balls seem to bounce around forever until almost every ball is sunk.
**Trick Shot**

*Company:* Innovative Design Software  
*Language:* Assembly Language  
*Hardware Requirements:* 48K

**OVERALL RATING**  
**GAME CONCEPT**  
**CREATIVITY**  
**GAME DEPTH**  
**CONTROLABILITY**  
**SKILL INVOLVED**  
**CHALLENGE**  
**GRAPHICS**  

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**Trick Shot** is the sequel to *Pool 1.5* by the same authors. It does not offer the same games as the original, but includes Snooker, Billiards, Three Ball, and a special game called Trick Shot. The Trick Shot game is the reason you buy this package. It allows you to position as many balls as you like before each shot. This permits you to place six balls like the professionals do, which carom into each of the side pockets when hit by the cue ball. Or, you could set up some bizarre shot that would have one ball carom off another in an almost endless procession.

The balls are positioned in a setup mode. Each ball is initially positioned with the U, D, right, and left arrow keys. Previously positioned balls can be moved or removed. What's exciting about this mode of play is that once the shot is taken, and if it doesn’t work properly, you can press the R key and all of the balls are put back in their previous positions. A slight adjustment can then be made, so the trick shot will hopefully work.

There has been a change in the aiming controls for the cue ball. They now work for either paddles or keyboard. You can switch back and forth with the CTRL-K key. The fine aim now has the accuracy of a single pixel position. Unfortunately, the extra precision is indicated by a projected path that doesn’t begin at the cue ball’s current position. It is very confusing, especially when the cue ball takes a jump while traveling toward the target. This is not very realistic.

The game comes with an extra disk that contains sample, impossible trick shots. These can be loaded by simple keyboard commands. In fact, you can save any of your trick shots to a specially formatted disk for future replay.

Setting up trick shots is quite a bit of fun. Users should be aware that setting up symmetrical shots doesn’t work properly. For some reason, possibly round-off errors during the calculations, symmetrical shots do not produce the outcome you’d logically expect. But they are close, so it is nothing to worry about. It will just take more work to set up a good shot. The game is a pleasure for pool fanatics; otherwise just stick to the original *Pool 1.5*.

**Apple Panic**

*Company:* Broderbund  
*Language:* Machine  
*Hardware Requirements:* 48K

**OVERALL RATING**  
**GAME CONCEPT**  
**CREATIVITY**  
**GAME DEPTH**  
**EASE OF USE**  
**SKILL INVOLVED**  
**CHALLENGE**  
**GRAPHICS**  

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**Apple Panic** is an intriguing arcade game that is virtually identical to Space Panic. You are in a six story brick-floored building. The floors are interconnected by a maze of ladders. The object is to destroy the little apples that are chasing you by digging holes in the brick floors for them to fall into. Once an apple gets stuck in the hole, you have to knock it through the hole by beating it over the head. If you get to the apple too late, it may crawl out of the hole and get you.

Movement control is by the I,J,K,M keys. Keyboard control is very responsive. The A and S keys dig and fill the holes, respectively. The game strategy is very simple. Lure an apple into a hole by letting it chase you, fall through the hole to the next level without injury, then climb back up out of the hole in order to hit it over the head. Kill off all the apples and you advance to a harder level. A Green Butterfly, which proves difficult to kill, can appear on some of these harder levels. In one of these levels, you confront the Mask of Death; a real bummer. You have three lives but you can earn a bonus life. The game and graphics are exceptionally well done.
In Search of the Most Amazing Thing, a game designed for children, departs from the usual kill-the-aliens theme and, instead, encourages you to negotiate with the creatures. In order to succeed in finding “the most amazing thing,” you must obtain clues from different alien cultures. You must discover how to interact with them: how to read sign language, exchange currency, read maps, and compose songs for which the aliens might wish to trade information.

The journey begins in Metallica, where old Uncle Smokie weaves tales about his past search and offers you the use of his B-Liner for the trip. The B-Liner is a combination hot-air balloon and dune buggy. It is even equipped with an oil-drilling platform on its rear deck so that fuel shortage is never a problem. However, the B-Liner is not fully equipped. You can auction items gathered from Smokie’s previous trips to raise money to buy your equipment. The Metallicans, however, are a crafty bunch, if you ask too much, they will steal your item. It becomes a challenge to outfox the aliens at the auction. Since you need a lot of green chips to buy the necessary things, this portion of the game is extremely slow and repetitive. I’ve been told that some children are completely absorbed by this section. I was bored, and I’m sure older children would be, too.

Once the B-Liner is fully equipped and you have enough clues from Uncle Smokie, you set out on your quest. You fly or drive around the Darksome Mire and get fuel by anchoring against a Night Rock and drilling for oil. To do the latter, you don a jetpack and fly outside to the rear platform. You drive and fly using the AWDX and S cluster of keys. You gather food by driving up to a Popberry Tree, flying to its branches, shaking a piece of fruit loose, and then scooping it up from the ground before it sinks into the tar.

Flying the balloon takes practice. Winds of various strengths and directions blow at different altitudes. You can only use one instrument at a time. If you are busy monitoring your radar, looking for the nearest hut, and you want to see if you are getting closer, you have to activate a direction display and then an altitude display. Each of these takes time to draw on the screen. By the time you figure out you are going in the wrong direction, the hut is gone. The game would have been much better if an entire instrument panel continually showed game information. It probably isn’t that important, though, because you eventually drift near a hut somewhere in the Darksome Mire, and then you can drive the rest of the way to the hut.

This portion of the game is designed to make you think. First, you have to read the map to determine which land you are in. (The clues offered by the B-Liner’s computer modules require the name of the culture.) The clues will give you information about the aliens, such as what the value of their currency is and what music they like. They will also tell you the aliens’ sign language (to which the creatures point with their antennae) for six important phrases used in trading. Since music is very important in trading, you are equipped with a music composer. If you can deal successfully with the aliens without offending them or scaring them away, you can trade for a clue to find “the most amazing thing.”

While this game is intriguing and educational, it takes innumerable hours to play. Fortunately, it does have a save-game feature. I wonder, however, whether the average child has the patience to play this game due to the time it takes (even days) to find “the most amazing thing.” It certainly teaches the child to think, for the instructions only offer some basic clues. A short novel accompanies the package, thus giving the child some background. All in all, although it is too long and slow, In Search of the Most Amazing Thing is a good, interesting game for a child with a long attention span.
ROBOT WARS introduces the fascinating concept of programming a robot to battle against other warring robots. Like the ancient Roman gladiator matches, ROBOT WARS is their late 20th-century equivalent.

The robot battles become the culmination of one's programming ability. After the robots are sent into battle, the player no longer has direct control over the robot's battle tactics. Each robot's micro-computer brain, which can hold a maximum of 256 instructions, has been previously programmed with a battle strategy plan. Once on the battlefield, the robots (from 2 to 5 in number) rotate turns, each executing a single robot language instruction. Obviously, the winner is the robot that runs the most effective battle strategy program.

A typical battle takes place on a walled-in square field 256 units long per side. Thus, the only ultimate escape is death, with only one winner left. The two waiting robots, represented by Hi-Res figures that show the positions of the radar and gun port, begin scanning with their radar as they move to some arbitrary position on the field. Robot A spots the other and fires a shot. Robot B, sensing immediate damage, begins moving out of fire towards a wall while its radar is still scanning for his opponent. The first robot begins driving for Robot B's last known position in an effort to cut down the scan time on its radar. B, lacking the intelligence to avoid the wall, inflicts more damage to itself upon collision. However, it sets its radar on a short scan, finds A and fires. The battle continues until one or the other is damaged 100% and a winner is declared. Scoring points are added or subtracted and logged in the robot's code. Robot battles can be dull or exciting, depending on the ability of the robots. But this wasn't meant to be a spectator sport. Only players personally involved would enjoy watching two poorly designed robots represented as a Hi-Res square and circle shoot at each other.

Each robot has an accumulator in which math is performed, a pair of index registers to help control the program flow, 26 memory registers and 7 input/output registers. These last registers store information like X and Y position, X and Y speed, the aim angle of gun and radar, amount of damage and length of time before a shell explodes. There is also a random number, generator register. The language is somewhat like BASIC's syntax, but in logic is more like machine language. Statements like 0 TO SPEED V puts 0 in the vertical speed register. B TO RADAR means to take what is in memory register B and put in the RADAR register. IF RADAR — 90 GOTO TRAVEL means if the radar register is less than 90, then jump to a location in the code starting with a label called travel.

The code is entered in a full-screen text editor. It can be saved to a source disk initialized by this program. The source code is then assembled with a cross-complier into machine language instructions. One can watch the assembly and control the speed by turning the paddle.

The robot is then tested on a test bench before being placed in battle. Here you can watch the micro-computer in action, speed it up, slow it down, stop it, and look at any of the registers. The bench displays on the right side of the screen the counters for horizontal and vertical position and speed, radar, gun aim, shot fired, damage, accumulator, program counter and which register is being watched. This last item can be changed to suit your test. The paddle buttons are used to simulate the presence of another robot and to simulate damage to your robot in an effort to see how your robot will react in an actual battle situation.

The program's documentation is lengthy but quite clear and understandable. The author provides some simple robot examples for you to study but if you watch these fight you will soon realize that a good robot is much more complex. There is also a list of spare parts suitable for using in your first few robots.

ROBOT WARS has a two-fold purpose. Of course, it is also meant to be a game, but it is also intended to be a tool for introducing and teaching an introduction to assembly language programming. I'm sure that even those that know little programming but are enthralled by robots will make an attempt to learn the language. However, be advised that this program, especially for beginning BASIC programmers or non-programmers, is not easy to use. Assembly language and Robot language requires exacting and careful planning. Finding and ridding mistakes even with the help of a good debugger like their test bench is not a simple task when values are stored and used in various memory and operating registers. I have no doubts that this is an excellent program but I am also inclined to believe that many game enthusiasts will buy this language-oriented game and never use it after watching the demo robots, because they may find understanding and programming robots very difficult to master. It is not a simple shoot-em-up game.
RICOCHET
Company: Automated Simulations
Language: Machine
Hardware Requirements: 48K

OVERALL RATING B-  CONTROLLABILITY B  ERROR HANDLING B
GAME CONCEPT B  SKILL INVOLVED B  DOCUMENTATION B-
CREATIVITY B-  CHALLENGE B+  VALUE FOR MONEY B+
GAME DEPTH C  GRAPHICS C+  HOLDS INTEREST? C+

**Ricochet** somewhat resembles bumper pool played by two players or one player against the computer on a frictionless table. Each opponent has two-five shot launchers set in each corner. There are also two bumpers, or goals, set midway between them, and six deflectors initially positioned in a triangle to guard the player’s goal. The entire field is gridded to make calculations easier.

A player has the choice of launching a ball, or rearranging his defensive deflectors. During rearrangement, all deflectors must be moved in the same direction for that turn. When a ball is launched it travels until it either reaches the playfield boundary, or strikes a deflector and flips it from one orientation to another. In each case the ball ricochets at a 90 degree angle and continues until it leaves the playfield at the left or right sides. When the ball strikes a launcher, that launcher is put out of commission for two turns.

Points are scored for striking bumpers, launchers, and deflectors of either player. The game ends when the player runs out of launcher balls. A match consists of a group of games. What is interesting is the handicapping that the computer does to even out the match. At the conclusion of a game in a match, the bumpers on the winner’s side of the board increase in value, thus the next game is easier for the loser. The average match takes between ten and thirty minutes, and in addition, a clock is used to penalize players who take too much time in choosing their moves.

The game has a number of variations including extra bonus targets. In all there are five variations with the fifth lacking the customary grid. While the game at first appears to the novice to be a game of random luck, like chess this game requires the ability to think and plan moves far ahead. The ricochets can be predicted, although they are difficult for the average player to visualize after several bounces, especially when deflectors shift orientation from vertical to horizontal. Like most strategy games, *Ricochet* requires a lot of experience, and skilled players will find it a real challenge.
WALL STREET

Company: CE Software
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING C
GAME CONCEPT C
CREATIVITY B
GAME DEPTH C

EASE OF USE A
SKILL INVOLVED C
CHALLENGE C
GRAPHICS C

ERROR HANDLING B
DOCUMENTATION B
HOLDS INTEREST B
VALUE FOR MONEY B

While there are several quite good Public Domain stock market programs, this one offers several unique features, such as selling short, inside tips, leverage, and the ability to borrow against one's net worth. Stock Market permits one to nine players to race each other in being the first to parlay his initial $10,000 worth of investment funds into $1,000,000 by buying and selling on the market each day of the trading week. The solitaire version isn't played against the computer, but can nevertheless be an interesting game. Any game may be saved at the close of business on each Friday, after all loan interests, tip fees, and brokerage commissions have been paid off.

This all-text game presents a "daily" financial paper consisting of five pages, plus an additional page for each player for specifying his portfolio and current status. The four pages of stock listings are grouped into six types of industries, and can be printed on hard-copy on a daily basis so that players can plan their strategy in advance; a good idea, since one indecisive player can slow the game down to an agonizing crawl. Players alternate in making their decisions, always getting at least one chance to buy or sell during each day, and usually enough opportunities to complete all the transactions they wish. (The game would be better-structured if each player made ALL his transactions before passing control to the next player in order to speed play.)

The only significant shortcoming in this otherwise pleasant-enough game is that, in a one-or-two person game, a player has too much leverage with the stocks that he has bought or sold and, therefore, can seldom go wrong. On the other hand, in a multi-player game, such leverage and the 100% of net worth borrowing power will soon result in an aggressive player's winning a permanent seat on the stock exchange, while the others must turn in their keys to the executive washroom.

CARTELS & CUTTHROATS

Company: Strategic Simulations
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A-
GAME CONCEPT B
CREATIVITY B
GAME DEPTH B+

CONTROLABILITY A
SKILL INVOLVED A-
CHALLENGE A-
GRAPHICS B

ERROR HANDLING A-
DOCUMENTATION A
HOLDS INTEREST B
VALUE FOR MONEY B+

CARTELS & CUTTHROATS is a business management simulation game that is suitable for high school and college business administration courses. The game can be played with up to six players, five of which can be computer players managing their own companies.

Each player, acting as company president, is expected to make decisions on eight aspects of company operation — units of production, units of raw material to purchase, selling price, advertising and research costs, new loans and whether to build new factories. Memorandums advising you of possible wage strikes, availability of new loans at better interest rates, time saving production costs, etc., must also be acted upon.

Numerous economic and company reports are available to help make decisions. These reports can either be viewed by all players simultaneously, each player individually during his turn, or sent to a line printer for classroom or homework distribution. The game can also be saved at the end of any quarter.

The summary news wire lists the Gross National Product and Consumer Price Index in addition to the number of units sold, price and total revenues for each company in the industry. Each player additionally receives a profit and loss statement, a balance sheet, sales report which covers sales, performance and consumer preferences, a production report explaining costs and inventory, and finally a market summary comparing all the company's sales. A year end annual report is generated to enable you to compare your success or failure for each business quarter.
Numerous business scenarios can be chosen that range from beginning to advanced. One can choose a business climate where the economic savings, inflation and raw material costs are relatively stable or one where prices swing dramatically. One can choose a product type that ranges from necessities through mixed goods to luxury goods. Also, the levels of chance can be specified. In addition, players can choose their level of difficulty. A beginner is not penalized against advanced players, but is actually given hints to improve his profits.

The game is excellent for developing business strategy since all the drudgery of calculations has been removed. It teaches through immediate feedback which policies are successful. The bottom line is market share and net profit. The game was designed by a systems simulation expert and a holder of a Masters in Business Administration. The model includes the relationships between economic environment, production management and market forces. It includes the laws of supply and demand, price elasticity, market price equilibrium, advertising and product differentiation's effect on sales, inflation, the GNP, CPI and disposable income factors.

CARTELS & CUTTHROATS is exceptionally well presented through extensive documentation which serves as a primer for business theory. It is worth reading as a solid base for making your own decisions during the game. All reports are presented in a pleasing font on the Hi-Res screen. They are readable and well-formatted. In all, an excellent game.

BERMUDA RACE
Company: Howard W. Sams
Language: BASIC
Hardware Requirements: 48K

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| GAME DEPTH     |  B-

| CONTROLLABILITY|  B |
|               |    |
| SKILL INVOLVED|  B |
|               |    |
| CHALLENGE     |  B-|
|               |    |
| GRAPHICS      |  B |
|               |    |
| ERROR HANDLING|  B |
|               |    |
| DOCUMENTATION |  B |
|               |    |
| HOLDS INTEREST?|  B |
|                |   |
| VALUE FOR MONEY|  B |

Bermuda Race is a sailing simulation for one or two players in which you attempt to maneuver your sloop from Newport, Rhode Island, to Bermuda. The race is actually just one portion of the disk. The other part is a tutorial explaining the basics of sailing, nautical terms, and navigation instructions complete with illustrations. For the first time sailor, this material will have to be reviewed often before it can be digested and remembered. (Having some of the information duplicated in the documentation would have been a help.)

There are five screens in Bermuda Race which you choose by pressing H for Help, S for Sail, K for Keel, C for Chart, and R for Status Report. The status screen is the most important. This text screen displays important information such as: wave height, boat speed, luff angle, wind direction, and speed. This is also where you enter your desired heading using either the left and right arrow keys or game paddles. Either method works well, although the paddles are quicker. To change course from 0 to 180 degrees using the arrow keys, you have to press the arrow key 180 times. Changing course 180 degrees with the game paddles is done by simply turning them. You can change between paddle or keyboard control in the middle of a game by pressing X.

Pressing C shows your position and progress on one of three charts: Newport, Bermuda, or the Atlantic Ocean. These charts are well done with the only limitation being that only the last 90 hours of a race are charted. In a two player race, one boat will be charted by (.) and the other by (+).

You can raise or lower the centerboard, or keel, by pressing K and then U for up or D for down. The amount of sail is increased or decreased by choosing S to get to the sail screen. The computer tells you the maximum amount of sail you can safely carry under the present wind conditions.

One turn is completed by setting your course, changing the keel or sail, and then pressing Return. The computer will then determine your progress and display the new conditions on the status screen. While you are in the Newport or Bermuda area, each turn represents fifteen minutes of real time while one turn in the Atlantic represents one hour.

Since you are racing against the clock, the fastest time to Bermuda wins. Additional penalty times or delays may occur. The program maintains the best five times on disk in the player's Hall of Fame to give you something to set your sights on.
CROSSWORDS

Company: Artsci
Language: Applesoft
Hardware Requirements: 48K

The CROSSWORDS program allows the user a choice of playing any of 24 supplied Hi-Res puzzles or creating one's own puzzle for others to play. The puzzles on the disk vary from 12 to 15 squares each way. A cursor can be easily moved around the Hi-Res display grid to the top or left position of any word. The computer supplies a clue. You type your answer in the correct position on the puzzle.

Crossword puzzles can be readily created and saved to a data disk. After the program is given the size (limits are 15 x 15) the grid is displayed for letter insertion. One uses cursor controls for correction, with the return key supplying a black space for a blank. When finished, the computer then paces through the words, prompting you for clues.

Although the program is well done and has a nice Hi-Res presentation, entering a puzzle requires a finished puzzle to start with. The computer cannot help you design a puzzle from a list of given words. The program has excellent error checking and will prevent you from inputting words that don't fill the space properly, and, like all crosswords, won't inform you that the answer is incorrect. There is a print routine to either print or display on the screen your completed puzzle for checking or for use by cheaters.

CROSSWORD MAGIC 2.0

Company: HLS Duplications
Language: Machine
Hardware Requirements: 48K

Crossword Magic 2.0 presents a fun way to create crossword puzzles. The puzzles that it creates from lists of words that you provide are of the British format, rather than the kind you are used to working in newspaper columns. These puzzles, lacking the tight interlocking symmetrical form, have many more black spaces because the words, although interconnected, are more strung out. The puzzle can range in size from a 3x3 square to a 20x20 square.

The package consists of a double sided disk: the maker program on one side, and the player disk on the other. The process of making a puzzle is both interactive and creative. One can arbitrarily choose a theme, enter words one at a time, and watch the computer instantly insert the word in the puzzle. The puzzle can be a fixed size, or can be expanded to fit in new words. If the computer cannot use the word immediately, it stores the word for later use. Because the process is interactive, you can choose words as you go, either to connect to the chain of linked words or to bridge a gap. The computer is quite capable of filling in the letters for SPAN if the P and A were missing, or the P and N were missing. There is no guarantee, however, that the computer won't decide that SPAN should cross the word EGRESS instead. In this latest version, you can press the R key to Reposition the word for another possible fit, if one is available. You can also delete the last word should you make a mistake.

After you have inserted all the words in the puzzle, its clue time. This is where children have the most fun. You can dream up strange or humorous clues. You're only limited by your imagination. When the clues are finished, the computer will step through them, enabling you to edit any errors.

Puzzles can then be saved to either the maker disk, or to any other formatted storage disk for later play. They can also be dumped to any printer (supports 30 printers and 14 interface cards) that has graphics capabilities. The printout contains the blank puzzle, with clues listed below and the answers at the very bottom. The answers can be clipped before distributing for player solution.
The player disk allows you to solve a puzzle. Puzzles are first transferred to this disk from the master disk. You use the arrow keys for movement over the crossword pattern; the space bar toggles the direction. When the cursor is on any black or filled-in square, the clue is displayed. You can type the answers in, or correct any mistakes. The computer will keep track of your errors. If you finish, or choose to peek at the solution, the correct answer will be identified with inverse lettering, with the errors in normal lettering.

Crossword Magic is exceptionally easy to use, fast and suitable for both home and educational application of all levels; it seems particularly useful for children who rebel at any program that teaches verbal skills. The documentation includes a large section of tips and techniques for forming better puzzles. The program provides an attractive display and user interface, and without a doubt is the best crossword puzzle program available. Considering the difficulty of the algorithm, it is an amazing feat in programming.

**PRESIDENT ELECT**

**Company:** Strategic Simulations  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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PRESIDENT ELECT is a political simulation game, which like a true politician, makes great promises and is agonizingly slow to deliver anything. There are bells, whistles, and options galore in this one-to-three player game in which you manage up to three presidential candidates in the final nine weeks before the national election. You may choose from six historical election years, using actual socio-economic conditions, or use the same six years under non-historical settings, or project into the 1984 election year; use real candidates and their beliefs, run Goldwater against Reagan or LBJ against Carter, mix and match them as you will, create your own candidate and run him as a Republican, Democrat, or Independent against whomever you wish. You can even create your own setup and let the Apple manage all the campaigns; however, the preset 1980 demo game takes 8.5 minutes for each of the nine weeks.

Once all these neat preliminaries are out of the way, it's on into a dull and repetitious set of nine turns, (i.e., weeks). This consists of simply allocating the available campaign funds into campaigning (in this case, the spelling IS correct) on a national, regional, or specific state basis. You may also elect to make campaign trips, at home or abroad, or agree to have a debate with your opponent, which are included in separate budget categories. The actual play of the game is very easy, due to extensive prompting and good error trapping. Just specify the amount to be spent when each element is presented. If you choose to debate, it's a matter of specifying what percentage of your argument or rebuttal period is to be spent on different categories, such as addressing the issue, criticizing your opponent, being ignorant or simply killing time; no, you don't even need to read the questions, which are really quite relevant.

After each turn, at which point, mercifully, the game could be saved, the only graphics in this program appear—a rather poor map of the USA; after only 70 seconds, the map is color-filled! The cartographic display shows those states that are committed, leaning to, or are too close to call for each candidate, and then its back to parceling out more money. Believe it or not, you can even watch the election results pour in in real time — it takes over four hours. Watching this grass grow is interspersed with the ultra-slow map coming up whenever another state is projected to be won by a candidate. Alternatively, time can be sped up to two faster modes, one of which proceeds to all of the final returns, with one map.

PRESIDENT ELECT may be nicely-modeled and, although it may provide a fine degree of simulation, it is difficult to maintain interest due to the dullness of play. It could, however, be put to good use as a youngster's primer in budgeting with the secondary benefit of learning what it takes to be elected president and the financial expenditure involved. As for me, I'd prefer to use the equivalent amount of time with the Apple to balance my checkbook and then watch the REAL grass grow.
**Pandemonium**

Company: Soft Images  
Language: BASIC, Machine  
Hardware Requirements: 48K

Overall Rating  
Game Concept: B  
Creativity: B+  
Game Depth: C  
Controllability: D  
Skill Involved: C  
Challenge: B  
Graphics: N/A

Error Handling: C  
Documentation: B  
Holds Interest?: B  
Value for Money: B

The small matrix and relatively limited vocabulary do reduce the intellectual challenge of Pandemonium. There is also a loss of interplay in having to take turns for a complete game, as opposed to alternating play with a board game.

**Street Life**

Company: Millionaire Pastimes  
Language: Applesoft  
Hardware Requirements: 48K

Overall Rating  
Game Concept: D  
Creativity: C  
Game Depth: C-  
Controllability: C  
Skill Involved: D  
Challenge: D+  
Graphics: D

Error Handling: N/A  
Documentation: C  
Holds Interest?: D  
Value for Money: F

Street Life is a business simulation in one of the more sordid occupations, pimping. The object is to manage a harem of hookers (or more politely, "Ladies of the Night"), while successfully making a profit. To do this you must help the girls find "johns," keep them healthy, out of jail, and free from the influence of rival gangs. Payoffs are a must. The police want their share, as do the girls who will otherwise leave you.

The program, however, has its faults (apart from some obvious objections). The sequences in which you are to drive around town and to the casinos require no skill and are a total waste of time. The gang warfare graphics sequences are solely determined by the number of weapons and men on both sides. There is no user interaction or skill required in these animated sequences. The language is definitely derogatory to both men and women, but is realistic. Finally, as with many business simulations, Street Life is boring. It appeals mostly to the baser instincts of individuals, and probably will not find much of an audience with educated computer users.
THREE MILE ISLAND [Special Edition]

Company: Muse Software
Language: Assembly
Hardware Requirements: 48K

OVERALL RATING  B+
GAME CONCEPT  B+
CREATIVITY  B−
GAME DEPTH  B
CONTROLABILITY  B
SKILL INVOLVED  C
CHALLENGE  B+
GRAPHICS  C+
ERROR HANDLING  A
DOCUMENTATION  A
HOLDS INTEREST  B
VALUE FOR MONEY  B+

THREE MILE ISLAND is a game involving the complex simulation of a nuclear power plant. The objective is to run the plant both safely and economically in a speeded-up, real time operation. As in any real simulation, problems occur and need fixing. Equipment in normal operation either breaks down or needs to be scheduled for repair. The backup systems need to be switched on-line. Inability to handle crisis problems due to your mistakes in operational procedure can easily lead to radiation leaks or even “Meltdown.”

The game has many Lo-Res views of the system. These are real-time views which show news of the plant; on-off status of valves and pumps, coolant levels and flow in all pipes and systems, and internal radiation leaks. This updated version is done entirely in machine language, so that all views are now switched instantaneously rather than the fifteen or so seconds that it used to take to redraw each view. Displays also include status of operating pressures and temperatures, electrical demand and expected changes, plus operating profit and loss statements. There is a real-time clock that can be stopped for beginners who need time to respond to system changes like increased electrical demand.

This is a very demanding game which requires a technical mind to understand. The documentation is thorough and explains clearly how an atomic power plant operates. There is a demo mode and a fast mode which allows you to view a meltdown from start to finish. This is one of the first and best simulations done on the Apple.

WORLD CURRENCY TRADER

Company: Telephone Software Connection
Language: Applesoft
Hardware Requirements: 48K Modem

OVERALL RATING  C+
EASE OF USE  A
VENDOR SUPPORT  N/A
GRAPHICS  B+
DOCUMENTATION  A
VALUE FOR MONEY  C
VISUAL APPEAL  B
HOLDS INTEREST  D
RELIABILITY  B
ERROR HANDLING  C−
CREATIVITY  B−
CHALLENGE  C−

World Currency Trader “simulates trading in up to ten major currencies (plus gold and silver).” It is self-documenting and easy to run. All currencies are displayed on the screen. The program then cycles through each, making random changes. You may stop the program at any point and place currency buy or sell orders. The screen shows your portfolio changes along with the state of your account.

The major deficiency of this program is that you are never able to buy/sell at the price shown on the screen. You use the spacebar to indicate when you want to place an order, but the spacebar is only recognized at the end of each update. That means when you see a value you want to trade at, the program is already updating the figures and that update will be complete before the spacebar is recognized. Thus, you must anticipate the “market” which, in the short run, is simply a random number generator. If the update does not produce a result you want, you have to back out of the transaction and wait for the next. This arrangement is very time consuming and detracts from the interest of the game.
The year is 1495 and you find yourself the ruling monarch of a European power in search of colonies in the New World. No, you haven’t been reincarnated, but are playing *New World* by EPYX. The object of the game is simple: establish colonies in the New World and bring back the most riches.

*New World* is a game for one, two, or three players comprising twenty-two turns, each representing five year’s time. During each turn, a player collects taxes and income from his colonies, recruits colonists, and buys soldiers, supplies and ships. When you arrive in the New World, you look for gold or fight Indians and other colonial powers.

A menu is presented with the choices available to you during your turn. In addition, you may look at a chart of either North or South America at almost any point during the game. These charts are a Hi-Res picture of the continent and allow you to check on colonies’ statistics (like how many natives, soldiers, and colonists are there, whether gold is likely to be found, and how many movement points are required to reach the colony).

Choose to search for gold and you’ll see colonists on the bottom of the screen with picks working to find that precious metal. Choose to launch an expedition and watch your ship sail across the bottom of the screen. Text screens present all other necessary information regarding your colonies and the state of affairs in Europe. You may stop in the middle of the game and save it to disk to play back later. No provision is made for saving high scores on the disk.

There are some minor inconveniences which detract from the overall enjoyment of the game. If you enter RETURN when the computer expects you to enter a number, the program sends you back to the very beginning, forcing you to start over.

When playing alone you cannot choose which country you want; you must be Spain while the computer is France. You are never shown what moves the computer makes. Only by going to the charts and checking on each of the colonies can you determine how the computer is doing.

Attrition and nature often take their toll on your colonies and a message is displayed to this effect. However, you never know exactly what the damage is until you examine the charts—a time-consuming process.

The idea for *New World* is a good one. Had it been around when I had World History in school, I might have paid more attention. However, the game is clumsy and slow in places and the bugs, although minor, detract from the play. Fix these problems and *New World* would be a first rate program for the school environment.

*New World* is copy protected, but EPYX will replace a defective disk within thirty days for free. After thirty days there is a $5.00 charge.
**Electric Duet** is a two voice music synthesizer that doesn’t require additional hardware on your Apple. The term “two voices” means that the program can play two notes simultaneously, a difficult feat with a sound system that allows you to click a small speaker often enough to produce a tone. The author accomplished this through “duty cycle modulation” on a carrier tone of 14,080 Hz. This essentially allows each of the two tones to be on only a certain percentage of the time.

The most important thing to consider in a program like this is the quality of sound. While it is a definite improvement over single tone music programs such as the author’s earlier Musicomp, it lacks the tonal quality of a music board or even what is available from a mediocre sound chip such as used on the Atari home computers. The sound wave is sawtoothy, and the carrier tone is quite audible during pauses when output through the cassette port to your stereo system. This high pitch carrier leads to listening fatigue.

You enter music by keyboard or by the easier piano entry mode. Notes are entered in pairs, one for each part. For example “4.,3G# 4.,2F” means play a G# note in the third octave as a dotted quarter note, and simultaneously play another F note in the second octave. While this works well for notes in both voices when they are of equal length, notes that are of unequal length require a different procedure that doesn’t work well. Notes must be entered in terms of the shortest note at that point. If voice #1 had a quarter note and voice #2 required a half note, the second voice would be entered as two consecutive quarter notes. Unfortunately, this would be played with a quick break between notes.

The piano method of entry is much easier. A piano, with the corresponding keyboard notes, is displayed at the top of the screen. As you play, the notes are entered automatically. It does not enter the length of the note; that is done later with the editor. Since there is no repeat bar as in sheet music, all the notes must be entered one at a time. It would have been nice if there was a GOTO line number command for repeat segments.

Each of these note entries is by line number, just as in BASIC. An editor is provided where you can move up and down through the file with the I and M keys. But inserting and deleting lines requires a tedious procedure of “opening” the file, deleting/inserting a line, then closing the file. One of the most powerful features of the editor is the ability to either transpose the music into a different key, and to slow the music’s tempo down or speed it up. Furthermore, all notes in the music composition can be changed by a factor of one and one half. Thus all quarter notes will be lengthened to dotted quarter notes and dotted quarter notes to half notes, etc.

All compositions are saved as binary files, and pieces can be inserted into another composition. You can also use these compositions in your own programs for free if credit is given to the proper program. A play module is transferred off the disk and incorporated with your program.

The documentation is clearly presented in a 17 page manual. There are various examples, and you can also look at the compositions that come on the disk. These range from the ever popular Entertainer to several obscure classical pieces.

**Electric Duet** is a fair program that coaxes the Apple into producing better sound, but it is no substitute for a good music synthesizer. While the sound is an improvement over Musicomp, it lacks Musicomp’s Hi-Res display of the scrolling sheet music. In this program you are stuck with the limitations of the hardware; and if you have a good ear you will shudder at the clarity and the high pitch carrier tone. But as an inexpensive learning tool it is good for budding musicians who would like to learn how to program some harmony into their music compositions.
MUSICOMP

Company: Apple
Language: Integer
Hardware Requirements: 32K

OVERALL RATING: B+
GAME CONCEPT: N/A
CREATIVITY: N/A
GAME DEPTH: N/A

CONTROLABILITY: B+
SKILL INVOLVED: N/A
CHALLENGE: N/A
GRAPHICS: B+

ERROR HANDLING: B
DOCUMENTATION: B
HOLDS INTEREST: B+
VALUE FOR MONEY: B

MUSICOMP allows the user to compose tunes via electronic sheet music on the Apple Hi-Res screen. The keyboard, acting as a piano, covers a four-octave chromatic range. The sound, which can be varied over a three-voice and four-timbre tonal range, allows one to arrange as well as compose. The sound is more suggestive of an electronic synthesizer than the usual Apple sounds. The output, through the cassette output jack, can be sent to one's own stereo system.

The program's main appeal involves viewing your musical tunes or any of 24 preprogrammed classical pieces as they are paraded across your screen in the form of moving sheet music with each note drawn in step with the musical sound. The program is easy to use and is well documented. It doesn't require any additional hardware.

Each note, as it is chosen for input, is displayed on a music staff centered on the screen. One sees the musical symbol as the computer produces the corresponding sound. If the note is correct, the A key accepts the note in memory. One can later edit the composition and save the music to disk.

After using the program extensively to input dozens of songs from sheet music, I've found several drawbacks. With no speed control you sometimes have to literally translate the lengths of the notes throughout the song to maintain the correct speed. For some reason, they did not include a dotted 16th note. This creates some musical headaches. Some music just doesn't sound right when entered. Also, several mistakes in the editing routines caused problems in early copies of the program.

In spite of the drawbacks discussed above, this program is one of the better non-musicboard programs on the market and the only one to use graphics.

MUSIC MAKER

Company: SubLOGIC Communications Corp.
Language: Applesoft & Integer
Hardware Requirements: 48K

OVERALL RATING: D
EASE OF USE: D
VENDOR SUPPORT: C

DOCUMENTATION: F
VISUAL APPEAL: C-
ERROR HANDLING: C

RELIABILITY: C-
USEFULNESS: D
VALUE FOR MONEY: D

Music Maker is a music program designed for the writing, editing, and playback of music. Generated music can be played either through the Apple Speaker, or through an external amplifier and speaker system by directing the signal to the cassette output port. Programs can be saved to disk. No additional hardware is required.

There are several problems with Music Maker. First, this is a monophonic program, and thus limits its usefulness to even an amateur musician since only a single-line melody can be entered. Two-part compositions or chords are not possible. The available range is from F below Low C, to F# above High C, a total of fifty notes.

Moreover, the mode of music entry is very awkward, mainly because no musical staff is provided. This is the program's main fault. Entering each note is a mathematical process. For instance, Middle C is entered as 1,3,C,Q,R,160. The 1 indicates the note in the sequence (of the program's own musical range). The C is the name of the note; here a note is changed to a rest by hitting the Space bar. The Q indicates the note's duration (whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth, 128th, up to 256 available); any note or rest can be dotted. The R indicates touch: regular, legato, or staccato. The 160 is the tempo's metronomic value, and can be increased or decreased in increments of 20 beats per minute.

There is no provision for measure bars; notes are numbered in sequence, 1 through 1,000. Thus, if you wish to edit a note in what would be the 16th measure, you must know the exact number of the desired note. To create or store a
composition of more than 1,000 notes, the piece must be broken down into 1,000-note phrases (16 maximum), and then the phrases linked and played back in sequence.

To give an idea of this program’s awkwardness, here is how a simple C Major scale must be entered:

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>OCTAVE</th>
<th>NOTE</th>
<th>TYPE</th>
<th>MARK</th>
<th>TEMPO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>C</td>
<td>Q</td>
<td>R</td>
<td>160</td>
</tr>
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<td>Q</td>
<td>R</td>
<td>160</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>C</td>
<td>Q</td>
<td>R</td>
<td>160</td>
</tr>
</tbody>
</table>

Entering a piece of any length is a tedious experience, to say the least. The 32-page documentation adequately explains the program’s awkward approach to music-making.

Color graphics can be added to the playback of any stored song by using the Kaleidoscopic Maestro option. However, the graphics are not imaginative and soon grow boring.

This program has very limited capabilities, is awkward and tedious to use, and is of no value to anyone who really wants to store, edit, and play back music.

**THE VOICE**

**Company:** Muse Software  
**Language:** Machine  
**Hardware Requirements:** 48K; Cassette Recorder  
**Department:** Utilities  
**Sugg. Retail:** $39.95  
**Availability:** 8  
**Disk or Tape:** Disk

**OVERALL RATING** B+  
**DOCUMENTATION** A  
**EASE OF USE** A−  
**VISUAL APPEAL** A−  
**VENDOR SUPPORT** B−  
**ERROR HANDLING** A  
**RELIABILITY** A  
**USEFULNESS** A−  
**VALUE FOR MONEY** A−

*The Voice* is a speech package which allows you to create voice sound, and to save on disk created words and phrases, or combinations of a pre-recorded vocabulary. *The Voice* can easily be added to programs.

There are three simple cafeteria-type menus: the Main Menu, the Voice Editor Program, and the Word Edit Screen. The Main Menu has three choices. Two are repeating machine language demos which use *The Voice* and display Low-res color graphics. The third choice is the Voice Program, and it has seven options from which to make further choices and additions.

Two methods of recording a word are documented, and both require a standard cassette recorder. Direct recording puts the word you speak on tape as well as in memory. The second method transfers words already on tape into memory. In both cases, immediately upon stopping the recording, the Word Edit Screen is displayed.

Within the word editing program you may playback, increase or decrease the playback rate (and thus change the pitch), and edit by adding or deleting spaces or sounds at the beginning or ending of the word. Changing the volume and/or tone of the cassette recorder while recording can also improve the sound.

Once editing has been completed to your satisfaction, the word can be saved on disk. After saving a set of words, phrases from within the set may be played back from disk. If a particular word does not sound right within the phrase, it can be recorded again and the old word over-written, and/or tone changes and pauses may be added within the phrase to improve the quality. It is also possible to add words to the end of the original phrase.

Another editing feature is the ability to create multi-word files. The advantage to saving a series of words under a single name is that it allows the group to be loaded from disk into memory with a one-word command. By selecting either “load” or “save,” the catalog of the existing vocabulary is displayed and all or part of it may be transferred to or from disk or memory. Once saved, it is possible to delete individual words from the vocabulary disk, and to sort the words alphabetically.

The program disk has only a limited amount of space for word storage, but the method of initializing a new disk (13 sector format) is provided. *The Voice* sub-routines are transferred during initialization. The Apple Muffin
program transfers the words and sub-routines to an initialized 16 sector disk, which can in turn be used to store an AppleSoft BASIC program using The Voice words.

The program provides a well-documented section including an Integer and AppleSoft BASIC sample program. CALL entry points and a Voice memory map are clearly charted. The documentation concludes with a good trouble-shooting guide.

I am not impressed by the commercial demos in this package. They are colorful, but not particularly appealing. A Hi-Res graphics animation accompaniment, with a little more effort to eliminate the stilted voice pattern, would help. Other than the demos, the package is a fairly good, inexpensive, easy to use, software-driven voice emulator.

**PICK THAT TUNE**

**Company:** Swearingen Software  
**Language:** AppleSoft  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>CONTROLLABILITY</th>
<th>ERROR HANDLING</th>
<th>DOCUMENTATION</th>
<th>HOLDs INTEREST</th>
<th>VALUE FOR MONEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-</td>
<td>B+</td>
<td>A-</td>
<td>B+</td>
<td>D</td>
<td>C-</td>
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</table>

There is now a computer version of Name That Tune. The rules are just like those of the T.V. show version. The Swearingen's (Randall and Mary) have faithfully duplicated the original game. There are 100 tunes, divided into four categories. The player picks a category of tunes and then guesses how few notes it will take to successfully name that tune. The most points go to the player who guesses the tune in the fewest notes. To add a little zip to things, they've included some variations on the degree of difficulty, and penalty points for wrong answers. There is even the opportunity to go down in magnetic history by being one of the top ten scorers on the disk.

One item makes tune recognition difficult. While the notes are accurate, they do not always proceed with toe-tapping precision. Another item limits the useful life of the game. With only 100 tunes, it is not long before the gamester becomes familiar with them, and the game soon loses its challenge. Those who didn't enjoy the T.V. show will probably want to pass on this one. Those who did enjoy the show will find a chance to be a contestant, minus the fanfare, applause, and bright lights.
**Police Artist** helps teach young children to recognize distinct facial features. Basically it is a learning game designed to exercise and develop the child’s powers of observation. There are actually three programs in the package: Police Lineup, Police Artist, and Off Duty.

**Police Lineup** assumes you have witnessed a crime. Depending on the level of difficulty, you are allowed to stare at the culprit’s face for two to ten seconds. Then, more than a dozen felonious-looking faces, many quite similar, flash by in sequence. You must correctly identify the culprit, or he will go free. If you succeed, the next random face appears. Accusing the wrong person ends the round. Considering the number of muggers in cities, this program might be an excellent educational package for the urban child.

**Police Artist** is the more challenging game. The length of time you get to look at the criminal depends on your skill level. You then have to reconstruct the criminal’s face by choosing one of sixteen possible shapes for the chin, hair, nose, eyes, and mouth. This is difficult, for you have to remember whether the face was round or square shaped, the lips thin or full, the eyebrows bushy or thin, the nose hooked or straight, and whether the man was bald or had curly hair. Apparently, to make the game harder, you only see one feature at a time; the rest of the face that you have already constructed is hidden. Once you make your choice, the rest of the face is shown. If you need help you can peek at the criminal, but you lose points.

The third program, **Off Duty**, is just a fun, entertaining game. You can design faces at your leisure. There are sixteen possibilities for each component of the face. This provides over one million different facial possibilities for these cartoonish-looking characters. As in Police Artist, you can’t see the rest of the face while you are choosing facial characteristics. I think this takes away some of the spontaneity of the creation. Another program that handles this better is Spinnaker’s Facemaker because it allows you to see the rest of your constructed face while you are choosing, say, a new nose. In sum, the package is cute, and may hold a child’s interest (children ages 7 to 10), while being of some educational value.

**Abuse** essentially offers a program that allows the user to trade insults with the computer. It has its roots in the program Eliza, where the computer responds to your input as if it were a psychiatrist. The computer acts on key words in any input sequence, and attempts to top your last insult. It even tends to be obnoxious, beeping at you if you ignore it. While most of its insults appear to be random, occasionally it produces a clever put down.

I'm not sure how to rate a program like Abuse. Certainly one man's pleasure is another man's poison. I've talked to some people who enjoy the program and others who hate it. Those who hate it become bored with it after five minutes, while those who like it will trade insults with the computer for hours. It certainly will relieve frustrations if you've had an altercation with your micro.
MICRO-PAINTER
Company: Data-Soft Inc.
Language: Integer or Applesoft
Hardware Requirements: 48K

OVERALL RATING B+
GAME CONCEPT N/A
CREATIVITY N/A
GAME DEPTH N/A
EASE OF USE A
SKILL INVOLVED N/A
CHALLENGE N/A
GRAPHICS A
ERROR HANDLING A
DOCUMENTATION C
HOLDS INTEREST B
VALUE FOR MONEY B-

MICRO-PAINTER by Bob Bishop is a draw-and-color graphics package that uses the “coloring book approach” to create colorful illustrations on the Apple. Using a program called Micro Draw and a joystick, one can create simple white line outline drawings. Then using Micro-Painter, the artist can invert the picture (white lines on a black screen), and, by positioning the cursor on any section of the drawing to be colored, pick one of 21 colors, push the paddle button and have the program automatically fill in a color to the black line boundary. Unfortunately, the routine doesn’t allow one to repaint a section if a wrong color is chosen. The color strip feature deletes all the colors from the screen, including (sometimes) portions of the original drawing.

A rather unique feature which can be used for highly detailed corrections of any Hi-Res picture is Micro Option. The space bar toggles a magnified view (23 dots wide) of the Hi-Res picture. The image is essentially a Low-Res view of the Hi-Res dots around the cursor’s position. One can easily move this cursor by keyboard control and color individual dots with any of the six Apple Hi-Res colors.

The program comes in a box complete with crayons and magnifying glass and an instruction book which appears to be designed for a child’s use. One of the intents of the program is to allow children to familiarize themselves with computer operations while they create beautiful pictures. The identical line drawings that are stored on the program disk are presented in the instruction book to allow the child or adult to color before attempting to do it with the program. The program is a novel idea which uses some very unique Hi-Res graphics techniques. It also has some serious uses.

NFL FOOTBALL—THE GOLD EDITION
Company: Systems Design Lab (SDL)
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING A
EASE OF USE A
VENDOR SUPPORT B+
DOCUMENTATION A
VALUE FOR MONEY A
VISUAL APPEAL A
RELIABILITY A
ERROR HANDLING A

If you’re a pro football enthusiast and plan on handicapping the weekly NFL football games, then you realize the importance of good information as well as sound predictions. The NFL Gold Edition was designed for this purpose. The program is modular in design and has a series of menu screens that allow you to move easily from one section to another. The program is very flexible and user friendly. In most cases you may go from one section to another and bypass the menu screens when using any of the eleven standard commands. Teams may be referenced by the team number or by entering the team name itself. All information in the data file can be changed at any time. Thus, if you make a mistake, you can easily go back and make corrections to bring the data file up to date.

The program may be used year after year and does not require annual data file updates from the publisher. You can create a data file for all 29 pro teams in any past season or any future season as the information becomes available, so in the event of a strike or schedule change, the data file can be changed accordingly.

The NFL Gold Edition package includes a system diskette, a data diskette, and over 100 pages of comprehensive documentation. The Gold Edition also provides a series of weekly reports and graphs that let you locate and identify profitable trends. For instance, if you wanted to know what percentage of the time Baltimore covers the Las Vegas line as an underdog at home, the reports will tell you. Similarly, if you wanted to know what percentage of the time all underdogs at home cover the line, reports make this information available. In addition, the reports provide team by team prediction summaries, weekly prediction summaries, season to date prediction summaries, as well as bar
graphs, so you know exactly where you stand against the Las Vegas line at any given point in time.

The program can predict real or hypothetical games for the current week or prior weeks. It can even predict all games in the season to date. This is especially useful when a change or correction has been made to an early week and you want to bring the entire season up to date.

For this review, the Gold Edition was tested against the Las Vegas line for the 1980, 1981, and 1982 seasons. I obtained data on the Las Vegas lines from Nation-Wide Sports Publications, Los Angeles (also known as The Gold Sheet). The results are based on all games from week six through Superbowl week (weeks one through five have not been included because the program requires about five weeks of data before using the picks for betting purposes). The percentage of wins against the Las Vegas line for the 1980, 1981, and 1982 seasons is 65.4%, 62.5%, and 61.4%, respectively. The overall average for the three seasons (389 total games) was a profitable 63.9%. Picking underdogs for the same period (224 total games), the computer won 67.0% against the Las Vegas line.

In short, the NFL Gold Edition is a very flexible and versatile program capable of generating excellent win percentages over the Las Vegas line. If you enjoy handicapping the weekly NFL football games, then you'll certainly find this program worthwhile.

**USFL FOOTBALL—THE GOLD EDITION**

**Company:** Systems Design Lab (SDL)  
**Language:** Applesoft  
**Hardware Requirements:** 48K

<table>
<thead>
<tr>
<th>OVERALL RATING</th>
<th>DOCUMENTATION</th>
<th>VALUE FOR MONEY</th>
<th>VISUAL APPEAL</th>
<th>RELIABILITY</th>
<th>ERROR HANDLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
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</table>

The USFL Gold Edition was designed for those pro football enthusiasts who enjoy handicapping the weekly USFL games. The program is similar in design and function to NFL Football—The Gold Edition, also by SDL (please see review of that program in this book). The program was tested against the Las Vegas line for the 1983 season (the only season available at the time of this review). The following results are based on all games from week six through the end of the regular season (weeks one through five have not been included because the program requires about five weeks of data before using the picks for betting purposes). The percentage of wins against the Las Vegas line for the 1983 season (78 total games) was a profitable 61.5%. With the NFL version of this program, the underdog picks were the best. However, it won 55.6% of the underdog picks (36 total games), and 66.7% of the favorite picks (42 total games).

The USFL Gold Edition performed exceptionally well against the Las Vegas line during the first USFL season. If you enjoy handicapping the weekly USFL football games, this program is for you.

**THE PREDICTOR**

**Company:** Pickam Software  
**Language:** Applesoft  
**Hardware Requirements:** 48K

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<th>OVERALL RATING</th>
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<td>A</td>
<td>B+</td>
<td>A</td>
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For all football fans who enjoy placing a little wager on that big weekend game, your program has arrived. The Predictor claims to be more than 60% accurate in predicting who will win each week, keeping within a seven point spread. This has been true, according to the author, for the years 1977-1981. He also stipulates that the program's highest accuracy is obtained between the 8th and 14th weeks of the season. The program contains the schedule infor-
formation for the current season. All that you have to do is enter the following information for each team, after all games within a given week have been played: points scored, rushing attempts, rushing yards, net passing yards, gross passing yards, pass attempts, pass completions, pass interceptions, fumbles, fumbles lost, and penalty yards.

I know this is a lot of information to be added, but all of this information is contained in the newspaper. (I verified this by looking in the Los Angeles Times Sports section.) The author also explains how to derive information that may not be included in the average game statistic listing. When entering data, the program does some validity checking and will warn you concerning data that does not appear to be correct. You must enter all data for each team and include all games played during a given week at the same time, so remember to wait until after Monday night football.

Initial predictions are not made until after the information for the first four weeks of the season has been entered. There are function commands provided to modify the schedule, to change a given week's stats in case you make a mistake entering data, and give you the ability to "clean" the entire system in preparation for the next year (although on this item Pickam Software offers an update service for the program and data on a yearly basis). One of the nice features of this package is that it contains a complete demo version of the program, so you can go through the actual operation of all features without modifying or affecting your real data.

The documentation is sparse, but it does give useful hints and advice. Over the past year, this and other sports prediction programs from Pickam Software have achieved an impressive 66+% accuracy rating according to the Las Vegas oddsmakers. This makes it not only one of the most consistently accurate series of prediction programs, it is also one of the least expensive. If you're interested in sports betting, this series of programs is worth your attention.

**BEAGLE BAG**

**Company:** Beagle Brothers

**Language:** Applesoft

**Hardware Requirements:** 48K

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<thead>
<tr>
<th>OVERALL RATING</th>
<th>GAME CONCEPT</th>
<th>CREATIVITY</th>
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<td>B+</td>
<td>D</td>
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*Beagle Bag* is a disk full of games for you and your Apple computer. Also included are two menu programs for you to copy onto your own disks. The games are not of the Hi-Res action variety, but of the puzzle and brainteaser type. Each can be played separately.

One of the games, *Buzzword*, allows you to insert crazy words into stories by specifying the first letter of the word. Or, you can write your own nonsense stories by letting the computer fill in nouns, verbs, and adjectives. *Elevators* is a challenging game which simulates the actions of a set of elevators during rush hour. Your job is to operate the elevators efficiently for a predetermined length of time and to eventually empty the building. *Texttrain* allows your choo-choo to tug around letters and to link and unlink them into words while the clock ticks you. *Sub Search* lets you seek the invisible enemy and capture his supplies before yours run out. There are also *Hang Person* (a unisex *Hang Man*), *Plenty Questions*, *21 Numbers*, *Name Game*, *Oink*, *Pick-a-Pair*, *Slippery Digits*, and many more. These games vary in theme from "trick your friends," to mind challenge, or race against the clock.

This is not *Pac-Man*; this is not even *Little Brick Out*. This is Solitaire with or without a friend. While these games are interesting and even a little challenging, you leave the computer feeling unfulfilled. *Beagle Bag* is an assembly of tricks and games that you might undertake on a rainy day after you have washed the clothes, patched the screen door, and catalogued your entire floppy disk collection. This bag of beagles turns out to be no barrel of monkeys. The Beagle Brothers should really offer this disk as a free bonus for trying their other software.
HERES HOLLYWOOD

HERES HOLLYWOOD

Company: Versa Computing
Language: Applesoft
Hardware Requirements: 48K

OVERALL RATING C
GAME CONCEPT C
CREATIVITY C
GAME DEPTH D

EASE OF USE A
SKILL INVOLVED N/A
CHALLENGE N/A
GRAPHICS A

ERROR HANDLING B
DOCUMENTATION C
HOLDS INTEREST? D
VALUE FOR MONEY C

Here's Hollywood is a two disk game that contains portraits of 24 Academy Award winning stars by computer artist Charlotte Miller. John Wayne, Alan Alda, Ingrid Bergmann, and Charlie Chaplin are several of the personalities included. The object is to match the portrait with the name; and these portraits can either be viewed as a slide show, or in the "Picture Game" where clues are offered to help identify them.

There is also a "Match Game" that asks the player to identify in which of five movies an actor or actress has starred, and a "Quotes Game," that asks players to identify quotes from well-known movies. Clues from both games can be varied.

Movie buffs may initially be impressed with the graphics, but it's a sure bet they will tire of this game rather quickly.
APPLE HARDWARE

Paddle and joystick peripherals have mushroomed during the last year. The combination of Apple Computer Company’s decision not to supply paddles with the system as of February 1, 1981, and the debut of numerous arcade games which require joysticks has created an unprecedented demand for these products. Also, the need to quickly change from paddles to joysticks, requiring access to a hard-to-reach paddle I/O port within the computer case, led a number of manufacturers to offer paddle port extenders or expansion ports. The following are some of the current game-oriented hardware additions and enhancements on the market.

PADDLES & TRACK BALL

HAND CONTROLLERS — THE KEYBOARD CO. — $29.95. These paddles, constructed of light-weight plastic and quality components, are extremely comfortable to hold. The manufacturer has incorporated a tapered handle which fits precisely into the palm of your hand. The paddle knob is large, yet easy to hold and turn with your opposite hand. Tests performed on the potentiometer show it to be very accurate and smooth over its entire range. The button, consisting of a large contoured contact switch, makes a distinct clicking sound when pushed, although it does take a hair longer to activate than other paddles of its type. If you own only one set of paddles, your reflexes will instinctively compensate for this lag. The paddle cable is strain-relief and is 60 inches long. The paddle is beige in color, obviously intended for complementing your Apple. Overall, the paddles are an excellent value and should last a long time.

TG GAME CONTROLLERS — TG PRODUCTS — $39.95. These paddles are constructed of light-weight, beige-colored plastic and are comfortable to hold. They employ a large paddle knob and large, sturdy, reliable buttons on the side. The buttons use contact switches, are extremely quick acting, and never miss. The potentiometers on these paddles sometimes tend to become noisy or jittery after long use. This problem can usually be corrected by flushing them with tuner cleaner. The manufacturer recommends rotating them back and forth for several minutes, but this rarely cures the problem. The cables are 60 inches long, and are not strain-relief. It is possible to break the thin wiring at the point where it enters the case. Overall, this reviewer would recommend the paddles, since I’ve used them for several months and find them to be very suitable for games that require lots of shooting, or for some of the newer pinball games that use two paddle buttons together, one for each hand.

ADAM AND EVE — TECH DESIGNS — $39.95. The trapezoidal-shaped case makes these paddles very comfortable to hold with either hand. They are beige in color, as is typical, to match the Apple computer. (I wonder if someone’s wife perhaps had a hand in labeling paddle #0 “Eve” and paddle #1 “Adam.”) The knob is one inch in diameter, and turns softly but smoothly. A trimmer adjustment is included for fine tuning. The three-eighths inch square push button on the side give both tactile and audible feedback. The five-foot cables are strain-relieved, even at the DIP connector. In short, a quality product.

KRAFT PADDLES — KRAFT SYSTEMS — $49.95. These are rather large and bulky measuring 4 x 4 x 2 ¼ inches. Some players find them awkward to hold, but they are extremely rugged. The wiring is strain relieved. Even the connector features reinforced pins that don’t bend when inserted into the paddle port. The two-inch turning radius is large, but you need only turn the paddle 180 degrees to lock it over its full range. Although these are good paddles, you might want to look for smaller ones if you have children.

A2D PADDLES (2002) — A2D CO. — $34.95. These paddle controls are the largest of the group under review, and they are awkward to hold. They come in a rectangular box shape 3” by 3.5” by 2” thick. The paddle knob is too small, and requires more turning than seems necessary. The large, square firing button is located in the middle of one end. This has a good tactile feel when pressed, and should last several million cycles. The paddle cable is a good eight feet long; but it is not strain-relieved. Most people will find the paddles uncomfortable to use.

TG TRACK BALL — TG PRODUCTS — $64.95. The trackball was designed for coin-operated arcade games requiring rapid and precise positioning, such as for games like Missile Command and Centipede. The TG unit differs from others in that it operates like a true potentiometer and does not coast when spun hard. The two-inch diameter ball rests in a cradle of three rollers. One is geared to the X potentiometer and another to the Y potentiometer. It takes 1.7 rotations to roll the ball from one side to the other. The unit does not replace the joystick, but you will find it adequate for a game like ABM. It works well indrawing programs because it positions the cursor precisely and smoothly; but its effectiveness in games is limited.
MIMCO STICK — MIMCO — $59.95. This is a very high quality, self-centering joystick with external trim adjustments on the top of the case. My initial impression was that it seemed to be too large; but it feels solid in your hand. The gimbal arrangement is the ball type. It is linear over its entire range on both axes, and displays virtually no over-travel. The trim adjustment allows flexible enough centering to match any game's requirements. There are three large, hairtrigger buttons on the top left side of the unit that respond with tactile feedback. The upper two can be fired with the rocking motion of a single thumb, for less fatiguing play. The bottom button (#2) is rarely ever used, because the standard has become two-button control. If you are used to other joysticks, button #0 is at the top and button #1 is in the middle. There is also a rocker switch to select between the joystick and an external socket. An extra set of paddles can be attached directly, without requiring an expansion port. The unit is connected by a 48" ribbon-type cable. This unit is topnotch, my personal favorite among joysticks.

KRAFT JOYSTICK KJS-01A — KRAFT SYSTEMS — $64.95. This is a very stylish, beige-colored, spring-centered, gimbaled joystick. It is made by the people who build controllers for radio-guided aircraft. It has one advantage over its competitors: the spring-centering can be "defeated" by moving two switches on the bottom of the case to the free position. The spring return levers can be raised when the stick is pulled to one corner, while simultaneously setting the switch. Either one or both axes can be set to nonspring-centering. There is also a trim adjustment on the top of the case to match the centering to any game specifications. The two square buttons are set apart, one on the top and the other on the back side. This arrangement places the buttons beneath the thumb and index finger of the left hand for easy play. The unit's high quality components are connected to the Apple by a 60" shielded cable.

MACH III JOYSTICK — HAYES PRODUCTS — $49.95. This well-built joystick has two buttons set diagonally at the top left and an alternate button (#0) built into the top of the oversized handle. This is a nice feature for playing shoot-'em-up arcade games and for programs requiring simultaneous joystick and keyboard control. The joystick is normally self-centering, but you can disable it by turning four screws on the base. Trim adjustments at the top allow you to adjust both the range and center of movement. The stick performs smoothly with no rough spots. It is ruggedly built, with strain relief at the cable. The unit I received had an Apple Ile 9-pin adapter, but it is also available for older Apples.

MACH II JOYSTICK — HAYES PRODUCTS — $39.95. This joystick closely resembles the Mach III with the exception that it has no alternate fire button built into the joystick handle. All other features described above also apply to this joystick, except the handle is smaller than usual.

MAGSTIK — TECH DESIGNS — $64.95. This joystick matches the size and feel of a paddle with two buttons protruding along the edge. Because the buttons are set close together, you can operate them by rocking your thumb from one to the other. The self-centering joystick mechanism with trim pots also protrudes from the case, making the main case small enough to hold comfortably. This stick handles reasonably well in most arcade games, but you can't disable the self-centering. Although the joystick seems durable, it lacks strain relief at both ends of the cable.

TG JOYSTICK — TG PRODUCTS — $59.95. This joystick is self-centering on both axes and is totally linear in its resistive circuitry. It is perfect for most types of space arcade games that require steering and have a neutral center position capability which you might prefer to return to automatically. This self-centering feature may be disabled by detaching the two springs inside the case. The unit also has trim adjustments for each axis located on the top of the case next to the stick. This allows the center and range of joystick control to be adjusted for the particular game or program. The joystick includes two large reliable paddle push buttons located to the left of the control stick. The entire unit is housed in an attractive light-weight, beige-hardened plastic case, and is comfortable to hold. A long 60-inch ribbon cable connects it to the Apple. It is undoubtedly the best joystick on the market.

CJM MICROSTICK — CJM INDUSTRIES — $59.95. This is an excellent nonspring-centered joystick. The stick is long, has a large black ball grip, and offers very slick movement. Its lack of resistance, coupled with the long throw, make it easy to position; yet this ease causes game players to hold the unit very tensely. The unit was barely able to reach the 0,0 position with any clearance. The pair of half-inch square firing buttons, located to the left of the stick, are the short-throw type and provide no tactile feedback. The unit is beige-colored, and is attached to the Apple with a 48" heavy duty, strain-relieved cable. The end connector is a Jones plug for use with their Apple-Xpander. But the vendor includes an adapter that has a standard DIP connector on its other end. In sum, it is a quality joystick.
AZD JOYSTICK (2001) — AZD COMPANY — $44.95. This joystick, featuring an open gimbal design, is the only joystick suitable for left-handed players. The two square buttons are on the front side (the side away from you) rather than on the top. They are large buttons, providing good tactile feedback. I found them spaced too far apart, and awkward to hold if using two fingers on the same hand. Many will prefer one finger from each hand. The joystick has trim adjustments located at the top. The unit is connected to the Apple by a three-foot shielded cable.

JOYSTICK II — THE KEYBOARD CO. — $49.95. This non-spring-centered joystick is an extremely linear joystick in both axes. It is perfect for positioning the cursor in a graphics program or for games like “Missile Command”, which are easier to play if the gunsight can be positioned accurately. The joystick has two buttons. One is a normal contact switch, while the other is a three-position toggle switch. This switch utilizes a permanent-on position and a momentary-on position which springs back to off in the manner of a push button. This arrangement, in games that require two buttons, is awkward. The buttons are diagonally-situated to each other and require the player to simultaneously press one button while pushing the other button sideways, all with one thumb. There are no trim adjustments available, although this is probably not needed with joysticks that aren’t self-centering. The beige plastic case is nicely styled and is comfortable to hold. The joystick is connected to the Apple by a 54-inch long strain-relief cable. Overall, the joystick is a very good buy for a non-self centering variety.

**PADDLE PORT EXPANDERS AND EXTENDERS**

SELECT-A-PORT — TG PRODUCTS — $59.95. This unit provides a convenient solution to expanding the paddle I/O port while at the same time providing easy access to that socket without opening the Apple’s case. Its five diode-isolated sockets are switch selectable. One can either connect paddles or joysticks simultaneously while accessing whichever one is needed by a switch, or connect two paddle devices (4 paddles or 2 joysticks) so that they can be used in tandem as is done in dual joystick games. The fifth socket is not isolated and acts in parallel with the game socket. This is used for especially sensitive devices. The unit has an attractive flat case which matches the Apple, and it can be attached to the computer’s side. We discovered that the unit is indeed diode-isolated, and should cause no device-to-device interference.

PADDLE-ADAPPLE — SOUTHERN CALIFORNIA RESEARCH GROUP — $29.95. This is a gameport extender with two switch-selectable ports. Either port can be selectively switched, or the unit can be rewired via supplied wire jumpers to support four paddles or two joysticks for multi-player games. One can also reconfigure a joystick to reverse the axis, if desired. The fourth paddle button is accessed from the cassette output port. Although the sockets are switch-selectable, they are not diode-isolated. Pressing a paddle button from the non-selected device interferes with the button on the selected device. The unit is designed as a small circuit board which will attach by tape to the Apple’s side. This product is not as versatile as some others, but then, again, it is only half the price.

GAME SOCKET EXTENDER — HAPP ELECTRONICS — $14.95. This device simplifies changing paddles or joysticks by extending the paddle connector outside the computer with a two-foot cable. The socket uses a force lever or “zero insertion force” device to connect the paddles or joysticks. This makes it extremely easy to disconnect devices. The unit attaches to the side of the computer.

PARADISE PORTS — TECH DESIGNS, INC. — $39.95. This is a very compact printed circuit board with sockets built into the PC board itself. It allows you to connect any combination of three joysticks (or paddles); and it allows a pair of joysticks to be connected simultaneously, one using PDL 0 & 1, the other PDL 2 & 3. Socket A is always connected to PDL 0 & 1, and Socket C is always connected to PDL 2 & 3. Socket B is switch-selectable. Socket D is wired in parallel with the paddle port. The blue colored unit is connected to the Apple by an 18” ribbon cable.

OUTPORT — OUTPORT, INC. — $19.95. This device simplifies changing paddle port peripherals by extending the paddle connector outside the computer. It uses a “zero insertion” force lever to connect the paddles or joystick. It has a 20” ribbon-type cable that allows you to attach it on the side of your Apple near the front.

TWIN PORT — OUTPORT, INC. — $19.95. This game-port extender is switch-selectable between two ports. Either port can be switched on to allow the operation of either a pair of paddles, or a joystick, without disconnecting. Two joysticks cannot be attached simultaneously. It extends outside the Apple, connected by a 20” ribbon-type cable.

THE PORT AUTHORITY — OUTPUT, INC. — $34.95. This device adapts two Atari-type joysticks for use on the Apple II Computer. There is a great speed advantage in using this method, since the Apple II takes up to 2,840 microseconds to read each paddle. Because the Atari stick is merely an assembly of four on-off switches and a button for firing, it can be read by an Apple using the button inputs on the paddle connector. Ten inputs are required with two joysticks, which means that the multiplex readings must be accessed through the two annunciator lines. This is not standard, of course, and software must be rewritten using this method. Instructions are provided giving sample machine language and BASIC programs as examples. However, there are already a number of JOYPорт-compatible programs available from Sirius, Sierra On-Line, and Broderbund that work with this unit, which is an enclosed circuit board. It has a zero-insertion socket for use with standard paddles (there is a toggle switch for the two modes), and two Atari-type, female sockets. There is no attractive beige case; but at $34.95, it’s less than half the price of its competitor. A good buy.
OCTA STICK II — ASTAR INTERNATIONAL CO. — $39.95. This unit connects an Atari eight-position joystick to your Apple. It includes one small hardware circuit board and one Atari joystick. The circuit board contains two relays which close when the paddle value is high. Thus, only three values are obtained in any axis or directions: 0, 128, or 225. The centered position is pot-adjustable. The unit is suitable for Pac-Man type games and others where non-precise user positioning of a normal joystick produces errant commands. The unit emits numerous clicking sounds as the relays open and close during game play. The device works well; if you have a suitable expansion port which can handle two sets of joysticks simultaneously, you could use dual Atari joysticks for future game design.
N  A2D2 PADDLES — A2D2 COMPANY
O  A2D2 JOYSTICK — A2D2 COMPANY
P  PARADISE PORTS — TECH DESIGNS
Q  THE PORT AUTHORITY — OUTPUT, INC.
R  KRAFT JOYSTICK — KRAFT SYSTEMS
S  MICROSTIK — CJM INDUSTRIES
T  MIMCO STICK — MIMCO
U  TWIN PORT — OUTPUT, INC.
V  ADAM AND EVE PADDLES — TECH DESIGNS
W  OUTPORT — OUTPUT, INC.
Apple Introduction

Computers cannot be marketed like soap. You can’t just stick a NEW and IMPROVED sticker on your latest machine and tell people to throw out the old product. Planned obsolescence works in reverse with this industry; if next year’s product is going to be bigger and better and cheaper, then why not wait until next year to buy it? And if you wait one year, why not wait two when it will be even bigger and better? With that logic, nobody would buy a computer.

So what do you do if you’re a company like Apple and you’re ready to introduce a new computer intended for the same market as your current best-seller, and it is bigger and better (if not cheaper)? What we are talking about here is the Apple IIE, heir apparent to the II Plus. Well, if you are Apple the first thing you do is say “Long live the King,” which means that the II Plus is just fine, will continue to do all that it was designed to do, and will even be able (for the most part) to take advantage of new software designed for the IIE.

This is the Apple Golden Rule: Thou shalt not kill the goose that lays the golden egg. Translated to software vendors, this means, develop and market one-package-fits-all-machines software. This is exactly what has happened. In going through this book, you will notice a preponderance of programs that can run on either the II Plus or the IIE, automatically recognizing which machine is which and adapting itself to the features of that system. Microsoft, Broderbund, Continental: most of the major software vendors have bowed to the king’s wishes and are marketing one-size-fits-all packages.

That’s undoubtedly heartening to several thousand II Plus owners. But what about potential buyers? What specifically does the IIE have to offer?

Apple IIE

The new IIE brings with it some welcome, and overdue, improvements over the II Plus it supercedes. While retaining the “traditional” appearance of the Apple II, the IIE has changed dramatically for the better both inside and out. It offers greater RAM and language capabilities, enhanced circuitry and a reduced number of higher quality chips for increased microprocessing speed and reliability (including self-diagnostics), 80-column capability as an inexpensive add-on, a sturdier and better designed back panel with sensible video, cassette and game controller ports, and, most welcome of all, an improved 63-key keyboard that is similar to the Apple III’s but lacking the numeric keypad. The new keyboard, including upper and lower case characters, independent cursor control keys, tab, caps lock, delete and function keys, goes a long way toward remedying what has been the Apple II’s most visibly annoying deficiency. Numerous magazine articles detailing and praising the IIE have already appeared, making it unnecessary to explore here the new hardware in depth. Briefly, the new Apple IIE provides more computing power for less money.

Most encouraging of all is Apple Computer’s recognition of its obligations to the broad base of established Apple users. At the same time the IIE offers an improved machine, it does not render the older Apple systems and software obsolete. Apple has gone to considerable lengths to ensure that the upgraded IIE is compatible with as many existing peripherals and software packages as possible. After months of preliminary testing, Apple has reported an impressive success rate with older packages on the new machine. However, early reports may have been just a bit optimistic. Programs using elaborate protection schemes (especially games), programs incapable of reading lowercase characters and the full run of ASCII codes, and programs making the wrong use of keys (such as Reset) in their operation — to name some common problems — have run into their share of difficulties. Yet it seems a reasonable estimate that some 80-85% of packages currently operating on the Apple II/II+ will also operate on the IIE, good news indeed.

Obviously, the Apple IIE will have considerable impact on future software production. The added power and flexibility of the new keyboard alone will open up many new possibilities for tomorrow’s programmers. Word processing, for example, seems an especially good choice for taking advantage of the IIE’s refinements. Indeed, Apple Computer simultaneously released specially designed and more powerful IIE versions of Apple Writer IIE and Quick File IIE, giving new IIE owners immediate access to word processing and database management programs worthy of the new machine. And many of the top independent software houses in the country, provided with prerelease Apple IIE’s, also tested or upgraded popular programs for IIE compatibility. At the time of the IIE’s release, announcements were made concerning the availability of a significant number of familiar programs for the IIE.
Lisa

This is Apple's Edsel. It's either a beautiful machine ahead of its time, or a show car that isn't quite street legal (and, consequently, not very practical) depending on who you ask. You know those sleek, shiny, stylish cars you see at Auto Shows—the ones you murmur about, "I'd sure like to own that," and your wife incredulously (and rightly) replies, "What on earth would you do with it?" That's the Lisa.

The engine is a souped up microprocessor with two inboard, high-density, double-sided drives, and a ProFile hard disk. It runs on BASIC-Plus or Pascal and gets six integrated software programs to the machine: a word processor (LisaWrite); an electronic spreadsheet (LisaCalc); a program that turns numbers into meaningful business charts and graphs (LisaGraph); a graphics editor to create diagrams, drawings and illustrations (LisaDraw); a project scheduling program (LisaProject); and a database program (LisaList). If this baby is still in your dealer's showroom next summer, a seventh application program will be released: an asynchronous communications program that emulates the common TTY, VT52, and VT100 terminals.

The real appeal, supposedly, to this machine is all the luxurious appointments that come as standard equipment. It has an automatic transmission (a mouse), power steering (pictures of a file cabinet to open a file, a trash can to delete material, etc), and cruise control (easy transfer of data between operating programs).

Whether you need all this or not is a separate question. Most potential buyers don't get close enough to purchasing the machine to make such evaluations. Most get stuck on the price tag: $9,995, tax and license not included. Maybe
this is one situation where waiting a bit wouldn't be such a bad idea. The original price has already fallen a cool $1,800 since the introduction of Lisa. Who knows what it'll be selling for by Christmas, 1984. Could be a bargain. (Remember what the DeLorean used to go for?) Another option is to wait for the introduction of Lisa's little brother, McIntosh, slated to have a lot of big sister's features at a fraction of the cost.
Aardvark Software
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Milwaukee, WI 53202
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p. 145, 159

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Ashton-Tate
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Culver City, CA 90230
(213) 204-5570
p. 94

Automated Simulations
(see EPYX)

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p. 380, 381, 388, 390

Avant-Garde Creations
P. O. Box 30160
Eugene, OR 97403
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Beagle Brothers Micro Software, Inc.
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Beaman Porter, Inc.
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Behavioral Engineering
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(415) 479-1170
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Budge Company, The
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California Pacific Computer Co.
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Central Point Software, Inc.
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CE Software
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CDEX Corporation
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Piccadilly Software
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Pickham Software
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PowerSoft
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ProForma Software
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Quality Software
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Savant Software, Inc.
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S-C Software Corp.
2331 Gus Thomasson, Suite 125
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Scholastic, Inc.
2331 E. McCarty St.
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Sensible Software, Inc.
66619 Perham Dr.
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Sierra On-Line Systems
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Society for Visual Education, Inc.
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Sof/Sys, Inc.
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SoftCorp International
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Software Entertainment Company
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Software Resources
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Solarteck
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Sublogic Communications Corp.
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Swearingen Software
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Synergistic Software
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System Design Associates, Inc.
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System Design Lab (SDL)
2612 Artesia Blvd., Suite B
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TMQ Software, Inc.
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Transend Corporation
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TSR Hobbies, Inc.
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Turning Point Software
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Ultraloft, Inc.
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United Software of America (USA)
750 3rd Avenue
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Utilico Software
3377 Solano Ave., Suite 352
Napa, CA 94558
(707) 257-2420
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Versa Computing, Inc.
3541 Old Conejo Road #104
Newbury Park, CA 91320
(805) 498-1956
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VisiCorp
2895 Zanker Road
San Jose, CA 95134
(408) 946-9000
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Voyager Software
147 22nd Ave.
San Francisco, CA 94115
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Westware, Inc.
2455 S.W. 4th Ave., Suite 12
Ontario, CA 97914
(503) 881-1477
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Winchendon Group, The
3907 Lakota Road
P.O. Box 10114
Alexandria, VA 22310
(703) 960-2587
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Xerox Educational Software
Computer Software Division
Dept. B-I
245 Long Hill Road
Middletown, CT 06457
(203) 347-7251
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