OMNI

COMPLETE CATALOG OF COMPUTER SOFTWARE

EDITED BY OWEN DAVIES

THE MOST COMPREHENSIVE GUIDE TO DATE

OVER 950 PROGRAMS REVIEWED

ENTERTAINMENT, EDUCATION, HOME MANAGEMENT, WORD-PROCESSING SOFTWARE—INCLUDES TIPS FOR FREE SOFTWARE, DISK MAGAZINES AND MUCH MORE

COMPATIBILITY INDEX FOR EVERY PERSONAL COMPUTER

OMNI

COMPLETE CATALOG OF COMPUTER SOFTWARE

Other computer books from OMNI

OMNI Online Database Directory
OMNI Complete Catalog of Computer Hardware and Accessories

This Book Withdrawn From The Record
Of The Mid-Continent Public Library

JAN 2 9 1998

OMNI

COMPLETE CATALOG OF COMPUTER SOFTWARE

EDITED BY OWEN DAVIES

An OMNI Press Book

Macmillan Publishing Company
New York
Collier Macmillan Publishers
London

AN

8530980

001.6425 D288 AD
OMNI COMPLETE CATALOG OF COMPUTER SOFTWA
AN MCPL
3 0000 00024044 4

STAFF FOR OMNI'S COMPLETE CATALOG OF COMPUTER SOFTWARE

Owen Davies, Editor

Robert Weil, Editor, Omni Books

Peter Tyson, Assistant Editor, Omni Books

Senior Contributors: Mark Andrews, Steven C. Fox, Gregory R. Glau, Harry Hewin, Chip Hilts, Scott Kariya, Gary Keenliside, Wes Lewis, Michael Nadeau, Ted Needleman, Tim Onosko, Robert V. Price, Ph.D., Robert Rivlin, Peter Runciman, Duane Saylor, David Fay Smith, Gary and Scott Smith, and M. David Stone

The staff of this catalog would like to give special thanks to Dominick Anfuso and Barry Lippman at Macmillan, and to Marcia Potash at Omni for her support. We would also like to offer our grateful appreciation to Mary Ann D'Urso, Patrick Filley, Jim Lepper, Jane Low, Diane McNulty, Susan Ostrov, Wendy Sherman, and Alexandra Urdang at Macmillan, and to Murray Cox, Claudia Dowling, Steven C. Fox, Linda Ganci, Paul Hilts, Babs Lefrak, Nancy Lucas, Bev Nerenberg, Dick Teresi, and Gurney Williams III at Omni for making their contribution to this book. Finally, to Bob Guccione and Kathy Keeton, who created a magazine environment where good ideas germinate.

Copyright © 1984 by OMNI Publications International, Ltd.

All rights reserved. No part of this book may be reproduced or transmitted in any form or by an means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system, without permission in writing from the Publisher.

MACMILLAN PUBLISHING COMPANY
866 Third Avenue, New York, N.Y. 10022
Collier Macmillan Canada, Inc.

Library of Congress Cataloging in Publication Data
Main entry under title:
Omni complete catalog of computer software.
Includes index.
1. Computer programs—Catalogs. I. Davies, Owen.
II. Omni (New York, N.Y.)
QA76.6.045 1984 001.64'25'0294 84-15449
ISBN 0-02-529820-8

Macmillan books are available at special discounts for bulk purchases for sales promotions, premiums, fund-raising, or educational use. Special editions or book excerpts can also be created to specification. For details, contact:

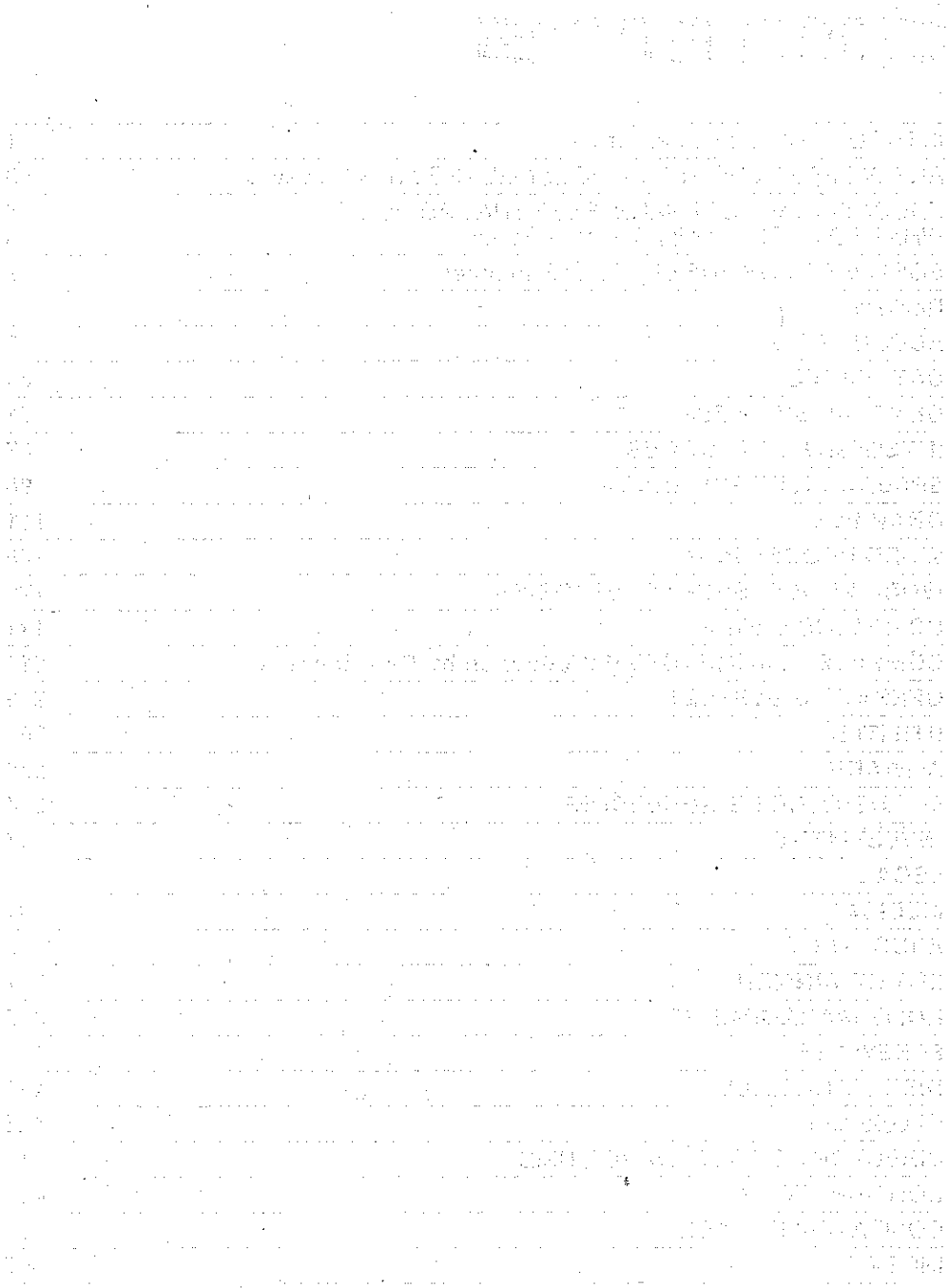
Special Sales Director
Macmillan Publishing Company
866 Third Avenue
New York, New York 10022

10 9 8 7 6 5 4 3 2 1

Printed in the United States of America

CONTENTS

INTRODUCTION by Owen Davies	1
ARE WE SPEAKING THE SAME LANGUAGE? by Wes Lewis	3
EDUCATIONAL SOFTWARE: ESSENTIAL ADVICE ON WHAT TO LOOK FOR by Seymour Papert	4
SOFTWARE FOR FREE by Peter Runciman	7
Reviews	
ACCOUNTING	**9**
DATABASES	**38**
GENERAL BUSINESS	**71**
INTEGRATED PACKAGES	**87**
SPREADSHEET PROGRAMS	**98**
GRAPHICS	**111**
WORD PROCESSING	**146**
WORD PROCESSING ACCESSORIES	**179**
COMMUNICATIONS	**191**
COMPUTER LANGUAGES (Introduction by Carl Helmers)	**214**
OPERATING SYSTEMS	**249**
UTILITIES	**261**
AGWARE	**286**
MATHEMATICS/ENGINEERING	**304**
INVESTMENT	**310**
LEGAL	**322**
MEDICAL	**331**
EDUCATION	**340**
ENTERTAINMENT	**371**
HOME MANAGEMENT	**395**
FREEWARE	**412**
DISK MAGAZINES	**418**
GLOSSARY	426
DIRECTORY OF SOFTWARE FIRMS	436
CONTRIBUTORS	455
COMPATIBILITY INDEX	459
INDEX	467



OMNI

COMPLETE CATALOG OF COMPUTER SOFTWARE

INTRODUCTION

BY OWEN DAVIES

When *Omni* magazine was born less than six years ago, no book in any way similar to this could have been written. True, the first personal computers had already made their appearance. The Altair was still available, and the first Apple and Radio Shack machines were beginning to make their mark, and a now-obsolete model called the Sol was being hailed as "the Cadillac of microcomputers."

But there wasn't much that these early machines could do. They were of little use as word processors. You couldn't build a spreadsheet model with them. Forget dialing up a bulletin board system; there weren't any, at least not for home users. The missing factor was software. Without programs, the best personal computer is no more than an expensive doorstop.

Just how many microcomputer programs have been churned out in the last six years, no one has any idea. Too many were of limited interest, too few have survived in the marketplace. But most estimates put the current total of commercial programs in the neighborhood of 12,000. Some 4,000 are available for the Apple alone, another 3,500 or so for the IBM PC and its relatives, 2,000 or more for the CP/M operating system. No one could possible wade through them all to find the software he or she needs.

Worse yet is the torrent of claims and counterclaims spewing from software firms and ad agencies across the country. Each month, computer magazines for the IBM PC alone churn out well over 1,000 pages of copy, two-thirds of it hard-sell advertising. And all too many of the software reviews published are little more than press-release rewrites extolling the wonders of the latest "me-too" competitor for *WordStar, VisiCalc, dBASE II,* or *Lotus 1-2-3.* There are exceptions, reviews that look deeply at what a program can do, then expose its defects as well as its virtues. But how do you find them amid the empty words?

One of the best ways is to read on. Gathered in this catalog is the work of some 70 computer writers, all experts in their fields. They have spent much of the last year combing through their experience with programs in a wide variety of areas, studying products for all of the major personal and small business computers. In each case, they have focused on the features and flaws that govern how a program will perform in actual use, not just on a few "benchmarks" designed to highlight technical details.

You'll find several categories of programs in these listings. Some are new offerings, widely touted as the best thing that's happened to computers since the silicon chip; a few even lived up to most of their claims. Other programs are standards in their fields; not all deserve to be. Most are respectable pieces of software, well suited to their tasks—unless you happen to need the few specific features they lack. These reports are not likely to tell you which program to buy; you'll still have to test your candidates to be sure which is best for you. But the reviewers' experience should at least warn you away from many of the programs that do not suit your needs.

Before looking at the reviews themselves, however, spend some time with the opening essays. Each was contributed by a leader of the computer industry, one uniquely qualified to deal with his topic. Here Dr. Seymour Papert, creator of the Logo teaching language and the acknowledged leader of educational computing, describes the role of home computers in learning and tells what to look for in a teaching program. And "Peter Runciman," long-time chronicler of the public-domain software movement, points out how much serious computing can be done without spending a nickel on commercial programs. (We're sorry we can't give Runciman credit under his real name; computer cognoscenti are sure to recognize the graceful dignity of his writing style.) If you've ever wondered how much substance lies behind the computer-world hype, our essayists should put your mind to rest.

When you are done with the essays, move on to the introductions that begin each subsection of the catalogue itself. Give particular attention to the Introduction to the Chapter on computer languages. Here, Carl Helmers, founding editor of *Byte* magazine, cuts through the hackers' rhetoric and tells what programming languages are really about. Also, in these intros you will find an overview of the software found in that category—the range of power, cost, and ease of use among, say, accounting packages; their practical benefits and limitations; and some of the trade-offs you will have to make in selecting the program you need. By the time you are finished, you should have no trouble in identifying the worthwhile candidates.

Unless you have been using a computer for a while, all this may leave you insecure. That's understandable. For most of us, fitting a computer into

our lives is not easy. Soon, though, it becomes clear that we can master this intimidating new technology and that doing so will trim the work from our lives and let us use our time and energy far more productively. Then worry turns to excitement.

Keep reading. The more you know about computers, the more useful—and enjoyable—they become.∞

ARE WE SPEAKING THE SAME LANGUAGE?

BY WES LEWIS

If you're having trouble understanding some of the debate about microcomputer languages, think of it in terms of the baseball season and the World Series. Everyone has their own favorite team and will quote you logical reasons why that team is the best. If they're on top, it is only what you would expect of them. If they're on the bottom, it's a temporary slump. Even the Mets have rabidly loyal fans! Then comes the World Series, and when it's over it seems as if the best team has won the title. But in reality, each team still has its own collection of loyal fans, still proclaiming "Wait till next year!"

The same thing happens with computer languages. A new language isn't born without a clear need for it, nor does it survive without users who feel it's better than another choice. Confusion about languages arises because there are really two different sets of needs among personal computer users. The first is that of the traditional programmer. He needs a language to write programs, generally large and complex programs that will run many times before they are replaced. The programs will probably need to be revised several times before they are discarded, and these changes must often be made by people other than the original programmer. Programmer languages must support and simplify these requirements. Much of the discussion about the merits of language centers on the needs of this community.

With the arrival of the personal computer, a new and growing community has entered the computing world. These are the people who use the computer as a tool to help get answers to their questions where these questions are not directly related to computers. They are not programmers per se, but will program if necessary. The best example of this is the *VisiCalc* phenomenon. Before *VisiCalc*, microcomputer users were mostly people with prior computer experience. Micros were used in some small businesses, but generally only under the supervision of a consultant or other computer-trained person. *VisiCalc* introduced a new view of how to use computers. Almost overnight, people who didn't know how to use a computer were getting answers to their questions from micros. As a result, the microcomputer market rapidly turned into the personal computer industry.

Although software is directed more and more toward users, the schizophrenia in language discussions remains. To understand these discussions, you must determine what category you fall into, and what category the opinions you are evaluating fall into. In order to help you through this maze, we will briefly examine the characteristics of the more popular languages from these perspectives.

Starting on page 219 (following Carl Helmers' introduction), we will discuss the individual languages in terms of their general defined characteristics. These have been broken down into groups labelled: User Languages, Programming Languages, and "New" Languages.There are often large differences between the definition of a language and the facilities available in a particular version of that language for a particular computer. The version available for your computer may have fewer or more functions and facilities of the language as described in these overviews. When in doubt, check it out!

EDUCATIONAL SOFTWARE: ESSENTIAL ADVICE ON WHAT TO LOOK FOR

BY SEYMOUR PAPERT

It is not easy to say what counts as educational software. Much of what is being sold as "educational" is not really very educational at all. Also, some software designed for other purposes can be very educational. And since we live in a caveat emptor culture, it can be very confusing to ferret out which piece of software will be most valuable for your purposes. Rather than try to provide a list of what's good and what's bad, I shall attempt instead to share some general concepts that may help you think about your specific needs. I shall use some specific examples to make general points, but these are not to be taken as endorsements for various programs. In fact, many good ones are omitted.

There are two general types of educational software: those that put the learner in control, a concept that has developed only recently, and those that try to control the learner.

The first use of any new technology is generally to improve something people were already doing. New and novel uses for any technology emerge over time. Thus, when computers first entered the realm of education, the concept was simple: Use the computer to automate teaching. But the computers of the early 1960s were cumbersome, expensive and not all that powerful. The aspect of the teaching process that became automated during this era was entirely mechanical: rote drill and practice. The computer became a programmed flashcard. It would ask things like, "5 + 7 = ?" If you answered "57," it replied, "Wrong, try again."

This approach to educational software is called computer-aided-instruction, or CAI for short. It has, naturally, become more sophisticated over the years. You may now hear little melodies or see flashing colored lights when you get the answer right. With other packages, the drill process may be embedded in a game. When the subject matter, like touch typing, is of a rote nature, the CAI approach is invaluable, because drill and practice may be exactly what you need.

Other programs on large research computers are striving toward another level of sophistication: They are applying techniques from Artificial Intelligence to diagnose the source of the user's errors and to make more intelligent and helpful comments than the mechanical kind of standard drill and practice. This ICAI (Intelligent Computer-Aided-Instruction) still requires more memory and processing power than is yet available for microcomputers.

The automation of learning, achieved through computerized drill and practice, is not the only goal of educational software. Following this early work have come more promising ideas about how the computer might be used to enhance education. Most antithetical to the concept of CAI is the microworld. The software designed for the microworld provides the learner with new vistas to explore. Whereas CAI forces the student to respond to the computer and puts the machine in control of the process, the microworld reverses this relationship. Here, the computer responds to the student's instructions; so the student controls the process and learns by exploration and discovery.

This distinction between CAI's instructional approach and the exploratory process used in microworlds is important. When we think about learning, all too often the image that comes to mind is one of sitting in school and repeating the multiplication tables in a tuned out, hypnotic state. But this is the least effective way in which learning takes place.

A good example of the best way to learn something is the way babies learn to speak. They are surrounded by language: not only adults talking to each other, but parents and siblings talking to them. Entry into the language is made easier by a microworld of "baby talk"—simplified bits and pieces of speech the child can grab hold of and expand upon. But nowhere in the world is any language limited to baby talk. The child continues to be immersed in the full richness of language and continues learning the same language that is used by philosophers, poets, and scientists to express complex ideas.

The striking thing about this process is how well it works. While not every child grows up to become a Dostoyevski, Aristotle, or Einstein, he or she does become a fluent speaker of that language. We resort to rote drill and practice—as in the case of "dead" languages such as Latin—only when we cannot design an environment in which the child can learn in a more natural and effective way.

Until recently, the only general-purpose technology for learning subjects that are conveyed primarily by symbols and by symbol-manipulation was pencil and paper. With the aid of the computer, we can now design a virtually unlimited number of learning environments.

Microworlds did not begin with the computer. A

simpler type of precomputer microworld, for example, is the well known construction kit Tinkertoys. Computer versions of such construction kits lack a physical reality, but they are more flexible and dynamic. With one of these programs, you can build a variety of simulated pinball machines. The various components are placed in different positions on the screen by manipulating Arrow keys. The result can then be played as a video game. The educational value of this microworld is similar to that of a construction kit. The point is not to learn about the content—pinball machines—but about the process of construction.

Rocky's Boots is probably the best-known computer-based construction kit, but it also has a more specific educational content. This particular microworld is inhabited by components used in building digital circuits. A user will come away with a solid understanding of how such circuits work. The components—AND gates, OR gates, NOT gates, sensors, and one effector—can be put together in many different ways. One can, for example, build a circuit that will recognize combinations of properties, such as green-but-not-triangular, and will toot when an object with these characteristics is presented. With this program, the user learns about general principles of construction and specific knowledge about digital circuits. The program is designed so that children as young as ten can use it easily, yet it is complex enough to interest adults.

Video games are also microworlds, but their educational value is relatively limited. One does learn a fair amount about strategy—both the strategies you need in order to win the game (just as checkers, tic-tac-toe, chess, bridge, and poker all have strategies that must be understood in order to play them well) and the strategies of learning, "How do I figure out what playing strategy to use?"

The microworld reaches its most powerful form when it is combined with programming. Logo is a programming language designed to promote learning. One way it does this is through a microworld inhabited by a movable object called a turtle. Various Logo commands instruct the turtle how to move, and whether to draw a line as it goes. Programs written in Logo—or, in principle, any other programming language—cause the turtle to draw complex graphic designs. By manipulating this turtle, the user learns both geometry and programming. At the same time, he or she acquires a sense of mastery of the computer.

As a programming language, Logo also has the capacity to create special-purpose microworlds. You can, for example, make the turtle behave like an object in space, responding to "forces" instead of "FORWARD 50"-style commands. This "dynaturtle" allows the student to explore Newtonian, gravity-free, frictionless motion in a direct and concrete way that would otherwise be impossible unless one got a ride on a space shuttle. The learning involved in figuring out how to write such a program is often just as significant as what is learned by exploring the microworld that results.

In evaluating educational software, it is important to distinguish between "easy" and ease of entry. Neither *Rocky's Boots* nor Logo is "easy." They are easy to get into, but they are also very challenging. One special advantage of Logo is its appeal to very young children, some as young as four and five, and to sophisticated adult programmers. Logo's reputation as being "good for children" is justly deserved, but only because it has a logical clarity that makes it good for everybody. In its structure, Logo is really equivalent to LISP, which is the language universally used in frontier research in Artificial Intelligence.

Few programming languages are intended to be educational—they're meant for real use. But they *are* educational, some more so than others. After Logo, which is designed for learning, the most educational language is the assembler for the machine you use. (Machine language is really not very difficult.) Educational higher level languages include FORTH, Lisp, and C. Of Pascal, the UCSD version for the Apple is particularly educational—partly because some good material has been written about it.

Besides programming languages, much software that is intended for wholly different purposes is also educational. For example, a good word processor is educational in many ways. It lets you develop a new relationship to language and a new relationship to the computer, a new understanding of a relatively complex system. A healthily complex word processor, like *Perfect Writer* or *MINCE*, is more educational than one that simplifies the process in order to seem "educational." With a little sensitivity, one can teach a young child to use a complex system by starting with the simplest parts of it. This is, after all, how anyone learns new things. As with any new process, one looks to make entry into the system as easy as possible, while still

ensuring that the possibilities for later exploration are kept rich and varied. Most designers of educational software miss the point and design simple systems that reach their limits much too quickly.

It is not always obvious how well the designers have done with any given program. In judging a piece of software, you need to use it for a while, not just try it out in the store for five minutes. What you can do in a few minutes isn't very indicative of how useful it will be later on. Friends are, of course, helpful in giving you some idea of what it is like, but their purposes may be a bit different from your own. And if you are going to be "the first kid on your block," you don't even have that much to go on. Reading the manual is sometimes helpful, but even with the best manuals, you need to work with the software to see what actually happens on the screen. Descriptive literature, after all, is written by people who want you to buy their software. Like advertising, such material tells you nothing about shortcomings. If you can't find some way of actually using the software, talk to people who have. Be sure to ask what they wish it could do, as well as what it does do. You may be able to find the missing features somewhere else.∞

SOFTWARE FOR FREE

BY PETER RUNCIMAN

If your budget is in poor shape after buying your computer or that latest spreadsheet marvel, look in the public domain and users' group libraries for free (well, almost free) programs, or use your smart modem and the telephone line to transfer needed programs from a Remote CP/M (RCPM) station. Price is not the only reason for exploring these programs; although some of the early contributions are of dubious quality, there are useful programs on almost every disk and most of the later contributions are extremely well designed and documented, and provide real competition to equivalent commercial programs.

Public domain programs are those that have been written by microcomputer users for their own purposes and then donated to one of the libraries for free distribution. Some of them have no strings attached: You can use these programs in any way, including incorporating all or part into programs that you develop and plan to sell. Others carry copyright notices and the admonition that you may not, without permission from the author, incorporate any part of them in software that you sell, although you may use, copy, or distribute them freely.

PUBLIC DOMAIN LIBRARIES

At present, the largest quantity of public domain software is designed for computers using the 8080/8085/Z80 microprocessor chips and running the CP/M operating system. Typical of these are the Kaypro, Osborne, Morrow Micro Decision—to name but a few. However, the number of programs written for the IBM PC and its look-alikes running PC-DOS is rapidly increasing, as are programs designed for machines using the 8086/8088 chips and running the Microsoft MS-DOS operating system. Libraries of programs written in FORTH, Pascal, and C are also available from amateur groups specializing in these languages.

The two largest libraries are the CP/M Users' Group (CPMUG), which has 92 volumes, and the Special Interest Group/CPM (SIG/M), which had published 156 volumes as of December 1983. Both of these groups are volunteer organizations and prefer to distribute through local computer clubs. If you don't belong to a club, they will supply volumes directly, but since they don't have the facilities for mass distribution, expect a delay of from two to three weeks in filling your order. A "volume" consists of from 15 to 20 programs and is available either as an almost full 8-inch single-density disk, or as an equivalent number of 5¼-inch disks. Not all 5¼-inch formats are available, however. Each program is supplied in the form of source code and, quite often, executable object code as well. Documentation is included on the disk. Programs are grouped by topic in each volume—i.e., games, communications programs, system utilities, database managers, word processors, etc.

Addresses of CPMUG and SIG/M are given in the Freeware chapter; for a comprehensive list of users' groups, refer to "A Directory of Users' Groups" by Don Libes, published in *Microsystems* vol. 4, no. 10 (October 1983).

REMOTE CP/M STATIONS

A Remote CP/M (RCPM) station is a computer system that will automatically answer a telephone call from another computer and immediately put you in the driver's seat—that is, your own micro will act as if it were the console of the RCPM. You can display the directories, examine the documentation files of the programs available, and use the transfer mode of your telecommunications program to move files from the RCPM to your own machine where they will automatically be stored on your disks. The files are all protected so you cannot change them or make the RCPM system crash. A comprehensive (though not complete) list of the RCPM systems in the United States and Canada was published in *Microsystems* vol. 4, no. 7 (July 1983), and we understand that an updated list is to be published in the June 1984 issue.

To talk to an RCPM station you will need a modem operating at one of the standard data rates (generally 300 or 1,200 baud). All RCPM stations can handle the 300 baud (30 characters per second) data rate; some can handle any rate up to 710 baud (450 and 600 are the most common), while others accept only 300 or 1,200 baud transmissions. The latter are usually using the Hayes SmartModem or a similar device compatible with the Bell 212A modem.

You will also need a telecommunications program with two modes: one to allow your micro to act as a terminal, sending characters typed on the keyboard to the RCPM and displaying characters sent by the RCPM; and another to set up a "protocol" for moving files from the RCPM to your machine. Such programs are available from public domain libraries as well as commercially. Of the

public domain programs, *MODEM712* and *COMM723* are for 8080/Z80 micros, and *PC-TALK* for the IBM PC and its look-alikes; of the commercial programs, *ASCOM* (from Dynamic Microprocessor Associates in New York City) and *MITE* (from Mycroft Labs in Tallahassee, Florida) are among the most common. Both of these include the *XMODEM* protocols for communicating with large time-sharing computer networks such as CompuServe or The Source.

To reduce both the disk storage required at the RCPM station and the time required for transmission of a file, many source code and documentation files are "squeezed"; that is, they are compressed to half or two-thirds of their operating size by a special program called *SQUEEZE*. It is difficult or impossible for a human to read a squeezed file because the compression process is almost equivalent to encrypting the file. To restore the file to readable form, you need to perform the reverse process by means of the *UNSQUEEZE* (USQ15) program; obviously, this should be the first program you obtain when you begin exploring RCPM stations. Some CPMUG and SIG/M disks also contain squeezed files, but such disks always include the unsqueezer as well.

CATALOGS

The CP/M Users' Group and SIG/M each produce a catalog of all the disk volumes in their libraries. These catalogs are arranged by volume number and contain listings in alphabetic order of the program names on each disk, followed by a brief one-to-two-line description of what each program does. The prices are $2.50 for the SIG/M catalog and $10 for the CPMUG catalog. These catalogs are adequate as teasers or as reminders of what is contained on any disk volume. SIG/M also provides (and regularly updates) disk volume 0, containing the complete catalog in machine readable form. By the time you read this, there may also be a cross-reference disk available from a commercial source, listing the CPMUG and SIG/M programs both by name and by topic.

For more details of what the various programs do and how they work, consult the printed volumes of the *Catalog of Public Domain Software for CP/M,* published by the New York Amateur Computer Club, P.O. Box 106, New York, NY 10008. In these volumes, priced at $10 each, the volume abstract is reprinted in full, together with the full documentation of most major programs. And as of December 1983 the NYACC had published two printed volumes of their *Catalog of Public Domain Software for the IBM PC,* also at $10 each.

Reviews of some of the most useful public domain programs are in the Freeware chapter. Have fun exploring!∞

ACCOUNTING

Accounting applications are some of the most popular programs sold for microcomputers. While possibly not one of the most glamourous applications of micros, they continuously rank in the top three along with word processing and spreadsheets.

This is not really very surprising. Accounting, while necessary to all businesses, is to most people —including many accountants—dreary, uninteresting detail work. The collection, storage, and presentation of numerous small transactions is a perfect use for a computer. Machines don't mind doing the drudge work.

All accounting applications are information management systems. They are concerned with capturing information on financial transactions, analyzing this information, and presenting the results in a format useful for various purposes.

We can divide these applications into three broad categories. These are "home and personal accounting," "generic accounting applications," and "vertical-market applications."

Home and personal accounting programs were the first of the serious applications—other than games—to appear for microcomputers. These originally consisted of electronic checkbooks and checkbook accounting systems. The problem with many of these early systems was that while they allowed you to disburse your checks into expense categories, it was often much easier to accomplish the entire process manually. Personal accounting applications have greatly improved as the market has matured. In the reviews that follow, you will find software that eases the job of complex personal accounting. These programs can handle the needs of many small home-run businesses; maintain, track, and analyze stock portfolios and other personal assets; and simplify the process of planning for, and preparing, your personal tax returns.

In evaluating this type of software, you should consider several things. The most important of these is whether it will take more time and energy to accomplish a particular task on computer than by doing it manually. This is called a cost-benefit approach. In general, this consists of determining that the costs of doing something in time, money, and energy expended do not exceed the expected benefits. This type of analysis is most often a subjective one. If you have an abundance of free time, the value of the hours might save by computerizing an application will be less than if you are very short on spare time.

The second consideration in choosing home software is ease of use. This is also frequently called user friendliness and consists of determining just how much effort must go into learning and using the software. Is the software menu driven? If so, it will probably be much easier for a novice to use than learning complex commands. How well is the documentation written and from what point of view? Is there a tutorial to get you started? The importance of this depends on how experienced or inexperienced you are in using microcomputers. Again, this calls for a bit of judgement on your part.

The most important consideration is utility. Does the software actually do something you need done? This point is so obvious that it often gets overlooked. Many home products are priced for impulse spending, and it's easy to get caught up in the "it's-so-cheap-and-maybe-I'll-find-a-use-for-it" syndrome. Try hard not to become a victim of this type of thinking. If you fail in this, however, don't be too hard on yourself. I've got several "electric checkbook" programs on the shelf that have never been unwrapped. They looked great at the time!

The second broad category of software considered in the following reviews is generic accounting. This type of software covers commonly found business applications including general ledger, accounts payable and receivable, payroll, inventory, and job cost. While the reviews of each package touch on features—both good and bad—of the individual packages examined, there are some general considerations you should be aware of when considering generic accounting applications.

The first three of these are identical to those discussed above under home and personal applications: cost-benefit, ease of use, and utility. These are important considerations no matter what type of software interests you.

In addition, there is a fourth general consideration. Generic accounting software is designed to be applied to a wide range of business sizes and types. When contemplating the purchase of a generic package, you must determine how well a general package will meet your specific needs. Will it meet them 100 percent, which is unlikely, 90 percent, or 20 percent? Perhaps you would be better off with a more expensive vertical-market package if one is available?

The easiest way to decide is to be prepared. Be-

fore you look at any accounting software, sit down with a pad and pencil and determine to the best of your ability what you need, and want, in a particular accounting area. Businesses are like people: Every one of them is different. Have you found shortcuts that let you operate more efficiently? If so, will the software let you continue to take advantage of them? Are there areas in the running of your business that are especially weak? Will a particular software package help you strengthen these areas? What is it that you wish to accomplish by computerizing—better organization, faster turnaround of financial information, reduction in cost, or all of these? How strong is your background in accounting and bookkeeping? What about the person who will be using the software? Do you have an accountant? If so, will he be involved in helping you choose or install the software?

All of these items make a difference, and they should be considered before you start to look at software. Spending a few hours beforehand can save days, weeks, and possibly months of trouble later. It will also help you to make up a list of questions to ask your computer dealer. How well he provides answers to your questions will help you determine not only whether you are looking at the right software package for you, but how much help you can expect after the sale. As many manufacturers of accounting software do not provide direct support to the end-user—they expect their dealers to provide this assistance—the level of dealer support and expertise is an important consideration.

While generic software may be suitable for your business, you may decide that you would be better off with a vertical-market package. These are software packages designed for specific types of businesses. These can consist of time and billing systems for accountants, lawyers and other professionals; medical management and billing for doctors and dentists; as well as other specialized packages. There are packages to manage apartment houses, bicycle stores, and flower shops. The major difference between these "verticals" and the generic applications is that the verticals are designed to offer features that are not commonly found in a more general application. For example, a doctor's accounts receivable must not only be able to track patient bills, but be able to generate forms for insurance companies. A restaurant accounting package might not only keep the books, but might allow the manager to calculate the cost of preparing a certain kind of meal, or track food spoilage.

In evaluating vertical packages, all of the preceding suggestions apply. Additionally, there is one additional consideration. This is whether the specialized package meets your needs better than a more general generic version. If it does, is it worth the additional cost?

The reviews in this section should be used to help you select which software packages might meet your needs. Please remember that no reviewer, no matter how experienced, can know your needs better than you do. The reviews are presented to assist you, not substitute for your own judgement. Also realize that while we have attempted to review many of the popular packages, the fact that a particular package may not have been reviewed here does not mean the software is not a good package, only that we were not able to review it.∞

ACCOUNTING PLUS PC

Accounting Plus PC's unassuming maroon box contains a pleasant surprise: modules to perform general ledger, accounts payable, accounts receivable, inventory control, purchase order, sales order, and payroll. All of these are used together as a single integrated accounting system. *Accounting Plus PC* is designed to be run on a hard disk.

Installation is not a complex process, consisting primarily of transferring programs onto the hard disk. The procedure is simple and well documented. *Accounting Plus* manuals, while not very impressive-looking, are organized effectively and are readily understandable. Sample data files are included to let you practice on the system before you start to work on your own books.

Thumbing through the manuals and using the software is a lot like watching Clark Kent in a phone booth changing into Superman. You keep expecting to see a mild-mannered basic accounting system, and they keep slipping in high-end features under your nose, with no great fanfare.

General ledger contains all the things you would expect it to—journal entry, financial statements, and the like. It also gives you departmental reporting, budget and variance reporting, comparative statements, and the ability to do extensive prior-year reporting. Your chart of accounts is not rigidly predefined, although account ranges are suggested. If departmentalization is desired, the de-

partment number is entered separately from the account number. This approach seems much better than the setups where the department is designated by the last digit or digits of the account number.

Accounting Plus's accounts receivable also has features that make it a pleasure to use. These include its ability to allow up to 64 line items per invoice, to post repetitive invoices automatically, and the automatic placing of dunning notes on statements with past-due balances. Another nice feature is the ability to apply a payment to the oldest invoice by just typing in "Old" during payment entry. The system will also automatically total an invoice, compare this total to the customer's credit limit, and if the invoice exceeds this limit, ask you whether you want to accept or reject the invoice. When posting to the G/L, the manual even instructs you what accounts are usually debited and credited for recording payments, debit or credit memos, and deposits.

Accounts payable is not a very exciting application, but *Accounting Plus* manages to add some nice touches. The system will automatically post repetitive entries. It allows different passwords for each function. A particularly impressive feature is the systems "priority code." This lets you rate, from 1 to 9, the importance of paying a particular vendor, and displays this information in cash requirements reports. A/P also permits you to enter up to 20 different terms codes. The system comes set up with the codes for COD and Prepaid, which can't be removed.

These thoughtful touches are also evident in the payroll system. To illustrate the payroll process, the manual shows a sample check calculation as done by hand. The software contains tax tables for all 50 states and the District of Columbia. Payroll keeps track of an employee's last and next salary review date, and can record when an employee's raise is due to go into effect. The system also tracks payroll withholding tax deposit liabilities and payments. This is a very unusual, and extremely helpful, feature. P/R also permits you to define many of the maxima, such as FICA Limit, FUTA and SUI maxima, and even a maximum limit for deducting disability insurance. If you have employees with loans or garnishes, the system will let you enter the number of weeks the deduction is to be taken out. The system will make the deduction for the number of weeks specified, then stop.

Surprisingly enough, the payroll module also contained a few flaws. The system will not allow you to pay overtime to a salaried employee. This is not an uncommon situation, and the capability should be provided. Another is the system's inability to list employees alphabetically. You can get this list only by employee number or employee number within department number.

In all, ASK Micro has done a great job on *Accounting Plus PC*. It is an excellent package for beginning users in almost any size business.

Requirements: Apple II, II+, or IIe, or CP/M-80, 64K RAM; IBM PC, 96K RAM; hard disk, 132-column printer

ASK Micro, $495 each module

BOOKKEEPING

This is a double-entry accounting system. The program allows the recording of daily income and expenses and produces standard accounting reports each month. The reports the program will generate are: complete lists of monthly transactions; trial balance; income statement; balance sheet; statement of retained earnings; and statement of changes in financial position. The program will keep track of individual enterprises by ownership, with up to three partners for each enterprise. It will maintain a history of 18 months of income and expense activity, allowing you to compare last year's activity to the current year. The system does error checking and has a built-in security system for control of access to information. The program will list all or part of the transactions during an accounting month, either by entry order or account number order. It will also list all transactions by type, such as cash receipts, cash disbursements, accounts payable, and payroll.

Within the package you'll receive two program disks, a sample data disk, and two backup disks. You also receive a three-ring notebook for storing the documentation and program disks, a primer on double-entry bookkeeping to help you understand the concept and its advantages over single-entry accounting, and a comprehensive instruction manual, which is helpful for learning to use the program.

Requirements: Apple II+ or IIe, 48K RAM, DOS 3.3; TRS-80 Model III, 48K RAM, TRS-DOS 1.3 or newer; IBM PC, 64K RAM; two disk drives; 80-column printer.

Successful Farming Management Software, $500

BOOKS!—THE ELECTRIC LEDGER

Switching from a manual to a computerized bookkeeping operation can be a traumatic experience, even for those who know what they are doing. For the average small-business owner who understands neither bookkeeping nor computers, the conversion can be much worse.

Systems Plus has attempted to ease this transition with their introduction of *BOOKS! BOOKS!* is advertised as "The Electric Ledger," and just as *VisiCalc* (and others) simulates a piece of analysis paper, *BOOKS!* is an electronic simulation of a ledger sheet-based set of books.

To a large extent, they have succeeded in what they set out to do. *BOOKS!* handles very much like a manual set of books. Transactions are entered one journal line at a time. *BOOKS!* then takes over and at the user's command automatically posts the transactions to the general ledger, generates the financial statements, and prints checks and invoices. *BOOKS!* also has the ability to do recurring journal entries and budgeting with job cost.

The *BOOKS!* system consists of a core module, general ledger, and optional modules for A/R (invoicing), A/P (check writing), recurring entries, and budgeting. These capabilities are built into the software, but must be de-encrypted with a password from your dealer before they will work properly. These optional modules can be de-encrypted at any time, adjusting any information previously entered into the system.

Setting up *BOOKS!* was a fairly straightforward process. Systems Plus provides eight sample charts of accounts for different kinds of businesses (service, retail, manufacturing, etc.) These can serve as an excellent starting point for many users. The documentation is not well organized, however, and forces the user to jump between the front and back of the manual to configure and start up the software. Also confusing is the terminology *BOOKS!* uses to describe their chart of accounts organization. Bookkeeping terms are used, but not with their normal meanings.

There was also a technical difficulty: The printer kept shifting into 40-column print. A Star Gemini 10X, it is an Epson MX-80 clone and it never had this difficulty with other programs. However, whether the problem lies with *BOOKS!* or the printer could not be determined. *BOOKS!* supports the MS-80, among others.

BOOKS! is accompanied by a thin but adequate manual contained in an attractive album case. The manual contains two tutorials, one on bookkeeping fundamentals, and one dealing with how to use the software.

Software Plus designed *BOOKS!* to be an easy-to-use bookkeeping system for the smaller business. They have succeeded to a large extent. They have provided an easy-to-use computerized system that will not intimidate anyone with manual bookkeeping experience. While the software and documentation appears to be a little rough, *BOOKS!* should appeal to those looking for an easy-to-use basic computer bookkeeping system.

Requirements: Apple, IBM PC; CP/M or MS-DOS; 64K RAM, two disks drives, printer
Systems Plus, $345

BPI ACCOUNTING SOFTWARE

BPI Systems is one of the oldest and largest suppliers of accounting software for micros. Available for a wide range of systems, their program has been improved and refined over the years. The software evaluated for this review was for the IBM PC, and although the packages vary in minor details from hardware system to system, to a great extent they are identical in features.

The mainstay of any accounting system is the general ledger. This is a company's main set of books, and all subsidiary ledgers, such as accounts payable and receivable, feed into it. BPI offers a General Accounting System containing a general ledger, accounts payable and receivable ledgers, and a payroll ledger. In addition, they have stand-alone accounts payable, accounts receivable, payroll, inventory, job cost, time and billing, business analyst, and church management. All of these are designed to be used either as stand-alone applications or integrated with the GAS to improve on the general accounts system's subsidiary ledgers.

All BPI applications have several features in common. The documentation for all applications is tutorial, and offers a practice set of books to learn on. People tend either to love or to hate BPI's documentation. Most beginners like the tutorial approach, but many more experienced users disdain what they consider extraneous verbiage. While BPI does not provide a reference manual for them, at least they have a good index that does provide some help for the more experienced user.

Another similarity between BPI's various pack-

ages is their general format. All are menu-driven, and the menus have the same general appearance. Whether you are working with the GAS, payroll, or inventory, menu choice 4 allows you to enter the company code and date, and menu choice 6 is always used to turn the printer on and off. All systems have the same general operation flow. You first enter data to the various journals, then post the ledgers, print reports, and close the period. This consistency means that once you have learned to use one of BPI's packages, you will be able to use any of them with very little additional learning time.

Also consistent from application to application is the "operations queue." This excellent feature allows you to enter a series of operations, which the computer will then execute automatically. The most common use of this feature is to enter a series of reports to be printed. Tell the system to execute the queue, and you can walk away from your machine until all the reports have been printed.

All BPI packages also share the extensive use of user-definable prompts to ease data entry. The General Accounting System allows you to define prompts for customers, vendors, and employees. You assign numbers, names, and general ledger account distribution accounts to people or companies you receive money from, pay wages to, or purchase products or services from. Then, when entering a transaction into the system, you type in a letter—C for customer, V for vendor, or E for employee—and their assigned number. The system pulls up onto the screen their name and general ledger accounts you have specified. You distribute the amounts into the proper G/L accounts, and the transaction is completed with a minimum of keystrokes. If you do a lot of business with the same people month after month, this feature can be a tremendous time-saver.

Also common between the packages reviewed was a single level password. This optional password, while better than nothing, is substantially less useful than the multi-level passwords that some other software uses to give operators access to one function, such as data entry, while barring them from more sensitive functions.

A very exciting feature is to be found under the chapter heading "Creating External Entries." In this chapter, BPI gives you the file layout for the General Journal file. If you are a bit of a programmer, you can use this information to interface non-BPI software directly into BPI's General Accounting. This is very useful if your other applications produce accounting information that should be reflected in your general ledger.

The GAS allows you to have approximately 2,000 accounts divided between the general ledger and the various prompts. Accounts receivable permits 1,000 customer accounts, 2,000 on hard disk. Accounts payable allows for 200 casual vendors, 450 regular vendors, and 1,000 vouchers, while payroll permits 230 employees per data disk on floppy-based systems, and 6,000 employees on hard-disk systems.

Each application has numerous reports, all standard features, and functions well as a stand-alone application. When integrated with the General Accounting System, the stand-alone ledger will replace the one supplied in the GAS. For example, if you are using both the accounts receivable and GAS, the ledger from the A/R package will replace GAS A/R subsidiary ledger.

While as a rule, BPI's packages are very well designed, there are a few limitations that might restrict your use in some situations. Two hinge on the account structure of the general ledger. BPI uses a four-digit account number in its chart of accounts. The right-most digit is used to departmentalize income statement accounts. Thus, account #8021 might be Telephone Expense-Dept 1, while account #8202 would be Telephone Expense-Dept 2. This is a common method of coding and provides the system with up to ten departments. The subaccounts, 1 through 9, are automatically consolidated into the "zero" account when the balance sheet is printed. This inability to provide departmental balance sheets is a serious defect in an otherwise excellent system.

One other limitation is that the account ranges are predefined by the system. Current assets must be in the range of accounts 1,000 through 1,499, and so on. While you may or may not be affected by this, you should know this limitation exists.

BPI has tended to concentrate on a specific market segment-those small businesses computerizing for the first time. Their systems are relatively complete and uncomplicated, and their documentation is aimed at the beginner. If you fall into the category of beginner or are interested in a proven system, BPI's software is definitely worth a look.

Requirements: Apple II, II+, IIe, or III, 64K RAM; IBM PC, 128K RAM; two disk drives, printer

BPI Systems, General Accounting System $595; Accounts Receivable $595; Accounts Payable $595; Payroll $595; Inventory $595; Job Cost $795; Church Management $795

THE BUSINESS LIBRARY

The first thing that you notice about *The Business Library* is its packaging, a red binder with black spine in a black plastic slipcase! It's absolutely gorgeous. Then you unwrap the binders, thumb through the documentation, and wonder, "How am I going to install and use this?" This is one series of packages that is definitely not for beginners.

This is not necessarily a bad thing. Many companies want the equivalent of a mainframe-or mini-based package with a micro-sized price. *The Business Library* is it, top-of-the-line software you can hand to a data processing manager and not have him or her sneer at you.

The Business Library is an integrated series of six accounting applications modules—General Ledger and Report Writer, Accounts Payable, Accounts Receivable, Inventory Control and Bill of Materials, Payroll, and Sales Order Entry. The entire series is integrated around a seventh package, The Librarian, which provides a master menu structure for access to the individual applications. The Librarian also provides system supervisory functions such as password security and access to operating-system utilities. Password security is not optional with this software; it must be installed and used. The individual applications can be used as stand-alone packages on a floppy disk-based configuration.

To integrate more than one application or use The Librarian's master menu, you must use the software on a hard-disk system. As these packages are more suitable for a multicompany/multiuser set up, a hard disk or network is a reasonable requirement.

While initial set up of the system is rather complex, using the software is relatively simple—certainly no more difficult then many lower-end software packages.

The series as a whole has all the standard features one expects. It also has some nice bonuses. All of the data entry screens are very attractive and easy to use. The individual packages offer a good selection of reports, and in several the report formats are user-definable. The reports offer various levels of detail, depending on who they are intended for, and most can be either printed immediately or sent to the disk for future attention.

The quality of the documentation varies enormously within the same binder. Overall, it seems acceptable, but not exceptional. Worksheets that accompany each application, they are well laid out and useful. One thing in particular is really impressive. Every few pages, at the bottom of the page, is a message: "***Always make backup copies of data***." Too few manuals give the important process of back-up the emphasis it needs.

One operating problem appears throughout the entire series. Almost all alphabetic entries *must* be entered in upper case. If you forget to lock the keyboard, you will most likely get an error message. This is minor, but in such a pricey system as this, the software should automatically convert imput into upper case, if upper case is truly needed.

The individual applications all have some nice bells and whistles. *Business Library*'s general ledger is capable of maintaining transaction detail for a full year if sufficient disk space is available. Account summary amounts may be maintained for 24 periods, and 12 periods of budget figures may also be kept. The G/L allows you to go back into closed periods and post adjustments. It also permits you to set up recurring entries.

The "Management Report Generator" gives the G/L extensive formatting options. While this report generator is not especially easy to use given the less then excellent documentation, the task is considerably eased by the separate "Sample Management Report Formatting Guide."

The software also allows you to define your own journals by means of a "journal number," an alphanumeric field up to five characters long. This allows fairly descriptive codes, such as "CR," "CD," "AR," "AP," "PR," and "INVNT."

G/L does not permit you to enter an entry where debits do not equal credits. While this is not an unusual feature by itself, many G/Ls built around a database do permit unbalanced entries.

The accounts receivable and accounts payable share many features. Both have numerous reports and are able to handle recurring entries. As with the general ledger, both systems feature worksheets to ease set up, and provide a "log" file that contains a record of all additions, deletions, and changes. You may also proceed from one period to

the next without having to close the previous period.

Business Library's payroll also has some nice features, including the ability to produce labor distribution and union reports. One unusual feature allows you to input a temporary pay rate for an hourly or salaried employee. Payroll would, however, benefit from the inclusion of an input worksheet for collecting employee hours for the system. Several of the better payroll systems available have this helpful report, and it seems a bit unusal for an otherwise high-end package like this one to omit it.

The Business Library is a powerful high-end accounting series severely hampered by so-so documentation. The users most likely to appreciate *Business Library* are those who operate in a multicompany/multiuser situation. For them, *Business Library* is a good choice. If you have less extensive needs—or less experience—you will probably be happier with a package that is easier to install.

Software Libraries does offer an extensive "Customer Satisfaction Plan," which includes a toll-free telephone number for support, an independent installation and service network staffed by CPAs and other experts, and a series of video training tapes. While the last two items are not free, if you get stuck or have a problem, you'll be glad to have them available.

Requirements: IBM PC, 128K RAM, MS-DOS 1.X or 2.X, two floppy disks or hard disk, printer

Software Libraries, General Ledger $595; Accounts Receivable $595; Accounts Payable $595; Payroll $595; Inventory Control $695; Sales Order Entry $695; The Librarian $195

THE CHAMPION

The Champion is a five-module accounting series comprised of general ledger, accounts payable, accounts receivable, payroll, and inventory. It is unusual in that it was the first widely distributed application software package written in *dBASE II*, rather than in a standard programming language.

The use of *dBASE* as the programming language provides both advantages and disadvantages. The major advantages it provides *The Champion* with are a central database organization and extremely compact code.

Building a series of applications around a central database is a great boon. It allows for integration of the application through shared access of data. Once a transaction has been keyed into one application the information becomes available to other applications which the transaction might affect. This is especially important in accounting as information from the A/R, A/P, payroll, and inventory must eventually be reflected in the general ledger. *The Champion* makes good use of this feature.

This type of organization also permits *The Champion* to offer realtime updating. This means that the software updates the files as soon as a transaction has been entered. There is no separate posting function. This is not only a timesaver; it allows you to run a financial statement after each entry to see the effect of the transaction. This isn't something you would want to do very often, but it is a handy bonus while making up adjusting entries.

Champion also makes efficient use of disk storage. Data files are compact and it is one of the few full-featured multiple application systems that can be practically run on floppy-based hardware.

Champion also suffers from some of *dBASE II*'s disadvantages. *dBASE* is slow, and this makes *The Champion* a bit slower than some written in a compiled language. While this is noticeable, it is not particularly objectionable. There are systems on the market that run much slower than *The Champion.* Use of a hard disk or RAM disk speeds things up a bit.

A second *dBASE* disadvantage from which *Champion* suffers is screen presentation. *dBASE* does not provide for full-screen data entry. *Champion* has overcome this to a degree, but the result is not particularly attractive.

These few criticisms are greatly outnumbered by *The Champion*'s positive features: an extensive "Help" facility available at a press of the "?" key; files can be recovered automatically or manually in the event of a hardware failure; error checking is extensive; report generation is fairly flexible; and the ability to start entering a second month's transactions without having to close out the first month is a great convenience. This is a particularly useful feature for companies that make monthly adjusting entries.

The individual applications also have some attractive features. The general ledger module provides for both cash disbursements and receipts and general journal entry. The system provides not only the standard reports but also subsidiary schedules to the financial statements. Financial

statements can be generated on an individual basis, consolidated basis, departmental basis, or even for an individual job.

Accounts receivable allows for up to nine levels of discounts, has order entry and point-of-sales functions, and maintains open-order and back-order files. It can also provide for up to 62 sales tax codes. A/R can provide a gross profit analysis total on each invoice. This report can be helpful in pinpointing excessive or incorrect discount levels.

Champion's accounts payable permits unlimited G/L distribution of an invoice and automatically computes the discount if an invoice is paid within the discount time. It also prohibits overpayment of an invoice.

The inventory module provides standard features as well as allowing you to maintain your inventory by product groups or subgroups. *Champion* provides for inventory item numbers of up to ten alphanumeric characters, which allows you to assign a meaningful identifier to each item. It will also provide the cost of a suggested purchase. This approach is better than just automatically issuing a purchase order when a reorder point is reached. One defect of *Champion*'s inventory, however, is that it maintains the inventory on a weighted average cost. While this is a legitimate method of valuing, many other packages offer the ability to maintain your inventory on a last-in, first-out basis.

Champion's payroll has all standard payroll features, but also has its share of design deficiencies. For example, the system does not update the files until *all* of the checks are printed. If your system or printer goes down after you have printed 150 out of 151 checks, you will have to destroy the checks and reprint them all again. The system also requires you to set up a local tax as a deduction code, which must then be used every time this tax is needed. Many micro-based payroll systems automatically handle this chore in their tax tables.

Using *The Champion* is simple. The entire system is menu-driven and extensive on-line help is available at the press of the "?" key. The manual, while not particularly attractive, is well organized and contains all the information needed to install and use the system. The manual would improve from being typeset, and a good index (there is none currently) would be appreciated.

Installation presents no problems. The instructions are clear, and several default charts of accounts are provided. The size of the manual dealing with installation is a little unnerving, however. It is 105 pages long!

You will need a "security code" from Champion Software to enter over 200 transactions. As entering your beginning entries can take up many of these, you should print the application for a security code as soon as possible. This is done as part of the installation process, so don't plan on installing your software and entering a half year's worth of transactions the same day.

Sometimes a software package knocks you out the first time you look at it. Most don't, and *The Champion* is one of these. It is, like many others, a good basic system with both frills and problems. *Champion* offers some very nice features, but could use a bit more maturing.

Requirements: CP/M-80, 64K RAM; MS-DOS 1.X, 128K RAM; two disk drives, printer

Champion Software Corp., General Ledger $495; Accounts Receivable $495; Accounts Payable $495; Inventory $495; Payroll $495

CLIENT LEDGER SYSTEM

The *Client Ledger System (CLS)* is a general ledger "write up" system for accountants, bookkeeping services, and other companies with a need for a significantly enhanced general ledger package. *CLS* appears to have started life as TCS Software's general ledger, as many of the screens and reports appear identical. *CLS* goes way beyond TCS's standard G/L, both in the reports it offers and in additional features.

Accountants and others offering client bookkeeping services need great versatility both in the type of reports they offer their clients and in the way those reports are presented. *CLS* offers a multitude of reports, including all three standard financial statements—balance sheet, income statement, and changes in financial position. It is capable of multiple-company consolidations, maintaining completely separate general ledgers for the companies being consolidated, and up to three levels of departmental summaries.

Balance sheets and income statements can be formatted almost any way you can think of. They can be produced on a comparative basis, and can include subsidiary schedules.

The system can also generate trial-balance worksheets used to make up adjusting entries, handle repetitive journal entries, and provide client trans-

double-entry accounting system, and another keystroke will print a trial balance to verify that all accounts were entered correctly.

Entering sales, receipts, disbursements, and general journal entries is equally easy. The entry screen already has the session and document numbers; you just fill in the blanks. At the end, a keystroke will produce document listing to confirm that the entries were accurate. Another keystroke posts the entries to the general ledger and prints a copy of the transactions.

A nice feature is automatic entry reversal. Without it, it's easy to credit when we should have been debiting and vice versa. This throws things out of kilter by double the amount. To fix things, the program simply reverses the entries, and your problem is solved.

The chart of accounts, the trial balance, the document summary, and the posting summary are among the package's major report formats. Three others are available: the ledger detail, income statement, and balance sheet.

The program has many nice features. It is easy to run, and it will not let you make an unbalanced entry or delete a non-zero balance account without considerable effort. The screen displays are excellent, editing features are very good, and the program is reasonably fast despite being written in BASIC. Your needs may dictate using another package. But if they are relatively uncomplicated, this general ledger is a good choice.

Requirements: TRS-80 Model II, 12, or 16, 64K RAM, disk drive
Radio Shack, $199

GENERAL LEDGER

This program is part of a new COBOL-based accounting series from Radio Shack. The series consists of G/L, Accounts Payable, Accounts Receivable, and Payroll. Each may be used as a stand-alone program or, with three disk drives, linked to the general ledger for automatic posting.

Where many such programs produce reports only in one format, this one allows many. In turn, it requires more effort to set up. In addition to entering the chart of active accounts, you must supply accounts that are essentially main and subheadings for reports and others that total your active accounts at various levels. Much of the manual is devoted to this process.

As you design and enter the account structure, you must assign each entry to its category: asset, liability, capital, revenue, cost of goods, expense, or other. Each entry must also be designated as active, or as a main or memo heading. Thus, the way in which reports are arranged and totaled and subtotaled is quite flexible. Setting it up takes a fair amount of work but is fairly free of problems.

The G/L allows up to 100 accounts and up to 1,150 transactions per month. You may enter up to 100 transactions before posting them to the ledger. Transactions are assigned a number for the audit trail in addition to the date and reference number. Transaction sessions are not numbered. The system will not let you post out-of-balance transactions or delete accounts with a non-zero balance.

Where some G/Ls are designed to post both sides of a double-entry transaction on a single screen display, this one displays each debit or credit as a separate screen and entry. Just fill in the account number and transaction data, edit as needed, and move to the balancing entry. The date, description, and reference number may be copied from the preceding entry by hitting Enter.

The bottom of the screen displays the running total of debits and credits entered to the same reference number and the reference information on that last entry. You may also elect at any time to inquire about, change, or delete a prior entry.

The system provides reports of posted or unposted transactions, an account list, and an account history with ending balances for the previous year and all months to present period. Other reports, accessed from the "End of Period Procedures" at the main menu, include trial balance, general ledger, income statement, cost of goods sold, and balance sheet. All of these may be printed at any time.

A nice touch is an optional trial balance worksheet. On the printout, it shifts account information to the left and provides two columns of blanks at the right in which to work up any adjusting debits or credits that may be needed prior to end-of-period close. This feels like the work of an accountant.

The program is not difficult to run. The menus are good, and the commands and keyboard controls are convenient. However, it is not particularly fast; when you do an End-of-Period close, you might as well get some coffee and take a break. And there are some other flaws as well: To save disk space, the package comes with an abbreviated

DOS that omits too many features that experienced computer users will miss. It is set up to use only Radio Shack printers. And setting it up and entering a chart of accounts takes more work than it should.

On the good side, it is a competent system running in a competent machine at a reasonable price. It will run alone or may be linked initially or later to other reasonably priced accounting programs.

The documentation is comprehensive and generally readable. However, it is not very well organized. The main sections of the manual include a short introduction, a sample session, a discussion of how to convert from your system to this one. Everything you need is in there somewhere, but this structure forces you to do a lot of page flipping.

Requirements: TRS-80 Model III, 48K RAM, or Model 4, 64K RAM; two disk drives; 132-column printer
Radio Shack, $199

GENERAL LEDGER (STATE OF THE ART)

The first thing that strikes anyone examining the *State Of The Art G/L* is the packaging. After slipping the binder out of the slipcase, you find that it has little velcro tabs that allow the binder to become an easel. You will also discover that there is a compartment in the binder to store your disks and a package of preprinted disk labels for your use. This clever packaging encloses a nice basic general ledger system. It's not as fancy as the packaging, but certainly workable.

This software is strictly a general ledger. It allows you to input journal entries for the various journals, print a journal report listing, post the entries, and print a trial balance, general ledger, and financial statements. Budgeting and departmental or comparative financial statements are not available from this basic package. These features can be added with the addition of an extra-cost optional module.

The manual, though a bit sparse, is well organized. A good part of the manual is devoted to setting up the system and, although the manual provides several pages of an accounting theory tutorial, you are expected to at least have some familiarity with double-entry bookkeeping fundamentals. State Of The Art provides you with handy worksheets to help you organize your setup.

Also provided is practice data. Rather than including sample data files on disk as is common, SOTA has provided this information on paper, in the form of an end-of-period trial balance of "Your Company." This is done to acquaint you with the process of setting up your books in midyear and give you a bit of experience on data entry before you start on your real books.

The State Of The Art general ledger is a "barebones" system well suited for the beginner with modest accounting needs. If you have no need or desire for the features in other fancier systems, you may want to look at it. It runs well and provides the basic functions necessary in a general ledger.

Requirements: Apple II, II+, or IIa, 64K RAM; IBM PC, 128K RAM; two disk drives, printer
State of the Art, $595

HARDISK ACCOUNTING SERIES

Accounting software, like most other kinds, is usually either easy to use and limited in capacity or capability, or very sophisticated and much more difficult to use. It is unusual for accounting software both to be easy to use and to provide a high level of sophistication and features. *Hardisk Accounting* by Great Plains Software manages to do both.

It is unusual in another respect as well. While many software producers recommend strongly that their programs be run on a hard disk, Great Plains insists on it. While restricting their packages to a hard-disk system immediately cuts Great Plains out of a nice piece of the market, it also allows them to avoid the compromises that other software firms use to minimize disk requirements. By avoiding these compromises, Great Plains was able to tune their packages to a hard-disk environment and it shows. The packages run beautifully!

Installing the system is reasonably simple. First, complete the sizing charts included in each application manual. Transfer the figures into the general ledger sizing chart when installing multiple applications. Finally, activate the "Autoload" process. The manual states the process takes a total of about 3 minutes; in fact, it can take over 20.

Each application system—general ledger, A/R, A/P, inventory with point-of-sale, and payroll—includes demonstration data to be used with an excellent tutorial. The tutorials are short—the G/L tutorial is 28 pages—but are complete and will give you a good understanding of the systems features and abilities and how they are used.

mittal letters, such as compilation or review reports.

CLS also has depreciation and amortization modules that allow you to produce these schedules using various methods of computation.

A necessary function of a write-up system is a good method of tracking various clients' payroll figures. *CLS* has an excellent after-the-fact payroll system, providing not only the required quarterly reports, but also year-end W-2s and 1099s.

CLS is menu-driven and not particularly difficult to use. Set-up of the system is a different story. Any software that is as flexible as this package requires a bit of effort to get going. The fancier you decide to get as far as formatting and features, the more effort you should expect to have to put in. Setup, while requiring an organized approach, is not an impossible task. Just don't expect to rush through it.

Client write-up is a rather specialized application, and it will not be suitable for everyone. If, however, you *can* use a write-up system, *CLS* is an excellent one.

Requirements: CP/M-80, 64K RAM, MS-DOS 1.X, 96K RAM; 2 disk drives, 132-column printer
TCS Softwares, price set by dealer

CLIENT MANAGER

Client Manager is a general ledger package with enhancements for accountants, bookkeeping services, and some businesses that must serve a wide variety of clients with different needs and organizational setups.

Client Manager permits you to maintain multiple-client ledgers on different fiscal years. You can keep extensive payroll information on your client's employees and generate quarterly and yearly reports. The package also provides extensive report formatting capability. This feature is relatively easy to use and allows you to set up different financial statement presentations for different clients. As *Client Manager* can keep an account balance history, these financial statements can be made on a comparative basis.

The package also allows you to generate the third basic financial statement, changes in financial position. This statement is often necessary and is infrequently found in micro-based general ledgers. Other enhancements are the inclusion of a loan amortization module, fixed-asset listing, and the ability to reconcile bank statements.

A handy feature is the ability to track client activity. This provides you with a list of each client with a summary of total computer time spent on each and total transactions for the client. This is convenient if you bill clients on a time-spent basis.

Using *Client Manager* is simple. Once a client has been set up (eased by the system's three default charts of accounts) all transactions other than payroll are entered in the format of a journal entry. The most difficult part of using this package is the initial client setup and report formatting. This process is no more difficult than the equivalent functions in a standard G/L. Default reports are included if you wish to use them.

The one feature the package doesn't provide is a builtin facility to generate a compilation or review report. This is a surprising lack in a write-up package.

Whether or not you need a write-up system rather than just a general ledger is a decision you will have to make. Many of the features of this package are available in several of the more advanced general ledgers on the market. If you feel you must have a write-up system, you could do worse than this one. While it is not an exceptional piece of software, it provides a fair measure of value.

Requirements: CP/M-80 or MP/M, 64K RAM; MS-DOS 2.X, 128 RAM; two disk drives, printer
Systems Plus, price set by individual dealer

CYMA ACCOUNTING SOFTWARE

Cyma's accounting packages most certainly accomplish the basics of required of an accounting series. They also provide some interesting variances from the standard basic packages that are worth pointing out.

One impressive feature is the reports. While not as numerous as some other packages reviewed, the ones that are available are exceptionally useful. An example of this is Cyma's general ledger system, which can generate all three basic financial statements, though they call the "changes" statement a "Funds Flow" statement. It can print the financial statement either in a "Standard Style," or on a comparative or budget basis. Their trial-balance worksheet is particularly useful. A trial balance is most often used by an accountant or bookkeeper to prepare adjusting journal entries. Most trial balances are just an account list with the ending account balance. Cyma's worksheet ap-

proach is much more in line for what this report is most often used for. Cyma also provides a "report formatter," which provides latitude in how the various reports are presented.

Additionally, Cyma provides you with the file layouts for the data files being used by a particular application. While they are not the only manufacturer to do this, it is still uncommon enough to deserve mention. Having this information is useful if you are a programmer. It allows you to write your own special purpose reports to pull information from the system's files. If you are not a programmer, a stand-alone report generator will accomplish the same thing.

All individual applications are fairly simple to set up and use, and all provide adequate capacities, even on floppy disk-based systems. Each of the systems can be used as a stand-alone or integrated with other modules. The manuals are all well laid out, attractive, and understandable.

The individual software packages all have their share of conveniences and idiosyncrasies. Slightly offsetting all the general ledger's nice features is Cyma's method of identifying journals. These journals are simply identified with a single letter, which you assign to a particular journal. This approach does not make a great deal of sense. A two-letter journal identifier would have permitted you to use CR for cash receipts, GJ for general journals, and so on.

Cyma's password system is deficient at best. The use of a three letter "password" provides a means of identifying a particular set of books. It does not exist to restrict access to information contained in the system.

Similar inconsistencies are to be found in the other CYMA modules. The accounts receivable has some nice features such as the ability to print payment books if desired, and it will let you put year-to-date finance charges on a statement if you wish. At the same time, many reports omit the customer's name and just show the customer number.

Payroll prints such reports as a payroll worksheet by employee, a payroll analysis report by G/L account, and a payroll verification report. These are all extremely useful, and are seldom found in micro-based payroll systems. But their usefulness is severely diminished, by the fact that only hourly employees are included.

It's very frustrating to come across what would essentially be an outstanding piece of software were it not marred by these annoying little flaws. It's a bit like finding the best car in the world, only to discover that the carpet is loose and there are chips in the paint job.

The Cyma series is basically well thought out and executed. It is easy to set up and operate, and does not only what it has to, but a little more. But the system needs polishing.

Requirements: CP/M-80, MP/M, or MS-DOS, 64K RAM; two floppy disk drives, printer

Cyma Software, prices set by individual dealers

GENERAL LEDGER

Written in BASIC, this general ledger is intended for Radio Shack Model II and 12 computers. Usable as a stand-alone package, it also interfaces with payroll and accounts receivable modules, offered separately.

It will fit many small and medium-sized businesses very well, but will probably not suit an accountant who needs a package for use with a number of clients, nor anyone who wants to maintain departmentalized profit centers.

Set-up is easy, largely because the program creates only fixed reports; there is no need to define your own. Its user's manual is above average, overall. It takes you through setting up a general ledger for a mythical XYZ Company, then tells how to insert your own company and accounts. It lacks an index, but this is offset by a detailed table of contents and by the program's ease of use.

The program will run on a one-disk system, allowing up to 504 accounts with four-digit account numbers. Each session is assigned a number by the computer, and each transaction entered is assigned a document number for the audit trail. You may have up to 3,072 documents per month with up to 50 entries per document; however, there can be no more than 11,420 entries per month.

One of the program's best features is its easy data entry and editing. To enter an account, for example, all you have to do is type in the account number, description, account type, category, and, at the beginning of your fiscal year, the items carried over from the previous year. If you forget an account type when prompted for that entry, you just have to hit Enter for a list of types.

When you have entered all of the accounts, pressing a single key allows you to print a copy for review. Any changes you need are simple to make, and you may delete an account entirely. This is a

Each package is entirely menu-driven, and on a first run-through of the documentation you are likely to be overwhelmed by the sheer number of the different screens. Luckily, you don't normally run into every screen, and the use of multiple screens tends to enhance the use of these packages, rather than slow you down.

The documentation divides the screens into two categories. Some are used to run an application, others administrative (ADM) screens. The ADM screens allow you to enter company information, configure the software for different printers, and set up passwords and user-access rights. While the *Hardisk Accounting Series* uses only a single level of passwords, an individual can be permitted access or barred from a particular application or administrative function.

The manuals for the series as a whole are very well organized and attractively presented. They present information in the order it is needed, contain a full range of sample reports, and have a good index, so that you can refer to specific operations once you have become familiar with the software.

The G/L is very well done. It provides for departmental and/or profit-center reporting with up to 99 departments and 999 cost centers. The reports are attractive and comprehensive and include comparative financial statements. Also permitted are "cross accounts," which permit you to group unrelated accounts for financial statements. The G/L can handle over 2,000 accounts and will permit you to retain transaction detail for an entire year; many other G/L packages erase this detail at month end closing. The reports allow a particularly wide variety in choosing account ranges to be printed, time periods, and comparison figures. You can print reports on the basis of transaction detail or summary.

The A/R can function as a stand-alone package or be integrated with the general ledger and/or inventory and point-of-sale modules. It will handle both open-item and balance-forward customers. A/R will accept commissions from the point-of-sale module and pass these commissions on to the payroll module. It can handle over 3,000 customers and offers a wide variety of attractive and useful reports. The package features flexible account aging and can print aging reports on a summary or detailed basis. The system lets you set up each customer with up to three sales tax rates. A salesperson can be assigned to a customer and can be overridden at the time an invoice is entered. A transaction can be assigned to a G/L profit center if this feature is being used.

The A/P system has a large capacity. It can handle over 3,000 vendor accounts efficiently. It accepts the entry of handwritten checks and will allow an individual vendor transaction to be distributed into 16 different G/L accounts. The software permits vendor codes of up to seven alphanumeric characters, allowing you to use vendor IDs that make sense—JOESBAR, rather than 173 or A49. A/P provides a particularly good variety of cash requirement reports; this is important, as cash management is the primary reason for using an accounts payable system. This system, like others, provides a wide variety of reports, few of which will ever be needed.

The payroll can handle effectively over 250 employees. It supports eight different pay periods at the same time and allows tip reporting for restaurant employees. It provides useful Help screens, which are accessed by pressing the "?" key. The software permits user definable departments and job descriptions. The system files up to two separate departments and pay rates for each employee. The P/R system can handle multistate payrolls, only one state per employee at a time. A tax-table update service is available for $150 per year. Expense payments are not handled well. Many systems let you handle expense reimbursements as nontaxable income; this system lumps these payments into gross wages and computes withholding on them. The employee must then file an additional form on his or her personal tax return to deduct these payments from taxable income. An additional flaw is that all data entry is limited to tenths of an hour; many companies use 15-minute increments.

Despite a few defects, the Great Plains packages are very good. This is one of the few software series that seems usable by both small and medium-sized businesses, and by both experienced and inexperienced users. Put this one at the top of your list to look at.

Requirements: Apple III or IBM PC, 128K RAM, drive (5 Meg minimum), floppy disk, 132-column printer capability in compressed mode.

Great Plains Software, General Ledger $595; Accounts Receivable $595; Accounts Payable $595; Inventory $595; Payroll $595

INFOTORY

Infotory is a small-business inventory manage-

ment program for the Apple II and III that supports both floppy and hard disks.

Using a simple menu-driven format, you can add new items, edit existing entries, delete items, request a screen inquiry for a particular part number, and print an inventory report and price list. Receipts and issues are handled by the "receivings-and-sales" entry modes, and items on order are tracked through an "on-order P/O" entry function. A transaction report is automatically printed for these three items, thus providing a complete audit trail.

The most important function of any inventory program is the report generator. *Infotory* prints three standard reports: inventory report, price list, and sales-and-cost analysis. As well as indicating quantities on hand and on order, reorder levels, and average costs, it provides vendor information, selling price, period sales, cost, and gross-profit information for items sold during a specific period.

The most powerful feature of *Infotory* is its "ANYREPORT" function. With it, you may create any number of reports by choosing from 18 different elements including part number, description, quantities, costs, percent profits, percent margin, sales, etc. You may also specify up to ten conditions using <, >, =, or a specified value. (For example, report all items with a period sales of greater than $50.) One flaw in this feature is it only supports 80-column printouts. With so many printers having compressed-print capability, it would be nice to have 132 columns or more available. Because each record must be analyzed before printing to see if it meets the specified criteria, it is a pretty slow process.

While the 1,400-item limit on the Apple II may seem small, multiple-data disks can be used to increase total capacity. One would have to assign part-number groups to each disk and manually consolidate totals. The Apple III handles 26,600 items using the Profile hard disk, and the IBM XT with its 10 MB disk will handle 50,000 items.

The program is supplied on a single-copy, protected disk and includes a sample data disk. A high-quality manual complete with samples of various ANYREPORT configurations, plus many screen illustrations, is provided.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM, two disk drives; Apple III, 128K RAM, Profile hard disk; MSDOS 128K RAM, disk drive

S.S.R Corp., Apple II $295; Apple III and IBM $575

INVENTORY MANAGER

Designed for retailers, distributors, or any business involved in the sale of merchandise, *Inventory Manager* is an easy-to-use inventory control system that will handle up to 2,700 items on a dual drive Apple II (1,200 for a single drive) and up to 10,000 items on the IBM PC using two double-density, double-sided disks.

Menu driven and easy to use, this program can keep track of current inventory levels, product name, category (up to 13 groups), selling price, unit costs, product code, vendor code, stock on order, reorder point and quantity, items on order, and percentage markup.

Reports are very important in any inventory system and *Inventory Manager* provides plenty of them. Along with a standard list showing stock numbers, description, prices, vendor, quantity, and so on, you can select a vendor listing including vendor codes (up to 99), stock-on-order report, a listing by product code group, and an alphabetical listing by item description. As well as a suggested reorder list, purchase orders for each vendor may be automatically printed with the option to place orders with a selected vendor rather than the assigned vendor. This is helpful for purchases being made through a distributor rather than directly from the manufacturer. A couple of unique reports include a listing of stock sold sorted by gross profit, and a list showing the percentage of gross profit in each of the 13 user-defined inventory categories.

Included as a separate option is a program called *IM-Retail*, which is a restricted-usage version of the main program. By letting your employees use this one, you can protect sensitive information. Access is allowed only to the update, vendor codes, and category search options.

Inventory Manager comes with an attractive 72-page manual and is supplied on a single unprotected disk. Because it is unprotected, using one of the high-speed DOS utility programs will greatly enhance its operation.

Requirements: Apple II with *Applesoft BASIC* in ROM, II+, or IIe, 48K RAM; IBM PC, 64K RAM; disk drive

Satori Software, $150

INVOICE FACTORY

Invoice Factory is an accounts receivable package targeted for companies that ship products,

rather than service businesses or cash and carry retailers. Three years ago this program would have been considered exceptional. Given today's software, the program begins to show its age. This shows up less in features than in performance and inconveniences of setup and use.

Invoice Factory has attractive data input screens, and can use Microlab's *Data Factory* to produce extra reports. It can store product weights and UPS rates to calculate shipping charges automatically. It can generate "Auto Invoices" when there are many invoices with the same products for different customers; "Standard Invoices," which accesses a file of up to 100 products; or "Free-Form Invoices," which are used to invoice products not in the data files. It even has a field for comments about a customer, which do not print on the invoice or statements. Microlab even supplies a starter supply of invoices and statement forms. *Invoice Factory* also record receipts and offers more than adequate reports: accounts receivable by invoice number or due date, aged receivables, quarterly and yearly sales analysis, lists of product and shipping variables, mailing labels, user-definable sales analysis report; cash analysis reports; royalty and commission reports; and a salesman production report.

With all this going for it, *Invoice Factory* has some very poor features. These are not really design flaws, but appear to be the result of the software's age. It has no provision for more than the Apple's standard 40-column screen and makes no use of a second disk drive during the setup process. As running the system requires two drives, the extensive disk swapping seems an unnecessary nuisance. Additionally, the product file, which stores descriptions and prices, is limited to 100 products and a single disk. The master account file can store 275 customers per disk and can be spread across two disks, for a maximum of 550 customers.

This program is also annoying to setup. It has significant limits on capacity and apparently cannot be configured to make use of a hard disk. Given the range of software available for the Apple, the price seems a bit high. If you can find the *Invoice Factory* for a substantial discount and can live with the limitations, it might be worth taking a look. If you anticipate that your business will grow substantially, you very well could outgrow the software.

Microlab supplies a backup set of disks with the copy-protected package and will replace a defective, blown, or damaged disk within the first 30 days for a fee of $10. They also offer a one-year warranty for $50. Most people will probably spend the money on a bit copier and make their own extra backup copies.

Requirements: Apple II, 48K RAM, *Applesoft BASIC* in ROM, two disk drives, printer
Microlab, $200

JEWEL

The *Jewel* series consists of 15 application and vertical market applications, most of which can either be used as a stand-alone application system or integrated into a single accounting system in which each accounting function shares its data with the others. The entire series consists of several general ledgers (standard G/L, complete G/L, and client write-up), accounts receivable, accounts payable, inventory, order entry, purchase order, fixed assets, job costing, manufacturing, point of sale, client/time billing, and a medical office manager. Evaluated for this review were the complete general ledger, accounts receivable, accounts payable, and order entry.

The *Jewel Accounting* packages are built around a database. This allows a great deal of flexibility in report formatting and adds the ability to do extensive searches on accounts and transactions. In the general ledger chart of accounts, there are 25 different codes used to designate account type. These different account types are used not only to indicate where in the chart the account appears, but also to set up the formats of the financial statements. On top of that are an additional seven print-column codes, used to position where the balance of an account appears on the financial statements. Then there is a special procedure for formatting the inventory account balances for the "cost of goods" section of the income statement.

Unfortunately, setting up your books on the *Jewel* system can be an extremely complex and time-consuming process. It requires that you give a fair amount of thought to the structure of your accounting system before you get anywhere near your computer. It also requires that you have a good understanding of accounting.

Entering your chart is equally complex. There are numerous screens that may be used, depending on which features—budgeting, statement of changes report, schedule to financial statements, etc.—

you've decided to use. The general-ledger documentation contains 83 pages on the setup and maintenance process alone. Other packages are somewhat easier to set up.

All the time and effort spent in planning and setup is well worth it if you need some of the advanced features that *Jewel* offers. The general ledger allows multi-company operation, extensive budget comparison and reporting, comparative financial statements, and various supplementary schedules to the financial statements. With enough disk storage, you may have up to 99 divisions, each with up to 99 departments. You can produce a statement of changes in financial position. This is the third basic financial statement—the balance sheet and income statement are the other two—and is not often found in micro-based accounting packages. *Jewel* even allows you to set up the system to make an automatic journal entry to adjust the inventory account based on a gross profit percentage and to make automatic accruals for estimated income taxes.

The other packages reviewed offered similar features. In addition to more or less standard features, accounts receivable allows unlimited descriptions on invoices, four user-definable tax codes, the ability to generate estimated or pro forma invoices, suggested purchase levels and reorder points, and many useful reports. Accounts payable also had many unusual conveniences. Some impressive ones are its ability to do recurring invoices; its user-defined aging; the production of "white paper" schedules when detail overflows a check stub; its ability to retain a history of paid invoices; and the ability to produce a summary report for Form 1099, used to report payment of dividends and non-employee compensation.

Using any of the packages is much less arduous than setting them up. The menu-driven process consists of entering the transactions, editing or deleting incorrect transactions, then "recording" the session. This allows you to correct an incorrect entry before it actually is entered into the file. After the session is recorded, an incorrect entry can be corrected only by an adjusting journal entry. This allows the maintenance of an adequate audit trail.

There are two flaws in the way *Jewel* handles transaction entry. In the general ledger, each entry screen is used to enter one journal line transaction. This is common in database-oriented accounting systems but does allow you to put in an unbalanced entry. *Jewel* warns you if the current session is out of balance, but does not prohibit posting an unbalanced entry.

The second is the way *Jewel* transfers information between accounting modules. It makes up a summary journal entry from one system, which is entered and posted into another. Most database-oriented accounting systems provide a direct transfer of information entered in one application to other applications which the transaction would effect. *Jewel* does this between some systems; if both A/R or A/P and inventory are installed, one will update the other. To update the G/L, you must choose a menu option "Post from other *Jewel* System screens." This is fine is you have several accounting modules that you do not want fully integrated, but it is a needless step if you desire a completely integrated accounting system.

After the transactions have been entered and "recorded," they are posted and various reports and financial statements are printed. This is entirely menu-driven and, again, is a simple process. Each of the applications reviewed offers a multitude of useful reports, though your circumstances will probably not require all of the reports provided. The general layout and appearance of the reports are attractive and, because many of the reports are the result of your setup procedures, should be germane to your business requirements.

The *Jewel Accounting Series* is not for everyone. Many of us have no need for most of its advanced features and complex setup. These packages seem more appropriate for a company grossing over 15 million per year or a smaller company with extensive reporting needs. It seems likely, however, that most companies that would find *Jewel* attractive would be using larger computers than micros.

Requirements: IBM PC, 192K RAM, two disk drives, 80 column printer

Heritage Computing, G/L $975; A/R $425; A/P $525; Order Entry $425

MBA ACCOUNTING SOFTWARE

The *MBA Accounting Series* is a set of the six basic accounting applications (G/L, A/R, A/P, payroll, inventory with invoicing, and purchase order), two vertical market applications (fixed asset accounting and professional time accounting), and several very interesting options.

The six basic accounting applications can be used as stand-alones, or can be interfaced with the

general ledger or each other. Unlike some systems, the software does not share a common database. Results of the operations in one application can be automatically transferred to another by means of a summary journal entry, which is transferred to the G/L journal file. While not as elegant as the shared database approach, it gets the job done.

MBA's various applications could be considered mid-level, both in the features they offer and in the relatively complex setup of parts of the system. They offer all of the basic accounting functions expected in their applications. It is the additional features the system as a whole offers that lifts this software out of the "basic" level. These features include password protection, on-line account inquiry, the ability to maintain year-to-date detail if disk space is available, a financial report generator, and a toll-free support line.

The manual is well written and understandable, with an excellent table of contents and an index—rather a pleasant surprise. It also contains a very good tutorial in basic accounting, which non-accountants will welcome. However, the manual was written solely for the CP/M version of these programs. Changes for the IBM PC version are noted in inserts scattered through the book. This is needlessly confusing, as sections of the book dealing with the operating system could easily have been rewritten.

The G/L has two check entry screens; one is used if you are using the A/P (accrual basis taxpayer), the second if you keep your books on a cash basis. You can modify or correct a journal entry as long as you have not yet posted it.

A financial report generator makes creation of financial statements very flexible. This report generator also allows you to do comparative and departmental statements. While not extremely simple to use, it is substantially less complex than the report generators in many competing products.

The structure of the chart of accounts is also very flexible, allowing account numbers of up to ten digits in length. One feature is very seldom seen in micro-based G/Ls: memo accounts—accounts in the general ledger that can store non-financial information. Memo accounts are extremely useful when you wish to record billings received from your two biggest customers, or the number of cigarettes you smoke while doing your books each month. Information stored in memo accounts will not be added into financial figures and will be available in your general ledger. Memo accounts are much more common in mainframe-and mini-based general ledger software. It is nice to see a micro-based package that includes them.

Other programs in the series are similarly well thought out and executed. *MBA*'s strongest features, however, are in the form of optional modules. One is a "multicompany" feature that allows you to maintain several sets of books on the same data disk. A multi-user option provides file and record lockout. And an interface system called DWP—available separately for G/L, A/R, A/P, Payroll, and Inventory—transfers information from the various applications into *d-BASE II* compatible files. From there, data can be manipulated with *d-BASE II*, or using *d-BASE II*, converted into ASCII text files for use with a word processor or your own programs. *MBA* also offers an interface that allows you to transfer G/L information to *Super Calc* spreadsheet models.

These two options (DWP and *Super Calc* interfaces) can give you an enormous amount of power in customizing a packaged application. If you need reports unavailable with the financial report generator, just dump the information into *SuperCalc* or *dBASE*. In fact, you might find this procedure easier then using *MBA*'s report generator. The DWP interface also allows you to transfer information into *MBA*'s application. This makes it a powerful tool indeed.

The *MBA Accounting Series* is unusual in that it can be used at various levels. Without the options, it is a fairly good basic and mid-range system. With the optional modules, it is easily customized. While the software has some weak points, it also has some very nice features. It might be worth a look.

Requirements: CP/M-80, MP/M-II, or TurboDOS, 64K RAM; IBM PC, 128K RAM, MS-DOS 1.X or 2.X; two disk drives, printer

Micro Business Applications, General ledger $595; Accounts receivable $595; Accounts payable $595; Payroll $595; Inventory $595; Purchase order $395; Fixed asset accounting $395; Professional time accounting $495; G/L SuperCalc interface $100; Multicompany option $250; Multiuser option $595; DWP interfaces $100 each

MICROTAX

While there are many programs that will prepare Federal returns, there are far fewer truly professional tax preparation systems available. One of

the more comprehensive of these is *Microtax*. Microcomputer Taxsystems has been in existence since 1979, which makes it one of the "old-timers" in the microcomputer software business. They offer a variety of different packages, from their personal federal package (Level I) through an expatriate system. Evaluated for this review were their professional Federal package (Level II) and New York State/City package, both for preparing 1983 returns. Also available are other states and a corporate/partnership return package.

Installing *Microtax* is simple. While it is possible to run from floppies, the programs are large, numerous, and require frequent disk access. Running from a hard disk makes using this system a whole lot easier, and much faster. Installation consists of copying the disks up to the hard disk and answering a few questions on terminal and printer characteristics.

Once this short installation has been accomplished, you are ready to use the system. The entire *Microtax* system is menu-driven. The various forms and schedules for a client can be selected before you start data entry, or can be selected on the fly by selecting the form from the one you are working with. For example, entering an "S" (for select) to the prompt "Excess Itemized Deductions (A)" on Form 1040 will select Schedule A. When you are finished with 1040, the system will automatically present you with Schedule A to be filled in. The data entry routines pretty much follow the forms, and allow a wide variety of overrides for information.

Data from one form that is used in another is automatically transferred. Information from the Federal return is likewise transferred to a state return.

All *Microtax* packages prepare a wide variety of the most often used forms. The firm is continuously adding new forms; any list would be obsolete by the time you read it.

Microtax has several other nice features that make it suitable for use in a professional preparer's office. It can prepare an interview questionnaire similar to a service bureau's input sheets, tax questionnaire booklets to mail out to your clients (an extra-cost option), and transmittal letters for your returns very similar to the ones prepared by the service bureaus.

Microtax is nice, but far from perfect. Even though it is written in compiled BASIC, the very size of the system makes it run slowly. The manual could also use some improvement. It is extremely disorganized, with most of the important information contained in the appendixes.

Alleviating this somewhat is *Microtax*'s toll-free hotline (when you can get through) and Tax-Net. *Microtax* provides Tax-Net on The Source to provide you with tips, additional information, and downloadable patches to the various packages they offer. It is ponderous to read through all the memos to find out which ones have importance to your particular operations, and instructions for downloading are given only for ASCOM's instructions for one of the freeware communications programs would probably be a good idea.

Microtax is a professional-level tax preparation package. It is not inexpensive, but if you prepare a significant number of returns each year, the reduced cost of the updates can make it extremely cost effective. Using it can save you time, money and aggravation.

Requirements: CP/M-80, 64K RAM, IBM PC, 128K RAM, two disk drives, printer

Microtax, *Level II (Professional Federal)* $1,000; *NY State/City* $750

MULTI-TOOL FINANCIAL STATEMENT

Microsoft's *Multi-Tool* series offers template generators meant to be used with the company's *Multiplan* spreadsheet. Each creates a different template for the generation and analysis of financial statements.

Financial statements are a method of presenting information from a company's main set of books, the general ledger, in a more-or-less standard format. As defined by GAAP, the Generally Accepted Accounting Principles set forth by the American Institute of Certified Public Accountants, a set of financial statements consists of three reports, a balance sheet, an income statement, and a statement of changes in financial position. Each tells something different about a business. The balance sheet lists assets, liabilities, and owner's equity—owner's investment in the company and the firm's retained earnings, profits and losses not distributed to the stockholders.

The income statement is a list of the company's income and expenses. It covers a period from the start of a company's fiscal year to the date of the report. The income statement gives information on

the financial results of a company's operations, sort of a "How are we doing so far this year?"

The third standard statement, changes in financial position, compares balance sheets for two years, and details the reasons for the changes in account balances. For example, liabilities may have been increased by a long-term bank loan. The "changes" statement might explain that this loan was used to finance inventory.

The *Multi-Tool Financial Statement* can be used to generate a *Multiplan* template which contains a balance sheet and an income statement. The third statement, changes in financial position, is not generated, but few businesses use this statement in any case; its omission is not a major defect in the software.

The financial statements are developed through a question and answer routine. The software asks you which accounts are used in each statement—there are separate programs for each statement—and the dollar amount of each account. After you have finished, the software creates a SYLK—symbolic link—file containing your statement. This must be loaded into *Multiplan* to be used or printed.

For the simple generation of financial statements this is a tedious process. Not only is it simpler just to use *Multiplan* directly to set up your statements, but *Multi-Tool Financial Statement* has certain accounts that will appear in the generated statements, even if your particular business does not use them. An additional rigidity is reflected in the equity section of the balance sheet. If your business is a corporation, there is no problem, but if it is run as a partnership, proprietorship, or a small business corporation under Subchapter S, you will need to do some editing on the generated statements.

Multi-Tool Financial Statement's strength, however, is not in the generation of the statements. As it generates the financial statements, it also prepares worksheets containing various ratio analyses. These analyses, and how they are used, are detailed in the manual. There are four basic types. The first, liquidity ratios, indicate a company's ability to meet its short-term debt. The second category, leverage ratios, are indicators of both how the company is financed and of its ability to meet both short and long-term obligation. Efficiency ratios, the third class, indicate how efficiently a company is using its assets. The fourth group includes various profitability ratios that indicate net return from operations.

If you have knowledge of ratio analysis, or are willing to spend a few hours learning how this type of analysis can help you run your business more effectively, then *Multi-Tool Financial Statement* might be a good investment. If your only interest is to produce a set of financial statements, especially if you need standard statements, forget it. You will find it easier to just use *Multiplan, Visicalc, 1-2-3,* or an electric typewriter.

Requirements: Apple, CP/M, or IBM PC; *Multiplan* Microsoft Corp., $100

PAYROLL MANAGER

Payroll is one of those office functions that fall into the category of necessary nuisances. The necessary part is obvious—everyone (including you) wants to get paid! The nuisance comes in because the payroll function is so labor intensive that it is a pain to do manually, a pain to have it done by a service bureau, and a pain to do it on computer. It is, however, much less painful to process payroll with a service bureau or on your own computer.

Depending upon your requirements, Microlab's *Payroll Manager* might be able to take some of the sting out of the payroll process. Designed for the Apple II or IIe computer, it can handle up to 200 employees, calculating gross pay on hourly and salaried employees. The system can track sick time, vacation time, personal time, and holidays, and can calculate up to 11 separate deductions of which five are user definable.

Payroll is a fairly standardized application. Almost all payroll packages have certain basic functions. You enter employees' time; calculate the gross and net pay; print checks, payroll registers, and earnings reports; and at the end of each quarter print reports for various government agencies. At the end of the year, you print W-2 forms. Any bare-bones system should do this.

The differences between packages are the various bells and whistles. *Payroll Manager* has a few nice ones including some additional reports you may find useful. It can print time card labels, mailing labels, an employee roster, and an employee seniority roster. Additionally, *Payroll Manager* can produce two useful blank forms, a blank employee record form, which you fill in when your hire someone, and a Payroll Input Worksheet to record hours before you input them into the computer. These are

very nice features. Microlab's package also permits very flexible calculation of user-defined deductions.

While *Payroll Manager* has some very nice features, it also has some serious faults. It requires at least three disk drives or a hard disk to run. If you already have a hard disk this may not be a problem, but the package runs much slower in the three-floppy-disk configuration. Yet *Payroll Manager* is slow even on a hard disk. If you have over 30 or 40 employees, be prepared to spend a lot of time in front of your screen. This is compounded by the need to enter hourly employees, salaried employees, and adjustments in separate input processes. This is much more annoying than entering employees in your own order and requires additional planning to minimize the annoyance.

Payroll Manager has one other limitation that may be a problem. Each employee is limited to a single department number. If you have employees whose time should be billed to several departments or jobs, you are going to be disappointed.

Microlab has produced a nice low-end payroll package with some useful frills. If you have a bare-bones type of payroll with 30 or 40 employees, *Payroll Manager* may be just what you are looking for. If you have many employees or have more elaborate labor or job costing requirements, you will probably be better off with something else.

Requirements: Apple II or IIe, three floppy-disk drives or hard disk, 80 column printer
Microlab, $300

PEACHTREE SERIES 40 G/L, A/P, A/R

These three packages form the heart of Peachtree's *Series 40* accounting system; while they share many similar qualities, one of the strongest is their auditability. Each can be told not to allow a user to change an entry once it's in the system. This means the only way to change incorrect data is a reverse entry—but that forces you to record every transaction all the way through, so each item carries a built-in audit trail. Your accountant will love the system.

Each program is menu driven, so they're easy to move around in and work with. The *Accounts Receivable* and *Payable* systems interface with the *General Ledger*, to send their summary data automatically to its files. All the programs are fully error trapped; you can't even enter an invalid date. Each package has a thorough manual, with a brief tutorial section at the end.

In the *Receivable* and *Payable* programs, customer information (name, address and so on) competes with your transaction data for disk space. Each data disk has about 900 spots; if you have 300 customers, you're only allowed to record about 600 transactions. The same is true for the *General Ledger*, although just about any chart of accounts and its associated information won't come close to filling the available space.

One weak spot is that your aging reports (for accounts receivable) and payable summaries (for accounts payable) can't span multiple disks. Each printout gives you one disk's worth of information. If you have current data stored on more than one disk, you have to add up their totals manually.

Peachtree's *Accounts Receivable* system creates invoices for you, automatically does line extensions, and will even add sales tax to your bills. If you do invoices by hand, you can enter just their data into the system. You can create automatic-billing accounts for those customers who have the same charge every month.

The system is seemingly designed for mail-order businesses, as there are numerous fields to skip through or fill in that concern themselves with shipping. There's also only a single sales code to which you can distribute your sales data; materials, labor, outside services, and so on all must be lumped together.

You can apply customer payments to specific invoices or use a balance-forward method. The system produces detailed summary reports and even tracks the credit limit you set for each customer.

Along with its invoices, Peachtree's *Accounts Receivable* package creates month-end statements for your customers. If you wish, you can print a message on each statement. Sadly, the system cannot add a finance charge to those accounts that promised your check was in the mail (although it somehow never arrived).

As the *Receivable* package prints invoices and statements and tracks what your customers owe you, the *Payable* system has the unfortunate job to do much the same for what you owe. The paperwork the *Accounts Payable* system provides is just as detailed and thorough as the one its sister package produces. There's a helpful cash-requirement report that lets you know how much you need in

the bank to pay all of your bills, or just a group of bills you select, or to pay all bills that are due by a certain date.

Accounts Payable, of course, also prints checks to your vendors for the materials you purchase. The system automatically numbers each check for you, takes advantage of discounts, and pays up to 12 invoices on each check. You can create auto-entry accounts for those payments that are the same every month (like rent) and the system will automatically post the data. You can distribute the information from each vendor bill to eight accounting codes (material, labor, permits, etc.) for your regular vendor accounts, and can make two distributions for auto-entry accounts.

Peachtree's *Accounts Payable* makes it difficult for you if you write a check by hand to pay an invoice that's already been recorded into the system. You must either reenter the voucher (the bill from your vendor) marked PAID, or let the system create and print a check for it, and then void the check.

At the center of any accounting system is your general ledger: it summarizes everything. If you have only the *General Ledger* package, you can manually enter the summary data from your current receivable and/or payable systems. If you have Peachtree's *Accounts Payable* and/or *Receivable* programs, the *General Ledger* system communicates with them to automatically take their summary data and post it to the proper General-Ledger accounts.

The *General Ledger* program creates a balance sheet and profit-and-loss statement for you, and if you wish, it will print last year's figures, too, so you can compare them with your current data. It also tracks budget information, so you can see how you're doing in relation to it. If you have a recurring expense (like depreciation) every month, the *General Ledger* program will post it automatically for you.

You can start Peachtree's *General Ledger* system at any month of the year. It's completely error trapped, and checks each entry to make sure it balances before it accepts the data into the system.

Each of Peachtree's accounting programs does an outstanding job, with only a minor deficiency or two (the worst is the lack of ability to automatically add a finance charge). Together, the three systems give you a complete accounting package.

Requirements: CP/M 64K RAM, two disk drives, 132-compatible printer, requires DOS 3.3 and *Microsoft* software

Peachtree Software, $400 each module

PEACHTREE SERIES 8

Peachtree Software, now a division of MSA, Inc., has an interesting history. As Retail Sciences, they were one of the first companies to offer accounting software for microcomputers. Developed in the late 1970s for the original Altair, the software packages have been adapted for new generations of equipment. Several years after its founding, the company split into two new firms, Peachtree Software and TCS, both of which retained the right to sell the software.

Over the years, both companies improved and sold variations of the original packages. About two years ago, TCS finally decided to retire the software and brought out an entirely new set of packages, their *TOTAL Accounting* series. Peachtree, however, has decided that the software, though aged, is not dead yet, and continues to sell their *Series 8* incarnation. Therein lies the problem.

When the software was first available, it was a remarkable package, with features that had been available only in software packages costing ten to 20 times as much. Unfortunately, the software has aged rather than matured. Report formats that were acceptable five years ago have been done much more compactly and attractively in more recent packages. Installation and set up are much too complex for what the software offers. The manuals, while better then some, do not reflect five or six years' worth of effort and refinement.

Peachtree still comes out well in a comparison of features. It does everything expected from its basic applications. It has a full complement of reports and is menu-driven throughout. Many people are using its reports, after all, with convenience. Peachtree has sold well over the years, and continues to do so.

But the software is substantially what they were selling five years ago, and compared to more recent packages it shows its age. You have to admire Peachtree's staying power. But the microcomputer software industry is fast moving, and five years is a long time. You can keep a package alive only so long by grafting improvements onto it. It's time to let this one rest.

Requirements: MS-DOS 1.X or 2.X, 128K RAM, two disk drives, 132-column printer

Peachtree Software, General ledger $750, Accounts receivable $750, Accounts payable $750, Inventory $750, Job cost $750, Sales invoicing $750

PRACTICAL ACCOUNTANT

Designed with the small business in mind, *Practical Accountant* is a single-entry accounting program that is both simple to use and powerful. From managing a single checkbook to running a farm, it can be used in any business where a complex double-entry system would be unnecessary.

Structured like many checkbook programs, income and expense transactions are entered into a cash record with simple on screen entry forms. All entries are maintained chronologically, and you may edit or delete them at any time. Either the cash or accrual accounting method is allowed, and you may handle accounts payables, receivables, and simple payroll. Checks may be printed using two-part forms to include a voucher with each item broken out.

Perhaps the key element to all accounting programs is the way financial information is presented. Cash flow is very critical to the operation of a small business, so in addition to printing cash transaction reports in both a short and extended format, three types of cash flow reports are also provided.

The main report, "Categories Cash-Flow," is a quarterly statement organized by income and expense categories. Detail amounts and totals are printed for each month along with the quarter and year-to-date balances. Printed one quarter at a time, a single report may cover up to four quarters. A report of subcategories provides more detail and a tax-type report shows amounts assigned to each of the 20 user-defined tax types. You may define up to 50 different account categories with up to 300 subcategories of income and expense items. These can be further grouped into 20 different tax-type categories.

Other features include easy reconciliation of accounts, split transactions, and a search function that allows looking for a specific date or range of dates, an income source, or an expense recipient.

The reference manual is exceptionally well produced. Beautifully typeset on slick paper and spiral bound to lay flat, its 213 pages abound with screen illustrations and printouts. The book is divided into two parts; the first is a comprehensive tutorial, while the second is a complete reference guide. A chapter on small business and farm applications contains sample charts of accounts for each, along with two methods of using the program to handle payroll. A handy keyboard reference card for both the Apple II and IIe is also included.

The system will handle a maximum of 634 transactions per year using two disk drives. You may extend this by adding one or two additional drives, 130 transactions for each, for a total of 2,800 checks and/or deposits. Alternatively, you may break your transactions up into quarterly or semi-annual groups using a separate data disk for each.
Requirements: Apple II, II+ or IIe, 64K RAM, two disk drives, printer
Softlink, $150

THE PROFIT CENTER

Given the enormous profits possible in the software business, most computer-industry analysts have agreed that it is only a matter of time before the "big guys" get into the act. Prentice-Hall is certainly one of the big guys. Over 70 years old, they are one of the world's largest publishers of computer books, texts, and information services for accountants and lawyers.

The Profit Center is Prentice-Hall's first major venture into the world of business software. For a first step it is both substantial and ambitious.

TPC is a series of 21 applications modules, to be released through 1984 and 1985, in the areas of accounting, word processing, planning and analysis, and database management. Most are completely integrated with the others through a master menu that provides access to the individual applications, utilities, and a common database.

Of the 21 modules announced, 6 are available now; Master Menu, General Accounting, Accounts Receivable, Accounts Payable, Business Word Processing, and N.E.A.T.—an acronym for notes, expenses, appointments, and time. All have several features in common: the use of a master menu to access the application, a common user interface, and shared data.

Shared data is a method of integration. Older programs transported the data from one application to another in a summary file. A more efficient technique is to share data in a set of common files. *TPC* uses this method. This avoids duplicating information in separate files and reduces or eliminates the need to re-key data that another ap-

plication has used or generated. *The Profit Center* enjoys both advantages.

A nice feature of *The Profit Center* is its common user interface. Once you have learned how one of the programs operates, about 80 percent of what you know is transferrable to others in the series.

Master Menu, while not unique to *TPC,* is very well done. During setup it can configure the system for almost any combination of disk drives and printers; later it serves as a gateway to the individual applications. As each application is acquired, it must be installed on the menu—a simple task. During installation, you may inform Master Menu that you wish the application to talk to other modules. You may well not. For example, a cash basis taxpayer may want to separate the accounts payable and receivable modules and not have them automatically posted into the general ledger.

Master Menu allows access to DOS functions, such as Copy and checking disk space, without leaving *The Profit Center.* This can be extremely useful when you want to back up data files without wasting time.

It also handles system security. Both user IDs and passwords may be used to control access to any of *The Profit Center*'s functions. A special option allows the system master to route a user ID to a specific entry screen, bypassing the intermediate menus.

Several nice features are common to all the modules. Many times, in using a computerized accounting system, you need to add a new G/L account, customer, vendor, or whatever. With most software, if you discover this during data entry, you must stop what you're doing, back out to a menu, call up a maintenance function, add the account, then go back to enter data. *TPC* lets you do this on the fly! Using a limited window facility, if you get an "account not found" message, you can add it right there and then. *TPC*'s ability to scroll through the various accounts and reports is also attractive and useful.

Alas, these features come with a price. *TPC* is slow. On a floppy-based system, it is agonizingly slow. A hard disk helps, but it takes a RAM disk to make things really bearable.

There was also one really impressive, and perhaps unique, feature, another package. The General Accounting system can print both checks and statements, and these are user-formattable. This is an easy process and means that you can use any available continuous form. Both the stand-alone A/R and A/P also have this feature and it is a good one!

All things considered, *The Profit Center* is easy to set up and easy to use. While not perfect, for the small business person with little computer experience, it is one of the better accounting packages. If you fall into this category, it is certainly worth taking a look at!

Requirements: MS-DOS 1.X with 128K RAM or MS-DOS 2.X with 192K RAM; two disk drives, printer
Prentice-Hall, General Accounting $595; Accounts Payable $695; Accounts Receivable $695; Master Menu $25; Business Word Processor $250; N.E.A.T. $150

QUICK-TAX

Quick-Tax is a tax-preparation package for professionals. It calculates and prints 28 federal forms and schedules and returns for nearly 40 states.

The program is menu-driven. It requests information from each schedule, independent forms first, and leads back to the 1040, client summaries, or state returns. Data can be edited using the Backspace, Delete, Insert, and Cursor keys or changed by calling up the appropriate line number and entering new figures. An option known as Quick-Call makes it possible to run a tax return without entering all the normal information, calculating the client's tax liability during the interview and delivering the finished return later.

After the calculations are finished, forms can be printed immediately or batched for later output. Government forms, continuous-feed blank paper, and snap-apart sets may all be used. Any form can be skipped during printing by typing "S." Both qualifying and nonqualifying forms may be printed. A verification elective will check the input before calculations are made and will check calculations before forms or summaries are printed. Error messages pin down common input problems.

The final menu prompt provides three alternatives: write a letter of instruction, print a billing statement, or address an envelope.

Quick-Tax is easy to set up. A utilities disk supplied with the package is set up to configure it for most of the computers on which it will run. For others, only four codes need be supplied: clear screen, cursor positioning, cursor left, and cursor right.

This program offers many interactions between forms and schedules, with checks and balances to ensure error-free returns. Single-entry input, supporting work sheets, and calculations of lowest tax are features that professionals need in a software package; they are available in this one. The ability to store and retrieve returns is a definite plus during the busy tax season. Yearly updates cost about half the original purchase price.

In addition to the 1040 tax program, Quick-Tax, Ltd., offers general ledger, client write-up, payroll, amortization, and time/billing software for tax professionals. All programs come with a one-year warranty and hotline support.

Requirements: CP/M 2.X, 56K RAM, two disk drives with at least 241K each, 80 character by 24 line screen, 10 character-per-inch printer with forms tractor

Quick-Tax, $1,000

REALWORLD ACCOUNTING SERIES

In the micro-based accounting software market, there are fewer than 15 major players at the moment. RealWorld Corp is one of them. They offer a complete line of multi-user accounting packages that cn be used either as stand-alone applications or integrated system. Modules in the series include general ledger, accounts payable, accounts receivable, payroll, order entry with inventory control, and sales analysis. All of these packages are derived from minicomputer versions written in the mid 1970s by MCBA and are programmed in RM COBOL.

RealWorld is a mid- to high-level system that offers multi-user file lockout protection and an optional password security system. It can be run either on a floppy- or hard-disk system. To use the master menu, however, the system must be installed on a hard disk. When multiple applications are installed on a hard disk, they can be completely integrated, and data keyed into one application can be shared by others. Additionally, all systems share a common user interface, having a similar menu appearance, and function keys that operate in the same manner in each application.

Evolving from a minicomputer environment, these programs are fairly mature. There has been more than enough time to polish the software, and it runs well, without apparent bugs.

Setup, for an experienced user with some accounting background, should pose no major difficulties. You have to set the current period through the accounting period processing menu. This function should be set on the main sign-on menu. Other than this, there is not a lot to criticize, or praise, about getting things set up. Account structure is flexible; the chart of accounts was a four-digit number for the account and an optional three-digit number if you are using profit centers.

The individual applications accomplish what they are supposed to. Most have some nice features in addition to the standard ones expected in a particular application. The general ledger handles up to 13 accounting periods (the extra period is often used for year-end adjustments) and will keep your transaction detail for the year, given enough disk space. The system has very flexible formatting on the financial statements and allows for on-line inquiry of individual account detail.

The sales analysis module, which requires that you have installed the accounts receivable module, offers especially useful reports. You can analyze sales by state, item, sales volume, salesman, customer type, and of course, by customer.

Order entry/inventory performs well and offers such amenities as a pick list, back-order retention, automatic posting into A/R, and on-line order status entry. The inventory function allows you to cost your inventory by any of the three standard methods—average cost, FIFO, and LIFO.

RealWorld's accounts receivable allows user-definable aging and two levels of finance charges for each customer—for example, 5 percent on the first $5,000 of an account, 10 percent on all amounts over $5,000. One very nice feature is that the system allows you to set up "miscellaneous" customers and add a customer name when inputting a receivable. This is good for processing onetime customers. The system allows you to handle both balance-forward and open-item customers, and provides an on-line customer account inquiry.

Payroll is one of *RealWorld*'s better modules. It has many superior features, excellent reports, including one for union deductions, and a payroll worksheet for gathering input data, which can be printed in any of three ways. It allows you to set up your own tax files, a rarity in micro-based payrolls, and supports a variety of pay periods. The software handles garnishes and loans, stopping when the correct total amount has been deducted. It allows you to print out employee lists, which include or exclude terminated employees. Payroll permits

more than one check per employee per pay period —separate vacation and current-period checks can be issued to an employee—and can be set to calculate a multiple-week vacation check on a weekly basis. A check for four weeks' vacation will have the same deduction as four separate weekly checks.

RealWorld has brought out a nice basic package with several interesting frills. Be forewarned that it is not a package for beginning users. If you decide that this is the package for you and do not have a fairly good background in both computers and accounting, you will need some help installing it from your dealer, accountant, or both.

Requirements: MS-DOS, 128K RAM; two disk drives, printer

RealWorld Corp., General Ledger $670; Accounts Payable $670; Accounts Receivable $670; Order Entry with Inventory $670; Sales Analysis $345; Payroll $670

RL-1

Unlike many of the information-management programs on the market, *RL-1* is a true relational database-management system. Designed and written especially for the IBM PC, it comes about as close to mainframe-database performance as you are likely to find in programs for personal computers.

As in the case with most programs, though, there are some tradeoffs involved. Although *RL-1* is able to accept and manipulate data in a truly impressive manner, it also requires a considerable investment in learning time and effort in order to benefit from all it has to offer.

This program is not going to be learned and put to use in a few hours of casual practice at the keyboard. Unless you are willing to work at developing the skill needed to use it to best advantage, *RL-1* is probably not your best choice. However, if your requirements for data management go beyond the abilities of the more simple file managers, *RL-1* is worth a look.

The documentation, which runs over 300 pages, is complete and thorough to a fault. However, it is not always presented in logical order, and some of the early sections are difficult to grasp. Later on, after the manner of presentation becomes familiar, things seem to go more smoothly. In any case, the manual will be best understood if you have had at least some programming experience.

RL-1 is written in assembly language and consists of three parts: The Data-Manipulation Language (DML), a query language used for creating relations (files) and manipulating data; the Relational Editor, the section used to input, delete, and revise records in the database; and the Program Interface, which allows experienced programmers to write additional applications in any high-level language for accessing the database.

Creating a new file with DML is a rather cumbersome process that takes a little getting used to. Its commands, though, are simple and easy to learn. They will be familiar to anyone who has done any work with BASIC.

Once you have defined your database and entered data, the power of *RL-1* becomes evident. Since it is a relational system, *RL-1* is able to compare or merge data from two or more separate files. The potential number of records within a file and the size of individual records are limited only by the memory in your system and the capacity of the disks.

RL-1's report generator works smoothly and allows you to create custom formats for your reports. Horizontal scrolling off either edge of the screen permits you to use a format wider than 11 inches for printing on wide paper. Also included is a "comment" field that does not print out on hard copies. This allows you to include comments or reminders to yourself that will not appear on the final reports.

RL-1 is a serious relational database management system that should be capable of handling most tasks required in a small business.

Requirements: IBM PC, 128K RAM, two disk drives

AW Corp., $495

THE SOFTWARE FITNESS PROGRAM

Open Systems' *Software Fitness Program* was originally written for minicomputers in the mid-1970s. It has gone through several rewrites over the years, and is now available on a wide range of micros. While no guarantee, this longevity suggests that when future customers need help, the firm will still be there to give it.

The *Software Fitness Program (SFP)* is a series of integrated accounting applications that include general ledger, accounts receivable, accounts payable, payroll, inventory, sales order entry and purchase order entry. An additional package, *Team Manager,* is a report writer. All of the packages ex-

cept *Team Manager* and sales and purchase order entry may be run as stand-alone applications. This is very useful for "cash basis" businesses, where automatic posting of the accounts payable and receivable into the general ledger will distort the financial status of the business. The applications can be run on a high capacity floppy disk system, but a hard disk makes it both much faster and much less awkward.

The MS-DOS packages provided for review were written in Control C's interpreted Business BASIC. The BASIC interpreter came in its own package, with documentation on its features and use. Many complex applications (such as accounting) written in an interpretive language seem to run extremely slowly. This was not the case with the *Software Fitness Program*, although whether this speed is the result of Control C's BASIC, the hard disk system on which the software was installed, or both, is not clear.

Any complex system of programs has both good and bad points. Many of the program's flaws arise from Open Systems' minicomputer heritage. Some have to do with appearances. The report formats and menus are very plain, compared to some other micro software. In most of the applications, data entry is awkward. For example, journal entries must be entered one line to a screen. Many other micro-based general ledgers allow you to enter between 10 and 20 line items per screen page, a process many operators find much less confusing.

Another poor feature is that the user may alter or delete accounts and account balances and information without leaving an audit trail. This is an extremely poor internal control procedure.

Some aspects of the *Software Fitness Program* seem both good and bad. Some reports, such as the general ledger's financial statements, must be user defined. This is good in that it offers you a great deal of flexibility in the report formatting. Yet an inexperienced user may have difficulty in figuring out what the format should be and how to set up the report. In addition, each line of the report must be separately set up. This is not particularly time consuming, but the report control must be changed each time an account is deleted or a new account added to the chart of accounts.

The *Software Fitness Program*'s applications center around a set of databases. This is a good approach, but the program requires that the size of these files be predefined when the system is installed. They provide a utility to expand the files, should your business grow, and provide worksheets to determine needed file sizes, but databases should have been allocated dynamically from session to session. These defects are, however, more than offset by the *Software Fitness Program*'s good features.

Software Fitness Program is organized around a database, using a main menu to provide access to the various applications and file maintenance. This organized, consistent approach carries over into the operation of the individual programs. While the data entry methods are a bit awkward, once one program is learned, you will have no difficulty operating the entire system. This main menu is supplemented by a multilevel password system that, if implemented, can provide a master password to get into the main menu and various other levels of passwords to limit access to sensitive functions such as printing checks and file maintenance.

The program is a multiuser system, allowing up to 25 terminals. While some processes, such as posting, are single-user, others may be carried on concurrently. Up to five printers can be used, and an individual printer can be assigned to a particular terminal.

Open Systems' documentation and installation procedures have been harshly criticized in the past. They have apparently rewritten them, and they are now easy to follow and well organized. The rather imposing 120-page installation guide is duplicated in each package's documentation. Installation of the software went smoothly, though transferring the considerable number of files from the floppies to the hard disk does take a bit of time.

One of the most attractive features of the *Software Fitness Program* is its openness. Many users are very dissatisfied with canned software. At the same time, writing a custom general ledger or accounts receivable from scratch can be extremely time consuming, costly, and difficult. This program offers a third alternative. The source code is provided. For a fee, Open Systems will provide additional documentation for a programmer's use. If your only need is for additional reports, or reformatting of the existing reports, then the *Team Manager* report writer provides this facility. These features allow the creation of a custom-tailored software system at a fraction of the cost in time, effort, and money that would be needed to accomplish this from scratch. System houses, consul-

tants, and dealers will find this particularly attractive.

As for specifics, *General Ledger,* like the rest of the *Software Fitness Program,* exhibits some shortcomings of its minicomputer heritage. Many micro-based packages provide various cashbooks, such as a cash disbursements journal or cash sales journal. This general ledger provides for only one method of data input, the general journal. The cashbooks are available by using other applications such as accounts receivable and accounts payable. It does allow you to organize the general journal by seven source codes—manual entry, accounts payable, accounts receivable, payroll, job cost, year-end process, and recurring entry. The *General Ledger* does provide for up to 25 characters of description for each line of entry and for a reference of up to eight characters. *General Ledger* provides for recurring journal entries (such as depreciation or rent), up to 13 accounting periods (it is very convenient to use period 13 for year-end closing adjustments), and great flexibility in financial statement formats.

On the down side, data entry and report formatting are awkward, and the system has inadequate safeguards for preventing the G/L from becoming out of balance. It is also possible to alter accounts without leaving an audit trail.

Accounts Receivable integrates with general ledger, inventory, and job cost. It provides both open time and balance forward accounts. You can build tables for different sales tax rates and finance charge methods and allow discount terms for up to nine terms. The system allows for cash customers to record sale and payment in one step. It will prompt when an invoice exceeds a customer's credit limit. *Accounts Receivable* provides an audit trail for manually entered miscellaneous credits, such as credit memos. The user determines the aging period that cash receipts are applied to. You can print all invoices or just selected ones, and include a message of up to 50 characters on the invoice. The sales journal can be printed in either detail, with all invoice lines, or summary form. It provides a cash flow report that gives the amount of receivables that should be received within any four dates specified—very useful! Either printed forms or blank paper can be used. You can place an invoice on hold where amounts are being disputed. Data entry is similar to the awkward method used in G/L.

Accounts Payable provides a hold/release feature that requires that an invoice be released for payment—a good control procedure. It can be interfaced with *General Ledger,* job cost, and inventory. The system provides good cash flow functions, including cash flow report, essentially a cash requirements report, a cash discount report based on discount due date, and will check for prepaid invoices and not print a check. Each check printed will have a remittance advice listing each invoice being paid. The system can print all checks, a range of checks, or individual checks. The accounts payable system provides most commonly used reports; purchase journal (full detail or summary), miscellaneous debits journal (detail or summary), prepaid invoices as of a due date, invoices as of a due date, cash flow report, vendor analysis, A/P check registers, and mailing labels.

Payroll allows for multicompany payrolls and has excellent reports (time ticket edit report, a payroll edit register, check register, withholding reports for weekly and quarterly, 941s, W-2s, sick leave and vacation, and employee labels). It permits different deductions to be taken at different times of the month; for example, insurance or dues can be taken out the third week of each month. This is seldom found in micro-based systems. The system allows for five deduction codes other than FICA and federal withholding and four other pay types. These both may be a bit sparse for your needs. Additionally, the routines for calculating state, local, or other taxes must either be programmed by the user or dealer or purchased separately from another company for $150. An order form is included.

In general, the *Software Fitness Program* is not for the one-person small business or those with no experience or interest in computers. Those with ten or more employees, with needs or desires not easily met with canned software, or with some previous computer background will find this software well worth looking at. For the more advanced user this is one of the better choices in the micro market.

Requirements: CP/M, MS-DOS, or Xenix, 80-column display, 132-column printer, two disk drives
Open Systems, $695

THE TAX MACHINE

The Tax Machine from Accountants Microsystems can take a lot of that trauma out of a harried

tax practitioner's life. Not only is it a full-featured system for preparing personal tax returns and their associated schedules, but it accomplishes this in a format familiar to many practitioners now processing with a computer service bureau. Thus it eases the chaos that can accompany setting up an in-house computer.

In evaluating specialized software, one item often overlooked is the experience and reputation of the company offering the software. Accountants Microsystems comes out very well in this respect. It was founded and is run by accountants to provide software for accountants. Their "premier" product, *Data Write*, is one of the best known client write-up systems for microcomputers. The 1983 *Tax Machine* is AM's first venture into tax return preparation, and they took their time and did it right.

Any tax preparation system meant for professionals will prepare form 1040 and many of the associated forms—for 1040ES, Schedules A,B,C,D,E,F,G,SE & W, form 2106, 2119, 2210, 2440, 2441, 3468, 3903, 4136, 4137, 4255, 4562, 4797, 4835, 5695, 6251 and 6252. In addition, the system can prepare additional supporting schedules and statements such as a W-1 worksheet, free form statements, and even a transmittal letter that instructs clients on how much they owe or have coming as a refund. About the only thing this system doesn't produce is a bill for the client.

AMI also provides several convenient optionals. One calculates a depreciation schedule in the same format as Form 4562. These figures are not automatically transferred to Form 4562. The second is a current year tax planner called *Plan.* This option lets you alter current year values to ascertain the effect on tax liability. These changes do not alter a client's tax return.

Tax Machine provides two methods of processing. In the interactive mode, the preparer enters data directly into the computer. The screens mimic the federal forms. This mode is good for preparing a return while a client is sitting there. The second mode will appeal to those practitioners currently using service bureaus. In the interview mode, the preparer fills out a series of "interview" sheets, similar to the input forms used by tax service bureaus. The information collected can be entered by another member of the staff less involved in client interviews.

As is usual on this kind of software, there are a variety of print options, and returns can be printed on blank paper for use with overlays, or on continuous or individual printed forms.

The Tax Machine is a large system and must be used on a hard disk. The 1983 version reviewed was provided on five double-sided IBM format disks; the depreciation and tax planner modules took three more disks. Installation was easy and quick. The longest part of the process was copying the over 200 files onto the hard disk. Many of these files are combined into several large files during installation. After completing the process and deleting the files that were combined, *The Tax Machine* consisted of 35 files taking up almost 1.4 megabytes of disk storage.

Once the program is installed, you proceed to set up your company and preparer information. If you wish, you can input a standard fee for each form, which will be printed as part of the client status report. This will assist you in determining the fee to charge a particular client.

Once installed and set-up, *The Tax Machine* runs beautifully. It is menu driven and easy to use in either interview or interactive mode.

There is only one thing to fault. While for 1983 they can provide companion state returns for California, Oregon, Michigan, Illinois, and Ohio, they will not get around to a New York State module until 1984.

In summary, AM's Tax Machine is a well-designed, well-executed, professional tax return preparation system. If you are a professional tax preparer and wish to bring the process in-house, this software should fit the bill. If you prepare a substantial number of state and local returns, check with AM to see whether the companion modules you need will be available.

Requirements: CP/M, MS-DOS, *Xenix;* hard disk
Accountants Microsystems, $1,495

TAX PREPARER

Tax Preparer is a tax-return preparation package designed for the professional who must handle many returns throughout the year. It may also be used by individuals, but the relatively high cost of the package might turn many away.

The program will prepare and print most forms generally used, including the Form 1040, Schedules A through G, R, RP, SE and W. Also covered are ten less common forms, such as Form 2106, employee business expense, and Form 3468, investment credit.

Operation is easy and straightforward. A facsimile of each form is displayed on screen, and the user fills in the appropriate blanks. All computations are done automatically, including calculation of tax liability. Results are updated and displayed on each line and form referenced. Access to supporting forms and schedules is available either by direct menu selection or by pressing I (for itemize) at the appropriate line on the 1040.

You may print a "client billing letter" (invoice) along with a cover letter outlining your client's tax liability. Two printers are supported so that blank 1040s can be in one and plain paper in the other. And a disk-library function summarizes the clients contained on each data disk, including which forms and schedules have been completed.

Other features include: printouts acceptable to the IRS; unlimited itemizing; batch processing; instant "quick-print" of any form directly from the entry screen, and compatibility with many 80-column cards for the Apple; hard disk drives; and memory-expansion boards.

While this program has been around for many years and has been virtually the only package of its kind available, it is not without problems. The program does everything claimed except for "high-speed data entry," "rapid editing," and "instant access." The messages "STANDBY! Computer is Pausing to Refresh" and "STANDBY! Computations in Progress" occur constantly and seem to last forever. Screen entry is slow, with the results lagging behind each keypress by one or two seconds. Using the Repeat key to skip lines that require no data invites long waits for the cursor to return. And mathematical calculations are among the slowest ever seen. In a simple test, it took 1 minute, 34 seconds to calculate the tax owed from the time a single wage entry was input.

Program operation in general is s-l-o-w. Even disk accesses are interrupted many times, making one think the program has bombed. Given modern programming skills and the substantial price charged for the program, techniques such as compiled code or machine-language routines could be used to improve the speed problem.

Error-handling routines have been improved, but it is still possible to crash the program. The Reset key has been ignored—a common accident on the Apple—and pressing it will cause everything to die.

The program is supplied in copyable form on two sides of one diskette. The manual, however, is vague about backups and merely states that the user should make a backup using the standard copy program supplied with your disk operating system. In reality, the user should make a separate copy of each side and not attempt to use both sides of a single diskette.

The manual, although now professionally printed and vastly improved over earlier versions, lacks an index and contains many appendices using micro type.

Although this program only handles federal returns, a California state supplement is offered, and others will be available in the future. Because tax laws and the tax tables change every year, a low-cost update package is available to registered owners of the program.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM; IBM PC, 64K RAM, disk drive
Howard Software Services, $225

SOFTWARE EXCHANGE

Don't throw out those educational programs your children have outgrown. You can turn them in for valuable software at the National Software Exchange in Montclair, New Jersey. For an individual membership fee of $75 per year—institutions pay $250—plus an exchange fee of $5 per program, you can trade unwanted disks for any of several hundred titles in the Exchange's bank. The emphasis here is on educational programs and games, but a few business programs are also listed. In addition, members can trade hardware through the Exchange's newsletter, *SWAP*. The National Software Exchange can be reached at (201) 783-6000.

DATABASES

Managing information of one kind or another is a major use of most computers. With the tremendous number of microcomputers that have been sold, it is no great surprise that some of the best selling software packages are those which accomplish data management tasks.

The ability to capture, store, and retrieve information has applications in many areas of our lives, both personal and business. At home, these software packages can track your tax deductions, keep your recipes, and manage your Christmas card list. In business, the uses have even fewer limits. In many cases, data management systems of one form or another will allow you not only to accomplish many of the functions of dedicated application packages, but also to design and generate your own custom applications.

While the term "database management system" has become almost a generic reference for any software package that can capture or retrieve data, there are actually several different types of software that can handle various data management tasks. The simplest of these, that is, the least powerful, not necessarily the easiest to use, is the file handler. File handlers differ from true database managers in that they allow you to manage only one file at a time. This is not necessarily a bad thing, but many applications you might wish to implement will probably require the ability to access two or more files. Aside from this limitation, many file handlers have features similar to their more complex cousins, the true database management systems (DBMS). Additionally, as with all information management software, file handlers are available in two "flavors," those which are able to create a program, either in one of the standard languages—most often BASIC or COBOL—or in a special one of their own (program generators, and those which do not).

For many of us there will be no great advantage or disadvantage in using one type or the other. If you are a fairly good programmer, file handlers and other information handling systems that generate *well-documented* program source codes can be moderately useful. But we all have our blind spots, software designers as many as the rest of us. Sooner or later you may wish to accomplish something the designer of the package never anticipated. If you can program, and the package you are using generates code, you can "massage" the generated programs, changing or adding new code to make them do exactly what you want. For most of us, however, this is no small task. Unless you are a programming ace, you may be better off going for a software system that offers you more flexibility to begin with.

In between the file handlers and the true multifile database management systems are several other types of software packages which are often lumped into the generic "database" classification. Two of the more common of these are screen managers and report generators. Both products, while not complete information management systems by themselves, perform useful tasks, whether they are used solo or in concert.

Screen managers handle one of programming's more tedious tasks, the process of formatting usable and attractive data entry and display screens. They do this by allowing you to "paint" your screen with the design for a "fill in the blanks" type of form. Many screen managers contain facilities to allow you to define data type, characters, number, date, money, and/or, yes no, and to do some sort of range and error checking on the input. Most of these products offer you the option of setting up your data files using one or more keys or indexes, and several are capable of generating program code that can be used as a stand-alone data entry module or integrated into a larger program of your own.

While screen managers take care of the problem of getting data *into* your system, this is only half of the job. Retrieving the information and printing it in a usable format is the province of report generators. These are software packages that read data files and generate a report to your own specifications. Report generators vary greatly in their ability to produce complex reports. Some can combine data from several files into a single report. The ability of many report generators to combine information from multiple files gives the screen manager-report generator combination far more capability than many file handlers. The limiting factor seems to be that many screen managers lack the ability to pull information from other files into the screen you are using.

At the top of the ladder are the true database management systems. These provide multiple file handling and, like the other types of software, are sometimes capable of generating program source code. Thus, while a database manager may be a program generator, not all program generators are database managers.

Database managers use several different methods to organize and reference their database. Most DBMS available at this time for microcomputers are built around the relational model. It takes a book on database theory to explain that word "relational" in detail, but in general there are only two criteria: A database is relational if its file organization can be represented as a table and has some form of Join command.

Tabular organization is fairly simply to visualize. Individual records in the file are represented as horizontal rows. The individual files in each record, which are the same from record to record, are represented as columns in the table. This type of table is illustrated below. This hypothetical "Employee Master File" contains five records. Each record contains four fields: Social Security # (S.S. #), Last Name (L Name), First Name (F Name), and Phone Number (Phone #).

Record 1	SS #	L NAME	F NAME	PHONE #
Record 2	SS #	L NAME	F NAME	PHONE #
Record 3	SS #	L NAME	F NAME	PHONE #
Record 4	SS #	L NAME	F NAME	PHONE #
Record 5	SS #	L NAME	F NAME	PHONE #

Tabular File Representation

The second requisite is a Join command. This command, or one like it, permits the file you are working with to access information from another file, in effect, "joining" several files. Many database managers that allow full screen entry are "forms oriented"; they allow you to design the equivalent of paper forms to be used to enter data. Many of these have no formal Join command but contain such equivalent commands as "transfer data from another form."

Another term that comes up frequently in discussions and advertisements dealing with databases is "application generator." By strict definition, an application generator is any piece of software that can be used to construct even the simplest of applications. Using this definition, many types of software could be considered application generators, including file handlers, program generators, database managers, and even spreadsheets.

While this definition may be valid, it is also slightly misleading. Application generators, or application development systems, are generally special purpose database management systems that have been optimized for the purpose of creating complex multifile applications. These application generators can be program generators, or they may use preprogrammed modules to accomplish different data processing tasks at the user's discretion.

Application generators are often enhanced to allow the development of turn-key applications. Features such as extensive menu management and "run time" systems allow the development of applications in which the database itself is transparent. The end users never see the database management system itself, nor do they need to know how the DBMS operates or is used.

Before buying any information management software, there are several things to consider. The most obvious is what you hope to accomplish. We are always tempted to buy the most powerful software we can afford. While this is not necessarily wrong, it is important to realize that the more powerful a package is, the more complex it generally is to learn and use. If the things you wish to accomplish are basically simple, you may find it more difficult to implement them using a complex, powerful package.

Another factor to consider is your level of expertise. If you are relatively inexperienced, a complex software package is going to take a while to learn to use. If you are not willing to put the time and effort into learning it, don't waste your money.

One last bit of warning. Database managers, application generators, and the like, are tremendously powerful software tools for translating your ideas and concepts into working software systems. Unfortunately, the most powerful database in the world won't turn a poorly designed system into a winner. Designing an application is still a task better accomplished by a human being. Take the time to think things through *before* sitting down at your computer. These tools can do much of the work for you, but don't expect them to do your thinking. The finished quality of your information management application will be a reflection of the thought you've put into it.∞

ALADIN

Aladin is a menu-driven relational database system with some interesting and important differences. It allows the user to set up an input screen, enter data, edit the data, store the data on disk, and produce reports from the information that has

been entered. Setting up an *Aladin* database is an easy task: Just specify the fields you wish to use in your record, then enter some information about them in the length of each field and the type of data it will contain. Four data types are allowed: alphanumeric, numeric, date, and money.

Once this has been done, *Aladin* will set up an input screen for you. If you don't like the one that the program does, you can use various keys to move the fields around the screen.

Generating a report is only slightly more difficult. While *Aladin* may not have the flexibility in formatting a report that some other packages do, its query module allows tremendous flexibility in specifying what information will appear in your report. Additionally, *Aladin* allows information in database to be used with a word processor or text editor—in effect, a "mail-merge" capability.

Aladin also has several features not often found in database software. Its statistics module allows you to perform various statistical analysis on your database. These analyses provide information on frequency distribution, mean, standard deviation, correlation, and regression analysis and chi-square analysis of data. The results can be presented in absolute or percentage terms or, using crude graphics, as histograms, bar charts, or scattergrams. Information on degrees of freedom and levels of significance are also provided. While not everyone will need this statistical ability, those who do will find it welcome and easy to use.

The free-form calculator allows you both to set up spreadsheet reports, and to perform a tremendous variety of computations on fields containing both numeric and alphabetic data. The tutorial manual gives the example of subtracting "Benz" from "Mercedes-Benz" and winding up with Mercedes. At its simplest level, using the calculator is much easier than a spreadsheet: Move the cursor to a field and specify an operation. It is also used to perform multilevel sorts by concatinating fields and sorting on the combined field. By using the query facility, you can select only certain records to be included in this sort.

Using the optional Program Genie, a Pascal program generator, you can generate complete turnkey systems in Pascal. A Pascal programmer can further customize them. Other abilities of *Aladin* include a script capability, which allows you to set up and save a series of commands, which are then used as if they had been typed in at the keyboard. This facility is useful for setting up batch update operations and job strings. Additionally, *Aladin* also permits you to include *SuperCalc* or *VisiCalc* files in a form letter generated with your word processor and *Aladin*.

Aladin comes with a manual containing an excellent series of tutorials on using *Aladin* and a useful reference section. The tutorial consists of eight chapters each containing one or more lessons. Each lesson focuses on one or two of *Aladin*'s features and takes 15 to 20 minutes to complete. By the time you have completed all eight chapters you have an excellent idea of what *Aladin* will do and how to accomplish it. While *Aladin* by itself is not a product you would wish to use to develop complete turnkey application systems for others, it is an excellent database. It is easier to learn and to use than many products in its class, while providing features that most databases do not.

Requirements: IBM PC, DOS 1.1, 128K RAM or DOS 2.0, 192K RAM, two 320 disk drives or a hard disk

Advance Data Institute America, $695

THE BASIC ANSWER

BASIC is well known for being easy to learn and use, but it is also easy to abuse. You can bang out a BASIC program right at the keyboard, writing some code, testing, and modifying, until you get it right. Unfortunately, this also makes it easy to write a messy program that is hard to understand and change when you haven't seen it for a while.

The BASIC Answer, from Logical Systems, puts a new face on *Microsoft BASIC* programming for the TRS-80. It runs under LDOS operating system on the Model I or III, and LDOS or TRS DOS 6.0 on the Model 4. *The BASIC Answer,* also called simply *TBA,* is a translator from "structured BASIC" to *Microsoft BASIC.* You use the BASIC editor, or your favorite text editor, to create a *TBA* program. *TBA* translates this program to normal *Microsoft BASIC,* which you run in the usual manner.

TBA programs are collections of line numberless "procedures," or subroutines. Procedures are identified by labels instead of by line numbers. Variables can be up to 14 characters long, and all characters are significant: *TBA* can distinguish LONGNAME.DEMO1 from LONGNAME.DEMO2. *TBA* lets you write meaningful statements like "IF BALANCE ! > 0 THEN GOTO @ PRINT.INVOICE" instead of "IF BA > 0 THEN 200." One drawback is

that you must follow variables with explicit type identifiers, such as the "!" used for single precision variables. Add the "@" sign before labels, and the resulting program looks cluttered. These signs persist in the output code, taking up a byte per variable.

TBA lets you declare a variable to be "local" to a portion of your program. Local variables have no meaning outside that part of the program, so their names can be reused elsewhere with no conflicts.

TBA also supports conditional translation. You can control whether specific parts of your program are translated or ignored during the translation process.

There is a price to pay for this added programming convenience. Every time you change your program, you must put it through the translator before you can run it again. On the other hand, *TBA* lets you build libraries of useful BASIC subroutines and easily merge them into new programs, speeding up the development process.

TBA comes with a good manual that includes tutorials, examples, and an index. It works as advertised and could change the way you look at BASIC.
Requirements: TRS-80 Model I or III with LDOS, Model 4
Logical Systems, Model I or III $69; Model 4 $79

BIMS (BUSINESS INFORMATION MANAGEMENT SYSTEM)

Many database management programs are sophisticated and complex, and are designed to handle very large files using multiple disks or hard disk systems. Many people, however, require only an inexpensive, simple to use program that will handle relatively small files. In this category are such applications as home inventories, checkbook registers, accounting journals, catalogs, real estate listings, sales reports, and name and address files.

BIMS (Business Information Management System) is designed to do just this. Entirely memory based, all data entry, sorting, searching, and printing is done without the constant disk accessing that slows down many programs. For instance, a 500-record name and address file can be sorted by name and by city in less than 10 seconds, then printed and sorted back to name order in a twinkle of an eye.

Whereas many programs require fixed-length fields that use up valuable disk and memory space, *BIMS* uses only what is required. If one name is 10 characters long and the next is 25, then only 35 spaces are actually used. Because of this, one diskette can hold 2,000 or more name and address records, depending on field lengths, with 500 or more in memory at any one time. A maximum of ten fields can be defined for each file with no limit to the number of files each disk can hold. During data entry, a copy-field option allows entering the same information automatically in successive records without having to type it each time.

Records are scrolled on screen either forward or backwards with a selection of all, one, or a range of records. Search any field for either a complete or partial match with the results listed on screen or printed in a concise report.

The sort and report generator functions can produce many different printed reports from the same data. As an example, your checkbook register contains data in chronological order. Sort and print a listing either by payee, check number, description, expense category, or whatever. A total-on-field-break option prints subtotals every time the specified field changes, thus providing subtotals by expense category, month, payee, and so on, along with a bottom-line grand total. If desired, subtotals only may be printed.

Reports can include any number of fields printed in any order up to maximum printer capacity. Numerical columns are right justified with dollar amounts correctly formatted. Labels of up to ten lines can be printed and used for mailing, file folders, parts bins, or whatever.

Files are stored as standard DOS text files accessible by many word-processing and telecommunications programs. A "Range Save" option allows splitting files and saving each segment under a different name. Create new files by merging these segments into one.

Unprotected, *BIMS* is written primarily in BASIC, may be user modified, and comes with a detailed instruction manual.
Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive
Gary Keenliside & Associates, $49.95

BOOKENDS: REFERENCE MANAGEMENT SYSTEM

Bookends is an amazing program. If you are a student, scientist, lawyer, or anybody who writes papers or reports with references, then this is one program to get. A very sophisticated database, it is

designed to keep track of bibliographical references; it is capable of much more. *Bookends* will store all the information that you might use to reference or cite a document of any kind—books, magazine articles, or whatever. Once the information is in a database file, *Bookends* will allow you to search through the file, extract the relevant references, and then output them to a printer or a disk file in any format.

The program is friendly and menu driven, with a built in help function. A written tutorial and examples on disk make learning to use it simple.

The librarian module, which is the main part of *Bookends,* allows you to create, add, modify, or search for references in the database. Data entry and editing in this mode is performed with the aid of many user prompts (e.g., the program tells you what to do next) and it is very forgiving of mistakes. Disk assess in Apple DOS is slow, so *Bookends* keeps the active database in RAM. This limits the size of each database to about 35 kilobytes on a 64K Apple; however, holding the file in RAM allows incredibly fast searching and sorting.

The number of references that can be in one file is highly variable, because each record has nine spaces, or fields, for data—author, title, keywords, and so on. These can each contain up to 760 characters. A tenth field is a single character for classification of record. *Bookends* does not store unused parts of the field, so files are much more compact than they would be with most other programs. Each field can contain several versions of its data, which can be selected for different types of output. For example, the *Journal of Irreproducible Results* can be cited by title or as "Irrep. Resul.," depending on the circumstances. Because *Bookends* allows nine large fields and stores the entries for each record in a compact form, it can be used as a simple general purpose filing system for recipes, sports trivia, a record collection, or any information you might put on index cards.

Bookends will search for records that fit several keys linked by logical operators—and, or, not—for example, "animals but not dogs." Searches may be limited to author, title, or keyword fields, or may scan the entire text. After references have been selected, they can be printed as they appear in the database or in any format you create. *Bookends* can have four different formats in memory at one time and will automatically switch formats for different classifications, like books or magazine articles. The ability to save, edit, search, and then automatically reformat your references, streamlines one of the most laborious tasks in writing a bibliography.

For users with modems who search Medline, DIALOG, and BRS online and then download information from their databases, a translator program, available separately, converts text files in these formats into a *Bookends* database.

Bookends is a well conceived and executed program that performs admirably. It contains many features that make it well worth the purchase price.
Requirements: Apple II, II+, IIe, or III in emulation mode; 48K RAM; disk drive
Sensible Software, Bookends $124.95; Translators $49.95

BPI INFORMATION MANAGEMENT

Data management software generally falls into one of two categories. A package that can use only a single file at a time is a file handler, while packages able to handle multiple files are considered database management systems. Under this classification, the BPI system is a file handler, but one that has many features of more elaborate database systems.

Information Management (IM) is forms-oriented: Data is entered by filling in the blanks of an on-screen "form." Each form can have several "pages" (screens), and a form can consist of several "data modules." The use of these data modules allows you to group items of related information on a page and move between modules with functions keys.

Access to the system is protected by a two-level password system. The operator password permits access to a pre-defined information systems, but the program's design functions are protected by a manager password.

Using the software is easy. The first step is to design the form. This is done by entering information about the various fields the file contains. The type of field, the field description that will appear on the screen, and the length are entered.

A form can have up to 100 fields, totalling 1,199 characters, and each field can be up to 76 characters long, including the on-screen description. Range and error-checking options are specified, and the system will then automatically arrange the fields on the form, which you can then modify. Al-

ternatively, you can locate the fields yourself with the cursor movement keys.

Creating reports is just as simple. You can choose to create reports in a standard listing format, selecting the fields to be included and modifying the package's automatic formatting. Or you can create "Freeform" reports. This option allows you to include information from your file in a text document. This document can be a maximum of 88 lines long, each line containing 79 characters. This is excellent for producing form letters.

The system has many features for selecting records based on various criteria and allows you to do complex arithmetic calculations between fields and batch updates and deletions of records. It is accompanied by BPI's usual good manual containing an excellent tutorial, practice disk, and worksheets to help you set up your files.

There are many tasks around the home or office that do not require the advanced capabilities of elaborate multi-file database managers. If your needs are relatively simple, this deluxe file handler is easy to use and has considerable ability.

Requirements: IBM PC, 64K RAM, two disk drives, printer

BPI Systems, $425

DATA ACE

The makers of *Data Ace* have really tried. And though they have not always succeeded, they've done a darned good job. But let's take the bad news first:

The manual makes it clear that the authors wanted their instructions to be easily understood by the non-technical user. In this they failed. While the documentation is enclosed in a sturdy and attractive loose-leaf binder with handy pockets inside each cover, the high marks end there. The information is poorly organized and not presented in a logical sequence. Almost as crippling, instead of being typeset the pages are reproduced from typed copy. There is a grammatical error on the manual's first page.

Fortunately, the program itself is more than good enough to make coping with the manual worthwhile. All too many software houses try to bill their programs as database management systems when they are little more than primitive file managers. Not so Computer Software Design. *Data Ace* is a true relational database management program that offers facilities for interactvie data definition and a memory resident data dictionary. It also features a data manipulation language that may be used to compile or interpret programs.

Written in FORTH, *Data Ace* offers a flexibility and speed that BASIC programs cannot hope to match. Thanks to FORTH's tight coding, all of this has been packed onto a single double-sided program disk. Thus, the annoyance of constant disk swapping, which handicaps many powerful database systems, is eliminated.

One of the most valuable facilities of a relational database manager is the ability to compare or merge data from different files. This process is illustrated quite clearly on the demonstration data disk that accompanies *Data Ace.* A file that tracks a store's inventory, for example, can be interfaced with one that lists suppliers and vendors. Thus, by using both Boolean logic and relational operators, the report generator can reveal which vendors are the fastest or slowest in shipping, which supply the fastest moving items, which offer lower costs, and so on.

The search functions are startlingly fast, and because the program uses notationals, painfully slow sorting procedures are unnecessary. Results of a search may be switched to the printer or screen easily at any time.

At $645, *Data Ace* will be too expensive for many potential users. Others may find they cannot meet the hardware requirements; the IBM PC version requires at least 128K of memory and two double-sided disk drives. And it is not suited to beginners.

Data Ace is a serious package with enough flexibility and power to satisfy most database needs. For those who have some familiarity with programming techniques and practical experience with another database, this system offers valuable features.

Requirements: IBM PC, NEC APC, TRS-80, CP/M-86, MS-DOS, TRSDOS; 128K RAM, two double-sided disk drives

Computer Software Design, $645

DATA DESIGN

Data Design is a database management system with an interesting extra feature—built-in communications software. The Phone communications subsystem can be used to transmit and receive information between computers running *Data Design.*

Data Design, which uses a modified relational

database structure, is able to hold over 32,000 records per file, enough for most applications. Files must all fit on one diskette, however, so the actual number of records may be more limited. The types of information that you want to store (such as name, zip code, and sales volume) are set up in a table. The number of tables is limited only by available disk space. Each table may then have up to 26 forms, screen formats for data entry or data display associated with the table. Each form may have as many as 40 fields, each of which is assigned a label. Labels are allowed to have up to 8 characters, and the field itself may have up to 79 characters of alpha information or 16 digits of numeric information.

Any of the data-entry or display fields from a form may be assigned the role of a key field. The key may then be used to access the information sorted in the table. You are allowed up to 26 keys per form. *Data Design* uses the B-tree method of indexing the keys that you choose. Unlike many data-indexing routines, this extremely fast access method shows very little degradation of performance as file size grows. *Data Design* stores information in the order in which it was input, and does not offer the ability to sort the data or to merge files together. Beause the number of keys allowed is so large, this should not be a problem.

Password protection is offered in *Data Design*, if the user desires. This is a definite plus for any business that allows several users to access to the computer, where each user needs to know only certain information. The operator must know the password to read, edit, or write to any form.

The use of the IBM Function keys and the flexibility of the forms make the program easy to use. An experienced user can even generate form letters with this system. Graphics are not supported in *Data Design*.

Users of programs like *dBASE II* that use a structured command language will find surprising power available from *Data Design*'s menu selections, but some control is definitely lost when you must rely on menus rather than a programming-type language.

The manual is well-illustrated, easy to use, and supplied with a tutorial on the selection and use of database systems. Five useful example databases are provided. A few improvements are in order, however. The index could have been more complete, and the various system parameters should be gathered together in a table, rather than spread throughout the manual. Some method of estimating the number of records, tables, forms, and fields that can fit on a disk is also needed.

Requirements: IBM PC, PC-DOS, 128K RAM, two 320K disk drives

Insoft, $225

DATA-WRITER

Data-Writer is a general purpose data management program for Radio Shack computers. The series of programs that comprise *Data-Writer* is written in compiled BASIC. This has two main effects from your standpoint: The programs run faster than they would under interpreted BASIC, but you cannot modify the programs. The Entry program is used to create a database. First you define the categories for which information is required. The abbreviation feature lets you define a number of two-letter codes to stand for entire entries. For example, "TC" means "Telephone call with client," and "CA" means "Court Appearance." The program automatically saves the abbreviations, and it is never again necessary to spell out the entire entry. Up to 100 abbreviations are permitted. Additionally, the abbreviations can be ignored, and entries unique to a certain case can be entered.

Several programs manipulate the data files created by *Data-Writer*. The Manage program lets you manage and merge data files without manual editing. This is very useful if, for example, you've defined many categories, entered a lot of data, and then discovered that you need to change the categories.

The Stats program searches your data files for inconsistencies and tells you where they are so you can correct them with the Edit program or your word processor. The Math performs calculations on stored data.

The Select program picks out records that fit your criteria. Sort puts the list into alphabetical order. Report writes a summary of your records.

The Letters program lets you create form letters into which you can insert stock words and phrases from your data files. You might use the Select program to create a file of delinquent accounts, and then use Letters to write reminder notices.

The Labels program lets you generate mailing labels from your data files. You could use these to send out newsletters or notices.

Data-Writer could be a workhorse in your office, and is easier to use than many similar programs.
Requirements: TRS-80 Model I, III, or 4, 48K RAM, two disk drives, printer
Software Options, $150

DATAEASE

DataEase is a computerized filing system to help you do record keeping on your IBM PC. It uses a relational database management technique to keep your records in an easily accessible format. The publisher also publishes *WordEase* for word processing and *GraphEase* for business graphics. These programs can be used together as an integrated package. Several popular spreadsheet programs can also use information provided by *DataEase*.

DataEase allows the creation of an unlimited number of forms that work just like everyday paper forms. Data is entered after selecting the form that you want to use. Once the form is filled in and verified for accuracy, it is entered into the database as a record. At any time, you may go back and change the data on a form, and it will be automatically updated in the record on your diskette. If the form itself needs a change, *DataEase* automatically takes care of all of the details for you. When the form becomes obsolete, the information may be stored in your archives.

The reporting module of *DataEase* gives you a great deal of flexibility. It will select the format for you automatically or let you design your own customized format. The *DataEase* program also allows you to define your own menus, to use the standard menus, or to use both at the same time. You can also customize the menus for each user, making it possible to differentiate between different classes of uses. Although the number of menus that you can define is unlimited, the practical limitation is 40, due to memory limitations in most systems. *DataEase* does not provide a command language in which to record applications that are performed frequently. Instead, you must build menus to serve this purpose.

DataEase program allows up to 65,535 records per file and up to 255 fields per record. Each record may have a maximum of 4,000 bytes, and each field can contain up to 255 characters. Field names may contain up to 15 characters. Up to 26 independent databases can be stored on one disk, using the letters *A* to *Z*. No other database names are allowed. One of the types of data that can be defined is called a "choice" field, where a multiple-choice–type question can be allowed with up to 15 choices. Information that is entered in the first four fields may be used as a key to help retrieve a record or put it in a specified order.

In the IBM version, the Function keys are all defined to make data input easier. The manual is complete except for an index and examples for the new user to practice with. Since the publisher is in the process of bringing out a new manual, these shortcomings may be corrected shortly. A small manual also provided gives a quick overview and mini-tutorial. Good password protection is provided on two levels. Combined with the multiple levels of menus, this makes the *DataEase* package a good choice for a business where many people need access to the company's data.
Requirements: CP/M-86 or MS-DOS, 128K RAM, two 320K disk drives
Software Solutions, $595

DATAFLEX

Given the large number of database management systems now on the market, it remains surprisingly difficult to find one that improves significantly on the original *dBASE II*. *DataFlex* is one that does.

DataFlex is a relational database management system with independent utilities and a command language—not unlike *dBASE II*. It uses a multikey indexed sequential access method to find records in the database. The indices are structured in multilevel "B-trees" to provide very fast access with minimal disk overhead. For a large, complex database, this is the most efficient management method yet devised, and it is the one most database managers now use, including *dBASE*. The indices are updated automatically each time a record is added, deleted, or updated.

Up to 64,000 records can be stored in one file. Individual records may be up to 4,000 bytes long, though this may be reduced when *DataFlex* is used in a computer system with limited program memory. The maximum file size is 8 Megabytes. The 8-bit versions of *DataFlex* allow up to four indices for a file, the 16-bit versions up to nine.

Outlining a "form" for on-screen data entry, for example, is astonishingly easy: The form can

be designed with almost any word processor, then transferred to the program effortlessly. The process is even described understandably in the *DataFlex* manual. In *dBASE*, by contrast, this requires a significant programming effort unless the screen generator, *ZIP*, is used, and even that requires too much familiarity with the program.

Another useful feature is automatic record number assignment, missing from many database managers. Unfortunately, this is not well explained in the manual. Learning how to use it required a call to the company.

At least one important feature is missing, however: an equivalent of the *dBASE* Trim function, used to remove blanks from a string. This is essential to printing out mailing labels and other such forms.

So far, all this is reasonably standard. What makes *DataFlex* extraordinary is that it is available in true multi-user versions. For corporate users, this means that highly paid managers are never locked out of a record while the clerical staff is editing it. Large files cannot be managed effectively without this division of labor. To get around this, many database systems simply refuse to give two users access to a given record at once. All too often, this means that each user makes his own copy of the file, changes it, and eventually claims that his is the only valid version. *DataFlex* may be the only microcomputer database system that avoids this hazard.

DataFlex is not suited to all purposes. It is meant as an applications development system, not for interactive use. Thus, when you want information from a file, you must use a formal, planned report to extract it. There is no way to type in a spontaneous question—"How many physicians in this mailing list live in New York City?"—and get an answer.

And you'd do well to have some experience with database managers before trying *DataFlex*—enough to answer your own questions. Data Access Corp. will help reviewers; all others are sent back to their dealer. If *DataFlex* were not so very good, this practice alone would justify looking elsewhere.

Requirements: CP/M-80, CP/M-86, MP/M-86, MS-DOS, TurboDOS, and many other operating systems; at least 700K disk space
Data Access Corp., $750

DATAKEEP

Datakeep is a database management system designed to be intergrated with other programs. This makes it easy to transfer data to word processing, graphics, sorting, statistics, spreadsheet analysis, and mailing list packages. Products that can be used with *Datakeep* include *Multiplan, 1-2-3, VisiCalc, SuperCalc, MicroStat; FastGraphs, Graph'n'Calc, WordStar, EasyWriter II, PeachText,* and several others.

Datakeep holds 32,767 records per data file. All records and files must fit on one diskette, so the actual number of useable records may be more limited. The types of information that you want to store—such as address, zip code, and product codes—are set up in a data file. The number of data files is limited to available disk space. If you have more records than will fit on one disk, you must split your file into smaller ones and manually keep track of which file has which information. Each data file may then have up to nine "pages" of data; a page is a data-entry screen. Each data file may have as many as 99 fields, each of which is assigned a field name. Field names may have up to 8 characters, and the field itself may contain up to 70 characters of alpha information or 16 digits of numeric information.

Any of the data fields may be used to search or sort the file. However, if you define indexed fields, the search can use the defined key to access your information far more quickly. You are allowed up to three keys per data file. Once you have defined your keys, *Datakeep* will establish and maintain the indexing system automatically, even when you add or delete records. *Datakeep* stores information in the order in which it was input, and does not offer the ability to sort the data, but it does sorting with *Supersort,* from MicroPro International.

This program has at least two significant limitations: Password protection is unavailable; this is an important feature that the publisher should add. A second feature that should be added for the IBM PC version is the ability to use the function keys to make data entry easier.

Datakeep has three levels of interface with the user. The beginner will follow the menus for all choices. An intermediate user can catalog a series of menu choices to automate simpler functions. In addition, like *dBASE II, Datakeep* has a structured command language in which an experienced user can program a complete database system. A com-

mand file can be set up to save time when the same complex application is performed on a regular basis.

The manual is reasonably well written, but could be more informative. A primer in the back of the manual allows a new user to work through one project completely, developing confidence before designing custom applications. However, trying to find the various technical specifications can be a chore. Some method of estimating the number of records that can be fit on a disk is needed.

Requirements: IBM PC, 128K RAM, two 320K disk drives

Mathtech, $450

DELPHI'S ORACLE

Delphi's Oracle pronounces itself a "professional data base manager" for Commodore computers. This doesn't give you a clue about its usefulness, however.

Database managers are, along with word processors and spreadsheets, among the most necessary microcomputer programs. While no one has yet come up with a program format that is comfortable and natural to use, *Oracle* comes close to it. It is actually possible, for example, to ferret your way through setting up and entering information without constantly consulting the good but wordy manual.

Since *Oracle* treats the storage disk as an extension of the computer's memory, the number of files and records is limited only by the capacity of the disk. An individual record (single dossier within a larger file) can include as many as 99 fields, each representing a specific category, and 7,000 characters. These records can be searched by asking for those that match with the requested information, or numerically for amounts less than or greater than a requested one, and in other ways as well. Like paper file folders, they can be browsed through and sorted. Because *Oracle* stores its "key fields" in the computer's memory, files can be sorted extremely quickly.

For purposes of security, special codes can be assigned to the fields in each record. This means, for example, that certain people who must use some of the information in a file can also be restricted from seeing everything in the file.

The only difficulty in using *Oracle* is learning to use the section of the program that generates reports, or summaries of information in the files. While this is an extremely powerful report generator, it is also about as complex as they come and requires careful scrutiny of the manual and provided examples. The ability to perform all four arithmetic functions on numeric information in individual records makes this program practical for accounting, order entry, and other sophisticated functions.

Finally, *Oracle*'s files can be interchanged with those of its sister program, the *Paper Clip* word processor. And, like *Paper Clip,* the program is protected from unauthorized copying by means of an electronic "key" inserted into the computer's joystick port (a ROM chip in some versions) and will not run without it. This means the program can be copied and backed up by the purchaser but not used by others.

Requirements: Commodore PET 4030, CBM 8032

Batteries Included, Inc., $150

dUTIL

dUtil is the oldest and best known *dBASE* programming utility. It has some functions in common with *fastBase,* and these have been described in that review.

Unlike *fastBase, dUtil* allows up to nine separate command files to be called from within an executing command file. This feature speeds up execution of large applications with multiple command files.

You can also store and then call frequently used functions, subroutines, and blocks of code in an external text file to eliminate repetitive typing.

A third feature permits you to align and indent, with tab stops, any *dBASE* command line to any depth you wish. This is especially useful with IF/ENDIF and DO/ENDDO sequences.

Finally, you can store all *dBASE* commands in a file in lowercase. *dUtil* will then check and convert your *dBASE* command in your program files to the required uppercase.

All four functions have various options to make their use both flexible and comprehensible. The documentation is excellent for experienced *dBASE* programmers.

Requirements: CP/M, CP/M-86, or MS-DOS; *dBASE II*

Fox & Geller, $99

ENB

ENB is a database management system written

by Southern Software, a British concern, and distributed in the United States by Allen Gelder. Although it is advertised as a relational database system, its data model is actually a network. While this distinction involves great complexities of theory and programming, its practical significance is simple: *ENB* is quite sophisticated and powerful. It is also much harder to use than many database management programs.

Most microcomputer "database managers" are in fact simple file managers. They let you set up an electronic card file, where each index card has a fixed format: say, name, address, phone number. *ENB* would use three sets to represent this file, one for each item of data. When you create each set, you tell *ENB* how it relates to the others; addresses belong to names, for example. When you add a name, *ENB* will prompt you for an address. If you didn't think to specify this relationship when you defined the database, you could add it later and supply addresses for names entered before the relationship was added.

One advantage here is that disk storage can be saved if entities are shared. For example, suppose you are storing data about cars, and color is one of the things you want to recall. If each car has one of 20 colors, your set of colors would have 20 members, and car entry would contain a pointer to a color, rather than repeating the name of the color.

ENB helps database users with a menu structure that controls database creation, data entry, and reporting. A very nice interactive tutorial is provided, and backed up by a manual that is friendly and complete. *ENB* is written in BASIC and assembly language, and details are provided for replacing the *ENB* menu system (the BASIC part) with your own program that uses the *ENB* access method (the assembly part). This is useful for programmers who are developing a turnkey data system and wish to shield their customers from the technical details.

The *ENB* approach requires more thought and insight than file managers. Database design is not a simple process, and network databases are notoriously difficult to lay out. *ENB*'s saving grace is the ability to add new sets and relationships, so your database can grow as you learn. The disadvantage of this is that your database model can eventually become a tangled mess of spaghetti.

Requirements: TRS-80, Model I, III, or 4; 48K RAM, disk drive
Allen Gelder Software, $140

FAST FACTS

Fast Facts is published by the company that produces *TIM III*, a database management system. *Fast Facts* is a forms-management system that works like a database manager in many ways. The basic concept in *Fast Facts* is the filling out of forms; the program takes this one step further, automating the filing and searching that normally takes up far too much time in most systems.

You begin the process by setting up a file, the same way that you would normally set up a file folder in a paper-based system. Within the file, you may store up to 1,000 forms. Each form may include up to 50 pages. Each screen, 80 columns wide by 20 rows long, makes up one page. The page is then available to enter items. Each page may have up to 100 items, with each item identified by an item title from 1 to 20 characters long. In order to accommodate such large files, you will probably need a hard disk, but the system will work reasonably well with two double-sided disk drives.

The program is easy to use, and the manual is written for a beginner. A complete example is included, and the forms generated by the system are quite nice looking when printed. The PC Function keys are fully supported.

Requirements: IBM PC, 128K RAM, two disk drives
Innovative Software, $195

FILMASTR

Nearly everyone with a home computer has some vague notion about using it to store personal records such as a property inventory, Christmas-card mailing list, or a list of magazine articles. *Filmastr* is ideal for this kind of simple data management.

Filmastr has few "bells and whistles." It is a straightforward database manager of modest capabilities. But what it does, it does well. The user can store records of up to 20 fields each. Each record can have not more than 255 characters. This is sufficient for mailing lists and most inventory needs. The user can scroll through the records, and can sort by any field or combination of fields via an efficient machine-language routine.

Subgroups can be picked out of a database with *Filmastr*'s select function. For instance, the user can get a list of every entry for New York, from a mailing list. This subgroup can be saved as a separate file. A simple add function will total the numbers in a particular field. This is useful if financial data is being stored. The user has much flexibility

in formatting data to be printed and can print out all or part of a file with or without field headings.

Filmastr is a boon to cassette users, since few good database managers exist on that medium. Of course, the disk version is much faster for data manipulation, but this makes little difference to the average home user. *Filmastr* is priced well, and it is a good introduction to database management.
Requirements: TRS-80 Color Computer
The Computer House, $29.95 cassette; $34.95 disk

FLEXI FILER

Database managers have a way of intimidating the novice user. Computerware's *Flexi Filer* is an exception; it offers reasonable data-management capabilities with easy-to-follow instructions.

Flexi Filer is menu driven. It displays options on the screen from which the user chooses. There are five menus in all: the main menu, the define menu, the records menu, the reports menu, and the disk-info menu. A handy flowchart in the manual shows their relationship to one another.

The main menu lets you access the other menus or leave the program. It appears when the program first starts. The define menu lists the options for preparing the screen format. The user is asked for the information needed to set up a file. (In fact, *Flexi Filer* prompts you throughout its operation.) The records menu lets you access an already set up file. You can add, delete, update, or just look at records from this menu. You can also reorganize or expand the file at this point.

The reports menu lets you set up a print format for either a hardcopy of the file or mailing labels. This is also where you can sort the data. *Flexi Filer* will print out files up to 132 characters long, and 132- and 80-column report worksheets are included in the manual to help in designing formats. Mailing labels can be up to five lines long.

You can sort by any field, or you can search a file for records containing a specific string or pair of strings. For instance, the program can print out all records with the name field of Jones and the state field of New York. A select file must first be made, however, and this uses up disk space.

The disk-info menu contains several maintenance utilities. It lets you view the disk directories, view only the directory of database files on the disks, see how much space is left on the disks, set up an auto-start routine for a specific file, or purge old files from the disks.

Flexi Filer can maintain fairly large mailing lists. It supports up to four disk drives, enough for several thousand addresses. A home user might use it to catalog a stamp or coin collection, and the small-businessperson might use it to keep inventory. Like most state-of-the-art databases, *Flexi Filer* is easily molded to the user's needs.
Requirements: TRS-80 Color Computer, disk drive
Computerware, $69.95

FORMULA II

DMA describes this software package as "The Application Creator." It certainly lives up to its billing. *FORMULA II* is a sophisticated parameter-driven database manager designed for use in creating complete business-oriented applications from simple mailing lists to complex accounting systems.

Like the best database packages, *FORMULA II* allows you to set up files and data input screens, enter and edit records, and produce reports. All these chores can be accomplished with ease. *FORMULA II* also lets you use up to two fields in your record as keys. This enables you to order your file, or to retrieve individual records if you are using unique keys. To sort your files on other fields, you can build index files using any field or combination of fields, in any order you wish.

Quick, ad-hoc reports can be generated using *FORMULA II*'s excellent query language. This allows you to generate a report to the console, printer, or disk, using simple English commands. If need be, search criteria can be combined with logical operators—less than, equal to, and so on. These queries can be saved and re-used at will. You may include data from up to six different files in a single report.

If these were *FORMULA II*'s only features, it would be a good database, but it has added strengths that make it a true application development system. One group of features allow you to hide *FORMULA II* from anyone using the application. These include an "Application Menu System" and a run-time system. Users never see *FORMULA II;* to their eyes, they are using a turn-key application. In additional, while *FORMULA II* does not have its own programming language ala *dBASE II*, it does allow you to write specialized portions of the in other languages and links them into the *dBASE II* application.

One of *FORMULA*'s most powerful features is its

report generator. Operating like a word processor, it allows the designer to generate just about any report that can be imagined.

If all of this were not enough, *FORMULA II* is also available in a true multi-user version, with record-lockout. This feature, seldom seen on database managers designed for micros, prevents two users from trying to access the same record at one time —a necessity in multi-user environments.

FORMULA II does have several weaknesses, however, and any potential purchaser should be aware then. Normal data entry is not full-screen but line under line. "Full-screen" data entry can be accomplished using the report generator to set up a report that accepts input from the keyboard. This method seems awkward in comparison to products that allow you to "paint" the input screens on the CRT. Additionally, any system as powerful as this one, will require some time to learn. While not as difficult as learning a programming langauge, you should expect to spend several hours going through the excellent User-Guide tutorials. Once you have done this, the documentation also contains a reference manual and on-line help assistance.

An additional weakness is the inability to do mathematical calculation of fields during data entry. This can be circumvented by using the same technique as in full-screen data entry. But again, this seems awkward.

FORMULA II is probably not the best package to use to develop simple database applications such as address books. There are much easier to use packages that will accomplish this without much of an investment in learning time or cash.

If, however, you develop—or wish to develop—for yourself or others—applications more complex than mailing lists, this powerful tool belongs on your shelf.

Requirements: CP/M, CP/M-86, MS-DOS, MP/M-II, MP/M86-II, TurboDos; or two disk drives
Dynamic Microprocessor Associates, $650

FYI 3000

This program is an expanded version of FYI's *Superfile.* As with *Superfile,* it is an index-card database program, designed to deal with text rather than numbers. As with *Superfile* also, the program is strictly for indexing your data, not creating it. This makes it appropriate for indexing letters, research notes, bibliographic entries, or anything else that you already have stored on disk. You can also use your word processor to create files specifically for use with *FYI 3000.*

FYI 3000 allows three different formats. One of these is identical to the *Superfile* format: The entry can be as long as you like, with the key words listed separately. The other two formats are limited to a maximum of 500 words. In exchange for the limitation, each word is automatically indexed, so you can search your files by any word at all. You can also create an "omit list" so you won't waste file space indexing words like "an," "for," "at," or "the." All three formats allows free entry of text. The only difference is in how you designate the beginning and end of each record.

FYI 3000 is partially copy protected. All the files can be copied over to a hard disk so that you can take advantage of the increased speed and disk capacity. When you start the program, however, it will first check the floppy drive to make sure that a distribution disk is in the machine. The program comes with both a master and backup disk. If you ruin a disk, FYI will replace it for $15.

If you already own *Superfile,* you can upgrade to *FYI 3000* for $200, just the difference in list price. Be aware, however, that *Superfile* has some housekeeping capabilities (for sorting, splitting, and merging files) that have been left out of *FYI 3000* in the interest of simplicity. For those who want these features, FYI sells a separate utility package for $125.

Requirements: IBM PC or XT, PC DOS 1.2 or 2.0, 128K RAM, two drives recommended
FYI, Inc., $395

THE GENERAL MANAGER

Database management programs all have one main purpose—to store information in an organized manner on a disk or other storage device and retrieve it when requested. These programs range in complexity from a simple name-and-address filing system to a complex, hierarchically structured system containing vast amounts of interrelated information.

The General Manager is one of those systems that supports a hierarchical data structure. Records are established and related to one another using a simple tree structure. For example, a genealogical file would have as its "root" the parent's name. The "offspring" records would contain items such as children's names and birthdates. An-

other level might contain their children's names, and so on. In looking for a record, the database searches through successive branches of this "tree" until the correct one is found.

The General Manager is a very powerful program: Up to 16 screens, 31 index keys, 117 data disks, and over 16 megabytes of information can be stored per database.

In spite of its complexity, *The General Manager* is very easy to set up and use. Using a tree-structured, menu-driven format, moving from one option to another is a breeze. Many operational commands take the form of control characters, which are all nicely listed on a handy four-page card for easy reference.

Basically you design a form and fill in the blanks with one form or screen established for each level of the hierarchy. Each screen has designated keys used for sorting and linking each level together. Reports are sorted automatically in the order of the defined keys, but may be sorted in a different order for printed reports. Fields may be configured to accept only certain types of data: fixed length, numeric only, alphabetic only, mixed, variable length, date only, telephone number, or whatever. Fields can be specified to take information from other screens. Numeric quantities from one or more screens can be processed using a variety of mathematical and logical operations.

The ability to reorganize the database at any time is a powerful feature. Fields can be added, deleted, or changed, with the program doing all the housekeeping. The reporting function allows formatting the output of data to be displayed on screen, printed, or written to disk as a text file. Reports can include totals, subtotals, and record counts.

An added feature called User Programs is included to allow you to write *Applesoft* programs that can use database information in a way that *The General Manager* can't. By using the ampersand (&) function, over 30 new commands are available that allow specific application programs to be written. A sample invoice program is included with the package that can sum information across all the records of a screen (invoice) which are children of a specified parent (customer). Another program could take this information and post it to a receivables screen.

Other features include support of up to four floppy disks, 8-inch and high-density 5¼-inch drives, plus a variety of hard disks. If you have a 16K RAM card and lowercase chip, the program will make use of them. The one-wire Shift-key modification and all of the Apple IIe's features, including the Apple 80-column board, are supported.

An extensive, 180-page manual comes with the system. It contains a section called the "Mini-Manager," which is designed to familiarize you with the basics of the program in a short time.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive
Sierra On-Line, $229.95

INFOSTAR

InfoStar is not a database manager. Neither is it a file handler, though it has some of the characteristics of both. *InfoStar* is an information management system consisting of *DataStar,* a screen manager, *ReportStar,* a report generator, and *SuperSort,* a sort/merge system. The combination of the three products is more than the sum of its parts.

DataStar was originally meant to speed construction of elaborate data entry screens and to store information entered on them into disk files. The data entry screens (called forms) can be up to 255 columns wide and 255 lines wide, with both horizontal and vertical scrolling, depending on available memory. A form this size is much larger than is really practical.

DataStar actually consists of two programs; *FORMGEN* is used to define the form, and *DataStar* is used to enter information into your form and disk file. Extensive help menus are used in both creation and use of a form, and many of the control-key functions are identical to those of *WordStar,* making the learning process much easier for users of the popular word processor.

DataStar permits multiple-key fields and requires at least one. The documentation suggests that the number of keys be kept to a minimum, as performance of *DataStar* slows as key size and the number of keys increase. As the *InfoStar* system includes *SuperSort,* an extremely fast sorting program, this should not be a problem.

DataStar also permits extensive error- and range-checking during data entry, and you may perform extensive calculation on and between fields.

Where *DataStar* goes far beyond file handlers is its ability to pull information from other files into your current form. The documentation calls this

process "File Derived Data Fields"; it can be used for such tasks as pulling a customer's name and address into your form when their account number is entered.

The other major component of *InfoStar* is *ReportStar,* a relational report generator capable of combining information from several data files into a single report. It can read *DataStar* files or other ASCII text files maintained in CBASIC format. *ReportStar* can be used at either of two levels. The *Quick Report* program will build a simple list-type report with just a few minutes' work. Much more complex reports can be generated by constructing a "Report Specification File." *ReportStar* reports can be printed on the printer or screen, or they can be "printed" onto a disk file and edited with *WordStar* or included in *WordStar* documents. As with *DataStar* (and all MicroPro products) extensive help menus and a common control-key format greatly simplify learning and using the package.

The documentation also eases the task of getting this powerful system up and running. MicroPro has the reputation of supplying extremely poor documentation. This is not the case with *InfoStar.* The software is accompanied by three excellent manuals. The *DataStar* manual contains both a training guide and reference guide. *ReportStar* is supported a reference manual and a separate tutorial training guide. *SuperSort* has been renamed *FORMSORT* and is covered in the *ReportStar* manuals. Both components are also equipped with separate command-summary reference cards.

InfoStar is an excellent information management system, which is both powerful and relatively easy to use. It offers significant advantages over most file handlers, yet can, at its simplest level, be used as one. *InfoStar +,* the newest version, includes *StarBurst,* a menu-management system that allows creation of turn-key applications. *InfoStar* also offers the benefit of easily integrating with other MicroPro products, such as *WordStar* and *CalcStar.* MicroPro has had great success with their word processor, *WordStar.* They deserve similar success with *InfoStar.*

Requirements: CP/M or MP/M II 48K RAM; IBM PC, 64K RAM; disk drive, printer

MicroPro International, *InfoStar* $495; *InfoStar +* $595

KEYSTROKE

Keystroke is an easy-to-use database-management package and report generator designed for the Apple III. The program is menu driven; you use an Arrow key to select the function you need and simply hit the Return key.

To set up forms you type in a field description followed by a colon, and the desired field length. *Keystroke* provides several predefined formats, including date, phone, social security number, decimal and dollar, which simplify data entry. For even greater specificity, you can describe your own input format (either alphanumeric, integer, or floating point). You can enter data directly on the keyboard, derive it from a defined mathematical relationship between two other fields, repeat it from a previous record, or increment it. Any predefined field may be overwritten.

The program also supports macros, which are multiple keystroke or word commands that can be defined as a single keystroke. These can be saved and recalled as needed. Using a feature called The Hand, you can grab a line of data on the screen and reposition it elsewhere without retyping. Sort and search operations work in all fields and can be defined when a file is created or later.

Of course, a database is worthless unless you can get a customized printout. *Keystroke* bills itself as a "report generator" because it excels in this area. Report formats can be set up at print time, or they may be predefined and included as a print specification. Print specifications can include sorted fields, break points, subtotals, totals, and so on, just about everything you would need for a professional-looking report.

Requirements: Apple III, 256K RAM, two disk drives

Brock Software Products, Database $249; Report Generator $149

KNOWLEDGEMAN

KnowledgeMan is a relational database, one that offers great power but requires some compromises. For complicated inquiries, there are not many database systems that can match it. In exchange, however, *KnowledgeMan* is more complex to use than many databases, and it often works slowly.

A relational database stores its information in tables, much like a spreadsheet program. In a file of addresses and telephone numbers, for example, street addresses might occupy one column of the table, Zip codes another, and telephone numbers

yet a third. Each record of name, address, and phone number would fill one row of the table. In a complex database, it may take several tables to store the data efficiently.

The special power of a relational database manager, compared with other types, is that it does not have to be told when you set up the database just what information you will want later; inquiries can be made up as needed. The special power of *KnowledgeMan* is that it can pull data from an unlimited number of tables.

In a factory, for example, you might use three tables: one listing the components of a product, the second an inventory count of all parts, and the third a table of suppliers and the parts they manufacture. To make sure you had enough parts to make 100 of your product, you would find the parts needed from the first table, check the inventory in the second, and perhaps locate the supplier in the third. A relational system answers inquiries by creating a "virtual" table from parts of the permanent ones. *KnowledgeMan* can do it without limit.

Everything in life has trade-offs, and the usual price for power in a program is complexity. With *KnowledgeMan,* you build and query tables via a command language similar to IBM's Structured Query Language/Data System. There are surprisingly few commands—only four to extract data—but entire statements tend to become very long, particularly when there are many selection criteria. Speed is another price. Because data is stored in more than one table, digging it out requires an enormous amount of disk access. Don't hold your breath waiting for output unless you are working with a large disk emulator. *KnowledgeMan* is primarily a DBMS but, it has an excellent screen/forms management system which allows customs systems for sophisticated data management and inquiry. If you have complex data requirements and are willing to spend the learning time, *KnowledgeMan* is an investment that will pay off.

Requirements: IBM PC, MS-DOS, or CP/M-86, 192K RAM, 500K disk storage
Micro Data Base Systems, $500

MAG/BASE³

*MAG/base*³ is an interesting package, almost a database management system and almost an application development system. It has many nice features and capabilities, yet the version reviewed, 3.2A, was missing several significant features.

*MAG/base*³ allows you to define files, enter data into them, and retrieve information and generate reports from your files. It contains a report writer module, which permits you to design almost any report you desire. In addition, the MAG/SAM access method allows you to set up an extensive key-indexing system if required; it can be used outside of the *MAG/base* package in your own programs. There is even a data management language (DML), which provides a relatively simple interface between a user-written program and *MAG/base* files. Add to these features *MAG/base*'s menu management and password facilities, and you have the basics of an outstanding package.

This nice start falters, however, through the omission of two significant features. The first is a true relational ability between files. While the report writer allows you to include data from up to five files in a report, there is no way to pull information from one file into another. Complex applications often make extensive use of this feature.

An example of this can be found in most accounting applications. When entering an account number, you would probably wish immediately to check an account list to verify that the account is a valid one. This can be done as a separate operation, using the report writer, but this type of range checking is most effective when done at the time the data is input.

The second major flaw in *MAG/base* is the lack of any way to update a record from the result of a calculation of another record. This "posting" feature is also frequently needed by more complex applications. If you wished to maintain a transaction file and use it to update information contained in a "master" file—such as updating an accounts receivable balance forward with current charges and payments—you would be unable to accomplish this with *MAG/base.*

The people at MAG seem to be aware of these problems. They claim that these features have been added to version 4, which they are now shipping. If so, it would make the *MAG/base* system a truly superior product. As things stand now, it cannot be recommended for anything more complex than simple file management.

Requirements: MS-DOS, 128K RAM; two disk drives, printer
MAG Software, $790

MAGIC MEMORY

Magic Memory bills itself as an "electronic address book," which is an accurate description. It's a no-frills database-management system best suited for simple tasks—listing phone numbers, birthdays, and the like. It's even set up to look like an address book, with 24 predefined tabs (A through W, and XYZ) in a row along the right side of the screen. You can also create your own tabs, with a maximum of three letters for separate lists.

But don't expect much versatility from this program. *Magic Memory* has room for only nine lines per entry. And it doesn't have field headings, so you'll have to remember what category you have been entering on each line if you want to achieve overall consistency. *Magic Memory* has no search facilities, and it performs no mathematical manipulations. It does, however, alphabetize by first or last names within tab settings. But if you put, say, John Jones in the tab *G*, the system will merely put the entry at the end of that tab, instead of transferring it correctly to the *J*s.

Entering text is simple; so is transferring entries to other tabs. You put the text into a buffer and move it where you want it to go. The print subsystem allows you to create numerous printout formats of either single tabs or the entire file. It's an elementary system that won't perform business-sized tasks, but it will allow you to throw out that tattered old address book you've been saving all these years.

Requirements: Apple II, II+, or IIe, one disk drive
Artsci, $99.95

THE MINI FACTORY; THE DATA FACTORY

The Mini Factory and *The Data Factory* are database-management programs that run on most Apple computers. The two perform all the same tasks, though the latter includes a number of powerful options not found in the *Mini* program. Although both require only one drive, without a second drive many of the programs' most powerful features become needlessly time-consuming.

In *The Data Factory*, information can be entered in either the standard- or the custom-format mode, which lets you place data anywhere on the display. In either mode, each record may hold up to 88 fields. In a typical seven-field file, the system will hold about 700 records.

The Data Factory's utility disk allows you to enter data in several ways; sort up to four fields at once alphabetically, numerically, or by date; transfer files; and inspect, search for, and enter data. The report disk has a list/report function to let you view your files, two search modules, an extensive math module, and other routines.

Most functions can be performed in many ways using different modules. To enter data, for instance, you can use the standard data-entry mode or the custom-entry mode, which allows for special placements of data, constants, and internal notes. To change data, you can use inspect/change, update, or replace modules. Similarly, you can use the inspect/change, list, search, master-search, and index modules for review and search operations. The program provides numerous math functions. Along with the conventional addition, subtraction, multiplication, and division, it performs trigonometric, algebraic, and geometric, and other functions. These, like all the programs' features, can simultaneously manipulate data from several fields.

Some drawbacks: In the data-entry modes, you can't add or delete space, so you may have to retype text to make corrections in the middle of a sentence. Also, the system will sometimes stop for several seconds in the middle of receiving data to "clear its memory." Unfortunately, it gives no warning when this is happening, so if you're not staring at the screen, you may continue entering data needlessly.

The Mini Factory provides fewer of the same features. It lacks the custom-entry, custom-output, and master-search routines, and it performs only seven arithmetic functions, eschewing the more esoteric mathematic capabilities of *The Data Factory*. This, however, is certainly sufficient for most applications. And if it does not meet your needs, you can trade in your *Mini Factory* diskettes at your dealer's and get the more sophisticated *Data Factory* for the difference in cost between the two software packages.

The weakest link of both programs is the documentation. The manuals often make relatively simple operations sound needlessly complex, and neither has an index. Furthermore, the manuals don't always match the onscreen displays, and there are occasional nomenclature problems as well.

Despite a few limitations, both "factories" are

powerful database programs, and with two disk drives, they can be speedy as well.
Requirements: Apple II, II+, or IIe (*Data Factory* only); one disk drive
Microlab, *Mini Factory* $150; *Data Factory* $300

MINI-JINI

Mini-Jini is a database manager for the Commodore 64 and VIC-20. Its name comes from a predecessor, *Jinsam,* one of the most popular database programs for the Commodore PET and CBM computers. *Mini-Jini* is not so much an abridged version of *Jinsam* as a new program with some of its capability.

It is packaged as a ROM cartridge containing the actual operating code. The databases themselves are stored as either disk or tape files. Like most database managers, *Mini-Jini* organizes information by files and, within these, individual records comprised of several fields of data. It will search files, sort records, and manipulate numeric information in fields.

On the Commodore 64 with a disk drive, *Mini-Jini* will store up to 500 records about 45 characters long or 250 of 100 characters. The VIC-20 version has the same capacity as the 64 when a 24K RAM expansion is used, but only 50 short records can be stored without extra memory. Although the program claims to work with a Commodore 1525E printer and a "wide range" of other ASCII printers connected to the VIC serial bus, there is no indication which will or will not work properly.

This is a menu-driven database that is easy to operate, even without looking at the documentation, in just about every way but printing labels and files—these require some explanation. This ease of use probably better reflects the simplicity of the program more than its quality. You do not have the flexibility of other, more powerful database managers for Commodore machines like Delphi's *Oracle.* Screens are simple lists and cannot be formatted other than to define and label the contents of a field.

Either the program requires better error trapping, or there are some bugs to cope with; pressing the Restore key by mistake sent the program into a terminal fit. And the cartridge appears to contain a BASIC program rather than faster, machine-language routines. However, this could be a valuable information management system for simple files. Jini Micro Systems, the program's publisher, also distributes ready-made databases for home applications. Included in this package are approximately 50 files for amateur radio operation, comic book collection, checkbook balancing, real estate management, recipe lists, and so on.
Requirements: Commodore 64, VIC-20
Jini Micro Systems, Commodore 64 and VIC-20 cartridge $89.95; Commodore 64 database disk $14.95; cassette $9.95

NEXT STEP

Although it does not have the power and flexibility of a true relational-database manager, *Next Step* is an easy-to-use file-management system, well suited for anyone who is not experienced in microcomputer use.

Actually, *Next Step* is a program generator that writes database programs in *MicroSoft BASIC* in accordance with the instructions supplied by the user. If this sounds complicated, it isn't. The manual is nicely done, and leads the first-time user carefully through the program's operating procedures.

The first task in creating and using a new database is designing the screen format for the entry of data. *Next Step* makes this easy by allowing you to "paint" your blank form on the screen. You may specify up to 99 different fields per record, but no single field may contain more than 78 characters.

Next Step provides such conveniences as date or time fields that will automatically enter the current system date or time when you make a new entry. You can also define calculation fields that will automatically display calculations based on other fields. Sales tax, for example, can be set as the result of selling price times tax rate. Setting up such formats will obviously require some advance planning.

Once you have it just the way you want it, *Next Step* writes a new BASIC program especially for your database. From that point, you may enter or delete data, search for data, and perform mathematical calculations on the numerical entries in your records.

Report generation works pretty much the same way as the file management system. You tell *Next Step* how you would like your reports to be laid out, and it proceeds to write BASIC programs to accomodate your needs. During the report-formatting procedure, you will be asked to define key fields just as you did when you created the database for-

mat. This is an important procedure if maximum flexibility is desired. The relationship of the key fields to your report needs may be a bit difficult to grasp at first, but *Next Step*'s ability to print reports on the screen as well as on paper makes experimenting easy.

Next Step does suffer from the same slowness that marks most file-management systems written in interpreted BASIC. If your files are small, say a few hundred records, you probably won't notice. Sorting large files, though, can take 20 or 30 minutes or longer. This is not too long for some purposes, but may be unacceptable to a business owner who never has enough time to wait around for reports.

The manual does give instructions on how to compile *Next Step*'s programs, but even compiled BASIC leaves something to be desired when it comes to speed. On the plus side is the fact that anyone experienced in programming BASIC can modify the programs to fine-tune them even closer to specialized requirements.

If super fast results are not especially important to you, *Next Step* offers a powerful and flexible way to manage small databases.

Requirements: IBM PC, 128K RAM, two disk drives
Execuware, $345

NPL

NPL, an acronym for Non Procedural Language, is a database-management package for the Apple III. It will organize data and guide you in generating customized reports. Commands are logically named and easy to remember.

NPL has three levels: The Apple Pascal Operating System, the Command mode, and the Report mode. Upon booting, you are inPascal. To enter the Command mode, you press the X key and respond /NPL/NPL when you see the Execute What File: prompt. You construct data files by using the Create command. This loads a data-creation program with four basic prompts. These are: Fieldname, a 12-character-maximum description; Alias, a 9-character shorthand label of the field; Printing Format, a letter designating the field as alphanumeric, integer, or floating point, and a number indicating field length or decimal places; and File Format, generally the same as the printing format.

After you have created the file, you can retrieve it using the Getfile command, and add data in a variety of ways. *NPL* will produce straight-line entry prompts using your field names as input guides, or you can redesign the input format to your specifications.

Data handling is easy as is generating printouts in the Report mode. Output can be routed to either the screen or the printer. And *NPL* performs multiple-field sorts at report time. As with *NPL*'s other functions, printout formats are established using English-based commands. You can align data in columns by typing Print but entering no parameters, or you can structure your output with the OVER command. You can even define a print specification that contains a formula for deriving fields from other fields. And you can save all specifications and formats in an AUTO EXEC file for later retrieval.

Requirements: Apple III, 256K RAM, two disk drives
DeskTop Software Corp., $950

PASCAL DATA BASE SYSTEM

The *Pascal Data Base System*, by Tom Swan, is a complete relational database system implemented in UCSD Pascal for the p-System. It was tested in versions running in *Apple Pascal* on the Apple-II/IIe, and in p-System version IV on the IBM PC/XT and on the Sage IV computer.

The key concept of the *PDBS* system is that it is available in complete source-program form as a book sold at book prices in your friendly local book store. For less than $100, the publishers will deliver you a copy of the software on diskette, thus saving hours of typing from the book.

As a relational database package, the standard set of 28 programs and four library units provides a foundation. All file operations are built around fields; all specialized setup files and general data files can be edited by the system's editor. The relational operations of "project" and "join" are implemented completely, unlike several so-called relational database packages that have been marketed widely for personal computers in recent years. Two different varieties of sorting are provided, as well as numerous utility programs.

In six months of use to date, the program has formed the basis of two different invoice/statement billing systems, a central filing place for business contacts, and several directories of companies and products. Any Pascal-knowledgeable personal computer user can easily build numerous specialized programs, given the ample and copiously doc-

umented source programs in the system as it is delivered.
Requirements: p-System version IV
Hayden Books, $79.95

PC-FILE

PC-File is an easy-to-use data manager for the IBM PC. It also is the least expensive data manager: It can be copied for free from anyone who has it already. If you decide you like the program, send Jim Button a $35 donation. If you want to just order a copy, you should include payment with the request.

PC-File fits a definite niche in the world of file-management software. Its design places simplicity ahead of power and sophistication. It can be used by almost anyone with very little training. It is menu-driven, and the on-line documentation file hardly needs to be read before you use *PC-File* for the first time.

This trade-off of power in favor of simplicity means you will probably want to use *PC-File* for small databases. A record can have up to 41 fields. With up to 21 fields, each can be 65 characters long; with more fields, they are limited to 25 characters. One field may be designated as the key, and searches on this field will proceed very rapidly. Searches can be performed on any field, and the search criteria can include combinations of equal, not equal, greater than, and less than conditions.

In theory, you can put up to 4,000 records in a database. However, they must all fit on a single diskette, and you can sort the database only if it will fit in memory.

The reporting facility is also simple and easy-to-use. You can list the entire database in a report, or just selected records. Any subset of the items in each record can be listed on one or multiple lines in the report. Numeric fields may be totalled.

Utilities are provided to export data to *VisiCalc, Multiplan, Lotus 1-2-3,* and MicroPro's *MailMerge* program. A portion of a database can be "cloned" into a new database. The ten keys from Alt-0 to Alt-9 can be programmed to contain a keystroke sequence, so you can execute a command or series of commands with a single key.

You can buy a more powerful database management system, but *PC-File* will handle many chores in a straightforward manner. It is also faster than many more expensive systems, since its design exploits the limited database size. It is definitely worth your time to take a look at this program.
Requirements: IBM PC, 64K RAM, one disk drive; 96K for DOS 2.00
Jim Button, $35

PERSONAL PEARL

Data management systems are some of the most popular microcomputer software packages. This is not really suprising considering that many of the activities we perform at work and at home consist of saving, retrieving, and manipulating information.

Software products range from simple file handlers to complex application development systems. Capabilities vary, generally in direct proportion to price, and no one expects to find a high-powered package at less than $300. Yet *Personal Pearl* is as capable as many of its costly relatives. It is also much easier to learn and use than many of them.

On its simplest level, *Personal Pearl* can be used as a file handler. Files are defined by "painting" a data input form on the screen. These forms can be up to three screens long, depending on the computer and operating system you use. By answering a few questions, you can define any or all fields in your form as "index" fields, to save time during production of reports.

Reports are defined in a similar manner, by "painting" them on the screen, a simple process. *Pearl*'s "Service Menu" offers four choices: Design Forms, Design Reports, Enter Data, and Produce Reports. If this were all that *Personal Pearl* could do, it would be a nice product, but nothing special. However, there is much more.

Personal Pearl is also a relational database. These relational features allow data from one database to be used by, or in, another. In the MS-DOS version, data from up to ten different databases can be used in one form or report.

Imagine, for example, that we have an input form for use in billing customers. We can set up the form so that when we key in a customer's name, *Pearl* will go to a second database of names and addresses, and put the customer's address into the form we have on the screen. Further down on the form, we can have *Pearl* go to a third database and fill in the description and price of the item ordered when we key in its number. All of this information will be saved when we are finished using the form.

Pearl also provides the advanced user with

masks, interfaces to *SuperCalc* and word processors, and the ability to construct and use formulae in your input forms and reports.

Personal Pearl comes with a three-part manual. An "Easy Tutorial" gets you started; then an "Advanced Topics Tutorial" teaches you how to use such advanced features as multiple database forms. There is also a "Reference Manual" to refresh your memory.

Pearlsoft also provides a "Welcome" disk, which gives a short on-screen tutorial on the screen, a "File Maintenance" disk, which can help to restore Pearl files damaged through power or equipment failure, and a "Starter Library" of *Personal Pearl* forms, including an appointment calendar, a cash journal, and several others.

In return for all this, *Personal Pearl* has surprisingly few defects. It does lack the kind of ad-hoc query language that allows casual interrogation of the database, but this is partially offset by the ease of creating a new report form. And it is somewhat more complex to set up than some programs; the installation program is long and makes it slightly difficult to correct errors.

In the end, however, these small flaws are well worth accepting. *Personal Pearl* is easy to use, easy to learn, and enormously capable. For the price, it represents an excellent value.

Requirements: CP/M-80, 52K RAM; CP/M-86, MS-DOS, PC-DOS, 126K RAM; two disk drives or hard disk

Pearlsoft/Relational Systems International, $295

PFS:REPORT

pfs:report takes files created by *pfs:file* and allows you to generate reports. Like the other programs in the *pfs* series, *pfs:report* is extremely easy to use; most file and report specifications are handled for you. It also does a nice job of formatting. Centering, page numbering, and the like are all done automatically. However, the price for ease of use is function and flexibility. Users familiar with other data management systems will quickly discover many limitations.

The main menu of *pfs:report* allows you to specify the file to work with. The next screen is the form you specified when creating the database. This "retrieval" screen operates almost identically to the *pfs:file* print function. You may select records that give an exact or partial match for a keyword, those that fall into a numeric range, and records that are "not equal" to a criterion. These are keyed next to the item names on the screen form. The next screen allows basic options including lines per page, output device (printer, communications line, screen, or diskette), and use of previously stored report format.

The last screen, also employing the form, is where you describe the report format. Up to 16 items may be listed on your report, with sorting on two fields. Numeric fields may be totaled, averaged, and counted. *pfs:report* does a nice job of centering the report, adding broken lines before and after totals. It also allows derived numeric fields—one numeric field multiplied, added, subtracted, or divided by another. An interesting function lists records by keywords that have been inserted into a special field.

The limitations of *pfs:report* may not be critical if you have small and simple files—the type for which you would use *pfs:file*. But they are real. Sort fields must appear as columns one and two. *pfs:report* requires two disk drives to sort a file of only 250 records. The second drive was used for a work file. Although you can store the report formats, you cannot store retrieval specifications and must therefore re-key those items each time.

pfs:report is a high-quality, easy-to-use addition to *pfs:file*. If you are happy with the database system, you will like the report generator as well.

Requirements: Apple II, II+, IIe, or III, 48K RAM; IBM PC, 64K RAM; one disk drive

Software Publishing Corp., $149

PRO-COLOR-FILE

The best database-management programs are limited only by the machines on which they are used. *Pro-Color-File* is such a program. It uses all of the Color Computer's considerable abilities, and it rivals similar programs costing much more.

Pro-Color-File can access up to four disk drives, the most that a Color Computer can support. The four data-entry screens use color, increasing the ease with which the user can input data. Most database managers cringe when more than one field must be sorted at once; *Pro-Color-File* can sort up to three fields at the same time.

Capacity is another plus. Each record can contain up to 60 fields, with a maximum character count of 1,020 for each record. Any field can be sorted, and file size does not restrict sort capacity.

With multiple disk drives, *Pro-Color-File* can handle a huge amount of data.

Numbers are no problem, either. *Pro-Color-File* allows 28 user-defined equations including all mathematical operations: addition, subtraction, multiplying, and dividing. In fact, the number-crunching capabilities of *Pro-Color-File* put it in an exclusive club among database programs for the Color Computer; it is a rare feature.

Pro-Color-File is compatible with nearly every popular printer. There are eight printout, or report, formats. The user can give each printout page a title, a number, or both. Line width and number of lines per page are also chosen by the user.

The manual is large, and it does a good job of leading the user through the program step-by-step. However, because of its sophistication, a novice will probably have trouble learning *Pro-Color-File*.

This program will satisfy many small-business needs. It is well suited to handle financial data because of its math capabilities. With the Color Computer and *Pro-Color-File,* a powerful data-management system can be had for a very low price.

Requirements: TRS-80 Color Computer, disk drive.
Derringer Software, $79.95

PROFILE III+

For moderate-sized files, *Profile III+* is an efficient and easy-to-use database manager. Once you format a disk for a particular task, you can expect hassle-free data entry and retrieval.

Profile III+ comes on two disks. One is the run-time disk, which the user backs up to produce a working disk; the other is the creation disk. The creation disk contains the setup routines that let you configure the working disk to the format you require. You can make unlimited backups of the run-time and creation disks, but the creation backup will not work; its only purpose is to be copied back to the original disk should that fail.

File setup is easier than one would gather from the manual, which is not well organized. Most of the prompts are self-explanatory, and the setup screens give you an accurate impression of what the finished form will look like. An inexperienced user could have a *Profile* disk set up in just an hour or two, including the time needed to go through the manual. Once you are familiar with the setup procedure, you can set up a disk in 15 or 20 minutes.

Once set up, *Profile III+* is very easy to use. Anyone who can use a typewriter can be taught how to enter and retrieve data in a few minutes. The only confusing aspect is the use of the ENTER and CLEAR keys. Sometimes you must press ENTER to store data, and other times you must use the CLEAR key. Pressing the BREAK key twice to abort any operation is good protection from an accidental touch of the BREAK key.

Profile III+ can support up to four disk drives, and at this capacity it can store 2,000 records of 255 characters each. This is sufficient for many routine office chores, small mailing lists, or almost any home application. You can increase the number of characters per record to 1,020, but this reduces the maximum number of records available.

You can sort any field of a *Profile III+* file and do simultaneous sorts of multiple files. *Profile III+* sorts in memory and does so relatively quickly. But because the sort is done within the computer's memory, a large file might have to be broken up to be sorted. This is the price paid for speed.

Profile III+ also supports math formulas. You can add, subtract, multiply, or divide data in particular fields. This is handy if financial data is being stored.

The Small Computer Company (230 41st Street, Suite 1200, New York, NY 10036) developed *Profile III+* for Radio Shack, and they currently market several enhancement packages for this product. *Prosort* increases the sorting capabilities, *Forms* improves the form-printing functions, *Archive* lets the user manipulate files easier, and *Propack* is a customizing tool for BASIC programmers. These add-ons cost from $75 to $150 each.

Profile III+ is an unintimidating database manager with many valuable features. It is versatile enough for the hobbyist and businessperson alike.

Requirements: TRS-80 Model III or 4, 48K RAM, disk drive
Radio Shack, $199

THE QUAD

AMI bills *The Quad* as an "application development tool." The *Quad* lives up to this billing. Technically it is both a parameter-driven database management system and a non-procedural language.

Parameter-driven databases contain program modules to do the most common data-processing tasks—data entry, sorting, updating and posting,

report generation, and the like. *Quad* even contains a module to calculate payroll deductions. A built-in menu manager makes it possible to generate complete, complex applications.

The Quad is able to generate particularly complex systems. It allows up to ten files to be open concurrently and provides reasonable file lengths and structures. Files can contain over 32,000 records, each up to 1,000 characters long. There can be up to 50 fields of 79 characters in each record.

There is always a price to pay for such power. *The Quad* comes with a sample application, accounts receivable, which goes a long way in demonstrating how an application is put together using *The Quad.*

The introductory manual talks about how *The Quad* allows end users to develop their own sophisticated applications. This is nice sentiment, but unless you are a fairly sophisticated computer user, you probably will not have the patience to learn how to use the program.

The real market for this software is a much smaller and more specialized one. System developers, those now using a programming language or other development tool such as *dBASE II,* will benefit most from *The Quad.* If you fall into this category, *The Quad* is most definitely worth taking a look at. If you are a relative beginner, you'd be better off waiting until AMI rewrites the manual, or looking elsewhere.

Requirements: IBM PC, 128K RAM, two disk drives, printer

Accountants Microsystems, $675

QUERY!2; REPORT WRITER

Query!2 is a simple file-management system rather than a comprehensive database program, but it performs much better than most of its peers. Several of its features are usually seen only in the more elaborate systems. Among these are the ability to search on any field and to delete and then "undelete" individual records.

In theory, at least, a record may have up to 255 fields, each containing 255 characters. In practice, a record of 255 fields, each 255 characters long, would more than fill 64K of RAM. For that reason, the program limits each record to 4,095 characters. Records are written to the file as they are entered. That slows the process of data entry a bit, but it also ensures that a system crash or power outage can destroy no more than a single record. Because records are not stored in memory, the only limitation on the size of each file is the amount of disk space available.

Query!2 is command- rather than menu-driven, but the program's simplicity makes the few commands easy to remember. *Query!2* will perform all of the basic functions required of a simple file manager. For cataloging a stamp collection or keeping a mailing or Christmas card list, it will do just fine.

By itself, *Query!2* will not print out hard copies; if you can live without them, it may well be all the file manager you need. If not, the optional accessory, *Report Writer,* will take care of any printing chore, from simple listings to preparation of mailing labels.

Query!2 cannot logically be compared to the likes of *dBASE II* or *Lotus 1-2-3;* it simply isn't meant for complex business uses. But at its price, it's a worthwhile little package.

Requirements: IBM PC, Apple IIe, TRS-80, CP/M, or Z-DOS; 64K RAM, one disk drive

Hoyle and Hoyle Software, *Query!2* $29.95; *Report Writer* $19.95

QUICK-SEARCH LIBRARIAN

If you're like a lot of people, you have accumulated stacks of magazines and technical journals. You keep telling yourself, "One of these days, I'm going to catalog that mess!" But somehow . . .

Quick-Search Librarian (QSL) may be able to help. A specialized database program with some unusual features, *QSL* lets you enter journal titles, search keywords, volume/year/page information, author's name, article title, and comments. Through the use of a unique method of handling keywords and journal titles, a single data disk can hold up to 1,000 entries, each containing three search keys and over 100 characters of text. The number of entries depends upon the number of keywords and characters stored.

Up to 255 keywords in 26 categories may be defined for each database, with a maximum of 12 keys assigned to each reference. Up to 18 letters can be assigned to each category and all 26 are displayed on screen when needed. To access one of them, you merely type a letter from A to Z and a list of the ten keywords (up to five letters each) in that category appears. By typing a single digit, you have selected your category/key. Using this method, each keyword requires only a single mem-

ory cell or byte for storage. Up to 255 journal titles are stored in a similar fashion.

Although written primarily in BASIC, *QSL* uses machine-language routines for fast searches and sorts. Typical search rate is 50 articles per second, using up to 16 parameters. Logical operators and multilevel parentheses may be used. Sort speed is typically 40 articles per second for concurrent sorting on three different fields, say, author, year, and journal.

Other features include a merge function for combining two similar databases and a copy function, which duplicates all or part of a database on another disk. *QSL* will print any combination of fields in any order with several fields per line.

Supplied on a single unprotected disk, *Quick-Search Librarian* comes with a complete instruction guide including tutorial and sample *Scientific American* database.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive
Interactive Microware, $75

R:BASE 4000

You've seen the advertisements for *R:BASE.* You know, the ones that say on one page "d WAY" and on the facing page, "R WAY." These ads purport to show how much easier *R:BASE* is to use than *dBASE II.* They don't really tell the whole story. *R:BASE* is easier to use, and it does sort faster. *dBASE II* is not only a database manager, however, but also an application development system, while *R:BASE* is "just" a database management system.

Unfortunately, that doesn't tell the whole story either. *R:BASE 4000* is not "just" a database manager, it is an excellent database management system.

R:BASE 4000 is a true relational database manager, and its documentation uses relational database terms. That means you will be reading about databases rather than files, and elements rather than fields. This process is similar to learning a programming language, but much simpler, as *R:BASE*'s commands are much more powerful than most programming languages. This learning process is eased by an excellent 65-page tutorial, a well-written and organized Reference Guide, a Command Summary, and extensive on-line help screens.

While *R:BASE 4000* does contain a menu manager, needed to produce turnkey database systems, you can put together some extremely sophisticated applications using it.

Anyone who uses your application will have to be taught something about using *R:BASE,* as there is no way to hide the fact that your application is built around this program. But you can develop some pretty "whiz-bang" systems using it.

"Plain" database management systems have generated less excitement than fancy application or program generators. This is unfortunate, as a good database management system can be an invaluable tool. *R:BASE 4000* is such a system, and is one of the better ones.

Requirements: MS-DOS 1.X or 2.X, 256K RAM; two disk drives
MicroRIM, $495

REVELATION

Revelation is a difficult product to define. COSMOS calls it an "operating environment," because it has some features of an operating system. While it installs over the MS-DOS or PC-DOS operating systems, the OS functions of *Revelation* are those of the PICK operating system used on mainframes and minis. COSMOS is a PICK licensee and says that *Revelation* is a microcomputer implementation of that operating system.

COSMOS also pushes *Revelation* as a database management system and program generator. It is certainly these things, and it has features which lift it out of the realm of "mere" databases.

Revelation at its simplest is a true relational database. You can define a database, create a data dictionary that contains the definitions of the database and makeup of its records, enter information, and retrieve the data in a variety of ways and according to extremely flexible selection criteria. You can also access information in other databases from the one you are working with. In relational database terms, this is called "joining," although *Revelation* calls it "translating."

To a large extent, these functions are accessed through two of *Revelation*'s modules—R/List and R/Design. R/List is *Revelation*'s retrieval language; it contains verbs, or commands, used to select, sorting, and list information in an existing database.

R/Design contains facilities to help you build and maintain the actual databases and their data dictionaries. This module contains some other features as well, however, and it is these, along with addi-

tional *Revelation* modules, which make this product more than just another database manager.

R/Design doubles as a development tool used to build input screens and to design reports. R/Design builds these screens and reports with a program generator called GEN, which outputs R/BASIC source code. R/BASIC is the *Revelation* operating environment's version of compilable BASIC. It has been greatly enhanced and optimized with features that allow it to function well in a database environment. R/BASIC screens and reports can be edited and customized through the use of the R/Edit line editor. R/Design also allows you to build user menus. All of these features, used in concert, allow you to develop complex turn-key application systems.

Revelation also consists of R/Net and R/Upload. These modules can emulate an ADDS 100 terminal to upload files or allow your PC to operate as a terminal to a PICK mainframe or minicomputer host.

Revelation is, in essence, an application development system that can be used to develop almost any conceivable turn-key application. All of this power and flexibility does not come without some significant trade-offs.

The greatest is in complexity and ease of use. *Revelation,* extremely powerful, is also a complex piece of software to learn and use. While it can be used on an elementary level almost immediately, it will be a while before you are able to take advantage of the more advanced facilities it offers. The documentation, well written and organized, fills two binders. The first of these, a "User's Guide," is set up in a tutorial format, while the second, the "Technical Reference Manual," covers the command sets in a more succinct manner. Both manuals assume a fair degree of familiarity with computers and with the PC-DOS (MS-DOS) operating system.

The next trade-off affects many of those who are *Revelation*'s natural users—applications developers. *Revelation* is licensed to one machine and one user. If you plan on using *Revelation* to develop applications for others, you will either have to have each of your customers buy a copy of *Revelation,* or work something out with COSMOS.

The final trade-off is the cost, both of *Revelation* and of the hardware needed to run it. *Revelation* is not inexpensive. The software itself retails for close to a thousand dollars. Additionally, it requires that your IBM PC or certain PC-compatibles has at least 320K of RAM and the 8087 Math Chip. This chip alone retails for over $250 as this review is written. This brings the total cost of the *Revelation* software and equipment enhancements somewhere in the neighborhood of $1500.

Whether *Revelation* is worth this much is hard to say. Some application development systems can do as much and cost much less. There are also others that cost more than *Revelation* does. *Revelation* is the only one that offers PICK compatibility. If *Revelation* were half its price, it could be recommended without reservation. If you really need software with this much flexibility and power, then the expense becomes less important. If, however, you could live with software that is less powerful, you might want to consider a software package considerably less expensive.

Requirements: IBM PC, Compaq, Corona, Eagle, or Columbia MPC; 320K RAM, MS-DOS 1.X or 2.X, 8087 math processor, 320K disk drive, printer
COSMOS, $950

SCI-MATE PERSONAL DATA MANAGER

There are very few database programs that are designed to deal primarily with text rather than numbers. There are even fewer that can honestly be called "world-class" programs, in the same sense the *dBASE II* is a world class numeric database program. *The Sci-Mate Personal Data Manager,* or *PDM,* is one of these.

PDM is the electronic analog to an index-card filing system. Each record entry is the equivalent of an individual index card. As with an index card, you can enter information in any form you like, and can vary the lengths of each entry as appropriate. Unlike an index card, you can later search for any word, phrase, or combination of words and phrases. You only need to enter your keywords; the program will look through the entire text of each entry looking for matches.

PDM allows just under 1,900 characters per record, but it will also automatically link records together, which gives you effectively unlimited length for each entry. Another nice touch is that the program lets you flag entries. You can print out a list of flagged records at any time and use it as a follow-up file.

The program has a built-in text editor, but you can also add information created by your word processor. It also lets you use the program in combi-

nation with the *Sci-Mate Online Searcher,* reviewed under communications programs. Briefly, you can use the *Searcher* to save information received by phone, then add that information to your own database for personal use.

This is not a program for manipulating numbers, but if you want to replace your index-card files or keep track of research notes, you will find few packages that can give you as much flexibility in dealing with text.

Requirements: IBM PC or XT, PC DOS 128K RAM, two disk drives; CP/M, 64K RAM, two disk drives; available in machine-specific versions for Vector 3 or 4, Kaypro 4 or 10, TRS-80 11/12 (with Pickles and Trout CP/M only), and Apple II with Z80 card and 80-column card

Institute for Scientific Information, $540; with *Online Searcher* $880

SUPERLOG

Superlog is part database-manager and part word processor. Billed as an "electronic notebook," *Superlog* provides a free-form means of handling a wide variety of information, a task that it does very well. However, you must have the LDOS 5.1.3 operating system in order to set up *Superlog.*

Superlog provides up to 32,767 blank pages per file of 1,024 characters each on which to enter your data. The format you use is limited only by the 1,024-character quota and your imagination. This arrangement makes *Superlog* an unintimidating database manager for the novice and a powerful organizational tool for data-management needs unsuited to more structured software.

Superlog's two biggest assets are its search function and its large data-storage capacity. You can search for any single-word string on a *Superlog* file, or you can do a multiple-word search with a wildcard option. Most conventional database managers allow searches for only the first few characters of specific fields. The *Superlog* user can find any word anywhere in any file.

You can have as many files as your disk-storage capacity allows. If that isn't enough, *Superlog* may be used with a hard-disk system, though the manual warns that the setup might be too difficult for a novice.

Superlog also features wordwrapping (that you can toggle off), commands to expand or delete a line, and one of the nicest looking, clearest manuals around.

Superlog also provides a means to design and print out business forms for billing, record keeping, payroll, or whatever. KSoft's method of retrieving data should be sufficient for many small-business needs.

Superlog has no sort ability, and it cannot merge files for mailing lists and other applications. But for versatility and ease of use where these powers are not required, *Superlog* is hard to beat, especially for the inexperienced user.

Requirements: TRS-80 Model I or III, 48K RAM, disk drive

KSoft, $119.95

TIM III

TIM (short for Total Information Management) is one of the oldest database management systems on the market. It is menu driven to help the user quickly to feel comfortable with the program. It does not allow the use of a command file to hold menu selections for easy retrieval, as do some other database management systems.

Any number of data files may be created with *TIM III,* and each may contain up to 32,767 records. Each record has a maximum of 40 separate data fields, and each field can contain up to 60 characters. Each of the data fields can hold one of eight data types. The types are alpha, numeric, data, inverted name, calculated, sequential, total, and dollar amount. As with most systems of this type, the real limitation is not with the software, but with the hardware. The number of data files is limited to the number that can fit on one diskette. An average application with 100 bytes per record and three key fields will permit 1,400 to 3,300 records, depending on the disk drive capacity. With a hard disk drive, the capacity is much greater, of course.

The numeric fields allow 16 digit precision and up to 4 decimal places. *TIM* can have as many as 3 total fields per record, and each of the 3 total fields can combine the contents of up to 16 other fields. In addition, *TIM* allows up to 20 calculated fields per file.

Searching can be accomplished by one of two methods. A sequential search through all of the records or a defined subset of the records—say, records 100 to 250—is the slower method. Key fields are also allowed and provide a much faster method of accessing your data. In fact, every field may be a key field, if desired. The problem is that the execution time in merging new records goes

more slowly with each key field. A more practical solution is to use as few key fields as possible, normally one to four, then use the sequential method for less frequently used searches.

The method that *TIM* uses for record updating may seem a little cumbersome to some users. Many database systems update the files with records as they are entered. *TIM* requires the user to merge new records into the main file every time 100 records (or fewer, if desired) are entered. This is a slow process, but it does allow data entry to proceed more quickly than if the system must update all information with each entry. The IBM PC version makes excellent use of the ten dedicated Function keys.

Innovative Software provides a thorough, well-written manual printed in two colors for easy reference. A primer section helps the new user get started with four completed examples: a mailing list, a medical office system, a search firm system and a sales commission system.

Requirements: CP/M, 56K RAM; IBM PC, 128K RAM, two double-density disk drives
Innovative Software, $495

VERSAFORM

Can you imagine a business that tries to operate without the structure its paperwork provides? While most business owners complain about the constant flutter of paper in their offices, it's a fact that you need to keep your records in a logical format and intelligent order, not only so you can find things, but also to help prevent errors.

Versaform is unique among information handling systems in that it works with what you're already familiar with: forms. Any manual file-management system stores its data on filed pieces of paper; *Versaform* emulates this process on microcomputer disks. The system lets you design your own forms; in effect when you put *Versaform* to work, the process simply transfers your existing forms and their associated data to computer files.

Once a form is designed, you can enter an almost unlimited number of automatic checking and filing features onto the form itself. For example, if you create invoices with *Versaform*, you might sell an inventory item that must be entered as one letter, a slash, and three digits, like G/445. You can instruct *Versaform* to accept entries only in that format. The system will then look up the price and description of the item (from a lookup table that can handle up to 99 items), do the necessary calculations automatically—14 of item G/445 at $15.03 total $210.42—and even add sales tax, according to the tax rate you specify. Do you have a space on your quotation forms that must be filled in? Just tell *Versaform*, and it won't allow users to proceed until they enter something.

The myriad entry-checking functions means you can design your forms the way you need them, and then anyone can fill in the information with a high degree of accuracy, because *Versaform* checks their input against your specifications. *Versaform* also lets you change a form design, even after you've entered data into the system. The package is completely error trapped and comes with a detailed manual as well as a separate tutorial disk and booklet.

Versaform can search over multiple disks to gather information for its reports, as long as their data is stored in the same form design. These summaries can be organized in any format you find helpful, and the package collects your information on a unique Report Work disk, which allows you to create reports with more data in them than your micro's memory has available for this purpose.

In its power you'll also find *Versaform*'s Achilles' heel. Since it's such a versatile package, to get started takes some time and effort; there are simply a lot of things you must decide on and learn about before you can effectively use the program. For instance, your search patterns—where you tell the system how to summarize your data—can have up to nine "or" conditions, with up to three tests for "and" in each. There is no "update-all-of-this-field" capability, so you cannot, for example, have the system go through your inventory records and raise all prices ten percent.

With all this power comes a certain amount of complexity; but if you work with numbers in a structured format, the cost of learning *Versaform* pales in comparison to its benefits.

Requirements: Apple II or IIe with 64K RAM and DOS 3.3; IBM PC with 128K RAM and DOS 2.0; two disk drives
Applied Software Technology, $389

VISIFILE

VisiFile is a highly functional file-management system, with documentation that is well done and

easy to follow. Although it is not a full relational-database manager, *VisiFile* offers a very high degree of flexibility, making it suitable for most data chores that do not require the ability to work with more than one file at a time.

After an informative introductory chapter, the documentation moves quickly into an explanation of the menu choices displayed on a line at the bottom of the *VisiFile* screen. A choice can be made by moving the cursor to the proper entry, or simply by typing in the first letter of the word.

Defining a new file is a straightforward process that seems less cumbersome than is the case with some programs. You begin by giving your file a name, defining a size and name for each of the fields, and designating the field type. There are five field types: alphanumeric, numeric, date, and a handy auto-date field that automatically enters the day's date. A password is optional.

Each record in a field may contain up to 1,000 bytes with a maximum of 40 fields per record (2,048 bytes and 104 records if your system has a 128K or more of memory). The number of records in a file is limited by the size of each record and the capacity of the disk. Sorting and searching can be done on any field in a record.

In the file-maintenance mode, which is where most work is done, records may be added, deleted, or called up for viewing or making changes. Deleted records are not permanently lost, only set aside in an "inactive" area where they may be called up and reactivated later.

As is the case with most database programs written in BASIC, the searching and sorting routines can be extremely slow. Sorting an index on a full double-sided disk can take two hours or more, depending on the number of records in the file. The same is true in the print function when only selected records are to be printed. This only becomes noticeable, though, with very large files.

VisiFile's report generator is quite flexible, allowing you to arrange your report or mailing label formats to suit your own needs. Reports can be arranged to print titles and subtitles, and printing can be done in numerical or index sequence. Merging address files with a form letter can be done in conjunction with a standard text editor.

Although *VisiFile* is able to work with only one file at a time, it offers most other features found in many of the more elaborate relational-database managers.

Requirements: Apple II or IIe or IBM PC, 64K RAM, disk drive
VisiCorp, Apple $250; IBM $350

dBASE ADD-ONS

There is no doubt about it: Despite bugs, despite the omission of some basic features from its built-in programming language, despite more complexity than many beginning computer users can cope with, *dBASE II* is by far the most popular database manager for microcomputers yet produced. Around it, a whole industry has grown up dedicated to patching its flaws. Five programs from this category are reviewed below.

The five *dBASE* code generators all perform common tasks, accepting your input and translating your definitions into *dBASE* source code. The first task defines and paints the screen you will use to enter data. The second defines the structure of your field and records. All five also provide update tools for maintaining your database file. The third task defines an index key or keys for your database. The fourth extracts the information you need from your database file for reports.

Autocode, fastBase, Quickcode, dProgrammer, and *dBASE Window* all perform these common *dBASE* tasks with varying degrees of complexity. They all provide a skeleton for a *dBASE* application without requiring any knowledge of the *dBASE* programming langauge. But they are aimed at two groups of users.

Autocode and *dProgrammer* are oriented toward beginning users with simple application needs—people likely to take the skeleton provided and put it to immediate use. *fastBase, Quickcode,* and *dBASE Window* are aimed at users with more complex application needs. They are likely to learn enough *dBASE* to put some flesh on the skeleton.

dProgrammer and *dBASE Window* are written in *dBASE,* and the source code is provided. The source code is a valuable learning tool for *dBASE.* The code is easily modified as your needs change or *dBASE* bugs occur. Also, these programs can take advantage of the quirks and specific features of the *dBASE* programming language that are hard to duplicate in a compiled language. So it is possible to get command files that execute faster and perform more complex operations. *dBASE Window* makes full use of the intricacies of *dBASE.* The CP/M version of *dBASE* is a mature product with only

minor updates likely. So CP/M users should consider the value of having source code.

Autocode, fastBase, and *Quickcode* are compiled programs, so they perform faster than the two source-code generators. However, once you have your *dBASE* output you are back to the speed of the *dBASE* interpreter. The main exception is in maintaining your database file, where the speed of a compiled program is useful.

All five programs require investing time to learn them. They also add $200 to $400 to the cost of using *dBASE*. The costs are easily justified by *dBASE* programmers who use them for multiple applications. Whether you can justify the costs is another question.

MS-DOS and CP/M-86 users of *dBASE*-support software should note that Ashton-Tate is currently working on version 2.6 written for the Lattice C compiler. Supposedly, this version will be 80 percent compatible with existing *dBASE* programs. *dBASE*-support software will have to adapt to new requirements. This question does not apply to the CP/M version. All support software reviewed is compatible with *dBASE 2.4*.

ABSTAT

Abstat provides statistical analysis for numerical fields in *dBASE*'s database files. Both multiple regression and two-way analysis of variance (ANOVA) are available. *Abstat* also provides simple bar and scatter plots using characters and numbers for the graph points.

Abstat correctly imports *dBASE*'s fixed decimal type and then converts it to a single-precision floating point for internal use. It also correctly converts numbers from single precision to fixed decimal for export back to *dBASE*. *Abstat* has useful options to control the range of numeric data imported and to specify the data exported. The documentation is clear and adequate about the *dBASE* interface. *Abstat* requires one year of graduate statistics to make full use of the program. Or, at least, a recent, intensive, one-semester course.

Abstat includes simple but adequate data editing, data transformation, and report generating commands. It can handle up to 4,000 data points. These can be split as needed among 20 independent variables for multiple regression. There are also the required statistical tests, such as the F test, various t tests, z scores, and Chi Square to allow you to interpret your results.

The documentation and help files are excellent for those with the required background. *Abstat* is compiled and hence faster than interpreted BASIC programs that also interface with *dBASE*. All in all, it is a very good general-purpose statistical package.

Requirements: CP/M-80, CP/M-86, or MS-DOS; *dBASE II* (floating point only for CP/M-80)
Anderson-Bell Company, $395

AUTOCODE

Autocode 1 is the program of choice for beginners. The two manuals are written for users without a background in either computers or *dBASE*. The "User's Guide" is a tutorial that takes you step by step through using the three core programs to create a database. The reference manual covers much the same terrain in greater detail. The quality of the documentation is such that a beginning user can create a successful application the first time. Further, the current documentation is a major improvement over version 1. Features such as the use of the relational operators for reports are now clearly accessible for beginners as are arithmetic operations for numeric fields, so users can add greater detail to their application outline as their skills and needs develop.

Autocode uses BASRUN.EXE or CBRUN.CMD, depending on the operating system you use. So the programs are compact and fit comfortably with your *dBASE* files on a double-sided disk. You can leave *Autocode* and conveniently test your code output. And the error messages are adequate.

Autocode treats *dBASE* as a flat file manager, so features such as linking a primary and a secondary database are not supported. Within its limitations, however, *Autocode* does provide the beginning user with the most important *dBASE* features—such as range and validation checking on fields, defining character, numeric or logical types, and specifying multiple report critera. If *dBASE* is currently sitting unused on your shelf, *Autocode* could entice you to begin using it.

Requirements: CP/M, CP/M-86, or MS-DOS; *dBASE II*
Axel Johnson Corp., $195

dBASE II

dBASE II is good, and some consider it great. Yet even committed *dBASE* users tend to mix their fa-

naticism with frustration. Develop a large application with *dBASE II*, and the reason becomes clear: You may never again be happy programming in a language that lacks *dBASE II*'s powerful file-handling statements. While you're working, however, you'll curse its built-in language for leaving out several standard programming constructs—and for its rich variety of insect life, particularly in versions earlier than the current 2.4.

Of course, you may never meet the programming language. The great strength of this database system over many others is that its programming ability is twinned with a full set of interactive commands. You can create a database, edit or update it, query it, or report on its contents without ever writing a line of code. It's a lot like interpretive BASIC; you can enter commands one at a time and see what happens, or you can use the built-in editor to create a program and then sit back and watch it run.

When you crank *dBASE II* up for the first time, all you see is the program's prompt, a dot on an intimidatingly blank screen. Yet getting started with *dBASE* is easy. Simply type Create, and *dBASE II* lets you define your database. Up to 32 fields or data items can be included in a database record. Each field has a length, name, and type: character, numeric, or logical. A field may be up to 254 characters long. Numbers are stored with ten-digit accuracy.

After defining the items in a record of your database, the Append command gives you a full-screen display of an empty record, with data fields set off by colons. You can add a record by simply typing values into the fields. *dBASE II* does some input processing for you; for example, only numbers may be typed in a numeric field.

Simple commands are available to List the records in your database, move to a particular record, Insert new records in the middle of a database, and Edit, or change, an existing record. When you Delete a record, it is marked for deletion, but not really removed from the database until you Pack it.

It does not become clear how powerful this database manager is until you retrieve, Delete, or change records. For example, if your database stores employee records, you could list all employees in New York State by typing LIST FOR STATE = 'NY'. A single Replace command can update the entire database. To give all the employees who work in the jewelry department a 6 percent raise, you could type REPLACE FOR DEPT = 'JEWELRY' SALARY WITH SALARY * 1.06.

Records are stored in the database in the order you Append or Insert them. *dBASE II* lets you create reports from your database, and you may want to Sort it first. Unfortunately, *dBASE II*'s sort is astonishingly slow, and it sorts only one field at a time; putting a mailing list into alphabetical order within zip codes requires two excruciating steps. Most programmers avoid using Sort, and several firms offer utilities to replace it.

In partial compensation, *dBASE II* also lets you create an index over a field, or more than one field. The index lets you access the database in the same order that a sort would have produced. Though much faster than sorts, indexing a database of 100-byte records using two keys still take nearly 10 minutes on a CompuPro System with a five-MHz 8088 and fast 8-inch disk drives. If you are going to use this feature often, it may pay to invest in a disk emulator.

You can do lots of useful things with just the interactive mode. However, with *dBASE II*'s programming language, you can develop application packages that appear free-standing. For software firms, Ashton-Tate even markets a costly "runtime" package for hidden use with commercial application programs; no one need ever know that *dBASE II* is behind the screen.

Good as it is, *dBASE* suffers from several deficiencies. Most seriously, only two files can be open at one time; this is too few for many applications. The limit of 32 fields per record is a lesser handicap. It would be nice to have more data types—a money type, for example. And the programming language lacks both arrays and an equivalent of BASIC's For = Next loop. Yet it is possible to program around most of these limitations.

One can also program around the bugs. The most recent revision, version 2.4, corrected neary 40 of them, but there are still more defects in *dBASE* than one would expect in a program so long on the market.

Version 2.4 also has a few improvements. Typing Help will now get you a reasonable explanation of *dBASE II*'s features. If you know generally what you want to do, this beats thumbing through the notoriously poor manual. Yet further aid is needed.

The manual has two major sections. Programmers should understand most of it but will have a hard time looking up details while working. Others

may be unable to penetrate the jargon to figure out how it all fits together. Because of this, a huge market has sprung up in *dBASE II* tutorials, books, and training aids.

Should you buy *dBASE II*? Perhaps. Few database management systems offer both convenient interactive querying and a powerful programming language. And *dBASE II* is the runaway best seller of the microcomputer world; skills learned with it can easily be transferred to another computer or to other programs.

Nonetheless, it is difficult to single out a replacement for *dBASE II* that is as versatile or that works on so many computers. If you are willing to put up with some quirks and spend time in learning to use this package, your efforts will be well rewarded.

Requirements: CP/M-80, 48K RAM; CP/M-86, 64K RAM; MS-DOS, 64K RAM; disk drive
Ashton-Tate, $695

dBASE WINDOW

dBASE Window is the preferred choice if you want a *dBASE* front end written in *dBASE*. *dBASE Window* takes full advantage of the programming quirks and optimization techniques of *dBASE*. In addition, *dBASE Window* can handle any number of databases and generate the complex relationships between them. Since you have access to logical operators, numeric expressions, and report qualifiers, you can perform operations against entire databases. For example, you can mark all the records in a database for deletion and then use *dBASE Window* to remove them.

Window refers to a relationship between two databases that share a common field or relation. Your currently defined relation appears at the top of the screen. The feature gives you a constant check on what a relational database is doing. Besides generating the output *dBASE* code, *Window* provides a menu-driven skeleton for running them.

Window also gives you full *dBASE* control for report generation. In one report, you can have data from two databases with break expressions for each. You can format your report almost any way you want with subtotals, totals, and counts. You can also do ad hoc queries to a database within *Window*. In short, *Window* is a substantial implementation of the *dBASE* program language. If you compare the source code against the output code, you will have a useful map of how to write more complex applications. You can take segments of the code and tinker and adapt them to speed up your learning of *dBASE*.

The 118-page manual is well organized and thorough. No familiarity with *dBASE* is assumed. But you do need a computer background. The error and warning messages are clear and detailed. A nice touch is the inclusion of forms for defining your application. There are also several appendices that nicely summarize *dBASE* commands and map the way *Window* uses them.

Window uses 186KB of disk space. So it will fit on a double-sided disk with *dBASE 2.4* on most systems.

Requirements: CP/M-80, CP/M-86, or MS-DOS; *dBASE II*
Tylog Systems, $249

dBPLUS

dBASE's Sort command is one of the program's greatest shortcomings; in fact, it is seldom used. *dBPlus* has moved into this gap with a fast-compiled program. The Sort program uses all available memory, so the MS-DOS and CP/M-86 versions are much faster than the CP/M-80 version if you have a 128K or more memory. It will sort on up to 11 fields simultaneously. *dBASE* only sorts on one field, and that with untoward slowness. Further, the *dBASE* Sort gets geometrically slower as more records are added.

The second useful function is compressing a database file to about 40 percent of its original size. This is useful for archive backup, simple encryption, and to reduce your phone bill for modem transmission. Of course, the recipient must also have a copy of the *dBPlus* decompression program.

The third function allows you to create and redefine a new database file from an existing one. You can copy or delete existing fields to the new database. Or you can change the field name and type as well as change the length and number of decimal places in a new field. After all your new fields and records are completed, *dBPlus* will generate the new database's structural definition. Users unfamiliar with *dBASE* can use one of the front ends to maintain a database and then use *dBPlus* to create new databases. All this is possible in *dBASE* itself, but it's much more complex than it need be.

All three functions are compiled and menu-driven. No knowledge of *dBASE* is required. The

documentation is thorough and clearly laid out for the beginning user.
Requirements: CP/M-80, MS-DOS, or CP/M-86; *dBASE II*
Humansoft, $125

DGRAPH

Those used to working with spreadsheet programs or databases, especially *dBASE II*, for which this package was designed, should feel quite at home with this program. From the layout of the menus to the use of the cursor for addressing to the basic concept of how the chart data is organized into rows and columns, it suggests spreadsheet all the way. This makes it an extremely versatile tool for many users, especially those using microcomputers for small business applications.

The manual is probably one of the best ever written for this kind of business graphics program. It takes you step by step through the process of creating the charts—bar, pie, line, and a special "pie-bar" in which pie segments are presented in linear form—using several sets of demo data provided on the diskette. Labeling of the various chart parameters—headlines, axes, legends, and so on, is all menu prompted. Axes may be set either by entering minimum and maximum values for each or by having the program calculate them from data. And data entry itself, from *dBASE II* files, other spreadsheet files, or the keyboard, is also quite easy.

Those with the IBM PC version of the program will be able to store and display up to three charts per page and also to view a chart on the screen before it is sent to the printer. With the CP/M eight-bit versions, you enter the data but can't view the chart until it is plotted.

The problem for some users, however, is that *dGraph* is a little less sophisticated than some other presentation graphics programs discussed in this chapter. For one thing, you are working strictly in black and white, not color, and the program supports only ten-dot matrix or letter-quality printers and no plotters. For another, the choice of cross-hatching is somewhat limited, as are line styles and data point markers for line charts. In short, though the program is flexible and works well, you can't rely on it to make slides and transparencies for your next presentation.
Requirements: CP/M 2.2, MS-DOS, or similar operating system, 48K RAM, 240K on one or two drives
Fox & Geller, $295

dPROGRAMMER

dPROGRAMMER is a program generator designed to create simple, menu-driven business applications using Ashton-Tate's popular *dBASE II* database management system. Its focus in on ease of use rather than on power. *dPROGRAMMER* is used to paint simple menu screens, which it then uses to define the structure of a database file. It also contains a simple file-maintenance program and a simple program for extracting information and reports from a file.

Simplicity is relative, however. This program eliminates some of the drudgery of setting up a database system; the real work of designing the application remains. To use *dPROGRAMMER*'s application generator effectively, you will have to understand *dBASE II*. Even the creation of a new record type is guided by menus only up to the entry of field information; at that point you fall out of the *dPROGRAMMER* menu system and find yourself looking at *dBASE II*'s "Name, Type, Width, Decimal" prompt. Although some work is saved in devising applications, this program generator isn't worth $295.

About the furthest *dPROGRAMMER* goes to help you is in the creation of "quick lists." You type your file name, list name, index name, selection criteria, and output field list into a form, and a *dBASE II* program is created to generate your list. This gets added to a menu, from which it can be called up by typing a single number.

Perhaps *dPROGRAMMER*'s best feature is a simple accounting system that comes with it. While not as powerful as many accounting packages, the general ledger, accounts payable, and accounts receivable programs are probably adequate for many small businesses and will serve as the starting point for a more comprehensive system. These programs are intended only as an example of *dPROGRAMMER*'s use, but they make up more than half the program and data files that come with this package, and they may be the more valuable part.
Requirements: CP/M-80, CP/M-86, or MS-DOS; two disks of at least 180K each; *dBASE II* version 2.3B or above
Sensible Designs, $295

FASTBASE

fastBase consists of seven compiled *CBASIC* programs with overlays distributed on two double-

sided disks. There are also two programs for installation and testing. You will have to do some adaptation and juggling to use *dBASE* and *fastBase* on the same disk.

The separation of *dBASE* functions into freestanding programs avoids confusion. And the separate programs are easier to use. In addition, *fastBase* is a well thought out and executed programming job. Unlike *Autocode,* it makes use of *dBASE* features, memory variables, and primary and secondary databases. Given its flexible approach, range of functions and price, *fastBase* is the choice of compiled programs for advanced users and *dBASE* programmers.

With a few exceptions, *fastBase* does everything *dBASE Window* does. You can create and build a new database from up to ten linked databases. The generated file-maintenance command file can reorganize index files, search for records, and add, modify, or delete records. *fastBase* also allows you to include a "print screen utility" in this file. So you could, say, print an audit trail of changes made in a database file.

Unlike *Autocode, fastBase* has a primitive full-screen editor. In painting a screen, you can define points where the *dBASE* command file halts for data input. After defining your stop, you are free to position the cursor anywhere on the screen to define the next field. Stops can be moved or copied to other positions on the screen, or they can be easily deleted. Features such as these make *fastBase* more powerful and flexible than *Autocode.*

fastBase allows you to create up to seven index files for every database. Numeric fields are automatically converted to strings. This allows concatenation of multiple numeric and character fields into one index. Character fields are automatically converted to uppercase, so *dBASE* can perform searches while ignoring upper- and lowercase distinctions.

The procedure for deleting records is another example of careful attention to progammming detail. You mark your records for deletion. If you make mistakes, you are given a safety clause. You must subsequently specify your deletion criteria. Only records that match these criteria will then be deleted.

fastBase also has a *dBASE* command file utility that duplicates much of *dUtil.* This utility performs three functions: all command lines can be left justified to maximize execution speed; you can indent a command line to increase readability and to locate important structures such as nested do loops; and a currently executing command file can be combined with second command file. Sequential combining one level at a time is possible.

The current Achilles' heel of *fastBase* is its inadequate documentation. Revised and expanded documentation should be ready by the time you read this review.

Requirements: CP/M-80, CP/-86, or MS-DOS; *dBASE II*

Fourcolor Data Systems, $200

QUICKCODE

Quickcode attempts to satisfy two groups of users: An automatic pilot mode supposedly guides novice users easily through the program. With the automatic mode off, advanced users can implement more complex features. However, mastering *Quickcode* requires a heavy investment of time for both beginning and advanced users. A separate user's guide and tutorial similar to *Autocode*'s would make the program usable for beginners. The documentation supplied is excellent for more advanced users.

Quickcode has a different design approach from the other four menu-driven *dBASE* generators. The approach is best understood by watching a demonstration before purchase.

Quickcode has many features that other *dBASE* generators do not. It can generate formatted fields for Social Security numbers, telephone numbers, and dates. It will output *WordStar*- and *MailMerge*-compatible files along with *dBASE* command files —useful for generating mailing lists and form letters. You can also define selection criteria within *Quickcode* for working with *WordStar* and *MailMerge* files. And the Quickscreen editor has a number of options, such as generating horizontal lines to clarify the location of fields and text. Another useful feature is the generation of simple *dBASE* program documentation by *Quickcode.*

Not all *dBASE* users will require such extensive and complex features. The audience for *Quickcode* is limited to serious *dBASE* programmers, most likely professionals who can profit from its power.

Requirements: CP/M-80, CP/M-86, or MS-DOS; *dBASE II*

Fox & Geller, $295

GENERAL BUSINESS

Newspapers and magazines may trumpet the joys of owning your own computer, but for makers of higher-priced micros so far the business market is clearly where the action is. For most people, it takes a definite money-making or money-saving use to justify making the kind of investment it takes to set up a major small-computer system—and after that to spend, on average, that much again for software.

Much of the business software now available falls into a few major categories—spreadsheets, database managers, integrated packages, and so on. But there is also a broad range of business programs that defy these neat labels. They are generally less generic microcomputer tools and more aimed at enhancing a specific business skill or discipline. While highly varied, these packages tend to have one thing in common: They let the user organize a mass of business data and select that which is most useful at any given moment or for any task. These packages offer users the time and analytical tools to make better-informed decisions about their day-to-day business operations—the crux of sound management.

One typical use is time management. Using time efficiently often means the difference between success and mediocrity in business. One must know how to assign priorities, schedule and keep track of appointments, and organize that information for retrieval and use later. A lot more is involved than simply making sure you have not booked overlapping appointments.

Another variety of software helps to manage projects—say, the construction of an office building or preparation of a large research report. Such projects typically involve many people and many specific steps, the timing of which affects other operations. A construction project, for example, may require dozens of licenses and zoning variations in addition to hundreds of factors involved in the building itself. Scheduling each step for greatest efficiency is a process that few managers would wish to take on without the aid of a computer.

In addition, software aimed at a specific, limited segment of industry falls into this chapter. From calculating the change in a restaurant's profits when meal size is varied to prospecting for new sales clients, nearly every business undertaking seems to have a specialized application package designed to make it easier or more efficient. In many cases, these chores could be handled by a generic spreadsheet or database manager. Whether they should be, or whether buying a special-purpose program is more sensible is a question that many business people must ask before every software purchase.

For example, there are many systems designed to help sales personnel keep track of prospect/client information. Data fields in these special-purpose database managers come with such predefined data headings as "Prospect Name," "Prospect Spouse," "Prospect Favorite Hobby," and so on. The goal, of course, is better customer rapport, better service, and ultimately more sales. It would be easy to write a custom database application to manage such data, but professional programmers with sales experience may be able to create a package that is easier to use than a beginner could write. On the other hand, writing your own application could produce software that fits your special needs better than the generalized packages on the market. The reviews below should provide at least a good place to start your analysis.

A glance at the software offerings in this section should convince almost anyone that somewhere there must be a program to aid in managing their time, money, business procedures, and specialized information. The efficiency gained by setting up a well chosen computer system can more than repay the time and money it takes to get started. Remember, though, that the effort of finding a program and inputting data is wasted unless you adjust your procedures to make use of information you can now organize. In the end, it is still man, not machine, who runs your business.∞

AGENDA

Agenda is a personal scheduling program for a single user. Its best feature is probably the built-in clock, which beeps when a scheduled appointment is imminent. Also, to its credit, *Agenda* allows the entry of memos, reminders, and appointments on the same screen. The entry can be up to 28 characters and may include two expense categories chosen from the 254 that *Agenda* allows the user to define. Expenses may be totaled by day or for defined periods. Both scheduled and actual time can be recorded. Up to 3,000 records are allowed.

In some ways, unfortunately, *Agenda* lacks polish. The free-format screen approach used is flexible in that you may schedule appointments at 2:13 and 2:59. However, this means that there is no con-

sistency in displaying time periods. A regular 4:00 appointment could show up anywhere on the screen, depending on how many items preceded it. A time organizer should itself show more organization. Events that recur each month or year can be entered automatically, but there is no provision for weekly or first-Tuesday-of-each-month events. Function execution shows inconsistency; a key may have two entirely different commands.

Agenda is passable but with higher-functioned, more refined personal scheduling programs on the market for about the same price, you'd better shop around.

Requirements: IBM PC or MS-DOS, 128K RAM, one disk drive
TCI Software, $65

ASSET-MANAGER

Almost all businesses have assets to manage. They can be large and elaborate, such as complex machinery, buildings, and cars, or as simple as typewriters, furniture, and small tools.

Keeping track of these assets can be extremely tedious. Good business procedure requires that you record both the acquisition and disposal of assets used in your business. To complicate matters further, many tax laws, on both the federal (IRS) and state levels, affect how you must account for the assets on your company's books.

Because many assets benefit your company long after the year in which they are acquired, the IRS and many state tax authorities do not always allow you to deduct the full cost of an asset at once. The process of matching the cost of an asset to the life of the benefit the asset provides is called depreciation or amortization, depending on the type of asset.

Microlab's *Asset-Manager*, for the Apple computer, can considerably ease this complex process. On one level, it acts as a simple database to track the location and serial numbers of your assets. This is useful, but could be done with any database or file handler. *Asset-Manager*'s real worth is in its ability to simplify the process of deciding which depreciation method is best and then calculating the proper depreciation and investment tax credits.

Asset-Manager can calculate depreciation based on declining balance (125 percent, 150 percent, or 200 percent), sum of the years digits, straight line, or ACRS. If you are unfamiliar with these terms, the documentation provides a good discussion of depreciation, asset classes, methods of depreciation, the investment credit, and asset retirement and disposal.

The package is easy to use and provides a variety of useful reports, including depreciation schedules, asset inventory lists, and even a form 4562 that can be filed with your corporate, partnership, or individual tax return. *Asset-Manager* can handle up to 999 different assets and ten different businesses for one taxpayer. It automatically updates the files from year to year so that a particular asset need only be entered once.

Anyone running a business will find this a useful, easy-to-use package. The only clear fault appeared during the data entry process. The program has adequate error trapping and refuses to take an erroneous entry. When this happens, the cursor just stays on the line and blinks at you. A much better approach would be to give a diagnostic message at the bottom of the screen, such as "You must input a date before 1/1/80." Other than this minor fault, it is not difficult to make use of the program.

Requirements: Apple II, II+, or IIe; 48K RAM, DOS 3.3, one disk drive
Microlab, $200

THE BOTTOM LINE STRATEGIST

New business ventures, whether for established or startup companies, are risky because they involve so many factors, each of which can make the difference between success and failure. *The Bottom Line Strategist* is a business planning program. It allows you to define marketing and financial assumptions, which are run through some complex forecasting equations. The resultant charts and graphs will then tell you how your venture will do financially.

Financial models are, by their very nature, simplistic approaches to complex situations. Those used by *The Bottom Line Strategist* are no exception. However, the program does allow for a fairly wide range of business factors, is easy to use, runs quickly, and produces thought-provoking projections.

To forecast your project's future, *The Bottom Line Strategist* asks you to supply "Key Business Assumptions." They involve your predicitons of sales during the period—up to 60 months maximum, expenses, financing and capitalization, as well as more general economic indicators such as the inflation rate. These factors include such items

as "Time lag between marketing expense and resulting revenue" and "Number of sale transaction per customer per month." There are even learning curve rates.

These data are then fed through several complex, though standard, business formulas, like the Vidale-Wolfe model. When the analysis is complete —calculation time is only a few seconds—a wealth of projections is available, from tables of numbers cascading across your screen like the directory of a 200-file diskette to a summary screen. They give ranging from your projected break-even point and maximum Net Present Value to bar and scattered point charts.

Econometric models that allow for every business factor with infinite flexibility would be inherently too complex for your average micro user, and in any case none has been designed yet. Most factors, projected sales, for example, are educated guesses anyway. But *The Bottom Line Strategist* does have a number of glaring omissions and faults. Capital assets are both expensed and amortized, for example, like inflation rate, once set, cannot change.

The Bottom Line Strategist is an excellent learning tool, its weaknesses notwithstanding. In fact, proficiency in this product would be comparable to receiving high marks in a quantative MBA course. There is a "sensitivity analysis," which applies a set of varying assumptions so that you can see how a change in a single assumption will affect the entire outcome. Its prime deficiency is that, unlike the real world where almost everything matters, in *The Bottom Line Strategist* you are only allowed to consider 31 items.

Requirements: MS-DOS, 128K RAM, one disk drive
Ashton-Tate, $400

BPT

BPT, the Business Planning Tool, is designed for the businessperson looking to test strategic marketing and financial decisions before committing company resources. *BPT* generates detailed profit-and-loss statements and balance sheets. Although no sources and uses of funds statements are created, a balancing mechanism is built into the balance sheet to handle cash surplus and/or shortfall.

BPT is an automatic spreadsheet generator, which allows the user to create interactive forecasts and budgets and does not require the user to set up formulae, do calculations, or create formats. The advantage of *BPT* over electronic spreadsheets such as *VisiCalc* or *SuperCalc* is its ease of use, for *BPT* is "account" oriented. The user specifies an item from his or her chart of accounts and then responds to plain English prompts to project this account into the future. *BPT* allows easy handling of complex interrelationships of items on the P&L and balance sheet, by letting the user set forth the relationship in English, moving the cursor to specify which accounts to link.

The *BPT* creates a 12-month profit and loss statement, with year total and percent of income columns. The *BPT* balance sheet shows a beginning balance, 12 months of data, an ending balance, and a column showing difference from start to end of the year.

Unlike some financial software which limits the number of product lines or costs, *BPT*'s only constraint is that the total package cannot exceeed 192K. *BPT* claims that you will be hard pressed to create a worksheet that runs out of memory space.

To create a *BPT* report, the user specifies a month and year to be used as a starting date. *BPT* has a built-in calendar from 1940 to 2039. After labelling an account on the P&L, the user states the base date, and then may input data for each month, establish a growth trend, or make one account a function of another. *BPT* has a specific code for total income and net profit, which automatically calculates these amounts. Other subtotals are user set and treated as memo entries.

BPT provides balance-sheet calculation subroutines. For example, the user can establish a sinking fund, an accumulating, interest-bearing asset account for funds to be used for a future purchase. After specifying the total amount, the date when funds are needed, and an investment rate, *BPT* calculates the monthly amount to be set aside. Similarly, depreciation is calculated automatically by specifying the life and total and salvage values of the fixed asset. The user may also set up loan accounts, listing amounts, annual interest rates, and tenors. The user then "posts" the balance-sheet subroutine to the P&L, creating an automatic tie-in. In the same fashion, "posting" transfers the net income after tax line on the P&L to the balance sheet, to be accumulated in the retained earnings area. *BPT*'s balance sheet provides an automatic "balancing account," either cash or a line of credit.

BPT interfaces with electronic spreadsheets such as *SuperCalc* or *VisiCalc* with a "template" in

an appropriate format for manipulation. All entries except totals, where math is retained, are data.

BPT has a built-in values projection graph, which displays graphically the data in the reports. Values may also be changed in this graphing mode, providing a visual display of the impact of any change.

Sofstar, the manufacturer of *BPT,* also sells connection software, which allows the user to interface a general ledger with *BPT,* loading the GL information as data. *BPT* creates the relationships for extrapolation.

Requirements: IBM PC
Sofstar, $225

BRAINSTORMER

Brainstormer is a problem-solving tool based on the Morphological Box concept, in which structured representations of a given problem are outlined and solutions to that problem generated. It is based on the theory that new and creative solutions arise from new ways of looking at a given problem.

The program runs in BASIC, but you do not need to know how to program. What will take time, even though the manual is clear and comprehensive, is familiarizing yourself with the 12 different screens used to display the problem of interest, its themes and variations, and ultimately to probe for unthought-of solutions, i.e., combinations.

Once a problem of interest is specified, you construct themes on that problem and variations on those themes. For example, under the problem "Transport Alternatives," you could specify power source, support structure, and operating medium as themes; under the theme "power source," for instance, solar power, gasoline engine, nuclear power, and human muscle might appear as variations. When all is set up, "probes" randomly select variations from the files, thereby creating new combinations, or "solutions," to your problem. Unfortunately, this works best for problems limited enough to handle with the unaided mind. Increasing the amount of data exponentially raises the number of potential combinations to be evaluated.

Theoretically, probes are generated until you arrive at a combination that engenders a new idea, a new way of looking at the problem. Each variation possesses a given probability of occurrence; for example, each of four variations on a theme has a 25 percent chance of popping up in a probe. This percentage can be adjusted to cause any bit of data to appear every time a probe is generated or not to appear at all. Whole problems of interest and any number of generated combinations can be edited, saved, deleted, or sent to the printer with simple commands.

Brainstormer boasts many applications, including broadened thinking, identifying new products and markets, and exploring personal and managerial problems. But unless so many factors are involved that they cannot be organized in your mind, this program does not seem to be an efficient way of solving problems. It takes too long to learn the program, too long to plug in all the data, and far too long to check out the thousands or millions of possible combinations that one problem of interest can produce.

Requirements: TRS-80 Models I, III, or 4, Apple II, CP/M; 48K RAM, *MBASIC,* two disk drives
Soft Path Systems, $50

BUSINESS CHECKWRITER

This program is just what it claims to be: a checkwriting system for small business. It prints checks and detailed stubs, which record invoice numbers, dates, expense description—10 items in all. It produces a check register, records of payments against expense codes, a statement reconciliation, and a few lesser reports.

The program is menu-driven—not fast, but not slow enough to be bothersome. It will handle up to 375 checks or deposits per pay period and nine deposits a day, up to 100 expense and payee codes.

The first choice at the main menu, System Definitions, leads to submenus for entry of company and bank information, expense and payee codes, and the status of the account being computerized. This start-up procedure is reasonably simple.

Check Entry is relatively painless. The program assigns check numbers, and you fill out the standard information on screen. The recipient can be entered by payee code or by typing in the first ten characters of the name. Amounts up to $999,999.99 may be entered.

Check Details for the records and stub are filled in on another screen. For each, you may enter several invoice numbers and dates, expense codes, and the amount. The program automatically totals the entries and flashes an error message if they do not match.

Checks and details may be edited or deleted until

the checks are posted and details deleted. After that, voided checks must be adjusted for by a compensating check entry. Deposit entries are accomodated in similar fashion.

Printing checks is equally straightforward.

There are a few problems with *Businss Checkwriter,* however. Expense codes are limited to two digits, while most general ledgers use four or more. Posting the expense records to a ledger thus requires some translation.

Error messages are sparse. The manual advises that COBOL errors "10-99, with the exception of 94, indicate a problem with disks," and error 94 is "file not found." And that's it.

It is hard to print forms other than the ones built in. Checks and stubs must be ordered in the program's own format.

One more minor gripe: Menu choices calling for a one-key response require capital letters. Type a small "y" for "yes," and nothing happens. The programmer could easily have fixed this.

Business Checkwriter isn't exciting, and it seems a trifle overpriced. But it does its job reliably, with few inconveniences. If you have to write bunches of checks each month and your other programs do not print them, it may be useful.

Requirements: TRS-80 Model III or 4, 48K RAM, two disk drives, printer
Radio Shack, $149.95

THE DESK ORGANIZER

A lot of time managers claim to make your working day more efficient. Many are good at keeping track of appointments but fail because they are not used. When the phone rings, few people will leave one program and find, insert, and load the time manager and data disk, just to make a note to call Fred on Friday. Enter *The Desk Organizer.* Though not as sophisticated as some time managers, it works where others do not because it can share memory with most programs. Even when you're in the middle of a spreadsheet, a few keystrokes bring your daybook to the screen.

Once inside *The Desk Organizer,* the screen divides into seven areas, including clock, notepad, mode, file names, and commands. Although a little messy, it is workable and easy to move around in. The files are simple variable-length records indexed by a single title. You can browse through them for particular records. For "To Do" lists and appointments and reminders, the program works with the clock; when the time comes, an alarm will sound even if *The Desk Organizer* is operating in background mode.

Looking at functions alone, *The Desk Organizer* rates only better than average among time management programs. But the best of them is no good if you don't use it. When you are using your word processor and suddenly have to note an appointment, the chance to do it without abandoning your work is one you'll appreciate.

The company claims that *The Desk Organizer* works "with 90 percent of available software." Check before buying.

Requirements: IBM PC, 64K RAM beyond that needed for coresident programs, two disk drives
Conceptual Instruments, $250

EXECUTIVE APPOINTMENT SECRETARY

Executive Appointment Secretary is a cheap, simple, personal calendar management system with the look and feel of programs done in someone's basement. Although it performs its stated functions decently, it lacks many aids and conveniences offered by other systems.

When first loaded, *Executive Appointment Secretary* will ask for a three-letter ID that identifies your files. Then a calendar of the current month appears with today's date highlighted. You can move the cursor around the calendar or use function keys to move to a different month. There is no onscreen prompt line describing the active keys, but a help screen is only a function key away.

Behind each calendar date lie two screens, one for the morning schedule and one for the afternoon. They are preconfigured for 8:00 to 12:00 at 15-minute intervals, but a separate configuration program can change this setting. Making an entry on a day screen puts a signal on the calendar. You may code six different signals; establish a *B* to designate birthdays, for example, and a "B" will appear on the calendar. There is no way to access appointments other than by date, and execution is noticeably slow.

Except for repetitive schedules, which *Executive Appointment Secretary* only does tolerably well, there seems to be no advantage that this program has over a calendar. Look over other programs in this category, or just buy an appointment book.

Requirements: IBM PC or Zenith Z-100, 32K RAM, one disk drive
Sunflower Software, $49.95

THE EXECUTIVE PACKAGE

Were you to take the course, "Microcomputer Applications in Business Management," as part of some university's MBA program, chances are it would be no less thorough or demanding than Alpha Software Corp.'s *The Executive Package—Computing with VisiCalc and BASIC*. Through a series of *VisiCalc* templates and short BASIC programs, the use of a micro in a corporate environment is demonstrated most admirably.

Employing the case-study method, you follow characters like Steven Cauldwell as he wends his way through marketing, inventory control, and other departments, whipping out his micro and solving problems in product mix, scheduling, growth, and distribution to the amazement and admiration of peers and managers. The emphasis is not so much on the hardware and software itself as it is on the use of them to solve common business problems. Do not think you can sit back and be entertained as graphics dance merrily across the screen. There is as much book studying as computer usage. This is definitely a no-nonsense approach to learning how micros can be effectively used in business.

If this sounds serious, it is. Spend 30 hours with *The Executive Package,* and you will know more ways to use micros in business than 95 percent of your peers. If that is your objective and you are willing to put in the work, *The Executive Package* will reward you handsomely for your efforts.

Requirements: IBM PC or MS-DOS, 64K RAM, disk drive, *VisiCalc*
Alpha Software, $145

FIELD COMPANION

Field Companion is a stand-alone software program for the traveling business agent or professional who needs accurate time logs, expense accounting, customer and product lists, and especially quotation and invoicing capabilities. After entering the lists of products, customers, and prices, invoicing becomes extremely fast and simple. With a new order, merely enter the Invoice file, and you have a blank invoice on the screen in front of you. Fill in the number, customer and date and the product code and then hit return.

Field Companion takes data from the lists of customers, products and expenses and fills in the invoice almost magically. The customer name, addresses, zip, phone, comments file, and the product number, price, discount, shipping, and time fees appear on the screen. One more hit of the return key, and all the tallying occurs, complete with bottom line. Once the data is entered, an intermediate user can do an invoice in less than a minute. The system is very easy to learn and apply. It also provides a code word for confidential access to the customer files. Any version after 1982 is recommended.

Requirements: CP/M, 64K RAM, two disk drives
Digital Marketing, $129

KNOW YOUR CLIENT

Know Your Client is a simple program that has but one function. If you must keep track of a list of clients, contacts, prospects, and so on, this program will fill your need well.

Although the record format is fixed, it is so well thought out that this is not a significant handicap. In addition to the standard data held in any client file—name, address, telephone number, and such—*KYC* has such useful frills as a "common factors" entry. This feature permits you to choose up to twelve factors that may be shared by some of the names in the file. The format also includes space for both home and business addresses, the name of the contact's secretary, data of last contact, follow-up date, and three lines for general note-taking. A single-sided disk will hold about 200 records.

The program allows searches for all or any of the primary entries, including name, company, zip code, and common factors. Thus, such things as age, college affiliation, hobbies, income bracket, or almost any other characteristic can be used to locate or print out a list of contacts with common ties. The print option on the main menu allows the printing of a partial or complete report of all records in the file or a fixed-format mailing label.

Know Your Client runs smoothly, it occupies a single disk and it requires only a small working memory. All in all, it is a nice little package for salespeople, stockbrokers, charity organizers, and others who need some way to keep track of a long list of acquaintances.

Requirements: IBM PC, 48K RAM, one disk drive
Execuware, $92.95

THE LANDLORD

The Landlord is a moderately useful property management system promoted as suitable for both

residential and commercial real estate. For residential use, its limitations and inconveniences are not serious. For commercial properties, though, lack of accrual accounting and support for such items as square-foot—or gross-income—based rent calculations make this system questionable.

The Landlord has two major systems, Property Manager and Financial Manager. Property Manager keeps track of properties, tenants, owners, and charges. Information kept on each is adequate. The tenant record, for example, includes such items as move-in date, lease expiration, and two lines of comments.

The Landlord will automatically post rent debits to each tenant record on a monthly basis. Thereafter, you may post up to eight other transactions —rental payments, additional charges, forfeits, and so on. Printed output includes automatic statements, mailing labels, reports by properties, owners, delinquencies, and month-end summaries. Good reports are available, but there is no way to sort data for them. You cannot, for example, print tenant listings by name, nor can you generate aged delinquencies.

Financial Manager is a fairly straightforward, single-entry bookkeeping system. Its predefined charts of accounts include 26 payment types, 45 expense accounts, and 5 accounts for nontenant revenue sources. Account names can be customized, but the numbering scheme and number of accounts are fixed.

Again, this should be adequate for residential requirements; it may be too inflexible for complex commercial rentals. The most serious failing is the lack of accrual accounting. Income is generated only when received, not when posted. Printed output includes disbursements, check register, account summaries, and property and tax analysis reports by property or owners.

For simple property management, which should include most residential needs, *The Landlord* is a good system. Operation of *The Landlord* is menu-driven and direct. The manual is well organized and clear, the program is easy to learn, and error-checking is thorough. However, the lack of sorted reports and conveniences for large numbers of units reduces *The Landlord*'s value. More importantly, many standard commercial requirements are omitted. Check this system's limitations thoroughly before buying.

Requirements: Apple II, II+, or IIe, 48K RAM, DOS 3.3; IBM PC, 128K RAM, BASRUN.EXE; two disk drives

Systems Plus, $595

MANAGING YOUR BUSINESS WITH LOTUS 1-2-3

This offering from Cdex is an explanation of basic business measurement equations and a series of *1-2-3* spreadsheet templates with common business applications. The tutorial on basic business equations employs a modest sort of computer-aided instruction. Although there is no scoring of questions and the questions themselves are not altogether rigorous, each point is explained well enough. There is a sharp diversity in assumed knowledge, though, when you try the templates. A few lines of instruction written right into the template are the only explanation.

The tutorial portion of *Managing Your Business* is a primer on business equations. There are chapters on return on equity, return on sales, asset turns, and financial leverage. Each is presented in a simple, easy manner using moving graphics, user-data input and periodic questioning. This is definitely beginner-level stuff—*Managing Your Business* spends several screens defining terms like assets and sales. But for those who missed Business 101 in college, this will teach why each value is important.

The second portion, the *1-2-3* spreadsheet, is also textbook material. There is a template for budgeting, which includes items like travel, telephone, advertising, and research with budget and actual input. Other templates include sales history and forecast, balance sheet, cash-flow projection and profit and loss. There is a distinct lack of instruction on how these templates are to be used.

Managing Your Business is an odd combination: a reasonable business equations primer matched with working, though instructionless, business templates. Would that Cdex supplied more thorough documentation to guide beginners; it would be a more valuable package.

Requirements: IBM PC, 128K RAM, disk drive

Cdex Corp., $69.95

MANAGING YOUR BUSINESS WITH VISICALC; MANAGING YOUR BUSINESS WITH MULTIPLAN

Managing Your Business with VisiCalc and the equivalent program for *Multiplan* are two in the se-

ries of Cdex Training programs available for many computers. Through a combination of disk-based tutorials and a training guide, both the new and experienced *VisiCalc* or *Multiplan* user is presented with a system for learning to effectively use an electronic spreadsheet in analyzing and forecasting many different business activities.

Using the interactive tutorial and guidebook exercises, the user is first acquainted with a variety of business performance measures. Next, Return on Equity (ROE) is discussed along with how it can be calculated using the spreadsheet. Other factors covered are Return on Sales, managing assets (Turns), and managing financial structure and its relation to leverage.

After working with the tutorial and exercises, ten actual *VisiCalc* templates are provided for you to practice with and even modify to suit your own business. These include: Sales History and Forecasting, Product Margins and Forecasting, Departmental Expense Budgets, Profit and Loss Statement, Cash Flow Projections, Materials Requirements, Accounts Receivables and Payables, Balance Sheet and an ROE Profit Model.

Also included is a listing of representative industry statistics on ROE, Turns, and ROS for a variety of businesses.

Supplied on four diskettes, two contain the ten *VisiCalc* templates which may be copied and modified.

Requirements: Apple II, II+, IIe, or III, 48K RAM; IBM PC, TI Professional, DEC Rainbow, or Compaq computers, 64K RAM; disk drive; *VisiCalc*
Cdex Corp., $59.95

PERFIN

PerFin is an inexpensive, low-powered personal finance system that keeps track of checks and deposits. After checking account debits and credits have been entered, the program will produce summaries of account activity, including analysis of payments in user-defined categories. It will also handle month-end reconciliation.

The cost of *PerFin* is in line with the simplicity of the program, but there are many common financial transactions, including split checks and transfers, that cannot be processed; thus it is less of a bargain than it seems.

The setup and operation of *PerFin* is very straightforward. You define up to 40 accounts, either regular or debt, and the monthly budget. There is no provision for seasonal variations, say, when setting up a summer gardening supplies or Christmas expense account. When entering checkbook transactions, *PerFin* allow you to specify whether sales tax was included in the price and tracks the tax portion separately. This is handy when itemizing deductions for April 15th. Report options include listings for the month or by category, with or without forecasted budget. There is a simple bar chart also provided. Documentation is rather modest but adequate considering the simplicity of the program.

When compared against more sophisticated (and expensive) personal finance systems, *PerFin* lacks many features. Think of it more as a simple way to record checks and deposits, and it becomes a viable, although limited, alternative.

Requirements: IBM PC, 64K RAM, disk drive
DEG Software, $65

PERSONAL DATEBOOK

Calendar management is a dubious use for computers. Because updates happen without warning during the day and require immediate action, almost exclusive use of your micro is required. In addition, the program itself must be very usable. This is not the case with *Personal Datebook*. Although adequate in function, it is very slow, not very flexible, and prone to errors.

After defining the particular work schedules (intervals between appointments, start/stop time) for up to nine people, you enter up to 30 characters of description next to the time slot. Each entry must be an appointment; there is no provision for non-scheduled notes or reminders. You may search out time slots open both for you and for other users, making it easy to schedule conferences. Calendars may be printed out.

Personal Datebook has many problems. It is slow in operation. Moving ahead one day at a time causes the screen to rewrite very slowly. This makes scanning tedious. There is limited flexibility. Working schedules are only 12 hours long, and once you set the interval between appointments, they cannot be altered. *Personal Datebook* keeps no history of past appointments. You must tell it to print out schedules from prior dates when you key in the current date; otherwise it erases prior calendars automatically. Finally, the adaptation from its 8-bit beginning to 16-bit offerings is sloppy. Hitting function keys causes unexpected results, often

crashing the program. There are many better time-management systems on the market.
Requirements: Apple II, II+, IIe, or III in emulation mode; IBM PC; 64K RAM, disk drive
Digital Marketing Corp., $300

PERSONAL SECRETARY

Personal Secretary is an appointment and expense-log system "designed to be an automated executive's diary." It has the standard features found on most personal scheduling systems, but poor documentation and quite a few problems in operation.

You begin *Personal Secretary* with a calendar of the current month and move the cursor to highlight the day for your entry. Once in the desired day, you enter appointments or reminders. All must be assigned a time in the format 00:00 A.P., even notes like "Today is Kent's birthday." *Personal Secretary* allows only two expense categories—an extremely limiting recording feature for "automated executives"—but at least you can total them for user-specified time periods. There is a case-sensitive search facility, and a few types of recurring events can be automatically posted.

These features sound at least mildly promising. In practice, many do not live up to their possibilities. *Personal Secretary* is written in BASIC, and even though it is compiled, response time often becomes noticeable, sometimes several seconds long.

The manual is an inferior piece of documentation, confusing and poorly written, though a few helpful screen prompts do partially offset this. For example, when you reach the capacity of a data diskette ("timefile" in *Personal Secretary* argot) you are prompted to produce a new diskette so as not to lose data. However, such minor conveniences are not enough. Although *Personal Secretary* is relatively inexpensive, its quality makes it poor value.
Requirements: MS-DOS, 64K RAM, two disk drives
Computer Aided Design, $54.95

PLANFIN

PLANFIN is a financial forecasting and budgeting package that generates operating income statements, net income and discounted cashflow analyses, and data input summaries. For the businessman, *PLANFIN*'s most attractive feature is its ability to do extensive testing of revenues and expenses.

PLANFIN, like its cousin *PROFIN,* asks the user questions. No formulae need be created by the user. *PLANFIN,* with its 30 categories of revenues and costs, creates a detailed P&L, but does not provide such *PROFIN* reports as capital expenditure schedules and interest schedules.

PLANFIN allows the businessperson to test assumptions about production, sales, pricing, financing, inflation, foreign exchange, and other such business factors, and to view the resultant P&L. *PLANFIN*'s consolidation program accepts separate divisional budgets, and then melds them into a corporate plan.

The user may input up to 30 separate product lines, entering data for each, or set a base quantity with an annual percentage growth rate. After a selling price is input for each product, *PLANFIN* asks for an inflation rate, then automatically applies this to selling prices and costs.

For each product listed, *PLANFIN* will accept up to 30 related costs. These may be input in any combination of five ways: cost per unit, percentage of revenues, percentage of another cost, a fixed cost per period, or specific payments, i.e., data for each period.

Interest and depreciation amounts must be input as data. Taxes are computed from Federal and state rates input by the user, with tax carryforwards applied if the user chooses this option.

PLANFIN allows extensive testing of revenues and expenses, but that is all it does. As an initial planning tool, its benefit is the large number of products and costs that can be manipulated. After that, users are on their own. For example, *PLANFIN* does not provide a loan/interest schedule, nor does it have the capacity to calculate depreciation given a capital budget and depreciation information. (*PROFIN* does). The user must calculate interest and depreciation and then input these amounts as data. *PLANFIN* does not generate a sources and uses of funds schedule, nor does it produce a balance sheet. *PLANFIN* does, however, interface with *Multiplan, VisiCalc,* and *SuperCalc,* allowing the user to do additional mathematical manipulations.
Requirements: CP/M-80 or IBM PC
Business Software, $295

PROFIN

PROFIN is a financial report generator for in-

come statements, interest schedules, capital expenditure reports, tax schedules, return on equity schedules, discounted cash flows, and abbreviated balance sheets. Unlike such electronic spread sheets as *VisiCalc* and *SuperCalc*, where users must supply their own formulas and formatting, *PROFIN* asks simple questions and offers options, then sets up the math for you and automatically generates the reports in 32-column format.

PROFIN will manipulate up to 15 products, each of which can be matched with the same number of expense categories; similarly, it allows up to 15 separate capital purchases, categories of equity, and different loans. By changing any entry, the user can see how altering an assumption affects the bottom line. For a businessperson trying to evaluate a product mix or a pricing strategy or wanting an overview of a capital expenditure plan supported by various levels of debt and equity, *PROFIN* can be a valuable tool.

For the P&L, the user either enters data for price information or simply supplies a starting price and growth assumptions, after listing different product lines. The user then assigns up to 15 expense items to each of these products, using any combination of five options: cost per unit, percent of revenue, percent of another cost, fixed cost or entering data. Data or option selected may be changed at a later date. *PROFIN* also asks for an inflation rate, which is then automatically applied to both revenues and expenses.

Interest and taxes are automatically fed to the income statement, and specific schedules are produced for each. To compute interest, and the resulting schedule, the user lists up to 15 different loans, specifying drawdown schedules, interest rates, and methods of repayment. To compute taxes, the user specifies both Federal and state rates, and *PROFIN* automatically creates loss carryforwards and utilizes investment tax credits as calculated in the capital expenditure budget.

For capital purchases, the user lists items to be bought, selects either straight-line or declining-balance depreciation, and states the depreciable life and the rate of investment tax credit. *PROFIN* then produces a detailed capital expenditure budget. For equity, the user specifies different types, and *PROFIN* calculates internal rate of return, effective yield, and payback period. *PROFIN* produces a discounted cash flow after the user supplies a discount rate. *PROFIN* transfers the net cash flow amount into cash on its abbreviated balance sheet (cash, fixed assets, loans and equity).

PROFIN reports can be interfaced with *Multiplan, VisiCalc* or *SuperCalc,* allowing further manipulation of data. However, after manipulating information on an electronic spreadsheet, the user must manually change the *PROFIN* inputs to generate a new report.

Requirements: CP/M-80, IBM PC, or MS-DOS
Business Software, $295

PROPERTY LISTINGS AND COMPARABLES

Property Listings and Comparables is a fixed-purpose database program used to maintain real estate listings and to search out and print entries that meet certain criteria.

Along with the address and asking price of the property, the system records the number of bedrooms or units, square footage, baths, age, lot size, and percent down payment. For income properties, a category for monthly income and expenses is included. A memo field of 40 characters allows for any notes or information pertinent to the listing. Additionally the listing and expiry dates, date sold, and selling price can be entered.

Information can be retrieved either by record number or by searching for records that match your criteria. Allowable criteria include maximum/minimum price, city name, code, number of bedrooms/units, memo line, maximum price/income (for income properties), maximum price/square foot, and minimum monthly cash flow. Search results can only be sent to a printer in an 80-column format that uses 11 lines per listing. It is too bad that the users cannot select between screen and printer. It is also unfortunate that compressed printing or wide-carriage printers cannot be used to put more listings on each page.

This package suffers other shortcomings. In particular, there is no way to put the user's company name on the printed reports, instead of the program title and manufacturer's name. The printer slot number and line-feed option must be entered at each start up, along with the default data drive; a configuration should have been used. During entry of a listing, you cannot back up to a previous entry; you must complete the screen form and then do it over. The Code field is very restrictive in that it allows only four characters. And when searching either it or the Memo fields, substring searches are

not allowed; you can't find the POOL in SWIMMING POOL. Finally, if the Reset key is accidentally pressed, the program bombs, forcing a restart. This should have been avoided.

Documentation is adequate, consisting of 29 pages in a looseleaf binder. The manual was written primarily for CP/M users and has a lot of text that Apple, IBM, and TRS-80 users do not need.

While the program performed as advertised, it seems overpriced for what it does. Many general-purpose database programs are available for less than half the price of this one. They could do the same job, offer more features, and perform other tasks as well.

Requirements: Apple II, II+ or IIe; CP/M-80; IBM PC; or TRS-80 Model I, II, III, or 4; disk drive, 80-column printer
Realty Software Co., $425

PROPERTY MANAGEMENT

Property Management is a flexible, comprehensive, and easy-to-use real estate system. Suitable for both residential and commercial income-producing property, *Property Management* is set up with defaults so that beginners and those with simple requirements can use it without heavy customization. At the same time, it is possible to produce a highly tailored system with reports and analysis geared to specific situations.

The basic files in *Property Management* are the same as in other real estate management systems, but they offer to store much more useful information. In the rental-unit file, for example, there are fields to record not just type of unit and monthly rent, but such optional information as the number of rooms and baths, square footage, and rate per square foot, which is used for commercial rentals. This makes the system useful when marketing the property. The record layout for tenants has handy categories for secondary mailing addresses, which might be used when renting summer apartments.

Property Management features a great deal of built-in flexibility. Rather than post rental debits all at once, users may specify rent dates. Late charges may be posted by the system, automatically charging rents calculated by gross income and assessments either by unit or by square foot. The reports, which include owner listings, unit-type listings, tenant payments, and statements and lease expiration, may be sorted and ordered in a variety of ways. Rent delinquency, for example, may be by tenant or age. The chart of accounts is user-defined.

Yet, though the system may be highly tailored, it remains easy to use. The menus guide operators through each step and will not move on until complete transactions are logged. The sequence for month-end processing, often a difficult and error-prone step, ensures that an accurate status of rental monies is produced. Error checking is thorough.

Documentation is exceptional. Both as an instructional guide and as a reference source, the manual is clear, complete, and easy to follow. *Property Management* should be set up by the most knowledgeable manager in order to achieve maximum benefit. Once done, however, it can be learned and operated by relatively unskilled personnel. Serving a variety of residential/commercial environments, *Property Management* is simply one of the best real estate management systems on the market.

Requirements: IBM PC, 128K RAM, two disk drives
Continental Software, $495

PROPERTY MANAGEMENT SYSTEM

Designed for both property owners and managers, *Property Management System* will keep track of rental income and expenses, manage cash flow, and provide many different management reports.

The program consists of three separate modules: Income program, Expense program, and Operating Statement program. Expense and Income data are stored on disk as separate files, which are loaded in memory one at a time. In the Apple II system, up to 215 rental units and 597 expenses can be kept in each file. Separate files can be maintained for different properties, and the number of files per disk is limited only by disk capacity.

Operation is straightforward. The Income section keeps a file on each rental unit, including up to three names, addresses, phone numbers, memo, rent/lease date, rent amount, deposits, number of returned checks, and a vacancy report. A Late Rent Report lists all delinquent tenants as well as amount due, deposits, phone numbers, and memo information. A summary total of all rents collected and overdue along with total rents is printed at the bottom of the report. A Year-to-Date Income Report shows income received to date for each unit plus total for the year.

The Expense program will separately keep track of expenses for each property. Up to 100 different accounts can be used, and you can search for any or all accounts, payees, or months on file. Checks may also be printed from within the program using universal blank check forms. A building-by-building comparison report of utilities, gas, water, trash, and so on, along with the average monthly cost of each is provided. Accumulated expenses by each building under the category of repairs, interest, insurance, property taxes, and utilities is printed in a Tax Totals Report.

The last program takes data from the Income and Expense sections and produces an Operating Statement. Statements for each building as well as a consolidated statement for all properties can be printed. Along with load payments (principal), month-to-date and year-to-date income and expenses are detailed. Breakdown is by account name, with percentages shown.

The program is very easy to operate; however, you must be careful in your disk file names and housekeeping. Income and expenses are maintained in separate files, but the program does not prevent you from using the same names; thus, you could easily wipe out a file. The reports are nicely done, but instead of your own company name, the manufacturer's name is imprinted across the top of each report.

The operating manual consists of 16 pages in a loose-leaf binder with sample reports.

Requirements: Apple II, II+, or IIe, IBM PC, TRS-80 Model III or 4, or CP/M; 48K RAM, disk drive, 80-column printer

Realty Software Co., Apple and TRS-80 versions $450; IBM and CP/M versions $525

RESTAURANT PROFIT ANALYSIS

Restaurant Profit Analysis (RPA) is a comprehensive management tool for the restaurant business. It reports on profits, preparation costs, and sales trends on individual menu items. High volume, low profit menu items are identified so prices can be increased accordingly.

Ingredient inventories are tracked, providing the owner with concise reports of quantities, costs, weekly usage, minimum stock levels, and items that need reordering. If a particular ingredient's price increases drastically, a Trace Report will show all menu items containing that ingredient so prices can be adjusted accordingly. Pilferage, losses, and poorly defined recipes can easily be revealed by comparing computed versus actual quantities, dollars, and percentage.

Daily sales are entered either by individual tickets or in batches. A Daily Sales Report shows the number of tickets, total sales, average sale amount, tax collected, and waiter/waitress production. A detailed Transaction Report provides a complete analysis of production costs, weekly sales, and year-to-date sales showing quantities and dollar value sold, percent of sales, profit amount and percent, and profit/sales ratio.

Recipes are easily defined within the system, using units such as ounces, slices, and teaspoons. Each menu item can contain up to 20 ingredients. A recipe list prints a complete breakdown of each menu item, showing each ingredient, quantity, cost, labor cost, production cost, suggested price, and menu price.

The *Restaurant Profit Analysis* system can handle up to 200 menu items per disk, with no limit on the number of disks, and up to 200 ingredients and 30 waiters or waitresses. Lunch and dinner menus may be kept on separate data disks but will work off the same ingredient database, thus permitting an unlimited number of recipes.

Restaurant Profit Analysis produces a great number of printed reports, some of which require a 132-column printer. A Config program is included to allow the user to set up the control codes required for the particular printer being used.

A highly detailed large-format instruction manual is included along with sample report printouts. Direct customer support is available from the manufacturer. Well thought-out, *Restaurant Profit Analysis* should pay for itself very quickly in most restaurant operations.

A CP/M based version scheduled for release at the end of the first quarter in 1984 will support touch-screen data entry, an automatic cash drawer, and remote printers for point-of-sale operation.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM, disk drive, 132-column printer. Supports Apple Dot matrix and most other printers

Computer Systems Design, $495

SALESMINDER

Current information is important to any business. This is especially true in a business that depends on retail sales. Correctly recording sales and know-

ing immediately which products are moving and which are not, can make the difference between a store that is profitable, and one that isn't. Large stores have known this for years; hence the popularity of computer-driven point-of-sale terminals in many department stores and supermarkets.

With the advent of reasonably priced microcomputer systems, this capability is now available to even the smallest stores. *SalesMinder* replaces your cash register with a micro and an electrically locked cash drawer. Used by itself, the software turns your computer into an ultra-intelligent point-of-sale terminal. Completely menu-driven, *SalesMinder* guides your sales clerks in entering information about the sale. Upon entering a product number and quantity, the system automatically brings up the price, description, and extension. Sales tax is automatically calculated and the software is capable of printing either an invoice or a sales ticket, which closely resembles a cash register receipt.

With most of the systems this software runs on, a bar code reader can be used. This enables the sales clerk to enter the product number directly into the system with a quick pass of the bar-code wand. This speeds the check-out process and ensures greater accuracy. *SalesMinder* is able to print price labels in both human and machine readable form. *SalesMinder* also makes good use of the special function keys of the systems it runs on. It even includes a self-stick label to identify the new functions assigned to each of the keys.

While *SalesMinder* is a useful adjunct to your sales force, its real power lies in the reports it generates. While not extensive in number, they provide you with information vital in running your business. The Transaction Listing is a complete record of all sales transactions. The Daily Sales Report allows you to track which items are your best (and worst) movers, and the composition of your sales (cash, credit card, COD, and so on). The "Salesperson Report" is useful to judge the performance of your sales force.

SalesMinder also generates a Register Recap (very helpful in making up sales tax reports), and check and credit card listings which help in making up your bank deposits.

The software installs and runs easily. It can be used on either a floppy- or hard-disk system. A hard-disk system is preferable if you have a large number of daily transactions or stock a wide variety of items. *SalesMinder* integrates well with *StockMinder*, XtrasSoft's inventory management software, and with MailMinder, a mailing list and customer profile system.

SalesMinder is a well-done vertical-market software package. It is specifically designed to provide point-of-sale capabilities for a retail store. It is well designed, and easy to install and use. It is significantly enhanced, however, by the addition of XtraSofts inventory package, *StockMinder*, and you would be best off considering the pair of them, rather than just *SalesMinder* by itself.

Requirements: IBM PC, PC-XT, Compaq, NCR Personal Computer, TeleVideo 806, 816, or 1603, TI Personal Computer, Victor 9000, or Zenith Z100; MS-DOS or MMMOST operating system (TeleVideo), 192K RAM, two high-capacity drives or hard disk, printer, RS-232 port if cash drawer or optical bar-code reader is implemented

XtraSoft does not publish a recommended list price. The price is set by the dealer and usually includes support.

SHOEBOX

Shoebox is a personal-scheduling system that acts as an electronic appointment book, tracking daily "to dos" and keeping a record of your activities. *Shoebox* is divided into several major areas. The first is the daily Reminder system, which is the first display to appear on the screen after sign on. This screen lists the date and your chores, both for today and for previous days' entries that have not been marked as completed. Entries for a given day are made by keying in a "C" (for Change) on the first line. They can be up to 63 characters in length.

Once you make an entry in the Reminder section, it must be marked as completed; otherwise, it will appear tomorrow, and the next day, and on and on. This may be the most useful feature of personal-scheduling systems and of *Shoebox* in particular. When you tell *Shoebox* you have something to do on a certain date, it hounds you until you mark the task as complete.

Another system is the appointments section, which closely resembles the Reminder display, except that the Reminder is free-form while time intervals are listed in the appointments. Appointment entry includes the following data: start/stop date, beginning/ending time, repeat information, and

alert notices. Scheduling an appointment that begins at 9:30 and runs until 12:15 will erase those time slots on the appointment display.

The repeat field (which also pertains to Reminder) instructs *Shoebox* to post entries automatically to future dates. For example, if you have a regular department meeting on Wednesdays at 9:30, *Shoebox* will mark your calendar accordingly. Items may be reentered at daily, weekly, or monthly intervals, and the program provides for such odd recurrences as the third Friday of every month. Alert notices will warn you a specified number of days ahead of given items.

The last area of *Shoebox* is the expense-recording system. Items are entered for each day and contain an account number, description, user-assigned category codes, and comments. Once entries are made, *Shoebox* has reporting facilities that allow you to prepare listings by account and category for specified time intervals. You can also search your entries in all areas for a given character string. For example, you can list all entries pertaining to Fred Smith.

Shoebox is extremely easy to use. To get from one day to another, for example, you can either key in the exact date, or hit the Cursor-Right key to move you sequentially. *Shoebox* greets you by name and has downright friendly prompts. It even offers more assistance if it determines that you haven't used the system in a while. The manual is a good learning guide but is incomplete as a reference source. All in all, this is a friendly, well-designed, and—save for the manual—a complete personal-scheduling system.

Requirements: IBM PC, Columbia, Compaq, Corona, Eagle, Victor 9000, 128K RAM, disk drive
Techland Systems, $195

TIME MANAGER

This IBM offering, written by Microsoft, is a good example of a high quality, single-purpose program. *Time Manager* begins by displaying a calendar of the current month, which it reads from the date you key in when you boot up your operating system. Days highlighted have appointments or "to do" entries. To see or make entries for a day, you move the cursor underneath and hit ENTER. To get to different months, you can hit PGUP or PGDN to move one month at a time, or specify the exact month and year and go there directly. Once in a day, you can enter appointments with times, personal reminders, and "to dos." An "alarm clock" entry will beep the computer's tone generator at specified dates and times.

With each entry can be added attributes—a priority code, a "P" for permanent annual events (like birthdays), and one of 26 category codes. These categories will allow you later to search your calendar for items associated with a certain subject. Once an item has been completed, it can be marked as done. Unmarked items will show up on subsequent days until marked.

When making entries, *Time Manager* follows a format quite common among personal-scheduling programs—you first insert a blank line, then fill it in. Entries may contain account references, numeric items that transcend categories—tax deductible expenses are one example. *Time Manager* gives you the ability to use nine accounts. Later on, you can ask for account totals for given periods. Promotional materials state that "you can enter the total number of hours logged on individual projects, for cataloguing and studying business expenses or sales call patterns, or simply for verifying your telephone bills." This is true, though not quite as easy as it sounds.

Besides daily entries, there are "notepads," blank screens which you can use to jot down unscheduled items—names and addresses, for example.

Personal-scheduling programs do not just organize your day, they keep a record of your activities. Say you want to see what you've done for a client. There are various ways to browse through your entries selectively to locate the relevant ones. *Time Manager* lets you specify category, priorities, or keywords. You may also print selective items within periods you specify.

Time Manager has several weak points. Only single-sided diskettes are allowed, a rather senseless restriction. The manual, while sufficiently explanatory, is not indexed well enough to provide a useful reference.

Used regularly, *Time Manger* could make you relentlessly efficient. It never forgets appointments, retains a history of your actions, and nags you until you tell it you've completed your chores. The category and account designations make it noteworthy among personal-scheduling packages.

Requirements: IBM PC, 64K RAM, disk drive
Microsoft, $100

TIMEMONEY MANAGER

TimeMoney Manager is a companion to Human Engineered Software's *OmniCalc* package. Like *OmniCalc,* it contains two personal productivity programs, *Finance*64* and *Schedule*64.*

*Finance*64* is a very good program for personal investment. It offers seven routines for loan, payback, and buy-vs.-lease analysis, as well as calculation programs for the future value of ordinary annuities, value of annuities due (payments in advance), and future/present values. Used to figure a mortgage, the loan analysis routines yielded figures that a savings-and-loan company pronounced right on the money, varying only by a few cents. Buy-vs.-lease analysis is a more elementary matter, but is visualized nicely. The remainder of the calculation portions appear to be straightforward and easy to use. Your own use for *Finance*64* will depend on whether or not you already know how to perform these kinds of complex arithmetic calculations. The advantage here is that the program takes care of the math and can print out long payment schedules for any loan.

The purpose of *Schedule*64* is to create a kind of electronic datebook into which appointments and reminders can be entered. This is a difficult program to use and requires so much keypunching that you'll soon wonder whether it is worth the trouble. It's much easier to buy a notebook to keep track of things.

Besides that, *Schedule*64* is an incredibly demanding program, always wanting more information before it does what it should. One of its functions, for example, is to scan the calendar and look for the next available appointment. This would be handy if the program didn't require you to enter the beginning and end dates to scan, the times of the day in 24-hour notation, the length of the time block you're looking for, and, for some reason, the time and length of your lunch break.

Requirements: Commodore 64, one disk drive
Human Engineered Software, $29.95

THE 25TH HOUR—25:01 TIME SCHEDULER/ORGANIZER

The 25th Hour is a personal-scheduling system. It offers some useful features for managing your calendar, but is maddeningly slow in operation and lacks many record-keeping and accounting details found in other programs of this type.

In the calendar-keeping process itself, you may specify both one-time and recurring events, have the system alert you several days before items come due, and search for available blocks of time. You can schedule events for any number of individuals, the only restriction being a limit of 99,999 entries.

Weighing down these advantages are some severe design problems. Perhaps worst, there is no way to display daily calendars; you can only print them. Editing is cumbersome. Existing entries can be accessed only through a system-assigned record number, which shows up only in printed output. In order to change an item, you must first print it out. There is no way to search for items, nor is there any way to track expenses.

The biggest failing of *The 25th Hour,* though, is its speed, or lack of it. Because it is written in BASIC, everything from initial load, item entry, even simple menu changes take at least several seconds. If you specify some of *The 25th Hour*'s more useful features, like automatic weekly events, be prepared to wait several minutes. Because of these inefficiencies in design, the limitations due to missing search functions, and, most significantly, its lack of speed, this program cannot be recommended.

Requirements: IBM PC, 64K RAM
Softrend, $99

VISISCHEDULE

If you have ever managed a complex project where many people in different areas were involved, hundreds of details needed tracking, manpower was short, due dates were missed, and deadlines always loomed, you can understand the benefits of *VisiSchedule,* the leading project-management program from VisiCorp. Simply stated, you enter key information about tasks, costs, deadlines and resources, update the information when items (usually dates) change, and *VisiSchedule* will let you know how it affects your project.

Project "set-up" information allows for job specifications, job locations, milestones, and time periods. A resource database covers skill categories of personnel and up to 9 tasks for each, up to 9 prerequisites, and task durations up to 999 units. Costs may be measured in whole, thousands, or millions of currency units.

The number of tasks is limited by the size of memory. You may manage up to 50 with 64K. If you

have 96K or more, *VisiSchedule* will allow 150 tasks.

Once the information is in, *VisiSchedule* automatically displays the critical path, the series of tasks that determine the length of the project, total manpower and direct costs, and start, finish and completion dates for each task. Should any task slip in completion date, all dependent tasks are adjusted. Moreover, instant recalculation of the entire project to compensate for any changes make "what if" projections easy and allows quick evaluation of tradeoffs. The entire project can be shifted by a specific time interval or to a particular date.

Printed report options include Gantt charts, cost summaries by skill categories, schedule graphs, task-prerequisite lists, milestone charts, job description, and project-description reports. One feature matches manpower resources against the task, a process called "leveling." *VisiSchedule* will offer solutions to eliminate resource overloads.

VisiSchedule is menu driven. While this provides a better learning method and is easier to follow for beginners, experienced users will probably long for the direct efficiency of a command structure. Functionally, *VisiSchedule* has a few limitations. Some actions that would facilitate entering specifications—for example, the ability to enter standard sets of tasks into project-wide schedules—are lacking. They are not crucial, however. Documentation is thorough and includes a reference card and a blueprint design of the menu structure.

If you manage projects now, you probably do manually the function of *VisiSchedule*. However, not only can *VisiSchedule* instantly tell the impact of changes, it also tracks costs and offers suggestions for making the best manpower resource utilization. *VisiSchedule* cannot manage projects for you. It can, however, give you an accurate and continuous perspective of where you stand.

Requirements: IBM PC, Compaq, Corona, Apple II or III, 64K RAM, disk drive
VisiCorp, $300

JANELLE BEDKE, VICE-PRESIDENT OF SOFTWARE PUBLISHING

Trial-size bottles of hair spray you've heard of, but Software Publishing Corp. made microcomputer history with trial-size versions of its new word processing program, says Janelle Bedke, company cofounder and vice-president of sales and marketing.

"The version of the disk we gave away doesn't allow you to print or save, but customers got a chance to try it and get the feel," says Bedke, 35, who established the privately held firm in 1980 with two former colleagues from Hewlitt-Packard—Fred Gibbons, now president, and John Page, vice-president of research and development.

The result: The four-year-old firm now has six major products and took in some $14 million last year.

"To introduce *pfs:write,* we distributed more than 100,000 of the trial disks and took out full-page ads in the *Wall Street Journal,*" she recalls. "The response was very strong."

Software Publishing has been courting a "Procter & Gamble" image, Bedke explains. The reason? "Software is a consumer product as well as a computer product, so we apply consumer marketing techniques even with the company's business-oriented software," Bedke says. At Software Publishing, she has continued to focus on the user.

To this end, marketing people were hired from Del Monte and P & G and coupled with the expected high-tech experts from Silicon Valley.

After graduating from the University of Utah in computer science and math, Bedke worked in software development and design at Hewlitt-Packard, concentrating especially on "user interface."

INTEGRATED PACKAGES

Productivity is a key issue today. With market share eroding in many basic industries, foreign competition producing ever-cheaper products, quality consciousness on the rise, and thoughts of recent recessions in our mind, managers are looking for any answer to the productivity problem. Enter stage left—the Integrated Program. A program that combines several important functions into one easily used package. A program that allows a manager or a clerical worker to perform many more tasks in a shorter period of time. A program that is fun to use and one that inspires creativity in all but the dullest of workers.

Is this the answer? Probably not, but it seems to beat out whatever is in second place. Is this kind of software without problems? No, not even close. Ask any data processing department or management information system manager, and you will hear about the fragmentation of critically important databases onto hundreds of small computers, with no hope of ever fitting all of this important information back together again, where it is really needed. If the local user programs his or her own spreadsheet and then uses the information to make a critically important decision, that sounds great. But what if the mathematical formulas are incorrect? In the controlled, structured environment of the data processing department, enough people look at the program at each stage so that very few errors will slip in. In the world of one-worker, one-computer, such safeguards vanish. So, what does all of this mean?

It probably means that the decentralization of control that is being widely publicized is actually here. It probably means that, although there are drawbacks to any human endeavor, human beings have taken back control of their destiny. It probably means that the end-user in a big corporation does not have to wait 8 to 15 months to get that critical report programmed in the MIS department. Although any new trend or technology is bound to create problems, the strengths and benefits seem to be outweighing the weaknesses, overall.

Integrated software is usually made up of some or all of the following functions: spreadsheet, database manager, word processor, communications program, and graphics. The driving ideas behind these packages are ease of training and ease of use. It is much simpler to train someone to use one set of commands than to train them to use five sets of commands. The typical computer user can be productive after just three or four hours of training with some of today's integrated software products. Ease of use is best described as the ability to turn the computer on in the morning and, without ever switching disks or changing programs, to do all of the tasks of the day with the aid of the computer.

If the communications portion of the integrated package can store all of the user's important phone numbers, and can automatically dial those numbers if the user just types in a name, then productivity is enhanced. If the word processing section is simple to use, then memos can be produced faster than by paper and pencil. If the user can quickly switch from one mode to another at the push of a button, then the normal workflow will not be burdened by shoe-horning the computer into the process. If the data gathering section is easy to use and has a good up-front editor, and if the database commands are easy to use and powerful, then previously unattainable levels of information will be available for important decisions. And finally, if the spreadsheet has powerful built-in functions and graphics, then business trends can be analyzed in a fraction of the time that they previously required.

All of the features and functions listed above are available in over-the-counter packages today. And the future looks bright indeed. Programs are easy to use now and getting better. Operating systems are giving way to operating environments, allowing software publishers to create even better programs. And the availability of venture capital is spurring the formation of many new companies, creating competition that is forcing the market for these products to move ahead at full speed.

Finally, a whole new type of product just being released will probably be integrated into these products shortly. These are the so-called expert systems, which have been used to automate the problem-solving skills of experts in fields ranging from medicine to mining. For example, if you want to get a technical answer about a law in your state, or if you would like the photocopy machine repaired, you must call a person who has spent many months or years in training to learn how to do the job. An expert system can help the average, untrained person to get the answer himself. The trick is to get down on paper in the correct sequence the whole process that the expert uses to solve the problem, then combine the process and sequence with a database of information to give the proper solution. Software that actually performs this syn-

thesis is now being developed. As the next few years pass, we will see these tools fitted into the integrated software products as we know them today, making the small computer an invaluable tool for solving the problems of everyday life at home and in the office.

A word of advice for the person who hasn't yet invested in an integrated software package: Don't wait for the perfect package to come along. Each day that you work without an integrated package slows your productivity. Use the following section to pick out a package that fits your needs today. As new programs are released, the cost to upgrade will be small in comparison to your savings.∞

ALPHA DATA BASE MANAGER II

Are you feeling a bit left out because of the current rage for integrated software? Perhaps you've already put in your time learning *VisiCalc, Multiplan,* or *WordStar* and shudder at the thought of having to learn an entirely new set of commands to accomplish the processes you've finally mastered. Still, being able to pass information back and forth between applications sounds—and is—convenient. If you can also use a good data manager, Alpha Software's *Data Base Manager II* might offer an alternative to abandoning your old friends for *Lotus 1-2-3* or *Context MBA.*

Alpha's *DBMII* is a data management package with a plus. Aside from making it easy to set up entry screens, enter and edit data, sort and print your data, and merge different databases, *DBMII* offers a special "Link Menu." This facility allows you to transfer data to and from spreadsheets, word processors, graphics packages, and other programs that store data in a variety of formats.

You can transport data to and from other packages using the DIF format common to *VisiCalc, BPS Business Graphics,* and many other programs; *1-2-3* worksheet and import file formats; Microsoft's *Multiplan* SYLK format; or ASCII text formats using Alpha's own Data Exchange—DEX—format. The menu also provides for converting *DBMII* files into *MailMerge* files to be used with *WordStar.* This provides a quick method for sending form letters using your *DBMII* files as the source.

Alpha also provides a great tutorial, an audio tape that guides you through each feature of *DBMII,* as well as appendices that provide examples of how the database can be used with a spreadsheet and word processor to implement several "quick and dirty" applications.

The information transfer process is not as easy to use as a package that offers many functions, such as *1-2-3.* To create and transfer a spreadsheet file, you must first boot the spreadsheet, create the model, save the worksheet, boot *DBMII,* and then transfer the file. This is obviously more involved than just switching applications within the same program.

For this greater investment in time and effort, *DBMII* allows you to use software you may already own and know how to use. It also allows you to put together your own custom integrated system. On top of this, you also get a nice, easy-to-use data manager, which, while not as capable as some of the more costly relational systems, should be able to handle many of your data management needs. In all, it's not a bad package.

Requirements: IBM PC with 128K RAM or IBM/XT with 192K RAM, one disk drive
Alpha Software, $295

APPLEWORKS

At last there is an integrated software package for Apple II users: *Appleworks,* a combined word processor, database, and spreadsheet package based on the new ProDOS operating system.

Though *Appleworks* is from Apple Computer, it is almost identical to *III Easy Pieces,* an Apple III program from Haba Systems. Like most integrated software, it ranks higher in its ease of use than in sophistication. Even a novice should need only a few days to learn to use it, with no instruction beyond the manual.

To load *Appleworks,* you must boot both a startup disk and a program disk. After that, it is easy to call up any of the programs and to switch among them. *Appleworks* is designed to mimic the familiar tasks of taking file folders from a cabinet—your disk drive—and putting them on a desk for use. The "desktop" can hold 12 files at once, but displays only one at a time. However, you can switch files at will and can copy or move data between them using a "clipboard" routine. The program will use files from *Apple Writer, Quickfile, Word Juggler,* and *VisiCalc* as well as its own.

The best program in the *Appleworks* kit is the built-in spreadsheet. Though it does not boast all the features of some super-spreadsheet programs, it is larger, faster, and more sophisticated than the

original *VisiCalc* and than many programs still being sold. The workspace totals 99 rows by 127 columns—larger than most spreadsheets for the Apple II. Special features include variable column widths, alphabetical and numerical sorting, accuracy up to 15 digits, and a wide range of commands for calculation and formatting.

The database works much like the Apple *Quickfile* system, but it is much more powerful, easy to use, and very, very fast. It can arrange up to 30 categories of data in alphabetical or numerical order or by date or time, sorting through 800 records in only 10 seconds. Printing is not as versatile as most features, but both table and label formats are available. For fancier printing, the data can be moved to a word processor file and formatted as needed.

The word processor has a number of terrific features, and a few annoying flaws. On the positive side, it displays documents on screen just as they will appear on paper, complete with centering, indentations, and page breaks. Search-and-replace functions work quite well, as do the cut-and-paste and clipboard features.

In theory, the word processor supports proportional spacing, boldface, and super- and subscripts. It will also see to it that short lines do not appear at the top of a page and that subheads and the first lines of paragraphs do not appear at the bottom. However, configuring the system for a printer is surprisingly difficult. It took several hours, and underlining and boldface could not be made to work properly with an Epson MX-80 printer.

There are a few other shortcomings. The word processor has no single-stroke commands to delete a word or line, or even the character under the cursor. (Deletion is done by backspacing onto the character.) Once cut, even by accident, text cannot be restored. And there is no way to print form letters using a mailing list.

Formatting is rather cumbersome, with multistroke commands to center or justify text and to set margins. More important, there is no way to change the program's default format. Other margins, page lengths, and so on must be inserted into every document you print.

Despite these limitations, the *Appleworks* word processor is probably adequate for letters and for most reports that require data from the spreadsheet or database programs. It is easy to learn and use, and a few of its conveniences—onscreen formatting, for example—are rarely found in the price class.

Overall, *Appleworks* is an excellent package. As long as it is the only integrated system for ProDOS, many Apple users will probably buy it simply because it, like Mount Everest, is there.

Requirements: Apple IIe, disk drive, ProDOS
Apple Computer, $250

DESQ

DESQ allows you to bundle your most used programs, say *WordStar, dBASE 2, Modem 7,* and *SuperCalc* and use them all, each appearing on your monitor which is now a "desktop" of different program "windows." This program claims to "integrate" the software; it does not change the programs themselves, but merely organizes them to access and compare. There is no true integration as with some high-end, high-cost programs. A visual concurrence of software windows is a fine and valuable accomplishment (especially at this price), however, the user continues to operate other software within each window. This other software must be purchased and learned, unless the user already operates a word processing, spreadsheet, or pie chart program.

It does more than merely save time calling up different files, a function we can do with programmable keys and two disk drives. *DESQ* allows the simultaneous booting of *WordStar, dBASE 2,* or *Pie Chart.* This uses over 200K of the recommended minimum 512K main memory. It is far better than the "interrupt-and-resume" procedures for changing software or the split-screens that try to solve the problems facing anyone with a busy "desk." Since *DESQ* allows us to patch in languages we are already familiar with and gain greater control over programs that may have become a habit, it solves many immediate problems, especially access time, cut and paste, and comparison decision-making. After a couple sessions with *DESQ* you will be able to look at different files simultaneously and obtain or send additional information by modem. Though a mouse is highly recommended for pointing at different windows in most window-software, *DESQ* uses keyboard cursor pointing and keyboard changes. The comfort and power approached the feelings at a Macintosh demonstration. But here at *DESQ,* you use your old favorites, and fan them out for study. If *DESQ* and

other window systems work well, they will be like a poker hand. Now the user can see all the cards at once, instead of one at a time.

At a bargain price of $399, this product has taken a slice out of the technological stream somewhere between *Lisa* and *Smalltalk* the prototype window integrated software developed in the mid-1970s at The Palo Alto Research Center. The pre-release documentation used for review was disorganized.
Requirements: IBM PC, MS-DOS, 512K RAM
Quarterdeck Office Systems, $399

THE IDEA PROCESSOR

The Idea Processor combines word processing with text and graphics management functions.

An editor/cardfile program has a complete complement of word processing features that make maximum use of the unique IBM keyboard. Used alone or combined with Shift, Alt, and Ctrl keys, the 10 Function keys become the equivalent of 40. Onscreen menus and help are available.

Cursor movement is particularly versatile. Horizontal movement may be character, word, tab stop, or either end of a line. Vertical cursor movement can be up or down by a screen 6, selectable number of lines, or to the beginning or end of a document. Line-by-line and page-by-page scrolling are available.

Versatile search-and-replace or simple search operations go forward or backward, either one occurrence at a time or globally and may be specified with or without verification queries, with "wildcard" characters, for whole words or parts of words, and even for long strings split between lines.

Block operations, underlining, boldfacing, and other actions also are provided, making it easy to manipulate entire sections of text at a time.

Print formatting commands handle headings and footings, alter paragraph or page formats, and even accomodate automatic adjustment of left and right page number positions. Automatic footnoting is provided, complete with numbering and positioning. Limited document indexing also can be achieved. Ten macro keys can be defined with up to 100 characters each. And graphics may be captured from other programs and merged into documents or the cardfile.

The integral cardfile is arranged as cabinets, drawers, and folders, emulating a physical filing system. Up to 64,000 freeform cards may contain as many as 1,500 words each and may be indexed with up to 10 keywords each. Naturally, folders, drawers, and cabinets may be scanned, read, altered, added, deleted, or moved into documents.

Considered a text data management system, this program allows a writer to structure documents based on early outlines and stored notes and inserts. Cut and paste or boilerplated document preparation is particularly easy.

The one shortcoming is that this program cannot output a fully formatted document as a disk file, cutting it off from applications such as telecommunications. Finished documents can be printed but not transmitted by modem and telephone. Furthermore, the onscreen display does not show the document as it will be printed; a separate previewing function must be used to examine pages breaks, headings, footings, line centering, and so on.

The system is quickly learned and easy to use. Eighteen screens of help information are available at any time, and the system arrives with many demonstration and guided practice files.
Requirements: IBM PC or MS-DOS, 192K RAM
Ideaware, $295

THE INTEGRATOR (DATA BASE MANAGER II)

Alpha Software's entry into the integrated software market includes an interesting twist—you don't have to give up your favorite word processor and spreadsheet programs any more to get integrated data files.

Data Base Manager II—The Integrator works by itself as a database system, but its real strength is that it can be used with other popular programs, specifically *WordStar* (including *MailMerge*), *1-2-3*, *VisiCalc*, and *MultiPlan*, allowing users to transfer information from one program to another. The twist is that although the *Integrator* was designed to work with these most popular "canned" programs, it also works with any other word processing and spreadsheet programs that read IBM ASCII files (and almost all do). But beware. Since *DBM II* is specifically molded around *VisiCalc* and *WordStar* files, if the programs that you want to integrate are radically different from them, you may want to check some commands or formats. For example, *Lotus 1-2-3* WKS files can hold more than 40 columns of data. Since *DBM II* only holds 40 fields per

record, you'll have to trim *1-2-3* spreadsheet files to 40 columns before transferring data to *DBM II*.

DBM II is menu-driven; that is, you choose what to do next from a menu that you can call up at any time. You begin by calling up the main menu, which has some 18 commands, including Enter Data, Create Report Format, Sort and Search Data, and the most interesting one, the *VisiCalc-WordStar* link. From the main menu you go to the Enter Data command. You enter data only this once, right at the beginning of the process. Then enter the *VisiCalc-WordStar* link. This link is really another menu of options (12 of them) available under the integration portion of the *DBM II* package, such as how to transfer data from *VisiCalc* Data Interchange Format (DIF) files to database files, or from database files to *WordStar* files. This second menu is where all the transfer of data takes place. When all the data have been transferred and integrated into the proper files, then you can go to the individual files under, for instance, *WordStar,* and print them out, but now with updatable numbers and names in them.

There are also a couple of intriguing things you can do that are not listed on the V-W link menu. First, by "printing" a spreadsheet model to a file instead of to the printer, you will create a spreadsheet file that can be read by *WordStar* and incorporated into other documents, such as a memo or letter. Second, if you print a report onto a file instead of the printer, you can then use this file for word processing. Thus, you can make database files part of a text document such as the letter mentioned above.

Each record holds as many as 40 fields of up to 60 characters apiece. The number of records that you can store depends only on the size of the disk used for storage. *The Integrator* can be used with any standard hard disk using MS DOS 1.1, 2.0, or 2.1. The database does a five-level search. An interesting feature of *The Integrator* is its phonetic search, which allows you to find information even if you can't spell the words (though you must know the first letter of the word). The database also does wild-card searches of both fields and records. And as a special little plus for those who have access to bigger machines, *DBM II* uses Data Exchange Format (DEX), which allows information downloaded from a mainframe or minicomputer to be integrated into the files in the program.

The package comes with a cassette tape containing spoken instructions as part of an interactive tutorial to help users pick up the program's functions more quickly.

Requirements: IBM PC, DOS 1.1 and 128K or DOS 2.0 and 192K; one double-sided disk drive *and* one single-sided drive

Alpha Software Corp., $295

JACK 2

Simplicity is the soul of *Jack 2*. In a time when most programs are growing more and more complex to fill the expanded memory available to the programmers, Business Solutions, Inc. went the other direction in seeking useful, integrated software. *Jack 2* does not have the most powerful word processor on the market, nor the biggest spreadsheets, nor the best database manager. Instead, *Jack* does all these things moderately well, and with extreme simplicity.

Rather than attempt to splice together "canned" programs from other companies, BSI wrote their own word processor, database manager, and spreadsheet programs, and tied them together in one package. While this did guarantee that the programs would be compatible and easy to learn, it does require the user to learn three new programs. Fortunately, there is a most complete tutorial included as part of the standard package. *Jack* is written in Pascal, and the disk holds Version IV.1 of the UCSD p-system.

The functions of *Jack 2* are carried through five levels, or screens: disk, envelope, contents, form, and record. The program is visually oriented, and at each level the screen displays an "icon," or picture, representing the level you are working on. The envelope screen, for instance, shows a group of file folders, each containing the name of a form. To see what is inside one of these envelopes, you must go to the next level, called contents. Each disk can hold 50 envelopes, and each envelope can hold hundreds of records. At the top of each screen is a header that shows between five and 11 commands that can be performed on that level.

The programs themselves are very simple, and this is both good and bad. *Jack*'s spreadsheet is 255 cells per column by 255 cells per row, and any given form can hold a maximum of 1,024 fields. A maximum of 2,200 records can be stored on floppies, 10,000 on a hard-disk. The graphics generator makes only bar charts and scatter charts. BSI included only those features that are used most often

in each of *Jack 2*'s three types of software, eliminating the frills and features that complicated the process of learning and using the programs. Consequently, there are very few commands to learn, but these must be repeated over and over. The brochure talks about how powerful the word processor is, and boasts that there are no control keys to worry about. What they neglect to tell you is that no complex commands (such as erasing ten words from a paragraph) are possible. Erasures can be made one character at a time, or one whole file or record at a time. Intermediate steps are not available.

Similarly, in setting up fields and records to be manipulated, because the program is graphically oriented, placement of words on the screen is very important. Unfortunately, because there are only a few commands available, you spend a lot of time repeating simple steps in order to place the fields exactly where you want them. The overall impression you get is that you are doing a lot of repetitive work that ought to be easy for the computer, and you wonder why you have to do it.

Jack 2 appears to be intended for people who haven't the time or inclination to learn a lot of arcane functions they may never use. The program would have tremendous advantages, for instance, for financial analysts who need very little in the way of word processing, or for anyone who must mix graphs and text, and would not do much writing beyond the odd memo or short letter. But *Jack* is clearly not the right package for anyone who needs the absolute fastest, best program in any of these three categories. If streamlining is what you're after, then *Jack* may fit your needs perfectly. With more machine memory available in the future, and with updated, more sophisticated individual programs, *Jack* (3?) could eventually be a giant advance over everything on the market. It's already very good; with some expansion, it could become the ideal for just about anyone.

Requirements: IBM PC, 128K RAM, two disk drives
Business Solutions, Inc., $495

SERIES ONE PLUS

Integrated software has become very popular, and for good reason. Packages such as *Lotus 1-2-3* and Context's *MBA* combine such functions as spreadsheets, information management, graphics, and sometimes word processing into one extraordinarily versatile piece of software. The fact that these components are integrated allows you to enter data into one area of the package—say, the spreadsheet—and use it with an entirely different function, such as graphics.

Executec has taken this idea a step further. Their *Series One Plus* offers seven applications that can be used independently or tied together as a totally integrated system. *Series One Plus* consists of the *Execu/WRITER* word processor, *Execu/FILE* and *Execu/REPORTER* for data management, *Execu/MODEL* spreadsheet, *Execu/PLOT* graphics, *Execu/LINK* for communications (IBM 3780 emulation), and *Execu/AID* disk-based tutorial. *Execu/BUS* ties all the individual packages together and provides utility and security functions.

Each of the separate *Series One Plus* modules function as well or better than most equivalent stand-alone packages. The bonus comes when two or more of the modules are integrated through the *Execu/BUS* master menu facility. Data can be captured with *Execu/FILE*, funneled to the *Execu/WRITER* word processor, *Execu/REPORTER* report generator to print letters or reports, and then transferred to *Execu/PLOT* to present the data in a more easily understood graphic. The graphics produced by *Execu/PLOT* can then be included in the *Execu/WRITE* report. Additionally, you can move the data into the spreadsheet, or transfer it to a mainframe with *Execu/LINK*.

The *Execu/BUS* host also includes utilities for importing and exporting data, allowing you to exchange data with other software packages you may be using.

Of course, all of this power does not come without some trade-offs. The first of these is money. The entire *Series One Plus* package is considerably more expensive than *1-2-3* or *MBA*. Then again, neither offers all the features that *Series One Plus* does.

The second trade-off is learning time. Each of the individual modules has features equivalent to a stand-alone package—and can be used as one. This means having to learn a new word processor, spreadsheet, and so on. This is mitigated, to some extent, by the fact that each package uses the same commands for such common functions as saving a file and leaving the program.

If you have need of more features than such popular packages as *1-2-3* and *MBA* offer but really want the convenience of an integrated system, take a look at *Series One Plus*.

Requirements: MS-DOS, 128K RAM; IBM PC/XT, 192K RAM; two disk drives or hard disk
Executec Corp., Execu/BUS (includes Execu/WRITER, Execu/FILE and Import/Export utility) $450; Execu/MODEL (requires Execu/BUS) $200; Execu/LINK (requires Execu/BUS and Communications Card) $350; Execu/REPORTER (requires Execu/BUS) $200; Execu/AID (included with Execu/BUS) $45

STARBURST

StarBurst is a member of the MicroPro family of software products. In a sense, it might be considered the "glue" that binds the other programs together into a productivity system for the home or office. *StarBurst* works especially well with *WordStar, CalcStar, PlanStar,* and *InfoStar* from MicroPro, but can run most other programs form its menus, as well.

StarBurst can take the place of a programmer in many circumstances. It is a menu generator that allows the user to decide what functions will be performed and the order in which they will be completed. The menu system can then be turned over to a data entry operator with little experience, and the results will be very professional. MicroPro calls this procedure a two-tiered approach to delegation. The "Builder" decides what the system should do, and the "Operator" puts the system into practice.

The *StarBurst* manual is divided into two parts. The "Builder's Book" is a reference manual. The "Workbook" is a companion manual to the tutorial supplied with the package. Both manuals are clearly written, well illustrated and printed in several colors for easy use. In addition, two quick reference cards are provided. One shows all of the commands, the other is a map of the system for the operator's reference.
Requirements: IBM PC, 96K RAM, two disk drives
MicroPro International, $195

SYMPHONY

Symphony is Lotus Development's second entry into the integrated products market. Its first product, *Lotus 1-2-3,* has been the best-selling software package on the market since its introduction in early 1983. The *1-2-3* package achieved this widespread popularity because it did everything so well, from the software itself to the manual to the disk-based tutorial. In addition, an advertising blitz unprecedented in the software industry accompanied the introduction of *1-2-3.*

With the introduction of *Symphony,* Lotus has once again take the software world by storm. The company has gone back to the drawing board and designed a completely integrated system consisting of a spreadsheet, a database manager, graphics, a word processor, and communications module. Although the *1-2-3* influence remains evident, the new program was written from scratch and will be sold as a separate product, not as a *1-2-3* upgrade.

In addition to the communications module and a word processor, Lotus has included many more features that will distinguish the package. All five modules use a single work area in which all of the information is temporarily stored during a work session. The work area is 256 columns wide by 8,192 rows deep, providing over two million cells to work with.

The need for windows is plain with a worksheet of this size, and Lotus has provided them. The new windowing capability is a pleasure to work with. It allows the creation of as many windows as you like, and changing the size and shape of each window is quite easy. There is even a Zoom key feature (assigned to one of the IBM Function keys), which allows you to "zoom" a small corner of the screen up to full size and then return it to its proper corner. Each time you set up a window, you must select which of the five functions will be supported by it. Having made such a decision, the proper menu selections will be active and available for use when you move into that window.

Symphony offers "The Symphony Command Language," a complete programming language that allows the creation of a series of commands that allows the user to run *Symphony* with very few keystrokes. Since the programming can be tedious, there is also a Learn mode, where every keystroke that you enter is remembered in a blank section of the work area. Then, after the worksheet is saved, the learned Macro can be invoked by typing in just a few keys. *Symphony*'s command language can also be used on a more advanced level. You can create your own menus of command words that look and work just like *Symphony* menus. For example, you might create a checkbook balancing application containing the following menu selections: NewCheck, CurrentBalance, NotCleared, and Reconcile. You could then move

the menu pointer through the choices, selecting the application that you want. Each selection would be a complete program, performing all of the minute details for you without all of the hassle.

The program is completely memory-resident, allowing the kind of speed that the busy executive needs. Of course, this takes its toll. The minimum configuration is a whopping 320K of internal memory to hold the basic system. If you use large spreadsheets or databases, you will want to expand your system to the maximum of 640K. In fact, if you now use a *1-2-3* spreadsheet that is close to maximum size, and you want to convert to *Symphony,* you will probably have to divide it into two separate sheets; the new program is that much larger than *1-2-3.* But the power that comes with having all applications just a microsecond away is well worth the memory cost for many users.

If you use *1-2-3* today, you will be a little upset at the changes made to the command structure. For example, in the old system, to erase a cell, you would type "/RE"; in the new system you type "/E." It is only a minor change, but one of many that you will encounter; and that means you will spend several weeks relearning the old *1-2-3* modules as well as spending time learning the windowing system and the new modules. On the positive side, if you are not encumbered with all of that old knowledge, most of the functions can be performed with fewer keystrokes than in *1-2-3,* a time-saver that will soon add up.

Although *1-2-3* had a database management system, it was rudimentary at best. The *Symphony* database manager is much better. The key difference is in a window called Form. When you want to enter information into your database, you now have two options. You can still enter it column by column, just as in *1-2-3.* But that is pretty tedious. With *Symphony,* you can set up a data entry form that not only makes the work go faster, but also allows you to perform various editing checks on the information, set up defaults, and perform calculations in the entry form rather than in the spreadsheet itself for immediate verification. You can also use the forms feature for retrieving your information, as in many of the dedicated database managers.

Symphony provides eight different charting capabilities, including bar, stacked bar, line, X-Y, area, pie, exploded pie, and open-high-low-close for stock market graphics. There are more functions built into *Symphony* than were included in *1-2-3,* most of which have to do with more sophisticated time and date manipulation, security, and the ability to work with text. In the text area, very complete string handling functions allow the user to turn a string into a value and vice versa, find the length of a string, search for characters within a string, pull portions of the string out for additional use, perform calculations based on whether a cell contains a text string or a numeric value, and handle many more operations.

The communications package is very complete and easy to use. It even has a feature that lets you interrupt data communications and talk on the phone line, then return to data communication. The word processor has all of the features expected from good word processing software. If you have used *WordStar* and want to change, you will spend some time learning the new commands. It's not that the commands are difficult, because they are much easier to use than *WordStar*'s; it's just that they are different. If you have used the Wang-type word processing programs, you will see the familiar format lines that allow you to change your format control anywhere in the document that you want, and as often as you want.

Besides the nice electronic tutorial, Lotus has developed a very comprehensive, easy-to-use manual and an online help facility that is almost as good as the manual. In fact, you will rarely have to refer to the manual if you use the F1 Function key regularly.

Taken one at a time, each of *Symphony*'s program modules would be a contender for the best program in that area. Taken together, you have an almost unbeatable system. But, in any other area in the computer arena, things change quickly and the challengers will be out there soon.

Requirements: IBM PC, 320K RAM, two double-sided disk drives

Lotus Development Corp., $695

T/MAKER III

T/MAKER III is free-form table generator with intermediate text editing and database functions. Although its capabilities are flexible enough for its manufacturer to advertise it (legitimately) as a word processor, database system, electronic spreadsheet and graphics program, it is not comparable to sophisticated integrated software packages like *Lotus 1-2-3.* Rather, *T/MAKER III* is a collection of

powerful commands that can operate on lines, columns, and larger blocks of data. Learning and using these commands requires thorough study. With practice, however, users will be able to duplicate, to a limited degree, all of the applications listed above.

The text manipulation capabilities of *T/MAKER III* are not powerful enough to classify it as a word processor. There are commands for centering, headers and footers, margin justification, bolding, underlining, right and left justification, an awkward line block cut and copy and search and replace. But lacking are full cursor movement, line-by-line scrolling, and onscreen formatting. A large portion of word processing is convenient human interface. In this regard, the somewhat technical implementation of *T/MAKER III* makes it more a text editor and less a true word processor.

The blank screen of *T/MAKER III* allows you complete flexibility to construct rows and columns of data in other spreadsheet programs. You instruct *T/MAKER III* to add, for example, a column of numbers by entering in a "+" sign to the column's left and an "=" on the line where you want the total. Values are formatted by typing "9s" on the top of the column, 999.99 representing two fixed decimals. Be sure to allow enough nines, though. *T/MAKER III* will only display as many digits of your answer as you have nines. There are a good number of arithmetic functions like Average, Greatest Element, Projections, Percentages, and Reciprocals. However, if you are used to a *VisiCalc*-style implementation you will probably find *T/MAKER III* initially hard to understand and ultimately less powerful.

Other features include a select/sorting capability that operates on rows or columns for data base functions, a merge function to combine data tables with text, and a primitive graphics generator that produces bar charts which, interestingly, you can move about your files as if they were blocks of text.

If your requirements in text, spreadsheet, and data manipulation are not stringent, you want the ability to do all in a single session, and are willing to learn the unique but powerful command world of *T/MAKER III,* this program might become "the only program you'll ever need." Experienced users of any single-purpose program, like *VisiCalc* or *WordStar,* however, will find *T/MAKER III* lacking convenience and power.

Requirements: CP/M, 48K RAM; CP/M-86, PC-DOS, or MS-DOS, 128K RAM; 250K disk storage
T/MAKER CO., $275

III E-Z PIECES

III E-Z Pieces, an integrated package for the Apple III, is an extremely versatile combination of word processing, spreadsheet, and database system. The onscreen display is modeled after a desktop: You can retrieve a number of files and place them "on the desk" for use at any time. Desktop size is limited only by the amount of machine memory available. All files can be accessed from menus, and when in doubt, you can call up help screens by pressing the Open-Apple or Question Mark keys.

During setup, you can define as many as three printer types, one of which may be an output to a diskfile. Another printing device may be designated a "snapshot" printer and used to capture an image of the screen. To open a file, you select a file type, word processing, database, or spreadsheet, and enter the individual file name.

The word-processing function automatically formats text on the screen, and help screens list additional formatting commands. Full block operations are also supported. Reminder menus indicate which keys perform special functions when used in conjunction with the Open-Apple key. These menus limit onscreen text size, although full-screen scrolling is easy.

Spreadsheet operations are similar to those of *VisiCalc;* anyone familiar with that industry standard will easily make the transition. *III E-Z Pieces,* however, has added a new wrinkle: an overlap function. With most spreadsheets, when an individual cell is filled with text, you must manually advance the cursor to the next cell. This can lead to a certain amount of textual gymnastics when you try to maintain formats and title styles. But with the overlap function, once the cell fills, you are automatically moved to an adjacent one, and you can continue entering data.

The database is an extension of the original Apple III *Quickfile,* with similar commands. Data are displayed in row format, with information pertinent to each record listed on the screen. A zoom feature allows you to access the individual entries within any row of data. Full editing and insertion and deletion of records are all possible. You can select and retrieve specific data from records and generate a printed report.

The manuals for all three modules are under-

standable and contain helpful examples of operating techniques. But a discussion of this program's separate functions tells only part of the story: *III E-Z Pieces* is a fully integrated package. Sections of text or information can be transferred to the "scratch pad," a memory-based holding area, and transferred at will among the word-processing, database and spreadsheet sections. You never have to exit the program and manipulate external files, a common failing of many other packages that maintain compatibility but not full integration. The levels of program involvement are described by overlapping menus. The number of overlaid menus indicates the depth of progress into the program. Operating-system level activities supported are disk format, root and subdirectory creation; catalog and delete file are also available.

III E-Z Pieces has a lot more going for it than just a clever title. Individually, its three functions stand up well, and collectively, the whole is even greater than the sum of its parts.

Requirements: Apple III, 256K RAM, two disk drives

Haba Systems, $295

VISION

The long-awaited *VisiOn* promises to be another superb VisiCorp program and may become as popular as *VisiCalc*. So far, though, it has a long way to go.

VisiOn is an integrated applications package with windows that allows the viewing of several files or programs simultaneously. You can take a piechart from a *VisiGraph* window and paste it into text in the *VisiWrite* window. You can access, change, edit, close, or open different files, shrinking the windows and storing them off-center on the screen. Or even reduce up to nine working files to filename tags and store them along the right side of the screen.

Characters appear on screen as they will on the printout—in italic, bold, or underlined. This solves a long-festering training program for instructors and the self-teaching novice. It is a great advance for software user friendliness.

The mouse-controlled cursor arrow is used to select filenames or a list of functions along the bottom of the screen: edit, open, close, size, cut and paste, delete and one box called "archives," which allows you to search through the equivalent of a high-speed file cabinet with reference card catalogs.

The problem is speed. On an IBM XT, version 8.2 it seemed prohibitively slow. This is particularly regrettable, because IBM virtually owns the business market for micros. The integration of text, charting and budget projections is especially useful for business management. Therefore, most *VisiOn* will be run on the IBM. But not very fast, and therefore perhaps not very often.

Speed becomes crucial after the user masters a software program; seconds become hours when you are holding a thought and waiting for the text or graph to shift to another window before continuing. A novice with 20 hours of flying time can cut and paste, write, chart, and layout several files, stack a teaser filing system on the right side, and become very proficient using the mouse. It takes only a little coaching. Then the user wants to go faster than the program can. The cursor arrow becomes a blinking hourglass while a command is working, calling up a file or window. This symbol for "wait while I get that for you," appears on the screen far too often. Though mere seconds pass, most users will probably find this unacceptable.

Version 8.2, the latest beta-test edition at the time of this review, was also visually confusing. To take an example: One "sizes" a text window down to a 3-by-5 inch rectangle on a 19-inch monitor screen, and pulls in a doodle, from *VisiGraph,* to include in the text. Hit Open and enlarge the window to 8-by-10 inches. This new window is flapped over the text window, which is now partially hidden by the new window. So the only text that shows in the text window is a bit of the upper-left top of the page. A cut-out corner of the page is visible, showing only sentence and word fragments. This is imbecilic. Lay four manuscript pages of text in front of you so that only the top corner of each is available for visual reference, and you will see the failure. It approaches uselessness and adds even further to the speed problems of running the software.

There are several packages sold separately: *VisiOn Management System, VisiGraph, VisiWriter.* The company claims that third-party software has been encouraged. *VisiOn* is worth examining if you require applications, own an IBM, and do not want to trade it for a 32-bit Macintosh or Lisa.

VisiOn will improve, VisiCorp promises. Let's hope so. This is, after all, a thousand-dollar invest-

ment in software. But after working with the beta-test program, one begins to wonder whether VisiCorp may be asking more of the IBM PC then its relatively slow 8088 can deliver.

Documentation is fair and a bit paranoid. The manual is dull and has a high school secretarial flavor, though it is worth plodding through.

Requirements: MS-DOS, 512K RAM, mouse

VisiCorp, *VisiOn Management System* $375; *VisiGraph* $325; *VisiWrite* $325

DAVE BELLET, PARTNER IN CROWN ASSOCIATES, A VENTURE CAPITAL FIRM

Software companies, and not hardware manufacturers, "are the driving force in computers today," says Dave Bellet of Crown Associates in New York, a group of venture capitalists with more than $150 million invested in growth firms, one-third of them software related.

"It's clear to us that the software companies understand better how to solve the customer's problems," he adds. "You can see that when multibillion-dollar IBM goes to Bellevue to get 25-year-old Bill Gates at Microsoft to design its personal computer software."

Crown feels that ease-of-use is the most important factor in software today. Among its investments since 1981 are Lotus Development with its *1-2-3* spreadsheet program (Crown's $1.5 million stock purchase is now worth $26 million); Convergent Technologies, creator of the lap-sized Workslate microcomputer; and Software Publishing Corp., which has sold more than 100,000 copies of its moderately priced, business-oriented *pfs* products.

"Software Publishing stands out especially in knowing what the first-time user needs," said Bellet, 37, who invested pension-fund portfolios at Citibank with his partner, Chet Siuda, before both moved to Crown.

Bellet still looks to put money into "small companies that will turn out to be very large," but he predicts that a shakeout will occur in computer software during 1984 because of rising research and marketing costs.

SPREADSHEET PROGRAMS

Accountants and business planners will have no trouble adapting to spreadsheet programs. Running a spreadsheet program is like having a large columnar pad in front of you, and each column can contain information for a single month and each row can hold the details of a particular category of information or account. It takes the place of not only the pad, but also the pencil and the calculator.

But it is also a lot more. A typical spreadsheet is much larger than any columnar pad; a standard size is 254 rows long and 64 columns wide—some even offer over 2,000 rows and more than 250 columns. It also provides the convenience of placing the whole formula for a calculation into one "cell," where a column and a row intersect. In a manually prepared spreadsheet, the user would often have to refer to some other page with the formulas spelled out, do all the calculations, and then place the correct answer into the proper box.

Finally, it gives the user an easy way to do a "what if" analysis. If you put your annual budget into a spreadsheet program, and then would like to see what would happen to your savings plan if you bought that new car, the program will tell you in a matter of seconds. Decision-support software of this type has been available on mainframe computers for only a few years.

Articles always compare a person using an abacus to another person using a calculator, and the experienced abacus "operator" always wins. But modern technology has finally won the race. If you compare the speed with which you can calculate a spreadsheet containing 25 columns and 150 rows (3,750 calculations) with that speedy abacus person, the spreadsheet will win hands down. In this example, if you were using *Lotus 1-2-3,* the calculation time would be in the neighborhood of a minute and a half. Just try to find someone who can do over 40 calculations a second for 90 seconds! And, to make matters better, calculations can be extremely complicated; some may contain an algebraic equation with over 200 characters, symbols, and variables.

The point of all this is that a spreadsheet can take a routine chore which takes an individual an hour or more a week to post and calculate, and make the chore into something that can be completed quickly and easily. This kind of speed leads the user to do many jobs that would have otherwise been avoided. Some of the tasks that can be tackled are budgeting, income tax preparation, checkbook balancing, engineering analysis, sales projection, utility cost analysis, rental income record keeping and analysis, loan amortizations, salary projections, and project management chores.

Some spreadsheet programs even give you a limited database system. Conceptually, each row of the spreadsheet is a record and each column is a field. With the addition of the database feature, the uses of a spreadsheet program expand even further. You can inventory such things as your household goods; your record, video tape, or book collection; and all of your computer magazines. Then you can compile and review the statistics for your favorite football team. Finally, you can tackle that job the big office mainframe never seems able to produce, such as a list of your customers with their current phone number and contact name.

As with all computer programs, the best way to choose a spreadsheet program is to list the tasks you want to accomplish and then search for the program that will handle all of them for you. In fact, human beings are inclined to dream a lot, and the perfect program has not yet caught up to this dreaming, but there are some very sophisticated packages available today, and you might be surprised at just how many of your wish-list items can be handled for you. The purpose of this section is to help you find the program or set of programs that will fill your needs.

To accomplish this, let's break down the task into several sections. Using a spreadsheet involves input, calculation, and output. If you pick a program that lets you input easily and calculate everything imaginable, but does not output the information in a format that you need, then your task is not really accomplished. If, on the other hand, the reporting capabilities fit your needs, but data entry is so tedious that you can never bring yourself to the keyboard, the job will never get done and you'll be right back where you started. If you do a lot of heavy-duty financial calculations, and the spreadsheet you chose does not offer built-in financial functions, much of your time at the computer will be spent reinventing the wheel, usually less successfully than the original programmer could have done it.

As you can see, the proper choice of a spreadsheet package is a matter of defining your need and investigating capabilities offered. Use the following directory section to narrow down your

choice, then visit your local computer retailer to try each program that interests you. If you don't feel comfortable with a program, no matter how it sounds in the advertisements, you must continue your search.

A state-of-the art spreadsheet will have as many built-in functions as possible, reducing the number of formulae that you must enter to accomplish your task. It will also have some type of command that lets you fill many rows or columns with repetitive or sequenced data by using just a few keystrokes. Finally, it will give you the ability to write small "programs" (often called macros or keyboard memory) that will do the same task over and over for you. This feature is especially handy when you perform the same functions on a regular basis, such as printing a daily sales report.

Some of the more popular spreadsheet programs come with preprogrammed templates that are actually a complete set of formulae and functions set up and waiting for you to enter your own data into the blanks provided. Many of these templates are also available in stores, provided by independent software vendors. In most cases, these templates are available only for the most popular spreadsheet packages; if you want to use them, be sure they are available for the package you choose.

When the first spreadsheet programs appeared on the market, the concept was so revolutionary that people snapped them up without worrying about the details. After all, any spreadsheet they could buy made them far more productive. Now, however, the prospective purchaser should spend some time working with several programs before deciding which data-entry style suits him. Some spreadsheets have been so conveniently designed that entering information and moving around the screen are almost second nature. Some are still very clumsy and difficult to work with. And still others have been designed for easy use in specific applications, but are difficult to use for other things. A case in point is the "financial modeling" genre of spreadsheet. This type of package often assumes that everything is being done on a month-by-month basis and automatically puts the information from the first column across all columns. A nice feature, unless you wanted to put a copy of the 1040 tax form into your system, where months make little difference and text is your primary need.

Even the simplest, least expensive spreadsheet on the market has very powerful calculation capabilities compared to a pencil and a calculator. But for many of the applications that the typical user can dream up, more sophisticated calculations are often required. Let's review the types of calculation by grouping them into categories.

First, we have "operators"—the math symbols. In this category, the most common operators are for addition, subtraction, multiplication, and division. Other useful operators are exponentiation (squaring or cubing a number), and the symbols that show relationships—greater than (>), equal to (=), less than (<), not equal to (<>), greater than or equal to (>=), and less than or equal to (<=). Another type of operator is the logical operator that lets you make multiple comparisons; the most common are AND, OR, and NOT.

Second are the mathematical functions. These include SINE, COSINE, TANGENT, LOG, NATURAL LOG, SQUARE ROOT, PI, EXPONENT, ARC COSINE, ARC SINE, and ARC TANGENT, which are used for mathematical and engineering purposes. There are also general purpose math functions in most spreadsheets, for example ROUND, RANDOM, MOD (show the remainder after doing division), ABSOLUTE, and INTEGER.

A third category is the set of logical functions, which allow the user to program complex sets of conditions into a spreadsheet model. These are usually used with the logical operators. The most powerful is the IF function, where a choice can be made based on the value available at the time of the calculation. Also included in the logical functions are TRUE and FALSE.

The ability to look values up in a table stored somewhere in the spreadsheet is accomplished by the fourth kind of function, the LOOKUP function. The various spreadsheet programs offer a range of ways to do this needed task, some easy to use and some more difficult.

The fifth type of function is the statistical function. This category includes SUM, COUNT, AVERAGE, MAXIMUM, MINIMUM, STANDARD DEVIATION, SLOPE, REGRESSION, and VARIANCE. These are perhaps the most commonly used functions, because they are the ones that provide us with information in usable groupings and help to make our raw data more meaningful. Best of all, you don't have to be a statistics major to use them.

The last category of functions can best be described as special functions. These are provided by the spreadsheet publisher to make the program

easier to use for the individual with a specific need. Included here are functions to do database manipulations, date functions that help when you are doing amortizations and discounting of notes, and a wide variety of financial functions. The more common ones are FUTURE VALUE, PRESENT VALUE, NET PRESENT VALUE, INTERNAL RATE OF RETURN, and PAYMENT AMOUNT.

Once your data has been entered and calculated, it's time to think about getting it back out in a usable format. In the simplest programs, the spreadsheet can only be printed as it is displayed on the screen, with no further formatting. At the other end of the spectrum, the newer programs often provide complete formatting as well as graphics ranging from the simple to the truly magnificent.

Some of the common formatting capabilities have to do with how the information is shown on the screen as well as how it is printed on your printer. In this area, the formats to look for are scientific notation, integer, fixed decimal place, currency, date, percentage, left and right justified text, and the availability of variable column widths.

The way the text is handled is also of interest to most users. In the older spreadsheets, text had to fit into the column exactly; if it didn't, the user was responsible for putting the rest of the information into the next cell. All formatting was manual. In the newer programs, much of this work is done automatically. Although none of the packages on the market today can compete head-to-head with a top-notch word processor, they can often handle simple one- or two-page documents more easily than jumping out to a separate word-processing program.

Spreadsheet programs are wonderful things. They are said to have been the real reason that microcomputers have gained so much popularity so quickly. Since *VisiCalc*'s introduction in 1978, no self-respecting computer owner can be without a spreadsheet program. The new wave of integrated programs have, for the most part, used a spreadsheet as the base for other functions, including database management, graphics, word processing, and telecommunications.

As you begin your search for a spreadsheet, or begin to think about replacing that old clunker of a program with a newer, faster model, keep in mind one thing: Every day that goes by, someone else is making a newer and better product. You will never find the perfect package, and if you do, it will be obsolete shortly thereafter. So don't go looking for a "ten" and refuse to buy before you find it. And don't wait until the next version is available. All you will be doing is wasting your valuable time.

When you find a package that is close to what you need, buy it and use it. You will save enough time and do a better job in so many areas that you'll be glad you went ahead. Then, when you see a product next year that is better by far, you can easily justify the expense all over again because of the time and money that you have already saved with your current spreadsheet.∞

CALC RESULT SPREADSHEET

Following the lead of *VisiCalc,* dozens of electronic spreadsheet programs have been introduced; they continue to be the among the most popular and practical programs for personal computers. The Commodore 64, with relatively large memory space for a home computer, is well suited to spreadsheet applications, and *Calc Result* was the first useful program of this type for it.

On the surface, *Calc Result* looks very much like *VisiCalc.* It functions about as well, but it is much easier to use and offers a number of unexpectedly advanced features. The program loads automatically, after the computer is turned on with the necessary ROM cartridge in place. (The cartridge holds certain essential program elements, as well as secures the program from unauthorized copying. It also allows for back-up copies of the program to be made and used by the owner.)

Like all spreadsheets, information (numbers and labels) is entered into "cells," the maximum size of the matrix, here, being 63 columns by 255 rows. Since the 64 is capable of displaying text and graphics in color, each cell can be any one of 16 different colors. The overall background color, too, can be selected. This may seem frivolous, but it isn't. The color of the numbers and labels are used by *Calc Result* to draw bar graphs based on the information entered into the spreadsheet. The graphs can be printed on Commodore's dot matrix printer or their color printer/plotter.

This is also a "three-dimensional" spreadsheet program. This means that, besides recalculating values in the vertical and horizontal directions, values can be passed and calculated among up to 32 different "pages," or additional spreadsheets. Two of these pages can be in the computer's internal memory at once, and information from up to four

different pages can be displayed on the screen at once in horizontal and vertical "windows."

Learning to use *Calc Result* is very easy. The text/tutorial that accompanies the program is very good and uses many visual examples, almost all of which are reproduced in color. "Help" screens are available at every step of the way, too. And, since *Calc Result* comes from Sweden, these help screens are furnished in English, Spanish, French, Italian, Dutch, Finnish, and, of course, Swedish.

There are two different versions of *Calc Result; Easy Calc Result* and *Calc Result Advanced.* The primary difference between the two is that the *Easy* version does not provide for multiple pages and has fewer functions. *Advanced* incorporates all the functions described above. *Easy* is packaged only as a ROM cartridge, while the *Advanced* system requires both a cartridge and program disk.

Requirements: Commodore 64, disk drive (for *Calc Result Advanced*)
Computer Marketing, $99.95

CALCSTAR

By far this program's best feature is the software family to which it belongs. Users of *WordStar* will quickly find themselves at home with *CalcStar,* both MicroPro programs. The same keystrokes used to control the word processor are used in *CalcStar,* making it easy for experienced *WordStar* users to learn this program. *CalcStar* is one of two spreadsheet-type programs offered by MicroPro. When the user needs more power than *CalcStar* offers, upgrading to *PlanStar* is easy. In addition, MicroPro's *StarBurst* control program helps to tie all of the family members together into an intergrated system.

CalcStar is slow, possibly one of the slowest spreadsheet packages on the market. It also lacks sufficient worksheet space to be considered in the league with a market leader like *SuperCalc.* Although the worksheet is physically larger than *VisiCalc* or *SuperCalc*—127 columns and 255 rows—only 1,350 cells can be used at any one time, even on a 16-bit machine with 160K of memory available. The size of the spreadsheet window is limited by the block of status and help information displayed at all times. This information is a blessing for the novice or occasional user, but it makes for much needless scrolling.

MicroPro provides a 160-page manual that is easy to follow and includes several worked-out examples, including job costing and checkbook balancing. A quick reference card is also provided.

Requirements: CP/M, 56K RAM; IBM PC, 160K RAM; disk drive
MicroPro, $195

DESKTOP PLAN III

Desktop Plan III is a combination spreadsheet and strategic information analysis program that will arrange your data and present it in a bar chart, stacked bar chart, or line format. As such, it is an efficient business tool.

The program begins by prompting you for the number of columns needed to generate the report; a maximum of 300 is allowed. *Desktop Plan* automatically calculates the rows available based on the figure you supply and the amount of system memory.

You enter information by assigning it to the appropriate cell, and, if desired, the program will perform the calculations for you. Alternatively, you can create your own "rules," which are actually intricate Business-BASIC procedures for doing complex formulations. *Desktop Plan III* provides up to two lines for the report titles and up to 30 characters for description of the values, which appear in the leftmost column of your screen. Data columns are limited to 10 character spaces.

The results of these calculations can then be used to generate graphs either onscreen or in a printout. You can use an Apple Silentype printer or, instead, store the results as a Foto file, which can be reproduced on any graphics printer that supports this type of file.

Overall, the program is efficient; it calculates your data and creates graphs quickly. The manual is generally informative, although it gets off to a slow start. The only apparent hurdle is that the program was designed for owners of a complete Apple system, including the Apple letter-quality printer. Changing the parameters for printing condensed, bold, underlined or double-underlined text entails altering BASIC statements, not for the faint of heart.

Requirements: Apple III, 128K RAM, two disk drives
VisiCorp, $300

EASYCALC

For the price, *EasyCalc* is one of the best spreadsheet programs available on the market. It does not

have a lot of fancy features, but it will handle all of the basic spreadsheet functions, costs less than most other spreadsheets, and even has a few innovative features found only in expensive financial modeling programs or integrated spreadsheet packages.

EasyCalc provides a worksheet of 254 rows by 52 columns, gives you 16 digit precision, has an online help facility, keeps its data files in ASCII for easy access from your other programs, calculates properly even if your formula has a "forward reference" (most spreadsheets must use strict column-by-column or row-by-row calculations), allows consolidation by externally referencing other spreadsheets, and has variable column widths, including total suppression of columns when desired.

EasyCalc is not without flaws. It is currently designed to recognize memory up to 128K, but no more. Columns are designated with both lowercase and uppercase letters (*a-z* and *A-Z*), requiring use of the Shift key to move around the sheet (other sheets use *A-Z* and *AA-ZZ*).

The manual is small but comprehensive and includes a tutorial section. A relatively complete income tax package is included with the program, a nice feature. No quick reference card is provided.
Requirements: IBM PC, 64K RAM, disk drive
Norell Data Systems, $99.95

EASYPLANNER

EasyPlanner gives the user a larger work area than such first and second generation spreadsheets as *SuperCalc* and *VisiCalc*. In theory, it allows 255 rows and 255 columns, or over 65,000 possible cells; in practice, this is limited by the amount of available memory. Included in the program are a number of more advanced features, such as multiple width columns, if/then capability, consolidation of multiple worksheets, and a reasonably good report generator. For more complex reports, *EasyPlanner* can feed information to its companion program, *EasyWriter II*. However, this procedure is more complicated than it should be.

Various functions are available to simplify the creation of a spreadsheet, including exponentiation, horizontal and vertical lookup tables, net future value, net present value, future value, and present value. Perhaps the most powerful feature is a reasonably complete programming capability. The manual is fairly complete, but difficult to use. Examples tend to be too cryptic on some of the more complex functions.
Requirements: IBM PC, 96K RAM, two disk drive
Information Unlimited Software, $250

ELITE-CALC

VisiCalc revolutionized the microcomputer software industry several years ago by providing a powerful business tool for modest systems. Color Computer users have had to wait for a spreadsheet program of *VisiCalc*'s caliber on their machine, but *Elite-Calc* made the wait worthwhile.

Elite Software sacrificed nothing to bring a full-feature spreadsheet to the CoCo. In fact, the only drawbacks *Elite-Calc* has are due to the computer, not the software. Although Elite Software claims *Elite-Calc* can handle 255 rows by 255 columns of data, it is limited by the amount of memory available. On a 32K CoCo, about 20K can be used for data. This allows for considerably less workspace than claimed.

Also, *Elite-Calc* uses the CoCo's 32-by-16–character screen format. This is not really a problem as the program scrolls horizontally and vertically, but it permits little data to appear on the screen at one time.

Elite-Calc has a big advantage over its competitors: It runs under the standard Radio Shack operating system, in both disk and cassette versions. Others require the sophisticated FLEX or OS-9, which are expensive. This, combined with a relatively low price, makes it practical for the home user to have the services of a spreadsheet.

A full complement of math, relational and logic operators are available, as well as trig and log functions SIN, COS, TAN, ATN, LOG, EXP, and SGR. *Elite-Calc*'s editing functions include delete, move, or insert columns or rows. It also has a feature that lets the user duplicate data from one cell of the spreadsheet to another.

Serious business software is available to the Color Computer user, and *Elite-Calc* is the proof.
Requirements: TRS-80 Color Computer
Elite Software, $59.95

MAGICALC

MagiCalc is an electronic spreadsheet program similar in many ways to *VisiCalc* but offering some unique features of its own. Like *VisiCalc*, it uses a worksheet format of 254 rows and 63 columns, with the video screen acting as a movable window.

Commands are invoked using the "/" followed by a series of single letters. In fact, a person familiar with *VisiCalc* can use *MagiCalc* without even consulting the manual.

Why should you consider purchasing *MagiCalc*? Well, first off, it is $100 cheaper, and even more of a bargain compared to *VisiCalc—Advanced Version*. Next, consider the following. Designed to be fully compatible with the Apple IIe, it operates equally as well on the Apple II. Multiple memory boards, up to 512K total, are supported, as are most 80-column cards. You even have the option of using a built-in 70-column display that requires no additional hardware. Generated on the high-resolution screen, the 70-column display does burn up about 12K of memory that would otherwise be available for data. Lowercase characters are allowed both on the Apple II, using the one-wire Shift key mode and lowercase adapter, and on the IIe.

Operation is very easy. Except for the spreadsheet itself, filing, printing, formatting, and system configuration are all handled through easy-to-use menus. Even large worksheet printouts are automatically formatted to allow for page breaks and page width; the exact page format is variable. Data is stored as standard text files, though *MagiCalc* is fully compatible with both DIF and *VisiCalc* formats.

Advanced features include individually variable column widths, hiding of sensitive data within invisible columns or cells, and protection of cells against accidental erasure. Additional cursor keys allow scrolling to the top left or bottom right of the worksheet and up or down ten cells at a time.

Documentation consists of an 86-page tutorial plus a 168-page reference section bound together in a loose-leaf binder with slipcase. A handy command reference card completes the package.

If you're in the market for a Calc-type program, consider this one.

Requirements: Apple II, II+ or IIe, 48K RAM, disk drive

Artsci, $149.95

MICRO/PROPHIT

Micro/Prophit is the microcomputer version of the *Prophit II* modeling language, a powerful mainframe financial modeling system. If cost is a consideration, then this program is not for you. However, if financial productivity of your PC is your top objective, there isn't much that this package can't do for you. Learning to use this package is not easy, but the program's power makes up for the time invested.

Your model may be up to 9,000 lines of code. Unlike some financial modeling programs, these lines are not in English, but in a financial programming language. Your analysis can contain up to 120 columns. Operation codes are provided to do logical tests, six methods of depreciation, compounding, net present value, internal rate of return, discounting, amortization and multiple loan amortization, lookups in lookup tables, centered moving averages, iterative looping, and scheduled factoring.

At least two features are particularly noteworthy: An advanced "what-if" calculation lets you set a financial goal—say minimal investment for a given profit—and automatically seeks conditions to meet it. And *Micro/Prophit*'s consolidation facility is the most powerful available in a spreadsheet.

Fifteen ready-to-use models are available to perform the more common business analyses. These include lease vs. buy analysis, capacity requirements planning, capital investment analysis, multiunit retail planning, residential real estate development, and several models for specific industries, mostly financial institutions.

Requirements: IBM PC, 192K RAM, two 320K disk drives

ViaComputer, $3,000

MICROPLAN

MicroPlan is Chang Labs' financial modeling program, part of their family of spreadsheet products. The lower-end product is *ProfitPlan,* a spreadsheet program. *Consolidation Module* and *Link Module* are add-on programs that allow consolidation of multiple worksheets and access to mainframe computer data.

Although *MicroPlan* has some advanced features, it is relatively hard to learn because numbered commands are used instead of the more common Englishlike commands. To ease the pain somewhat, *MicroPlan* has included a menu listing the numbered commands on the screen. Unfortunately, not all commands are shown at one time, and an unfamiliar user will have to search through several menus to find the needed command.

Available commands include reorder (to swap, insert, or delete rows or columns), inverse, floor and ceiling (to compare values to designated high

or low values), depreciate, amortize, discounted cash flow, internal rate of return, ratios, tables, and tax calculation. Many of the financial modeling packages now available include consolidation of several worksheets as part of the standard package. *MicroPlan* sells it as a separate module at an additional price.

The manual is complete and easy to use and includes a tutorial section. No quick reference card is provided, however.

Requirements: CP/M or MS-DOS, 64K RAM, disk drive

Chang Laboratories, $495

MULTIPLAN

Multiplan is one of the second generation of spreadsheet programs. Its designers have noted the deficiencies of the first spreadsheets and added many of the features most often requested by knowledgable users. The result is both convenient and powerful.

Someone who has already used *VisiCalc* or *SuperCalc* will have to spend some time getting accustomed to the structure of *Multiplan*, but beginners will find data entry fast and quite easy. All the standard spreadsheet features are available, and a number of relatively novel ones.

One feature that *Multiplan* offers is new to spreadsheet programs: the ability to name a group of cells and then use the name instead of the cell locations. For example, instead of referring to R1C1:R7C9, this range of cells can be named Sales. Then whenever sales information is needed, it can be called up by simply typing Sales. This gives *Multiplan* applications much of the flexibility of a programming language.

Another new feature is the ability to link several sheets together, allowing the user to build a system of sheets much larger than any single one could be. Because *Multiplan* sheets are limited to only 63 columns and 254 rows, linking helps to keep *Multiplan* competitive with programs like *1-2-3*, which allow much larger working areas. However, one limitation to the use of linked sheets must be noted: When a change is made to the first in a series of sheets, the user must load and recalculate the others, or the final sheet will not be correct. This missing feature, called forward recalculation, is available in several other second-generation spreadsheet programs.

All spreadsheet programs will do "what-if" calculations, where the user changes the value of a variable and the program computes the changes in the rest of the spreadsheet; that is their purpose. The problem with most is that when the bottom line of a spreadsheet does not suit the user's needs, other variables must be entered and the whole process of trial and error performed over again. *Multiplan* tries variables iteratively: It allows the user to enter a target value for a calculated variable and let the program try a series of variables until the desired result is found. This "goal-seeking" function puts *Multiplan* in a class with much more costly and complicated planning software.

Multiplan also offers many advanced mathematical functions and display formats. It is especially strong in the area of text formatting and manipulation, providing such BASIC-like functions as Value, allowing text to be used as numeric data in calculation, and Len, calculating the length of a string of characters. Up to eight windows can be used at one time, data can be sorted using one column as a key, and many printing formats are available.

The manual is complete and well written, and the program has a good on-line help facility. This is "context sensitive," automatically showing the user the help screen that relates to the function currently in use.

In all, *Multiplan* is a very strong entrant in the spreadsheet market. It should be popular for some time to come.

Requirements: CP/M or MS DOS, 64K RAM, one disk drive, 80-column display

Microsoft, $250

NUMBER CRUNCHER

A financial modeling program designed to produce finished reports, *Number Cruncher* employs a "forms fill-in" approach. Once created, the forms —"templates" in traditional spreadsheet terminology—offer the advantages of providing rapid and simple data entry. However, the inherent design of the "forms" approach is rigid and time-consuming. *Number Cruncher* does provide a convenient and significantly easier way to blend text and calculated data on the same page. But these features can be accomplished on most second-generation spreadsheets without sacrificing flexibility.

Producing a desired report with *Number Cruncher* involves a series of steps based on the actual report format and defining the arithmetic relationships between the number fields or cells.

Starting with a blank screen, you first create the report, called "model format," onscreen, exactly as you would like it to print out. Instead of actual numbers, however, you leave "Xs". "$XX,XXX.XX," for example, would indicate a seven digit, two-decimal, currency-format cell. Cells and text can be placed anywhere. Up to 3,400 cells on ten pages can be designated.

Once you have setup this model, *Number Cruncher* will print out a "Layout Sheet"—the same model but with individual indentifying numbers replacing each cell. The next step is to describe each cell, telling *Number Cruncher* whether it will contain a number to be keyed in, a constant, or a calculated result from other cells. The formula for calculated cells resembles BASIC; for example, the formula for Cell 3, the sum of Cells 1 and 2 is ADD (0001) TO (0002) GIVING (0003). When all the cells have been defined, *Number Cruncher* redisplays the original model format, giving you the chance to enter in cell values and calculating results in a manner similar to a templated spreadsheet.

Compared to current spreadsheets, *Number Cruncher*'s design is tedious and time-consuming. What you are actually doing is breaking into three separate processes what standard spreadsheets do in one. Changing the model by adding in new cells or radically redesigning the model format constitutes redoing virtually the entire process. Most spreadsheets allow tremendous flexibility, perhaps their biggest attribute. *Number Cruncher* simply does not. Besides basic design weaknesses, *Number Cruncher* lacks the productivity aids now standard on more sophisticated spreadsheets. These include predefined cell formats, a wealth of statistical and arithmetic functions, and automatic or manual calculation.

The forms approach, due to its consistent focus on the final report, may make for simplified data entry, especially for inexperienced operators. But the lengthy development and rigid alteration process poses a far greater tradeoff.

Requirements: MS-DOS, 128K RAM, two disk drives, 132-column printer or compressed font
Pyramid Data, $395

PEACHCALC

Peachtree Software is best known for their accounting programs, but they also produce many general purpose programs. One is *PeachCalc*, a first-generation spreadsheet package. Like *VisiCalc, PeachCalc* allows the user to input information and formulas into cells and then perform what-if calculations on the data.

The *PeachCalc* worksheet is 254 rows by 64 columns, or over 16,000 cells. Each of the cells can be filled with data, text, or formulas. Selected columns or rows can be locked in place as titles, while the rest of the worksheet is scrolled for easy viewing of the entire sheet. Split screen viewing is available so that two different areas may be viewed at one time. An online help facility is available at any time.

PeachCalc is slower than some newer spreadsheets, and provides less worksheet space, but it is adequate for most applications that the average user is likely to have in mind. Cells can be protected from accidental erasure or data entry, and columns can be of a different width. Editing is easy, so formulas don't have to be completely reentered for a simple mistake. Several worksheets may be combined into one as long as adequate memory is available. Either values or formulas can be displayed, allowing the user to check for correct interactions.

Requirements: IBM PC, 64K RAM, two disk drives
Peachtree Software, $150

PERFECT CALC

Perfect Calc is not perfect, but it does have a variety of interesting features. The worksheet size is 255 rows by 52 columns, somewhat less than the standard for this type of program, and maximum memory is limited to 64K. This memory limitation is overcome by the program's ability to link sheets together into a spreadsheet system. The Associate Files command is quite powerful, automatically remembering which sheets are dependent upon each other and the proper order in which to link the spreadsheets.

Recalculation of the current spreadsheet works in column-by-column or row-by-row order, so forward references must be avoided. However, *Perfect Calc* allows regional recalculation of specific areas of the sheet, so the user need not recalculate the whole sheet at once. Columns are designated with both lowercase and uppercase letters, requiring the user to press the Shift key to move around the sheet. Files are stored in standard ASCII, allowing you to transfer data from program to program, including this company's *Perfect Writer* and *Perfect Filer.*

The manual is complete and comprehensive, including a tutorial section. A Function-key template and a quick reference card are provided.
Requirements: IBM PC, 64K RAM, disk drive
Perfect Software, $295

PLAN80

While most spreadsheet programs allow only a single worksheet, *Plan80* is actually a financial modeling program that can automatically link an unlimited number of worksheets. The user, freed from remembering how the sheets tie together, gets about the business of planning. Commands are written in simple English instead of formulas and are created separately from the data. This eliminates much of the "cursor tour" that most spreadsheet programs take you on during model creation. Unfortunately, the model must be created with an editor or word processor, increasing the expense to the end user.

Automatic replication of information, across all columns or down all rows, saves time during data entry. A powerful if/then/else facility allows construction of complex models. Calculation is done in the order required, rather than in the upper-left to lower-right fashion of most spreadsheets programs. Reporting capabilities are strong, allowing the printing of formal multi-page reports with little user intervention. Limited graphics capabilities are also provided. Special functions include averages, amortization, various trigonometric functions, lookup tables, internal rate of return, net present value, and several methods of depreciation, including ACRS.
Requirements: CP/M, 64K RAM; IBM PC, PC-DOS, 128K RAM; two disk drives
Digital Marketing, $295

PLANSTAR

PlanStar is a financial modeling system from MicroPro. Though similar to their *CalcStar* spreadsheet program, it is significantly more powerful. Separate data and calculation rules simplify consolidations and multiple what-if questions. *PlanStar* uses a "sequential logic" system to accomplish this goal, with the logic written in English instead of using formulas.

PlanStar provides many specialized financial functions to save the user/programmer from reinventing the wheel. Included are functions to do depreciation, discounting, amortization, consolidation, internal rate of return, moving averages, net present value, salvage value, and best fit. A complete report generator prints data out for use in formal presentations. Some graphics capabilities are included, but for professional applications, a stand-alone graphics package will normally be needed.

PlanStar includes a complete manual that provides many examples and an easy to follow tutorial section. A quick reference manual is also provided.
Requirements: IBM PC, 128K RAM, two disk drives
MicroPro, $695

PROOF

VisiCalc, one of the most popular and widely used programs, performs many great and wonderful feats of magic. One thing it does not do, however, is allow the printing out of the cell formulas to show how each calculation was derived. *Proof* does just that. It gives you a spreadsheet printout of all the assumptions and formulas that went into planning your *VisiCalc* model. Printing each formula in the same format as your model, you or anyone else can see exactly what produced the end result. Even very long formulas are printed in their entirety in their correct position. During spreadsheet development, *Proof* can be very helpful in picking up where you left off the day before, or in seeking out logic errors.

Proof will print out your *VisiCalc* models in three different formats: in row sequence in either a one- or two-column list; in column sequence in either a one or two column list; and in a grid format the way your *VisiCalc* model normally prints out. The program will print models with maximum limts of 63 columns and 255 rows—the same as *VisiCalc*—but not both limits at the same time. *Proof* will process approximately 1,200 cells on a 48K machine and over 2,000 cells on a 64K system. While this represents a relatively large model, a 64K machine is capable of building a 5,000-cell model. Large models do take considerable time to load, as the program builds a cell-lookup table in memory. Memory housekeeping may require even more time.

All in all *Proof* is a very useful utility for anyone who uses *VisiCalc* extensively and builds complex models. Sample files are included on the reverse side of the copy-protected program disk. A comprehensive 17-page user manual comes with the program.

Requirements: Apple II or IIe, one disk drive
MicroSPARC, $49.95

REPORT MANAGER

Most electronic spreadsheet programs show clear evidence of their *VisiCalc* heritage. *Report Manager* is no exception.

The slash (/) commands familiar to *VisiCalc* users are there, along with all of the functions that we have come to expect in spreadsheet programs. But *Report Manager* is not just another *VisiCalc* lookalike. Along with many of the refinements so sorely needed in the original *VisiCalc, Report Manager* introduces at least two original enhancements to the spreadsheet idea.

"Data cube" is a unique idea that adds impressive flexibility to the basic spreadsheet. It enables you to create "pages" of templates as part of the same file. Thus, the familiar two-dimensional spreadsheet of horizontal rows and vertical columns becomes three-dimensional through the addition of pages that can be "turned."

Another feature, Exec Language, allows the user to create multiple-screen programs that require user response. This makes it easy to design menu-like arrangements complete with prompts that can be used to allow persons other than the creator of a template to learn how to use it quickly and easily. However, since Exec Language is a form of programming language, putting it to practical use is going to require some study and practice time.

Report Manager offers the full range of functions including absolute value, average, integer, and look-up, plus a day-of-the-week calculator that converts a conventional month/day/year entry into the proper day of the week. There is also a HELP key, F1 on the IBM PC keyboard, that offers suggestions related directly to the function in process when HELP is requested.

The documentation is professionally illustrated and nicely bound and printed. With all of its features, *Report Manager* would be capable of just about any task that you would expect from a spreadsheet program.

Requirements: IBM PC, 64K RAM, disk drive
Datamension Corp., $399

SENIOR ANALYST

Spreadsheet programs for the Apple at one time were limited to one, but today they come in many varieties and colors. *Senior Analyst,* designed as a middle-management planning tool, takes a slightly different approach to the subject and offers some unique features.

Instead of moving a cursor from cell to cell, entering text and difficult-to-understand formulas, English-language abbreviations or "tags" are entered to specify calculation rules. For example, COST=.3 * LABR + .4 * MATL instead of B6=(.3*B2)+(.4*B3). Entered in orderly lists as row, column, or global definitions, rules may be specified without regard to particular row and column positions. And longer labels may be assigned to tags for improved clarity on screen displays and printouts.

Models are organized in "pages" for ease of use. Values can be passed between pages which may be linked together to build infinitely large complex models. Although each page is limited to 50 rows and 17 columns of values, each disk holds up to 9 pages with no limit to the number of disks.

Built-in calculation functions include: straight-line, sum-of-digits, and declining balance depreciation, compound growth rate, linear regression forecasting, plus many others.

An excellent report generator provides freedom to create attractive reports by affording the user complete control over headers and footers, titles and subtitles, numeric format and column/row header width. A built-in print spooler allows data entry or model evaluation while printing is in progress.

The documentation is excellent, with two manuals, a 70-page tutorial and a 176-page reference manual. Many sample models are included, along with a handy folding reference card.

There are only a couple of problems. The manual is unclear about what 80-column cards are supported; it merely states "will tolerate some." The other is the use of nonstandard files. Passing of data to other programs is not supported.

All in all, this is a very powerful and useful tool.

Requirements: Apple II+, 64K RAM, two disk drives
Apple Computer and Business Solutions, Inc., $225

SUPERCALC

After *VisiCalc* came *SuperCalc.* It took the basic ideas that were pioneered by *VisiCalc* and added features that the marketplace had been asking for: individually variable column widths, hidden columns, built-in help function, protected cells, more

powerful formatting control, 16-digit precision, limited programming, better error handling and the ability to load a partial file.

SuperCalc is a member of a family of spreadsheets that includes *SuperCalc 2,* and *SuperCalc³.* It is the least capable of the three, but remains more powerful than the *VisiCalc* that carried microcomputers into the business world. It also offers the lowest price.

SuperCalc was designed for CP/M systems but has been adapted to the IBM PC and many other computers. It provides a spreadsheet of 254 rows by 63 columns, allows two windows on the screen at one time, has a complete set of built in functions and the ability to use the *Superdata Interchange* utility to exchange information between several types of data storage formats. The exchange function allows the user to exchange information with other programs, such as *WordStar* and *VisiCalc.*

SuperCalc's manual is clear and easy to use. It provides 12 lessons that teach the computer owner how to use all of the commands and functions in a step-by-step fashion.

Requirements: CP/M, CPM-86, or IBM PC, 48K RAM, disk drive
Sorcim, $195

SUPERCALC 2

Sorcim provides three different spreadsheets with increasing capabilities. *SuperCalc 2* is the intermediate version. It offers all of the same functions of the original *SuperCalc* plus some important new features. If you need lots of power, own an IBM PC, and can spend more money, buy *SuperCalc³;* if you are on a limited budget or own a computer that does not offer IBM-style graphics, this program provides plenty of power for the money.

One of the interesting new features is the "Hide" function, which allows you to shield confidential data from prying eyes. The calendar functions allow you to enter a date into the spreadsheet and then refer to that date in your calculations. The Arrange command allows the sorting of columns or rows within a spreadsheet. Sorting may be done in ascending or descending sequence, and can include partial or full columns or rows.

Execute allows you to program a series of commands and save the information in a file for later use. A new feature added to the Execute command is the ability to suspend automatic processing to allow data entry and then to resume processing with the new information. A most useful new feature is the ability to consolidate information from a disk file with the contents of a spreadsheet. For example, a user can combine monthly files to get year-to-date figures.

The manual provided with this program is excellent. It includes a tutorial and plenty of examples to get the new user started.

Requirements: CP/M, CPM-86, or IBM PC; 64K RAM, disk drive
Sorcim, $295

SUPERCALC³

The most powerful of the three spreadsheets offered by Sorcim Corporation is *SuperCalc³.* Similar to the popular *Lotus 1-2-3* in capabilities, *SuperCalc³* is lower in price by $100. The user who needs a powerful integrated package should compare the features of these two packages to find which fits their needs better, as there are several important differences.

SuperCalc³ provides one of the most comprehensive graphics facilities available as part of an integrated package. It can generate more types of graph than *1-2-3* and does a better job of displaying the information.

The program's data management capabilities are comparable to those of other integrated packages. Although this program can't replace the specialized capabilities of a stand-alone database manager, it does allow selection of desired data by using various criteria. Once the data is found, it can be output to another area of the sheet or scanned on the console. Owners of *SuperCalc 2* or the original *SuperCalc* will find that their files are upwardly compatible.

Sorcim provides a complete manual with a reference section and a tutorial section, two easy-reference cards, and a manual with detailed instructions for using a conversion program called *Superdata Interchange (SDI). SDI* can be used to exchange information between *SuperCalc³* and other programs, such as *WordStar.*

Requirements: IBM PC, 96K RAM, two double-sided disk drives
Sorcim, $395

TARGET FINANCIAL MODELING

Target Financial Modeling is a good financial modeling system from Comshare. It allows the con-

solidation of many spreadsheets to develop extremely complex models that more closely mimic the real world than most spreadsheet programs can. Formulas in *Target* are written in an English-like command language that makes data input easy and fast.

Target provides functions to manipulate the data using simple commands. Functions available include net present value, weighting, consolidation, internal rate of return, compound growth, and if/then/else conditions. It is not as powerful in this area as some of the more expensive modeling tools. Format commands are powerful enough to create a report that can be used in a meeting or formal presentation.

A nice feature is the ability to split the screen vertically, horizontally, or into quadrants. This allows the viewing of what-if calculations on four different areas at one time. No graphics are provided, however. For users with little time or experience to develop their own models, Comshare sells a library of general business applications.

Target Financial Modeling includes a reasonably complete manual that starts the user with a tutorial and builds up to the more advanced functions. No quick reference card is provided.

Requirements: IBM PC, 128K RAM, disk drive
Comshare, $325; applications library $125

VISICALC

The original spreadsheet program, *VisiCalc* is credited with popularizing the use of personal computers. The kind of calculating and organizing power that *VisiCalc* gave users was a major breakthrough in personal computer software. The original version of *VisiCalc* is limited by a lack of memory space, making the size of a spreadsheet too small for serious users. A newer version is able to take advantage of up to 256K of memory. With 64K, the user has only 22K left to hold a spreadsheet. With 256K, the spreadsheet can be 214K. The program provides a grid of up to 63 columns and 254 rows in which to store and manipulate information, but memory limitations may limit you to smaller working areas.

The manual includes a tutorial section and a reference section that makes it easy for the beginner to get started. Most functions are well explained, with useful examples. Because of *VisiCalc*'s popularity, there are many "how-to" books available for the user who wants to get the most out of this program.

A reasonable number of mathematical, logical and lookup functions are provided, but newer programs on the market tend to have more functions. Sorting, graphics, programming of certain key sequences, rearrangement of rows and columns, variable column widths and simulated database features are not supported in this version. The user who needs more advanced features should try *VisiCalc IV*, which is a combination of *VisiCalc* and *StretchCalc* selling for the same price; but it requires 192K of memory and two disk drives.

Requirements: IBM PC, PC DOS, 64K, one disk drive, display (monochrome or color) or TV set
VisiCorp, $250

VISICALC IV

VisiCalc IV is a program that combines the original *VisiCalc* with a program called *StretchCalc*, adding several new and important features to this IBM version of the old standby spreadsheet. Although the new features do not bring *VisiCalc IV* up to the same level of functionality as state-of-the-art programs such as *Multiplan* and *Lotus 1-2-3*, the cost is quite a bit lower, and the functions are enough for all but the most demanding user.

One feature that many users of the old *VisiCalc* will welcome is the addition of sorting capabilities. One sort key is allowed, and the sort may be considered "temporary" or "permanent." A temporary sort has the ability to be "undone," putting the file back into its original sequence.

The new graphing feature creates graphs from your worksheet. The types of graphs supported are: bar charts, pie charts, line graphs, scatter diagrams, dot graphs, area graphs, component graphs, and high/low close graphs. The graphs can be displayed on color or monochrome monitors or printed on a graphics printer.

Moving columns or rows from one place to another is greatly simplified in the new version by using the rearrange option of the Move command. This option moves one or more rows to the top of the worksheet or one or more columns to the left side of the worksheet. As with the sort option, the moves can be permanent or temporary, and if temporary, can be undone with the push of a button. This is especially nice for setting up columns the way you want them for printing, and then going back to the original sequencing.

A command called "Keysaver" allows you to assign sequences keystrokes to each Function key or letter on your keyboard, up to 67 sequences in all. Later, when you press a Function key the program automatically does your typing for you. The maintenance options let you create, edit, clear, print, store, and retrieve your keystroke sequences from the disk. The obvious advantage is the ability to set up a rather complex series of keystrokes that you perform regularly. The "program" is then available whenever you need it, saving typing time and preventing costly typing mistakes. Each sequence can contain up to 80 characters, enough for a fairly complex task.

A concept now appearing in spreadsheet programs is the use of worksheet as a database. *VisiCalc IV* allows the user to view the data as if it were in a visual database. Selection of information according to specific criteria is allowed.

VisiCalc IV includes most of the needed mathematical, logical, and lookup functions, but some of the newer programs on the market offer still more functions. For specialized users, one of these may be preferable.

The manual includes a tutorial section and a reference section that make it easy for the beginner to get started. Most functions are well explained, with useful examples. Because of *VisiCalc*'s popularity, there are many how-to books available for the user who wants to get the most out of this program.

Requirements: IBM PC, PC-DOS, 192K RAM, two disk drives

VisiCorp, $250

GRAPHICS

Fueled by the appearance of magnificent on-screen images in virtually every magazine and television ad for computers, computer graphics programs have proliferated wildly in the last few years. Today, there is a bewildering number of choices for the computer owner looking to do something more with hardware than write letters or balance checkbooks. At last count, there were some 200 graphics programs on the market, with more coming out each week.

Fortunately, we need not search through all 200 items to find the software we need. Graphics programs fall into only half a dozen categories, and you don't need more than one of each type, any more than you need more than one good word processor or database manager.

The programs have an enormous range. For those serious about their computing, there are graphics programming languages. These allow you to write your own program that calls up and displays different graphics primitives. There are interactive drawing/painting programs that let you draw lines, boxes, circles, and more complex forms; fill them with color, rotate and mirror them, copy them to different parts of the screen, and so forth. Mostly those who use these languages do their programming just for the fun of it.

For the serious businessman, there are specialized graphics packages. These are intended to make it easier to visualize data sets and clearly show trends in business. And there are presentation graphics packages that create all manner of pie charts, line, and bar graphs and format them for use in business presentations.

Both presentation and business graphics programs are usually menu driven; you build charts or pictures by responding to questions the program asks. Then there are shape table programs. These allow you to create special lettering styles or sets of symbols, store them on an electronic "template," then use them as elements of a larger image.

Other graphics utility programs form yet another group—programs to create slide-show–like sequences of graphics created with other programs, to compress picture files to achieve greater disk storage capability, or to perform other useful functions.

And finally there is a group of programs called "screen dumps." They take the output of the terminal's graphics display and convert it into a form that can be printed out on a graphics-capable printer. Often, they also enhance the basic graphics image and add features to it.

Many programs combine several of these features into a single package designed for a particular graphics application. The creation of architectural drawings in a CAD (computer aided design) program, for instance, often requires routines for most of these functions.

Most programs that create onscreen graphics rely on the process of bit mapping, achieved either internally by the computer or else through an add-on graphics card. Just as the computer's operating system organizes the RAM memory, and therefore the display screen, into discrete slots into which the cursor can write characters and numbers, so bit mapping organizes the RAM into a series of even smaller slots, called pixels (picture elements). Each pixel is quite discrete, each has its own digital address in the RAM, and each can have its bit value set to either nul or a color. Drawing a colored line on the computer is therefore as simple as issuing a command that all the pixels between points A and B have their values set for the color red, for example. In an interactive program, the cursor is moved from pixel to pixel on the screen, changing bit values as it goes. In the most sophisticated systems, a mouse or an electronic stylus and digitizing tablet are used to address the pixels over which they travel.

Tied in with the ideas of bit mapping and pixel addressing is resolution—a measure of how many different pixels make up the screen and therefore how many pixels define each line that is drawn. (Resolution is especially important where diagonals and curved lines are concerned. Low resolution produces "jaggies"—staircaselike lines—instead of smooth curves). The more pixels per screen, the clearer the picture that can be drawn on it. The most elaborate—and expensive—graphics screens can display 2000 by 2000 pixels, better resolution than many 35mm cameras. (Statements of resolution traditionally give the number of vertical pixels first. This is limited in most cases to the number of lines in the TV display.)

Resolution also has a direct relationship with color. In a black-and-white graphics screen, each pixel is either on or off. Technically, this means that only one bit of information is needed to set the pixel value. Typical resolutions for black-and-white graphics are the IBM's 640 by 200 and 560 by 192

for the Apple. With color, however, each pixel must have its value set to a particular color. This requires a minimum of three bits per pixel in a system designed to display eight colors at once. Since this occupies considerable RAM space, typical color pixel resolution is considerably lower than in black-and-white systems—320 by 200 for the IBM and 140 by 192 for the Apple.

Resolution and how much memory is tied up in defining color has far-ranging implications in graphics program design: It is possible to add bits which either increase the number of color choices or add black and white shading to a standard color set. The more bits that are used to define colors, the less space that is available to carry on the other program functions. Eight-bit computers are almost always limited to 64K of memory space, and many 16-bit computers offer only 128K. Whatever the graphics program does, it must accomplish within those limits.

One solution is to limit the number of color choices to just three, plus black and white, freeing up extra bits to handle program load. Another, adopted by several programs, is to avoid displaying the image on the screen. Instead, they simply store the information necessary to create the graphic and rely on hardcopy from a plotter to show the design. This also makes it possible to increase the resolution of the system, since a plotter is not bounded by the resolution of the screen display itself.

Given these basic principles, what can a given color graphics program do for you? The specific capabilities are described in the individual reviews. But it is important to realize that there is nothing "mystical" about graphics. As far as your computer is concerned, it is still dealing with bits and bytes that could as easily be a stream of numbers for a database as a pie chart or original artistic composition.∞

ALPHA PLOT; APPLE MECHANIC

These two programs come from the renegade of the software business—Beagle Bros., which markets a whole series of products for Apple computer enthusiasts. Their programs are completely unprotected and may be used in your own programs without extra license fees. The style of both the software and documentation is extremely chatty, designed for those who are already quite familiar with the Apple and want to know all the inside tricks about using it. Therefore, supplied with every Beagle Bros. package is a wall chart listing dozens and dozens of Peek and Poke commands, plus special programming pointers. And each program manual is also filled with dozens of tips on programming, both connected with the program you bought and other useful information. As if this weren't enough, you also automatically receive a free newsletter with your software, full of even more useful tips. It's like joining the Apple computer fan club!

Alpha Plot itself is a graphics/text utility package that contains graphics routines designed to be incorporated within *Applesoft BASIC* programs. The high-resolution drawing program allows you to use either the keyboard or a game paddle to draw lines with three different cursor styles. Drawing is either normal, or, with XDRAW, you get a rubber band effect in which a line is stretched from the last marked point to the new cursor position. You also have your choice of any color in the Apple palette. Single keystroke commands also allow you to draw circles, ellipses, and rectangles instantly, both filled and outline. Other utilities permit compression of stored images for increased disk space, movement of images inside a window to either high-resolution page, mixing of two high-resolution images for superimpositions, high-resolution/low-resolution conversions, and instant image inversion.

Apple Mechanic is also a series of utility programs, some of which have direct uses in graphics. The main programs in this respect are two shape table editors—one for geometric shapes, the other for characters. Both are relatively easy to use. Information stored in the tables is retrieved through *Applesoft BASIC* commands, with little extras such as proportional spacing with the character sets. Included in the package are programs that make it possible to type the characters directly into graphics presentations using any font style that has been stored in the shape table. There are also three demonstration programs that illustrate the program's graphics capabilities.

Requirements: Apple II, II+, or IIe; single disk drive; *Applesoft BASIC*

Beagle Bros., *Alpha Plot* $39.50; *Apple Mechanic* $29.50

APPLE FLASHER

After you have finished creating graphics with

one of the other programs described in this chapter, you'll want this handy utility program to help manage your high-resolution binary files.

Apple Flasher boots on the IIe in nine seconds. After that, you can check any data storage disk for binary picture files in less than two seconds, with a single keystroke command. After searching, the program displays the names of the binary files it has found and assigns each a keystroke character. With a single keystroke you can then display a binary picture in less than two seconds, or flash through all 15 pictures on a full disk in 23 to 30 seconds.

In addition to these cataloging functions, the program also provides for "slide show" presentations as well. In the manual mode, either the keyboard or a game paddle is used to go either forward or backward through the files on a disk—two disks if a second drive is present. Three images —the current slide, the next image up, and the one just past—remain loaded for instant recall. In the automatic mode, display time can be set for up to four minutes per image; the program cycles through any number of slides on either one or two drives.

Requirements: Apple IIe or III, 48K RAM, disk drive, DOS 3.3; Apple II with *Applesoft* ROM card or 16K language card
Crow Ridge Associates, $34.50

APPLE II BUSINESS GRAPHICS

Apple II Business Graphics is an easy-to-use program that does more than plot charts. Included are many mathematical and statistical functions not found in other packages. Among these are calculation of the mean, minimum, maximum, standard deviation, variance, and sum for any set of data points.

Curve-fitting capabilities can fit a set of data points to any of five curve functions, a constant, straight line, logarithm, parabola, or a sine function. These same capabilities can also help with forecasting by extending a time line beyond the last data point. Future trends can also be plotted from moving averages.

Rather than functioning from a menu, the program uses easy-to-remember English commands for its operation; there are over 120 in all. A tear-out Command Reference Card is included with the 232-page manual. For example, once a set of data points have been entered, the command DRAW PIE or just DR P will produce a pie chart. Optional identifiers control the number of colors, total area, and aspect ratio.

Graphs are displayed on the high-resolution screen in any of six colors using line, bar, or pie forms. Line graphs can use solid or dashed lines and the space beneath the lines can be color filled. Vertical and horizontal bar charts can be produced in three formats: vertically stacked, single, and up to four per label side-by-side bars. In addition, images may be overlaid for comparative plots.

The manual is well done and very extensive. With the reference card and a help screen, operation is easy and straightforward.

The program supports both printers and plotters for hard-copy production, but only two of each: the Silentype and Qume Sprint 5/45 printers and the Hewlett Packard 7225A/B and Houston Instruments HIPLOT plotters. Data points and the graphics screen can be saved to disk but because the program uses Pascal files, most graphics dump interfaces and routines will not work with it.

VisiCalc and *Apple Plot* data files may be read by the program, but you cannot transfer information back to standard DOS files.

Requirements: Apple II, II+ or IIe, 64K RAM, two disk drives
Apple Computer, $175

ARBPLOT

This graphics program is actually a teaching tool designed for use in college and advanced high school math courses. It provides visual representations of geometric processes and concepts in analytic geometry, differential calculus, and integral calculus. As such, it comes with documentation labeled "Instructor's Guide" and "Student's Guide." But don't let these academic trappings fool you. This is a high-quality graphics package that automatically plots curves, 3D curves, lines, conic sections, and so forth.

Arbplot is easier to use than it might be, largely because it is completely menu driven. In following the menu, you are basically defining the values for mathematical formulas whose graphic representations are plotted and displayed by the program. Even if you have absolutely no knowledge of calculus and higher math, it is possible to create and then save a variety of interesting shapes. Until you become quite proficient with the system, however, they may not be the ones you originally envisioned.

The package is broken down into three groups of programs, (loaded from two write-protected disks): plotting curves, plotting calculus programs, and a program sequencer that mimics a slide show display.

Those who are unsure if this program is right for them can send for a demonstration disk, available for only $2 shipping and handling. Also see the description of the Surface program below.

Requirements: Apple II, disk drive, DOS 3.3

Conduit, $125

ARTGRAPHICS; CHARTGRAPHICS; WORDGRAPHICS; VIEWER

This rather exclusive group of programs is designed to complement one another to form a complete graphics package. Between them, they are capable of everything from painting to business graphics to slide-show–like presentations. They are, however, designed to run not on average home or small business computers, but on graphics terminals such as the Ramtek 6214 and Florida Computer Graphics Beacon—systems that can cost upwards of $35,000. The advantage is extremely fast processing and screen refresh—both occur within 5 to 15 seconds; extremly good resolution; and better-than-ordinary color selection—16 colors may be displayed on the screen at once out of a possible choice of 256.

Artgraphics is an interactive drawing/painting program designed for use either with a digitizing tablet or through the keyboard. Its initial setup is entirely menu driven. Besides the extensive color choices, you can select among six different "brush" sizes to create lines and opt to use an area fill program. For all images created with the Xybion programs, storage is in run-length encoded form rather than pixel-by-pixel, is common in most other systems. This considerably compresses the space required for image storage and aids in the rapid image processing.

Chartgraphics is a menu driven business graphics program. Up to 520 data points may be entered on a line chart, manual and automatic scaling are available, and both multiple axes and multiple charts may be displayed on the same plot. Bar chart may include either two- or three-dimensional bars, horizontal or vertical, with side-by-side, stacked, or clustered configurations, with up to 20 clustered bars in 12 groups. Pie charts can be created in up to 25 segments, integral or exploded, with chart values placed either inside or outside the segments.

The *Wordgraphics* programs provides extensive character composition ability using a variety of fonts supplied with the program. These can be displayed in many different sizes, outline or filled. The program also has a cut-and-paste feature allowing single letters or groups of letters to be moved or repeated anywhere on the screen.

Finally, *Viewer* allows the assembly of "slide trays" up to 30 images each, with either forward, backward, or random access sequencing.

Requirements: Ramtek 6214 color graphics workstation with 128K RAM, two disk drives; Florida Computer Graphics Beacon with CP/M, two disk drives

Xybion Graphics Systems Corp., Turnkey system with all software, Ramtek hardware, graphics camera for shooting images off CRT, $34,995; turnkey system with FGS hardware, graphics camera, $29,330; Software packages sold separately beginning at $995

ARTIST

Artist is a truly versatile interactive two-dimensional art/graphics program at a truly reasonable price. It performs all of the wonderful drawing and graphics functions that the IBM PC user is likely to need for some time to come. It is loaded from a single, unprotected floppy disk, allowing plenty of room for storage of graphics creations on the program disk. The only potential shortcoming is the lack of a fancy, color-printed program manual; but the typewritten sheets nonetheless provide a more than adequate description.

Seventeen subroutines loaded into Function keys define the basic inventory of capabilities. Option 0, for instance, displays instructions. Option 2 sets the display for high- or low-resolution, allows text entry in 40- or 80-character formats, and lets you select a background and palette color in the low resolution mode. Options 2 through 5 allow points and lines to be drawn, using either cursor movement or entry of X/Y coordinates. Options 6 through 10 allow the automatic plotting of basic geometric forms—triangle, rectangles, circles, ellipses, and polygons composed of up to ten straight line segments—drawn after the user answers a simple set of prompts. Option 11 allows text entry within the image.

More advanced graphics capabilities are defined

by menu choices. To fill a bounded area with color, for example, one uses a subroutine that asks for the interior and boundary colors of the object. Another menu selection is used to define a portion of the displayed image—a window—that can be saved in memory and then recalled for later use. One simply positions the cursor at the upper left corner of the window and types "W," then repositions the cursor at the lower right corner of the window and types "W" again; the image in the window is automaticaly saved. Portions of images or whole screens are retrieved with equal simplicity.

Figure editing is also quite easy. It takes only single keystrokes to move the image up and down, left and right, rotate the figure clockwise or counterclockwise, erase the figure, invert foreground and background colors, enlarge and reduce the figure, and so forth. In this mode, the Function keys increase the angle and incrementation of the moves described above.

Requirements: IBM PC, 128K RAM, color graphics board
Sunshine Computer Software, $75

B/GRAPH

B/Graph will produce graphs of many types on the screen and will print them as hard copy on compatible printers. The best feature of *B/Graph* is its flexibility. Once data is assembled and entered, point, line, area, 3-dimensional bar, and market graphs can be created and interchanged with one another automatically. The user determines what labels, axes, and scales the graph will exhibit. *B/Graph* can also automatically determine the most space-efficient scale for a graph, and automatically label consecutive months or years.

Each graph can accomodate up to 100 data points for up to three different factors, though bar graphs are more limited in space constrictions. Graphs can also be overlaid for comparisons. Graphs can be arranged in sequence for automatic recall and a joystick-controlled pointer employed for easy organization and demonstrations.

Utilities included with the program calculate and plot various statistical functions—including averages, probabilities, standard deviations, and regressions. Data from ASCII files and *VisiCalc* files can be used with *B/Graph* and all graphs and data can be saved to disk.

While *B/Graph* is easy to use, it is very comprehensive and therefore may require some time to become familiar with all it can do. It is powerful enough to handle complex business applications. The manual not only provides clear instructions for use of the various programs, but gives a thorough discussion of the uses of graphs and statistical analysis.

Requirements: Atari, 48K RAM, *Atari BASIC,* disk drive; compatible printers include Centronics, Epson/Gemini, C.ITOH/NEC/Prowriter, Seikosha AT/100, and Okidata 92
Inhome Software, $99.95

BANNER BUILDER

Banner Builder is one of those inexpensive, single function programs that can be described by the word "nifty." Briefly, *Banner Builder* prints messages approximately seven inches tall and three inches wide sideways on continuous form paper. The message can be up to 80 characters long and include any upper-case letter, number, or keyboard symbol.

The huge letters are printed using overstruck solid rectangles. Instead of solid rectangles, you can use any other keyboard character but only one character per message is allowed. Printers listed on the main menu include the IBM Graphics Printer, Epson, Okidata, NEC/C. Itoh, and IDS. The manual says that other printers are also supported.

Operation is amazingly simple: Just type the message, choose the printer, change the print character from the solid rectangle default if desired, and go. The resultant banner is proportionally spaced, extremely readable and, well, nifty.

There are some caveats. Don't hold your breath waiting for the banner to be completed. Each character of the message can take up to five minutes to print. Printing messages quickly turns a new ribbon into an old one. Finally, consider a service contract for your printer if you use *Banner Builder* frequently. In normal operation, *Banner Builder* puts your printer through some pretty bizarre mechanical steps.

Requirements: IBM PC 64K
Software Publishing Corp., $34.95

BENCHMARK GRAPHICS

The *Benchmark* graphics package is part of an integrated system that includes a word processor, mailing list utility, financial planner, and so forth. But it also stands alone as one of the more sophis-

ticated business/presentation graphics programs around.

To the usual presentation charts and graphs, *Benchmark* adds extensive freehand drawing ability; area filling; image enlargment and compression; such computer-plotted shapes as circles, ellipses, and rectangles; and the complete freedom to mix text with graphics. One important feature is that the IBM color graphics board is optional; the program can be run with a black-and-white monitor, then plotted on a color printer for the final output.

The program works with 12 graphics primitives, including arcs, ellipses, rectangles, and lines. Selecting one brings up subroutines to control and manipulate it. Some are common to all primitives: The numeric pad governs the movement of the form or cursor from its home position in the center of the screen. "C" and "R" increase the speed of movement. And "F1" cancels the command. Other controls are specific to a one primitive. When "ARC" (draw an arc) is entered, for instance, "+" and "−" change the arc radius and the Arrow keys vary the arc's starting and final angles.

Freehand drawing uses the numeric pad to select points, which are then automatically connected by the computer. This same simplicity is found in many other commands. "MES," for example, creates a background mesh of lines whose height and width can be varied incrementally. Line thickness can be changed, five fill patterns selected, and text entered anywhere on the screen.

Two "super-primitive" functions can be called into play at any time. One is a Set toggle that displays intersecting lines either as a combination of elements—a line through a circle will show both the line and the circle—or with one element in the foreground, blocking part of the form "behind" it. The second super-primitive lets you select a color from the graphics primitive menu, then use it in drawing whatever other primitives you need.

When working with these routines, complex images are built one on top of another; at any point, the form can either be locked together and all the components treated as one, or broken down so that individual elements can be added, deleted, or changed in some way. This function is one of the program's most useful features.

Graphs and charts may be created almost as simply, with subroutines called up from a menu. Scales are set, for instance, by entering their minimum and maximum values. Again, the bars can be manipulated with the graphics primitives commands—moved, labeled, filled with color or patterns, resized, and so forth. Because new images are simply added on top of old until the screen is cleared, it is easy to prepare multiple chart images or to combine charts with other graphics or text.

Line charts must be plotted point by point, as if using the Dra graphics primitive—positioning the cursor at the next point, then telling to program to draw a connecting line. The advantage is that the control over line thicknesses and other variables offered by the interactive graphics program are available here.

The documentation is quite well written, and is organized to take you step-by-step through the graphics process at first, then refer to it quickly as you become more proficient.

Requirements: IBM, NEC, or Victor; PC-DOS or MS-DOS

Metasoft Corp., $599

BPS BUSINESS GRAPHICS: APPLE II BUSINESS GRAPHICS

When you see ads on television or in magazines depicting beautiful, full-color graphs on a display monitor or rolling out of a plotter, chances are very good that they were created with this program. Many consider it to be the finest business graphics program available.

BPS displays dozens of different chart types—over 70 are depicted in a brilliantly executed tutorial manual—in 16 colors, with full control over every single variable of the graphic display. They can be turned into hardcopy on over 70 models of printers and plotters—fewer for the Apple—supported by the software.

Compare the vital statistics with those of other business graphics packages: For line charts there are four different line thicknesses, solid or dashed, connecting nine different point styles. There is no limit on the number of variables per chart. Bar charts can be set up either horizontally or vertically at will, with up to five bars clustered per table, filled with seven patterns, in outline or solid. Pies can be displayed whole or partial, again with a choice of seven fill patterns. The same goes for curve fills (any number) and screen fills. Multiple graphs can be plotted on the same axes, and provision is also made for scatter charts. Text may be placed horizontally or vertically anywhere in the display. Axes

titling is done automatically from menu prompts, and the legend box automatically selects appropriate colors for the display.

Data handling is just as flexible. The system accepts either keyboard entry or files created by *VisiCalc, SuperCalc, Multiplan, 1-2-3, dBASE II,* and other business programs. One unique advantage is that the *BPS* package also permits mathematical computations to massage the data. These include standard calculator functions as well as smoothing, regression, and curves in which you specify constant, line, parabola, logarithmic, or sine.

The documentation and user support live up to the program itself. Onscreen help displays are available for 23 subjects, and an excellent tutorial/demonstration program on its own disk, along with the tutorial manual, enables you to walk through the program's many features even while learning to operate it—though the manual itself is so clearly organized that you might begin using the program immediately. The program is copy protected, but there is a backup copy of the master system disk in addition to the main system, demonstration, and printer/plotter installation disks.

The price tag is high, of course, for the simple home user. But in the business environment, where there is money available to pay someone else (in this case the *BPS* programmers) to do some of the work for you, this is one of the best choices on the market.

Requirements: IBM PC, 128K RAM; Texas Instruments Professional Computer; Wang Professional Computer; Apple II+ with 48K RAM, language card or 16K add-on memory; two disk drives
Business and Professional Software, IBM and Texas Instruments $350; Wang $300; Apple $175

BUSINESS GRAPHICS PAK

This new offering from Radio Shack seems both useful and welcome—a remarkably versatile package. With a minimum of effort, *Business Graphics Pak* will generate a wide variety of line, bar, pie, and scatter charts.

Line charts accommodate three lines with up to ten points per line. Bar charts fit up to ten values per bar, with bars either groupd or stacked, with both positive and negative values. Pie charts and exploded pie charts may contain up to 12 slices. Scatter charts may be based on three X,Y coordinate sets, or six data files of 100 values each.

The program is run from a hierarchy of logical menus. The main menu leads to submenus for data handling, line charts, bar charts, pie charts, scatter charts, and a chart text editor. Most of those have submenus in turn.

You can enter data from the keyboard or from files created with this package; utilities also make it possible to use files from *Scripsit,* BASIC, FORTRAN, or *VisiCalc.* The program will also generate files for you based on either arithmetic or geometric progressions and values you supply. Up to 100 values are allowed per data file.

An added facility will add a constant to your entries, subtract it, or multiply or divide raw data by it. This feature will compute moving averages or calculate trends using least squares for linear, quadratic, and exponential trend types. It will also consolidate figures; for example, summing monthly sales for quarterly totals.

If your printer or plotter allows, a variety of lines and fillings are available: solid or dashed line, dotted line, or no line; up to eight color choices; no fill, light, or dark for enclosed areas. With a high-resolution printer, vertical, horizontal, and checked fills may be used. Drivers are included for 17 Radio Shack printers and plotters.

If you wish, the program will set the scales on your chart—it does a good job—or you can set them yourself. Horizontal axes may be graduated in numbers, weeks, months, quarters, or years; vertical scales are numerical. Charts may be labeled automatically at the top or bottom or along the left edge. You may set the size of your chart and whether it is to have a border. If none of the automatic options is right, you can insert text anywhere on the chart.

You may display the chart at any time on the screen to see how your settings look. With the high-resolution graphics option, the display will appear almost exactly as it will be printed.

The program is sold on a TRS DOS 2.0a single-sided disk for the Model II. The drivers and utilities are provided on two more disks. Model 12 and 16 owners will probably transfer the programs, drivers, and utilities they need to double-sided TRS DOS II disks, a difficult and time-consuming process.

The manual is very complete: It has a good table of contents, a comprehensive index, a good description of controls, how to run all functions, sample sessions, a getting started section, and

appendices that cover error messages and other things you may need to know. However, it is a bit disorganized, requiring a good deal of page turning when you are learning the program.

Overall, this is an impressive package. Some operations are painfully slow, but when you consider the number of operations required for automatic scaling and driving the output devices, it helps your patience. In fact, the delays may result from the great amount of disk access required—always slow on a Model 16. It might well run faster on a Model II under TRS DOS 2.0a.

Other criticisms are minor, and there are many conveniences that have not been mentioned. A Model II or 12 equipped with high resolution graphics, a high resolution printer or color plotter, and *Business Graphics Pak* would make an outstanding combination for those who have many charts to produce.

Requirements: TRS-80 Model II, 12, or 16; 64K RAM; disk drive; printer or plotter
Radio Shack, $249

BUSINESS GRAPHICS III

Business Graphics III is a graph generator for the Apple III that uses ordinary English commands to create line, pie, bar and stacked-bar graphs, among others. Any of the graph types can then be combined to accomodate a wide range of needs. The program requires neither mathematical skill nor a calculator; all computations are done internally.

Typing the command "EDIT" places you in the data-entry mode. You can type in numbers of graph titles; titles are denoted by quotation marks. Data from previously generated graphs can be entered as individual points or as a group of points with their own corresponding labels. All such data can be modified or deleted from memory. Once the points have been entered, you type the command "DRAW" followed by the appropriate graph type and *Business Graphics III* will generate a graph on the screen. Once a graph is drawn, it can be printed on a wide variety of printers. Both the data entered and the generated graph can be saved to disk.

Data from other graphs can be appended to graphs in memory or extrapolated using the relationship between points already present. *Business Graphics* will even inform you of the possible margin of error. At any time, you can have an additional value added to all points, or you can increase or decrease them by a percentage of their value.

Because the program uses the Pascal operating system, it comes with the Pascal runtime package. If you don't have a hard-disk system, you may need a total of 256K. If you want customized, professional-quality graphs, however, it's worth the added expense.

Requirements: Apple III, 128K RAM, two disk drives
Apple Computer, $250

CADPLAN

Despite its name, *CADplan* for the IBM PC with 320K RAM cannot be the same as CAD programs run on mainframe computers. Images are limited to two dimensions. The output resolution is only that of the color graphics card and display monitor, not a high-resolution display. And you neither draw directly on the screen nor use a digitizing tablet the size of a drawing board; instead the program supports a mouse. In every other respect, however, *CADplan* is a fully professional CAD system offering features not even hinted at in most other software for micros.

What makes it so professional is the number of choices it gives you. You define the scale of the drawing and grid markings. You determine whether lines will be "locked" to grid vertexes for precise angulation or left floating free. You decide whether to display the grid. You decide on the exact thickness of the lines. There is virtually no aspect of creating floor plans, engineering diagrams, flow charts, and even business graphics that you cannot control through this program. The only sacrifice is in the range of colors: Only red, yellow, green, and black are available.

In addition to basic line drawing functions—either a "rubber band" effect or a standard line—you have a full choice of automatic plotting functions, including circles, arcs, and rectangles. An extensive shape table program lets you define a window and save it for later use. The same function lets you rotate and move the drawing or zoom in or out in 2× increments. All of these functions are fully interfaced with the mouse; you get specific instructions about which button to push as each new menu routine is selected. With many routines you also can enter precise coordinates through the keyboard rather than visually positioning the mouse.

The program creates drawing on up to 65 overlaid planes, which can either be locked together or split apart. You thus can create different elements of the drawing on different planes and modify only specific parts without affecting the rest. The same principle holds when moving objects or saving them to the shape file: You can move a single object, defined by placing the cursor within a bounded area; or you can "gather" objects together and move or manipulate them as a group.

Another major feature—one found on many professional CAD systems but unique among microcomputer programs—is automatic cost analysis. By defining the height of a wall and entering a basic drywall sheet dimension, you can calculate how many sheets will be needed to execute your design. If you enter the cost of wallboard sheets, it will even tell you how much the project will cost. Similarly, you could define a particular sized circle as a conference table, then ask the program to tell you how many conference tables you placed in the office design. All of these features require an optional database analysis package.

Requirements: IBM PC, 320K RAM, two disk drives, color graphics board
Personal CAD Systems, *CADplan* $1,200; database extraction $350

CHARTPAK-64

From the start, graphics have been an important part of personal computing, not just for drawing pretty pictures or playing games, but for visually representing information, as well. The reliance on graphics—charts and graphs—in business is increasing, too. *Chartpak-64* is an attempt at a low-cost business graphics software system for the Commodore 64.

With video screen resolution of 320 by 200 pixels in up to 16 colors, the 64 is well-suited to drawing charts and graphs, and *Chartpak-64* strives to take advantage of this capability. In addition, it is designed to print screen graphics on Commodore's 1515 or 1525E printers, on Epson printers with *Graftrax,* and on the Star-Micronics Gemini-10 or Gemini-15.

Designing a chart or graph begins with entering data that can then be stored on diskette. The values along the *X* and *Y* axes are specified, as are legends or other information to be incorporated into the graphics. *Chartpak-64* offers several different types of charts and graphs: pie charts, horizontal and vertical bar graphs, horizontal and vertical charts, conventional *X-Y* plotting, and comparison plots. The results, both printed and displayed on the video screen, are quite impressive.

Chartpak-64, unfortunately, is not easy to learn, nor to operate. Although it was designed by Roy Wainwright, who did an admirable job with *Ultrabasic-64*—an excellent BASIC extension for the 64—*Chartpak-64* is confusing and overly complicated. This is undoubtedly the price paid for the program's enormous flexibility, but it might be easier to draw graphs and charts using either Wainwright's *Ultrabasic-64,* the more powerful *Simons' BASIC,* or an integrated software package that provides for business graphics.

Requirements: Commodore 64, one disk drive
Abacus Software, $42.95

COMBINED ENHANCED GRAPHICS SOFTWARE

This screen dump package allows the Apple II to print out graphic images on some 20 popular models of printers using virtually any of the interface cards now available. One of the first such systems on the market, it has since been upgraded and improved several times since it appeared in 1979.

After following prompts to define the kind of printer being used, you come to a menu of the basic printing program and options. Choices include black on white and reverse printing, standard (4 by 3) aspect ratio or an enlarged (7 by 5) format, and horizontal positioning. A special program feature allows a search of the disk for all binary language files, which automatically includes all the high-resolution images; the catalog is then displayed and the user can step through the choices with the Space bar, selecting and executing a printout with the Return key.

Also available is a ditherizer for the IIe that enables it to capture a frame from a video camera, digitize it, then display it as a high-resolution image. The processing speed depends on the number of grey scale values assigned to the image—1 to 64—so that even moving objects can be captured by using low contrast. The ditherizer kit contains both an interface card for the video camera, ditherizing software, and the *Combined Enhanced Graphics Software* screen-dump package.

Requirements: Apple II, disk drive
Computer Stations, $34.95

COMPUTER (HIGH-RESOLUTION) GRAPHICS

Some of the most loyal TRS-80 afficionados have from time to time wished for the higher resolution graphics capabilities similar to those of some of its competition. The reasons might be for engineering or business graphics, or for creating games or animation, and the TRS-80's normal low-resolution (128 by 48) block graphics just do not completely satisfy.

The software/hardware combination reviewed here is Radio Shack's offering for those who have such a need—a package that provides 153,600 (640 by 240) pixels instead of the normal 6,144, 25 times as many points.

We had hoped to review the Model 4 version (26-1126, $249.95) but it was not yet available though included in the current Radio Shack catalogs. From descriptions, the two are identical in functions and performance, and we cannot tell you why the price of the Model 4 package is markedly lower than the Model III.

Both packages provide a board, which includes 32K additional memory to handle the high-resolution graphics display and requires installation, and the software which includes a graphics BASIC (GBASIC), sample programs, and some machine language utilities.

We had our Model III kit installed in our Model 4 at the local Radio Shack computer center for a fee of $30. The internal board uses the normal buss connection and provides a new one at the end of a short cable extending outward from the same physical opening for connecting hard disk or other peripheral requiring connection to the buss.

USER SET-UP AND INSTALLATION

The programs, utilities and sample files are distributed on a TRS DOS 1.3 diskette with no backup limitations. We expect that most users will probably immediately do the same thing we did—boot the disk (a backup, of course), load BASICG, and run some of the sample BASICG programs to see what the effects look like—even though the manual does not suggest this approach. And if you are using a backup, it's not a bad approach because when you see the rather dazzling effects, a normal reaction is, "Gee, that looks great, how do I do that?" and to immediately bury one's nose right back in the manual to see how it works.

The sample program's titles include such jewels as *PecanPie/Gra, ThreeDee/Gra, Clock/Gra, Linegraph/Gra, TwoCol3D/Gra,* and more similar titles. Listings, liberally commented upon for some of the titles, are in an appendix in case you want to study or modify them; and since they are in BASIC, you could of course List any of them to your printer for study.

Suffice it to say that set up and installation is no problem.

GBASIC

The heart of the system for most users will be BASICG and so examination of some of its features are in order. The manual devotes a major part of its effort to lucid explanations of the BASICG commands and functions.

The conceptual center of the system lies in the ability to turn any one of the screen pixels "on" (white) or "off" (black). These are addresses in an X,Y coordinate system. BASICG builds on this to provide commands that make the creation of geometric entities easier to create than using the process of your setting every individual pixel either on or off.

We cannot detail here all of the characteristics of the GBASIC commands, so we'll list the commands and detail a couple of them to provide an idea of the system's operation.

The commands include:

Circle—draws a circle, arc, semicircle, etc.

Clr—clears the graphics screen

Glocate—sets cursor location and direction for putting characters on the graphics screen

Get—reads contents of a rectangle on screen into an array for future use by Put

Line—draws a line in specified style and color (on/off). Also creates box or rectangle

Paint—paints an area a specified style

Preset—sets a pixel on/off

Print #-3—writes characters to graphics screen

Pset—sets pixel on/off

Screen—selects the graphics or text screen

View—creates a viewport which becomes the current graphics screen

&Point—returns the on/off color value of a pixel

&View—returns the current viewport coordinates

Before exploring a couple of the above commands as examples, let's first define a few examples of BASICG operation.

Two "screens," or modes—Text and Graphics—

can act independently. The normal text display will operate as it always does; a graphics screen operates separately for display of graphics. The Screen command is used to display one or the other, but they cannot both be displayed simultaneously, and they must be cleared independently.

Files created under regular BASIC are not directly loadable by BASICG and vice versa. If the file is saved in ASCII format with the Save "filename/ext," A procedure, the file of either may be loaded to the other; however, BASIC will not run programs with statements or commands peculiar to BASICG. BASICG uses about 6.5K more of user RAM than BASIC.

The Circle command is a good example of the "shorthand" provided by the system to create graphics. Its full statement is:

CIRCLE (x,y),r,c,start,end,ar

Where x and y are the integer coordinates of the center's location, expressed in pixels; r is the integer expression of the radius in pixels; c specifies the on/off color (white/black)—c is optional, and if omitted defaults to white; start is start point of the figure in radians, 0-6.28135 is optional, defaults to 0 if omitted; end specifies endpoint, expression same as start, is optional, if omitted defaults to 6.28315; ar is the aspect ratio of the figure—values greater than .5 draw ellipses with major axis on Y-axis, less than .5 ellipses with major axis on the X-axis; .5 draws circles—optional, defaults to .5 if omitted.

Additionally, if negative values are used for either start or end or both, the corresponding radius is also drawn, allowing the construction of "pie" slices.

Thus in a single line statement is the ability to draw a wide variety of circles, ellipses, the arcs of both, pie slice and other variants.

The Line command is equally versatile. Its form is:

LINE (x1,y1)–(x2–y2),c,B or BF, style

Again, the dimensions are expressed in pixels, the first x.y values providing the origin, the second the endpoint. The c specifies color, the B will draw a box based on the specified line as the diagonal, and BF will shade the box. Style allows choice of solid line or a variety of dotted or dashed lines.

The Paint command allows "painting" specified enclosed areas with a nearly infinite variety of patterns that can be created with user defined string variables. Border and background color may also be specified.

While you cannot, in the conventional sense, type to the graphics screen, the Print #-3 command provides for writing characters to the graphics screen, and the Glocate command is used to set the start point and direction of print—it is not limited to the conventional horizontal left-to-right.

Other commands provide the ability to: turn any pixel on/off; determine the on/off condition of any pixel; read the contents of a rectangle on the screen into an array for later display at a user specified location; create a "viewport" on the screen that becomes the current graphics screen; and determine the coordinates of the current viewport.

GRAPHICS UTILITIES

The program includes a set of assembler language programs that allow loading and saving displays to/from disk, clearing graphics memory, and printing graphics displays to the compatible printers. The utilities may be executed from DOS Ready, or may be called from BASICG by use of the CMD "I" function, for example,a BASIC program may contain the line:

100 CMD "I", "GLOAD DISPLAY 1/GRA"

It is also possible to use the utilities with FORTRAN, and a chapter of the manual is devoted to use of the programs with FORTRAN.

The source code for all of the utilities are contained in the user's manual.

We were not able to test the graphics printing capability. Three different print commands are provided for use as appropriate with Radio Shack dot matrix printers including the LPVII, LPVIII, DMP100, DMP200, DMP400, and DMP500. We had none of these available and were left in doubt by the manual's wording as to whether any of them would produce an exact pixel-by-pixel reproduction of the graphics. It would seem likely that the later Model 4 version may include print drivers for the current Radio Shack DMP-series printers. If precise printouts are important to you, we would suggest checking this point in detail before purchase.

DOCUMENTATION

The *Computer Graphics* package is not an instant creator of pie, line and bar charts for the businessman who is interested only in quick results and not his computer or in programming graphics, and the documentation reflects this orientation.

Computer Graphics is for the person who understands his computer, is familiar with BASIC programming and possibly Assembler. For him, the manual provides complete descriptions of all commands and functions, frequently illustrating them with sample programs.

The manual also helps the novice programmer. For example, in addition to descriptions of how binary code sequences may be used to define hex strings that are used for lines, and others that may be used for "tiling" used to paint areas of graphics, the manual also provides many frequently used samples of both and conversion tables to assist the programmer. GBASIC program listings and source code listings also aid easy understanding of the programs.

The manual is, in short, comprehensive—holding nothing back—easy to read, well organized, and has a good index.

EVALUATION

Computer Graphics is an excellent package for the experienced or semi-experienced programmer who wants to combine his imagination and creativity with the versatile tools provided by *Computer Graphics* to produce high resolution graphics on the TRS-80 computers.

The commands provided in *Computer Graphics* are versatile, and when combined with the normal powers of BASIC—for/next loops, conditionals, and math functions—provide a capability to create effects limited only by the programmer's interests, imagination, and capabilities.

We considered the package not unreasonably priced at $369.95, and if the Model 4 version provides, as advertised, the same capabilities for $249.95, it will have to be counted as a bargain.

Requirements: TRS-80 Model III, one disk drive
Radio Shack, $369.95

DATA*EASY BAR GRAPH GENERATOR

For many business applications, all you need for illustration is a bar graph. This program will create it for you with amazing ease. It uses the standard graphics capability of the ASCII character set, already programmed into most computers, rather than the output of a color graphics board.

Compared with some of the more sophisticated business and presentation graphics programs, the number of choices here are somewhat limited. Times displayed on the *X*-axis, for instance, can be in years, months, weeks, or days, with up to 15 periods per graph—but that's it. Nonetheless, the program does allow three graph plots to be displayed together as clustered, stacked, or overlaid bars. And its menu routines for both entering data and editing chart parameters are quite easy to follow.

The manual is well written. However, because this is part of a series of business and accounting programs, the first two-thirds of it is devoted to general program information and setup.

Requirements: IBM PC, 64K RAM, disk drive
Data Consulting Group, $35

DELTA DRAWING

If the text and illustrations in this program's manual were not aimed at five- and six-year-olds, the program might well be a full-fledged adult graphics program. Unfortunately for adults, the language of the manual *is* obviously meant for kids and is rather offputting. And unfortunately for small children, the program is so complex and requires so many steps that it may indeed be more suited to mom and dad.

The program creates drawings by moving the cursor one pixel at a time using appropriately labeled keys; D = down, R = right, and so forth. Another set of keys enables the creation of half-pixel steps so that smooth curved lines can be constructed. Colors are easily selected and can be changed in an existing drawing. Up to four different line colors, background colors, and filled-area colors can be used in each drawing.

Advanced drawing modes offer features such as "Kaleidoscope," in which every move of the cursor is mirrored four times; text insertion; expansion and compression along both axes; the ability to reposition the drawing on the screen; a random line generator; and so forth. A form of animation can be achieved by controlling the speed at which images are loaded.

Requirements: Apple II+ or IIe or IBM PCjr., 64K RAM, disk drive; Atari or Commodore 64, 48K RAM, tape

Spinnaker Software, Apple or IBM $29.95; Atari or Commodore $39.95

DEMOGRAFIX

This program allows you to set up sequences of graphics created with other programs on the Apple II. These may be displayed under control from the keyboard, under remote control from a hand-held controller supplied by the company, much like the remote control of a slide projector that can go forwards, backwards, or pause; or unattended, with a preset speed.

Its best feature is the enormous range of transition styles it gives you. You can flash between images on the two high-resolution screens for an animationlike effect; roll up and down or left and right; crawl from one image to the next; build ghost images in which every other line is removed and the line above it repeated; dissolve from one image to the next; create push-ons; or use "Snap," which holds the incoming image in a buffer memory until it is completely assembled, then bursts it onto the screen. All except flash also let you set the rate at which the transition will occur, from extremely slow special effects to the fastest recall time—about one second. This, of course, is much faster than the conventional Apple recall time.

Information about the control sequence is loaded into control files, edited through the main menu of the program in response to a series of prompts. Since you have the opportunity to select the type of transition and the load time for each new image, you can vary the effect and speed from image to image and change the control sequence at any point. Graphics are loaded from the second disk drive rather than the primary drive, which contains the program.

You can print out the control sequences for easy reference, or you can print out the images themselves. The program works with an Epson MX-80 or MX-100 with graphics option or with other printers through a screen dump program.

Demografix's manual is clearly written—simple, straightforward, and easy to follow.

Requirements: Apple II+ or IIe, 48K RAM, two disk drives

Business Logic, $129.95 (includes hand controller)

DICOMEDIA 1 AND 2

These two integrated hardware/software packages—*Micro 1* for the Apple II+ or IIe, *Micro 2* for the IBM PC—are the scaled-down versions of a product line used extensively in CAD/CAM and other industrial and professional applications of computer graphics. This version uses your computer, a Dicomed graphics tablet, and a phone modem hooked to a Dicomed D148"S" Color Image Recorder to translate your images into slides, transparencies, or prints. It is every bit as sophisticated as its big brother CAD/CAM system.

The software is essentially a business/presentation graphics package, with several distinguishing features. For one thing, 64 colors can be selected and displayed in a single image, including primary shades, pastels, and gray tones; this is far more than the 16 background and 6 line colors choices available with most graphics designed for the PC. For another, text entry is quite flexible, offering a choice of seven sizes, horizontal or vertical direction, and different drop shadow sizes (which can be used to create a zoomlike effect as the drop shadows grow larger). You can also use a rectangle plotter to draw rectangles anywhere on the screen for the creation of organization diagrams and other charts.

As with most business graphics packages, the actual creation of the charts is completely menu driven and almost completely automatic. Bar charts can hold up to 20 bars per image, grouped or singly. With pie charts, you can have 1 or 2 per page, with up to 12 slices in a single pie, 8 each in a two-pie display. In the line-chart mode, you can generate 3 separate lines per chart with up to 24 points per line.

The *Micro* software also forms the basis of a graphics design station system from Dicomed—the Presenter—which adds a 64K RAM computer with twin disk drives, a 12-inch black-and-white monitor and a 13-inch color monitor to the Dicomedia package described above. You do all the design work on the black-and-white monitor, then view it on the color monitor at any point during the creation process. The color monitor retains the image while you go back to the monochrome, enabling you to compare different stages of the composition.

Requirements: *Micro 1*, Apple II+ with 48K RAM, IIe with 64K RAM, two single-sided disk drives, 80-column printer card, NTSC-compatible monitor; *Micro 2*, IBM PC, 64K RAM, two double-sided disk drives, color graphics board, NTSC-compatible monitor (IBM monitor does not work), PC-DOS 1.1

Dicomed, *Micro 1* $6,000; *Micro 2* $6,500; Presenter $17,950

DOODLE

Doodle describes itself as a color sketch pad for the Commodore 64. With it you can draw and color on the screen, using a joystick or trackball and a set of programmed drafting tools.

Functions are chosen from a menu. Sketch is the basic drawing function. Lines, boxes, and circles are the drafting tools. Zoom enlarges the screen pixels so that detail can be added. Two especially powerful functions are copy and stamp. The first memorizes any image and copies it to another place on the screen. The copy can be enlarged or reduced, and rotated in increments of 90 degrees. Stamp is used to create up to nine different "rubber stamps," which also can be used to duplicate portions of screen images.

Two other functions, letter and color, allow you to enter text—horizontally, vertically, or upside down, in several different sizes—and finally to color the picture. Since *Doodle* uses the highest screen-resolution mode—320 by 200 pixels—the original drawing is created in two colors, black against a white background. The process of coloring can be compared to using crayons on the finished product—it is an imperfect approach to the problem, at best. Screens prepared with *Doodle* can be printed in black and white on Commodore, C. Itoh, NEC, Epson, Star Micronics, and Okidata dot-matrix printers equipped with the necessary graphics options.

While *Doodle* is more difficult to use than the painting program included with the KoalaPad, the ability to enlarge, reduce, and rotate objects is a nice addition. It is difficult, though possible, to draw free-hand using the joystick. Overall, a trackball is quicker, easier, and more natural. Generally, the program has some good features we have not seen in other graphics programs. The only regret is that there isn't a version that works with the KoalaPad.

Requirements: Commodore 64, one disk drive
City Software, $39.95

DR GRAPH

This is just what you would expect from the people who created the CP/M operating system. *DR Graph* is a completely menu-driven, automatic chart creator. It can produce bar, line, pie, scatter, clustered bar, stick, stacked bar, or text-only charts. The program makes virtually every plotting decision, yet allows you to take manual control when you want to change the automatics.

Although designed to operate in monochrome on the IBM PC, *DR Graph* will present full-color previews when used with a color graphics board. On CP/M-based computers, you must wait until the image is run on a plotter before seeing it in color.

Among its many features is a nicely organized process that allows you to select between eight color and eight fill patterns. This makes it easy to add color and pattern to any element of a chart. On bar charts, it gives excellent control over such features as bar width, stacking and clustering, and horizontal or vertical composition. Pie charts are divisible into 16 parts. Lines may be solid or dashed, axis lines thick or thin. Bar and line charts can be combined in the same display, using the same axis, while four different graphs can be presented on the same page of hardcopy. Labels, headlines and subheads, and legends may be placed anywhere within the chart.

Data may be entered through a well-designed menu prompt system. Or you may use *SuperCalc* SDI, *VisiCalc* DIF, or *Multiplan* SYLK files as input.

Documentation is well written; it can be followed by the novice but is not offensive to the experienced operator. Illustrations are clear. And, unlike the manuals supplied with many other programs of this kind, the text is typeset rather than typewritten —much easier on the eyes.

One aspect of the program that may prove confusing is the menu structure. The process begins simply, but it is not until the file has been saved that you are given a choice of annotating the text or moving the legend. The intricacies of the command menus are shown quite nicely in the manual, but it's a good idea to memorize the basic structure as soon as possible.

Requirements: CP/M-80; IBM PC, CP/M-86 or PC-DOS
Digital Research, $295

ED-A-SKETCH

Most terminals are already equipped to display the standard ASCII graphics set, a series of lines and angles entered through the terminal's graphics mode, as well as such other graphics functions as half-intensity video, underlining, and so forth. All

this is achieved without special graphics adaptors, but is often hard for the nonprogrammer to use. *Ed-A-Sketch* lets you access these various terminal graphics functions, use them to create images on the screen, and save them to disk where they can be incorporated as graphics routines in regular BASIC programs.

In addition to creating images one graphics symbol at a time, the program offers block operations, much as a word processor handles text. Thus, rectangles of various sizes can be defined on the screen, then filled with different characters or symbols, moved about, and so forth. During most operations, the status line(s) at the bottom of the screen can be used to display an index of the ASCII graphics characters and their corresponding letter keystrokes.

The program comes with a caveat that it is not designed to provide screen dumps without added software; without a screen dump utility, the graphics symbols will be printed as their corresponding letter. Despite this small limitation, *Ed-A-Sketch* is an exciting tool for those whose computers do not support other kinds of graphics program.

Requirements: Heath/Zenith computers, HDOS; Osborne 1; two disk drives to initialize system, which then runs with a single drive
The Software Toolworks, $29.95

ENERGRAPHICS

There is something almost unbelievable about this IBM PC program. Using only 64K of RAM, it promises not only color business graphics, but two-dimensional interactive drawing and painting, a symbol generator with 140 symbols arranged in 30 templates, and an interactive 3D drawing program with hidden line removal as well! Amazingly, the promises turn out to be true. Enertronics delivers the whole thing for only $250; $350 with a plotter interface option, though the main program supports most dot matrix printers with graphics capability.

Beginning with the best things first, the 3D editor is nothing short of spectacular. Using either a bit pad or the keyboard, you can create shapes composed of up to 20,000 data points—the capacity of an IBM diskette and far more than is needed for most applications. To the right of the display screen appear Function key definitions, plus a scaled-down version of the object. In the main part of the display, the object is shown either as wireframe or with hidden lines removed. The object can be viewed from any angle and also scaled up or down. Also, since the object can be created on several interconnected planes, you can choose to manipulate one of the planes independently to replicate its information, rotate or mirror it, and so forth. This is used when, for instance, one element of the 3D object is repeated throughout its design while the other elements remain unchanged.

Other capabilities include the creation of surface drawings, coupled with linear, polynomial, or multivariate regression analysis. Like 3D objects, the surface plots can be viewed from any angle.

Two dimensional freehand drawing can use a bit pad or the keybard. Lines can be of virtually any thickness, and the drawing can be rotated, mirrored, or repeated. This part of the program works with the shape table/symbol editor to create forms in a 24 by 24 dot grid. Both the blown-up dot pattern and an image in real size are displayed, together with a menu for adding and removing dots and storing the form in the shape table. The program also comes with several useful sets of predefined symbols, especially those used for electrical design, both standard and digital. For mechanical design the program can add dimension measurements to the drawing, plus a legend box, which you just fill in with the appropriate specs.

The business graphics facilities offer all the standard graph types—line, bar, and pie, with exploded slices—in a menu-driven format. The program accepts either keyboard input or DIF files. Best of all, the charts can be manipulated by both the 2D and 3D editors, enabling fanciful presentations of 3D stacked and clustered bars and similar images. The program will automatically sequence through selected displays, giving a kind of electronic slide show.

In all of this, there are bound to be some pitfalls. The two most apparent are the limited choice of colors text-handling capabilities—unless you create your own fonts and store them in the shape tables. But given the overall power of the program, fine documentation, ease of use, and, perhaps best of all, its very low price, *EnerGraphics* seems destined for the best-seller list.

Requirements: IBM PC, 64K RAM, two double-density disk drives, color graphics board
Enertronics, $250; $350 with plotter interface; demonstration disk available for $15

ENHANCED BUSINESS GRAPHICS; STROBEVIEW

With dozens of business/presentation graphics programs on the market, how do you decide which is best for you? It's difficult at best, and made even more complex by the entry of excellent programs such as this onto the market. Not designed for on-screen displays, it is used to create line, pie, and bar graphs on either single- or multiple-pen Strobe plotters.

EBG's graphics are awesome. To begin with, up to four graphs of any type can be displayed on a page, in either horizontal or vertical layout. Line graphs can use linear X and Y axes or linear X and logarithmic Y, with seven different types of line and nine point markers. Pie charts come with up to 15 slices and 5 different hatch patterns. Bars can be stacked or clustered, with seven shading patterns, including solid and outline.

Two special features make this an outstanding program. One is excellent text handling, both for legends and for axes and chart labels. Another is the large number of data points that fit into each chart. With line charts, for example, up to 8 lines can be drawn per graph, with either 120 or 255 data points, depending on your computer's memory. Bar charts hold up to 48 bars side by side or stacked, or up to 24 sets of clustered bars, six per set. Data is stored in DIF files on a separate disk, allowing simple conversion of one graph type to another using the same data. And the program can also read and plot data created with a spreadsheet.

Supplementing *EBG* is *Strobeview*, a set of programs that manipulate shape and text for more interesting plotter output. There are three programs in the package. *Viewgraf* gives you a choice of three type styles—regular, bold, and offset—in sizes from .05 to .50 inches, which can be either centered, indented, or justified. *Shape* gives you a choice of such basic shapes as a pointing finger, bullets, circles, rectangles, and diamonds. These can then be used with limited amounts of text either inside the shape or alongside it—ideal for flowcharts and similar diagrams. *Newtyper* is used when more extensive text files are to be presented.

Requirements: Apple II, II+, IIe, or IIi; IBM PC; Kaypro, Osborne, Compaq, or Columbia; two disk drives

Strobe, *Enhanced Business Graphics* $195; *Strobeview* $75

ES PAINTER

This program proves that with a little imagination and a lot of excellent forethought, software for basic interactive painting and drawing need not be any more complicated than using a brush and paint. *ES Painter* is simple enough to be used by a child, and yet it doesn't make you feel like a child to use it.

Part of the simplicity comes from using a joystick to control the brush (cursor) movement, eliminating the cursor control keys used in so many other programs. One button on the joystick turns the brush on and off, the other is not used at all. The rest of the program is accessed through the Function keys.

Immediately after the program loads, you are given a choice of 16 background colors—you simply type in the number corresponding to the color palette display. The same choice is made for the brush color, selecting one of the two IBM color palettes. After this, either the background color or one of the brush colors can be used simply by pressing one of the Function keys. To change the drawing board color or the brush palette while painting, another Function key recalls the color selection menu.

Another Function key fills an area with a selected color. Still another saves drawings onto the diskette. One calls stored drawings back. And F10 erases the displayed drawing without saving it. That's all there is to it—unless you have a second disk drive and can view or alter nine sample images supplied on a second disk.

This isn't a program that will allow you to create 3D images, or automatically plot presentation graphics. Nor does it offer some of the more sophisticated drawing and painting modes; cut-and-paste, for example. But if all you want to do is experiment with graphics or give a child some creative freedom, there's probably no better program on the market.

Requirements: IBM PC, 64K RAM, disk drive, color graphics board, self-centering joystick

E&S Software Services, $45

FONT GENERATOR II

Font Generator II is a menu driven, Business-BASIC program that lets you customize preexisting character sets supplied with the Apple III or create nonstandard characters. The program can hold up to 16 character sets in memory, and it reserves

space for a working font, which may consist of segments of existing character sets or newly created ones.

From the menu, you can scan the directory of any drive for valid font files, load a file into any of the 16 available slots, and/or transfer sections to the working set. Any of the fonts may be displayed on screen. You create new characters on an on-screen grid, which makes it easy to orient and alter individual character segments. When you've finished designing, the new character is shown in both normal and inverse video, black letters on a bright background, for approval. Newly created font files are stored in text format; some programs, however, may not recognize these as valid fonts.

Font Generator II is not fast: No Business-BASIC program that can perform complex matrix manipulation and store and retrieve character sets could be. And execution is further slowed by the program's redundant screen handling, especially if you should enter an incorrect response to a menu prompt. Even so, *Font Generator II* will bring your printouts to life.

Requirements: Apple III, 128K RAM, disk drive
Apollo Software, $40

4-POINT GRAPHICS

This relatively recent software package for the IBM PC is an excellent, innovative interactive drawing and painting program. It offers high-resolution images on both graphics pages, which can be layered on top of each other. The program takes its name from the four-point cursor used to define areas on the screen which are to be filled with color, textured, enlarged or reduced horizontally and vertically, saved for use as elements of another image, mirrored or flipped, and so forth.

Actually the four-point cursor is only one of four main modes of cursor movement. One-point is a basic line-drawing program in which a cursor is moved through keyboard controls. The two-point program produces the "rubber band" effect. The three-point program is used in the construction of circles, ellipses, and curves. Background, drawing line, and filled-area colors are selected with the Function keys.

A unique animation mode can record each step of the user's creation and play them back at variable speeds, even removing the cursor from the image. The cursor can also be turned off at any point to permit photography of the screen. Another helpful function is a preview mode in which an image or parts of an image can be viewed for two seconds, long enough to decide whether they should be saved. Text mode allows the entry of 36-character wide text in any color, with full text-editing functions.

The accompanying manual is clear and concise and can be followed through even the most complex procedures with ease. A reference card to program controls and capabilities supplements it. Also of value is a demonstration program which promises to demonstrate the system completely within five minutes; it does. The 16-color images can be printed out on both the Epson and Sweet-P plotters using new software which is supplied with *4-Point.*

Requirements: IBM PC, 128K RAM, color graphics board
International Microcomputer Software, $225

FRAME-UP

Turn your Apple into a slide projector! *Frame-Up* is a fast utility program that allows you to produce professional quality "slide" presentations mixing color graphics and text frames. Easy to use, it loads high-resolution pictures from disk to the screen in 2.5 seconds; text and low-resolution frames load even faster.

Presentations may be controlled by the keyboard or by paddles or joysticks, or the show can run unattended, switching frames every 1 to 99 seconds. When operated manually, frames are advanced or reversed simply by using the left and right Arrow keys, or the paddle buttons. An editor function makes it easy to change order and timing of each frame.

Text frames may be created from within the program, but both high-resolution and low-resolution graphic pictures must be produced by some other program and transferred to a *Frame-Up* data disk. Up to 17 high-resolution or 136 low-resolution or text frames can be stored on each disk. Two disk drives can be used to run an unattended show of twice that many frames, or you may link disks together to create an uninterrupted show of any length.

Presentations can be made to run on any Apple without the *Frame-Up* program by placing a "Display Module" on the initialized data disk. You are allowed to produce, copy, and distribute these "shows" at will, a nice feature.

A Print command used in conjunction with an

appropriate graphics printer and interface produces hard copies of any frame.

Other features include one-key commands, a bidirectional scrolling catalog, on-screen menus, a handy keyboard reference chart, a complete user's manual, and a wall chart of Peeks and Pokes. It is supplied on a single unprotected and customizable diskette. It is an excellent value.

Requirements: Apple II, II+ or IIe, 48K RAM, disk drive

Beagle Brothers, $29.50

GRAFMATIC

While many graphics programs produce output designed to be incorporated within BASIC language programs, *Grafmatic* works with FORTRAN and Pascal to achieve sophistication not possible with BASIC. This includes complete 2- and 3-dimensional drawing plus a set of algorithms that remove hidden surfaces in 3D modeling. Truly solid-looking objects can be formed.

Grafmatic is actually a collection of 4 separate programs, loaded from a single disk. Part I consists of basic utility programs allowing FORTRAN programming of operations such as setting foreground, background, and line colors; drawing and painting modes; text entry; screen size and proportions; cursor position; and so forth. Every pixel on the screen can be set individually, with colors alternating from one to the next. Part II is used for interactive 2D drawing. Objects formed with the Line program in Part I can be filled, moved, grouped together, rotated, and inverted by a simple set of FORTRAN programming commands. A graphics cursor that appears as a box in the screen display is useful. For those anxious to draw graphs of various types, Part III of the program contains a 2D plotter.

It is in Part IV, however, that the 3D fun begins. Again in FORTRAN, the user programs *Grafmatic* to draw the 3D object anywhere on the screen. By manipulating the *X*, *Y*, and *Z* coordinates, the object can be rotated or viewed from any angle, moved from one point to another, and displayed so that the panels forming the object's surface appear as solid blocks.

This is a highly innovative program for the serious computer graphics programmer. Don't expect to create 3D images instantly. You must write and compile a FORTRAN program before an image will appear. Burdened with a program manual clearly meant for programmers, the 2D and 3D programs in *Grafmatic* take time to grow into. It is worth the effort.

Requirements: IBM PC, *Microsoft FORTRAN* (1.0, 3.1) or *Pascal* or *SuperSoft FORTRAN* Microcompatibles, $95

THE GRAPHIC SOLUTION

When it comes to animation programs for microcomputers, there are not many choices. Animation is a fairly complex task requiring both large memory—each stage of the movement sequence must be created as a separate "frame"—and rapid recall, so that the frames can be displayed so rapidly that the brain perceives them as continuous motion rather than discrete parts. For the kind of computer animation you see on television or at the movies, you'll still have to invest in a larger computer system than Apple. Yet Accent has managed to create an animation program that should keep you excited for quite some time.

The Graphic Solution starts out as a shape table creation program. You work in Apple low-resolution to sketch out the shape cursor movement, then manipulate it by stretching, shrinking, mirroring, and moving it around the screen. Then in high-resolution mode, you define a window around the shape and store it in the shape table for later use in the animation sequence.

Building animated movies with this program is a little like working with the flip books we made as children—drawing a stick figure on the edges of the page whose arms and legs moved a little from frame to frame. In *The Graphic Solution,* each of the little figures is stored in the shape table, and it is up to the projector section of the program to access and display them.

Requirements: Apple II, 48K RAM, DOS 3.3, disk drive

Accent Software, $149.95

GRAPHICAL ANALYSIS II

This is a specialized line-chart plotter designed for physics and math students. It presents sets of experimental data. Fully 200 X/Y data points can be entered. These are rounded off before being displayed, but you set the number of digits to be considered valid. Further, various operations, such as squaring, can be performed before the data points are displayed, in a variety of tic mark patterns.

Display of the connecting line between points is

optional. The points can be numbered, a grid displayed, the scale divisions set according to your choice, and the slope, intercept, and coefficient of correlation can be displayed at the top of the chart. It is also possible to display two different sets of data on the same graph.

An integral printer support program allows hardcopy on any standard 80-column printer.

Requirements: Apple II+ or IIe, 48K RAM, *Applesoft BASIC,* DOS 3.3
Vernier Software, $24.952

GRAPHICMASTER

Graphicmaster is a collection of five graphics utility and editing programs that will enable you to create virtually any image—animated or still—that you can imagine. This isn't an interactive drawing program nor a menu-driven business graphics package; you have to program the graphics yourself. But by using *Applesoft BASIC* and the GR&MPS language—one of the five programs here—you can program just about anything.

The five programs include *Fontcaster,* which creates and edits characters and shapes, up to 24 by 24 pixels, in the high-resolution mode. Upper- and lowercase letters may be included in the same set. This is one of the best shape table programs around, and worth the price of admission alone for both its ease of operation and flexibility of control.

Other programs in the group include *Bitmap Wizard,* which lets you capture high-resolution images to disk—including images which have been created using a graphics tablet or mouse, or digitizing camera. Once the basic image has been captured, it can be manipulated or moved, then re-stored in a different position in the shape table. This module also contains a paint program, allowing the captured images to be further enhanced. Images may be recalled from the table as a series of high-resolution frames, creating a sort of animation.

Patternmaster is a standalone module, allowing you to create an enormous variety of colorful abstract screen patterns. These may be integrated into other programs.

The most impressive of the five programs, however, is the GR&MPS graphics language. This allows you both to create graphics and to access stored high-resolution images using a simple BASIC runtime program. It works with the Apple's "ampersand vector" capability; commands in an *Applesoft BASIC* program that are preceeded by ampersands are executed in machine language—extremely rapidly. You can access files stored by the *Bitmap* or *Fontcaster* program, change colors of any graphic element, view the presentation in any of seven different font styles, instantly reset values in the BASIC command file, switch back and forth between the two high-resolution screens, and perform many other manipulations. Once the machine language command has been executed, the program switches back again to the BASIC format for further instructions.

Requirements: Apple II, 48K RAM, disk drive
Tid Bit Software, $79.95

GRAPHICS DEPARTMENT

Graphics Department is an integrated graphics package combining four separate programs that allow the production of complex high-resolution pictures suitable for printing or turning into slides.

A Chart Generator produces bar, line, scatter, and pie charts, in color, from both direct data input and *VisiCalc* DIF files. Data entry is very fast. A chart can be designed and printed in less than ten minutes. Each graph can have up to 99 data points, and you may combine or "overlay" several charts (each in a different color) into one.

A Trend Analysis option provides mean value, standard deviation, and a least-squares linear regression trend line that can be added to any scatter, line, or bar chart.

The Lettering Kit lets you dress up your pictures with additional titles. Thirty different fonts from Old English to Bold Modern are included, in five sizes. Lettering may be inserted anywhere on the screen.

A Graphics Tool module allows creation of a variety of pictures using lines, rectangles, ellipses, and shapes derived from shape tables. You may edit and combine charts, create pictures from scratch, cut and paste, overlay, merge, flip, shrink, invert, change colors, and add patterns. Over 100 different shades are available.

A Slide Projector function permits the production of professional quality presentations by using your graphics pictures in a "slide show." Slides can be selected manually or displayed automatically as fast as one every 1.5 seconds or as slowly as one in 9999 seconds, roughly two hours and 45 minutes.

Pictures can be printed from within the program using either a Silentype printer or a Grappler type interface and another dot matrix printer. Pictures

are saved as standard binary files and therefore may be printed on any printer or plotter that can access such files.

The package is supplied on three copyable disks and comes with a well-written and thorough 134-page manual, along with many sample "slides."
Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive
Sensible Software, $124.95

GRAPHICS ENHANCED BASIC

This is a programming language designed to work with ordinary BASIC programs. It offers control of dot-matrix graphics printers from Epson, C.Itoh, NEC, and Gemini. Using a set of commands including Limit (which sets the size of the graphics page to be printed), Draw, Plot, Putdot, and so forth, it allows you to address some 500,000 dots, individually or in groups, using about 8K of memory. The manual provides programs for creating spirals, a sine wave, a circle, and other shapes, but more advanced programmers can create their own programs. The set of commands is simple and fully explained in the manual.
Requirements: TRS-80 Model I or III, 48K RAM, disk drive
WileSoft, $69.95

THE GRAPHICS MANTIS

This recent addition to the world of computer graphics programs is an interactive drawing/painting program with a major distinction: While basic commands are issued via keyboard letters and the ten Function keys, you can also set up your own command strings for commonly used editing sequences; retrieving a picture from a disk and scaling it down, for example. These may be programmed into the 30 remaining Function key slots using their Shift, Alt, and Ctrl values.

Other graphics features are fairly standard for interactive programs. It is possible to draw points, lines, boxes, cubes, circles, ellipses, and arcs. Simple menu-driven subroutines help define the specifics of the shape. You can also enter text, which can be positioned anywhere within the display. Other commands allow you to rotate the image 90 or 180 degrees, scale it up or down, crop it, fill bordered areas with color, mirror it, use a window to copy portions of the image to disk, and so forth. The program supports either high-resolution images or low-resolution displays with three colors.

The program also comes with a library of images that, with a second disk drive, can be accessed through menu commands in the main program. The library disk includes both a character set and four files of Function key definitions, in case you don't want to bother setting them yourself.

An unfortunate drawback of the package is that the program manual is is poorly organized and not written terribly well. At points it's positively ungrammatical and at others it is just plain sloppy.
Requirements: IBM PC, 128K RAM, disk drive, color graphics board
Shuttle Enterprises, $69.95

GRAPHICS UTILITY

Although shape table programs are almost as plentiful as business graphics packages, this one is a value-packed tool for anyone interested in making the best of the PC's graphics. A menu-driven system (relatively rare among utilities of this kind), it allows you to create, store, and retrieve both characters and shapes from any of the 21-position shape tables.

You start by answering a menu question about the size of the character to be created—up to 39 by 39 pixels. A large grid of boxes corresponding to the pixel count is displayed, together with a set of function and cursor key commands that insert, delete, fill, invert, and clear the boxes in the grid that define your character. A real-size character is displayed alongside the grid for instant reference.

Individual shapes are filed in the shape table, or the 39 by 39 pixel shapes can be combined into more complex images and then stored in composite form on the disk. An animation program is also available; give it the name of the file containing the figures to be animated and the character numbers, and the program automatically assembles and displays the animation sequence. Any character in any table is also retrievable through BASIC program commands. In addition to the on-screen displays, *Graphics Utility* provides hardcopy through an integral screen dump to an Epson or IBM printer.
Requirements: IBM PC, 64K RAM; color graphics board; one disk drive
Savant Software, $85

GRAPHICS WIZARD

This package for the Apple III is a combination of several different types of programs. Among them

are an interactive drawing/painting section, a font editor, and a "slide show" sequencer.

The program's general format is similar to that of several other programs. It combines free-hand drawing with dot-by-dot font creation. Thus, single keystrokes or control keys are used to select among 15 colors for drawing, color filling, and background color, to define boxes and windows, to copy, invert, and mirror an image, to shift between low-res and high-res operation, to type using special character fonts, and so forth.

There are some very notable features as well as the standard ones. The most interesting is an Option menu which is used to determine how graphics will lie on top of one another and whether the images are inverse or normal. Thus it is possible to have the top image block out the underlying image or simply overlay it, or to have one imasge in normal and the other in inverse video, all with single keystroke commands.

The font editor with this program is also quite exciting. It presents a screenful of dots, which are removed one by one to form a character as if carving it out of a block of stone. You can also add dots if you make a mistake. The character is stored in its normal size in the shape table, but its size can be manipulated by simply enlarging the graphics screen.

Given that this program was released as recently as 1983, it is surprising to find that it suffers some rather unfortunate problems when compared with other systems. The slide show feature, for instance, displays a programmed series of images, but the pace can't be varied except by pausing and there is no way to use a remote hand controller.

Then, too, the documentation is neither well organized nor very clear. It's sometimes difficult to tell where you are, and whether you are reading an introductory overview or the actual operating manual.

Still another flaw is a far too limited choice of prints supported by the program.

Requirements: Apple III, Profile hard disk
Micro Lab, $100

GRAPHMAGIC

This menu driven program will draw pie charts, bar graphs, or line graphs. You feed in the numbers, tell *GraphMagic* what kind of graph you want, and the program draws it for you. In drawing a bar or line graph, it even chooses the range of values for the axes. You can modify either or both ranges if you like. You can also add text, including a two-line title that you can justify left, right, or center.

GraphMagic gives you a fair amount of flexibility. With line graphs, for example, you can plot points, draw a line through the points, or fill in the area between the base of the graph and the line. You can also mark the mean, median, or mode on the graph, and you can draw the graph over a grid of horizontal lines, vertical lines, or both. When you're finished, you can save the graph to disk or print it.

If you have a color monitor, *GraphMagic* will let you use color or black-and-white. The IBM PC version can use a color monitor to display the graph, while simultaneously using a monochrome monitor to display the menus and entry screen. If you don't have both monitors, you can use any monitor that works with the color board.

Probably the most interesting aspect of *GraphMagic* is its ability to read data files from other programs. In particular, *GraphMagic* is designed to be used along with the companion program *MatheMagic,* which is reviewed elsewhere in this catalog. By using these two together, you can do things like calculate points on a sine wave with *MatheMagic,* then use the result to draw a graph with *GraphMagic*. The IBM version of *GraphMagic* can read data from *Visicalc, Supercalc,* or *dBASE II* as well.

Requirements: IBM PC, 128K RAM, color graphics adaptor, one disk drive, and BASRUN.EXE (also available with the program); CP/M 2.0 or later, or Apple DOS 3.3, 48K RAM, one disk drive
Brightbill-Roberts, IBM version $90, with *MatheMagic* $160; Apple II version $90, with *MatheMagic* $150

GRAPHPLAN

The important point about *GraphPlan* is not that it is a particularly fine spreadsheet program; neither is it a simple presentation graphics program. Rather, *GrafPlan* is both—a spreadsheet and a graphics generator, in the same software package and loaded from the same floppy disk. This makes it something special, even if the price does seem a little steep for an average home or small business user.

Once the spreadsheet entries are made, a single command calls up the graph plotting menu. Prompts ascertain the type of chart—horizontal or

vertical line and bar graphs, pie chart with or without exploded sections, colors of the different chart elements, and so forth. The program does the rest, automatically creating the labels from the spreadsheet row and column titles, determining the scale of the chart from the data entries, and so forth. The desired chart appears extremely rapidly, helpful when testing which presentation best suits a section of spreadsheet data. Different types of chart can also be saved separately, then recalled as desired. Several printers are supported, together with Hewlett-Packard color plotters.

In general this is designed for business users who want the convenience of going from spreadhseet to graphics without having to change programs, and who need the convenience of having changes in the spreadsheet immediately reflected the in the chart or graph. Those willing to pay the price will also find the looseleaf-bound manual entirely professional, and written for the computer user who wants to dive right in without having to learn computer theory.

Requirements: IBM PC, DEC Rainbow, NEC APC, North Star Advantage, TeleVideo 803 or 1603; 64K RAM; double-sided disk drive

Chang Laboratories, $395

GRAPHWRITER

In their literature, Graphic Communications, Inc., asserts that *Graphwriter* goes far beyond other business graphics packages—in fact, it is almost a whole new category of graphics software. This is as suspect as any other promotional claim. Yet, after a little time with the program it becomes clear that this is more than just hype.

For one thing, *Graphwriter* offers an almost staggering choice of display formats—over forty in all. Formats are loaded from seven disks, each containing several choices. In the Basic Set there is a (V)ertical column chart, (H)orizontal bar chart, H and V segmented bars, H and V clustered bars, pie charts with up to four pies per display, a line chart, a section chart for regressions, a bar chart/line chart combination, and a text/word chart, which can either stand alone or be used as an overlay onto graphics material. An Extension Set includes more exotic displays—bubble charts, flow charts, and Grant charts, as well as pie/bar combinations, paired bars, grouped bars, surface/line charts, and others.

You also have extensive control of variables within the basic formats. Vertical clustered bars, for example, can rise from the bottom of the graph or decend from the top. Paired bars may be shown separated or grouped. Surface/line charts will show the dark area either above or below the line. The segmented bar displays allow up to twenty bars with up to eight segments each. Such oddities as 35-mm charts and half-page plots can be made quite easily.

Another distinguishing feature is *Graphwriter*'s text handling ability. Each chart can have up to three lines of heading, with three more lines of forty-eight characters each for explanations. Few programs offer as much. Positioning labels is done as easy as creating the chart.

Anything that a graphics artist working with pen and ink can do is available here, but much more quickly and accurately. A reference guide shows all the possibilities at a glance.

The program is entirely menu driven, so you need only answer to make your chart. Data may be entered manually, or the program accepts DIF files from *VisiCalc* and other spreadsheets. *Graphwriter* also offers extensive editing, using single keystrokes to change the data itself, change the styles of each element of the chart—the axis labels, colors, and so forth. Each set of changes is performed independently.

One advantage of the program for some may be a problem to others: *Graphwriter* can be run without a graphics board and color graphics monitor and the results viewed only when the plotter is run. Making this possible has required some compromises in the screen display. If the chart is particularly complex, the program will tell you that it cannot display the chart on the screen, forcing you to go to hardcopy. Even with a graphics board, the display shows only the outline of the text areas.

Requirements: IBM PC; 128K RAM; two double-sided disk drives; color graphics board; RS-232 plotter

Graphic Communications, $595

HIGRAPH-III

Higraph-III is the latest version of a very basic presentation graphics program that allows users of the IBM PC, TRS-80 Model II, and Apple II to create pie charts, line graphs, and bar graphs on various models of Houston Instrument DMPL plotter.

Each type of chart or graph has its own subroutines, asking the user to choose such features as

major and minor axis divisions, whether pie-chart sections should be exploded, the type of line to use in a line graph (nine choices are offered), position of labels, and so forth. Up to eight pen colors are available.

This is not a program loaded with fancy extras, but it is quite adequate for its low price, assuming one has an HI plotter.

Requirements: IBM PC, 64K RAM, color graphics board; Apple II, 48K RAM, one disk drive, serial or parallel interface card; TRS-80 Model II, CP/M 2.2, 64K RAM, 8-inch double-density disk drive, serial port

Houston Instrument (Bausch & Lomb), $25

HP-85 BUSINESS GRAPHICS

This is a truly versatile, well-constructed presentation graphics program for the Hewlett Packard HP-85. Although the CRT displays are not as fancy as those on the IBM with its color graphics board, this is made up for when the program is run out on the plotter.

The program's efficient organization makes it seem at first that only a few formats are available: bar graphs, pie charts, and line graphs. After a while, you discover that within each major group there are dozens of ways to manipulate the data. In the Pie mode, for instance, you can display up to four pies per page (separation lines between them are drawn automatically), with up to twenty explodable segments in each. Lettering identifying the segments can be placed either inside them or outside, and a legend can be positioned anywhere within the display.

With bar graphs, the choices are even more varied. You can plot up to 700 data points per graph, either above or below the X axis. There are seven different bar fills to choose from, plus solid and blank, any of which can be almost infinitely varied by changing the hatching size. With colored pens, the variations become even greater, and the program will stop the plotter for a pen change. The bars themselves can be given different widths; clustered in groups of up to five bars, with variable spacing between clusters; and divided into twelve segments.

You can plot up to up to thirty points on a line chart in up to twelve lines. Seventeen styles of line are available, and the data points can be indicated with any character, in different sizes.

There are many other features as well. Utility programs allow, for instance, the creation of overlays, enabling you to set up combination charts. There are also several useful utilities for file manangement, including selective copying of file elements, so that, for instance, the area fills selected for one graph can be instantly copied to another for consistency. Still another useful feature is a cataloging routine that prints of a full list of 108-character titles and descriptors.

Although the program is menu-driven and intended for end-users with little or no programming experience, the documentation contains frequent notes and other material for programmers. More advanced users who want to modify the program are free to do so. The source code files are not protected. However, Commercial Software will not support modifications to the program that it, itself, has not authorized. With that one limitation, purchasers get an automatic one-year free update as part of the price.

Requirements: Hewlett Packard HP-85, 32K RAM, Printer/Plotter ROM, HP-1B interface bus, plotter

Commercial Software Systems, $150

IMAGINATOR

If you ever intend to get serious about computer graphics, you must come to terms with three-dimensional modeling. And if you're going to do modeling, there is probably no better program to get started with than *Imaginator.* It's simple to use, written to enable wireframe compsitions of everything from a simple cube to a complex, multiplane form, and its cost puts it in reach of just about anyone.

As we all remember from high-school geometry, three-dimensional objects are defined by points on the X, Y, and Z axes. So *Imaginator* asks you to first define where the points of your object lie—up to 200 of them in each object. You define them through an incredibly powerful editor that allows you to position the cursor in an X, Y, Z table and enter the value of each point. Another editor allows you to describe the lines that connect the points. After this, you simply ask the program to draw the object you have defined.

What makes 3-D modeling on the computer such an exciting experience is the variety of manipulations that come into play once the basic object has been defined. You can, for instance, rotate the object to view its back or sides. You can move it to any position on the screen. You can change its

apparent distance. You can view it from different angles, including from inside the object.

All the commands for these manipulations are entered through the object display editor almost as simply as the points and lines were defined in the first place. At all times, the screen displays the object, its name, the angle of view, size, and so forth.

The file management system is quite well thought out, and files can be protected against inadvertant writing-over. Files are stored in binary, compressed form, allowing many to fit on a disk. Printing is done through a screen dump program such as *Zoom Grafix,* or data may be fed directly from the *Imaginator* to a plotter.

One of this program's most impressive features is its manual, which introduces you not only to program but to the whole field of 3-D computer graphics. There's a chapter on the 3-D coordinate system, another on representing objects in 3-D space. For some chapters, you don't even need the computer; they're just basic guidelines in case you slept through three-dimensional geometry.

Requirements: Apple II, II+, IIe, or III in emulation mode; 48K RAM; Applesoft ROM card or 16K RAM card; one disk drive
Townsend Microware, $129

KEYCHART

As one of the few graphics programs for CP/M-based computers, this package takes on value that it probably would not have if it were available only in the more competitive MS-DOS field.

KeyChart is a basic business/presentation graphics package that offers all the standard charts, graphs, and text handling ability in a well-prepared, completely menu-driven package. The data is entered either from the keyboard or read data files produced by spreadsheet programs such as *1-2-3, VisiCalc, SuperCalc,* and *Multiplan.* Once the data file has been completed, it is rapidly transformed into any of four basic charts—bar, pie, line, or scatter. The results can then be previewed in full color (if available on the terminal) or sent to a plotter.

One of the program's major benefits is its text-handling. It incorporates text files written with programs such as *WordStar* directly into the graphics files. In addition, the legend can be moved around the screen—up to 84 floating titles can be positioned anywhere, including inside the four pie charts that fit on a display; letters can be italicized.

KeyChart treats each graph as a separate file, enabling you to place several reduced-size charts in the same display, writing the files into the display one after the other as easily as a word processor reads text files together. Since your color choices are remembered with the data values, the entire composite image can be viewed on the graphics monitor. Still other features include the ability to combine line and bar charts, a choice of eight hatch types for bars and pie sections, and the ability to switch instantly between horizontal and vertical displays in any chart type.

Requirements: Kaypro; Osborne double density; Epson QX-10 with TTM and HASCII keyboard; IBM PC, 128K RAM
Softkey, $375

MICRO ILLUSTRATOR

After you connect your KoalaPad and put the *Micro Illustrator* diskette into the drive, you may never need the illustrated 17-page manual. *Micro Illustrator* is so well thought out, so simple in its design, that all the menu choices you need appear on a single page when you press one of the KoalaPad buttons. The menu is graphic rather than simply verbal; FILL shows a partially-filled abstract form, DISC has filled circles. To select a mode, color, or brush size, you simply move the cursor to the appropriate box and push one of the pad's buttons. Just in case of confusion, a help function describes each of the commands when you touch the cursor to a box marked with a question mark.

The program incorporates all the features found in most interactive drawing and painting programs. In the draw mode, the KoalaPad is used for free-hand drawing. Other modes, reached with the pad, include line drawing, connect the dots, automatic plotting with circles and boxes, both outline and filled, color selection, and painting with different style brushes. The computer keyboard is needed to enter the file name when saving or recalling a picture.

Several other programs can be run with the KoalaPad, and children find them particularly interesting. *Coloring Series I* is a set of twenty-five geometrical forms to color and manipulate using *Micro Illustrator.* They are loaded from a separate disk on the same drive as the main program. An accompanying manual has printouts of the images and invites children to compare the results of the computer painting with those of regular paint.

Coloring Series II is similar, but has twenty-eight "crystal flowers" and snowflake designs.
Requirements: Atari; Commodore 64; IBM PC; Apple II, II+ or IIe; 48K RAM; one disk drive, DOS 3.3; KoalaPad graphics tablet
Koala Technologies Corp., Atari and Commodore 64, $99.95; Apple, $125; IBM, $50

MICRO-PAINTER

Micro-Painter is an excellent graphics-utility program for all ages. With it, the user can draw and paint on the screen. The program features inversing, line drawing, color fill, and a selection of 4 patterns and 16 colors and 8 intensities. The program can be used as a tool to generate charts, graphics, illustrations, and other visual aids, or it may be used in art or other creative expression.

The documentation is simple and fully illustrated. Commands are uncomplicated. Children, hobbists, and professionals can enjoy this program as pure entertainment, employ it as a learning tool, or use it as a serious professional tool. Pictures may be saved on disk and called back to be admired or edited. Those with a little programming skill can incorporate the pictures created into other programs.
Requirements: Apple II, II+, or IIe, Atari 400 or 800, 48K, one disk drive
Datasoft, $34.95

OSBOARD 1; OSGRAPH; OSBRIEF

How many Osborne users actually know about, much less use, the 32-character graphics set in their Osborne 1 or Executive? With these three inexpensive graphics packages, you can create designs, graphs, and even electronic slide shows.

Osboard 1 turns your keyboard into an electronic drawing board. You simply move the cursor around the screen with the Arrow keys and punch in bright or dim graphic and alphanumeric characters. Your creations can then be printed in 52-, 80-, or 104-column formats on many popular dot-matrix and daisy-wheel printers. You can also display *Osboard 1*–generated graphics in any BASIC program with a simple Gosub call.

When you're through drawing pictures, you can get down to serious business graphics with *Osgraph*. Though primitive, the bar and pie charts and XY plots created by *Osgraph* should be suitable for most Osborne users. Data can be read from *SuperCalc, dBASE II,* or MBASIC or hand-entered sources. Often-used constants can be stored in separate files or changed and viewed instantly.

Osbrief is an extremely easy-to-use addendum to *Osboard 1* and *Osgraph*. It sequences and displays any number of graphic screens created with the other programs. A master file built with *WordStar* contains the file names to be accessed, the order and length of time they will be displayed, and the special effect—wipes, fades, curtains, spirals, and so on—used to write each file to the screen.

The documentation for all three programs is clear and comprehensive: constant onscreen instructions and sample graphs in each program supply any information not found in the manuals. Error messages are equally straightforward.

The manufacturer offers *Osbrief* free with a purchase of both *Osboard 1* and *Osgraph*. Given their low price and capabilities, these programs are well worth it.
Requirements: Osborne 1 or Executive
DG/Systems, *Osboard* $29.95; *Osgraph* $34.95; *Osbrief* $24.95

PAINTER POWER

If you look at interactive graphics programs, you find that inexpensive paint systems do little more than draw lines and fill in bounded areas, while the super-sophisticated graphics editors are often priced beyond an ordinary user's means. *Painter Power* is unique. An interactive painting program with the sophistication of a graphics editor, it has enough features to make it useful for professional illustrators. Yet it costs only $40.

Painter Power creates unique images either by using one of eight pre-defined brush shapes to paint with the Apple's eight basic colors (including black and white), or by allowing you to create your own brushes. With the simplest squiggle or zigzag, many intriguing abstractions can be created. By using a built-in routine to create circles, elipses, and spirals, and a mathematics program to vary the results, you can make an infinite variety of brush shapes that leave behind trails of paint in wonderful patterns.

In a beginner's version of the program, both the brush shape and the painting are created on the color monitor; in the advanced version, a black-and-white monitor is used to define the brush shapes, which are then used on the color monitor. In either case, movement of the cursor may be controlled through the keyboard, a joystick, or up to

four paddles; one of the program's better features is how easily it shifts control back and forth among these devices. Four keys govern the brush speed—important controls to master, since the cursor will keep moving once it is activated. A special preview mode, however, shows you what the line will look like without actually committing it to memory.

The program's more advanced features include "quickstroke," a way to store a special brush shape which can be repeated over and over again using a single keystroke. You can also change the direction and color of the cursor while it is in motion. Another unusual visual, actually created by a basic flaw in the Apple's processing, gives a wavy, rippling effect if a horizontal and vertical line are used in the same brush. Other options allow for overall color changes in existing images, the ability to control wraparound, and a slide show program that automatically sequences through sets of images.

Although the simpler version of the program can be run by reading the menu prompts and following its simple instructions, there is also an extensive set-up menu in which all of the program's options and values are displayed at once and can be changed either before painting or while working on an image.

Unfortunately, *Painter Power*'s documentation is not well organized. There are no illustrations, and, though the text is clearly written, the publishers did not break it up with headlines and subheads; one paragraph simply flows into the next. Nonetheless, this is a good investment if you want more creative choices in building your computer images than simply changing line thickness and pen color.

Requirements: Apple II; 48K RAM; Applesoft in ROM or language card; one disk drive
Micro Lab, $40

PC CRAYON; EXECUTIVE PICTURE SHOW

This is one of the more popular interactive drawing and painting programs for the IBM PC. It is designed, and comes with a manual written for, the user who is *not* a computer graphics programmer and simply desires to create attractive drawings and images—for entertainment or business applications. It is good, basic, well-planned commercial software—like a word processor, except that it works with graphics.

Both medium- and high-res graphics are offered, with the standard choices of foreground, background, and line color. Once installed, the program loads the keyboard with single-stroke commands that display several classes of graphic image: drawings, graphics symbols, and vector symbols. The first automatically plots lines, curves, ellipses, and other basic shapes, and also permits free-hand drawing and painting. In drawing, the cursor control keys move the brush/pen, while others change line thickness and color. A "continuous" style allows you to create extremely smooth lines without the normal stepped appearance. A "scenario" mode re-creates drawings on the screen, step-by-step, with an effect like animation.

The other two modes are essentially file management tools. In the Graphics Symbols Utilities mode, elements of a drawing can be saved by simply defining a window around the part of the drawing you want saved. Vector Symbols Utilities, a shape table program, allows you to store a whole set of symbols under a single file name; when loaded back into the computer, this file sets up the keyboard so that each keystroke writes a graphics symbol or character.

This program would make a fine introduction to the use of computer graphics for any level of generalized computer expertise. The manual is clearly written, more akin to the kind found with computer games than to the lengthy, complex instruction manuals for expert programmers; a handy reference card contains all the operating commands.

For the business-oriented user, PC Software also offers *Executive Picture Show.* It incorporates many of *PC Crayon*'s features for freehand artwork but adds a section for creating line, bar, 3-D bar, pie, horizontal, and surface charts. Eight type fonts are included. (Two are standard in *PC Crayon,* although more can be entered.) *Executive Picture Show* also includes a sophisticated slide-show routine, enabling the business user to present graphics material by activating a single program. Further, screen displays from other graphics packages can be captured and displayed as part of the sequence. This facility also can activate external devices such as tape recorders by POKEing the interface port.

Requirements: IBM PC; 64K RAM; color graphics board; BASICA
PC Software, $44.95

PC-DRAW

Of all the interactive drawing and painting pro-

grams on the market, *PC-Draw* is among the top ten, if not the top three, in sophistication and power. It may be the best of all at creating such figures as flow charts, electronic circuit diagrams, drafting designs, and so forth. All the usual features associated with PC graphics are here, of course—free-hand drawing, computer-aided plotting circles, arcs, and lines, area filling, and so forth. But to these, *PC-Draw* adds several new dimensions.

It includes, for one thing, a vast shape table program. It is thus like the plastic templates used in electronics engineering, drafting, and design, except that here you can design your own set of symbols and use them in any size or color. Another feature sets this program apart is that it supports the use of a light pen to enter commands from a menu rather than using the keyboard.

At the heart of the program is a set of user-defined Template Menus. Each contains up to 105 symbols, which are displayed in blocks of 7 by 3 to the right of the drawing screen (unless a full-screen display is selected). Templates can contain graphics symbols, lettering styles, or both, making it equally simple to manipulate both graphics and text. You may create symbols by free-hand drawing or computer plotting, and use them when creating an actual drawing. Symbols from one Template Menu can be used in many drawings. To select a symbol, you simply place the cursor where you want it and enter a code number from the template menu. You can also move a symbol around a drawing by placing the cursor next to it. These are the applications, of course, where the light pen comes in handy.

Each symbol used in the construction of complex figures can be manipulated separately, or the whole figure, with up to 100 parts, can be "compressed" and treated as a unit. Fifteen background colors can be selected, and the symbols can be displayed in any of the six basic IBM colors; filled with color or left the color of the background; and re-sized, rotated, and otherwise altered from the form stored in the Menu.

Eight of the ten function keys are programmed with commonly-used commands, including save to disk, draw a circle, draw a line, expand and reduce the size of the image, and so forth. Two keys are "soft"; you can program them yourself.

One of *PC-Draw*'s most impressive features is multipage drawing within RAM—up to four pages arranged in a horizontal and vertical grid. This allows you to copy symbols from one page to another within a multipage drawing. More importantly, it permits some especially interesting animation-type sequences within the four-page file boundaries. There is also room within the screen for either full page drawings or menu displays with truncated drawings.

Requirements: IBM PC; 128K RAM; color board; two disk drives

Micrografx, $295

PICTUREWRITER

For children four to fourteen years old, this interactive drawing and painting program allows the creation of both basic computer-plotted shapes and more complex images made by free-hand drawing. It's a lot of fun even if you are older than fourteen.

One of its more interesting features is a well-put-together demo program that functions as an electronic coloring book; children can change, adapt, and color its pictures at will. Another is a manual that makes learning the program—and therefore the basics of computer graphics—a painless, enjoyable experience.

Yet another excellent feature is the graphical menu display that appears on the screen along with the picture, telling you which keys to press to create a rectangle or oval, choose the line and background or fill colors, erase or save a picture, and so forth. The colors appear as a palette, making the choice even easier. And symbols accompany the various functions, so children can follow them easily.

Requirements: Apple II+ or IIe; 64K RAM; joystick or KoalaPad

Scarborough Systems, $39.95

PIXON

Pixon is designed to give control over the graphics abilities of printers such as the Epson FX-80/100 and MX-80/100, Diablo 1610/1620, IDS Prism, and Toshiba P1350. With a color graphics board for the PC, it will even give color prints.

The program first defines the size of the matrix to be plotted, then uses the screen as a window into the dot pattern. Dots can be created, removed, or mirrored, and other special effects are available. Thus, you could create your own alphabet or other

form one dot at a time, using the cursor controls to set the dot pattern of the letters or shapes, then sending them to the printer. It's also possible to manipulate the seven alphabets supplied with the program as if they had been created from scratch.

Pixon offers many features not found in comparable programs. The ability to move and edit blocks of dots independently and support of graphics programs written in BASIC are two of the more prominent.

The manual is clear, but unfortunately a little simplistic in its style: "Press the button and see what happens. Wow! The cursor just went off the screen!" It is worth following nonetheless.

The manufacturer promises that *Pixon* will soon support both the MicroSoft mouse and the Microneye digitizing camera, making it possible to edit their input dor by dot once the original image has been digitized.

Requirements: IBM PC with PC-DOS; 64K RAM; one disk drive; color or monochrome graphics board

Olive Branch Software, $79

PM ANIMATOR

PM Animator creates high-speed animation using Atari player-missile graphics (PMG). The package consists of a tutorial on the operation of PMG; editing utilities that simplify creation of PMG characters; and a series of machine-language routines that can be used in BASIC programs.

The editing utilities allow the user to draw detailed characters directly on the screen with joystick or cursor keys, as well as edit, duplicate, store to disk, and text animation. The machine-language routines permit fast motion and animation, high-speed loading of character files from disk during program execution, and creation of multicolored or oversized players.

A certain understanding of PMG is necessary to use *PM Animator* to the best advantage, especially in debugging programs that use the machine-language routines. The tutorial included in the package is essential for this reason. There is also a series of demonstration programs whose code may be examined; these are valuable, however, only after the user has gained an understanding of the principles behind them. In short, *PM Animator* will not make the creation of arcadelike graphics as easy as pressing a few keys; it will make some of the more time-consuming programming tasks considerably easier.

Requirements: Atari, 32K RAM, disk drive, BASIC

Don't Ask Software, $44.95

POOR MAN'S GRAPHICS TABLET

The *Poor Man's Graphics Tablet* is an alternative solution to the high cost of graphics hardware. Using keyboard commands in place of joysticks, games paddles, light pens, or other free-hand devices, highly accurate and detailed high-resolution pictures may be created. Pictures in both black and white and color can be made using an unlimited number of hues in 59 different textures.

The program consists of two main sections, a graphics editor and a color editor. The first section is used to create the drawing. Command-driven from the keyboard, you move a cursor to draw straight lines, circles, and arcs, and to connect points. Text may be entered normally, sideways, and even upside down. Shapes can be drawn, up to 255 of them at one time, and put into shape tables, which may be saved to disk. These shapes can be laid down anywhere on the screen, rotated in any direction, enlarged, duplicated, and combined with other shapes to create complex pictures.

Once a picture is drawn, the color editor is used to color the picture in a fashion similar to a coloring book. The cursor is positioned inside the desired area, colors and texture are selected, and the color spreads out from the cursor to fill the area completely. Using Apple's four basic colors, plus black and white, you can mix colors and textures to create an unlimited variety of hues.

Both color and black-and-white pictures can be saved to disk along with shape tables. These can then be used in your own *Applesoft* programs or printed using high-resolution dump routines or graphics interfaces with a suitable printer or color plotter.

The program comes with three sample pictures and a demo-shape table consisting of 20 different electronic symbols. A 95-page manual in a tutorial format is included.

This is a professional-quality program of exceptional value; it is refreshing to see high quality software at a reasonable price.

Requirements: Apple II with *Applesoft BASIC,* or II+, disk drive

Rainbow Computing, $49.95

POWERDRAW

Powerdraw, for Radio Shack computers, is a graphic screen editor with all the standard features: It can be used to create screens with combined graphics and text. Multiple screens can be saved temporarily in memory or to disk. It will display a sequence of graphic screens to create animation. The graphic screen can be printed if you have an Epson printer.

Powerdraw couldn't be much easier to use. Just press the D key, and move the cursor with the Arrow keys or a joystick. To erase something, press the E key and then move the cursor over the part you want to erase. To skip over graphics you have already drawn without erasing, you press the S key. Pressing "T" lets you put text anywhere on the screen.

Other screen functions include reverse the graphics on the screen, though not the text. You can also do a mirror image top to bottom or a mirror image left to right. Another command flips the left and right sides of the screen.

The program works well under LDOS. TRS DOS 1.3 was unable to load the entire DEMO file into the buffers and thus the Watch Buffers command did not work. In general, however, this is an excellent program.

Requirements: TRS-80 Model I or III, 32K; Model 4, 48K RAM
Powersoft, $39.95

PRINTOGRAPHER

Graphics capabilities are standard equipment today on most Apple-compatible printers. But if your Apple is not equipped to send graphics information to the printer, alas, you'll make no pictures or graphs! Some people choose to equip their Apple with one of the many graphics-printer interfaces available, but many others already have a nongraphics interface and wish to add graphic printing capabilities at a lower cost.

Printographer, at less than $50, is a high-resolution graphics-printing utility that includes many features not found in hardware systems. Menu driven and a breeze to use, it gives you complete control over the final printout. Inverse or normal images, horizontal or vertical placement, picture magnification up to 99 times, cropping of the image to any size and into "diamond" or "cameo" shapes, and placement of the picture anywhere on the printer page: These are just some of the things *Printographer* can do.

You may save your cropped pictures to disk, and a special "compress" program saves picture files in less than the normal 34 sectors. Included also is a routine that can be put in your own programs to allow high-resolution screen printing. Pictures may even be transmitted by modem with communications software such as *ASCII EXPRESS: The Professional.*

Printographer is claimed to interface with virtually any printer/interface combination available, even color printers. Through the use of a "configure" program which is automatically run the first time the disk is booted, the user selects a printer/interface combination from a vast list or creates his or her own custom driver by following simple instructions.

Complete with an excellent user's manual, the *Printographer* disk comes with its own backup program that will make a total of three archival copies.
Requirements: Apple II, II+, or IIe; 48K RAM, *Applesoft BASIC,* one disk drive, printer with dot-addressable graphics
Southwestern Data Systems, $49.95

RAINBOW GRAPHICS

The Apple II has long been famous for its superb high resolution color graphics. For most of us, however, the production of high-quality graphics using *Applesoft BASIC* usually proves difficult and frustrating. *Rainbow Graphics* provides a way to produce elaborate high-resolution color graphics quickly and easily without any programming knowledge. Requiring only a good quality joystick for operation, the program makes absolutely no use of the Apple keyboard.

Using the joystick either to position a cursor or to make a menu selection and the two pushbuttons to select "yes" or "no," you can virtually turn your joystick into a paintbrush. Freehand lines, straight lines, open frames, filled-in boxes, circles, and polygons may all be produced with amazing ease. For example, to draw a circle, you simply specify the center and the outer edge; the computer does the rest. You may change both the background and pen color to black, white, green, orange, blue, or violet. Boxes, circles, or any closed shape may be filled with any of the six colors. A color-burst mode allows the freehand painting of colors with no boundaries.

A "label" option with a choice of six type fonts permits labelling your pictures. Characters may be positioned both vertically and horizontally.

Rainbow Graphics provides three different methods of storing shape definitions utilizing shape tables. You may build a shape dot by dot, freehand style, or by saving a small segment of a previously loaded picture. A scratch pad utility allows testing of the shape table being built without affecting the picture under construction.

All pictures and shape tables may be saved to disk as regular binary files to be recalled later or used as parts of other programs. Pictures may be printed directly from the program if you have a Silentype printer; otherwise, you must use an external high-resolution dump program or graphics interface board and printer.

This is a useful and enjoyable program, but the user should be aware that a steady hand is required. The slightest variation in movement is accurately recorded on the screen.

Requirements: Apple II with *Applesoft BASIC* in ROM, or II+, disk drive, color TV or monitor, non-self-centering joystick with two pushbuttons
Rainbow Computing, $29.95

SCIENTIFIC PLOTTER

This somewhat specialized line-graph generator should prove of immediate benefit to almost every scientific user who must handle tabular data. You could, of course, invest $300 or more in a presentation and business graphics package, then adapt it to your particular needs. But *Scientific Plotter* has already done it for you—and at a price that seems more than reasonable.

This package is clearly intended for plotting complex scientific data. There are twenty different styles of plotting points, so that many lines can be plotted in the same display. The margin of error in data can be indicated by a vertical bar through each point. Different scales can be provided on the same graph, and the grid size and spacing of the axis values are fully controllable. Text is displayed with an integral set of 124 characters.

Data entry from the keyboard is simple, in response to well-phrased prompts. If you don't like the way a graph is turning out, you can erase it and begin over, changing only the variables that were causing trouble; your other choices become the default settings. For $25 extra, you can get a program to convert DIF files written by *VisiCalc* and other spreadsheet programs into a format that can be automatically plotted by *Scientific Plotter*.

Unfortunately, the literature confuses the choice of printer and plotter interfaces. (Neither interface is supplied with the program.) For hardcopy on a dot-matrix printer, you must either buy an intelligent interface printer card or invest $35 in Smartware's *Advanced Grafpak* program, which supports dozens of printer cards and printer combinations. If you would rather the sophistication of a plotter, IMI offers $30 interface programs for either the HP 7470A or Houston Instrument DMP series.

Requirements: Apple II, 48K RAM; Apple IIe, 64K RAM; printer/plotter interface card or software
Interactive Microware, $25; DIF file converter, $25

SCREEN DIRECTOR

This is a sequence controller for Apple II graphics displays. Though designed as a companion program to *Apple II Business Graphics*, it works with any graphics file created with DOS or Pascal. For faster operation, it can convert DOS picture files or text files created with Pascal into high-resolution Pascal language files.

Trays of "slides"—screen presentations and text files—are created in response to a series of prompts and commands entered through the keyboard. Commands are issued in Pascal-like verb-noun strings such as CHANGE DESCRIPTIONS or CREATE SHOW:TEXT. *Screen Director* isn't quite as completely menu-prompted as some similar programs, and it requires a little study in the well-organized program manual before you can get started.

Slide entries contain the name of the picture file to be shown together with the kind of transition desired and the duration of each image. Global and group commands for all slides in a sequence avoid having to repeat commands every time a new slide is entered. The slides can be run automatically at a rate set by the control file or switched manually from the keyboard or a remote control supplied with the package. Alternatively, you can use a joystick or game paddle to change displays.

Screen Director can also be used to send displays to a printer or plotter. Both on-screen and hardcopy images can be improved by running the data through the Electrohome graphics board,

which *Screen Director* supports. Another nice feature is the ability to run other programs while in the middle of creating a command sequence. This makes it possible to stop writing commands and look at an image before deciding whether to include it in the sequence.

Requirements: Apple II, II+, or IIe; 64K RAM; two disk drives

Business and Professional Software, Apple II, 150; Apple III, $250

SOFTPLOT/BGL

For those who already have a working knowledge of BASIC, this two-part program offers a set of graphics commands that can be used in a BASIC program to create sophisticated two- and three-dimensional images. One of *BGL*'s best features is its ability to run on virtually any computer with CP/M or DOS.

BGL itself is a BASIC Graphics Language, comparable to CORE and GKS standards in capabilities, but operating with simple BASIC-style commands. There are thirty-four commands in all, ranging from instructions to create windows and viewports in 2-D drawings to a complete set of color choice and area fill commands to advanced 3-D object rotation, movement, and change in viewing angle. Still other commands create dashed lines, change background color, plot lines between any two points, and so forth. All the features that other programs present in a menu are available here as part of a programming language.

Emuplot, the second of the two programs in this package, allows the conversion of your graphics material for use by a standard dot matrix printer without graphics capability.

Requirements: CP/M-86 or MS-DOS; Microsoft BASIC; 15K RAM work space

Mosaic Software, $200

SOFTSLIDE

Softslide is an unusual program that seems to combine elements from other software into a hybrid graphics package. Features from Sirius Software's *E-Z Draw* form the heart of *Softslide*'s interactive freehand drawing routine. *Higher Text,* from Synergistic Software, contributes to the character generator. To these, MACS has added an original program sequencer used to create "slide show" sequences. This combination offers flexibility but is a bit confusing.

Part of the confusion comes from the huge array of diskettes required to run *Softslide.* The "Creation Master" disk contains the character generator fonts—14 in the basic set, with 24 additional fonts on another disk. A separate disk holds the programming instruction for the slide shows, and yet another is needed to run the printer programs. A sixth contains a demonstration slide show, and you get five pre-prepared "slide trays"—data storage disks. Each will fit up to fifteen standard images, and some forty compressed-density pictures. To set up sequences for a "slide show," you label the trays, tell how many slides are in each, and identify the individual picture elements. Be careful about labeling the "trays;" you can lose an image by forgetting the name of its tray.

The drawing program is fairly typical Apple fare. Basic shapes—circles, ellipses, rectangles, lines, and others—are created by marking two cursor positions. Drawing in either outline or filled color requires only single-keystroke commands. Images can be moved by creating a window, then re-positioning it.

The TEXT mode places text at the cursor location, in either standard lettering or one of 38 special lettering fonts. Some of the fonts are quite ordinary, but some are more like graphic symbol tables for flow charts, floor plans, and the like. You have your choice of small or large fonts. In addition, you can save a portion of the screen as an IMAGE—defined and stored under a name you select, then redrawn anywhere you wish.

Perhaps the most exciting feature is *Softslide*'s ability to create rolling and crawling titles whose features—speed, color, font selection, direction of movement, and size—can be varied in mid-crawl. Setting up the program for these moves is more complex than interactive creation but is still easy to master; before every command line you simply type an exclamation point, followed by the command—Fast, Blue, Fnt (= font), or whatever.

The manual tends to be a little simplistic, written for the person who knows nothing about computers. For those with some experience, this can be irritating. But it is clear and covers just about everything you need to know.

Requirements: Apple II, II+, and IIe, 64K RAM; one disk drive

Management and Computer Services, $500

SPACE TABLET/ADVANCED SPACE GRAPHICS

In the world of graphics for microcomputers, few programs can lay any claim to being unique. Limited by processing power and memory sizes, most programs fit into certain categories and have several competitors. But there are some notable exceptions, and this hardware/software package is one: a three-dimensional digitizer that offers *interactive* editing of points in 3-D space!

The *Space Tablet* is the hardware component. It's something like a bit pad, but with a difference: The jointed arm, rather than an electronic stylus, moves up and down on the Z axis in addition to X and Y movements. When you move it to a new location and push a button, the X, Y, and Z coordinates enter the database of the object being defined. Thus, it is possible to trace the outlines of a solid object and have the results entered precisely, on a pre-selected scale. Once there, the points are connected by line segments to form a wireframe outline of the object. The screen displays three static views of the object at once. Or, if you would rather, you can view a full-sized rendition of the model that can be moved and rotated by using the *Space Tablet*'s arm as a 3-D joystick.

Several features make this a truly professional CAD system. In the first place, you can duplicate parts of a model already entered into the database, changing the the perspective as the sections are duplicated around a common axis. Then, too, with "transformations" from an on-screen menu, you can perform all manner of operations—re-scaling, zooming, moving, rotating, "dragging" points and lines, and so forth. It is even possible to visualize changes in the object without actually transforming it until the decision is made. An option allows you to place a label anywhere within the display. Dimensions of the object can be calculated automatically from your scale and dimension markers displayed wherever you wish.

You can also plug in a high-resolution digitizing tablet and use it for standard two-dimensional applications. A standard *Space Graphics* package does many of the same things as *Advanced Space Graphics* but with fewer bells and whistles. A high-resolution graphics board is available for the IBM PC. A demonstration disk is sold separately.

Requirements: Apple II+ or IIe, 64K RAM, one disk drive, DOS 3.3; IBM PC, 128 or 320K RAM, color graphics board, one disk drive, game port

Micro Control Systems, Space Tablet with Space Graphics software $795; Space Tablet with Advanced Space Graphics software $1695; high-resolution board $750; demonstration disk $25

SURFACE

Like *Arbplot,* described earlier, this program is designed to aid math students in visualizing mathematical equations. For the serious computer graphics enthusiast, it offers highly complex three-dimensional modeling. This can be accessed from a simple menu or used through well-explained BASIC programming commands. Since virtually all 3-D computer modeling programs are based on various forms of equation with two variables (quadric surfaces, cubic patches, and so forth), the programmer who really wants to learn about 3-D should consider this a wise investment.

The program is loaded from a single disk, which contains not only the plotting routines but examples that can be called up and manipulated or edited. For normal operation, the standard Apple display resolution is used; this creates a 16 by 16-unit grid onto which the differential equation is plotted using 17 by 17 corner points of each rectangle in the main grid. This produces a wire frame display of the desired surface in a relatively short time. For those willing to wait about seven minutes for the picture, a high-res mode plots 49 by 49 corner points for each of the rectangles, yielding an extremely handsome image.

The program offers some 3-D modeling features that are extremely sophisticated for such an inexpensive package. The viewpoint, for instance, can be manipulated, so that the object can be viewed from any angle and rotated about the axes with true 3-D perspective. The defined surface can also be reproportioned by changing both horizontal and vertical axes, and can be positioned anywhere on the screen by changing the value for the center of the display.

Surface is not going to give you facile color graphics, and it's not an "instant drawing" program. But it is certainly a worthwhile program for the computer graphics enthusiast, and can help in future work for anyone serious about three-dimensional modeling. As with *Arbplot,* a demo disk is available for $2 shipping and handling.

Requirements: Apple II or II+, 64K RAM; one disk drive, DOS 3.3

Conduit, $65

TARGET IMAGE MAKER

The novel concept behind this program is to send graphics created with *Apple Business Graphics* or *ApplePlot,* over a telephone modem to Comshare. The firm then enhances the image, either selects the colors it considers best or follows a color scheme you specify, and translates the data into high-resolution color slides. These are shipped to you in as little as twenty-four hours, with rush handling. The service is automatically billed to your credit card.

The program comes with two disks. One enables your Apple to store data in Comsearch-readable files, the other contains the protocol needed to communicate with the firm's main computer.

After running the configuration program, you issue a series of commands that transmit your data files to Comshare together with instructions to set the color and other factors in the enhancement. These are entered with one-line SET commands: SET DEVICE TARGET, for example, changes the color cycling among different chart elements. Other commands include SET COLOR, DRAW BAR, and LOAD POINTS.

One of the best parts of this program is the manual, which is written precisely for the businesspeople who will use it. It's split into two sections, one on *ApplePlot,* the other on *Apple Business Graphics,* and an amazing Appendix, which contains color samples of charts and graphs, comparing the way they appear on the Apple screen and the way Comshare transforms them, using different color ranges. Each sample is accompanied by the set of instructions that produced it, so you can simply follow one of the examples if you like the way it turned out.

Requirements: Apple II; 64K RAM; two disk drives; communication card; 300 baud modem; *ApplePlot* or *Apple Business Graphics*
Comshare Target Software, $175, plus $20 per slide on overnight rush and $25 per order shipping and handling

TYPE FACES

Many programs let you insert one or two type faces into your graphics for labels, identification, or headlines. Others let you create your own type faces by assembling the letters dot by dot. Yet there is only one program designed to give you complete choice of lettering styles and sizes: *Type Faces.*

With it, you get sixteen type faces—fancy, calligraphic letters for use on an invitation, the formal Times Roman style used in newspapers, Greek letters, and ornate Gothic styles, all in different weights and sizes. You also get a set of over 100 symbols—stars, diamonds, a bell shape, and so forth. All can be inserted into text created with standard word processors, or you can use them with *Type Faces*'s own flexible text editor.

The output prints on virtually any standard dot matrix printer. A very special feature of the program, however, is that it will take any of the lettering styles and reduce them to the size of standard typewriter text. In this format, the dot pattern of the dot matrix disappears, and you are left with letter-quality printouts in a wide variety of text styles.

Requirements: IBM PC, Apple II+ or IIe, Columbia Data Products, Compaq; 64K RAM; two disk drives
Alpha Software Corp., $95

UGRAF

uGraf is a serious, no-nonsense presentation graphics program for the serious business user. It features a commanding array of program options, well laid out and easy to use even for the occasional operator, but with enough shortcuts so that it can be used frequently without getting bored.

The impressive features start with the wide range of computer systems it accommodates and its ability to accept keyboard entry, database files created with *dBASEII* or *Condor,* DIF and BASIC files, and several others.

Bar charts are either vertical or horizontal, with up to two hundred bars in a standard display, up to fifty stacked bars, and up to twenty groups of two hundred paired bars. Pie charts hold up to twenty, and slices may be automatically labeled with information from the data file or else labeled when you are creating the pie. When creating line plots, you have your choice of up to two hundred data points per line, with an unlimited number of lines per chart. A scatter plot can hold two hundred points per variable with an unlimited number of variables. In both line and scatter plots, the data used for different lines can come from different data files, enabling side-by-side comparisons. Surface plotting permits an unlimited number of surfaces with 50 points per surface. Within each type of chart, you specify the color, pattern, pattern angle, and pattern intensity for the various pieces of the image

—more than enough to distinguish among the twenty pie slices or fifty stacked bars.

Unsurprisingly, there is also a host of graphics and text features to accompany these graphs. Five-line headings and footings are available, with the text justified on either margin or centered, and color specified on a line-by-line basis. Scales may be linear, log, discrete, or actual, and may be either entered when the chart is put together or created automatically from the data file.

Also supplied are easily-installed and followed programs allowing the use of graphics printers and plotters.

Requirements: CP/M-80 2.2, 64K RAM; MS-DOS, 192K RAM; two double sided/double density disk drives

Transparent Data Systems, $295

VIDEOGRAPH

This innovative group of programs, written in UCSD Pascal rather than BASIC, was originally developed for use by television stations and other video professionals working with larger computer systems. Thus, the microcomputer versions incorporate an enormous range of advanced graphics capabilities hard to find on programs written only for home computers. When the program is run on such advanced systems as the Jupiter 7 and AED 767, it offers even more power, including resolution of up to 1,024 by 780 pixels in full color and acceptance of images from a video camera in real time.

Although the program can be installed to work with the Function Keys alone, it supports either a mouse or a digitizing tablet and electronic stylus. With the tablet, the keyboard is all but redundant 95 percent of the time.

Basic graphics functions include line widths variable from two to 32 pixels; a choice of 16 colors per image out of a possible 256; independent selection of fill, background, and outline colors; windowing that expands an area of the image for detailed editing; and extensive rubber stamping. With this feature, a section of the image or certain "primitives"—lines, angles, rectangles, ellipses, and so forth—can be copied repeatedly throughout the screen. Other graphics features include an "airbrush" mode in which the intensity of a color being laid down can be varied, and the ability to type characters in the drawing color anywhere on the screen.

Also part of this package is *VGtype,* a font creator that stores up to 96 characters in a standard ASCII set, displaying them either in real size or expanded on a composition grid. When enlarged, the characters can be edited pixel-by-pixel, copied from one half to four times normal size into other fonts, have their baselines and heights changed, and so on.

The program supports only the Sweet-P plotter, but interfaces for several other models will be available shortly. Also on its way is a business graphics package, *VGchart,* compatible with the drawing and typography programs described above. Using menu prompts for keyboard entry, or accepting data files from spreadhseet programs, it will automatically plot charts and graphs with the same high-image-quality graphics produced by the basic program.

Requirements: NEC APC; IBM PC; p-System or MS-DOS; Jupiter 7 and AED 767

Xiphias, Videograph $1000; VGchart (when available) $295

VISITREND/PLOT

Unlike most business graphics programs, which simply display data entered through the keyboard or read from a file, VisiCorp's program also forecasts and projects time series data. Thus, though it is not intended to produce the full-color charts and graphs that other programs offer, it has advantages for the business that needs more than pretty pictures. One example is a high-low chart, the kind used in stock market analysis, which can be combined with a line chart to track market trends.

A menu leads you through the type of analysis you want and the calculations you need, and the program does the number crunching for you. It creates DIF files, which can then be displayed as a variety of charts and graphs, including line, bar, and pie charts, area graphs, and X-Y plots. Text-only graphs can also be handled quite easily, and the program has extensive features for including text within graphic displays. You can also display more than one chart per display—either similar charts plotted along the same axes or completely different types (bar and pie, for example).

The manual and reference cards are among the best available with programs of this type, and the examples of charts and graphs—both those printed in the manual and those on an example

disk—make it easy to grasp the program's features.
Requirements: IBM PC, 128K RAM, two disk drives; Apple II or II+, 48K RAM, DOS 3.3, two disk drives; Wang Professional Computer
VisiCorp, $300

WORD-PLOT AND BIG-PRINT

Even if you don't want to invest in the simplest business graphics package, you can still create X/Y plots with your PC: This handy utility program transforms any DOS-based word processor program into a plotter.

The program is menu driven. It first asks whether you want to create a new file, edit an existing one, or store or recall plot points. You then answer a few questions about plot size—the grid can be anywhere from one inch square to the size of an entire page, whether you want to enter the scale manually or have the computer create it for you, and the titles of your axes. The graph is then created using the underline and vertical line for grid elements and the asterisk for plot points. The result may be shown on the monitor, sent directly to the printer, or saved as a word processor file, which can then be read into your text.

From the same company, *Big Print* is a simple little program for creating seven-inch-high letters on any standard parallel printer. After loading the program, you simply type in a message up to 255 characters long. The program verifies that no "illegal" characters have been used, then prints out the message on 82-column paper—suitable for stringing about the office or "covering the side of a barn" as ATC suggests.
Requirements: IBM PC; Word Plot 64K RAM; Big Print 48K RAM; one disk drive
ATC Software, *Word Plot* $19.95, *Big Print* $17.95.

XCEL GRAPHICS

This line of graphics products includes some extremely exciting programs for either the TRS-80 Model II or the Superbrain/Compustar. The catch is that you must install a new graphics processor board with 16K add-on memory. It clips easily into the card cage, but also requires adding a resistor or two on the current video board and a switch to select between graphics or terminal display or a combination. This is not to be undertaken by those who are squeamish about taking the cover off a computer, but it is definitely worth the effort: It transforms the screen into a super-high-resolution 512 by 240 format.

The software is not interactive but is designed to be used with virtually any language, from Fortran, Cobol, BASIC, and Pascal to assembler. The symbol generator, for instance, uses simple commands to create circles, rectangles, elipses, arcs, and the like, either filled or outline. Another subroutine, the 3-D generator, uses simple commands to define points in space, connect them with lines, and redraw the wireframe object from any viewing angle. A surface plotter displays curved surfaces in 3-D perspective, removing hidden lines. A graph program plots two sets of data as line graphs on the same axes; area fills of various types are also provided. Finally, a screen dump program prints out graphics created with the other programs; most popular printers are supported.
Requirements: TRS-80 Model II or SuperBrain/Compustar; CP/M 2.2; 64K RAM; two disk drives
Maxtek, TRS-80 version $895; SuperBrain/Compustar package, $995

ZOOM GRAFIX

This is a dandy little screen dump program that works with over 1,000 combinations of interface card and printer—virtually any the average user is likely to encounter. It permits extremely flexible printouts of high-res graphic images from either graphics screen. One of the program's chief selling points is its extremely flexible package of user-specified printing capabilities: over 65,000 combinations of size and proportion, zoom into and print any area of the screen, upright and rotated printing, automatic centering or adjustible margins, negative or positive printing, and so forth. All variables have sensible default settings, allowing trouble-free operation when no special features are selected. The operating parameters are easily changed by altering entries in the Picture Menu presented when the program is loaded. Configuration for different printers is as easy as answering a series of menu prompts.
Requirements: Apple II, II+, IIe, or III; 48K RAM; one disk drive
Phoenix Software, $49.95

WORD PROCESSING

"Writing is easy," Red Smith once observed. "All you do is sit in front of a typewriter until little drops of blood appear on your forehead."

Many writers would agree. Nothing is more difficult than forging a graceful sentence—except writing enough of them to fill a coherent paragraph, then going on until an article or essay, short story, or novel is complete.

But Smith was writing when word processors were costly and rare. We no longer have that excuse. A personal computer and a good piece of software can do more to ease the creation of professional prose than all the prayers murmured to the muses.

Most of us would like to believe that we sacrifice our sweat to the gods of art; in fact, it goes to the mechanics of typing. It is an uncommon writer who does not tinker with opening paragraphs. Many rework them several times, and true perfectionists—or simple compulsives—have been known go through several dozen rewrites before reaching the second paragraph. Repeatedly retyping those first lines can take more time, energy, and paper than an entire story. And in completing the piece there are typos to correct, paragraphs to transpose, needless words to cut. More typing.

It's this sort of busywork that a word processor eliminates: If you hit the wrong key, backspace, and try again. To delete a word, type a control character; to kill an entire line, type another control code. To copy or move a block of text, simply put markers at the beginning and end, move the cursor to the destination, and type a control code—four or five keystrokes in all. The exact procedure varies with the program, and some word processors are needlessly cumbersome. But none forces you to retype your page to clean up after a few changes. It is not easy to design a word processor as tedious to use as a typewriter.

Yet most programs are better suited to some tasks than to others, and a few are worth using at all only if a typewriter is the sole alternative. Some word processors, in the public domain, are available for the cost of copying a disk, while others cost up to $1,000. Their range of power and complexity is equally broad. Finding the one that suits you best will take a determined search, but the effort will be well repaid.

If you already own a computer, of course, that narrows the field; just how much depends on which model you have. There are only three or four common word processors for the VIC-20, half a dozen for Atari computers. Yet word processors are the most common variety of software available, the first item most people choose after settling on their computer. There are at least 70 programs for the IBM PC, many of them heavily advertised; making an informed choice between them will take some time.

Start by looking at your own needs. If all you will ever do is write the occasional letter, almost any word processor should be adequate. Find one that's simple, easy to learn, and inexpensive, and you needn't ask for more. But think of it as being your first word processor, not your last. It is astonishing how quickly new uses for a computer appear once you are accustomed to having one; some of them will probably require a more elaborate word processor.

More complex needs can also narrow the field. Are you likely to send out form letters? For most computers, there are at least a few word processors that can pull names and addresses from a mailing list file and insert them into a boilerplate letter. Others produce text files that can be used by a stand-alone mailing list manager, an accessory available for most, though not all, word processors. You will need one or the other.

Do you ever write long manuscripts? Perhaps business reports or technical manuals? If so, you may want a word processor that automatically creates indexes and a table of contents. One that can perform elementary arithmetic within the text might help as well. Only a few offer such facilities, however, and they tend to be more complex than most. If you can't afford some extra time to become proficient with the program, it might be better to use one of the simpler ones and stick to manual indexing and a calculator. And there are limits to the formatting ability built into any word processor. Few if any can handle footnotes that wrap from one page to the next. Academic writers may have to rely on a specialized text formatting program to turn out an acceptable thesis.

Oddly, one of the simplest-sounding requirements is also one of the most difficult to meet: Creative writers, by and large, do not need any indexes, or arithmetic, or mailing lists. Neither do they require footnotes, support for uncommon printers, or complex printing formats—except for screenplay writers, whose scripts must be laid out

in a pattern nearly impossible to create with most word processors. What they do need is *transparency,* the ability to use the program so fluidly that it never distracts them from the business of writing or tires them halfway through a long manuscript.

For any writer, this is a quality to be treasured. Unfortunately, really transparent word processors may be the rarest of all. And though it is not impossible to design a program that is both transparent and versatile, few have done it. If your thoughts are easily interrupted, it may be best to buy one of the simpler programs, one with few commands to strain your memory, and rely on accessory programs for such functions as complex formating, index generation, footnoting, and the like. This will narrow your selection again. While several dozen support programs are available for *WordStar*—few people's idea of a transparent word processor—few others are so well supplied with aid.

You will want at least one word processing accessory in any event: a good spelling checker. You will want one no matter how well you spell. Even the best of us makes an occasional typographical error, and the chances of finding all the mistakes in a sizable manuscript are remote. For a poor speller, the task is hopeless; no one who consistently misspells a word can be expected suddenly to get it right when checking over the finished text.

The most obvious concern in choosing a spelling checker is whether it will work with the word processor you have chosen. Some word processors include a spelling checker; others offer compatible prorams as accessories. And many spelling checkers will deal with files created by many word processors. If your chosen word processor is so uncommon that no spelling checker is available for it, you may want to reconsider.

Then comes the size of the dictionary. The more words it can recognize, the less time you will have to spend reassuring it—and yourself—that uncommon ones are correctly spelled. Dictionary size should be treated with the same suspicion as any other form of advertising, however. Programs that claim to use huge dictionaries may recognize no more words than others; they just count prefix and suffix variations in the total, where others count only root words.

Most spelling checkers permit you to save lists of uncommon words to be checked before probable mistakes are reported. For a technical writer, the ease of saving these supplemental lists and the number of words that may be saved may be a major factor in the choice of a program. Some also offer medical and legal dictionaries that can be very helpful in a professional office.

Other factors add up to ease of use, or the lack of it. Does a program correct all occurrences of a given error at once, or must you go through the text fixing them individually? Will it check through supplemental dictionaries automatically, or must you give it special instructions for each? Above all, how fast is it? There are large variations, and the only way to find out is to test the program on one of your own text files before you buy.

No word processor can make you a better writer. Neither can a spelling checker—though repeatedly fixing a mispelled word may finally teach you its correct spelling. But better writing is the goal of another category of word processing accessory: grammar and style checkers. Some of their functions are strictly mechanical—making sure that sentences begin with capital letters, that parentheses and quotation marks occur in pairs, and so on. Other functions mark passive verb constructions, cliches, and needless words—"in a hasty manner" rather than "hastily"—and offer better ways to phrase the idea. Using one of these programs takes some extra work, but clearer, more concise writing is the result.

Do not get bogged down in looking at word processing accessories, however. The primary goal is to find a word processor that allows you to record your words efficiently and without interruption. A spelling checker or grammar and style program is just a bonus.∞

APPLE WRITER III

Originally designed for the Apple II, this menu-driven word-processing program has been rewritten to accomodate the standard 80-column screen and directory structure of the Apple III. Like its predecessor, *Apple Writer III* is a competent performer.

The opening screen summarizes the control-key functions that will load, save, delete, and perform SOS operations.

In the editing mode, text is displayed on 23 lines. The top line, a status line, indicates cursor position, current text length, free memory space, and whether text blocks are marked for erase or uner-

ase. You can remove the status line to leave the entire screen available for editing.

Apple Writer III has all the standard text-handling features, as well as a few not-so-standard ones. There is a glossary function that allows you to define multiple-keystroke commands as single-key entries. Thus, a series of control codes needed to activate a special printer function can be entered with a single keystroke. And you can save these redefined commands to disk for later use.

You use the Arrow keys to move the cursor within the document. Vertical movement of the cursor, however, can be erratic. *Apple Writer III* bases its horizontal cursor movement upon an 80-character line. Unfortunately, it does not take into account the spaces it has inserted into the line to produce word wrap, so the cursor often lands several spaces from its intended location.

Although the document being edited does not appear on screen as it will on paper, output can be redirected to the screen so that the text, headers, and footers are displayed as they will be printed. Boldface or underlined words appear in inverse video, black letters on a bright background.

Blocks of text are moved by erasing a section and storing it in memory; all erased characters are stored in a buffer for later recall. You move the cursor to the desired point and "unerase" the text. Unfortunately, the buffer area is not large, so only a small segment of the document can be moved at a time.

A page-formatting menu lets you assign default settings, including header and footer values. You can change these settings from within the document by embedding a "Dot command": a period at the extreme left of a line of text, followed by a command code. You can save these formats to disk.

Also included is *WPL,* a word-processing language, with which you can create command files that allow the program to perform repetitive functions when unattended. *Apple Writer III* supports form-letter and mailing-list generation and can be used with *Apple Speller III,* a powerful spelling checker. The program also supports such operating system functions as time and date set, file rename, screen character set downloading, and normal cataloging and deleting of files.

Apple Writer III is copy protected and comes with both backup and utilities disks. It does a workmanlike job with workmanlike tools, and even uses a few techniques from the master craftsman's bag of tricks.

Requirements: Apple III, 128K RAM, disk drive
Apple Computer, $275

BANK STREET WRITER

This is a word processor designed for the home. There are no complicated commands, no tricky operation sequences. In fact, you can start it up and use it without even opening the instruction manual.

Bank Street Writer is its name. Developed and tested by the Bank Street College of Education, it is one of the easiest-to-use word processors available. Designed for simple at-home tasks such as letters, school assignments, reports, or even short stories, it is loaded with conveniences usually found only in more powerful programs.

Incorporating such features as word wrap, global search and replace, block move and delete, block save to disk, centering and indenting of text, password protection of files, document chaining, page headers and numbering, *Bank Street Writer* uses simple-to-follow, onscreen prompts to make operation easy for even the youngest family members.

The program is crashproof and nearly goofproof. You may back out of any option, and even if RESET is pressed, both the program and your file remain intact. Even block deletions may be recalled, though only the most recent deletion remains available. Upper- and lowercase text 38 columns wide is displayed with no additional hardware required. The Shift-key modification on Apple IIs are also supported although no Caps-Lock is available (no problem on the Apple IIe).

Many print options are available, including separate print-draft and print-final modes. Print-final allows you to set the number of characters per line, line spacing, page numbering, and heading as well as selection of single-sheet or continuous-form paper. A nice feature is the ability to see where each page will end prior to printing. If you wish, you may adjust the page break up or down and print selected parts of the file. The Print-Draft option prints the document exactly as it appears on screen, 38 columns wide. This is handy for proofreading.

In trade for this program's simplicity and relative power, the user must accept a few inconveniences. One is its right-justification procedure: There isn't any. Text must always be printed with a ragged right margin. Nor is there any way to indent a para-

graph, except by using the Space bar. The most serious limitation is dependent on the computer. The program is so large that a machine with 48K of memory can hold documents no longer than about 1,300 words. Longer texts must be split into several files. A 64K computer will hold more than 3,000 words, however, and the program will even use the entire 128K RAM available on an Apple IIe.

Bank Street Writer comes complete with a backup disk as well as an excellent interactive tutorial on the reverse of one disk. A utility option allows various defaults to be set. Among these are the number of disk drives, printer slot, page format, and printer-control codes.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, Atari, 488K RAM, disk drive
Broderbund Software, $69.95

COLOR SCRIPSIT

While *Color Scripsit* lacks the sophistication of some other Color Computer word processors, but it is sufficient for average needs. It sacrificed "bells and whistles" for fast, simple operation.

Like most popular word processors, *Color Scripsit* offers a true lowercase display. It does not, however, provide alternative screen formats to the standard 32-column by 16-line display. This can make it somewhat more difficult to edit files of even moderate length. A further disadvantage is that the text displayed on the screen will not look like the text that is printed out, as *Color Scripsit* files may be printed at up to 132 characters wide.

Color Scripsit has all the standard editing functions: block move, copy, or delete; tab setting; inserting text; delete word, line, or letter; and full cursor control. The printing functions are standard as well, with the exception of a spool file. This lets the user continue writing while other text is being sent to the printer.

A 16K-memory, one-drive Color Computer is sufficient for *Color Scripsit,* but it leaves only 1,433 bytes for text. This is enough for a long letter, but not for most other documents. The user can, however, turn off the lowercase display option and free 7,200 bytes. This makes for an unattractive screen display, though. A 32K Color Computer allows 17,817 bytes for text.

The manual is thorough and well produced. A novice can easily understand it. A sample session is given to familiarize the user with the program.

Color Scripsit is the average person's word processor. It is ideal for the student or the home user. Professional writers will probably want to opt for something with better screen displays and fancier printing and editing functions.

Requirements: TRS-80 Color Computer, 16K RAM, disk drive
Radio Shack, $49.95

COPYART II

On word-processing prowess alone, *CopyArt II* could stand up well to its competition. But this program gives the user features not usually expected on a word processor: math functions, sorting capability, and high-resolution printer graphics.

CopyArt II has most of the word processing features found on its competitors: a full complement of text-editing functions, flexible text-formatting codes for a wide variety of printers, and a mailing-list option with merge capabilities. Text-editing commands are accessed by two keystrokes. Print commands can be embedded in text, and they include underlining, sub- and superscripts, boldface, and italics. *CopyArt II* can also print multiple columns.

The user can set up numerical data in rows or columns and then add, subtract, multiply, or divide the values in a particular column or row—sort of a rudimentary spreadsheet. The results are given in dollars and cents and neatly aligned by the decimal point. The sort function sorts lines of data in ascending or descending order.

CopyArt II's graphics capability is its most outstanding feature. Graphics can be incorporated within printed text, or the user can create his or her own letterheads. Fancy large typefaces are possible, too. The program asks for the letter's height, width, whether to print them horizontally or vertically, and whether they are to be reversed (white on black).

Likely uses for these graphics include graphs and charts, unique methods of emphasizing text, or just putting humorous caricatures in personal letters. Of course, the user must have a dot-matrix printer, such as an Epson or Okidata, capable of producing these graphics.

By giving *CopyArt II* these unusual features, Simutek gave TRS-80 owners a word processor limited only by their imagination. It makes an interesting tool for experimenting with printer graphics, and it gives the businessman a way to dress up correspondence.

Requirements: TRS-80 Model III or 4, disk drive
Simutek Computer Products, $149.95

CUT & PASTE

Cut & Paste is a product of the "keep-it-simple" school of word processing. It is not an office-quality word processor and was not intended to be. It is, its excellent documentation claims, "the first sensible word processor for the home." At $50, it is at least sensibly priced.

Cut & Paste is a two-disk package that includes an excellent 14-page instruction manual, a quick reference keystroke card, and a set of valuable, easy-to-understand onscreen prompts and "help" instructions. One of the disks carries *Cut & Paste* itself; the other has some sample documents on it, plus some extra space for a few documents of your own. To create another document disk, all you have to do is format a blank disk by calling up the main *Cut & Paste* menu and pressing a couple of keys.

One unfortunate feature is that *Cut & Paste* uses a nonstandard disk format. Because of this, you can't transfer documents from *Cut & Paste* to other word-processing programs, and you can't splice alien data into a *Cut & Paste* document. In addition, *Cut & Paste* documents cannot be transmitted by any telecommunications programs now available. So *Cut & Paste* is not very versatile.

It is, however, amazingly easy to use. Once you've booted the program disk, all you have to do is press the Return key. The program will then present you with a list of the documents on your disk, and you can choose one by moving the cursor to it with your Arrow keys and typing "ESCape."

At this point, your cursor moves to a line at the bottom of your screen with a short list of commands that perform various functions—load, save, or print a document, for example, or insert or delete text, or move it either from one file to another or within a file.

Once your cursor is on the command line, you can move it from one command to another with your Arrow keys, and you can choose the instruction you want to implement by pressing your Escape key.

If you use the command line to load a document into your computer's memory, the text is automatically displayed on screen. when *Cut & Paste* is in its editing mode—that is, when there's a document on the screen—you can use your Arrow keys to move your cursor to any point on your screen. Control keys shift it backward or forward one full screen, or to the start or end of a document.

To erase a letter using *Cut & Paste,* you have to back up into it using your Backspace key. Blocks of text can be deleted, inserted, or moved with an ingeniously engineered "cut & paste" function—the operation from which the program derives its name.

The cut-and-paste function can also be used to move text from one document to another. When you delete text from a document, it is stored in a special buffer that remains intact when a new document is loaded into your computer's memory. And that means that text can be moved into the buffer, saved there while a new document is loaded, and then loaded into the new document using Control-P.

When you've written or edited a document, you can save or print it using commands on the command line. When you hit the Print command, you'll see a menu that you can use to configure *Cut & Paste* to work with your printer. *Cut & Paste* can be used with a wide variety of printers and interface cards, but you should make sure before buying it that your combination is supported by the program.

If *Cut & Paste* is compatible with your printer, it can be configured to work with it in—literally—just a few seconds. It took about twenty seconds to get *Cut & Paste* to work perfectly with an Epson MX-80 used for this review. And that is truly remarkable. Getting your printer to work properly with some word-processing programs can take days.

This simplicity does have its price, however. There are dozens of common word-processing jobs that *Cut & Paste* cannot do. Some examples: *Cut & Paste* cannot underline text, or print subscripts or superscripts, or print boldface. And tabs stops are fixed in five-space increments; they cannot be changed. The program can be set to print headers, but except for page numbers no footers are allowed. *Cut & Paste* will not automatically justify a document, nor will it automatically center lines on a page. And, although the program will number pages, it uses just one format—with the page number centered at the bottom of the page.

The *Cut & Paste* program cannot be used with any spelling checker now available, nor with any mailing-list program. And, as already pointed out,

currently it cannot be used with telecommunications software.

On the plus side, *Cut & Paste* be the easiest-to-learn and easiest-to-use word-processing program on the market. And it is certainly inexpensive. But its capabilities are extremely limited—so if there's any possibility that your needs will ever exceed them, beware!

Requirements: Apple IIe and IIc, Commodore 64, Atari, IBM PC and PCjr., 64K, disk drive
Electronic Arts, $50

EASY SCRIPT

Easy Script is the "official" word processor for the Commodore 64. Created for Commodore by Precision Software, a British company, *Easy Script* is very similar to *WordPro 3 Plus/64* in design, but very different in operation. Like *WordPro,* it is not a "see-what-you-get" word processor, but a character-oriented editor in which the video screen acts like a window to the memory where text is stored.

In addition to Commodore's own printer family, *Easy Script* can be used in conjunction with printers from Epson, NEC (Spinwriters), Qume, and Diablo. Printers can be connected to the computer in the normal fashion, through the 64's serial peripheral bus, or via the computer's parallel "user port." Both Centronics parallel and RS-232 printers are supported this way.

Easy Script displaces BASIC in the 64 when it is loaded from disk, so there's plenty of room left for entering text. Slightly over 30K bytes are available, the equivalent of about 20 double-spaced manuscript pages. This is important, since the program works strictly on the text in RAM memory. Longer files can be chained together when printed.

By design, *Easy Script* takes advantage of the 64's function keys to control its operation. Key "F1," for instance, acts like a control key to change editing modes, and "F4" puts the program into "disk mode" to store and retrieve manuscripts. Other helpful features include the ability to preview the text as it will be printed, and screen width can be set between the standard 40 and very wide 240 characters. Since the 64's screen cannot display more than 40 characters on a line, the screen scrolls horizontally to see the rest.

Unfortunately, *Easy Script*'s text files are structured in a unique manner. This makes the program incompatible with the other leading word processors for the 64, even though it is so close or identical in many important ways, including many formatting commands. Still, *Easy Script* is all the word processor that some people will need. It is fast, performs all of the basic editing functions exactly as advertised and, at the price, is a considerable bargain.

Requirements: Commodore 64, disk drive
Precision Software, $225

EASYWRITER 1.1

The original version of *EasyWriter* was released at about the same time as the IBM PC for which it was written. It proved to be the only serious blemish on the otherwise sparkling debut of "Baby Blue." It was unarguably bad.

EasyWriter Version 1.1 is evidence of IBM's determination to rid itself of the embarrassment caused by *EasyWriter*'s shortcomings. It's an excellent package.

In the original program, key functions such as insert/delete and block-move/copy were slow and clumsy. Embedded print commands caused extra line feeds that sometimes fouled up the formatting routine. Those problems, and most others, have been eliminated in the new version.

The new manual is complete with an easy-to-follow tutorial near the beginning, a reference and clear explanation of commands and menus in the middle, and appendices with tips and troubleshooting for advanced users. If you're already familiar with the typewriter keyboard, it shouldn't take much more than an hour or so to have *EasyWriter 1.1* up and running.

EasyWriter has three command levels: the file system, the additional-commands menu, and the help menu. Each can be called up with a single keystroke, and the help menu can be left on the screen while editing.

Creating a new document starts from the File System. Just hit "E" (for editor) and you have a blank screen ready for your text. Calling up an existing document for revision or printing is equally simple. The save and revise functions are called up with single keystrokes, plus "Y" in response to the failsafe, "ARE YOU SURE?"

Text can be aligned with or without right justification, but the alignment function is still a bit on the slow side.

The block-move and block-copy routines have been thoroughly overhauled and now work quite

smoothly. This and most of the other functions make good use of the PC's special function keys.

Since the perfect program is yet to be written, there are shortcomings. In general, *EasyWriter 1.1* tends to be a bit slow when compared to other popular word-processing programs. Also, some users may find the limited document size undesirable. Unlike some programs that move text back and forth between RAM and disk as needed, *EasyWriter* stores the entire file in RAM. This limits file size to 14,000 bytes with 64K-memory, or 24,000 with 128K. In practice, though, this problem need not be serious. *EasyWriter* makes it easy to "link" up to 124 existing files on the same disk and print them as if they were one; thus the theoretical file-size limit is not restrictive.

There are faster and more elegant word-processing programs available, but most are considerably more expensive than *EasyWriter 1.1*. The user who does not require the sophistication or speed of the higher priced programs should find *EasyWriter* quite satisfactory.

Requirements: IBM PC, 64K RAM, disk drive
Information Unlimited Software, $175

EASYWRITER II

EasyWriter II is a page-oriented, full-featured word processor. It offers a definite alternative to programs such as MicroPro's popular *WordStar* package. *EasyWriter II* takes quite a different approach to things. Which you choose is largely a matter of personal preference and requirements.

EasyWriter II mimics a dedicated word processor. It uses the IBM PC's function keys for all special operations—control key sequences are never used. This is one of the clear differences between it and programs like *WordStar.*

Another is *EasyWriter II*'s use of many editing modes. The meaning of the Arrow keys, for example, is modified by the current mode: character, word, line, sentence, paragraph, block, or page. The modes are set by pressing different function keys. This is straightforward and easy to learn but quickly grows cumbersome to use.

One of *EasyWriter II*'s outstanding features is its on-screen formatting. What you see is what you will get when your text is printed. In this, it outperforms even *WordStar*. Directly displayed are such things as headers and footers, boldface (shown as bright characters), and underlining (if you have the monochrome display adapter.)

Formatting of paragraphs follows the current "ruler." A ruler specifies left and right margins, tab settings, centering, and line spacing. You can store up to eight named rulers with each document, and you can change rulers from line to line in your document.

EasyWriter II stores your documents in "file folders." A folder can hold many documents, and you need an import/export utility to move regular ASCII files in and out of folders. This makes for more efficient use of disk space, but it also renders the program inconvenient for many purposes.

A very nice tutorial comes with *EasyWriter II*. The tutorial is a document, and you simply run *EasyWriter II* and page through the document, trying out features on each page as they are described. *EasyWriter II*'s "undo" feature lets you throw away changes made during your experiments. This ease-of-use carries over into everyday writing with extensive, readable on-line help screens. The manual is clearly written and well organized. If the emphasis on function keys doesn't bother you, *EasyWriter II* lives up to its name.

IUS has recently bundled *EasyWriter II* with their *EasySpeller II* and *EasyMailer II* packages. *EasySpeller II* is nicely integrated with *EasyWriter II;* you can check the spelling of a word, or an entire document, against an 80,000-word dictionary without leaving the word processor. One major drawback is that you cannot permanently add new words to the dictionary. *EasyMailer II* lets you merge information into a boilerplate text and create your own personalized form letters.

Requirements: IBM PC, 64K RAM, one disk drive; 96K required for advanced features
Information Unlimited Software, $350

THE EXECUTIVE SECRETARY

What would you think of a full-featured word processor that can generate form letters using files directly from many popular database programs, including *VisiCalc* and its own built-in Electronic Card File program? Plus, a built-in electronic mail feature?

The Executive Secretary is capable of that and more. It incorporates all the features expected of a professional word-processing package: global search and replace; block moves; character, word, and line insert, delete and replace; word wrap; embedded printer commands; document preview; page headers and numbers; two level indexing;

multilevel outline indenting; and two-letter phrase abbreviations. You can even use the program to fill out blank forms by using simple vertical and horizontal spacing commands. Input may be from keyboard entry or document files. Customized form letters may also be produced directly from the keyboard; a "blank" is recalled from disk, and you merely fill in the blanks by responding to screen prompts.

As is the case in most word processors, workspace is limited by available memory and allows the user to work on only a few pages of text at a time. Handling about 3,000 words at once, *The Executive Secretary* has a very powerful feature that allows the production of large documents. By using the Block-Marker command, portions of text may be saved as subfiles to be recalled later using a one-line Embedded-Text command. Regular document files may also be merged into the printed output by using a similar command. Thus, an entire document can be printed by using nothing but a series of these commands.

The manual states that the program uses standard Apple text files; however, unless these files are on a specially formatted disk, they are unreadable. Furthermore, a "restore-document" option that is supposed to "convert text files to a format *Executive Secretary* recognizes" did not work.

The 80+–page, easel-bound manual is organized into 25 easy-to-follow tutorial lessons. Some bugs still exist in the manual. Some of the screen formats it shows don't coincide with those of the program, one appendix is missing, and such menu functions as how to "restore a document" are unexplained. Although professionally typeset and printed, the type size used in the manual may be too small for easy reading. A comprehensive reference card designed to lay above the keyboard is also provided.

The Electronic Card File is a relatively powerful database manager that can be used to organize mailing lists or other information that could be kept in a card file. An empty disk will hold about 500 records consisting of 13 lines, or 999 with five or fewer lines per card or record. More than one file may be stored on one disk. Easy to use, the files may be searched and sorted, printed in one- or multiple-line reports with totals and subtotals on selected fields.

The Electronic Mail System transmits documents automatically over a modem to and from other Apples and mainframe computers. If a clock/calendar card is installed in your system, you may even have the transmission occur later at night, when rates are lower.

The Executive Secretary has tremendous power and potential with many options and capabilities too numerous to discuss here. With a little more improvement and bug correction, this program could be a winner. The internal card file, *DB Master, Data Factory, Information Master, VisiFile,* and most DIF files are supported for mail-list merging. It supports Superterm, Full View 80, Smarterm, Videx Videoterm, and Vision 80 boards. Apple IIe requires no modification and Apple 80-column board is supported. Special versions are available for Corvus and other hard disks. The Hayes Micromodem and Thunderclock for time/date stamping of documents is also supported.

Requirements: Apple II with *Applesoft BASIC* in ROM or Apple II+, 48K RAM, one-wire shift key modification, lower-case adaptor (for 40 columns) or 80-column board required
Sof/Sys., $250

FORMAT II

Format II is a sophisticated, page-oriented, word-processing program that is excellent for one-page documents and other short pieces. The designers have put everything possible into *Format II:* logical, easy-to-use editing functions; consistent commands that work globally or locally; advanced mail-merge capabilities; and highly flexible printing subsystems.

Unfortunately, there is a worm in the otherwise polished apple: *Format II* handles only one page at a time. For anything longer, you must move the current page—up to 80 lines—out of memory (save it to disk) and move the new page in. Although you can load a series of finished pages to be printed consecutively, moving back and forth between different pages of a document while writing or editing is a time-consuming annoyance—especially on longer pieces.

The system's otherwise excellent features should not go untrumpeted, however. *Format II* uses two modes, Enter Text and Format Text. In the format mode, each key triggers a (occasionally farfetched) mnemonically based editing command. For example, pressing "S" (for start) elicits a one-line prompt at the bottom of the screen: "(W)ORD, (L)INE, (S)ENTENCE, (P)ARAGRAPH, (T)EXT,

(A)LL." Selecting the letter of your choice moves the cursor to the beginning of the appropriate place in the text. The same or similar prompts appear for deleting, justifying, centering, and numerous other applications. Transposing is done by defining a text block, putting it in a buffer, and reinserting it at the cursor. Moving and closing up lines, adding line spaces, making new paragraphs, underlining, and getting a word count are all similarly painless, requiring at most two keystrokes.

Format II's search-and-replace functions do allow you to make immediate, global substitutions throughout a multipage document. The system, however, doesn't replace with lowercase letters any letter that was upppercase to begin with—and there's no override that will let it do so. That's usually O.K., but if you wanted to replace every mention of, say, "BASIC," with an upper- and lowercase "Basic," *Format II* wouldn't permit it.

Other functions, though, are more yielding, and there are generally several ways to accomplish any procedure. Also handy is the editor's instant reformatting ability. When you insert or delete text, the existing copy slides over instantly to accommodate the new paragraph structure.

Format II's editing abilities are only part of the story, however. Its printing subsystem, along with all the usual headers, footers, and margin settings, allow proportional spacing, so the letter *W* takes more space than the letter *i*. And its "microspace justification" puts extra, tiny spaces between words or letters to fill justified lines. The mailing system is also powerful, with a built-in database capable of storing 510 records of up to 16 fields, and easy sorting, searching, and editing functions.

This and other features are typical. Indeed, so chockful of goodies is *Format II* that it takes a full 55 seconds to load the program into the Apple when you boot up. Now if only the programmers could have made all this work on more than one page at a time. . . .

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive

Kensington Microware, $150

HOMEWORD

Word processors for the Apple computer range from very complex programs intended for the professional writer or office to very simple ones designed for the occasional letter-writer. Complex word processors generally have extensive command structures that are difficult to remember unless the program is used regularly, and some simple programs don't do very much.

Homeword is an attempt to give the occasional home-user a simple-to-operate yet relatively sophisticated word processor. By selecting from a menu of pictures or "icons," the desired function is easily chosen without having to remember complex commands.

Complete with most expected word processing functions—headers and footers, page numbering, centering, justification, find and replace, block move and copy—*Homeword* offers two unique options not found on most word processors.

The Indented Point function allows one to set up four levels of indentation to produce outlines or lists. You may define the symbol used for each level as numbers, upper-and lowercase letters, or a "bullet" symbol such as a period or asterisk. The program automatically keeps track of your numbering or lettering sequence and will reset each level when instructed to return to the next higher one. Totally automatic, it demands only that the user indicate in the text the level of indention desired.

Because *Homeword* is uncommonly large, only four standard-size pages fit in the memory work space at any given time. While parts of other files may be inserted anywhere in the text, this would still prevent production of large documents. However, another unique feature, called "include document," lets you specify the names of the other files you wish to include in your document. While they don't appear on screen in your current file, they will all be printed in proper order. Using this feature, very large documents may be produced.

Working with only 40 columns of text on the screen, *Homeword* also displays a miniature formatted page layout in the bottom corner of the screen. This helps take the guesswork out of how your page will look when printed. You can see centered titles, indented blocks, how many paragraphs are on each page, and where the page number will appear. Also, when the print icon is selected, you may "SEE FINAL DOCUMENT" by printing to the screen in a 70-column format similar to that of *ScreenWriter II*. Both the 40-and 70-column displays are in true upper-and lowercase text, generated without any additional hardware, though a one-wire modification may be made to enable typewriter-style use of the Shift key.

Block moves of phrases or paragraphs are ac-

spaces to make room. If the line width does not allow enough space to be added, you have to break the line into two smaller lines, add the appropriate material, and then "glue" the lines to make the text run in as it should. If you then decide you want to change that insert from single-spaced to double-spaced, you have to add space between the lines one line at a time.

Moving blocks of text is equally cumbersome. Each line you wish to move must be put in a buffer that holds up to 16 lines. Then you move the cursor to the appropriate spot and recover the lines, one line at a time, from the buffer. The last line put into the buffer is the first retrieved, so the order of initial entry into the buffer is critical. Since the buffer holds only 16 lines, transposing long copy blocks is tedious. And if you mistakenly put 17 lines into the buffer, the first line input will be permanently erased.

Various control functions allow you to move the cursor to the top or bottom of file; up or down ten lines (handy); up or down a line; right or left one character; and right or left to user-set tabs. Another simple commmand lets you move to any page in the file. Search and search-and-replace functions are global, though the justification functions—flush left, right, justified, centered, or "packed," with excess spaces removed from between words—are not. Title lines and page numbers can be placed in just about any position at the top or bottom of a page.

Magic Window II is friendly. It is almost impossible to erase a file by accident. If you try to load a new file over one that has not been saved, the program warns you and will not act until given the go-ahead. To delete, rename, lock, or unlock a file, you exit to the DOS-command subsystem. The procedure is slow but safe. And if you ever find yourself lost in one of the menu-driven subsystems, pressing Return enough times will always get you back into the editing mode. Such ease of operation even carries over to the documentation, which is clearly written and well indexed. In fact, if you can't operate *Magic Window II,* maybe it's time for a refresher course in Elementary Household Appliances 101.

Requirements: Apple II, II+, or IIe, one disk drive
Artsci, $149.95

MEGAWRITER

This is it! The easy-to-use word processor for your Apple that does more for half the price. *MegaWriter* may be the first word processor designed specifically for the Apple IIe.

These are the claims made by *MegaWriter.* A features comparison chart on the package, called "*MegaWriter* vs. the Competition," compares it, at $99.95, with *Applewriter* at $135 (presumably the old *Apple Writer 1.1,* which is no longer marketed) and *Apple Writer II* at $150. Neither takes advantage of the IIe's features. *Apple Writer IIe* at $195 is not compared.

One of the claims made is that *MegaWriter* "gives a full 80-column page with or without an 80-column card." What it actually does is show two 40-column halves of the 80-column page with Ctrl-A switching between then. The bottom line is that an 80-column card is highly desirable for ease of operation.

Originally released as version 1.0 at $59.95, it was updated to version 2.0 to incorporate many customer suggestions. The entire program is now supplied on a single faster booting disk, and it features faster command operations, tabs that can be set, micro justification, and DOS file conversion.

Just what does *MegaWriter* have to offer? Well, for one thing, it is very easy to use. Menu driven, with all commands displayed on screen, it has some very powerful features. A full-screen editor allows for easy cursor movement and makes insertion and deletion of text a snap. Onscreen formatting lets you shift text horizontally; left or right justify or center text a line at a time or in blocks. You may change margin settings and then reform the text on screen with a simple command. What you see is what you get!

Blocks of text may be moved or copied, both within the current file or to and from files on disk. Utilizing markers, selected parts of disk files may be merged with the current work file.

Printing your document is just as easy, with many options available. Full control of all margins, paragraph indentation, page header and numbering, line spacing and the use of single or continuous sheets are all selected from a simple Print Environment menu. It is here that *MegaWriter* excels; in conjunction with an ASCII Codes screen, you may set up the program to work with your printer's special features, such as emphasized or double-width characters and even proportional spacing. These features are then called up in text with simple embedded commands; for example, "(e+)" can be made to turn on emphasized print and "(e−)" to turn it off.

MegaWriter directly supports mail-list merging and chaining. Chaining is done with a simple in-text command and allows an unlimited number of document files to be printed as though they were one. Mail merge is accomplished simply by first creating a "merge-data document" containing all the names, addresses, and other information you wish inserted in your form letter. Then a form-letter blank is set up showing where each variable is to be inserted. Finally the two are run off together to produce customized letters. Easy and painless!

Written in Pascal, the program operates under the p-system rather than to Apple DOS but will convert text files from one system to the other. The Apple II one-wire Shift-key modification is supported, although the manual says it is not, but lowercase adaptors are not. In the 40-column mode, uppercase letters are displayed as inverse video characters. An 80-column board must be used to obtain true upper- and lowercase characters. The manual is unclear, however, as to which 80-column cards are supported.

The 160-page spiral-bound manual is well written in an easy-to-follow tutorial format. A command-summary list is included along with three block diagrams showing the command structure. Included is a version 2.0 supplement manual, but by the time you read this, the current manual should have been revised to include the changes it covers.

Requirements: Apple II, II+ or IIe, 64K RAM, disk drive

Megahaus Corp., $99.95

MSCRIPT

MSCRIPT is a low-cost word-processing program that runs on many popular systems. It does most of what you'd want a word processor to do, without a lot of fuss or complexity.

It is a personal word processor, not for someone who makes his or her living as a typist. But for someone who may want to draft a memo now and then and have the secretary clean it up, or edit the secretary's work electronically, *MSCRIPT* is ideal.

You won't have to use this program daily or even weekly to stay proficient. To create text, you tickle the keys; to save it, you hit the command key and S (for "save") followed by the file name.

Editing is generally easy, too. You move the cursor where you want it, and overtype old text. Control I lets you insert, control D lets you delete by character, and control S (for "subdelete") lets you delete by word or line.

Other important features include a "help" screen that briefly describes commands, underlining, and boldface printing with appropriate printers, user-definable printer control codes, user-definable tab stops, and status line indicators showing where the tabs are and the cursor position expressed numerically.

On the negative side, *MSCRIPT* won't do some things that can be useful. The following aren't supported: indication of page breaks before printing; mail merge; proportional spacing; automatic vertical centering; automatic line numbering of documents; boilerplate insertion in mid-document; and math operations on numbers in text files.

The manual is just fine, although a touch of art work amid the text would ease the eyes. It's engagingly written, by a novelist who has taught word processing. The manual is a little brief in places (print formatting needs a longer treatment), but it'll get you into the program with a minimum of hassle. If you still have questions, you can expect good support from the manufacturer.

Requirements: TRS-80, Model I, II, III, 4, 12, or 16, IBM PC or PCjr., LNW-80, Lobo Max-80, Epson QX-10, Zenith Z-100; disk drive, printer

Micro-Systems Software, $79.95

NEWSCRIPT

Newscript has everything a person could want in a word processor: powerful text-manipulating abilities, compatibility with nearly any printer, the ability to merge addresses with form letters, and one of the best print-formatting command sets available. The user can also buy other software, including a spelling checker, mailing-labels option, and a graphics editor and programmer, to expand *Newscript*'s capabilities.

All this is great news for the professional who needs a lot of word-processing power. The computer hobbyist, however, will probably never use *Newscript* to its full potential, and may be better off with a word processor such as Radio Shack's *Scripsit*.

Newscript comes ready to run—no transferring of files to a system disk. The program prompts you through the setup procedure. This setup lets the user configure the program to his or her equipment. This is an excellent feature, considering the

complished by "painting the text" with the cursor and arrow keys. This works fine, but it is somewhat slow if you are moving large blocks. It would be nicer if the beginning and ending of the block could just be indicated with a marker.

The user must be very cautious of one thing—Never hit the Reset key. The program will bomb, and a reboot will be necessary with loss of all unsaved data. It is too bad that the Reset key cannot be trapped with a return to a menu or to your place in text as in many other programs.

In an attempt to simplify home word processing, the manufacturer has taken a different approach to the documentation. Included is a cassette tape—side A for Apple IIe, side B for Apple II—that leads the user through a simple letter-writing tutorial with additional instruction on print and disk utilities and setup. A transcript of the tape is provided as a separate pamphlet. Another small manual, called *The Homeword Story,* is provided as a reference to all the program's functions. Produced in a picture storybook format, it requires very little "computerese" to understand. More experienced users will find it lacking in technical information, but provided on the program disk are several help files that further explain some of the program's functions. Included also is a reference card showing all the editing and filing commands as well as other functions directly accessible from the keyboard.

Given its nominal price, *Homeword* is an excellent value.

Requirements: Apple II, II+, or IIe, DOS 3.3; 64K RAM, one disk drive
Sierra On-Line, $49.95

LeSCRIPT

LeScript is a well rounded word processor suited for a business or home environment. It is flexible and easy to use without sacrificing important features.

Editing commands include block move, insert text, a powerful tab, rejustify, split text, and search and replace. *LeScript* has excellent cursor control, making it possible to get to the beginning or end of a line or body of text with a minimum of keystrokes. The user can also underline, italicize, and super- or subscript text.

LeScript can handle virtually any popular brand printer. Its printing capabilities are powerful, as well. The user has much flexibility in formatting text. He can justify right, left, center, or any combination thereof. *LeScript* can take advantage of nearly any popular feature on most printers, such as emphasized, double-strike, italicized, or double-width print; underline; super- and subscript; and top-of-form controls.

Anyone with previous word-processing experience can learn *LeScript* in minutes, while a novice will take a little longer. Not only did Anitek cleverly design *LeScript* for ease of use, they also had the good sense to provide an excellent manual.

The manual is well organized. Its thorough table of contents doubles as an index. A quick-reference function guide in the back is all an experienced user needs to learn the system. The writing is concise and easily understood by the novice. The only flaw is that the manual is printed in dot matrix. This makes for gray pages (there are no illustrations), which are sometimes hard to read.

The office worker will appreciate *LeScript*'s hassle-free controls and flexibility. The average home user might find *LeScript* more word processor than he really needs, but *LeScript* shines equally brightly on routine chores as it does on difficult ones.

Requirements: Radio Shack Model III or 4, one disk drive
Anitek Software Products, $129.95

MACWRITE

With word processing, the most popular applications software for personal computers, it's no surprise that Apple Computer introduced its *MacWrite* word-processing package along with its innovative Macintosh computer. The $99 program, which comes with a *MacPaint* graphics program on a 3½-inch plastic-encased disk, is a bargain. Like all bargains, however, there are some shortcomings that buyers should be aware of.

In its favor, *MacWrite* is so simple that its nicely documented manual is almost superfluous. As with any program for the Macintosh, the user must gain some facility with the machine's mouse, the cursor-control device that one rolls about at a side of the computer. Moving a cursor to an icon or label to choose an action is a lot easier on the mind than remembering a variety of keyboard codes, of course. However, experienced computerists who are also facile typists may at first balk at interrupting their typing rhythm.

To begin *MacWrite,* you double-click the mouse

button on the *MacWrite* disk icon. A "window" with a ruler at the top then appears on the display, with various symbols used to format a page displayed under it. Solid triangles are used for margins, open triangles for tabs, and an arrow for indentation. These symbols are moved along the ruler by moving the screen pointer to the selected one and, holding the mouse button down, dragging the choice to a desired location on the screen.

Other format options available just underneath the ruler are spacing (single, double, and triple) and justification (left, center, right, and full). Lines are formatted and reformatted automatically with these options. To format different parts of a document in different ways, just embed another ruler in the text. (Rulers can be made visible or invisible on the display.) The only problem with this method of formatting is that sometimes a simple task such as centering a single line becomes a cumbersome job. In this case, a ruler must be placed above and below the line with centering selected and then deselected.

A feature of *MacWrite* that will impress both beginners and veterans is the ability to type in different character styles and sizes. The styles available are plain, bold, italic, underline, outline, and shadow, while font types give the user a wide choice of typefaces, such as Old English, Cursive, and so on. Size choices range from 9 point to 72 point. Makes one feel like a typographer.

MacWrite is always in the insert mode. Two cursors are used: one is vertical line, and the other has the shape of an I-beam. The vertical line shows where the next letter will be inserted, while the I-beam moves in response to the mouse's movement. A click on the mouse button brings the vertical line to the I-beam for insertion of text at that point.

An Edit pull-down menu provides easy options for manipulating text, such as Cut, Copy, and Paste actions. You can usually undo your last command.

MacWrite does have some minor and serious shortcomings, depending on the user's applications. For example, at this time only the Apple Imagewriter printer is supported. So if you already have a printer or wish to use a formed-character printer, you can't do it. The Imagewriter itself is an impressive dot-matrix machine, however, enabling one to print text and graphics with admirable ease.

Missing in the word-processing system are superscript, subscript, indexing, split-screen, and other niceties that professional book authors normally desire. Furthermore, you cannot pause while printing output, though the printer can be shut off. Additionally, the machine can only handle 10 to 20 pages of double-spaced typing before it runs out of memory. Therefore, one must do a lot of saving when typing a long manuscript. As a consequence, having a separate, outboard disk drive is an imperative. At this writing, the additional drive is not available. Neither is much available right now in the way of other software, though you can be sure that innumerable software packages will come online. Nonetheless, *MacWrite* word processing is not yet supported with such marvelous options as mail sorting and merging, spelling and grammar checkers, and a thesaurus.

In sum, *MacWrite* is simple to learn and very easy to use. Graphics can be combined with text, assuming use with Apple's Imagewriter printer, and combining *MacPaint* with *MacWrite* at just $99 makes it a worthy buy. Actually, you have no choice but to buy it at this time if you purchase a Macintosh computer.

MacWrite certainly has some invaluable features that other word processors do not have—integrating drawings from *MacPaint* into a document; variable type styles, fonts, and sizes, and so on. But for those who need a true professional word processor, with all the accompanying bells and whistles, *MacWrite* itself is not an appropriate choice. For people who do not require the foregoing, perhaps wanting a computer for letters and short reports, it will do marvelously well for them.

Requirements: Apple Macintosh, Apple Imagewriter printer

Apple Computer, $99 packaged with *MacPaint*

MAGIC WINDOW II

Magic Window II is a more-than-adequate word-processing program for the beginner. It is simple to learn; its multiple menus guide you through the separate editing, filing, printing, formatting, and configuring modes, spelling everything out along the way. The control commands in the editing mode are similarly uncomplicated, with few multiple keystrokes required.

Of course, to make *Magic Window II* so elementary, the designers had to sacrifice versatility and speed. A few examples: There is no insert mode. When you want to add new text without typing over existing matter, you must first insert enough

variety of printers, operating systems, and peripherals a user could have.

There is almost nothing the user can't do in editing text with *Newscript.* It even includes a "whoops" command, which lets the user erase all changes made to a screen, restoring its original format. Most of the text-editing functions are accessed by either two-letter commands preceeded by a period; for example, ".ce" to center the next line of text, or one-letter commands, such as "C" to change text.

Print formatting is *Newscript*'s forte. In conjunction with a good printer, it can even be used to typeset text. (Prosoft typeset *Newscript*'s documentation this way.) It can also create forms, format letters, or even make a logo or masthead if the user has a dot-matrix printer and the graphics editor and Programmer option.

There is a trade-off for all these features: You must spend a lot of time familiarizing yourself with *Newscript.* Its massive 270-page manual reads like a treatise on word processing, and it is very thorough. The user might never need to read all of it, but just getting through the basics is time consuming. A quick-reference card makes things easier once you know enough of the basics to begin using the program.

Newscript is a professional product for professionals. It matches features found on word processors for more sophisticated machines for much less money. Prosoft has also designed the program to expand with the needs of the user. *Newscript* may well be too much word processor for the average hacker, but it is a must for the office or small business.

Requirements: TRS-80 Model III or 4, disk drive
Prosoft, $124.95

NEWWORD

A few minutes with this word processor can leave you wondering: "Somebody's already written *WordStar.* Why do it again?" That should come as no surprise. *NewWord* was written by three MicroPro alumni. As it turns out, they had several good reasons for taking on a seemingly odd project.

One is economic. The list price of *NewWord* is less than half that of *WordStar*—less even than deep-discount mail-order prices. And the package includes a *MailMerge*-style form-letter generator, rather than leaving it as a $250 add-on.

The designers have also incorporated a couple of small improvements that MicroPro forgot: When you save a file and wish to continue editing, *NewWord* automatically returns you to your place; there's no need for an extra command. Headers and footers may occupy up to three lines, not just one. And as long as the program is going to keep track of the page you're on, *NewWord* includes a Find Page command that automatically moves you anywhere in the text—a convenience when you are trying to find your way around a long file.

Balanced against these benefits is one small disadvantage: To help distinguish text from the menu area, which appears at full brightness, *NewWord* displays the text at half intensity. This is tolerable on some computers, but many users will find it markedly too dim. Fortunately, it affects only monochrome versions of the program; the IBM edition uses color to subdivide the screen. And the folks at Rocky Mountain Software Systems will tell you how to patch the program to reverse the settings. It is not difficult.

No one will ever accuse *NewWord* of being innovative. But it is certainly a money-saver, and its small refinements over *WordStar* are likely to prove welcome.

Requirements: CP/M-80, MS-DOS
Rocky Mountain Software, $249

PAPERCLIP WORD PROCESSOR

PaperClip is the Cadillac of Commodore 64 word processors—chock-full of features that make it a true professional tool. Though there are nearly 150 total commands to the program, you can start using it almost immediately, with a minimum of essential knowledge.

PaperClip looks and acts very much like *Easy Script* and *WordPro 3 Plus/64.* It is not a "see-what-you-get" program. And, it is almost totally compatible with *WordPro* commands and files and will accept files from *Easy Script* with some modification to them. (This compatibility doesn't go in both directions, however. *WordPro* will not accept *PaperClip* files.)

The nicest feature of *PaperClip* is that it will operate with virtually every printer, since the printer commands for such things as underlining, super- and subscripts, boldface printing, and tabs are contained in separate printer files. You can overlay these files at the time of printing, create a customized version of the program incorporating the

printer file or even make a new file if your printer is not among the dozens on the program disk.

As with *Easy Script,* you can set column widths to be longer than the 40 columns the 64 can display. The screen scrolls horizontally. And, to make up for the unformatted video display, you can preview the text as it will be printed on paper. Recent versions of *PaperClip* actually allow you to see text up to 80 columns wide on the screen in this mode. This works by redefining the computer's character set, making each letter half as wide as normal.

In addition to all the standard editing functions, *PaperClip* also offers features rarely seen on word processors. It can perform simple addition and subtraction on columns of numbers, sort numerical and textual matter, and move columns around on the screen. It will also automatically compile an index and store it as a separate disk file at the time the text is printed. This index file can then be edited, formatted, and manipulated like any other text.

Unlike most word processors, *PaperClip* is protected by a "key," an electronic security device which plugs into one of the Commodore 64's joystick ports, and will not operate without it. This makes it convenient to copy the program onto each disk used for word processing, so the program is always available. This is just one more feature that makes this a "dream machine."

Requirements: Commodore 64, disk drive

Batteries Included, Inc., $90

PEACHTREE BUSINESS GRAPHICS SYSTEM; PGL

Peachtree, of course, is one of the country's largest software producers, so it is not surprising that an impressive business graphics package is part of its offerings.

Ten chart types are available, including the standard bar, line, and pie shapes, and also histograms, scatter charts, critical ratio graphs for financial work, single- and double-sided horizontal bar charts, and word charts for organization, flow, and other presentations. An eight-color CRT is used, but full graphical quality is available only when the chart is recorded on a multipen plotter. Most popular brands are supported, together with several printers. In plotting, you can either print out the entire graphics page or single out a window. You can also combine several charts on the same plot, using a standard layout or creating your own.

Zeroing in on the business user, Peachtree has simplified data entry by presenting it as an electronic "form" to be filled out. Similarly, a label form defines the chart's appearance, including any text, which can be entered from the keyboard or read from an ASCII word processor file. This form also sets colors and fill patterns; fonts (seven are available), slant, and character size for lettering; Y-axis scaling; X-axis positioning; choice of six symbols for data points in the line graphs; and so forth. The data form also allows entry through the keyboard or from a spreadsheet file.

Several other features also make this a good choice for a graphics system. Among them is the file management function, a set of sub-routines off the main menu that allows you to do just about anything you want with your data files. Another plus is the extremely well-written, clearly organized manual, printed in full color and very attractive.

Peachtree Business Graphics System is written in *PGL—Peachtree Graphics Language,* a proprietary form of assembly language. *PGL* does everything that the *Business Graphics System* does, but with more sophistication. But while *BGS* is a menu-driven program that allows inexperienced users to create charts and graphs, *PGL* is designed for those who want to write their own graphics programs. *PGL* will work with virtually any cursor-addressable color CRT or plotter and will accept input from a light pen, graphics tablet, and other devices as well as a keyboard. PGL is extremely flexible, both in the images it will create and in its ability to use various data files.

Requirements: Peachtree Business Graphics System—IBM PC; 160K RAM; color graphics board, one disk drive; Zenith Z100 series; Osborne; PGL—CP/M, 48K RAM; MS-DOS, 128K RAM; one disk drive

Peachtree Software, IBM, and Zenith, $295; Osborne, $125

PERSONAL WORDPERFECT

Personal WordPerfect is a budget-priced version of the original *WordPerfect.* The publishers have done an excellent job of retaining most of the important features of the original at a savings of $300 in list price. Missing from the new version are such advanced features as centering a page from top to bottom, double-underline, automatic block-move, and a built-in dictionary. What's left, though, is a

nice word-processing package that should fill the needs of all but the most advanced users.

The program is furnished in two versions, a standard version and one that the publisher calls *Flash*. The latter is a high-speed version for use with the IBM monochrome display. And fast it is. The standard version must be used with a color monitor and is a bit slower; in fact, even the manufacturer notes its screen updating as being only a third as fast.

The ability to alter formats, an important feature for most word-processor users, is well supported in *Personal WordPerfect*. Spacing between lines, margins, and tabs can all be changed at any point. Page length can be set up to 108 lines, and boldface, underline, subscript, and superscript are all provided.

A number of printers are being supported, and the program offers enough flexibility through its embedded print codes to access the features of most of the popular printers available.

Despite a few omissions in the setup procedures, the manual is nicely done in a spiral binder that conveniently lies flat in use. This makes it even easier to learn a program that already is simple to use.

Considering its reasonable price, *Personal WordPerfect* is among the better buys in word-processing packages.

Requirements: IBM PC, 128K RAM, two disk drives
Satellite Software International, $195

PFS:WRITE

This is a moderately powerful word processor. Like the other programs in the *pfs* series, *pfs:write* is a solidly designed program with all the fundamental features; it is extremely simple to learn and use and works with its cousins, *pfs:graph, pfs:report,* and *pfs:file*.

pfs:write is designed for the novice or occasional user. It therefore relies heavily on menus and, in the IBM version, on the function keys. The main menu offers six choices: type/edit, page definition, print, get/save/remove, clear, and exit. All the standard functions are available and most are convenient. One exception: Commands for underlines and boldfacing must be repeated for every letter, not just at the ends of the area they affect.

There are a few advanced extensions. Unedited ASCII codes may be sent directly to the printer. Files may be sent to disk in standard ASCII format rather than to the printer with special embedded characters. And there is an interesting envelope function that automatically takes the address from a letter and prints it in the correct position for a business envelope. But there are none of the features found in sophisticated word processors—no right justification, no super- or subscripts, none of the extraordinary formatting of some programs.

For many people who use micros for word processing, this is an excellent program. It is reliable, easy to use, has all the basic functions, and is reasonably priced. It may not satisfy full-time writers or typists; its reliance on menus and other limitations make it slower than many other word processors for someone who spends enough time at the keyboard to become expert with a more elaborate program. For most others, it is definitely worth a look.

Requirements: Apple IIe, 64K RAM; IBM PC, 128K RAM; one disk drive
Software Publishing Corp., $140

PIE WRITER

A well-known word-processing system on 8-bit machines, *PIE Writer* has been adapted for the 16-bit market, particularly the IBM PC. Text entry, editing, and printing are separated into individual programs; novices, particularly, are likely to find this considerably more complex than programs that operate in a single stage. However, *PIE Writer* has many strong features and options.

During text entry, a left-hand diamond pattern of control keys is used for cursor control, even with the IBM PC's extensive keyboard. Formatting instructions are manually entered on a separate line from the text that they control. Dot commands govern underlining, boldface, centering, and so on; on some machines, the function keys will enter specific control characters. Other capabilities include headers and footers, global search and replace, and a split screen for editing or merging two documents. Once text has been entered, you invoke the formatter, which displays the text on the screen as it will print out. Making changes requires going back to edit mode.

PIE Writer offers most of the functions you might want, but they do not make up for the complexity of operation compared with word processors. Particulary if you have a 16-bit machine with many function keys, you would be well advised to check other programs.

Requirements: Apple II, II+, IIe, or III; Atari; Commodore PET; IBM PC; TRS-80, Model III or 4; one disk drive
Hayden Software, $49.95

PMATE

If you do a lot of programming, as opposed to writing, the features you need in an editor are quite different from those you would look for in a word processor. *PMATE* is a full-screen text editor that gives programmers more features than most could ever dream of . . . more than 100 commands, 30 numeric arguments, ten text buffers, horizontal scrolling, and a complete macro programming language with logical and numeric operators, flow control, and even error tracing.

A configuration program allows you to define any key you want for any command. In addition, when working with the editor, whatever parameters or macros you have set up for the job at hand can be saved on disk at any time, to be used again at a later date.

Two cursors are used, one on the command line in addition to the usual one in the text area. The text area is always visible and active, even in command mode, so you always see what is happening to your text as it occurs.

As an editor, *PMATE* is one of the fastest around and surprisingly easy to use, even for beginners. But for serious programmers who take the time to learn how to use its advanced features, it can be a powerful text-processing tool that takes much of the tedium out of those long sessions at the terminal.

Requirements: CP/M-80, CP/M-86, or MS-DOS; 24K RAM; disk drive
Lifeboat Associates, CP/M-80 version $195; CP/M-86 and MS-DOS versions $225

PORTWARE

Portware is an integrated portfolio-management package that handles all the standard accounting functions while generating analysis and performance reports. *Portware*'s four modules work together to break down each security in your portfolio into a collection of isolated statistics, simplifying the decision whether to buy, hold, or sell.

The package relies on the Portcom module to collect quotes, 15 minutes delayed, from the Dow Jones network. These data are used by the other three parts of the program: Portrac, a fairly straightforward accounting module; Portrate, which perfoms statistical analysis; and Portrend, which monitors market performance.

The program can generate on reports that include risk, percentage yield, price-to-earning ratios, and many other categories. Within Portrate, the Income Forecaster uses the most current data to predict expected profits for your entire portfolio and the individual securities within it. Portrate, which focuses on overall trends, can be particularly helpful in highlighting subtle changes in the values of your holdings.

Portware generates a useful sampling of statistical reports, and its manual is clear and gives numerous examples. Of course, the decision to buy or sell a security is still left up to your discretion, but *Portware* makes that decision less mysterious.

Requirements: Apple II, IIe or III, 48K RAM, one disk drive
Portware, $450

POWERDRIVER

Radio Shack's *Superscripsit* is a full-featured and popular word processor that in theory will make your printer perform all sorts of useful and interesting things. Unfortunately, to get the use of these features, you must use a Radio Shack printer; the Shack doesn't provide drivers for any others. The *PowerDRIVERS* offered by Powersoft fill this need. Versions are available for the Epson series, the Prowriter 8510, and the C. Itoh Starwriters and Printmasters.

The exact features of the driver vary with the printer selected. The Epson FX80/CTL provides a variety of pitch sizes and proportional spacing, line spacing up to 3.5 lines, underlining and double underlining, boldface and overstrike, and superscript and subscripts. The version for the Itoh Prowriter provides substantially the same features. Note that proportionally spaced printing does not support boldface or overstrike. Proportional printing automatically uses the doublestrike mode of the Epson as the normal print for that mode.

All features claimed for the drivers worked reliably and just as claimed. The main difference between the two versions tested was the speed of proportional printing. It took 2:07 minutes to print a two-page text on the ProWriter, 4:26 on an EPSON FX-80.

Also on the diskette is a utility written by Renato Reyes and called *DISK/CTL*. When used in place of

your normal print driver, it allows printing formatted copy to disk rather than to a printer. While it was written to facilitate using *Superscripsit* to prepare files for subsequent uploading to bulletin board systems, it may also be used to save formatted text to disk, which may then be printed out with the normal command for printing a diskfile, for example, in TRSDOS 1.3, List filename/ext (ASCII, PRT), or in LDOS, List filename/ext (p).

If you use *Superscripsit* with any of the non-Radio Shack printers supported by this series, the *PowerDRIVER*s will probably give you a big improvement in versatility over using the Radio Shack driver nearest your printer's characteristics.

Requirements: TRS-80, Model I, III, 4 and *Superscripsit,* 48K RAM, one disk drive, printer

Powersoft, $29.95

POWERSCRIPT

Radio Shack's popular *Scripsit* word processing lacks a couple of features that are very handy to have. *PowerScript* adds them: the ability to obtain a directory of any on-line diskette, and to load, chain, or kill the displayed files; and the ability to embed printer codes within the text that will shift your printer's mode as desired and perform other needed printer functions.

There is one peculiarity that potential buyers should be aware of. The *Scripsit* version that must be used in all cases, whether for Mod I or Mod III, is the Model I *Scripsit/LC;* and it must be an unmodified copy of the program. However, the program will work with a variety of operating systems, including DOSPLUS 3.4, LDOS, NEWDOS-80, and TRSDOS.

Printers supported include the Gemini, MX-80, MX-80 with Graftrax, MX-80 with Graftrax+, FX-80, the TEK/NEC8023/C. Itoh, and the DMP-2100. Printer control codes are stored in tables, and other tables may be made up as needed.

To send a command to your printer, the first step is a Control P. Then, for example, a Control E will cause a graphics character and the E to be displayed in your text where the cursor was located at the time of command entry. All text after that would be Emphasized for an FX-80 printer. Repeating the command later in the text turns the emphasized printing off again. Other commands control the use of 10- or 12-pitch printing, double width print, condensed print, double strike, emphasized print, italics, proportional spaced print, superscript, subscript, and underlining.

Printer output can be caused to pause for input from the keyboard, forms alignment, or changing print heads or wheels.

Another new feature is the ability to chain documents at print time. *Scripsit* documents must fit into memory, and so this feature will allow printing of documents that effectively are longer than memory limits.

You also may mark a block of text for saving to disk as a separate file. However, if you do not specify a filename, the program will use the last one loaded or saved and overwrite it with the designated block.

As a nice touch, a Help file contains information on the basic features of *Scripsit* as well as on the mods added by *PowerScript.* The documentation is reasonably clear and comprehensive. Appendices contain printer control code tables and several other helpful tables.

The features offered are easy to use and valuable. For a $40 investment they turn a word processor priced originally at less than $100 into one worth several hundred. It seems well worth the cost.

Requirements: TRS-80, Model I, III, or 4 in emulation mode, or Lobo MAX-80 + *Scripsit;* 32K RAM, one disk drive

Powersoft, $39.95

POWERTEXT

PowerText! And indeed it is. Perhaps the most powerful word-processing package available for the Apple, it is not intended for the occasional at-home letter writer.

What you see is NOT what you get with this program. At least not quite. Rather it takes a different and unique approach to the subject of word processing. It allows the user to store formats for virtually any type of document used, letters, memos, scripts, or whatever. Then, instead of having to be concerned with margins, page format, tabs, headers, and so on, the typist merely indicates which format to use and proceeds to input the text along with simple formatting commands. The result? A perfectly formatted document, automatically.

For example, "/:letter" calls up a standard business-letter format; "/date." "/subject," "/sal" (for salutation), and "/closing" all cause the appropriate information to appear in the letter in the correct

place. Included with *PowerText* are six format files: Document, for reports and proposals; Letter, for standard business letters; Memo, for interoffice memos; Personal, for personal letters; Standard, a blank page; and Landscape, for a 132-column wide page. Text may be "boxed" with a simple command, thus enabling complex reports containing vertical and horizontal lines to be produced effortlessly. An additional module called *PowerScript* allows the production of screenplays with a minimum of effort.

PowerText incorporates a very powerful disk-based text editor. File size is limited only by disk space, with backups automatically maintained. All of the expected functions are there: search and replace, both forward and backward; change, delete and move text; block moves both within your file and to or from a disk file; automatic word wrap; type-ahead buffer; and so on. A "paint mode" allows the cursor to move vertically and horizontally to create boxes, charts, or make entering columns of numbers easy. Nested editing up to six files deep allows you to suspend the current file, look at and edit another, and retrieve data to be placed in the first file. On the IBM PC, up to eight user-defined functions can be assigned to the computer's function keys.

Written in Pascal, *PowerText* uses a horizontally split screen to display 80 columns on 40-column Apples, 40 at a time with Ctrl-A shifting between halves. A lowercase chip may be used with 40-column Apple IIs, as may the Shift-key mode. Even more desirable is an 80-column board, most of which is supported in the Pascal environment. Naturally, the IBM version displays all 80 columns.

Other features include automatic indenting of outlines to nine levels using numbers, letters, and Roman numerals; subscripts, superscripts, boldface printing, wide printing, underlining, and automatic pagination. Complete tables of contents may also be produced. An Include command allows the production of very large documents by printing external files from within the current one. And a built-in spooler makes it possible to print out one document while editing another. On an IBM PC with 320K RAM or more, part of the memory can be set aside for use as a disk emulator, and the program loaded into it, making operation much faster.

Text can be reviewed on the screen, printed, sent to a disk file, or transmitted over phone lines. A file utility provides 18 functions, including backup and formatting of disks, moving files, changing file names, and listing directories. You can even check for bad disk blocks and sometimes repair them.

The user manual consists of over 250 pages in a large looseleaf binder. With ten tutorial lessons plus reference sections, every aspect of the system is well covered. Also provided are several sample documents, showing typed text compared with the formatted document.

On the market since 1981, *PowerText* has undergone several revisions with more still in the works. New revisions are available to registered owners at a nominal fee. The program comes on unprotected disks with a five-year warranty against performance failure. The company provides full direct customer support.

Requirements: Apple II, II+, IIe or Apple III, IBM PC, 64K RAM, two disk drives and printer. Pascal required for Pascal versions Beaman Porter, Apple II runtime version $299; with *PowerCase* chip and solderless Shift-key mode $329.95; Apple II and III Pascal versions $199; manual alone $25

PROOFWRITER

Image Processing Systems is the name of the company that wrote this word processing package, but it much more accurately defines the special power that marks this otherwise simply competent program. This is the ability to create totally new characters, symbols, or whatever and store them for printing in a document.

Proofwriter, you see, lets you address each pin on matrix printer's head, thereby actually constructing an image and assigning that image to "@A," "@B," or "@Any-letter." This is particularly useful in scientific and technical documents, but the possibilities are endless. Foreign language, even Chinese characters, can be constructed and used freely.

Even beyond this remarkable ability, *Proofwriter* ranks high. All the standard editing commands are available, including search and replace and block copy, move, and insert. These are implemented by single keystrokes mnemonically tied to the function; F, for example, is used to Find a string. A nice feature allows you to store a phrase for retrieval by hitting the IBM's function keys F3 through F7, five phrases inserted at the press of a single key. Another convenience is that *Proofwriter* prints sub- and superscripts on normal printers by sending out

half-line signals. A modifiable spelling dictionary is also included.

Though *Proofwriter* shines on paper, it does have one limitation: The formatting program works only during the print process. You must wait until it comes time to print before seeing your results.

In summary, *Proofwriter* is a very good, full-functioned word processing program. It has some nice editing features, and its dot-addressable graphics will appeal to anyone who must use foreign alphabets, mathematical symbols, or pictures embedded in their text.

Requirements: IBM PC, 128K RAM, two disk drives
Image Processing Systems, $195

QUICK BROWN FOX

Quick Brown Fox was one of the first mini-word processors and remains one of the most popular. It offers the rudimentary functions needed to write, edit, and print out text.

Unlike most word processors, which allow access to all functions while the text is displayed, *QBF* forces the user to select activities from a main menu. These functions are: B.View, to read boilerplate text stored on tape or disk; G.Edit and L.Edit, for global and line editing; Move, to transfer text from one place to another; Delete, to remove text; Zap, to clear memory; Send and Receive, to transmit text over a telephone line using a modem; and Clerk, which takes care of loading and storing tape and disk files and directories.

Since the program is on a cartridge, approximately 38,000 characters of the 64's RAM memory is available for storing text. This means that about 25 pages of double-spaced manuscript can be in the machine at any time.

Among *QBF*'s better points is its use of word wrapping; it does not break words at the end of a line on the screen. But the overall awkwardness of this program makes it nearly useless. Not only must you switch from one mode to another to enter and edit text, but lines actually appear in reverse order in the L.Edit mode when scrolling through material already written. Like this:

"over the lazy dog.
The *Quick Brown Fox* jumped"

Confusing? Of course. Another less important objection is the documentation provided, which goes more for a cute and clever style than actually describing how *QBF* operates and the differences between versions for various computers.

Finally, very few word processors will work with every brand of printer, and *QBF* is no exception. So if you're interested in this one, it is probably a wise idea to check with your dealer to make certain yours will.

In all, *QBF* may serve some users' purposes, as long as they do not demand much from a word processor or rely on it professionally.

Requirements: Commodore 64, VIC-20, IBM PC; one disk drive
Quick Brown Fox, VIC-20, IBM PC and Commodore 64 cartridges $65

QWERTY

There are hundreds of word processing programs available, and all claim to have special benefits. *Qwerty*'s claim to fame is that it is "designed for both the professional typist and the non-professional."

Indeed, *Qwerty* has several typewriter-like characteristics. The cursor, here called the "typehead," rests at the bottom of the screen and lines of text move up, just like paper in typewriter. There is even a "typewriter" mode, which omits many functions to give typists an easier transition to the computer.

Like a typewriter, *Qwerty* is easy to use, significantly so. It lacks such sophisticated features as column formatting and automatic footers and headers, but it has complete editing functions: full on-screen attributes like underline and bold face which can be added after the text has been created, search and replace in either direction, and continuous paragraph reformatting. Users accustomed to secretarial work will appreciate other features like widow-line control, multiple rulers controlling margins, tab stops and indents, and generous status information continually displayed. One quirk is that text positioned using tab stops remain there even if you delete words before it on the same line.

In all, this is a good word processing package with well-designed implementation of standard functions. It may not be bursting with exotic capabilities, but it should make most people who now use typewriters happy. It is not cheap, however, and those accustomed to word processing or with special needs may find a less friendly but more powerful program suits them better.

Requirements: IBM PC, 64K RAM, one disk drive
HFK Software, $395

SCREENWRITER II

"A Professional Word Processing System For Apple Computers," or so it is stated on the cover of the *ScreenWriter II* manual. Whether it is really "professional" could be debated extensively. It is, however, a very powerful word processor that contains many more features than most people would ever use.

In its original form, first known as *SuperScribe* and later as *ScreenWriter*, the program had some very innovative features but was lacking many other things. Not the least was an easy-to-understand manual.

In this latest version, many improvements have been made, the most obvious of which is the manual. Overwhelming at 321 pages, it used to be a nightmare to use and understand, requiring the reader to play a game of hide-and-seek to find all the references to a particular command or function. The new manual sports index tabs separating major sections, with a complete table of contents at the front and section contents at the beginning of each major division. At the back of the manual are a complete index and an embedded-command index.

The main part of the manual is divided into three sections: "The Mini-Writer," "The Creative Writer," and "The Compleat Writer." The first section has been completely redone as a tutorial, with colors, many illustrations, and screen layouts to make it easy for the user to become familiar with the most necessary and often-used commands. Once having mastered this section, the user will be able to use *ScreenWriter II* productively. The other two sections deal with successively more advanced features, which may be learned as proficiency is increased.

Designed to operate on an Apple II, II+, or IIe, it provides the user with the option of using 40 or 70 columns on screen with no extra hardware, and 80 columns on a IIe equipped with an 80-column card. If you have 64K of memory, the program will load both the editor and runoff modules together; otherwise they are loaded separately when you switch between editor and runoff. The time taken to load *ScreenWriter II* has been vastly improved. The older version seemed to take forever to load, while now the entire program loads in less than 10 seconds.

Screen editing is accomplished through the use of many Control commands and Shift-control for the reverse function. Control-A, for example, moves the cursor down, while Shift-Control-A moves it up. Apple II and II+ users really must have the one-wire, shift-key modification, or cursor movement is very cumbersome. To move the cursor up requires an ESC/Control-A sequence for each line of cursor movement. An alternative method of cursor positioning is to select the mouse option, which allows the use of a joystick for cursor moves. Use of the mouse precludes the use of print spooling, which allows the printing of one file while editing another. If your system has a large capacity print buffer then spooling may not be of benefit.

Many word processors use only available memory as the work space, so that on a 64K machine from four to ten single-spaced pages may be edited at one time. *ScreenWriter II* uses what is known as "disk virtual memory": When files become too large to fit completely in memory, portions are saved in various places on disk. This sometimes produces disastrous results if the warnings in the manual are not strictly adhered to. While you are advised to keep your files small and append them if necessary, *ScreenWriter II* does allow the production of very large and complex documents.

Among some of its advanced features are the production of up to four true page-oriented indexes, alphabetized if desired or printed in a table of contents format, automatic or manual hyphenation, footnotes, page numbering, page titles and form letters. Block moves, search and replace, and the ability to edit BASIC and text files are additional features.

Form letters are prepared using token characters at each place a variable is to appear; a separate address file contains the information that changes between letters. Runoff combines the form letter with the address file to produce letters that look individually prepared. The same address file may also be used to prepare mailing lists and labels.

A set of four command charts is included, two for the Apple II/II+ and two for the IIe. One card for the "Mini-Writer" contains just enough to get you started, while the other is a complete reference card with almost all of the editor, runoff, and embedded page-layout commands shown in an

easy-to-read format. The embedded-command format is similar to many other word processors: A period in the left margin signals the command, followed by two letters to indicate the function—".LM" is left margin, ".BM" is bottom margin, ".AH" is auto-hyphenation, and so forth.

ScreenWriter II interfaces with virtually any printer on the market and supports underlining, boldface and incremental justification of text.

This is still one of the best bargains available in word processors today.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive
Sierra On-Line, $129.95

SKIWRITER II

The market for inexpensive word processors is enormous. There are several million home computers just waiting for the right word processor, and several new programs are announced each week.

Jumping into the middle of this fray is Prentice-Hall, the well-known book publisher with *SkiWriter II*. The original *SkiWriter* was created by Ken Skier for Epson's HX-20 lap-size portable and has earned an excellent reputation. Skier and Prentice-Hall have outdone themselves on this new version for the Commodore 64, promised also for a variety of home systems. *SWII* is not only a ROM cartridge-based word processor, it also turns the C-64 into a "smart" terminal. Prentice-Hall calls their product "a communicating word processor."

Installing *SkiWriter II* is easy. Just plug a small cartridge into the slot on the back of the computer. Place the plastic keyboard overlay on the keyboard, and power up the system. *SWII*'s main menu appears on the screen.

Unlike most word processing software, *SkiWriter* has no embedded control keys. All operations are accomplished with a combination of the numeric keys and the "Commodore" key. The function keys on the side of the keyboard are relabeled "Cancel," "Execute," "Previous Screen," and "Next Screen." All operations are selected either from the menu (tapping the space bar moves the entire menu up and down; when the arrow points to the selection you want, hitting the "Execute" key selects it) or one of the "Commodore" number key combinations.

SkiWriter will store documents on either tape or disk, and contains utilities that bypass Commodore's cumbersome operating system. It will work without either, but leaves you with no way to store your document when completed.

For more advanced users, *SWII*'s user-definable dot-commands allow you to send any ASCII code to your printer. This enables you to take advantage of any features your printer might offer—bold printing, overstrike, alternative fonts, or whatever.

SkiWriter's major limitations are those of the hardware it runs on. The C-64's keyboard is no one's choice for word processing. Also, *SWII*'s text file length is limited to available memory, 28,000 characters. This is approximately 30 or so pages of text. Longer documents must be split into two or more files.

SkiWriter would be a good, basic word processor at five times its price. It is extraordinarily easy to use, and does force you to cope with separate modes for text entry and editing, as do many low-cost packages. That it provides this ease and communications features at the price makes *SkiWriter* an outstanding value.

Requirements: Commodore 64
Prentice-Hall, $69.95

SPELLBINDER

Word processing programs, like any programs, should be evaluated in a number of areas—function, ease of learning, documentation, etc. A strong and balanced program is almost always preferable to one with a single dominating feature but spotty in the rest.

Spellbinder is an exception. The print formatting capabilities of this program are so incredible they are almost ludicrous. You will want to run out and buy the most expensive typographic printer just to try some of them. If you want multiple-line footnotes called by superscripts nested within subscripts perfectly centered and proportionally spaced, all invoked by a macro, you might as well look no further.

Many of *Spellbinder*'s capabilities grow from its proportional spacing. With a user-defined space table, you can specify exact widths for each character. There is a user-defined letter table to accomodate non-ASCII printwheel characters. Centering lines maintains true proportional spacing. Other printer control features include variable line spacing up to ¼ inch, negative line feeds, ribbon color change, reverse enhanced print and nestable scripts. Many of these functions are beyond the reach of even precision printers and can only be

utilized on typographic such as Sanders. Learning to use these facilities takes time, as one might imagine, but the implementation is, considering the complexity, fairly straightforward. Naturally, this is not for the novice.

Spellbinder has other strengths as well. Macro facilities are powerful enought to run simple applications; search facilities replace, delete, or add with or without case sensitivity; and there are arithmetic capabilities on both rows and columns. Document merging is above average, and *Spellbinder* comes with several macros that merge shell letters, boilerplates, and even a fill-in-the-blanks which, the manual says, can be used for order entry/invoicing. Add to all this the more standard word processing features—full cursor movement, block insertion, and flexible hyphenation.

The manual that comes with *Spellbinder*, unfortunately, is not of the same caliber as the program itself. Many of the explanations are vague, and there is a woeful lack of examples. Phone assistance is very helpful though. Chances are that if you take advantage of the keyboard customizations or attempt some of the more complex formatting with a nonspecified printer (*Spellbinder* gives you the code) you may be calling them.

This is an expensive word processing package offering typeset-quality output. It takes time and a lot of practice. However, few, if any, other programs can match *Spellbinder* in producing professional copy.

Requirements: CP/M, MS-DOS, CP/M-86; 64K RAM
Lexisoft, $495

SUPERSCRIPSIT

Scripsit has been the word-processing workhorse for many a TRS-80 owner. It doesn't have all the fancy features that some other word processors have, but nothing beats it for turning out text quickly.

Radio Shack decided that they needed their own high-powered word processor, and they created *Superscripsit*. *Superscripsit* is a powerful word processor, but it sacrificed a little of *Scripsit*'s ease of use, and it is much more difficult to learn.

Improvements over *Scripsit* include the ability to save documents longer than 11,821 characters to disk, user-definable Function keys, improved printing and editing functions, a text-compression utility for disk storage, and a better tab function. The user can preprogram text up to 127 characters long into a two-key command that will insert that text into the file whenever it is needed. This can be done with up to ten phrases.

Superscripsit comes with printer drivers for all Radio Shack printers, and some of these drivers will work with other printers. In many cases, though, the user must either write his or her own driver or buy one. *Superscripsit* takes advantage of all the capabilities of the Radio Shack printers. Elongated, enhanced, bold, condensed, and other typefaces are available depending on which dot-matrix printer is used. Underlining, sub- and superscripts are also available.

Text scrolling is also improved. The user can page through the text a character, word, line, paragraph, or screen at a time.

The documentation consists of four-cassettes worth of lessons with a manual, and a reference manual and card. All this is necessary if the user wants to learn all of *Superscripsit*'s features. The program itself has a help menu if the user forgets what to do at any point.

Superscripsit works best with two disk drives, and it requires at least 48K of memory. It is written in modules, and when certain functions are called, *Superscripsit* must access them from disk.

Superscripsit will work on the Model 4 in Model III mode. Though Radio Shack plans to come out with a true Model 4 version, at this writing, it is not available.

Most users don't need *Superscripsit*'s sophistication. For them, *Scripsit* is still available.

Requirements: TRS-80 Model III or 4, 48K RAM, disk drive
Radio Shack, $199

SUPERWRITER

This program appears to have been designed someone who set out to improve on *WordStar*. The similarities are so strong that anyone familiar with *WordStar* will immediately feel comfortable with basic editing in *SuperWriter*. The program has most of the features and even many of the same commands as its better known competitor; yet it takes a fundamentally different approach to certain aspects of word processing.

There is, in particular, the matter of how *SuperWriter* handles files while editing. *WordStar* writes part of the file to disk when it runs out of memory. Then it juggles the file between the disk and RAM as necessary. *SuperWriter* holds the en-

tire file in memory at once. This is either *SuperWriter*'s greatest strength or its major weakness, depending on your point of view.

The *WordStar* approach lets you make your files as long as you like, but keeping track of the juggling act ties up memory and forces you to wait while your computer reads from or writes to disk. When the file nears the length that will fit into memory at one time, this can make editing very slow. *SuperWriter*'s approach speeds things up, but it also means that your file size is limited by how much memory is in the machine. In a 64K computer, you are limited to roughly 20 pages of text.

Each of these approaches to file handling has its own advantages, and which one you prefer is in part a matter of taste. Few writers often need files longer than 20 pages; on the other hand, when they are needed it can be terribly inconvenient to work around their absence.

SuperWriter has a number of uncommonly useful features. One nice touch is a "document history" that lets you enter a document number, author name, creation date, and a short comment describing the file. This last entry especially will be appreciated by anyone who has spent time staring at a screenful of file names while trying to remember what each one was. However, you can skip the document history if you prefer.

Another nice touch is that *SuperWriter* comes with sophisticated print formatting and mail-merging as part of the basic package instead of making them extra-cost options.

In fact, *SuperWriter* includes a number of sophisticated capabilities. Once you tell it that a line of text should be centered, for example, it will recenter that line automatically when you change it. Another feature lets you write batch files. This means you can create a file that will tell *SuperWriter* to do what amounts to a multiple global search and replace, then run this file on any number of individual document files without having to reenter the commands. This can be more than a little useful for doing something like a global search and replace through an entire book where each chapter is a separate file.

Surprisingly, *SuperWriter* is weak on some basic editing needs. For example, the search feature doesn't give you the choice of ignoring case, and it doesn't give you the choice of looking for whole words only. The first limitation means that if you tell *SuperWriter* to look for "science" it will miss "Science" at the beginning of a sentence. The second oversight means that if you tell *SuperWriter* to find "science" and replace it with "research," you may wind up with the word "conscience" changed to "conresearch."

Overall, *SuperWriter* is very much a first-rate word processor. In comparison to other such programs, it misses a few tricks, but it also adds a few of its own. Whether you consider the overall result to be an improvement over the competition will depend on what you want out of a word processor. But if you're in the market for a full-featured word processing program, this one deserves serious consideration.

Requirements: MS-DOS, 96K RAM; Machine-specific versions for IBM PC, PCjr., and compatibles, Tandy 2000, and Texas Instruments Professional; CP/M and CP/M-86, 64K RAM
Sorcim, $195

TELEWRITER-64

No computer can be taken seriously without a good word processor. *Telewriter-64* offers every popular word-processing feature a Color Computer user needs, and it rivals the best programs available on any home computer. It even works on a cassette-based CoCo, not just on disk-equipped machines.

Telewriter-64 overcomes the Color Computer's 32-column by 16-line screen format with its own screen-display generator. In fact, the user can choose one of three formats: 51 by 24, 64 by 24, or 84 by 24. The 51-column by 24-line format is by far the easiest to read. The other two formats are useful to get an idea of what the printed output will look like. A monitor, rather than a TV set, should be used for maximum clarity, but this requires a monitor driver.

The screen-format generator has another plus: true lowercase letters. The Color Computer usually indicates lowercase by printing those letters in reverse video. This looks terrible when writing text on the screen.

The text-editing functions are first class. All are accessed by one- or two-letter commands. You can move, delete, or copy blocks of text. You can move the cursor anywhere on the screen and massage your text into its final form with a minimum of effort. *Telewriter-64* even keeps track of the number of words and lines that have been typed.

Telewriter-64 is compatible with all the popular

printers, and it can take advantage of special printer features such as underlining, sub- and superscript, and graphics. The user can number pages, set margins, and specify top and bottom of form. *Telewriter* also allows for headers to be printed on each page.

Cognitec has produced a program with powerful features whose functions don't get in the user's way. The manual is complete, though the production quality is poor. Any CoCo owner, novice or experienced, will enjoy this fine program.

Requirements: TRS-80 Color Computer
Cognitec, $49.95 cassette; $59.95 disk

TEXT WIZARD

Text Wizard is a versatile word processing program for Atari computers. It is reasonably simple to use and inexpensive as well.

Text is entered from keyboard to screen, much as it normally would be with the Atari. Word wrap and scrolling are available. Most of the normal Atari keyboard editing functions can be used. In addition to the usual Atari single-character insert, whole portions of text may be inserted at will. Other functions permit deleting, moving, or duplicating anything from a single letter to an entire text. The file may also be searched for words or phrases, and they may be replaced automatically with new text.

Supplementing the usual margin setting, line and character spacing, and length of page is a wide variety of printing features. These include automatic centering, underlining, indenting, justification, page numbering, sub- and superscripting, and printing with elongated or condensed print. These features appear as control characters in the text and are executed only during printing.

It takes only a few keystrokes to activate each of the editing and printing functions; some offer several alternative methods. While it would save trial print runs if more of the text formatting could be displayed on screen, *Text Wizard* does almost everything else a sophisticated word processor should do, and with logical and easy-to-learn procedures.

Requirements: Atari, 32K RAM; Atari 825, Epson MX-80, Centronics 737, or compatible printers
Datasoft, $49.95

VEDIT

VEDIT is one of the best selling text editors for microcomputers. It can be used as a word processor, but it is most popular among programmers. The V in *VEDIT* stands for "virtual"; it is a full-screen editor with a command language bearing some resemblance to the *TECO* editor found on minicomputers from Digital Equipment Corp.

VEDIT has two very strong features: You can customize it to your heart's content, and it includes a macro language that lets you write programs to manipulate text.

VEDIT is customized by running a program called *VEDSET;* the result is a new copy of *VEDIT* tailored to your liking. The range of things you can customize is impressive. Every function of the editor can be assigned to a key or escape character plus the key of your choice. You can even define two keys that *VEDIT* will use as escape characters. For example, you could assign insert mode toggle to Control-V, like *WordStar,* or to the INS key on your IBM PC, or Escape-I. Cursor control is totally definable, including cursor motion by character, word, line, paragraph, and page. Other functions include erase to end of line, copy or move to a scratch buffer, undo changes made to the current line, accept the next character literally (embed control codes in your file), format the current paragraph, and on and on.

This customization does not guarantee that you can make *VEDIT* behave like any other editor: *VEDIT*'s primitive functions may behave slightly differently than another editor's, especially at boundaries like the end of a line. Nevertheless, it does mean that you are not stuck with someone else's idea of a mnemonic key sequence for editing functions.

In addition to customizing keyboard layout, *VEDIT* lets you set myriad other parameters, including the cursor character and blink rate; the status line character; whether tabs should expand to spaces; whether files larger than will fit in memory should be automatically buffered; and whether to ignore case differences on search, margin settings, screen size, and even the sign-on message. One very clever feature will appeal to assembly-language programmers: You can configure *VEDIT* to convert lowercase to uppercase automatically as you enter assembly-language mnemonics, but stop converting after encountering the "start comment" character on each line (usually a semicolon, but configuration, of course).

VEDIT's macro programming language is its other unique feature. A macro is a sequence of

VEDIT text editing commands that are executed automatically when the macro is run. Macros can be stored in numbered "text registers" or on disk. Macros can include iteration—a command or sequence of commands can be automatically repeated a specified number of times. A macro can even call another macro while it is executing.

The text registers can hold any block of text, not just command macros. This lets you store up to ten words, phrases, or entire documents in temporary buffers, and merge them into the text as required.

Macros are particularly useful for lengthy search and replace operations. You can even use "wildcard" specifiers in the string you are searching your text for; for example, "VEDIT.:::" will match any text string starting with "VEDIT." and ending with three arbitrary characters.

VEDIT is fast, functionally rich, and configurable to your whims. Its programming ability lets its usage stretch as far as your imagination will allow. If you just want an editor that pops a file up on the screen, lets you move the cursor around and change things, *VEDIT* is overkill. If you want something more, and you like to program, why not try programming your editor? Just don't get so involved programming *VEDIT* that you forget about the program you bought it to write!

Requirements: CP/M-80, IBM PC, or MS-DOS; 64K RAM, one disk drive
CompuView Products, CP/M-80 or IBM $150; CP/M-86 or MS-DOS $195

VISIWORD 1.1

Like all programs from VisiCorp, *VisiWord* is slickly packaged and beautifully documented. The printing and paper stock used in the manual are first class. The overall visual impression is excellent. All this would seem to complement the "what-you-see-is-what-you-get" advertising slogan used for *VisiWord*. Unfortunately, what you see on the screen is not as good as what you get in the way of packaging.

Perhaps the most annoying of this program's faults is the bright, inverse video border surrounding the display screen. In addition to wasting valuable screen space, it is distracting after only a few moments of use. Several continuous hours at the keyboard would make it a major irritation. Unfortunately, there is no way to turn it off.

Cursor movement, which is a vital part of working with a word processor, is unacceptably slow. The cursor cannot be moved a sentence at a time, or even a word at a time. When moving from the end of a line to the beginning, it must be moved a letter at a time. Other functions, such as delete and block copy, are equally slow.

On the plus side, the program is very easy to learn. It is completely menu driven, and most of its functions are straightforward and logical. It has a window feature that allows you to split the screen into two horizontal sections. Thus, text from one file can be displayed in one window, while a completely different file can be displayed in the other. This is handy for looking over notes or an earlier version of your text while you create another.

VisiWord can do just about anything you would expect of a word processor, but there are easier ways to do them.

Requirements: IBM PC, disk drive, DOS 1.1 and 128K RAM or DOS 2.0 and 192K RAM
VisiCorp, $375

VOLKSWRITER

Volkswriter is an attractively priced word processing program characterized by extensive editing functions, full use of the IBM PC keyboard, and file-safety features. Some formatting functions are inconvenient, but the package as a whole represents very good value.

Editing commands include multiple deletions by character or word or to the end of a line, block copy and move, centering, screen reformatting, and underlining. The majority of these are executed using the ten function keys, either alone or in conjunction with the ALT key. This provides single-stroke implementation for maximum efficiency. Others, like overstriking and bolding, require awkward procedures. Where the left-side function keys control editing/formatting, the ten-key pad controls cursor movement.

Headers and footers can have multiple lines and *Volkswriter*-generated page numbers. There is no footnoting capability. Page formats, including margins, tabs, and line spacing, may be stored as boilerplate and recalled into a document as needed.

Volkswriter subscribes to the block procedure; you insert markers to define passages of text. You then can copy or move this block. Unfortunately, blocks can only be specified by lines. This usually means that you must isolate the passage you wish to copy or move to prevent affecting too much text. *Volkswriter* loads the entire file into memory so that

repositioning is very fast. The Find command is unusually powerful in that it searches the entire file regardless of cursor position. It is case-sensitive, however; *Volkswriter* does not ignore upper- and lowercase. Screen formatting is not continuous, but executes almost instantaneously upon command.

One very notable feature is *Volkswriter*'s memory-capacity warning signals. With 64K RAM, you can store about eight pages. Too often with programs of this type, you lose text when this limit is exceeded. With *Volkswriter,* however, the screen status line continuously displays available memory. Once the 10 percent level is reached, the display blinks, and at zero, *Volkswriter* beeps and courteously but firmly asks you to save the file.

Word processing novices will find the online tutorials complete and easy. Error trapping is very good. The F10 key immediately cancels mistaken commands. These items, along with the easy-to-use program itself and the relatively low price, make *Volkswriter* an ideal word-processing system for the beginner. Lengthy, complex documents may require more sophisticated offerings, usually at a much higher price. If you are just starting, or do not need functions like newspaper columning and subscripting, this may be just the package for you.

Requirements: IBM PC, MS-DOS, 64K RAM, disk drive

Lifetree Software, $195

WORD

The people at Microsoft have done their homework and managed to combine the features of more difficult word processors, such as *WordStar,* with the user-friendliness often claimed for the new generation of application programs. As a result, Microsoft *WORD* sets new standards of power and convenience that its future competitors must work very hard to meet.

To anyone familiar with Microsoft's spreadsheet program, *Multiplan,* most of *WORD*'s commands will look very familiar. Someone who has become accustomed to the more complex command structure of *WordStar* will have to spend some time unlearning skills they no longer need. The time spent will be well worth the trouble.

For their efforts, these users will end up with a program that offers not just split-screen editing, but multiple windows. *WORD* makes it possible to work on up to eight documents at the same time or to view, edit, and copy different parts of the same file between windows. The speed of the program does suffer when more than three or four windows are open at the same time, but the result is still much faster and easier than reloading documents one by one.

Another nice feature is *WORD*'s powerful formatting control. The user can save a "style sheet" for any kind of document format imaginable and format the entire document instantly simply by calling up that style sheet. Footnoting is handled automatically, renumbering as changes are made.

A special command called "Undo" will save the text that the user has deleted and put it back in place with the push of a single key, a big help when you have just erased a paragraph instead of a word by mistake. Undo even allows the user to copy text between two or more documents and to hold it in memory and re-enter it in several places without retyping.

WORD was designed to use the Microsoft Mouse, which is included with the program. Those users who can pull themselves away from the keyboard will find a significant improvement in productivity when using the mouse. It allows quick scrolling in all four directions and makes it possible to select commands by merely pointing to them on the screen. Locating a particular page in a document is easy, as is finding or updating any word or phrase.

Microsoft did make one unfortunate decision in setting up the screen. The screen of an IBM PC has 25 lines, but *WORD* uses six of them for various status and command-line functions. This leaves the user with only 19 lines for text. If several windows are opened at once, each becomes so small that it is difficult to work with.

A few increasingly common facilities are not yet available in *WORD*. Microsoft does not offer a spelling checker at this time, nor is there a mailing-list program tied to *WORD*. However, most users will find that the power of the program in so many other areas will make up for these deficiencies.

The manual makes it easy for the beginner to get started. Most functions are well explained, and most include useful examples. An on-line help facility is available; it gives a reasonable amount of information, but does not contain as complete a description of what to do next as *Lotus 1-2-3,* today's leader in on-line assistance.

Requirements: IBM PC, PC DOS, 128K RAM, one disk drive; mouse optional
Microsoft, $475 with mouse; $375 without

WORDMASTER

One of the early screen-oriented text editors, *WordMaster* is a less powerful relative of the more famous *WordStar.* Though the two have much in common, there are significant differences.

Where *WordStar* has half a dozen menus full of specialized editing commands, *WordMaster* has only two sets: In video mode, the cursor can be moved, characters inserted or deleted, and other changes made directly on the screen. In command mode, lines and pages can be moved or altered, strings searched for and replaced, and macros—sets of commands executed at one time—set up and used. Specifying a number with most of these commands causes the instruction to be repeated that many times. Results of the command-mode functions appear when you return to video mode. Unlike a full-fledged word processor, *WordMaster* provides nothing in the way of formatting; text is printed out just as it is typed in and edited.

Though powerful, the relatively limited set of editing commands means that it will take longer to create a large document with this program than with more modern word processors. *WordMaster*'s most satisfied users tend to be programmers writing source code for later assembly or compilation. For this purpose, it is probably one of the best CP/M text editors available. Writers who often produce long blocks of copy and require neat manuscripts are likely to prefer one of the faster, more powerful word processors, however.

Requirements: CP/M
MicroPro International Corp., $150

WORDPERFECT

If it can be done with a word processor, *WordPerfect* will do it. What's more, it will do it quickly and conveniently.

WordPerfect's power is not discernible from the screen. From the time the program is first loaded, the screen is blank. The only hint of versatility is a plastic template that fits on the keyboard. Even though the template labels each function key as having two or three purposes, it is only when you read the accompanying list of features that you begin to appreciate the scope of the functions.

You can move the cursor forward or back one character at a time or by the word, screen, page, or to the ends of the document, but not to the end of a line or paragraph. To control cursor movement, you press the Home key. For example, hitting Home, then the Up Arrow, moves the cursor to the top of the screen. Hitting Home twice before the Up Arrow moves the cursor to the beginning of the document. In practice, this method is very fast; it is easier to hit one key twice than two keys once. You can delete a character to the left or right, a word, a line, or the rest of the document. For the last two, an error trapping routine verifies your intention.

WordPerfect offers true what-you-see-is-what-you-get editing. Underlining, boldface, centering, single- and double-spacing are all displayed. However, many control characters do not appear. Formatting codes like margin and tab changes can be placed anywhere, but they can be seen only when you invoke a Reveal Functions that displays all hidden codes. One inconvenience is the inability to make changes from this special screen. You have to see what hidden codes are there and return to the regular screen to make the changes.

WordPerfect has all the normal features, and some powerful innovations as well. Hitting the Set Page Attributes key allows you to change the format or page number of the current page, or even to center the text from the top to the bottom. This last feature would be extremely useful in writing letters. Other formatting options include tabs and decimal tabs, flush right and left justification, left and right temporary margins, changing lines per inch, and setting top of page margins. *WordPerfect* allows you to include multiple-line footnotes that follow the subscripts, and will even renumber them for you.

Printing can be done while working on the document itself or can be held for batch printing later. Options within the document include printing either the current page or the entire text. Print commands allow control of changing printwheels, printing multiple copies, and handling multiple bin sheet feeders. You can also insert embedded ASCII commands for typesetters.

A macro facility allows easy creation of keystroke routines. You may store the phrase "personal computer" and call it to the screen by hitting the ALT and a single letter key. Moreover, you may store command sequences like changing margins, tabs, line spacing, and justification, some 20 keystroke functions, and invoke them with two keys.

A dictionary can be called from within *WordPerfect*. Some 1,500 common words reside in memory, 30,000 more on the program disk. You may check a word, page, or the entire document. If the word is not found, you may elect to search the larger dictionary, and *WordPerfect* will come up with alternatives. If the word is correctly spelled but just not in the dictionary, hitting one key will add it. You can create personal dictionaries as well.

A math package also comes with *WordPerfect*. Although it is meant for statistical typing within a document, it is really a low-powered spreadsheet. This portion lets you set up columns of numbers, which it will add, subtract, multiply, and divide both across and down, calculating subtotals, totals, and grand totals. Once you set up the process, you may change the numbers and *WordPerfect* will recalculate the results.

Perhaps this program's strongest asset is its so-called Flash feature. Most MS-DOS word processors, including *WordStar,* suffer from painfully slow screen updating. *WordPerfect*'s Flash option roughly trebles the speed of updating and will come as a relief to creative writers who loathe being interrupted in midsentence while the screen is rewritten. The manual insists that this feature works only with the IBM PC, but Flash has been found to function with several of the compatibles as well. It's worth a try.

WordPerfect's only weakness is in its documentation. The manual is somewhat light in explaining the functions and gives only one example of each. For a system of this sophistication, separate tutorial and reference sections would be valuable.

Without a doubt, though, *WordPerfect* is a first-rate, professional word processing system. It takes a while to learn all the features, but there are few it lacks. Moreover, the dictionary and math packages are equal to separately priced programs with other word-processing systems. Though costly, *WordPerfect* ranks as one of the best values around.
Requirements: IBM PC; Victor 9000; Zenith Z-100; TI Professional; DEC; 128K RAM, two disk drives
Satellite Software International, $495

WORDPRO 3 PLUS/64

WordPro 3 Plus/64 could be considered the "standard" word processor for the Commodore 64. It isn't the best, but it is a good program by which to judge the relative power of others.

With very few changes, this program is almost identical to earlier versions of *WordPro* for the Commodore PET and CBM machines. The differences include a slightly expanded capacity. The computer can store a maximum of 329 lines, or about 9 double-spaced manuscript pages, of text without the need to write a disk file. And, for convenience, the foreground, background, and border colors of the screen can be changed to suit individual tastes.

In *WordPro,* all of the formatting—that is, determining how a page is set up on paper—is done at the time of printing. the look of text on the screen is sometimes confusing. Except for paragraphs, the text simply fills the screen; if words are not finished at the end of a line, they are broken and continued on the next. This is probably *WordPro*'s most inconvenient feature, but since the program uses the 64's 40-column screen as a "window" to the RAM memory in which text is stored, it is actually quite logical. This is not as troublesome as it sounds, and the user grows accustomed to it rapidly, although this is not a "see-what-you-get" kind of text editor.

Several desirable features give *WordPro* impressive power. It is fast. Scrolling backward and forward through text, and activities like deleting and moving text work with blurring speed. It is also possible to merge variable text, like mailing-list information, into the main text, a letter, for example, without the need for additional software. It is easy, too, to link several short files together into longer ones when necessary.

Finally, *WordPro* accomplishes virtually all of the basic printing functions that a writer needs: the ability to change pitch sizes and line lengths and spacing within a document, underlining, boldface printing (overstriking), and sub- and superscipts. Using these features is easy and very natural. For those who prepare financial reports, *WordPro* can add and subtract columns of numbers, as well.

All of this, and much more, makes *WordPro* the kind of professional tool one could use on a day-to-day basis. Released at press time, though unavailable for review, was a spelling checker (dictionary) for *WordPro.*
Requirements: Commodore 64, disk drive
Professional Software, Inc., $80

WORDSTAR

If there is any single word processor that can legitimately be called the standard against which

all others are measured, *WordStar* is certainly it. Yet if you want to start a lively discussion, try walking into a roomful of knowledgeable computer users and making a comment about *WordStar*, good or bad. Odds are you'll find a wide range of opinion, with a few people claiming the program is the greatest thing since sliced bread, while others make snide comments about its performance and ease of use. What's really interesting, though, is the number of people who can't find anything nice to say about the program but use it anyway.

The telling point, of course, is the last one. Even while people complain about *WordStar*'s limitations, real and imagined, they keep using it. What it boils down to is that an amazingly large number of *WordStar* users regard it as the worst word processor imaginable—except for everything else.

Even if you're new to computers you're probably aware of *WordStar*'s reputation of being powerful but difficult to learn. The common wisdom is that its greatest strength is also its greatest weakness—that the very flexibility and richness of commands that makes it so powerful also makes it overwhelming for the beginner. The argument is reasonable, but flawed. Granted, if you sit down with *WordStar* and try to learn all the commands at once, you will likely be overwhelmed. But that would be just as true with any full featured program if you're misguided enough to approach it that way. You can also sit down with *WordStar,* limit yourself to a few fundamental commands, and be using it productively within ten minutes. More on this shortly.

WordStar is probably best known for two features. First, there is the on-screen formatting—the "what you see is what you get" approach to word processing. Many word processors still do not use this approach. Without it, if your screen has 80 columns across, your text will appear as 80-character lines, no matter how you plan to print it out. This means that you don't know how your text will lay out on the page until after you've printed it. A letter, for example, may surprise you by printing out all on one page, except for the signature block, which winds up on another page all by itself. With *WordStar,* though, typing text on the computer is pretty much like typing it on a sheet of paper. If you want to print with 60 characters per line, you set the margin at 60, and your text shows up on your screen that way. If it doesn't lay out well on the screen, you can change the margins and otherwise fool with it until you like the way it looks.

The other feature for which *WordStar* is known is its menus. These are probably the most misunderstood and least appreciated part of the program. They can be set to any of four help levels, and they let you treat *WordStar* as fully menu-based, fully command-based, or as something in between. If you know how to take advantage of them, they make the program reasonably easy to learn and use—despite anything you've heard to the contrary.

When you go into *WordStar,* you are presented with an "Opening Menu." From here you have several more-or-less standard choices for a word processor including copy a file, rename a file, delete a file, and open a file for editing. There is also an option to set the help level. If you are new to the program, you are best off leaving it set for maximum help.

If you then open a file, you'll find that *WordStar* will devote the top third of the screen to its Main Menu. This includes the most commonly used commands, along with reminders for how to get to other menus that list more commands. If you want to change your margins, for example, you would enter a "Control-O" to go to the On-screen format menu. Not-so-incidentally, all the commands you need for basic word processing are on the Main Menu. If you simply ignore the other menus when first learning the program, you'll be able to use *WordStar* almost immediately without feeling overwhelmed.

Once you get reasonably familiar with the basic commands, you'll want to get rid of the Main Menu so you have more room for text on the screen. At that point you can switch to next help level. This turns off the Main Menu (unless you switch back to the maximum help level), but it still lets you call up additional menus on-screen. This means that if you want to change your right margin, but can't remember the command, you can enter a "Control-O" for the On-screen format menu, then read the menu to find the command "R" for right margin. Alternately, if you know the full command, you can enter "Control-O R" for "On-screen format—Right margin," and not have to wait for the menu to be written on the screen.

One problem with this help level is that occasionally you will hesitate between the first and second keystroke and wind up having to wait for the menu to be written on the screen even though you know the command. As you get more familiar with the

program, though, you can move to even lower help levels. At level 0, the program won't put menus on the screen at all.

One other note about *WordStar*'s structure: The program has been characterized as taking a Swiss Army knife approach to word processing, with some of the blades optional *(MailMerge, SpellStar, StarIndex)*. Aside from the obvious, and valid, implication that *WordStar* program has enough features to do just about anything, there is something particularly appropriate about the image of multiple blades. In effect, each menu functions as a separate blade. The On-screen menu contains all the commands relating to on-screen format—things like margins, tabs, line spacing, and justification. The Block and File menu contains all the commands relating to blocks and files—things like marking a block, copying a file, or closing a file. And so on.

WordStar has been widely criticized for having arbitrary, hard-to-learn commands, but most commands suddenly make sense if you realize that within each menu, each "blade" on the knife, most commands are mnemonics—as with "Control-O R" for "On-screen format, Right margin," or "Control-K D" for "blocK and file menu, Done."

Ultimately, how you feel about any given word processor is bound to have at least as much to do with the biases you bring to it as with any features or limitations of the program itself. And the odds are very long indeed against any word processor matching your biases exactly. The genius of *WordStar* is that it is powerful enough to do just about anything you could want while being flexible enough so that most people can make it match most of their biases most of the time.

Requirements: Versions for MS-DOS, CP/M-80, CP/M-86, Concurrent CP/M
MicroPro International Corp., $495

WRITE

There are a few people who use word processors and would not be happy with *WRITE*—Writer's Really Incredible Text Editor. But most are probably concerned more with tangential matters than with writing itself.

If, for example, you love being able to peer through a window at one file while editing another, *WRITE* is not for you. A windowing, multifile revision is in the works, but the version now being delivered is limited to a single text file.

Programmers will miss certain features. The macro language and many scratchpad buffers that make *Vedit* a joy to program with are absent. Again, a programmer's edition of *WRITE* is in the works but remains undelivered.

But if what you do is write—that is, churn out large quantities of original text, reworking it repeatedly until it suits you—then take a close look at this word processor. After a minimum of learning time, *WRITE* fades into the background, leaving you to wrestle with your prose. All the features of a powerful word processor are available, but none of the common inconveniences. If you, too, are the sort of writer who used to turn off your Selectric between sentences because the whirring made it impossible to think, you'll understand how much easier writing can become when you eliminate even minor distractions.

Part of *WRITE*'s ease of use comes from the program's structure. An opening menu handles file and directory functions, display width, tab settings, and the like. A separate print menu accessible from it governs the standard page settings, line width and spacing, header and footer margins, hyphenation, and so on. Any function is available with a one-key command. A single ESCape takes you from the print menu to the main menu, from the main menu to the text area, or from the text to the main menu. In use, nothing could be faster.

Another factor is one of the designer's judgement calls: Files are limited to the space that will fit in memory—about 20 pages of double-spaced typing. This avoids the delays that plague word processors like *WordStar* and *Final Word,* which switch your text into and out of memory. Further, all of *WRITE* fits into memory, save for the help screens and a few seldom-used overlays. You are never forced to wait for a command to arrive from the disk before it takes effect.

WRITE is not exactly a "what-you-see-is-what-you-get" editor. In fact, it's more. On-screen lines and and printed lines are set independently; if they are set to the same width, the lines break on screen as they will on paper. (When you change screen widths, the result appears immediately; there is no need to reformat the text, as in *WordStar.*) If that is not good enough, a print-to-screen function displays page breaks as well.

All the standard editorial functions are supplied, including a variety of cursor-movement commands; delete character, line, or block, or to the

end of a word or line; and an unusually versatile search-and-replace routine. About all that is missing is a Remove command: Control-R, say, followed by any character deletes everything from the cursor position through the next occurrence of the character. Virtually no program has supplied that extraordinary time-saver since the original version of *Electric Pencil,* now long forgotten.

In all, this is a first-rate word processor. Several years of determined searching have turned up nothing that approaches its combination of simplicity, power, and speed in turning out large volumes of original writing.

Requirements: CP/M-80
Workman & Associates, $239

THE WRITE CHOICE

Several years ago, a rather unusual text editing program for the Apple made itself known. Called *The Correspondent,* it used a left and right scrolling window to fit a true "what you see is what you get" 80-column work area on the 40-column screen. No formatting commands were needed; text appeared on screen exactly as it would be printed. Forms could easily be produced, allowing you to "fill in the blanks" on screen and then print the completed form.

Many standard word-processing functions were included when this remarkable program debuted at $35, but what made it unique were some of the other features. Incorporating a fast "find" routine and file-linking function, it could be used as a free-form database of unlimited size. Notes and other information could be stored in multiple files on many disks, yet could be retrieved easily because every linked file could be searched in a single operation. Text was saved normally as binary files, but the program could access both random and sequential text files. This allowed for editing of program data files and the creation of Exec files.

Over the years, *The Correspondent* has been improved and revised into what is now an excellent word processor for both the beginning and advanced user. Still using the horizontally scrolling window, it now supports most 80-column cards to give up to 160 characters across. Block moves, find and replace, justification, multiple copies, help screens, tabbing, insert and delete, upper and lower case, Shift key . . . it's all there.

What makes this new version worth considering? For one thing, it is no longer copy protected, it uses a high speed DOS for quick loading and saving of files, and if you have *The Printographer,* you can create documents with graphics right in the text.

Along with a reduction in price, a couple of extra goodies are included. One is the classic book, *Elements of Style,* one of the best manuals of English usage, composition, and general writing style. The program's manual also includes a "style" section showing sample letters, manuscripts, reports, and outlines, along with helpful hints and instructions on how to produce them professionally. Still another item is a typing teacher program called *Tut's Typer,* with both a drill section and a typing game. All of this is wrapped up in a nice package called *The Write Choice* and retails for only $44.95. A real bargain in today's world!

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive
Roger Wagner Publishing, $44.95

XYWRITE II

XyWrite II may be the best all-around word processing program on the market today. It is aimed at professional writers and others who write a great deal and need to be able to choose from a variety of formats and commands.

XyWrite was written originally by two people who had worked on the program for the ATEX word-processing system. They decided there was no reason they couldn't put a similar program on a microcomputer, and *XyWrite* is the result. At present, *XyWrite* is only available for the IBM. It would take some work to adapt *XyWrite* commands to other micros' keyboards, especially if they lack special function keys and large memories.

There are several remarkable and useful features in *XyWrite* not found in most other word processing programs. Among them are the ability to recall and save materials that you have just deleted; and to run DOS under *XyWrite* as well as *XyWrite* under DOS, which will help programmers perform some neat tricks. You can also make indices and tables of contents. *XyWrite* also allows you to run two files simultaneously through split screens or windows: You can put two files up at the same time and split the screen into a top half and a bottom half, or a right and a left half. If you prefer to give both files the full screen, you can alternate from one file to the other by pressing a function key. You can also

transfer data from one file to the other in this fashion.

The menus from which you can choose special functions appear in a line, called a header, that appears at the top of the screen. There are three such menus, and you select functions by two-key commands. The only problem is that these headers are not very easy to read, and some of the commands are not as easy to understand as their *WordStar* counterparts. Once you are used to the program, though, you'll have no trouble finding what you need.

Search methods are very comprehensive. You can search globally; or you can search from where you are to the end of a file; or from the cursor location back toward the beginning of a file. And you can search not only for specific combinations of letters or numbers, but also for any wildcard matches, including punctuation marks.

The program has provisions for all the standard text material and formats, including subscript and superscript, running headers and footers, and footnotes.

You can insert date and time at the beginning of each file automatically, if you choose—a real boon to people who must keep track of the time they work, or have so many versions of a document that it becomes hard to keep track of which was done when.

One very nice thing about *XyWrite* is the instruction manual that accompanies the program. It isn't written in jargon, and it isn't written in muddled sentences. The language is generally clear, and the instructions for any given function are easy to find. Every function in the program gets its own section in the manual, usually not more than a page or two long. All the functions are listed in the table of contents and in several indices and lists scattered through the book. Because the instructions are brief and easy to find, you sometimes get the feeling that maybe you're missing something. Most likely you've just become cynical from reading all the bad computer manuals out there. In general, this is one of the best program instruction manuals around.

Xyquest has recently announced an update of *XyWrite*, called *XyWrite II-plus*. The update adds such features as integrated mailmerge, a completely redefinable keyboard, and on-screen page and line indicators to *XyWrite*'s already-impressive list of functions.

These people have really done a nice job of using all the keys on the keyboard intelligently. They have kept the number of necessary keystrokes to a minimum while including several uncommon and very handy functions. It will take only a little while for those who are used to other word processors to get the hang of *XyWrite*, and people who've never used any word processor before will find this one easy to start up and become comfortable with. Once you become accustomed to *XyWrite*, you'll never want to go back to the old programs again.

Requirements: IBM PC, 128K RAM, one disk drive

XyQuest, $195

ZORLOF

Funny names aside, *Zorlof* packs a surprising number of important word-processing features into an inexpensive package. Formatting options sometimes not available on more elaborate programs are supported in *Zorlof*, and they work well.

Writers of manuscripts will be pleased with the ability to place titles and page numbers at the top or bottoms of pages. Setting tabs or indents is an easy job, and they can be set on both the right- and lefthand margins. Another important feature that is well supported in *Zorlof* is the block move function. This enables you to "cut and paste" your text with speed and accuracy. High-speed typists will also be pleasantly surprised with *Zorlof*'s type-ahead capability. It is written in Z-80 machine language and so is not hindered by the slowness that is characteristic of many BASIC programs.

The documentation, bound in a three-ring binder, is thorough and easy to follow. The opening parts of the manual are included on the program disk to serve as a tutorial, an effective teaching system.

Most popular printers are supported, and the *Zorlof* file-management system is very efficient. You can call up a file directory for the current disk at any time. To load a file from the directory, just place the cursor over your choice.

Zorlof's ability to print-to-screen allows you to see what your text will look like before you print a hardcopy.

Considering the purchase price, this is one of the best word processing values on the market.

Requirements: TRS-80 Model I or III, 23K RAM, disk drive

Anitek Software Products, $69.95

WP ACCESSORIES

BULK MAILER

Bulk Mailer is a mailing list program, and only that. You can't use it as a checkbook register, and you can't use it to manage your inventory. But you can certainly manage a mailing list and do it right!

In case you thought microcomputers were incapable of handling large mailing lists, guess again. This one has a 32,000-name capacity with a hard disk, and a 2,400-name limit with two Apple II floppies. An IBM PC version handles up to 5,400 names, and a 32,000-name XT version is coming.

Since the entire program is held in memory at one time, both disk drives may be used for record storage without the need for disk swapping. Working from a single master menu, you can enter, scan, and edit records; search; look up a specific record by number; print a last-name-first alphabetic listing; and have all or part of the list printed, from high to low zip code order, in one-to-four-up labels. Large zip code groups, 50 or more names, can be printed last to be grouped for bulk rate mailing. The new nine-digit and Canadian zip codes are allowed.

Duplicate names and addresses are the scourge of all mailing lists. *Bulk Mailer* can be instructed to remove all exact duplicates automatically and inform you of close matches. You may then scan those records and decide which to delete.

Bulk Mailer's label format is four lines with 28 characters per line. Because the record number is normally printed on the name line, only 22 characters are allowed here. The second entry line has several options. It can be printed as the first line, not printed at all (keep phone numbers here), or printed normally as a second name or address line. Another field called XCODE can hold a sorting code of up to five digits. This can be used for customer groups, magazine subscription dates, and so on.

As well as being able to define the label format, such as number across, spaces between labels, label width, and printer codes for different type styles, you can also specify default entries for the city, state, zip, and XCODE fields. (Handy when entering a thousand names all in the same city!)

For users who start out with the floppy version, the company offers a $100 credit toward purchase of the hard disk version along with a conversion utility to transfer your records to the new system.

Bulk Mailer is supplied on a single copy-protected disk and includes a nicely printed 56-page manual.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM; disk drive; IBM PC, 64K RAM; disk drive

Satori Software, $99; hard disk version $350

DDPLUS

DDPlus is designed to provide enhanced printing for *WordStar* or ASCII word-processing files. While recognizing conventional *WordStar* formatting and printer commands, the menu-driven *DDPlus* adds powerful functions through new "double-dot commands" and the ability to define and use "macro" strings for complex operations.

Users have complete control over their text, with *DDPlus* providing all necessary commands for margins, spacing, and text arrangement.

One attractive and effective feature is the ability to use page headings and footings of one, two, or three lines each. Another is printing up to four columns in one pass down a page. Columnar printing is particularly easy. Once the number of columns, width, and column divider have been specified, the computer does all the work. Automatic formatting and numbering of outlines and lists also can be done easily.

Merging operations are supported, as are microspace justification and true proportional spacing when a suitable printer is used. Fully formatted outputs may be routed to a serial printer, parallel printer, screen 6, or a new disk file. Even multiple-column text may be previewed on screen or saved to disk. This is ideal for telecommunications.

DDPlus is thoroughly documented, easy to use, and affordable. It is a remarkably capable word processing aid.

Requirements: IBM PC, 96K RAM

The Alternate Key, $39.95

ELECTRIC WEBSTER

Electric Webster, one of the older spelling checkers, is available for Apple, Radio Shack, and IBM computers. You are more likely to find it, however, in disguise as part of a word-processing program. It has been licensed for packaging with *Spellbinder, Palantir*, and many others.

EW shows words in context, but only on its second pass through the document; on the first pass, you must tell it you'd like to see the word. With the correction feature, it corrects words at the time it

finds an error, but it doesn't correct all errors of the same type at once.

If you find the correct spelling in *EW*'s dictionary, you can have it replace the error automatically. This saves you from making another error as you type the correction. This feature does work, but not as the instructions said it would.

If you don't use the correcting feature, *EW* simply marks words for correction, marking all errors of the same type at the same time. When it's done, it returns you to the word processor with the cursor on the first word you marked for correction. Then it takes you to the next word, etc., until you're finished.

The manufacturer has put considerable effort into adapting this program for Radio Shack computers. This may have been a mistake. Because of the many TRS-80 operating systems, installing *Electric Webster* on one is a complex three-hour task. It involves six disks, multiple duplication of several disks, and moving various files. Other versions install and work much more easily.

Documentation for the TRS-80 version is long, complicated, and not at all clear. Different sections tell how to install the program to work with specific word-processing programs. The TRS-80 version works with *Scripsit, Lazy Writer, Electric Pencil,* and many other word processors.

Frequent disk swapping plagues the TRS-80 versions but not the others. The program check file is larger than memory, but only if the word processor can create them. On the TRS-80, only *Super-Scripsit* creates files larger than memory.

Using this program with a single-drive machine would be very hard. You'd be prompted through each step, but the constant disk switching could well stop you from using the program.

Requirements: Apple II, II+, or IIe; IBM PC; TRS-80 Model III or IV; 48K RAM; one disk drive

Cornucopia Software, Apple and IBM versions $149.95; TRS-80 version $89.95 or $149.95 with correction feature; hyphenation option $49.95; grammar and style corrector $49.95

THE EXECUTIVE SPELLER

The Executive Speller is a companion spelling checker for *The Executive Secretary* and *Personal Secretary* word-processing programs. It cannot be used by any other word processor and will not read standard Apple text files.

The program is supplied with a spelling list of 10,000 words, which can be expanded to 25,000 words. You may make as many copies of the supplied list as you like, customizing each to a different application. Blank lists may also be made, allowing you to build custom spelling lists from scratch.

Menu driven, the program begins by offering you several choices. You may elect to just proofread a document or proofread and correct. In the correction mode, words not in the program's dictionary are underlined on the screen in context and you have the option of both correcting the word and adding it to the spelling list. Other options allow you to add and delete words from a spelling list, print a complete spelling list or just the words in a particular document.

Verification speed is quite slow, approximately 160 words per minute, and the program does have some problems. Prompts to change disks are not explicit, and the program either hangs or bombs if the right disk is not in the right drive at the right time. When listing document words to the printer or screen, the word-frequency count of each word was totally erroneous. With these problems corrected, the program should prove adequate for its intended purpose.

Requirements: Apple II, II+ or IIe, 48K RAM, disk drive, *The Executive Secretary* or *Personal Secretary*

Sof/Sys., $75

FCM WITH FORM LETTER

FCM (Filing, Cataloging, and Mailing) is a database filing system designed primarily for the maintenance and printing of mailing lists, envelopes, and labels. Formally known as *1st Class Mail* and before that, *Mailroom, FCM* can also be used for filing and cataloging collections, inventories, medical records, schedules, or any information that will fit into a maximum of ten fields.

When *FCM* is used as a mailing list, data is entered into ten preformatted fields containing first and last name, company, address, city, state, zip, telephone, and two special fields that can be used for miscellaneous data. Up to a total of 132 characters can be entered; individual fields are limited to 24 characters. A total of 750 records fit on a single disk with only one file allowed per disk. Up to three sorted versions of the primary file can be held on the same disk, but longer files must be split among multiple disks.

Mailing-list programs are useless if you can't print what you want and where you want. In this department, *FCM* shines. Labels can contain as many as nine lines with up to five fields per line on as many as nine labels across. You can even change type styles between fields. As expected, labels can be printed based on any sort file or search criteria. Along with printing a master list in any order, *FCM* also prints envelopes either singly or continuously.

A Form Letter module allows the date, addresses, salutation, closing, signature line, and so on, to be set up within *FCM* and then merged with your mailing list. The body of the letter (up to two pages) is prepared in advance using your word processor. Compatible programs are *AppleWriter II/IIe, ScreenWriter II, SuperScribe, Pie Writer,* and others producing standard DOS text files.

Field names and lengths may be redefined to adapt *FCM* to any customized database applications. Up to 10 fields containing no more than 132 characters total can be used. A default option allows specified fields to contain fixed information, and a repeat option copies whatever was written in the same field of the previous record.

A well-written 108-page manual is included.
Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive; Commodore 64, disk drive; IBM PC, two disk drives
Continental Software, $74.95

FOOTNOTE

Footnote is an add-on to the popular *WordStar* word processing function. It has only a single function, but one that academic writers will appreciate. *Footnote* provides the ability to make superscripted calls and bottom-of-the-page notes.

The process is simple: When you create *WordStar* text, just type an "@" wherever you wish a call to appear. Then either type in the collective footnote texts in following the normal text, create a separate *WordStar* file that only contains footnote text. In either case, footnote text creation requires only that you begin each note with the same "@" as in the actual text itself, end each with a hard carriage return and put a blank line between each entry.

Once the *WordStar* file is created, you load *Footnote.* Actually printing documents with proper footnotes is a two-stage process. The first step involves replacing the "@s" scattered throughout your files with numbers. *Footnote* gives you the ability to name the starting call number. It is a simple process, choosing the first *Footnote* menu item, but it must be done for the text file, and then again if the footnotes are in a different file.

After numbering comes a formatting process that arranges the footnotes in the text so that they appear at the bottom of the page with the associated call. This process works reliably, but it is quite slow. Finally, *Footnote*-processed files can be edited with *WordStar* to add or delete footnotes. Since you do not key in the numbers while creating the text, *Footnote* makes it easy to add or delete footnotes and change the numbering sequence after creation.

These are flaws here. *Footnote* does not allow for variable line spacing of text and footnotes and cannot indent footnotes. Worse, though, is the process itself. It is simply cumbersome.

For the committed *WordStar* user, *Footnote* adds a significant function. If you need this capability and are not married to *WordStar,* however, you'd be best using some of the newer, more advanced word processing programs with footnoting built in.
Requirements: IBM PC, 64K RAM
Pro/Tem Software, $125

LETTERFORM 1000

It has been estimated that average office workers and professionals spend more than 20 percent of their time writing correspondence. If you suffer writer's block every time you sit down to compose a letter, or just plain hate letter writing, you are going to love *Letterform 1000.*

Letterform 1000 is five disks worth of prewritten letters and forms meant to be used with a word processor. The author claims that there are over a thousand letters and forms included, and certainly there are too many. These are divided into seven broad categories. The accounting and collection section has letters to help you ask for payment, demand payment, beg for payment, and explain why you are not sending someone else their payment. There are letters for dealing with banks and letters meant to be used by bankers. Credit functions are also well represented.

The "employers and employees" section contains a large selection of letters to help employees administer the personnel function, but employees are also well represented. Other sections include a variety of letters for "General Business," "Goodwill

and Sales," "Legal," "Shipping and Ordering," "Personal," and "Schools, Charities, and Organizations." The letters are generally well written, and there is definitely something here for everybody.

Letterform 1000 is extremely easy to use. Check the index to find a suitable letter, load the letter into your word processor, edit the letter to fit your circumstance, and print it out. It takes almost as long to describe the process as it does to execute it.

The documentation consists of three parts. The largest part of the manual contains printouts of all of the letters and forms. This allows you to determine whether a particular letter will serve your needs. This is followed by an excellent "Writers Reference," a guide to abbreviations, conversion tables, proper forms of address, guide to correct punctuation, and much more. The third part of the manual is a well-organized index.

If *Letterform 1000* saves you just a few hours of your time, (and it will), it will have paid for itself.

Requirements: IBM PC, two double-sided disk drives; word processing software
PBL Corp., $95

MAGIC WORDS

Magic Words is a spelling checker designed by Artsci, the same company that made the word-processing program, *Magic Window II*. Though the company recommends that you use *Magic Words* as an adjunct to its product, this package will work with most other word processors as well.

Magic Words has a built-in dictionary of 14,000 words. That sounds impressive, but it's not. For one, it doesn't include any contractions. Because *Magic Words* treats apostrophes as word separators, "hadn't" becomes two words: "hadn" and "t." The program accepts all one-letter words as correct, which takes care of "t," but "hadn" isn't in anyone's dictionary. Hyphens are also treated as word enders, so words broken by hyphens at the ends of lines are invariably listed as errors. In addition, many "-ed" and "-ing" endings are missing, even when the root word is in the program's dictionary.

The good news, however, is that *Magic Words* is easy to learn and use. It gives you many options for checking your documents. You can create a "marked file," a duplicate of the file being checked but with a marker in front of every word not found in the dictionary. You can also print out a list of errors pulled from the text, with page and line listings and context—up to 254 characters showing where the word was used. And you can change the mistakes as the program whirrs about its business. At the end of a document, *Magic Words* tells you how many words it has scanned, giving you a word count in the process.

In the "attended" mode, *Magic Words* displays the suspect word and asks whether it is correct. If you answer no, you can have the program put the word in a file, ignore it, or change it. If you answer yes, the word goes into your own custom dictionary, and you won't be asked about it again. In the "unattended" mode, words not found are simply listed for later perusal.

Of course, for many writers, that list will be too long, and they'll be tempted to skip the whole checking procedure. There is another option, though: Don't hyphenate words and don't—or rather, do not—use contractions. Oh, yes, and use only the present tense.

Requirements: Apple II, II+, IIe, one disk drive
Artsci, $69.95

MAIL LIST MANAGER

Mail List Manager is a mail-merge program for the Apple III. From the main menu, you create a label format of up to six lines. The default setup is for four lines of label information and two additional lines of comments. Each line may contain multiple fields, though there is a maximum of 12 fields total for all lines of the format. Two additional lines of information are available at entry time. One is for phone numbers; the others for a label code, a six-character maximum description that can be used to hold specific selection criteria. Sorting, which is accomplished when the labels are printed, can be done on either of the two preselected fields.

Mail List Manager has several helpful features. While you are creating the format, the outline of a label is placed on the screen so you can expand or reduce it to match the actual label dimensions. The same holds true during data-entry, when you fill in a life-size label on the screen.

The program also uses the Sondex coding system, which converts vowel and consonant combinations into numeric values. This lets you search using descriptions that do not precisely match the desired record. As long as there is a similarity in the pronunciation or sound between the two, *Mail List Manager* will find the record sought.

Some minor faults are also apparent. If you define a wide label line, the onscreen label can expand into the definition section, disturbing the aesthetics of the display. Also, you are limited to 960 records per file, even if you have a hard disk. Similar records from different files can be merged into a new file, but the 960-record limit still applies. For business mailings, more space would be appreciated.

Requirements: Apple III, 128K RAM, two disk drives
Apple Computer, $150

MAILING LABEL PROGRAM, MERGE 'N PRINT

It's understandable, but a hazard for software buyers. Faced with all too much competition, many of the software houses marketing so-called database management systems seem to panic. They make wild claims of flexibility and power that prove to be false almost as soon as the customer has paid for the program.

Mailing Label Program risks no such disappointment. In one unalterable format, it will store up to 1,200 names with associated data on one double-sided disk, or 600 on a single-sided disk. The program is menu-driven, and its commands are so simple that a user should be able to set up a database within minutes of booting up the disk for the first time.

Though the record format is fixed, it contains all the fields and user-controlled variables that most buyers will need to maintain a simple mailing list or directory. The sort and search functions can conveniently locate or print records that fit a wide variety of criteria in many combinations.

Mailing Label Program will insert names and addresses into *WordStar* files, making it a relatively inexpensive alternative to MicroPro's *MailMerge.* Working with its sister program, *Merge 'n Print, Mailing Label Program* is also compatible with any of several popular word processing programs. Among them are *Benchmark, EasyWriter 1.1* and *II,* and *Volkswriter.* For these programs, it is not quite so cost effective, however.

This combination of database and word processor makes it relatively easy to produce customized form letters with the recipient's name and address inserted automatically as needed in each letter. No doubt it could be adapted to other purposes by anyone willing to recall that for *this* file, name, address, and the other fields have been given new meanings.

Requirements: IBM PC, 64K RAM, two disk drives
MBS Software, *Mailing Label Program* $95; *Merge 'n Print* $149

MEGASPELL

Every word processor should have it's very own spelling checker. *MegaSpell,* with it's large 40,000 word dictionary, is intended for use exclusively with *MegaWriter.* Expandable by another 10,000 words, the dictionary disk may be copied and customized for specialized applications such as legal, medical, or technical writing.

Easy to operate, *MegaSpell* uses only six commands. Misspelled or unknown words are shown in context, allowing correction. You may choose to replace all occurrences of the word, replace only one, or skip this occurrence. An Ignore command instructs the program to ignore all occurrences of the word, and an Add command allows the addition of the word to the dictionary. Included also is an Organize option, a disk utility used for backing up, deleting, and renaming documents.

Unfortunately, the ease of use comes at a price. The program lacks both speed and features. It took approximately ten minutes to proofread four pages of lightly packed text, not counting correction time. No total count or tally of unique words is provided. There is no access to the dictionary; you can't look up a word to check spelling. When correcting a misspelled word, you must type in what you think is the correct spelling. It is then checked against the dictionary, and you are informed whether or not the word was found. Finally, one must be careful not to add *misspelled* words to the dictionary disk. Once added, they are there forever.

Requirements: Apple II, II+ or IIe, 64K RAM, disk drive
Megahaus Corp., $59.95

MICROSPELL

MicroSpell has several nice features. When it finds a word it doesn't recognize, it prints both the word in context and a list of guesses. You can accept, correct, or replace a wrong word or search the dictionary with wildcard characters. You can correct all identical errors at once or ask to see each one.

Some words it corrects automatically, using a list of commonly misspelled words and correct spell-

ings. This part of the program, amazingly, updates itself by automatically storing the words you misspell and matching them with correct versions, so you'll never have to fix a wrong word more than once. This is quite a timesaver! Another unique feature: it finds double words, a frequent typing error.

MicroSpell comes with a built-in dictionary of 28,000 words, but the use of prefixes and suffixes makes this effectively equal to about 50,000. You can create special dictionaries and modify the program in various ways to suit your needs and system. And there's no limit on file size.

There are two versions of documentation. One, apparently an older version, abounds in words like "heuristics," "solecisms," "stem-suffix decomposition," "transparent," and other user-hostile terms. The print is tiny, the characters run together, and the index is unreadable. The IBM PC version is much improved, but the index still is printed in very tiny letters. Make sure the documentation is legible before you buy.

Requirements: CP/M-80, CP/M-86, or IBM PC; 42K RAM, one disk drive
Lifeboat Associates, $249

PERFECT SPELLER

Marketed with *Perfect Writer, Perfect Speller* is a spelling checker that is both fast and easy to use. It comes with a main dictionary equivalent to about 50,000 words—as much as possible, they are stored as root words, prefixes, and suffixes—yet can usually process a 20-page document in three minutes or less. To start it, you type "CTRL X," then "S" followed by the file to be checked. *Perfect Speller* soon displays the number of words processed and the number it doesn't recognize. Then it asks whether you want to scan the list. If you say "no," it marks the unknown words in your document and returns you to *Perfect Writer* so you can correct the words. If you say "yes," it displays the words alphabetically, one at a time, to be added to the dictionary, marked for correction, or ignored.

At many points the documentation didn't match what the program was doing, the result of a rush to adapt the *Perfect* series to the IBM PC, on which the program was tested. Sometimes different statements on one page conflicted.

When you're ready to correct words, you can either do in-context correction, or use *Perfect Writer* itself. The editor will be more convenient. Correcting in context fixes one marked word at a time, even if you misspelled the same word 50 times in the document. With the word processor you can use global search and replace to correct all similar errors at once.

The documentation warns that adding words to the dictionary may destroy the dictionary file, so always back up the current dictionary before using it. Also, adding words to the dictionary increases very slightly the chance that the program will skip over a wrong word. You can create your own dictionaries and even buy additional special dictionaries.

Requirements: CP/M or MS-DOS, 64K RAM, one disk drive
Perfect Software, $189

POWERMAIL PLUS

This is a very potent mailing-list program for TRS-80 computers with many versatile features. *PowerMAIL* was written by Kim Watt, whose programming skill is legend among serious TRS-80 users, and it lives up to his normal high standard.

In theory, this program will store over 500,000 address records on a Model I, III, or 4, and more than 16 million on a Model II, 12, or 16. In practice, it requires about 150K of disk space for each 1000 records. Thus, on an 80-track, double-sided drive, you could have a single file with up to 4,500 names. However, *PowerMAIL* will keep track of files on up to eight drives, using them as one.

One selection on the main menu is Add Records. Choose it, and the program displays an entry format with a flashing block in the first field. You can then enter data, editing at will until you move to the next field. When all the data is entered, action moves to the bottom of the screen to allow setting flags, up to 24 of them for each record. Each flag can be either ON or OFF and allows you to classify records for selective printing.

New records are entered into a special file called PMAIL/ADD; before use, they must be merged into the main repository, PMAIL/DAT. This requires little more than a menu choice.

Before any individual record in the file can be located, the file must be sorted. There are ten fields in each record, and up to eight be specified in the sort criteria. In fact, only an index is sorted, so the process is fast. Sorting a 1,250-record file on the last name and zip code fields took only 1 minute and 12 seconds.

To edit a record, it must first be located by

searching for a string in any of the fields. Again, the process is quick. Any name in a 1,250 name file could be found in about 3 seconds.

The user may also set a condition mask for each field and flag, and an action mask allows setting or resetting a flag when the labels are printed. This feature eases such procedures as "send to all who are flagged as not having been sent this mailing and reset the flag to show that they have now received it."

In addition to labels, eight printing formats are available. The print options include sending control code sequences to the printer to change its print modes.

PowerMAIL Plus is an excellent mailing list program. The publisher will answer any technical questions over the telephone. However, the manual covers the program very well. If it had an index and glossary, there would be little need to call the company.

Requirements: TRS-80 Model I, II, III, 4, 12, or 16; 48K RAM; disk drive
Powersoft, $149.95

SCRIPLUS

Fast and easy to use, Radio Shack's *Scripsit* word processor has been deservedly popular for quite some time. However, it lacks some features it should have had, and *Scriplus* remedies these omissions nicely.

Scriplus adds two general categories of function: the directory functions, and embedded control codes in your text to call up printer functions that *Scripsit* normally does not use.

The directory functions are probably the more important. The "plain Jane" *Scripsit* requires you to leave the program to view a disk directory, find out how much file space remains on it, or kill a file to free extra storage. Hit the Break key, pick from a menu, and *Scriplus* will do all of them with a single keystroke.

The print codes are also very useful. If you use any of the popular dot-matrix printers, such as the Epson, you may embed codes to shift from the normal ten characters per inch to the condensed mode or the expanded mode, or to start and stop the emphasized or bold modes, underlining, super- or subscripts—you can even create graphics within your text.

Scriplus has worked without problems over a long period on Models I, III and 4 (in Model III mode), under both TRS DOS and LDOS. It well worth its price.

Requirements: TRS-80 Model I or III, 48K RAM, disk drive
Powersoft, $39.95

SENSIBLE SPELLER

Dictionary programs or spelling checkers are certainly nothing new to the world of microcomputers. The big questions: Is the spelling checker a good one, and does it contain an adequate number of words in its dictionary? Many spelling checkers on the market today have a very limited vocabulary, generally in the range of 15,000 to 30,000 words. While that may seem like a lot, it is only a very small portion of the approximately 600,000-word English language. Nonetheless, this number can be adequate if you are able to add your own personal words to the dictionary.

Many dictionary programs are made up electronically. Rather than having someone type in all the words, certain root words are entered, and a computer electronically produces the dictionary words. In a language as irregular as English, this can introduce some errors.

Sensible Speller on the other hand, contains all the words found in the *Random House Dictionary Concise Edition*—over 80,000 in all—and stores them all on two floppy disks. As is the case with most spelling checkers, you make a copy of the dictionary disk, not the program disk, and use this copy in your proofreading session. Most programs allow you to add or delete words, but some are limited to only 1,500 or 2,000 words that can be added. The *Sensible Speller* has room for approximately 10,000 words on each of the two disks. One, the main dictionary, contains 43,000 words of the *Random House Dictionary,* the words most often used. The second disk, the supplementary dictionary, contains words less frequently used.

Unlike many other spellers, *Sensible Speller* permits you to create an empty-dictionary disk. This lets you build a dictionary containing words unique to your occupation or purpose. Although the program requires only a single disk drive, you will not be able to add or remove words from the dictionary with only one drive. For ease of operation and to use this and some other features, two disk drives are strongly recommended.

The speller works by collecting all the words

from your document into the Apple's memory. If the document is larger than available memory space, it will be automatically processed in sections. The program then reads through the selected dictionary disk and searches for each word, ignoring whether letters are in upper- or lowercase. Usually there are a few words from your manuscript that can't be found in any of the dictionaries —technical words and proper names as well as misspellings.

You are shown, with three lines of text, the exact context in which the suspect word was used and are given several options. You may add the word to a dictionary if it was properly spelled, ignore the word if it was spelled correctly but you don't want to add it to the dictionary, look up the correct spelling in any or all of the dictionary disks (two wildcard characters are supported), or have the program suggest the correct spelling. You can mark the misspelled word so it can easily be located with your word processor, or you may correct the misspelled word immediately. If you choose to fix it immediately, *Sensible Speller* will accept lowercase input from various shift-key modifications.

Extremely fast, this program will verify a ten-page document in about one minute if there are no errors, two to three minutes if there are several misspellings. The user should be aware that spelling checkers will not spot grammatical errors. If the word is in the dictionary, the program says it's O.K.; but if you are using correctly spelled words out of their proper context there is no way the computer can understand what you mean.

Available in four different versions, the *Sensible Speller* will work under DOS 3.2, DOS 3.3, *Apple Pascal,* and Apple CP/M word processors, in both 40- and 80-column versions. Able to handle both binary and standard Apple text files, it is compatible with almost every word-processing package currently available for the Apple. The few exceptions are *EasyWriter, EasyWriter Pro,* and the *Incredible Jack.* Note also that the *CP/M, Pascal* and *Word Handler* versions do not allow immediate replacement of misspellings or automatic suggestion of correct spellings. The program disk contains both DOS 3.2 and 3.3 and boots on either system.

Special dictionaries are also available. Currently available is the *Official Black's Law Dictionary.* The entire official word list from this reference has been condensed on to a single 5-inch disk for use with *Sensible Speller.* All 20,000 words from the dictionary with 15,000 of the most commonly used words from the *Random House Dictionary* are included to provide a comprehensive legal dictionary on a single disk. Soon to be released is *Steadman's Medical Dictionary.*

The *Sensible Speller* is an outstanding package for anyone who does a lot of writing using word processors. It will eliminate the drudgery of trying to find typos we all make, and the word-frequency analysis will provide you with an idea of whether you're being too repetitive or not. The documentation is excellent and comes with two copies of the program disk along with the two dictionary disks.
Requirements: Apple II, II+, or IIe, Apple III in emulation mode, DOS 3.2, 3.3, CP/M, or Pascal, one disk drive
Sensible Software, $125

SPELL-IT

Spell-It is a very inexpensive spelling checker designed to work with several of the popular word processing programs. *WordStar, EasyWriter, Volkswriter,* and most other ASCII text editors are supported. It uses the batch method for checking; that is, it creates a list of words it cannot find in its dictionaries. Once the list is created, you may either flag the words or correct them interactively.

Spell-It has several dictionaries. The main one contains 41,000 words. There are smaller ones for proper names, contractions, and facilities for creating up to ten of your own supplemental files. *Spell-It* is quite fast in batch checking. According to the manual, indexes and sub-indixes reduce the amount of disk accesses. Once the suspect words have been isolated in a file, *Spell-It* offers a number of alternatives for handling them. You may leave them, change them in context, print or display them, or flag them in the file for later processing. The process of adding words to the dictionaries is very easy—just two keystrokes.

Spell-It requires 64K RAM but needs additional memory to load the file. Although it is fast in batch-checking files, there may be times in checking files of less than five pages when one-step, interactive checkers may be faster. The thing that you can't beat with *Spell-It* is the price. It works well and at $29.95 it may be the best software bargain around.
Requirements: IBM PC, 64K RAM, disk drive
Berzurk Systems, $29.95

SPELL 'N FIX II

Spelling checkers are rare for the Color Computer, but Star Kits' *Spell 'N Fix II* is a first-class product that competes in capabilities with spelling checkers for higher-priced systems.

Spell 'N Fix II has a 20,000-word vocabulary. The user can add another 20,000 words to this or substitute his or her own vocabulary geared to a technical field or a foreign language. A 40,000-word dictionary is less that that of some other spelling checkers, but the emphasis on this program is not size, but accuracy. If the user builds a dictionary carefully, 40,000 words are more than enough for any spelling checker.

The program splits the screen display in two. The upper portion shows the text being read by *Spell 'N Fix*, and the bottom displays any misspelled words and lists the correct spellings. The user can leave the misspelled words alone or correct them. If the word does not appear in the program's dictionary, the user can add it. *Spell 'N Fix* also lets the user scan the program dictionary to find the correct spelling.

Spell 'N Fix II is easy to use. It prompts the user at every step. A reference manual is included with the program, but some users could learn this spelling checker without written instructions.

There are one or two other spelling checkers for the Color Computer, but none is better than *Spell 'N Fix II*.

Requirements: TRS-80 Color Computer
Star Kits, $69.29

SPELL WIZARD

This is a standard spelling checker for Atari computers. With a dictionary of over 30,000 words, it compares favorably with its competition.

In proofreading a text file, the program counts all words in the file, displays a total of unique words, and then tallies and locates all words not found in either its basic dictionary or a supplementary dictionary supplied by the user. If any are found, the user may make corrections or tell the program to ignore them.

It is also possible to search the dictionary for a correct spelling, using "wild card" letters for those parts of the spelling that are not known. Other functions display or print out any portion of the dictionary.

Spell Wizard is easy to use and can operate with files created by any word processing system or test editor. The dictionary is comprehensive enough for all but the most technical uses. For these, the user can add technical terms and proper nouns to a supplemental dictionary.

Though inevitably not as fast as some spelling checkers for business-oriented computers, *Spell Wizard* does its job reasonably well and with a minimum of fuss, and it is easy to learn. Atari users whose machine does word processing duty should at least give it a look.

Requirements: Atari, 32K RAM, disk drive
Datasoft, $49.95

SPELLGUARD

In 1981, *SpellGuard* won *Infoworld*'s Software of the Year award. The first of the modern spelling checkers, it remains probably the best of the programs that do not correct at the time they find an error. Available on its own, it also comes free with *SuperWriter* and *PeachText 5000*.

Both versions of *SpellGuard* are menu-driven. When it checks, the program reports the number of words read, the number and percentage of unique words, the number and percent of words not found in the dictionary, and the percentage of proofing done. Another menu lets you check words alphabetically. You can add words to a dictionary, mark wrong words, skip words, list words quickly, mark all at once without review, get help, or quit. After checking, you return to the word processor and search for the marked words. *SuperWriter* marks with a "?"; *PeachText* marks by replacing the last letter with a "[." *SuperWriter*'s approach seems clearer.

You can create and use special dictionaries, but must use just one dictionary at a time. If you have double-sided, double-density diskettes, *SuperWriter* and the spelling checker can go on the same diskettes. *PeachText*, in contrast, directs you to store the two programs on separate diskettes. *SuperWriter*'s practice is much easier to use.

Periodically, as you add to the main dictionary, it needs sorting. *SpellGuard* thoughtfully does that task for you automatically.

Requirements: CP/M or MS-DOS, 64K RAM, one disk drive
ISA, $295

SPELLSTAR

SpellStar is MicroPro's spelling checking program for *WordStar*. At the moment, two signifi-

cantly different versions of the program are available. *SpellStar 4.0* is the newest CP/M version. It is the first release of *SpellStar* with a 55,000-word dictionary. This is a significant improvement over earlier releases, all of which suffered from having dictionaries with only 20,000 words. MicroPro will presumably add this larger dictionary to other versions of the program as well, but as of this writing, the MS-DOS, PC-DOS, and CP/M-86 versions of the program are still limited to *SpellStar 3.3,* and are hamstrung by their extremely limited dictionaries.

Aside from questions of dictionary size, *SpellStar* has some serious problems as a spelling checker. To begin with, it's clumsy to use. To start the program, you go to *WordStar*'s opening menu and enter "S." *SpellStar* takes you through a few preliminaries in which you enter the name of the file to check and choose a few options to use. Give the program the go-ahead, and it will check the file, giving you a count of the number of words in the file, the number of different words, and the number of misspelled words.

At that point the program stops and gives you another set of choices. You can tell it to list the misspelled words, mark the errors in your text, or abandon the check. Tell *SpellStar* to go on, and it flags the errors. Then it stops again to give you the choice of correcting the errors now or saving the file to correct them later. There doesn't seem to be any point in stopping at either of these stages. It just forces you to hang around so you can hit the RETURN and tell the program to get on with it.

These are minor annoyances. More important, even if you hit RETURN immediately both times, the program is slow. Using a 20,000-word version of *SpellStar* on a 7,200-word file, it took 4 minutes, 27 seconds to run through the spelling check and flag the errors. Two other programs gave me times of 1:56 and 3:15. And neither of the other programs makes the user sit there and wait just to tell them to finish the job.

Another problem with *SpellStar* is that it is missing at least one feature critical to any spelling checker—especially one that costs this much. The two programs that are faster than *WordStar* in checking a file will both let you look a word up in their own dictionaries. This will usually find the correct spelling for you, and even when it doesn't, it will often tell you whether a word is misspelled or simply missing from the program's vocabulary. With *SpellStar,* you're forced to go to a printed dictionary to check your spelling. This translates to much wasted time and effort in double-checking your spelling.

Another way to look at it is that *SpellStar* isn't really a spelling checker. It's a "typo checker." If you're good at spelling, and can trust yourself to recognize and correct a typographical error when you see one, then *SpellStar* is probably adequate. If you want a program that will help you find and correct your spelling errors, though, look elsewhere.

Requirements: CP/M (2.0 or higher), 56K RAM; MS-DOS and PC-DOS,64K RAM; CP/M-86, 80K RAM; 240K on one disk. The version of the *SpellStar* overlay file must match the release of *WordStar* being used. (Note: CP/M version of *WordStar 3.3* uses *SpellStar 4.0*)
MicroPro International, $250

TALKING SPELLER

Talking Speller is a versatile drill-and-practice program easily adapted to a child's level of knowledge. The teacher or parent sets up the desired word list, and once assured that the spelling is correct, records them onto a blank tape. The program then uses this tape in its drill, playing the voice back while prompting for the correct spelling.

The student gets three chances to spell each word correctly. The program rewards correct answers with sound and an encouraging word. After an incorrect response, the program displays the letters the student typed correctly, leaving spaces where he or she typed wrong letters.

Talking Speller keeps track of the student's performance and gives the number of correct answers with a percentage after the lesson.

This is a simple program, but this fact is its main strength. Because it is simple, teachers and parents can easily adapt it to an individual child's needs. And at its simple price, it's hard to pass up.

Requirements: TRS-80 Color Computer
Superior Graphic Software, $19.95

TEXTPLUS

TextPlus from Owl Software is designed to produce large batches of personalized letters. The main functional components are a database and a word-processing system. Typically, the database is used to store names, addresses, and other particulars to be sorted and merged with a form letter. This gives you the ability to print hundreds of indi-

vidually addressed letters with a few keystrokes. This ability is ideal for many businesses and associations, and *TextPlus* performs its stated functions well. However, this program lacks some functions in this area which would make it truly outstanding. Evaluated as separate programs, both the word-processing and database systems merit B ratings against their competition. For the price of $240, however, this package represents extremely good value.

A typical mass mailing begins with your database of names and addresses. *TextPlus* allows 1,000 records with up to 21 fields each, a maximum of 72 bytes per field, and a maximum record length of 253 characters. Operating from the "Change/View File" mode, it is easy to display, change, and sort files.

The next step it to create the form letter. The word processing portion of *TextPlus* has the standard functions, including headers/footers, page numbering, centering, underlining and move copy. One significant feature is the ability to select multiple typestyles. Implementation here is a mixed bag. *TextPlus* makes extensive use of function keys, reducing keystrokes. However, embedded formatting commands are awkward. To underline the word "title," for example, you key "ul=title." Underlined, bold text does not appear as such on the screen. Text is not continuously formatted; you must enter a format command, then wait several seconds.

Once form letter and database are entered, the next step is to select/sort the data and merge to print. This process is quite simple and effective. You can produce letters and labels with ease. What would make this part truly outstanding is a conditional-merge feature. Most name and address files have "Address 1" and "Address 2" fields. Frequently, "Address 2" is blank. Some systems allow you to instruct the program, "IF ADDRESS 2 IS BLANK, DON'T PRINT A BLANK LINE." With *TextPlus,* you have to do more individual sort/selects on the file.

Other nice features include card-file creation, two-bin printer support for simultaneous printing of letters and envelopes, and extensive arithmetic functions for data-file reports. Documentation ranks high as a tutorial but is only adequate as a reference. Even though the word-processing section of *TextPlus* suffers from formatting weaknesses, it is functionally complete. The data-file section is good and the ability to merge the two make *TextPlus* very useful for personalized letter/label applications.

Requirements: IBM PC, Columbia, or Compaq, 64K RAM or 128K RAM, depending on version, disk drive

Owl Software Corp., $240

THE DIC-TION-ARY

THE Dic-tion-ary is a spelling checker designed for use with many Apple word-processing programs. Marketed as a companion product for *ScreenWriter II,* it works with *Pie Writer, Apple Writer 1, Apple Writer II, SuperScribe, Text Power,* and *Word Handler,* plus other word processors that use standard DOS 3.3 text files.

THE Dic-tion-ary comes with two disks. One contains the program itself, which is copy protected; the other is the Wordbook containing the 28,000 word dictionary. (A backup copy of the program is one the flip side of the Wordbook disk.) Up to 2,500 words may be added to each copy of your Wordbook, thereby creating specific dictionary disks for different applications. Adding and deleting single words or lists of words is easily accomplished, and you can list the entire dictionary on a printer—though you'd better have lots of power.

The program may be used with either one or-two disk drives, but as the case with many other dictionary programs, single-disk systems require extensive disk swapping between the Wordbook and your text files.

Menu driven, the program has several options. In the noninteractive mode, the unknown or misspelled words are sent to the printer. This option is rather slow and involves a great amount of disk access, but you may let the processing go on unattended.

In the interactive mode, the suspect words are shown in context within a two-line window at the top of the screen. You have a choice of ignoring the words, marking them as misspelled, adding them to the dictionary, correcting the spelling on the display, or searching the Wordbook for the correct spelling and then overtyping your misspelled word to correct it. Very slow, it took approximately 12 minutes to process a file of 863 words containing just a few errors.

The word-frequency-analysis option, while not allowing you to correct your document or see where misspelled words occur, has the advantage

of being much faster in processing especially when the document is longer than three pages. This option displays or prints in alphabetical order all the unique words found in the text along with a count of the frequency of usage of each word. You may elect to list either all the words or just the suspect words. Words not found in the Wordbook are marked with an "*." Listed also is both a total word count and a count of the unique words.

In processing text files, *THE Dic-tion-ary* reads a portion of the file from one disk and then searches the Wordbook for the words on the other disk, assuming that you have two drives. This causes a considerable amount of disk access and track searching. When changing from one menu option to another, the program disk must be interchanged each time with the Wordbook disk. It is too bad the entire program could not be loaded into memory at once. One strong point is that there is no limit to the size of the file that can be processed.

Although one of the less expensive spelling checkers, this program is of questionable value considering the time it takes to process longer documents.

Requirements: Apple II, II+, IIe, or Apple III in emulation only mode, DOS 3.3, *Applesoft BASIC,* one disk drive
Sierra On-Line, $99.95

VISISPELL

VisiSpell is a one-step, interactive spelling checker. Designed primarily to work with *VisiWord,* VisiCorp's word processing program, it is compatible with DOS text files. It employs a dual-dictionary look-up system. The first dictionary, of 15,000 commonly used words, is loaded into memory. The second, a master dictionary, contains about 100,000 words and remains on the disk ready to be consulted if a word is not found in the first dictionary. The first dictionary, labeled "Personal," can be customized by the addition of your own words. Moreover, you can create several different personal dictionaries, useful if you work with different types of textual materials.

After the personal dictionary is loaded, *VisiSpell* scans your text. When words cannot be found in either dictionary, *VisiSpell* displays the suspect word in reverse-video in 12 lines of the context. The bottom of the screen displays the word as it was typed along with *VisiSpell*'s best guess as to the word you really wanted. Options include another search, leave the word unchanged, mark the text, and type your own word. *VisiSpell* also capitalizes its alternative words if your original one was capitalized. Repeats ("I I") are also found.

VisiSpell is reasonably fast and allows for quick addition of your own words to the personal dictionary. It would be nice if multiple alternative spellings were displayed rather than having you search one at a time. For large files, you may want to consider two-step, batch checkers that will isolate all the suspect words before requiring your attention.

Requirements: IBM PC, 128K RAM, two disk drives
VisiCorp, $225

WORDY

Wordiness is a common condition among many writers. Unnecessary words make your manuscripts confusing and boring, causing readers to tire easily. *Wordy* is a set of programs designed to make one aware of common forms of wordiness and to help develop a more concise style of writing. It consists of eight lessons; each takes about ten minutes to complete. Wrong answers are presented again, and a percentage score is given as each is finished.

Combined with imaginative graphics, topics covered are circumlocution redundancy, "it is" constructions, weakening intensifiers, unnecessary "is" and "are" forms, vague expressions, pretentious diction, and elaborate construction. Supplied on three diskettes, *Wordy* will appeal to both students and professional writers who wish to improve their style.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 488K RAM, disk drive
COMpress, $100

COMMUNICATIONS

One of the first things most people learn about computer communications is that knowing about computers doesn't help much when it comes to trying to understand communications programs. The problem is that communications is an entirely different field, complete with its own concepts and language. Computer communications is a hybrid. You've probably already learned much of the computer side of it. Here is a primer for the communications side.

TERMINALS:

For most communications applications, you have to turn your computer into a terminal. Terminals come in two basic varieties: dumb and smart. A dumb terminal program will ignore most of your computer's abilities, leaving you with a keyboard for sending information and a screen for receiving it. A smart terminal program will give you a much wider range of possibilities. At a very minimum, a smart terminal program will give you features of a dumb terminal plus the ability both to send information that is stored on disk or tape, and to save incoming information to disk or tape.

We need two bits of jargon here. Sending a file is known as uploading that file. Receiving a file is known as downloading. A minimal smart terminal program will turn uploading and downloading into a clumsy, two-step procedure. To send information you first load it into your computer's memory, then send it to your modem. To save information, you receive it in your computer's memory, then send it to disk or tape. In most cases this means that you won't be able to send or receive files that are longer than can fit in your computer's memory. A smarter program will sidestep this limitation by letting you upload or download directly from or directly to disk or tape. For our purposes, we can think of these smarter programs as "standard" smart terminal programs.

COMMUNICATION PARAMETERS:

For two computers to communicate with each other, they have to be co-ordinated with each other. More technically, they have to be using the same set of parameters. Since different systems use different parameters, it's important that even the simplest dumb terminal program gives you some control over parameter settings. The two most common parameters that you will find controlled by software are baud rate and duplex setting.

BAUD RATE:

Baud rate is a measure of the speed of communications. There are several standard baud rates, with 110 baud, 300 baud, and 1200 baud being the three most common. The speeds you can use are determined almost entirely by your hardware, and particularly by your modem, the gadget that lets your computer talk over the phone lines. Whatever speed is being used, though, has to be the same on both sides of the conversation. Typically, you can change the speed that your computer is using by opening it up, finding the proper switch, and changing its setting. Obviously, it's much more convenient to change the setting by telling your terminal program to do it for you. Not all computers will let you control your baud rate through software, but if your computer has that capability, you will want your communications program to have it too.

DUPLEX SETTING:

This is actually a misnomer. In communications jargon, duplex simply means two-way communications. Full-duplex means that both sides can talk at the same time, as with telephones. Half-duplex means that each side has to wait for the other to finish first, as with CB radio. With computer communications, the nature of the conversation—full or half duplex—is determined completely by the hardware that you are using. Most computer communications though is strictly full-duplex. This allows for a feature called echoplex.

If the computer that you are talking to is using echoplex, then each time you send a character, the computer will echo it, or send it back to you. When the character shows up on your screen, it automatically confirms that the other computer received it correctly. If the other computer isn't echoing you, however, you won't see anything on your screen. In that case, you'll want your modem or software to put the character on the screen instead. Logically, the choice in settings here should be called "remote echo" and "local echo." They almost never are. "Remote echo" is usually called "full-duplex." "Local echo" is usually called "half-duplex." Even in the half-duplex setting, though, you're usually engaged in full-duplex communications.

Most modems have a full-duplex/half-duplex set-

ting of their own, but some do not. If your modem is full-duplex only, then it becomes important to have this feature in your software. Even if your modem lets you change the duplex setting, it's usually more convenient to change it with software.

ADDITIONAL FEATURES:

If you want more than rock-bottom, basic communications, you should be aware that there are any number of features available in various programs. Many of these simply make the process of communications more convenient. Others give you additional powers that you may or may not need. The convenience features first:

AUTOMATIC DIALING:

Some programs will let you create a phone directory for your most commonly dialed numbers. This feature assumes you have a modem that's capable of automatic dialing. Typically the program will let you enter enough digits so you can call though a carrier like Sprint or MCI and even add commands to your modem to switch between pulse and tone dialing as appropriate. Dialing then becomes a simple matter of choosing a name or number from a list, or entering the label that you've listed the number under.

AUTOMATIC LOG-ON:

If most of your communications are with online systems—meaning anything from a small bulletin board to a major information utility—you'll find that having to spend time logging-on to these systems becomes a minor irritant. Many programs will let you store the log-on sequence, with or without your password and will automatically take care of this chore for you. This feature will also take you through the log-on procedure much faster, since the computer can "type" faster than you do.

PARAMETER FILES OR BATCH FILES:

Many programs will let you create parameter files. As the name implies, any given file contains one set of parameters. You can create as many sets as you need, then load all the parameters into your program at once, rather than having to set each parameter separately each time you make a call. If the program has automatic dialing and automatic log-on, the parameter file will often include the phone number and log-on sequence.

Batch files give you much the same capability as parameter files. The difference is not in what they will do for you, but in how they are created. Parameter files are typically created from menu selections built-into the program. Batch files generally are created by a word processor or text editor, and take the form of a series of commands to the program. Batch files are often more flexible in terms of what they will let you do, but before you can use them you have to learn the program's command language.

Some programs have neither parameter files nor batch files. As long as these programs are not copy protected, you can still get much the same effect by creating several different versions of the command file, and saving each one to disk under a different name. The only drawback to this approach is that it uses up much more disk space.

Features that give you additional capabilities, as opposed to additional convenience, tend to be more technical. Here are some of the more common ones:

ERROR CHECKING PROTOCOLS:

Telephone lines are noisy. Every now and then they will make a noise that the receiving computer will interpret as a character. If you are dealing with text files only, you can usually tolerate an occasional error of this sort. If you are dealing with command files you cannot. With command files, you generally won't even be able to tell there is an error until it shows up as a bug in the program. Error checking protocols help prevent that by automatically double-checking the transmission. Different programs use different error checking protocols, and both sides of a conversation have to be using the same protocols in order to talk to each other.

One common error-checking protocol is often known as the Ward Christensen protocol, after the man who wrote it. It is also known by other names, including the CPMUG protocol (for CP/M User's Group), and the XMODEM or the MODEM7 protocol (for two of the programs that use it). This protocol is widespread, in large part, because it is in public domain. You will find it on most CP/M-based bulletin boards and many other bulletin boards as well.

Much commercial software includes the Christensen protocol, often in addition to one or more proprietary protocols. The proprietary protocol in such cases is usually easier to use, but the Chris-

tensen protocol has the advantage of letting you exchange files with another system even if you are not both running the same program. A word of warning, though. Precisely because programs like XMODEM and MODEM7 are in public domain, there is no way to guarantee that the protocol remains entirely consistent from revision to revision. It's quite possible to have two programs said to use the Christensen protocol that will not work with each other. Keep that in mind if you run into a problem when trying to exchange files.

X-ON/X-OFF PROTOCOL:

If you are downloading a file that's longer than can fit into your computer's memory, it's important to have some way to tell the other computer to stop and wait while your system frees up its memory by writing the current information to disk. The standard trick for this is called the X-On/X-Off protocol. When the system that's doing the downloading runs out of memory, it sends the X-Off signal to tell the other computer to wait. When it's ready for more information, it sends the X-On signal to tell the uploading system to start sending again.

TRANSLATING OR FILTERING OUT CHARACTERS:

Occasionally, you will find that the system you are online with is sending control codes that are interfering with communications in some way. Typically these control codes are meant to work with some specific terminal or piece of software. If you are using some other terminal or software, they may have no effect. If they do have an effect, though, it is likely to be undesirable. Under these conditions, it is useful either to translate the incoming control codes so they will have the desired effect or to filter them out entirely. In general, the more sophisticated your program, the more likely it is to need this capability, and the more likely it is to have it.

TERMINAL EMULATION:

All communications programs are terminal emulators in the sense that they make your computer act like a terminal, but the terminal they are emulating is a very limited teletypewriter, which the host computer can control only on a line-by-line basis. Some programs will make your computer act like a specific terminal—a Hazeltine 1500, a DEC VT52, and an ADM 3A are three common examples. The advantage here is that some computers are programmed so they can control specific terminals on a full-screen basis rather than one line at a time. This opens up the possibilities for full-screen text editing or even graphics if the host system is programmed for it.

SPECIALIZED FEATURES:

Some communications programs provide specific capabilities that put them beyond being simple terminal programs. You can, for example, find programs that send and receive electronic mail. Typically this means being able to enter the messages to send, along with instructions about who to send them to and when, then leaving it to the computer to do the work. Some programs will let you set up your own computerized bulletin board so that others can post and read messages. Still other programs have special features tied to specific online systems. VisiLink, for example, is designed specifically to work with the databases of Data Resources, Inc. It will let you download "data kits" in VisiCalc format, so that you can then manipulate the data with VisiCalc. A few programs are designed to let you the Telex I or Telex II networks, or other specialized systems, such as the deaf network.

All this is no more than an overview. As with most things that deal with computers, the overriding reality is that computers are infinitely flexible. Still, we've touched on all the basics—enough so that this qualifies as a fair introduction to the subject, and is certainly enough to prepare you to look at some specific programs.#

ABBS (APPLE BULLETIN BOARD SYSTEM)

ABBS is not a terminal emulation program. Rather, it will let you set up your own bulletin board using your Apple II as the host computer for others to call. *ABBS* is easy to use; in fact, except for a simple installation procedure, it is basically a hands-off system. Even the installation is done through a series of questions and answers instead of through the complex programming that some other bulletin board systems require.

ABBS is written primarily in *Applesoft BASIC,* with several machine language subroutines added to enhance performance. Using machine language leads to several important advantages, not the least

of which is the ability to operate at 1200 baud as well as at 300 baud.

As a bulletin board system *ABBS* is a full-featured communications tool that can be installed with a variety of options. The simplest form of the program uses a single "message tree," or bulletin board. You can add more message trees by adding new conference modules.

Other features include an upload and download module that will let your Apple send or receive both program files and ASCII files. The autolog feature lets the system record and store information about first-time callers. Once callers have left the information, they need only enter their names to gain access to the system. A privacy module can also be added. This restricts the message area of the system, making it available only to those individuals who have the correct password.

Software Sorcery recommends that your system include a storage device larger than the standard Apple II drive. Even this drive, though, with its 140K of storage, can handle up to 1,700 72-character lines of text.

ABBS supports a variety of serial interfaces and modems for the Apple, but it requires that the modem make use of the carrier detect (DCD) and terminal ready (DTR) lines of the RS-232 serial port. To function as part of a bulletin board system, the modem must also be able to work in an auto-answer mode.

Requirements: Apple II or II+, one disk drive
Software Sorcery, $74.95 to $164.95 depending on how many modules are included

ASC II EXPRESS "THE PROFESSIONAL"; P-TERM "THE PROFESSIONAL"; Z-TERM "THE PROFESSIONAL"

This trio of smart-terminal programs for the Apple II are sold by Southwestern Data Systems, and are known collectively as *The Professional Series.* All three were written, in part at least, by the same individual: Bill Blue. All three have similar capabilities. The most important difference between them is the operating system they run under.

ASC II *Express "The Professional,"* or *AE Pro,* runs under Apple DOS 3.3. *P-Term "The Professional"* and *Z-Term "The Professional,"* are also known as *P-Pro* and *Z-Pro. P-Pro* runs under *UCSD Pascal. Z-Pro* runs under *Microsoft CP/M.*

When dealing with a computer like the Apple, the first question to ask of any program is whether it is compatible with the particular cards that you have in your machine. As of this writing, *AE-Pro* is the most recently revised of the *Professional* series, and SDS claims that it will support all current Apple-compatible modems, serial cards, and 80-column cards. *P-Term* and *Z-Term* will also support a wide variety of possibilities, but make sure you check before buying.

The programs in the *Professional* series have all the features and flexibility you would expect in a sophisticated smart-terminal program. To save incoming information, for example, you have three choices, depending on the situation and what kind of file is involved.

First, you can simply capture information in memory as you receive it then save it to a disk file at any time. This lets you do a rough edit as you go by turning the memory buffer on and off.

A second choice lets you automatically save the incoming information to disk. Each time the memory buffer is filled, the program sends an X-Off character to the transmitting computer, then saves the memory to disk. Each save produces a new disk file. With *AE Pro,* this option lets you save files that are longer than can fit on your disk. If you run out of disk space, *AE Pro* (but not *P-Pro* or *Z-Pro*) will tell you about it and let you change disks.

Either of these options is appropriate for downloading text files. A third choice on all three programs will let you download programs with full error checking. The *Professional* series uses the public-domain Christensen protocol, the most common error-checking method in microcomputer communications. By virtue of using it, the *Professional* series can exchange programs with the largest possible number of other communications programs.

The programs offer similar flexibility in other features: You can send a file directly from disk with or without error-checking protocols. You can turn your printer on or off at any time. You can review the information currently in your memory, in a kind of instant replay of the conversation. You can also turn the printer on and have the "replay" printed. If the other computer is sending control codes that interfere with communications, you can set the program to filter them out.

The programs in the *Professional* series also offer most of the convenience features you might

hope for in a communications program. *AE Pro*'s disk commands give you a list of files on your disk and will let you view or delete a file. *P-Pro* and *Z-Pro,* with different operating systems, will give you a list of disk files and will let you view a file or log-on to another disk. All three programs will let you toggle between full and half duplex, and all three will control baud rate for you, if the communications card in your Apple can be software controlled. *AE-Pro* (but not *P-Pro* or *Z-pro*) also includes a primitive, one- line-at-a-time text editor that will let you edit the information in your memory buffer before sending it out or saving it to disk.

The auto-dial and auto-log-on features are particularly noteworthy for their flexibility. With auto-dial, you can enter a number either from the keyboard or from the program's directory of up to 26 numbers. If the number is busy, you can redial with a single keystroke. You can also tell the program to redial an arbitrary number of times, or to redial indefinitely until it gets an answer. When it does, it will tell you about it by making your Apple beep at you.

The auto-log-on feature will actually do much more than just log-on to a system. You can set the program up so it will dial a system, ask for some specific information, save that information to disk, log off, and hang up the phone. You might want to use this with an information utility such as Dow Jones to download the current prices on your stock portfolio.

One last important communications feature is terminal emulation. *AE-Pro* comes with conversion tables to make your Apple emulate about a dozen different terminals. These include the Hazeltine 1500 or 1510, the IBM 3101, the ADM-3A, and the DEC VT52. If you need to mimic some other terminal, *AE-Pro* will let you custom-design your own terminal emulation table. *P-Pro* and *Z-Pro* provide fewer conversion tables for you, but they will still let you custom design your own.

This doesn't exhaust the list of features of the *Professional* series by any means, but it should give you a sense of the power and flexibility built into these programs. The one danger in any such program is that the number of features available may overwhelm the new user. Fortunately, the effort that went into designing these programs wasn't all directed at adding extra features. A fair amount of it was aimed at making the programs understandable and usable, even for a communications novice.

This shows both in the programs themselves, and in the instruction manuals. The programs contain menus that you can ask for if you need them or ignore if you don't. The manuals are intelligently divided into sections, some suitable for the novice, some for the more advanced user. Most important, a "Getting Started" section in all three manuals eases you into learning the program, beginning with such basics as reminding you to make a working copy of the disk and store the distribution disk safely away.

There is no question that the *Professional* series includes three of the most sophisticated programs for the Apple II. Beginners will find them easy to learn, easy to use, and hard to grow out of. Advanced users will find that the programs will do nearly everything they could ask for.

Requirements: Apple II, II+, IIe, or compatible machine; 48K RAM; *AE Pro,* DOS 3.3; *P-Pro,* UCSD Pascal and language card; *Z-Pro,* Microsoft Z-80 Softcard Southwestern Data Systems, *AE Pro* or *P-Pro* $129.95; *Z-Pro* $149.95

ASCOM

This sophisticated smart-terminal program has enough features to handle virtually any reasonable communications task, and quite a few unreasonable ones as well. With a total of 72 commands, plus the ability to let you enter those commands either manually or through batch files, it will do almost anything you need in interactive communications.

ASCOM offers all standard smart-terminal functions and gives maximum flexibility in their use. You can capture information in the memory buffer then save it to disk manually, or you can set the program to save to disk automatically whenever the memory is full. You can also send and receive files directly to and from disk, with or without error checking. If you are using protocols, you have a choice of which to use. One choice is the widespread, public-domain Christensen protocol. Its inclusion means that *ASCOM* will let you exchange files with other microcomputer users as possible.

Convenience features in *ASCOM* include automatic dialing, automatic log-on, and control over your computer's baud rate, unless your system requires manual switching. You can display your disk

directory, delete files, rename files, and display files, all without leaving the program.

A welcome novelty is the Run command, which will let you leave *ASCOM*, run some other program, then automatically return you to *ASCOM* when it's done. This raises some interesting possibilities. For example, *ASCOM* has no way to tell you how much room is left on your disk; the Run command lets you run the *Stat* utility and find out anyway. A simple carriage return puts you back into *ASCOM*. You can just as easily go to your word processor, quickly create or edit a file with full word processing capabilities, then jump back into *ASCOM* to send it.

Some of *ASCOM*'s more sophisticated features include the capability for unattended operation and the capability for remote operation by another computer. You will also find "translation tables" that let you translate incoming and outgoing characters and "ignore tables" that will let you filter out characters that may be interfering with communications.

ASCOM's one failing is that it may ask too much of the communications novice. It was originally designed as a strictly command-based program for people who knew what they were doing. As a result, very little effort was made to help the newcomer. The most recent version tries to correct that oversight by including a menu mode as well as the command mode. This helps considerably, but there is still much room for improvement. The manual suffers the same problem. It is an excellent, and unusually accurate, reference but contains almost no introductory or tutorial material.

Aside from the possible difficulty in learning the program, I've yet to hear of any serious problems with it. If you're looking for a communications program that you won't soon outgrow, you may well find it in *ASCOM*.

Requirements: CP/M, CP/M-86, MS-DOS, or PC-DOS; 48K RAM
Dynamic Microprocessor Associates, $180

THE BENCHMARK TELECOMMUNICATIONS PROGRAM

This program is misnamed. Far from being a full featured telecommunications program, it is a narrowly focused, file transfer program providing little in the way of interactive communications capabilities. Even the file transfer function is limited. It will work only with another copy of *The Benchmark Telecommunications Program*. In exchange for its limitations, the program provides an important feature that you will not often find. You can send and receive messages to the person working with the other system while files are being transferred. Simply type them in. They'll show up on the screen at the other end, without being copied to disk.

Using this program is simple enough. First, you either connect two computers directly through a cable or establish communications by modem. You then tell one computer to send a file and the other to receive it. The systems do as they've been told, putting messages on their screens to to keep you posted on their progress. When the file has been transferred, the message on both sides is "Operation Complete." All files are sent and received with full error checking, which makes the program suitable for sending command files as well as text files. The program will also give you full control of baud rate, if your system allows for it.

Don't mistake this for a terminal program. It's not. However, if you a good file transfer program to shuttle files between two computers, you might like to take a look at this one.

Requirements: PC-DOS, CP/M, MP/M, or MS-DOS (pre-configured for specific machines)
Benchmark Software, $150

CHAMELEON

This program was written by a student at MIT who was too lazy to leave his room to walk to a computer terminal elsewhere on campus. The result is one of the most sophisticated smart-terminal programs available for the Atari.

Chameleon's most striking feature is terminal emulation. As shipped, the program will emulate a DEC VT-52 or a Lear Siegler ADM-3A as a simple menu choice. Each of these emulation modes has some limitations when compared to the real thing, but the limitations are relatively minor. The important point is that if the computer you're talking to knows how to deal with either of these terminals, *Chameleon* will let it control your Atari on a full-screen basis. For host systems that can't take advantage of *Chameleon's* emulation modes, the program also has a menu choice called GLASS TTY. This turns your Atari into a standard, one-line-at-a-time terminal, a "glass teletypewriter."

Terminal emulation may be *Chameleon's* most conspicuous capability, but it is far from the only one. Other important features include the ability to

send files directly from or directly to disk or tape, with or without the widespread Christensen error-checking protocol. This means that file transfer is not limited by the size of your memory buffer.

The manual, like most manuals for Atari programs, has a strong hobbyist flavor to it and may tell you more about the nuts and bolts details than you really want to know. Given the approach, the manual is well written and useful, but don't expect it to serve as an introduction to communications in general. It is written for those who already have some familiarity with terminals and with online systems. Others may have to struggle a bit to get through it.

Requirements: Atari computer, 850 interface, cassette version; 24K RAM, disk version, 32K RAM.
ATARI Program Exchange, $24.95

CONECT

Most CP/M programs are designed to run on virtually any machine that will run the CP/M operating system. *Conect,* from Vector Graphic, is designed to run on the firm's own machines. Because it is tailored to the specific machines, it solves certain problems that most communications programs have when running on some models of Vector computers.

Conect is a standard smart-terminal program. It can capture information and save it to disk, and can upload files directly from disk or download them directly to disk. Features include auto-dial, the ability to emulate a Hazeltine 1500 terminal, and full support of any modem that uses Hayes protocols. Parameter files give you control over a fair number of parameters, including baud rate. This is particularly nice for Vector 3 users, since the baud rate in that system has only a limited kind of software control, not used by most communications programs.

One nice touch in interactive mode is that the program provides a help screen that also functions as a menu. The screen lists the commands to send a file, turn the printer on and off, and start or stop capturing information. You can make any of these choices at any time, without leaving interactive mode. You can also turn the menu off once you know the commands.

Conect will also let you use your Vector 3 at 1200 baud for interactive communications. With most terminal programs the Vector screen can't keep up at 1200 baud and will drop characters. This is built into the hardware. *Conect* takes the design into account, and eliminates the problem. For this feature alone, *Conect* is worth having if you own a Vector 3.

Requirements: Vector Graphic computers only
Vector Graphic, $150

CROSSTALK, CROSSTALK XVI

Crosstalk and *Crosstalk XVI* share the same name and a few of the same basic capabilities. Both are from Microstuf, and both are smart terminal programs. Do not confuse them, though. They are two very different pieces of software.

Crosstalk XVI is one of the most sophisticated communications programs available. The *XVI* part of the name is significant. This program was written specifically to run under MS-DOS on 16-bit systems. It requires a minimum of 96K RAM, and is designed to make full use of the extra memory. It comes in several versions for specific machines, including the IBM PC.

Crosstalk is a less sophisticated program. It is available in various versions that run on most 8- or 16-bit computers under a variety of operating systems. The program was designed to work within the limits of an 8-bit system. The 16-bit version is a straightforward conversion, and carries with it most of the limitations of the 8-bit version.

This review is based primarily on *Crosstalk XVI.*

The manual for *Crosstalk XVI* is reasonably well-designed, but it could have used a little more work. In particular, the sample screens are in the right places and show you what you need to know, but you may need a magnifying glass to read them. Despite this and some other minor oversights, the manual will give you most of the information you need, including some important points about installing your modem.

Probably the nicest thing about this program is the way you interact with it. With most commands you have the choice of stepping through them with a series of prompts, bypassing the prompts if you already know what's needed, or asking for further explanations at each step. All this translates to maximum ease of use for the new user and maximum efficiency for the experienced user.

Crosstalk XVI has all the features you would expect in a sophisticated smart terminal program, beginning with the ability to capture information and save it to disk, and the ability to send and receive files directly to and from disk. For protocol file

transfer, it gives you the choice between MODEM7 protocol and Microstuf's own proprietary protocol. When using the proprietary protocol, *Crosstalk XVI* is compatible with *Crosstalk*. The program also allows for remote operation with password protection: It will answer the phone, ask you for a password, then allow you to control it from a remote location. Other features include terminal emulation. *Crosstalk XVI,* but not *Crosstalk,* can emulate the Televideo 910/920 series, the IBM 3101, the Adds Viewpoint, the DEC VT-100 and VT-52, and the Texas Instruments 940.

Finally, *Crosstalk XVI* will let you create batch files. Microstuf divides these into "command files" and "script files." The command files are simply parameter files that include the information for auto-dialing, auto-log-on, characters to filter out, and settings for various communications parameters. The script files can be much more involved. As with batch files in other programs, you can use a script file to create what amounts to a program. The *Crosstalk XVI* language is particularly rich, with more than 70 commands to choose from.

This is one program that is suitable for both the rank beginner and the most advanced user. It may be possible to outgrow it, but it's not at all clear what you might move up to.

Requirements: 96K RAM; IBM PC or PC-compatible with PC DOS 1.10 or 2.00; Hyperion, Eagle 1600, TI Professional, Toshiba T-300, Seequa
Microstuf, $195

DATALINK

Datalink is a standard smart terminal program for the Apple II. As with any such program, *Datalink* will let you capture information and save it to disk, and will let you transfer files to or from disk. It has a fair number of features, but the most notable thing about this program is that it is written in Pascal.

This is notable because the programmers who wrote *Datalink* chose to imitate the standard Pascal menu display throughout the program. This means putting the entire menu on a single line, with the first letter of each command followed by a left parenthesis, followed by as much of the actual commands as will fit. As is true of the actual Pascal menus, this makes the menu ugly and difficult to read.

If you can get past the menus, you will find that *Datalink* is a reasonably full-featured program with a fair range of capabilities. These include auto-dial and auto-log-on. One nice touch is that the program's telephone directory lets you store communications parameters along with each phone number. The program will also let you print information as it comes in, but only at 300 baud. At 1200 baud you not only lose this capability, but run into another problem as well, thanks to the Apple II's slow screen refresh rate. *Datalink* will lose characters unless the other system can be persuaded to twiddle its thumbs after each carriage return by sending pad characters while your system catches up.

All in all, *Datalink* is not a bad program, but it's not an overly impressive one either. Keep in mind, though, that its major fault is the menus. The unfortunate thing is that such menus are not even required by the Pascal operating system. They are the product of misguided programmers, who are overly fond of a poor idea.

Requirements: Apple II+, 48K RAM, language card, two disk drives
Link Systems/Naru Enterprises, $99.95

INFO-NET

People are always looking for simple, direct ways to communicate. Now, Apple III users can achieve this goal with *Info-Net,* a program that will transform your computer into a bulletin-board system. The program's most significant application is as an in-house mail facility.

The program is initialized from the Apple III that is used as the nexus of the communications system. A system operator, or sysop, controls and determines levels of access for each user.

You access the bulletin board with a password, which is assigned when you subscribe to the service. You may change your password the first time you log on. For multipurpose situations, a null or blank password can be used, but can be altered only at the sysop level.

The mail system provides private letter files. When you sign on, you are notified whether you have received any mail. You can choose to scan or read through new or existing letters, and, if desired, delete them. Provided your access level allows, you may also file mail for future reference.

A classified section can be set up as a bulletin board with multiple categories, and the program will indicate whether they are opened or closed to reply.

The program is well implemented and serves its purpose admirably. One problem: *Info-Net* provides no password protection at the sysop level, which means that anyone who has the boot disk and the computer it's run on can alter access levels. Also, the program assumes that the user has a certain amount of knowledge. The manual, for instance, makes no mention of communication speed or protocol. The RS-232 driver file included with the program is set with the default 300-baud transmission rate and all default protocol values. In most, if not all, cases, this is sufficient, but further explanation could have been provided for users who would like to set up a higher-speed system. The manufacturers promise this in forthcoming issues of the operations manual.

Requirements: Apple III, 256K RAM, Profile hard disk, Hayes Smartmodem
Sun Data, $250

INTERLYNC

Interlync is one of the new generation of programs that makes use of the extra memory available in the IBM PC. The program is written partially in C, with some assembly language routines thrown in. Even so, it uses 67K of RAM. In return for using up all that memory, the program offers all the features you would expect in a standard smart terminal program, plus a few sophisticated features that you generally won't find elsewhere.

As you would expect from any standard smart terminal program, *Interlync* will let you capture information and save it to disk. It will also let you transfer files directly to and from disk, with or without error checking protocols. The program uses XMODEM protocol, which makes it compatible with the widest possible range of other software.

Interlync will let you save communications parameters and such for each system you deal with. Each parameter file lets you program up to 26 keys to send auto-dial commands to your modem, log-on sequences to the other computer, or any commonly used set of commands. With THE SOURCE, for example, you might program a key to take you directly from the sign-on menu to your favorite bulletin board. Twenty-six definable keys per system is more than you're likely to need.

The most welcome, and most uncommon, feature in this program is the full-screen editor. Once a line or page is entered, you can send it to the host computer, the printer, or disk. Or revise it if you like.

Other features include the use of Function keys rather than an arbitrary maze of keystrokes for entering commands. Also, the program will handle communications at up to 9600 baud if connected directly to another computer.

A very nice touch finally is the online help built into the program—nearly 35 "pages" worth. This feature can be called on at any time by pressing the help key, without interrupting an online session.

All in all, *Interlync* is an impressive program indeed. Try it. You'll probably like it.

Requirements: IBM PC, 128K RAM, one disk drive
Zsoft (distributed by MicroMart), $199

MICRO LINK II

This smart terminal program is available in preconfigured versions for a wide variety of computers. "Pre-configured" means that you don't have to spend time installing the program for your system. It also means that you must order the program specifically for the system you plan to run it on. Make sure you get the right version, and make doubly sure of that before you take the disk out of its plastic envelope.

The notice on the envelope says it is your responsibility to make sure that the program is suitable for your needs and that the disk is compatible with your system. It also says that once the envelope has been opened, your money will not be refunded. This is not unreasonable, considering that the disk is not copy protected, but before you open that envelope, you want to be very sure that you didn't somehow wind up with a disk you can't use.

The manual for *Micro Link II* makes the program appear much much more confusing than it is. If you follow Digital's instructions and read the manual before you open the envelope, you're likely to pack everything back in the box and send it back. (The fact that most people don't send it back is probably a measure of how many people actually read the manual before opening the envelope.)

The confusion in the manual stems from the way it refers to the program's commands. It simply doesn't help to be told that to send a letter by electronic mail the commands to use are, "22.39, 41.1, 43 (on), 44.1, 45.0D, 5."

This problem disappears when you look at the program. *Micro Link II* offers you four sets of menus. These list the various commands as num-

bered menu choices. Each command has a unique number so you can enter any command at any time, regardless of which menu is on the screen: "22" happens to be the menu number for line width, so that "22.39" in the example translates to a command to change the line width to 39 characters. Considering that the program has more than 40 commands, it would have been much easier to refer to them by mnemonics, or even by full name, instead of by numbers. Because you can display the menus at any time, this is merely an inconvenience rather than a major problem.

Using the program is easy enough. For interactive communications you simply pick "conversation mode" from the menu. You can then establish communications manually, or, if you have an auto-dial modem, simply type in the phone number from the keyboard. The program is also capable of storing up to nine phrases. You can use this to save phone numbers for auto-dialing with an intelligent modem or to store log-on sequences. Other commands let you turn the memory buffer on and off, turn your printer on and off, or filter out unwanted characters. The program will send or receive files, with or without the MODEM7 error checking protocol.

Micro Link II won't do anything very sophisticated, but it will meet most communications needs for most people. If you're looking for a standard smart terminal program—and one that you won't outgrow too quickly—*Micro Link II* is a good place to start.

Requirements: MS-DOS, CP/M-86, CP/M 2.2, 32K RAM

Digital Marketing Corp., $99

MITE

Computer programs can be classified along a scale of suitability that runs from computer novice to sophisticated user. They can also be classified along a slightly different scale that runs from computer-user-as-consumer to computer-user-as-hobbiest. *Mite* is a sophisticated smart terminal program that succeeds in covering a wide range on the first scale, but is oddly difficult to place on the second.

Mite comes in specific versions for more than 100 different machines. The 16-bit versions come pre-installed so that you need only make a backup copy and run the program. The 8-bit versions include a simple INSTALL program that can be used by anyone who has a passing acquaintance with his or her system. If you ordered the right 8-bit version of the program, you simply follow the instructions in the manual and pick your system from the list in the INSTALL program.

It is also possible to customize *Mite* for other machines, but only if you know what you're doing. The procedure involves writing assembly language routines, a task well beyond most casual computer users. Mycroft Labs will make the attempt to customize *Mite* for you. Contact them before buying the program.

Mite is reasonably easy to learn and use, yet it offers all the capabilities you would expect to find in a sophisticated smart terminal program, including auto-dial, auto-log-on, the ability to capture information and save it to disk, and the ability to send or receive files with or without error checking protocols.

Other features include control over an unusually large number of parameters, the ability to store any number of parameter files, and the ability to filter out unwanted characters that might be interfering with communications. One particularly noteworthy feature is the range of choices in error checking protocols. These include, but are not limited to, the CLINK/Crosstalk protocol, the Hayes Terminal Program/Hayes Smartcom I and Smartcom II protocol, the XMODEM protocol, and *Mite*'s own protocol. *Mite* can also be used with the Western Union's Telex II system (TWX).

Mite's design is remarkably simple and straightforward. The program's main menu lists several commands including Go, Start Communications, and Hang Up Phone. It also lists a choice of eight sub-menus. These have names like "Text File Upload," "Text File Download," and "Binary File Xfer." The odd thing here is the reliance on computer jargon in a program that is otherwise carefully designed for ease of use. These three sub-menus could just as easily have been labeled "Send a Text File," "Receive a Text File," and "File Transfer with Error Checking."

If you know what these terms mean, it is a simple matter to pick the right sub-menu, make the appropriate choices from that menu, and get on with communications. In fact, if you are already familiar with the terminology, you can probably learn most of what you need to know about using *Mite* simply by looking through the menus. The complication, of course, is that if you don't know what these

terms mean you have to turn to the manual to find out.

The manual shows a tendency toward the technical, yet manages to explain things in reasonably clear English. The result is that you may learn more technical details and jargon than you really need, but you will *learn* them, not be overwhelmed by them. And once you learn them, you will find that *MITE* is flexible enough to meet most communications needs.

Requirements: Available for over 100 specific machines.

Mycroft Labs, CP/M version $150; CP/M-86, MS-DOS, PC-DOS versions, $195

MOVE-IT

As the name implies, this is a lean, no-nonsense program with an emphasis on file transfer functions. As such, it will let you send and receive files with or without *Move-It's* own error-checking protocol. It also functions quite nicely as a straightforward, standard smart-terminal program.

"Lean and no-nonsense" are not to be confused with "limited and difficult to understand." The program has relatively few commands, but they are well chosen. They are also well named, which makes them exceedingly easy to remember and use. The command to send a file is Send. The command to get a file is GET. The command to make a phone call is Call. Perhaps the nicest is the command for direct communications from the keyboard. Most programs call this interactive mode, conversational mode, or least terminal mode. *Move-It* calls it talk mode, and the command to get there is Talk.

Move-It uses a command-based structure; it gives you a prompt sign and waits for you to tell it something. It will also give you menus if you need them. In command mode, enter "?" followed by a return, and you'll get a list along with a short explanation of each command. In talk mode, you enter "ESC ?" for a similar list. In most cases you can enter the command by its first letter only.

The manual is not as well designed as the program itself. It is reasonably readable, but it assumes that you already know what things like "duplex" and "parity" mean. This is less than helpful if you're not already familiar with communications. There are other oversights you might quibble with, but for the most part *Move-It* represents a major victory for common sense design in a highly technical, jargon-laden field.

Requirements: CP/M, CP/M-86, or MS-DOS, 32K RAM

Woolf Software Systems, CP/M version $125; CP/M-86 or MS-DOS version $150

MTERM

This minimal smart terminal program has a number of surprisingly sophisticated features. It comes in versions for several systems including the IBM PC, TRS-80, and the Apple II and II+. Each of the versions has identical protocols, and similar communications features.

MTERM will let you capture information in memory, then send it to disk or to a printer if you have one. You can also print information as it comes in. Sending files is a two-step procedure. First you load the file into memory, then you send it. You can also transfer files directly to and rom disk through a separate module called *Xfer*. *Xfer* will work with both text files and program files and is not limited to files that will fit into the memory available in your system. The *Xfer* module uses an error-checking protocol that is apparently specific to *MTERM*, though the manual is not clear on this point.

Other features of *MTERM* include auto-dial and semiautomatic log-on. The auto-dial feature can store up to ten phone numbers for retrieval at the touch of a key. Auto-log-on is accomplished through the program's "MacroKeys." *MTERM* will let you define ten keys as "macros." Each of these will let you send up to 64 characters with a single keystroke. You can also set up one of the macros for automatic transmission in response to a control-E. This signal is used by many bulletin boards, which makes this a handy feature if you use these services frequently. The program also gives you control over several communications settings, including baud rate and duplex setting. You can store a separate set of parameters for each system you use.

One very nice feature in *MTERM* is unattended auto-dial, a capability seldom found in communication programs in this price range. Give *MTERM* its orders, and it will quietly wait until the specified hour, at which time it will wake up, reach into its well of telephone numbers, dial, and connect your system to another computer. This feature is not as useful as it might be. *MTERM* will log on only in response to a control-E, and will then be limited

only to sending a message from its memory buffer and hanging up the phone. Still, this capability can be useful in a limited range of situations.
Requirements: IBM PC, Zenith, TRS-80, Apple II or II+, disk drive
MicroSystems Software, $79.95

OMNITERM

Omniterm is one of those rare programs that offers many sophisticated features, yet is simple enough for any novice to use. It does most of the work to get the user online, and the latest version will even dial the phone and log-on automatically.

A command menu, summoned by pressing the "@" key twice, displays the user's options. These options are accessed by a single keystroke. For example, pressing "P" toggles the printer on or off. It would be hard to imagine a simpler way to set up *Omniterm* to the required format.

Omniterm has virtually every option one would want on a smart-terminal program. Lindbergh Systems claims that *Omniterm* will let your TRS-80 communicate with any computer, and this is probably true. It allows for changing the screen format to match that of the system the user wishes to contact. A line-feed suppression option compensates for other systems that send only a carriage return at the end of a line. Baud rate, number of data and stop bits, and parity are all adjustable. (*Omniterm* defaults to 300 baud, 7 data bits, 1 stop bit, and even parity when booted up.)

When it comes time to print out data from the screen, *Omniterm* offers some handy features. A 2,000-character buffer stores text in case your printer can't keep up. A carriage-return suppression feature aids in formatting printouts.

The manual is thorough, and includes a code-conversion table and a glossary.

Omniterm has been around for several years, and it is still one of the premiere terminal packages for the TRS-80. This program shows how successful well-thought-out, easy-to-use software can be.
Requirements: TRS-80 Model III or 4, disk drive
Lindbergh Systems, $95

P-COM

E-COM is both a trademark and a service of the U.S. Postal Service. It is also an acronym for Electronic Computer Originated Mail. The concept behind the service is simple. Instead of dropping your mail off at a post office or mailbox and having it sent to a central distribution point, you use your computer to send the mail directly to the distribution center. The post office then trucks the mail to local post offices and delivers it.

E-COM has three basically different capabilities: Single Address messages (SAM), Common Text messages (COT), and Text Inserted messages (TIM). SAM service lets you send many letters to a single addressee. COT and TIM are two variations on form letters. COT lets you send identical letters to any number of different people. TIM lets you send slightly different letters to any number of different people.

To use E-COM you need two things. The first is permission from the Post Office. The second is some way of connecting your computer to the system. *P-Com* gives you that capability for the IBM PC.

In addition to letting your IBM PC talk to the E-COM system, *P-Com* also helps to create mailing lists and text to send to E-COM. The *P-Com* text handler is primitive, but you can also create letters in *WordStar* (and only *WordStar*) and read them in to a *P-Com* text file.

P-Com also functions as a database program for your mailing lists. Once you've created a set of master lists, you can have the program select specific groups of names from each list and merge them for specific mailings—all architects, perhaps, or all addresses in Nevada. Mailing lists created and maintained with *P-Com* can also be used to create standard mailing labels when needed.

There is at least one problem inherent in the *E-COM* system that *P-Com* makes a serious attempt to solve. When you send a form letter with TIM, you never get to see the finished product. The actual merging of text into the form letter is done by the Post Office on its own printers. This doesn't give you the chance to look over the letters and fix any errors that might have crept in. *P-Com* lessens the danger of disaster somewhat by giving you a "pseudo E-COM environment." This lets you run the text insertion step on your own, and see the final letter so you can verify the contents.

The program is designed to work with an absolute minimum of knowledge on your part. Every step is guided by menus. A profile information menu asks you to enter information about your ID number and transmission speed, after which you never have to worry about such things again. And since the program is designed specifically for use

with E-COM, it automatically provides the proper communications protocols and parameters.

The manual is extremely short, but tells you everything you need to know to use the program. However, one small comment raises a very large question about suppliers of E-COM software in general. The manual warns that the software includes a routine which will automatically send a SAM letter to Fogle Computing Corporation roughly once in every 500 letters you mail. This is not a copy of one of your letters, but simply a verification that the return address of the person using the program matches the address of the person licensed to use the program. The potential behind this, however, is a hidden ability to send a copy of all your mail to one central point without your knowledge.

Requirements: IBM PC, 128K RAM, one disk drive
Fogle Computing Corp., $325

P.I.T.S.

P.I.T.S. is short for Pascal Interactive Terminal Software. Software Sorcery touts it as a highly sophisticated program, but in fact it is no more than a minimal smart terminal program. Incoming information can be captured in a 24K memory buffer and later saved to disk or sent to the printer, but file size is limited to what will fit into memory. If you have a printer with an honest printing speed of 60 cps or greater, information can be printed as it is received. Because the Apple II screen is refreshed slowly, communications with *P.I.T.S.* are limited to 300 baud.

The most important limitation of this program, though, is that its usefulness depends largely on how well you understand the Apple Pascal system. Functions that in other programs are governed interactively, here require modification of the program itself. For example, the program as shipped is set to use one start bit, eight data bits, one stop bit, no parity, and full duplex. The documentation claims correctly that this will let you talk to most systems. If you want to use a system that won't accept these settings, though, you have to use the Pascal Editor to modify the appropriate item in the system configuration file. Similarly, if you want to filter out an incoming character, you can do it by redefining the Validcharset (valid character set) in the *P.I.T.S.* text file, but any such modification requires that the program be recompiled using the *Pascal Compiler.*

In its favor, *P.I.T.S.* supports a variety of serial interfaces and built-in modems for the Apple II.

Requirements: Apple II or II+, 64K RAM; language card, one disk drive
Software Sorcery, $54.95

PC/INTERCOMM

This terminal emulation program for the IBM PC is easy to learn, easy to use, and offers enough features to handle most interactive communication needs. It will also turn your PC or PC work-alike into the equivalent of a DEC VT100 terminal.

For the most part, *PC/InterComm* qualifies as a standard smart terminal program. It will let you capture information and save it to disk, and it will let you send or receive files with or without error checking protocols. The choice in protocols is between MODEM7 and a second protocol for use with another system running *PC/InterComm.* You can control a fair number of parameter settings, including baud rate and duplex setting, and you can save as many parameter files as you need. With each parameter file, you can program up to 30 function keys with up to 23 characters of text each. You can use these for automatic dial commands and as a kind of semiautomatic log-on, though the manual "strongly recommends" that you do not use these for sending passwords.

The most distinctive feature of this program is its ability to emulate a DEC VT100 terminal. In addition to giving you standard line-at-a-time communications abilities, this opens up the possibility for full-screen text editing or even graphics—if you are dealing with a system that knows how to talk to a DEC VT100 or VT52 and is programmed to make use of these capabilities. Even without the terminal emulation feature, *PC/InterComm* is worth a close look if you are in the market for a smart terminal program.

Requirements: IBM PC with PC DOS, 64K RAM
Mark of the Unicorn, $99

PC-TALK III

In the beginning, there were two kinds of software. One kind was fully commercial. It was copyrighted, often copy protected, and sold for profit. The other kind was a hobbiest product, freely available for the asking. These two kinds of software overlapped in all sorts of ways, including quality, features, amount of documentation, and the level of expertise required in order to use them. But

there was always a clear distinction between software that was sold, and software that was given away.

Then came Andrew Fluegelman. Fluegelman had a communications program called *PC-Talk*. He also had a strange idea. In a world where most commercial software houses were charging whatever the traffic would bear, Fluegelman decided to charge the almost token price of $25. That wasn't the strange idea. The strange idea was this: While most software houses were spending more and more of their time and energy worrying about software pirates stealing their programs, Fluegelman decided to give his program away for the asking. Not only that, he encouraged others to give it away as well. All he asked in return was the voluntary payment of $25 from anyone who used the program and decided it was worth the money.

Clearly, Fluegelman is not destined to survive in the world of big business. Yet survive he has. The original *PC-Talk,* I am told, had some bugs in it, but it was soon replaced by a second version. This second version went on to become a standard of sorts in the IBM PC community. More recently, Fluegelman has come out with a new version, *PC-Talk III*. The voluntary price for this version is $35. This is slightly more than a token payment perhaps, but still a bargain when compared to the programs that *PC-Talk* competes with on a feature-by-feature basis.

PC-Talk III qualifies as a standard smart terminal program. It will let you send or receive disk files with or without the XMODEM error checking protocol. Other features include auto-dial and auto-log-on. The program's dialing directory can hold up to 60 phone numbers, along with appropriate parameter settings for each number. Log-on sequences are stored elsewhere. One important new feature in *PC-Talk III* is the ability to translate or filter out up to three incoming characters. A nice touch also is the ability to save the current screenful of information to disk. This can be more than handy for those occasions when you suddenly realize you ought to be saving something, but hadn't previously thought to tell the program that.

The manual for this program comes in the form 70 pages of documentation, all on disk. It's up to you to print it. You will also find two versions of the program on the disk (or two disks if you are using single sided format). The 128K program is the one described here. The 64K version is a slightly stripped-down version for those who don't have 128K to play with.

You can most likely get *PC-Talk III* by asking around for it. If you can't find anyone who has a copy, you can either send $35 to Headlands Press, or you can send a formatted double-sided disk or two formatted single-sided disks. Be sure to include a pre-addressed, pre-paid, return mailer. The address is: The Headlands Press, Inc., P.O. Box 862, Tiburon, CA 94920.

Requirements: IBM PC; 64K RAM or 128K RAM

Headlands Press, $35 if you like it, nothing if you don't

PEACHTREE TELECOMMUNICATIONS

Some programs refuse to fall neatly into simple, categories. *Telecommunications* from Peachtree software is a prime example. In some ways this is a standard smart terminal program. If you insist on looking at it as one, however, you'll have missed the point. Imitating a terminal is not what this program is about.

It's probably best to think of *Telecommunications* as a file transfer utility that includes some limited terminal capabilities as a bonus. As a file transfer utility, it will work only with another system that is also running *Telecommunications*. Within these limits, the program gives you some sophisticated and extremely useful features. You can, for example, set the system to wait for a call so that a second system can call in and transfer files without anyone at the first location. A nice touch here is the printer log, which will print a list of all files sent and received in your absence.

The manual also deserves special mention. Its target audience is the nontechnical office worker who is concerned with finding out how to get job done while learning as few technical details as possible. In that context, the manual succeeds reasonably well, but with one glaring omission.

The program comes with a program disk and a configuration disk. If you follow the instructions in the manual, you will make a back-up of the program disk, then configure it. What the manual doesn't tell you is that you will also configure your configuration disk in the process, and make it impossible to reconfigure the program if you've chosen the wrong system. The only way to recover from this error is to start over with a previously made back-up copy of the unconfigured version of

the configuration program. But the manual never warns you to make one. The disks don't even come with write-protect tabs to help save you from this disaster.

If you can get beyond this particular problem, and if you need a file transfer utility, Peachtree *Telecommunications* is probably worth looking at, but approach it with care. For a program that was clearly designed for the non-technical user, it shows some strange oversights.

Requirements: MS-DOS with 64K RAM; CP/M with 48K RAM
Peachtree Software, $150

PLATO ACCESS DISK

This may be the most specialized communications program conceivable. Not only is it designed to work only with a particular computer system the IBM PC, it is also designed to work only with a single online service, Control Data Corporation's *PLATO*.

PLATO, in case you're not familiar with it, is an online system, much like CompuServe or THE SOURCE. Unlike these better known systems, *PLATO* specializes in educational software, with heavy reliance on graphics capabilities. It also has graphics-based games and a graphics-creation section. In order to use these facilities, *PLATO* must be able to control your terminal on a full screen basis instead of the one-line-at-a-time basis that CompuServe and THE SOURCE normally use. Until recently, the only terminals that *PLATO* would work with were those supplied by the system. The *PLATO Access Disk* is a terminal emulator program that will make your IBM PC act like a *PLATO* terminal, both giving the system full screen control and letting you send the commands that the system expects to see from its own terminals.

Because it is tailored for a particular computer system, there is hardly anything to install, unless you count making a backup copy of the disk and following a few simple instructions for adjusting the monitor. Because it is similarly tailored for a specific online system, it gives you control over only one parameter—the baud rate. There are no noteworthy communications features.

As of this writing, *PLATO* is planning to offer similar programs for other machines. Check with them for current availability, and for further information on *PLATO* itself.

Requirements: IBM PC with 64K RAM; one disk drive; Color/Graphics Monitor Adapter; RS-232 interface
Control Data Publishing, $50

SCI-MATE UNIVERSAL ONLINE SEARCHER

Probably the most intriguing online utilities are those that specialize in information-retrieval services. These systems aren't as well known as more general utilities like THE SOURCE or CompuServe, but more and more people are learning about them and beginning to use them. Five of the largest such systems are BRS, DIALOG, SDC ORBIT, NLM from the National Library of Medicine, and ISI (Institute for Scientific Information).

Between them, these five systems have hundreds of individual databases. To get the information, you have only to type in a request at your keyboard. Just because the information is almost literally at your fingertips, however, doesn't mean that you can necessarily get your hands on it. These systems are completely command based, with little or nothing in the way of help screens or menus. And to make matters worse, each system has a different set of commands.

Enter the *Sci-Mate Universal Online Searcher*.

What the *Sci-Mate Searcher* does, in effect, is remember the command for you. The program lets you tell it which system you're on, then provides a menu of commands to choose from—essentially the same commands for each database. You pick from the menu, and the program generates the proper command for the system, all of which effectively turns an online command-based system into a menu-based one.

The menu-search feature would not be very useful without communication capabilities to go along with it, of course. The program has these too. It is probably best classified as a specialized smart terminal program, complete with the ability to save incoming information to disk for later use. A companion program, the *Personal Data Manager* (see review), is designed to help you index and maintain the information you save.

Communications features include such common conveniences as auto-dial and auto-log-on. You can also put the program in "passive-terminal mode." This bypasses all the searching features and gives you what amounts to a simple smart terminal program. It is somewhat limited, but it will

still let you communicate with most online systems, including THE SOURCE and CompuServe.

The advantages of the menu-search capability of the *Sci-Mate Searcher* are obvious. There is at least one disadvantage as well. For those who are proficient in using a system, using menus is never as fast or as efficient as entering commands directly. Of course, if you are proficient in using the online system, you wouldn't need the menus in the first place, and as a beginner, you would tend to ignore the finer points anyway. But if you rely on the menus, you will never become proficient.

If you don't use these systems very much anyway, this might not be much of a disadvantage, but keep it in mind as a possible problem. Online searching is still costly, and learning the commands of a system you use often is an effort that will be quickly repaid. Also keep in mind that when it comes to the actual search, the program won't do any of the real work for you. Learning how to conduct a search is an art in itself.

Yet the *Sci-Mate Universal Online Searcher* is still the most painless way for a beginner or occasional user to make use of the five systems the program is designed for. If you've been staying away from these systems because they looked too complicated, you've just lost your excuse.

Requirements: IBM PC or XT, PC DOS 1.1 or 2.0, 128K RAM, two disk drives; CP/M, 64K RAM, two disk drives; available in 8-inch disk or machine-specific versions for Vector 3 or 4, Kaypro 4 or 10, TRS-80 Models I and II (with Pickles and Trout CP/M only), and Apple II with Z80 card and 80-column card; Apple II version requires a serial card and RS-232 modem

Institute for Scientific Information, $440; with *Personal Data Manager* $880

SMARTCOM II

This somewhat-more-than-standard smart terminal program is one of the new breed of programs that answers the question, "But what are you going to do with all that extra memory available on the 16-bit machines?" The answer is, you use it. The program comes in an 8-bit, "stripped down" version for the Xerox 820 and Kaypro II, but the 16-bit version needs a minimum of 96K RAM and can make use of much more. *Smartcom II* comes in modules. It will load as many of these into memory as will fit. The more that fit, the less often the program will have to go to the disk, and the faster it will run. It can make use of up to 192K of RAM.

This is a lot of memory for a communications program. Some of the most sophisticated smart terminal programs available fit into as little as 56K and can handle at least as many communications tasks. *Smartcom II* uses the extra memory for bells and whistles—the kind that make life more convenient, particularly for the new user. These show up primarily in the menu displays and the help feature.

The menus are well designed—informative, easy to read, and easy to use. The main menu is particularly helpful, and includes an option to display the disk directory. The help feature is similarly impressive. If you need a parameter setting explained, for example, you can ask for help and will usually be given a complete, reasonably nontechnical explanation of the parameter, its function, and its possible settings. You can also get online explanations of prompts.

Smartcom II has all the features you would expect in a standard smart terminal program, including auto-dialing, auto-log-on, and the ability send and receive files with or without error checking. Unfortunately, the only error checking protocol included is Hayes's own.

Smartcom II offers unattended, remote access from another system also running *Smartcom II*. This lets you call the system and transfer files, controlling the entire operation from the remote location. One noteworthy feature that you won't find on many programs is the ability to save incoming information to disk as it is being displayed on the screen. You can toggle this disk capture on and off. Other features include storage of up to 25 "Communication Sets," extended parameter files that can also store a phone number, log-on sequence, and up to 26 "macro commands" for each file. These macro commands give you the equivalent of having 26 programmable Function keys in each parameter file.

The manual is up to Hayes's most recent standards, it provides an excellent introduction to the program. The help feature in the program itself is so well designed that the manual might almost be superfluous, except that it includes a thorough overview of communications. And not just the technical side. You will find a list of phone numbers for nearly 400 bulletin boards and an introduction to several online systems, including CompuServe, Dow Jones/News Retrieval, Knowledge Index, and

THE SOURCE. The program also includes pre-defined Communication Sets for each of these.

One last note: *Smartcom II* is written specifically for the Hayes Smartmodems and comes in specific versions for specific machines. Even better, each version comes with a manual that is also written for the specific system the program runs on. This eliminates the task of "systems integration" that is usually a major complication for the communications newcomer. On this basis alone, if you have a machine that the program will run on, and if you are considering any of the Hayes Smartmodems, you might very well like to complete your system by adding Smartcom II.

Requirements: Smartmodem 300, 1200, or 1200B; 16-bit versions for IBM PC (DOS 1.00, 1.10 or 2.00) and WANG Professional need minimum 96K RAM; DEC Rainbow version (runs under CP/M 86-80) needs 128K RAM; CP/M-80 version for the Xerox 820 or KayPro II needs 64K RAM and minimum disk storage of 250K.

Hayes Microcomputer Products, $149

SMARTERM/PC

This program comes in so many variations that it's hard to keep track of them. What they all have in common is that they can't run an IBM PC into a smart terminal. More precisely, each one can make your PC emulate one or more specific smart terminals.

The basic description of each version is hidden in the program name, if you know how to decode it. The "TE" in *TE400-FT* translates to "Terminal Emulator." The "400" is Data General Corporation's D400 terminal, and the closely related D100 and D200. The "FT" indicates that the program includes file-transfer capabilities. Similarly, *TE100-FT* emulates the DEC VT100, along with the VT101, VT102, and VT52. *TE125-FT* is not available as of this writing, but should be by the time this catalog is published. This is essentially an upgrade of *TE100-FT,* and adds the DEC VT-125 to the list. Current plans call for yet another version, *TE950-FT,* to emulate the TeleVideo 950.

The precise features in each of these program variations are, of course, dependent on the features in the terminals they emulate. Even so, the various versions have many features in common. Among other things, *TE400-FT, TE100-FT,* and *TE125-FT* each let you define four different setup configurations for communication, and each lets you program ten "softkeys" to store text for auto-dial, auto-log-on, or other frequently used commands. More important, each gives you the ability to send and receive files, with or without Persoft's proprietary error-checking protocols. (The *TE100-FT* is also available without the file-transfer capability.)

The manuals that come with these programs are not their strong point. They assume that you are already familiar with the IBM PC, the terminal being emulated, and commmunications in general. The instructions for setup, for example, tell you that the "Com line" choice "Selects comm line, 1=COM1, 2=COM2." This is not going to help much unless you already know that the IBM PC lets you designate a communications device as either COM1 or COM2. Similar is the explanation for the "Bits/Char-Parity" choice, which says, "First character may be 7 or 8 [for 7 or 8 bit characters]; second character may be E for even parity, 0 for odd parity, N for none, M for Mark (set parity to 1), or S for space (set parity to 0)."

Oh. Another point against *SMARTERM/PC* is that it is copy protected. Mitigating this flaw, a backup disk is sent free upon receipt of the signed license agreement. On the plus side, Persoft will exchange a defective disk for $5, or essentially the cost of the disk. Even better, it will replace a missing disk for $25, one replacement per license. The company also offers a full refund within 30 days of purchase, which gives you a chance to try out the program at their risk.

Another point in Persoft's favor is its warranty policy: ". . . if you discover a program bug, let us know and we will fix it at no charge to you." This is a refreshing change from the growing number of companies that refuse to warrant that their programs are good for any purpose at all.

Requirements: IBM PC; *TE100-FT* and *TE400-FT* for PC DOS 2.0 or 1.1, 96K RAM, two single-sided disk drives; for DOS 2.0, 128K RAM, two disk drives, at least one of which must be double-sided; *TE125-FT,* 128K RAM, PC DOS 2.0, two disk drives, color/graphics adapter

Persoft, Inc., *TE100-FT,* emulator only, $100; *TE100-FT* with emulator and file-transfer capabilities $150; *TE400-FT* $125; *TE125-FT* $295; *TE100-FT* can be upgraded to *TE125-FT* for $175

SOFTCOM

The subtitle for this program is "Data Communi-

cations Utility for CP/M." This not only describes what *Softcom* does, it gives some indication of the modest goals that the program sets for itself. After all, you wouldn't expect as much from a "utility" as you would from something that was billed as a "Data Communications Software System," or as an "advanced state-of-the-art communications program." And you would be right.

Softcom qualifies as a standard smart terminal program, but just barely. You can capture information and save it to disk, and you can send disk files or receive files directly to disk, with or without *Softcom*'s error checking protocols. The protocol file transfer can only be used with another system also running *Softcom*.

The program gives you a few simple amenities, including the ability to toggle the printer on and off and toggle the memory buffer on and off. It will let you escape to your operating system to perform system commands, then quickly get back into the program, without disturbing a communications link. A parameter menu lets you set the program for full or half-duplex and gives you control over a few other parameters that relate to the file transfer function. That's about it.

In exchange for its limitations, *Softcom* offers ease of use for the communications novice. Precisely because the program is so limited, it is extremely easy to understand. The main menu only has about a half-dozen commands on it. This makes the *Softcom* a good entry level program. It won't do anything very sophisticated, and it won't let you talk to systems that have unusual parameter settings, but it will introduce you to communications, and it will handle most common communications needs.

Requirements: CP/M; 32K RAM
The Software Store, $150

SOFTERM 2

If packaging added value to programs, then *Softerm 2* would sell for twice its retail price. Actually, considering the features it supports, it could sell for that much anyway.

Softerm 2 is a sophisticated smart terminal program for the Apple II. Features include the ability to capture information and send it to disk, and the ability to transfer files directly to and from disk, with or without the *Xmodem* error-checking protocol. File transfer is a particular strength for this program. Thanks to its advanced file manager, *Softerm 2* will let you send and receive files stored in Apple DOS, CP/M, or Pascal formats.

If your system is equipped with a clock or calendar card, you can use *Softerm 2* for unattended operation as well. The system will wake up at a scheduled time, make a call, log on to another computer, carry out your orders to receive or send some information, then log off and go back to sleep.

Part of the package is an additional piece of hardware called the Keyboard Expander. This connects to the standard Apple keyboard and adds three modifier keys. Like a control key, these function as additional "shifts" that triple the number of possible keyboard characters and add terminal codes not usually found on the Apple.

The program's most significant feature is its ability to make your Apple emulate roughly 20 different terminals, including the ADDS Regent 20, the IBM 3101-2X, and the Televideo 925. It will even emulate a garden variety "glass teletypewriter," like most other communications programs.

Also important on any program for the Apple is the range of modems, serial cards, and printers that the program can work with. *Softerm 2*'s menu driven installation routine gives you more than 15 modems and serial cards to choose from, including the Novation Apple-CAT II and Hayes Micromodem II. The choices in printers include about 25 printers, plus a "universal" interface that is supposed to give minimal printer capabilities with just about any printer.

The *Softerm 2* manual is a hacker's delight. It runs over 300 pages, not including the various appendices and glossary, or the quick reference cards. If you're a beginner, though, you'll find that the first few chapters will tell you what you need to know.

Requirements: Apple II, II+, or IIe, one disk drive
Softronics, $195

T.H.E. SMART TERMINAL

There aren't many smart terminal programs available for Atari computers, so it is not surprising that the writers of this one decided to call it *T.H.E. Smart Terminal*. Whatever the initials mean, this is an easy-to-learn, easy-to-use program that will turn your Atari into a minimal smart terminal.

T.H.E. Smart Terminal is menu driven. When you call it up, it gives you a list of options to choose from. Turning your Atari into a dumb terminal at

that point is as simple as reading the menu and entering a "T" at the keyboard for "Terminal Mode." Other options are just as straightforward, once you've built a conceptual map of how the program works.

The key to understanding this program is to realize that you have to do most things in stages. To send a file, you load it into the memory buffer then send it to your modem. To receive a file, you capture it in the buffer then send it to disk. Even printing requires two steps: First you capture the information, then you print it. Most of the commands on the main menu are concerned with shuffling the information around.

A group of sub-menus gives you control over a few basic parameters including baud rate and duplex setting. You can also use MODEM7 protocol for transferring files. You cannot send or receive files that are longer than your system can hold in memory at one time. With text files you can solve this problem by breaking a long file into several shorter ones.

T.H.E. Smart Terminal is written for the 400, 800, and the short-lived 1200XL. According to Atari, if it works on the 1200XL it should work on the entire series of XL computers.

Requirements: Atari 400, 800, or XL series computer with 850 interface; 16K RAM for cassette version, 24K RAM for disk version
Binary Corporation, $49.95

TALK

With the apparent demise of the Osborne computer line, software for the Osborne 1 will probably become less available with time. But old computers can last a long time, and computer users often develop an attachment to their machines. It is this sort of attachment that has kept even ancient Altairs in use. *Talk* is for Osborne users who have no plans to abandon their machines. It is a minimal smart terminal program written specifically for the Osborne 1.

Talk will let you communicate at either 300 or 1200 baud through the built-in RS-232 printer port on the Osborne. The program has no error checking protocols, which means that you are limited to sending and receiving text only. File transfer is a two-step procedure. First you load the incoming or outgoing information into the memory buffer, then you send it to its destination. The maximum size file that will fit in the memory is 33K. *Talk* will not let you send information to a printer while online. You have to save information to disk, then print it out after you hang up the phone, either using a word processor or the Type command in CP/M.

The 20-page manual that comes with this program is simple enough to understand, but as its size suggests, it contains relatively little information—certainly less than you'll want to know if you are new to communications.

All in all, *Talk* is too limited a program to deserve serious consideration. It simply is not one of the better terminal packages for this machine.

Requirements: Osborne 1
Universal Synergetics, $75

TELELINK I, TELELINK II

Atari's *Telelink II* offers just a smidge more than rock-bottom, dumb terminal capabilities for your Atari. *Telelink I,* manages to offer even less in the way of features while still managing to be barely more than a strictly dumb terminal program.

Both *Telelink I* and *II* come in the form of a cartridge. With either, you plug the cartridge into your system, hit the reset button, and the program responds with its sign-on message. At that point, your Atari has been turned into a dumb terminal, which is to say that your keyboard and screen have been effectively disconnected from the rest of your computer system. Anything you type will go to your modem by way of your 850 Interface. Anything that comes in through your modem will show up on your screen.

You can also print information by capturing it in memory, then sending it to the printer. This is *Telelink I*'s only added feature. *Telelink II* improves on it by letting you print a conversation as you go, toggling the printer on or off at any time. A less important feature in *Telelink II* is the ability to store two phone numbers (if you have an auto-dial modem) and two log-on sequences for automatic log-on. This maximum of two is either small enough to be laughable or just large enough to make you wish for more, depending on your viewpoint.

Be forewarned. If you get either version of *Telelink* (or any other dumb terminal program for that matter) you will quickly outgrow it. These programs are strictly for beginners.

Requirements: Atari 400, 800, or XL Series computer; 8K RAM.
Atari, Telelink I $29.95; Telelink II comes only as

part of Atari's Communicator II Kit, which cost $149.95 and includes a modem

TELETEXT

TeleText is a communications software package that allows data transmission between your Apple II and other personal computers, bulletin board systems, or commercial time sharing systems such as The Source or CompuServe.

More than just a basic communications program, *TeleText* consists of an editing, filing, printing, and answering system, macro editor, phone number editor, and four conversion programs to allow transmission of *Applesoft, Integer BASIC* and binary program files as well as Pascal text files.

With the editor and filing system, text may be easily prepared in advance to save on long-distance telephone charges and connect time. Received information can be downloaded quickly into the buffer holding more than 17K bytes and automatically saved to disk for later review and printing.

TeleText will operate through any modem connected to an Apple Communications Card, but if either a Hayes Micromodem II or Novation Apple-Cat II is being used, your Apple can automatically answer the telephone, receive the data, and save it to disk. It operates only at 110 or 300 baud, however, not at 1200 baud.

TeleText supports the Videx 80-column board, upper- and lower-case display, and the Shift-key modification on the Apple II. Other features include elimination of word splitting on incoming text (40-column screen only) and optional page formatting of printed copy. All 128 ASCII character codes are available through the keyboard while editing or online.

A macro editor allows definition of up to nine macros containing a maximum of 39 characters. As an example, your sign-on password or an entire log-on sequence can be assigned to a macro and then entered any time with only two keystrokes.

TeleText is supplied on a single copy-protected disk; two backups may be made using its own copy program. If you are using a hard disk system that allows extended volumes of more than 35 tracks, *TeleText* may be copied to that disk. Included also is a 67-page instruction manual with tutorial.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive

MicroSparc, $79.95

TELPAC

This communication program from U.S. Robotics is designed to work with "U.S. Robotics or compatible modems." The manual does not say what it means by "compatible modems," but a fair guess would be the Hayes Smartmodems, since the two lines share the same set of commands.

The program is filled with useful features. You can capture incoming information and save it to disk; you can send and receive disk files with or without the widespread Christensen error-checking protocol; you can even set up your system as a host computer, complete with password protection to prevent unauthorized access. Other features include auto-dialing, auto-log-on, the ability to use batch files, and more. But there is also a problem: You may never get it working.

Telpac comes in several versions, including one for the IBM PC, which is preinstalled. The CP/M version is not preinstalled however. To set it up, you must be able to answer questions like which UART, or serial interface chip, you have in your system, whether the UART is "memory mapped," and a few other quasi-technical things that most users neither know nor care about.

If you get past this obstacle, you'll find that the manual is filled with more of the same. It contains such useful instructions as: "The first step in using *Telpac* is to attach the modem to the serial data port of the microcomputer." This is much like a book on carpentry that starts by telling you "First build a workbench. . . ." Also, although the latest manual is a vast improvement on earlier *Telpac* manuals, it is still written in the dry technical style that makes it tough reading even for those who are familiar with communications and have a fair idea of what to expect from the program.

This is a hacker's program, pure and simple. If you're already familiar with communications, if you can find your way around the technical computer jargon, and if you have a good idea of what to expect from a communications program in principle, you will find this program sufficiently useful to count as a bargain for the price. Nonhackers need not bother.

Requirements: CP/M, 64K RAM; IBM-PC, DOS 1.1 or later

U.S. Robotics, $79

TRANSEND 1, 2, 3; TRANSEND/PC

Transend and *Transend/PC* share the same

name, the same software house, and—in general, at least—many of the same communications capabilities. Aside from that, they are two entirely different programs.

Start with *Transend.* This program is strictly for the Apple II or IIe. It comes in three levels, cleverly named levels 1, 2, and 3. Level 1 turns your Apple into a basic smart terminal. Features include auto-dial, auto-log-on, control over a fair number of parameters, the ability to print information as it comes in, the ability to capture information to save to disk, and the ability to send disk files without error-checking protocols. All this makes *Transend 1* suitable for most interactive communication needs, including sending and receiving text files.

Level 2 adds full file transfer capabilities, using Transend Corporation's own error-correcting protocol. (Unfortunately, this means that you can transfer programs only to other systems using *Transend.*) It also adds the ability to create lists of files to be sent with a single command. This level also has a useful feature that will calculate the estimated length of time for transmission for any given file.

Level 3, finally, adds full electronic-mail capabilities for use with other systems also running *Transend* or *Transend/PC.* This translates to completely unattended operation. You give the system its orders and leave it alone. It will then keep track of the time and send messages at specific times as ordered. It the program gets a busy signal, it will automatically redial at intervals until it gets through. It will also answer the phone to take incoming messages. Level 3 will work with up to 128 other *Transend*-based "post offices."

All three levels support a wide range of Apple compatible serial cards, modems, and 80-column cards. All three will control baud rate if your system allows for it, and all three can handle 1200 baud if your system can.

The concept of having three levels of *Transend* is an interesting one. The idea is that you buy just as much communications capability as you need. If you find you need more, you can step up to the next level without having to buy or learn an entirely new program. For whatever reason, Transend Corporation decided not to stay with this concept for *Transend /PC.* Here you either buy the whole thing, or not at all.

Transend/PC is the PC equivalent of *Transend 3,* but don't get the mistaken idea that this is just a rewritten version of the Apple II program. Not only has the IBM PC version been revised to take advantage of the machine's greater power, the program doesn't even look the same on the screen.

Transend is completely menu-based. In the Apple version this is true in the worst possible way, with complex interlinked menus that are bound to make the experienced user feel as though trapped in molasses. You can give "type ahead" commands to the program that will take you through several levels of menu with a single command, but to do this you have to memorize the commands on the various menus.

In the IBM version you are dealing not with menus so much as with icons—"in" baskets and "out" baskets that zoom in and out as requested so you can take a closer look at the contents. The effect is to make the program understandable to the new user without being annoyingly slow to the experienced user. Even so, the icons give you the same nested effect as interlinked menus, and you might begin to wish you could bypass them once the novelty wears off. The IBM version of *Transend* also included the widespread Christensen error-checking protocol as an additional choice in file transfer.

One disadvantage of *Transend/PC* is that it is clumsy to run on a dual-disk machine. First you have to boot your system. Then you put the *Transend/PC* distribution disk in drive A and your "message disk" (created by the program during installation) in drive B. Once you load the program, you have to remove the distribution disk from drive A and replace it with the *Transend/PC* "attachment disk" (also created during installation). All this nonsense is a direct result of the program's copy protection.

In fact, both versions of *Transend* are copy protected. The Apple II version comes with a backup disk to help tide you over if you manage to destroy your working disk. *Transend/PC* comes without a backup, but one is available when you return the registration form. The backup is free if the registration form is returned within 30 days of purchase. After that, it is $20. On the plus side is Transend Corporation's update policy, which offers upgrades at special discounts. Unfortunately, this is more than counterbalanced by the company's replacement policy. Replacement of a damaged disk is free during the 90-day warranty period, and $20

for "up to one year from date of original purchase." After that, you are apparently on your own.
Requirements: *Transend*, Apple II or IIe, Check for compatibility with the serial cards, modems, and screen control cards in your system; *Transend/PC*, IBM PC or PC-XT, 256K RAM, two drives; Transend PC ModemCard, TransModem, or Hayes Smartmodem 300 is needed for electronic mail application; any modem will work for terminal applications
Transend Corporation, *Transend* Level 1 $89, Level 2 $149, Level 3 $275; *Transend/PC* $189

TSMART

When compared with communications programs available for other machines, *TSMART* is not a very sophisticated program. It is, however, one of the few smart terminal programs available for Atari computers. As such, it is one of the most sophisticated communications programs for the Atari. Particularly noteworthy when using disk drives, *TSMART* will let you send and receive files longer than can fit in your computer's memory. (If you're using tape cassette you are limited by memory size.)

TSMART comes in two versions. One is specifically for the Atari 800 using the Atari-specific model of the Microconnection modem. The other is for any RS-232 modem connected through the Atari 850 Interface. Both versions work in much the same way from the user's point of view, but each comes with its own version of the documentation. This comes in the form of roughly 30 single-sided, single-spaced pages printed on a letter quality printer. The documentation is generally adequate and reasonably well written. As with much Atari software, the documentation has a strong hobbiest flavor to it.

Other features in the program include storage of up to eight phone numbers for use with a Microconnection auto-dial modem and a kind of quasi-auto-log-on in which you enter your log-on information before you go online, then have the program send it when appropriate. The auto-dial feature can also be modified for use with the Hayes Smartmodem.

One unwelcome feature of *TSMART*'s manual is a notice in boldface saying that Microperipheral will provide 15 minutes (count them: 15) of free "consultation," after which their time will be billed at $50 per hour. Oh, and be prepared to give your VISA or Mastercard number when you call. In practice, Microperipheral is quite a bit more helpful than this, but it would be nice if they could find a more pleasant way to discourage unnecessary phone calls.
Requirements: 24K RAM for cassette version, 32K for disk; Microconnection Version, Atari 400, 800, or XL Series; Microconnection modem with cable for Atari SIO bus connector; RS-232 Version, Atari 800; 850 Interface and any RS-232 modem.
The Microperipheral Corporation, cassette version $39.95; disk version $49.95

VISILINK

Getting and analyzing information has always been one of the more difficult aspects of operating a business. You cannot make far-reaching decisions about your corporate survival unless you have a solid understanding of what your major competitors are doing, and perhaps some statistical surveys on current market trends. Of course, if you spend all your time doing research, the odds are quite good that your business will die from inattention.

For many, it is a catch-22 situation. But now something new has been added. Since 1979, Data Resources Incorporated, has operated an information service for large companies. Now they are opening a segment of their data banks to personal computer users through *VisiLink* from VisiCorp.

VisiLink is best thought of as a utility program. It lets you retrieve "frames" of information on business, investment, and financial analysis from DRI. The information comes by way of modem and phone lines. More important, it comes in *VisiCalc* DIF format. Analyzing the information becomes a simple matter of loading it into an open *VisiCalc* worksheet, after which you can play with it in any way you like.

Using *VisiLink* is much like catalog shopping, except that the product you are buying is information. The entire transaction—from filling out the order blank to transferring the information—takes place within the framework of the *VisiLink* program.

VisiLink is simpler to use than many other terminal programs. All communications information, including baud rate and such, is stored in a configuration file. So is the information that DRI needs for billing. All you do is call DRI, ask for the appropriate "order form," select the "DataKit" frame you want, and DRI sends the information. You do all this by way of step-by-step menu

choices in both the program and the online system. Most potential problems are anticipated in the manual. Also nice is the QuickStart Course mini-manual, which will get you up and running in minimum time.

If you run a business, and need information to run it, you'll find that *VisiLink* and DRI make an interesting research source.

Requirements: Apple II or II+, 48K RAM; IBM PC, 192K RAM; two disk drives
VisiCorp, $250

VISITERM

There is very little that VisiCorp hasn't tried to do for the Apple II. *VisiTerm* is the company's contribution in the field of communications programs.

This is a somewhat limited smart terminal program that takes advantage of some features specific to the Apple. The program provides a number of utilities that may or may not enhance the computer's ability to talk over the phone lines, but certainly add to the idiosyncratic nature of the product. In sending a file, for example, the program insists on showing you the text as it is being transmitted. Not only is there no need for this, but it is distracting, too.

Probably *VisiTerm*'s most notable feature is the way it displays information. If you want an 80-column screen with most programs, you have to get an 80-column card. With *VisiTerm,* you simply select an appropriate character set, and the program creates the characters on the screen for you, using the Apple II's high resolution graphics capabilities. The program will give you between 60 and 80 characters per line, depending on the design of the character set you use. If you've never seen lower case on your Apple, you will also appreciate the way the program uses the Apple's graphics capabilities to "draw" lowercase letters. *VisiTerm* comes with two character sets to choose from. One of these includes the characters and codes for the APL language. If you don't like either set, you can create your own.

Other features in the program include the ability to capture information and save it to disk and the ability to transfer files directly to and from disk. There is no error checking protocol available in the program, and no way to transmit program files. The program will let you store parameter files for each system you deal with.

All in all, *VisiTerm* is a rather run-of-the-mill communications program. When it was released, it was highly praised for some of its features, but that was some time ago. The program's age is beginning to show, and the novelty of its more notable features has definitely worn thin.

Requirements: Apple II, II+ or IIe, 48K RAM, disk drive
VisiCorp, $100

AL BERKELEY, VENTURE CAPITALIST WITH ALEX BROWN & SONS

Educational programs rather than games promise the highest profits when investing in software companies, says Al Berkeley, principal with Alex Brown & Sons, a major venture capital firm.

"The games business is pretty rugged now," says Berkeley, 39, who has been with the Baltimore company since 1972. "It's more of a hit business than education, whereas in investment we look more for high recurring revenues with a broad consumer base."

Alex Brown, which was founded in 1800 and underwrote the first railroad in the country, has invested in only one computer game company (Imagic), Berkeley says, while its educational software clients have included Spinnaker, VisiCorp., Sierra On-Line, and Information Builders.

"We've got a dozen research analysts and corporate finance specialists out there full time visiting software companies. We're interested in the educational market, the medical market, financial services, transportation, computer-integrated manufacturing with robots, and database companies," says Berkeley, whose background in computers includes four years in the air force tracking an inventory of aircraft parts.

Over the past few years, Alex Brown has invested more than $1 billion in companies designing software for mainframes, minicomputers, and microcomputers for home and office. In early 1984 alone, a fund of $80 million was on tap for investment in software, telecommunications, and health care industries.

COMPUTER LANGUAGES

BY CARL HELMERS

Personal computers, like the oracles of mythology, require that we pose the right questions to them if we want the right answers. Every time we interact with them we have to use a language to pose these questions. This is true whether communicating by keyboards, mice, graphic pad inputs, or even our own voices.

Computer languages are our way of talking with personal computers. The personal computer as a servant must be told what to do. The personal computer as a scribe must be able to record writings. The personal computer as a device for automatic execution of our preprogrammed thoughts must be able to "read" these thoughts in some way. Designing these ways of interaction between people and computers ultimately means designing some form of language.

A "personal" computer is just a general purpose computer made inexpensive and interactive. The traditional concept of a computer language is a way of creating computer programs for the operation of such a computer. These programs are the "software" which turns a standard general purpose computer product into something useful and adapted to a particular situation.

Personal computer software can come in prepackaged, standardized form as nicely marketed products with documentation telling how they are used. Indeed, this is the way all computer languages themselves come. Prepackaged software is like prerecorded music. If we agree with all the functional, stylistic, and hardware assumptions the developer used in writing the program, then we'll probably like it in our own personal context.

Sooner or later, as we get into the serious use of a computer, we all need to do some programming. When we want to write, change, or extend a program, we need to use a programming language. In a system of prepackaged commercial software, if we want to add one or two of our own custom programs we'll need to use a programming language. Much of today's mystique of using personal computers comes from the use of programming languages—"foreign" languages not native to most people.

To program a computer requires a language. To use a computer requires a beast called an "operating system." Languages interact with operating systems in numerous ways. This combination forms our "user interface" environment as seen at the keyboard and display screen when we turn on the computer.

In most inexpensive personal computer designs, there is no separation of the BASIC language "interpreter" from the operating system. They are one and the same program. When we turn on the computer we are always in the interactive BASIC language environment. Many BASIC commands are like operating system commands in more sophisticated computers. The simple command "Run" throws us immediately into execution of our program. The BASIC language commands "Load" and "Save" access built in services that manage our mass storage resource on cassette tape or floppy disk. There is no formally recognized "operating system" in such a simple interactive environment. Low end entry level computers from Atari, Coleco, and Commodore use this kind of integrated operating system and programming environment.

In larger, more professionally oriented personal computers, the language and operating systems are separated. We can choose a programming language to suit our needs either before or after choosing a computer and its associated operating system programs. The only major requirement is that the language we choose must play together with an operating system for access to the full range of a computer's peripherals, memory, and mass storage. If a program wants to access disk drive block N, a language which is adapted to the environment of a computer with a disk drive will have some way to say "SEEK BLOCK N." The properly designed language provides convenient "hooks" for accessing disks, printers, modems, and other peripherals. This is true whether the operating system is a simplistic implied operating system of a toy BASIC computer, or a widely used operating system like CP/M, MS-DOS, the UCSD p-system, or Unix. It is no fun trying to reinvent the software interface wheel every time we write a program.

Since the first computers, languages have been designed to help in the writing of useful programs. All computers that are widely available today have the similar design technology. It's thus no surprise that most computer languages have the same basic components.

Once our first computer language is mastered, learning yet another language is always a much simpler and easier accomplishment, since we al-

ready know the basic components of any language. Mastering a new language for computers starts with a process of figuring out how to do the things we used to do in a previous language. While exploring the new ways to do familiar things, learning a new language often involves finding out about one or two totally new techniques. Let's examine some of these components of languages, illustrating them with examples drawn from contemporary personal computer languages.

In order to write a program that manipulates some form of data, we are compelled to use names. Every language has a way of forming names for data, for variables, for places in the program, for all the purposes of symbolically referring to something. In computer languages, names are the fundamental symbolic units of programs. The ways of forming names out of sequences of letters are very similar in all computer languages. Nearly every language requires that we start a name with a letter from *A* to *Z* (or from lowercase a to z). Most modern languages allow use of the numeric digits 0 to 9 as long as the name does not start with a numeric digit.

Many languages allow the use of a "break character" to improve readability by humans. The traditional languages of COBOL and PL/I on large machines, as well as most microcomputer implementations of Pascal, allow the use of the underscore character ("_") to provide a visual break between sections of the long, descriptive name good programmers use in their programs. As far as the computer is concerned, the break character is ignored totally in a name—as if it were never used.

The number of characters we are allowed in a name varies considerably from language to language. The smaller the allowed number, the more problems we have with duplicate names in larger programs. In most early and many current versions of BASIC, for example, style is crimped by a requirement that names be only two characters long. FORTRAN, the venerable old language of large computers used in engineering and scientific applications only allows us six characters in a name. The Pascal implementations typically available on personal computers allows 13 characters in a name, of which the first eight alphanumeric characters must be unique. Languages like Pascal, PL/I, and COBOL, which typically allow such longer names, can use these longer names to help make the programs more readable to human beings.

Every computer language has a certain core list of predefined names for the purposes of creating programs. This set of built-in "identifiers" is what gives a language its flavor and style. Thus in BASIC, we have words like "Common," "Dimension," "Do," and "Go To." In Pascal we have words like "For," "While," "Begin," and "Procedure." And in nearly every computer language, we have the predefined words "If," "Then," and "Else." As with human languages, we have to be careful when using several computer languages—the meaning of an English language word used in one computer language can be subtly different when used in another. The list of built-in names of a language also defines a list of words we should not duplicate in choosing names for our own use in programs. (Some language systems enforce this "should not" with syntax error messages. Some other language systems allow confusing programs to be written, where the standard words get redefined to mean something else. Even if the language system allows it, this is a practice which good programmers avoid unless the purpose of writing the program is to make a joke.)

Every language has the concept of a variable. A variable is a name, supplied by the programmer, which can have a data value associated with it. Thus if we choose a name in some language, like "todays date," a value we might associate with it is a string of characters, say, "January 1, 1984." A variable always has a data type associated with it. We manipulate the values of variables in programs by changing them according to computations. We can move values from one variable to another. We can read values from an input device like a computer keyboard or a disk drive. We can write values to an output device like a disk or a display screen. The data that a program works with is nothing more than a set of values that its variables currently contain.

A variation on the concept of a variable is the concept of a named or unnamed "constant" data value. The number "3.14159" might be used in a program all by itself as an unnamed constant value in some computation. If we were going to use this number a lot we might want to give it a name symbolizing why we are using this particular value. Many languages like Pascal, FORTRAN, PL/I, and COBOL allow us to declare that the symbol "PI" would be used in place of the value 3.14159 in this example. If at a later time we wanted to replace the value by a more accurate approximation, say

3.1415927, all we would have to change in our program is the one statement where we assigned a value to the constant PI.

Every variable must have a "type." This type can be that of a number, a string of characters, or one of several more advanced type concepts available in some languages. In simple, easily used languages like BASIC, the number of possible types for variables is limited—they can be numbers or they can be strings, or ordered collections (arrays) of numbers or of strings. In more generally useful languages like Pascal, we find additional data types like Integer, Boolean, Record, and Set.

The fundamental unit of memory storage in a computer is the binary bit—a cell in memory that can be either "1" or "0," "yes" or "no." A bit by itself is of very limited utility. In order to compute useful things, we have to impose "data structure" onto groups of bits. The first level of data structure in all languages is provided by the fundamental data types mentioned above. A numeric variable is no more or less than a group of bits interpreted according to a numeric representation and given a name. A "character" is a group of 8 bits (a "byte") containing one of 256 different codes for letters, numbers, punctuation, or "special characters." A "character string" is a simple data structure built of characters grouped together and given a single variable name.

These are the simple data structures which every language has. There is a more general concept of data structure as well. We can group several items with the simpler data structure under a common name in some way. Every language shares the most basic form of general data structure, the "array." An array is a group of identical data items referenced by one variable name and a number picking which particular item is desired.

If we have the 25 different scores of students in a class on some test, we might make an array of 25 numbers inside our computer program.. Each item has a number identifying it. We refer to an item of data in an array by giving the name of the array and the number of the item we want. The score of the fifth student in our list of students would be referenced by giving the array name and the numeric value "5."

Array structures require use of a "declarative" statement to tell the computer how many items of what type will be required. In BASIC, this declarative form is the "DIM" statement, as in "DIM A3 (40)" to specify a list of 40 numeric items which can be referenced as A3. The same statement in FORTRAN would come out as "DIMENSION A3 (40)" or "REAL A3 (40)." In Pascal we would say the same thing as "VAR any old name : ARRAY[1..40] OF REAL;". An array can only consist of identical items of data.

This array form is the only way to group data in BASIC or FORTRAN. But in languages like Pascal, C, Modula, PL/I, and COBOL, there is a much more powerful way of grouping data, the concept of the "record." A record can mix any type of data together. Thus in Pascal we can think of a record containing several numbers, several Boolean flags (single bits), a few character strings, and even a "pointer" data type referring to another record.

The most powerful uses of computers are those involving "databases." Databases are nothing more than collections of records found on disk memory units. The computer languages which provide a means of defining and manipulating such record data types are the most flexible and desirable languages in which to write programs. Beginning programmers may start out using simpler languages like BASIC, but sooner or later will progress to languages with record structures.

To just define all the data we need is not enough. To use a computer program we have to "do something"—we have to compute results and manipulate the data in some way. The fundamental manipulation statement in every conventional computer language is the "assignment statement." If "A" is some symbol representing a data item, and "B" represents a computed value or the contents of another data item, then in BASIC we might say:

```
LET A = B
```

This means "move the value of B into the data item A." In COBOL (a verbose language), we actually say exactly that:

```
MOVE B TO A.
```

In BASIC, the word "LET" is often omitted from the assignment statement, leaving the FORTRAN version of the same statement:

```
A = B
```

In Pascal, we would add two punctuation symbols:

```
A := B;
```

But in each language the meaning is the same: Compute or retrieve the value of B, then plug that value into the data item or structure A.

Where do we get the value of "B"? If the source of the assignment operation's data is a simple name, the answer is obvious. Go look up the current value in the data item associated with the name, then plug it into the item A.

More often than not, the source of the data in an assignment is an "expression" representing a computation. An expression is a rule for combining different data items into a resulting value. Like data, every expression has a data type. The data type resulting from an expression may differ from the data types of the items it references. Here is a simple statement in Pascal which computes the average of three items, X, Y, and Z and then assigns the result to A:

```
A := (X + Y + Z)/3;
```

When the program executes this statement, it goes out and finds the values of X, Y, and Z. It then adds them together to give a value for the quantity bracketed by the parentheses. After figuring out the sum, it divides by 3. The result of the division is then moved into A.

The simplest program is a series of statements. When we tell the computer to execute the program, it takes each statement in our series and carries out its operations. When it is done with one statement, the next statement is carried out.

A computer program would have no flexibility whatsoever if all it could do is execute statements one after another. We need a way to alter the order of execution based on data. Every conventional computer language has the concepts of the "if statement," the "loop," and the "subroutine."

The "if statement" is no more than a method of choosing between two alternative paths of execution based on a condition that can be true or false. Suppose we had a variable called Sex, which might be Male or Female. An IF statement could be used to treat the two options differently in some program. Here is an IF statement in Pascal that might sort out a dress code according to Sex—and even cry for help if the data is bad:

```
IF
SEX = MALE
THEN
wears_a_dress := FALSE
ELSE
IF
SEX = FEMALE
THEN
wears_a_dress := TRUE
ELSE
cry-out ('I am confused');
```

The form shown here illustrates the key words found in every language for the IF statement. The keyword "IF" starts the IF statement. Everything between "IF" and "THEN" defines the condition that will be tested. Everything between "THEN" and "ELSE" defines what will be done if the condition is true. And, everything from the word "ELSE" to the end of the statement defines what is done if the condition is false. In Pascal, PL/I and Modula, the end of the statement is usually signified by a semicolon (";"). In this sample, the "false" case is another IF statement. (Jumping ahead just a bit, this example also shows how Pascal, PL/I, or Modula would reference a subroutine called "cry_out.")

More advanced languages such as PL/I, Pascal, C, and Modula have an extension of the "IF ... THEN ... ELSE" to multiple conditions. This extension is called the "CASE" statement. It allows us to write a statement like the following to sort out several different options:

```
CASE ANIMAL_TYPE OF
WHALE      : legs := 0;
CAMEL      : legs := 4;
HUMAN      ; legs := 2;
CROCODILE  : legs := 4;
SPIDER     : legs := 8;
END;
```

The CASE statement picks one of the assignment statements based on the current value of ANIMAL_TYPE, which in this example can have one of five different values.

The loop concept of a language allows us to write a set of statements that will be executed over and over, sometimes with slightly different data conditions each time. An indexed loop exists in every language, allowing us to step through a se-

ries of values from a starting point to an ending point. In BASIC, we might write:

```
FOR I = 1 TO 5
. . . any group of statements . . .
NEXT I
```

This construction will cause "any group of statements" to be executed five times. On each successive execution, variable I would have the values 1,2,3,4 and 5. The same loop could be expressed in Pascal as:

```
FOR I := 1 TO 5 DO
BEGIN
. . . any group of statements . . .
END;
```

The effect is the same.

There are two other variations of the loop construct used in many languages, called conditional loops. The While loop evaluates a condition before each execution of the group of statements. The loop is executed over and over While the condition remains true. The Until loop evaluates a condition after execution of the group of statements. The loop statements are always executed at least once, and will be repeated Until the condition becomes true. The original definitions of BASIC and FORTRAN did not have these more sophisticated forms of the loop. All modern conventional computer languages including enhanced versions of BASIC and FORTRAN have While and Until loops.

In addition to conditional IF statements and looping, every language has a means of executing a "subroutine" in some way. In BASIC, the execution of a subroutine is done with the "GOSUB" statement. In FORTRAN and COBOL the "Call" keyword is used. In Pascal, Modula, and C, the way we execute a subroutine call is by just mentioning the name of the subroutine. One of the major handicaps of BASIC as a programming language is the fact that we have no way to call a subroutine by name. Instead, we have to use arbitrary line numbers to refer to places in a program. Thus to execute an error-handling procedure in Pascal, as noted in an earlier example, we might simply write:

```
cry_for_help ('Some error message');
```

But in BASIC, we would have to set some error variable "E$" equal to the message then GOSUB to some location like 10000:

```
2135 LET E$ = 'Some error message'
2135 LET E$ = 'Some error message'
2136 GOSUB 10000
```

In each case, we leave the present place in the program, go off to another place (while remembering where we came from), execute the subroutine, then return to where we came from.

Every language also has a variation on this idea of branching off somewhere, called the "unconditional GO TO." In languages such as FORTRAN and BASIC, the unconditional GO TO tends to be used quite frequently to jump around in programs. In modern "block structured" languages like C, Pascal, Modula, COBOL and PL/I, the unconditional GO TO is rarely if ever used in practice.

The fact that a language with "block structure" rarely has to use the GO TO operation is inherent in its highly developed mechanisms for creating and using subroutines. The first widely used language that possessed some of the attributes of block structure was the commercial language COBOL. This was soon followed by IBM's PL/I language in the early 1960s. Today's modern languages Pascal, C, and Modula all owe some of their "flavor" to earlier languages descended from the pioneering block-structured language Algol.

The idea of block structure is to partition a problem into inherently separate steps through the creation of blocks. At the level of an IF statement, use of the BEGIN . . . END brackets in Pascal or Modula will partition off whole series of statements within the THEN or ELSE parts. A similar bracketing function is provided by the symbols "[" and "]" used in the C language.

In addition to such local structure and bracketing, there is the convenient specification of named blocks—procedures and functions—which can be conveniently invoked as required. Procedure blocks are referenced in such languages by stating their names with optional parameter limits. Function blocks are like procedure blocks, except they have values returned that can be used as part of expressions. Each language has its own particular rules on how these blocks are used and what kinds of values can be passed between caller and callee.

Every language has to deal with a host of other technical details, such as input and output of data, conversions of data between different data types, and so on. These issues are usually addressed by extending the concept of built in names to include

procedure names and function names which are part of one or more "system libraries." Thus in Pascal, we have the built in Input/Output functions and procedures including GET, PUT, READ, READLN, WRITE, WRITELN, RESET, CLOSE, REWRITE, etc. The names used vary, but the operations are similar in all conventional languages.

The tight coupling of a language to its operating system and user environment is no more important than in the process of writing programs. We have to have a method of creating a program, finding errors ("bugs") in it, and changing the text of a program. This is where we find the concept of a language system most important.

The interactiveness of an language system is perhaps its most important attribute. No matter what the language is, if it is more interactive than the next language it will probably be easier to learn and use. This is undoubtedly the "secret" of the wide use of BASIC as a language for many early personal computers. It is easy to write a BASIC "interpreter" system that will run interactively in the smallest of computers—witness the $39.95 drugstore specials on one brand recently available. As the language systems get more complex, the interactiveness often goes away in small computers.

We pay a price in software engineering costs to make a powerful and complex language interactive. Thus the more powerful languages like C, Pascal, and Modula will only work well on the more expensive personal computers with large size floppy disks and hard disks. With such languages, we need tools including text editors, file systems, compilers, and debuggers. All these tools must play with each other, using the glue of an operating system to stick together.

As we've seen, the art of computer programming is an art of phrasing our thoughts in a computer language. The language is our method of talking to a computer and asking it to do various tasks. We've been concentrating here on traditional computer languages such as BASIC, FORTRAN, Pascal, and the like. But in fact every prepackaged application of a computer defines an unconventional language. Thus the user of *VisiOn* or *1-2-3* interacts with a computer in a style and manner that could be called a language. Or, the bona fide member of the artificial intelligentsia uses a rather unconventional language such as LISP or Prolog. Or, when we use a database query application on computers ranging from the personal to the gigantic, the interaction defines a language. Generalized in this way, computer languages go far beyond the formal programming languages mentioned in this essay.

Whatever the method and style of interaction with computers you choose, do interact. Unless you experiment with your personal computer, you'll never learn what it can do.∞

THE USER LANGUAGES

One characteristic common to the user languages is their "interactive environment." This is a fancy name for, "you type a few statements and quickly see a result." This interaction is basic to the character of the personal compute environment. It reflects how people wnat to use their PC's. The hardware is designed to support this type of use. But not all PC languages and tools fully utilize this capability. In many cases, it's not practical to do so. In any program, including languages, there is a tradeoff between function and execution (or runtime) efficiency. You can only do so much in a given time with a given computer. Therefore, user languages usually restrict function to provide a user friendly, interactive environment. This explains the feeling that "real programmers don't use BASIC." But then, who said you had to be a programmer to use a personal computer?

BASIC BASIC is probably both the most loved and the most maligned of computer languages. Ask someone if they use BASIC, and you will get a pretty good idea of whether they are a programmer or a user. Programmers sometimes use BASIC, but they tend to apologize for it.

BASIC is clearly the language of computer literacy. This is expected because it is what the language was designed for. BASIC was originally a new learning tool, not a new programming tool. It was also the first tool to introduce a simple, interactive user environment. This led to its being adopted as the language of choice by people who didn't need the complex functions of traditional languages like FORTRAN. Today, there are a few computers that do not run BASIC.

BASIC is relatively easy to learn. Once again, it was designed that way. To achieve this ease, BASIC limits what you can do, sometimes severely. Many people who know BASIC will violently object to that last statement, primarily because of the differences between versions of the language. Because there is no "standard" BASIC, the problem is particularly severe. Even though the versions of

BASIC for many different machines are written by the same software house, there is not guarantee that a program written in BASIC for an Apple will run without alteration on an IBM PC.

Most PC manufactures have used BASIC as a way to make the facilities of their machines easily usable by the nonprogrammer. Although you may not be able to do everything for that machine in BASIC, most user requirements are satisfied by the "limited" facilities provided. A good illustration is graphics. Apple, Atari, IBM, and others have had color graphics from the day they came on the market and provided facilities in BASIC to use these graphics. It may be slow, but the facility is there. On the other hand, it has usually taken a year or more for these same capabilities to become generally available for the more efficient languages on these machines. Just having the facility is often more important than having it in its most machine-efficient form.

BASIC is considered a slow and inefficient language, but this is one of the costs of providing an interactive environment. For many machines, BASIC compilers are available that use the BASIC program statements developed in the interactive environment to generate a faster-running version of your program. They are not available for all machines, and they may not support all the facilities of the BASIC for that machine. Also, they do not generate programs that execute as rapidly as a program written in a more sophisticated programming language, but they are a way to close the gap.

One real problem is that BASIC is poor for developing large and complex programs. It is cumbersome to develop a library of subroutines for commonly used functions and include some of them in new programs. The use of line numbers rather than names as the targets for Goto and Gosub, statements used to branch from one part of a program to another, make programs more difficult to understand after they are written. Also, any variable can be changed by any statement in a program. This is fine if it is intentional, but if it happens by accident, the error can be difficult to find.

In summary, BASIC is an excellent language to begin learning about computing or about your specific machine. It is also good for getting quick answers to relatively simple questions. BASIC should be in everyone's vocabulary, but if you are going to write more complex programs, you should be ready to learn a different language as well.

LOGO Logo is one of the underrated languages of the personal computer world. To most people, it seems to be only a language that kids can use to learn about computers. This view is encouraged by the fact that the turtle graphics associated with the Logo language is an extremely effective learning tool. But once you look beyond its graphics, you find a very sophisticated and powerful language. In reality, Logo is an extended dialect of LISP, the language used for the original research in artificial intelligence. Unfortunately, on systems with less than 64K of memory available it is difficult to use the full capabilities of the language. Since personal computers which allow 64K and more of memory are now available, these other features of Logo should gain additional recognition.

LISP stands for LISt Processing, and this name reflects the unique character of the language. The purpose of LISP was to make it easy to write programs that analyze the content and structure of natural language statements and then manipulate these statements to produce new statements that appear to show "understanding" of the original statements. *Eliza,* one of the most famous programs in computer history, was written in LISP to simulate the dialogue between a psychologist and patient. The program was so effective that many people had trouble believing that they were talking to a computer program. The effectiveness of LISP is shown by the fact that versions of *Eliza* written in other languages, such as BASIC, wouldn't fool a ten-year-old.

Combine this with turtle graphics and an interactive environment, and you have an extremely powerful learning tool. If you think this is all just for kids, take a look at *Turtle Geometry* by Abelson and diSessa. By the time you start working with curved space and general relativity, you should have a good idea that Logo is not just kid stuff.

With the increased emphasis on more natural communication between man and machine, we may see increased use of Logo in the near future. It could easily replace BASIC as the language of choice for nonprogrammers.

FORTH FORTH can be considered a user language for the machine-oriented user. It is an extremely fast and powerful interactive language and has the advantage of being available on a wide range of personal computers. FORTH presents the user with a view of a simple stack-oriented machine (similar to a Hewlett-Packard calculator), with a predefined

set of operations that machine can perform. This simulated machine is the same no matter what PC is being used. This gives some machine portability to FORTH programs.

FORTH functions are called words, and these words are defined in the FORTH "dictionary" or symbol table. A major feature of FORTH is the ease with which the user can add new words or functions to this dictionary and gradually build a more powerful language. These new words can be combinations of previously defined words, assembly language subroutines, or both. Most FORTHs also provide a facility to have a library of user functions, called "screens," and to include only those functions needed for a particular program into the active dictionary.

These features combine to make FORTH the erector set of computer languages. This is both its strength and its weakness. The inexperienced user may find it very difficult to build the functions necessary to make FORTH a complete language for his purposes. The user who can deal with program logic at a machine-language level will find FORTH to be an almost invaluable tool.

APL The user languages are often controversial, perhaps none more so than APL. This is a shame because APL can be one of the easiest and most powerful languages to use. Unfortunately, because of the power built into the language, it cannot be effectively implemented for a system with less than 28K of memory; thus it is not available on all personal computers.

The power of APL is that it works directly with groups of data rather than single values. For example, the APL statement "<– A+B" works properly as long as A and B both have the same "shape" as long as they contain the same number of similar variables or one of them has only a single value. This eliminates the need for many of the loops required in languages like BASIC or Pascal. Because APL works on groups of data, things like sorting and selection are basic operations of the language, not separate programs or subroutines. No other language provides as many directly usable functions as does APL. As a result, your time is spent more in solving your problem than in figuring out how to program the solution.

The richness of function is also one of the problems of APL. At first glance, it seems an impossible language to learn, and the many special characters add to the initial confusion. Add to this the fact that one line of APL can perform the work of five to ten statements in another language, and it can seem awesome. Programmers have special difficulty with the language because most of the looping and control flow work normally associated with programming is reduced or eliminated.

One weakness of APL is in its character and string handling. Although it is stronger than any other language in this area, the functions to handle strings appear more mathematical than string-oriented. This can lead to difficulty when you are first using complex string maniuplations. However, string handling on the same level as BASIC is just as easy to do.

All things considered, this is a language that most users should at least look at. Remember, you don't have to learn the entire language to use it effectively. Spreadsheet type programs were being written in APL long before *VisiCalc* appeared.

UCSD p-SYSTEM Although Pascal is not really one of the user languages, the p-System has gained a lot of popularity because it allows interactive program development in the Pascal environment. Even though it tends to be slow, it retains its popularity by providing a language with the power of Pascal in a user friendly way.

PROGRAMMING LANGUAGES

It may sound obvious, but programming languages are those languages designed for writing programs. Over the years, the programs people have wanted to write have become longer and more complex. This has placed many new demands on the languages used for programming and has led to many new languages. The family tree of these languages reflects how our understanding of programming techniques has grown.

Machine Languages and Assembly Language Although machine language and assembly language are closely related, they are not the same. The only language a computer can actually use is its own machine language. At some point, every program written in any language becomes part of a machine-language program. Although machine language is the only language that a computer can use, it is very difficult for a human being to write more than a few dozen instructions at a time in it.

This led to the development of assembly language. Assembly language allows the programmer to use predefined Englishlike names for the operations the machine can perform, and allows him to

assign labels instead of actual addresses to refer to memory locations within the program or data areas. This makes it easier and faster to write machine-language programs.

One advantage of assembly language is that any operation a computer can perform can be coded in the language. There is also the myth that assembly language provides the fastest programs possible. This may be true for a skilled programmer, on short to medium-sized programs, but on longer programs, a good optimizing compiler can often do a better job than even the best programmer.

As a result, assembly language is most often used to code subroutines to handle specific device requirements or to handle those short segments of a larger program that must run exceptionally quickly.

FORTRAN FORTRAN is the granddaddy of high-level languages. Since computers were originally used to solve scientific problems, it seemed natural to have a programming language that looked like the formulas being calculated. Although the language has been improved over the years, it is generally limited in its string and file handling and its report formatting.

FORTRAN has two basic advantages. The first is the large amount of code available in the public domain for solving various problems. For a long time, FORTRAN has been the language used to describe algorithms, and the literature is full of examples and complete subroutines. These can be a valuable resource both in learning the language and in coding it.

The second advantage is for those who already know FORTRAN on another machine (generally a mini or mainframe computer). It's easier to code in a language that you already know. But, it is extremely difficult to write a full FORTRAN compiler for a small 64K or less machine, and therefore the full language is seldom implemented on personal computers. Even though the larger micros could run a full compiler, programmers should be sure the one they intend to use on their computer does implement the FORTRAN they are familiar with.

COBOL When computers were first used for business problems, FORTRAN was the only language available. Programming was difficult because FORTRAN lacked several of the features needed for business programs. Other problems arose because the FORTRAN for each manufacturer's mainframe was different, and programs had to be heavily modified if you changed the machine they were to run on. Since the government was the largest user of computers at the time and also wanted to be able to write programs to run on any manufacturer's machine, the Department of Defense sponsored the development of COBOL or the Common Business-Oriented Language.

COBOL added such things as decimal arithmetic, string handling, file handling, and report formatting within the language. It was also the first major language whose structure was controlled by a group independent from the hardware manufacturer. Although it took a number of years, COBOL has become relatively independent of the machine on which it is run. It has also become the most used mainframe language in the business environment.

Like FORTRAN, its primary interest in the personal computer environment is for programmers who are already using COBOL elsewhere. The same cautions also apply. It will require a larger micro than other languages, and you should carefully evaluate the compiler you want to use on your computer to be sure it is compatable with the mainframe language.

PL/I PL/I was an attempt to combine the scientific processing facilities of FORTRAN, the business features of COBOL, the program structuring methods of ALGOL, and program optimization techniques into a single language compiler. Such a compiler is extremely complex, and it took several years before a full compiler was available even on mainframes. The language has gained popularity but still hasn't replaced either COBOL or FORTRAN.

On personal computers, PL/I has the same interest as COBOL or FORTRAN although the problems of large machine requirements and partial language implementation are even more severe.

THE "NEW" LANGUAGES

Program requirements became more complex, and computer science became a major subject. This led a lot of research into how languages could be used to improve the process of programming. This led to a growing number of new languages, and microcomputers have been a major element in their design. The primary emphasis of these new languages is on portability of programs between different machines, and using the structure of the

language to increase the probability that a program that compiles correctly will run correctly.

PASCAL True Pascal is like training wheels on a programming language. One of the frustrations of a programmer learning Pascal is the things it will not let you do. Since the language was designed to teach good structured-programming techniques, this is not a surprise. The discipline learned from programming in Pascal can be a positive influence when using other languages. Since Pascal implementations provide more features than the pure language, real Pascals tend to be more usable.

The major characteristic of Pascal is that everything you are going to use must be specifically defined. Unlike BASIC, its variables do not default to floating point and cannot be used without being defined. Each variable to be used must be named in advance and its type specified. Once specified, this type cannot be changed. This is known as "strong data typing." This same idea holds for arrays, functions, subroutines, and so on. The visibility of a variable can also be controlled. If the variable "loopcount" is defined as "local" to a function or subroutine that is, to be used only in that part of the program that same variable name can be used in another function, but the compiler will keep the two variables separate. If several functions are meant to share particular variables, the variables can be made "global." These are some of the features that help insure correct running programs.

Pascal also defined a number of new data types, such as enumerated types (i.e. "SUN," MON,". . .), subrange types (i.e., 1 thru 99), records (collection of different simple types), files (collections of records), sets ("JOHN," "MARY," "JOE," . . .), pointers (which give the location in memory of values, structures, and functions), and even user-defined types. These new types help insure that a program will work and also make it more understandable.

Pascal is also designed to make programs portable between different computers. Although this is not always possible, using Pascal can significantly reduce the amount of code that must be changed to run on a new machine. It also helps make clear what code must be changed.

Pascal is a good language for programming and an excellent language for learning programming techniques.

MODULA AND MODULA-2 Pascal was difficult to use in programming real-time and machine specific systems. Modula was designed to correct this but left out many of the data typing facilities of Pascal. This led to Modula-2, which combines the strengths of Pascal and Modula.

The key concept of Modula is the concurrent process. This allows multiple tasks to operate in parallel and communicate with each other as necessary. For example, if you were writing a terminal program, one process could be collecting data from the serial port and saving it for a separate process that uses the data. Obviously, Modula must be able to deal with machine specific features to provide these features.

Modula programs can be viewed in three parts. The sequential part is similar to Pascal. The machine-independent part deals with concurrent processes, communications between processes, and intefaces to machine dependent segments. The machine-dependent segments are the device modules and device processes. This split clearly separates the various sections, eases the programming task for complex and machine-specific programs, and allows the compiler to do a more effective job of checking for logic errors.

Modula-2 gains even more ability to control errors by implementing abstract data types. Abstract types allow control of how a variable may be used as well as the type of data that may be placed in the variable. For example, if A and B are variables of an abstract type, A+B is not a valid operation unless "+" is specifically defined for that abstract type.

Modula-2 is just becoming available for CP/M and MS-DOS computers. It will probably be quite some time before it is supplied for other machines.

ADA Like COBOL, Ada is a product of the U.S. Government and is intended to use the latest techniques in compiler technology to provide a portable, general-purpose language. It has very strong concurrent programming capabilities, but where Modula is designed for single processors, Ada is meant to run parts of a program on several communicating (or distributed) processors.

Ada also has a Pascal-like flavor, but it again expands the types available up to abstract types. Ada also lets you build a program from separate modules and provides for machine-specific code segments.

It has more relevance in the mainframe or mixed mainframe-personal computer environment.

With all the research results showing that high-level languages, modularization, data typing, and

so on could lead to better and safer programs, system programmers felt the need for a language that would give them the benefits of these techniques with the flexibility of assembly language. C was the answer to this need.

C allows programs to be written in an assembler-like language for a pseudo-machine. Commonly used data types are defined so the programmer can work with logical data elements rather than machine-specific data representations. It also provides the variable-hiding and modularization of block-structured languages like Pascal.

But C is closer to assembler than Pascal. The structured facilities are provided but not enforced, so it is not as safe as Pascal. C is also very idiomatic. The meaning of "A++" may not be obvious, while the difference between "A++" and "++A", both of which are valid C statements, is even less obvious. But, if you are writing large assembly-language programs, C can be a powerful substitute for assembler code.

One thing to be careful of when evaluating C compilers: A real C system is a combination of the compiler, the function libraries supplied, and the library-management tools available. Without all three components, the usability of the language can be greatly reduced.

THE FUTURE

That's how we got here, but what's in store? It will take several years for the dust to settle with the new languages. FORTRAN will continue for a time, but will be gradually replaced by Modula-2 and Ada. Pascal will also probably fall victim to these two languages. C will continue to gain supporters, especially among systems programmers and software developers.

But with all this, the most exciting growth will be in the area of the user languages. Logo will begin to replace BASIC as the language of computer literacy. As more users become familiar with list-processing techniques, a new generation of user-friendly programs will begin to emerge. A combination of the Logo list processing and APL data manipulation would provide an almost unheard of tool for people who use computers. Who knows what else may be in store?∞

ACTION

ACTION is a complete programming language for the Atari and can perform the full complement of programming tasks. ACTION is a compiled language, as opposed to BASIC, which is interpreted. This means that ACTION programs will run at a significantly greater speed than a comparable BASIC program.

In general, the language itself is somewhat more difficult to maniuplate than BASIC and requires a greater appreciation of the inner workings of the microprocessor in order to be used to its greatest advantage. This is particularly true in the handling of variables and constants. In most respects, however, the organization of ACTION is ultimately clearer than that of BASIC. Programs contain discreet parts called functions and procedures; each performs a specific task and can be labelled with an appropriate word. They are then linked together to build more complex programs.

This type of programming is called structured programming and has several advantages. Small parts of a larger program can be run and debugged individually. The written code is more easily understood at a glance. In these respects, ACTION resembles the high-level language Pascal.

Other advantages of ACTION are in number of editing functions unavailable in *Atari BASIC.* These include move, search, and replace functions; various alternative ways of inserting and deleting characters and blocks of text; and particularly the ability to view and work on two different programs or parts of programs at the same time.

An important drawback to this language is that is programs can only be run with the ACTION cartridge, though a runtime version of the language can be licensed from marketing software created with ACTION. Moreover, it is a language produced and copyrighted by one company for one compute system the Atari. Therefore, it probably won't prove as useful as the more standard languages. Specifically geared to Atari, ACTION makes optimal use of this particular system's capabilities. But given the time it takes to develop real fluency in computer language, you might want to opt for one which can be used in more circumstances.

Requirements: Any Atari computer
Optimized Systems Software, $99

APL (IBM)

When compared with IBM's mainframe APL and STSC's *APL*PLUS* for the IBM PC, this version of the language is a disappointment. The implemen-

tation is fairly complete, but the file handling, workspace management, and screen handling are merely adequate. The documentation is also not up to IBM's normally high standards. Although adequate for reference, the manual will be very confusing to the new APL user. Fortunately, there are other very good introductions to APL available.

IBM APL requires the 8087 math coprocessor and the color graphics display adapter in order to operate. Another limitation is the 32K restriction for the sum of the sizes of the variables and functions being operated upon at any one time. Although the entire memory of the PC can be used, this places a practical limitation of about 2,300 floating-point numbers on most objects. This will not be a severe restriction for many users.

Another strange feature is the definition of two types of workspaces, transport and execution. Individual objects can only be copied from transport-form workspaces. This kind of copy and save operation is common in APL, so this feature requires the user to exercise special care where objects are saved.

Although the color graphics adapter is required, no graphics functions are provided. The monochrome adapter can be used with running APL programs to display numbers and text, but no APL special characters can be displayed.

The saving feature in all this is that *IBM APL* is designed using the "shared variable" approach for all functions beyond the language itself. Functions such as the file handler are actually provided by "Auxiliary Processors" (APs), which can be user-written. The documentation on how to do this is quite good. This means that if you are not satisfied with a particular feature, you can add your own without having to change APL itself. It also means that additions such as graphics could someday be introduced as separate options.

This may not be the APL of choice, but it is a usable low-cost option for the person who wants to try the language first. With additional APs, this could become a much better version than it is today.

Requirements: IBM PC, 128K RAM, one disk drive, color graphics adapter, 8087 math coprocessor
IBM, $195

APL*PLUS/PC

STSC has been a provider of APL services on mainframes for over a decade, and their experience shows. Their implementation of APL on the IBM PC (and compatibles) is exceptionally complete and powerful. In addition to the standard APL facilities, they have included numerous extensions for file handling, graphics, output formatting, help screens, DOS interfaces, screen handling, communications, and others. Users who are familiar with IBM's Shared Variable APL system will need a brief period of readjustment, but it is time well spent.

All the standard APL functions are supported. About the only limitation of the system is that any single object can only be 64K bytes long (or about 8000 floating-point numbers). In a 320K system using DOS 2.0, there is slightly more than 180K available in the user's workspace. If the system contains an 8087 math coprocessor, *APL*PLUS/PC* will use it. If not, software routines are used. This leads to execution times as good as or better than those of many high-level compiled languages, such as Pascal and FORTRAN.

Both DOS files and files of APL objects are supported. For APL files, facilities are provided for controlling who has what type of access to each file. All types of DOS files can be read or written, although you must have some awareness of the structure of the DOS file to do this successfully. Either type of file can be read sequentially or randomly.

Although *APL*PLUS/PC* will run using the monochrome monitor (with a special ROM chip provided with the system), functions are provided for graphics on the color monitor. These functions are similar to those found in Advanced Basic, but when combined with the array math capabilities of APL itself, they make complex graphics manipulations much more achievable.

APL output can be printed using the IBM Graphics Printer, the EPSON MX series using *Graftrax*, or the EPSON FX series. For the FX printers, routines are provided to load the APL character set into the printer, thereby increasing print speed and allowing the use of all printer modes for the APL printouts.

All things considered, this has to be one of the most powerful tools available for the IBM PC. The initial expense of the package is tempered by STSC's support policy. Users of version 1 received the upgrade to version 2 for $100 despite the fact that it included major new functions and four new volumes of excellent documentation.

Requirements: IBM PC or compatible, MS-DOS 1.1 or 2.0, 192K RAM, disk drive
STSC, $600

THE ASSEMBLER

The Assembler is a co-resident macro assembler/editor for Apple II and Apple-compatible computers.

The editor is a powerful line-editor with several worthwhile features. You may insert or delete both lines and characters and move or copy lines or blocks of lines. A search-and-replace command that supports wildcard characters is included, lowercase characters are allowed, and the program sports a type-ahead buffer. If you get into trouble, a HELP command is there to assist. If you simply press the H key, a built-in "reference-card summary" of the editor commands will appear on the screen.

The Assembler portion is a two-pass variety. The first pass creates the symbol table and checks for duplicate symbols and invalid opcodes. The second pass creates the actual object code, which may then be saved to disk as a binary file. The assembled listing may be sent to either the screen or the printer along with an optional symbol table. You can also request a printed listing of just the assembly errors.

A utilities option has been included to help in software development. You may convert binary-source listings to text files and back again, request a cross-reference listing, print an unassembled-source listing, and even save and load source files from cassette tape.

If you have a 64K machine, all of the assembler, editor, and utility routines are loaded together in memory, requiring no further disk access. Because no overlay scheme is required, transfer between routines is much faster. If you are using a 48K computer, however, selected functions must be loaded from the disk each time. Both versions are included on the program disk, and the proper one is loaded automatically.

System capacities are also greater with the 64K version. The number of available macros increases from 126 to 253, and an additional 1K of RAM is available for source files and symbols. This increases the source code capacity to 29.5K, or approximately 1,500 lines of code.

The Assembler supports a macro library with nesting of up to 55 deep. Also supported are Sweet-16 Macros, 8080 Assembler Macros and a Subroutine Library. A 130-page manual complete with tutorials is included. The novice assembly-language programmer should have no problem mastering this one.

Requirements: Apple II, II+ or IIe, 48K RAM, DOS 3.3, one disk drive
MicroSPARC, $69.95

BABY/34

Turn your IBM PC into an IBM System/34? A software package from California Software Products called *Baby/34* will put you well on your way. *Baby/34* includes eight software modules which emulate System/34 processing. They include the *RPG II compiler, OCL Control Language Processor, SEU Source Editor, DFU Data File Utility, SORT, $SFGR Screen Format Generator, Workstation I/O,* and a special *Data Exchange Utility (DEU)* to help convert files from the System/34 EBCDIC format to the PC's ASCII format.

There are a large number of IBM System/34s in use, and a tremendous amount of software written for the System/34. *Baby/34* will allow a number of companies to make their System/34 programs available on the IBM PC and PC/XT. It will also be of interest to those installations already owning a System/34.

Three configurations are available: The full stand-alone system, the *Run-Time* system, and *Run-Time-Plus.* The stand-alone system contains all eight modules, including the *RPG II compiler,* allowing full development. The Run-Time system consists of the *OCL Processor, Work Station I/O,* and *SORT.* This system allows precompiled applications to be executed. Run-Time-Plus includes everything in the Run-Time system plus *DFU, SEU,* and *DEU.*

Requirements: IBM PC, 256K RAM, monochrome adaptor, DOS 2.0
California Software Products, full system $2,500; *Run-Time* $600; *Run-Time-Plus* $1,200

BASCOM

A compiler translates a programming language, such as BASIC, into machine language that your computer understands. Most microcomputer BASICs are interpreted rather than compiled. Every time a BASIC statement is executed, the interpreter translates the BASIC keywords into actions that are performed in machine language. When you use the

Microsoft BASIC Compiler, or *BASCOM,* this translation is performed only once. You can't read the compiled program, but your computer can run it immediately.

The main advantage of the *Microsoft BASIC Compiler* is execution speed. With most compiler systems, you trade the ease of interactive program development for this speed. The Microsoft compiler has the advantage of compiling essentially the same language that the Microsoft BASIC interpreter executes. This gives you the best of both worlds—you can develop an application under the interpreter, and then compile it for speed whenever you like. If you are selling your software, you also gain security for your source code, which you no longer have to distribute to your customers.

Programs to be compiled must be in plain ASCII file format. You can use the BASIC interpreter's editor and save your program with the ",A" option. Alternatively, many text editors are capable of creating such a file.

The compiler reads your BASIC program and produces a file with an .OBJ extension. An .OBJ file cannot be run yet. You must first Link it. When Link finishes, you can finally run your program. If you find an error, you must go back to editing the source program and repeat the whole process.

If you've used the BASIC interpreter but not a compiler, you should be getting the impression that developing programs under the compiler takes more time and steps than under the interpreter. You soon learn to restrict your programming to the common subset of BASIC understood by both the compiler and the interpreter, so you can debug under the interpreter and then compile for execution speed.

You can include compiler commands in your BASIC program. Most of these control the format of the listing file produced by the compiler. An important one is $Include, which tells the compiler to read from another file as it compiles your program; for example, all data definitions used in several programs could be stored in a file that is $Included in compiling the BASIC programs.

Although there are differences between interpreter and compiler BASIC, most can be avoided if you follow good programming practices. For example, the interpreter lets you have more than one Next per For statement; the compiler insists that they match one-for-one. Another difference is that the interpreter lets you place a subroutine at the end of your program to Dimension arrays, Define functions, etc. The compiler processes your code a line at a time, and these definitions must appear before the things they define.

Compiled programs cannot include statements that manipulate source text, since that text is not around when the compiled program runs. One enhancement creates an incompatibility: Strings can be 32,767 characters long instead of 255. The string descriptor is thus one byte longer, so assembly-language subroutines that access the string descriptor must be changed.

These changes bring big improvements in string manipulation and integer arithmetic. These computations can run 50 times faster and more. Floating-point computations and disk file I/O are not improved nearly as much.

This compiler does its job well and works very nicely as a companion to the interpreter. If the speed of the BASIC interpreter is bogging you down, or if you want to distribute your program while keeping the source code to yourself, try the *Microsoft BASIC Compiler.*

Requirements: MS-DOS computer, 64K RAM, disk drive

Microsoft, $395

BASIC09

Have you been looking for a language that is as easy to debug as BASIC and has the speed of a compiled language? If you have, *BASIC09* (running under OS-9 on the TRS-80 Color Computer) will fill the bill.

You can write programs with syntax almost identical to *Microsoft BASIC* programs. Or you can write programs without line numbers, as in Pascal. Each program line is checked for syntax when you enter it and is compiled to an intermediate code immediately.

Programs in *BASIC09* are called procedures. Procedures can run other procedures and pass parameters to them. These innovations give *BASIC09* its speed, power, and unique flavor.

BASIC09 has four modes: system, edit, execution, and debug. When you first call up *BASIC09* from OS-9 you arrive in the system mode. There you can get a directory of procedure modules in memory, Load and Save procedures to disk files, or switch to the edit and execution modes. Edit mode is used to enter or modify procedures. Execution mode is used to run programs. From there you can

go to debug mode, used to test procedures that do not work properly.

It is difficult to summarize the merits of *BASIC09*. What they add up to, though, is small, well-structured programs that run uncommonly fast.

There are five data types built into *BASIC09:* Byte, Integer, Real, String, and Boolean. In addition to these, the user can define his own data types, much like the Pascal record. These complex data types can be written to or read from a file with a single put or get. A user-defined data type permits string arrays.

BASIC09 treats devices such as the printer, keyboard, and display as files for sequential input and output—a great convenience found in few BASICs. The standard input (keyboard), standard output (display), and standard error (display) are "opened" automatically. Both sequential and random-access disk files are also available.

Procedures may be packed while in the system mode for more compact code and faster operation. However, once a procedure is packed it cannot be edited.

Tested with a small benchmark program, *BASIC09* proved to be almost three times faster than the extended BASIC interpreter on the Color Computer and twice as fast as the Model 4 under *LDOS* 5.1.4.—a faster machine. Packing the file caused a drop to 97 bytes for about a 12 percent saving in memory.

BASIC09 permits structured modular programming on a very low-cost microcomputer. Color Computer enthusiasts would do well to add this language along with the OS-9 operating system to their library. It's only real flaw is that it runs only on computers with the 6809 microprocessor.

Requirements: TRS-80 Color Computer
Radio Shack, $99.95

BEAGLE BASIC

If you have an Apple II+ or IIe, then like it or not, *Applesoft BASIC* is unchangeably burned into your machine, or is it? What if there were a soft-loaded BASIC that had some of *Applesoft*'s missing features, one that you could even customize?

Beagle BASIC may just be the answer. By taking a "picture" of normal *Applesoft,* throwing out some of those unused cassette commands, adding some new commands and features, and then placing it into your Apple II's 16K RAM or language card, or the upper part of the IIe's memory, you end up with Beagle's new BASIC, or *NewBASIC.* Through an easy-to-use editor, you can rename any or all of the *Applesoft* commands and error messages any way you like. Using *NewBASIC* precludes the use of any DOS relocating program.

NewBASIC adds over 20 new commands, each of them optional. The two most powerful are Else and Swap. Else is used to complete the normal If-Then statement, eliminating an extra program line after an If statement. Swap is a useful command for sorting routines, allowing the use of two variables instead of three. This not only improves execution speed, but cuts down on memory housecleaning. A useful modification to the Goto/Gosub commands permits branching to a named subroutine instead of to line numbers—for example, Gosub Sort.

Other commands deal with music, graphics, alternate text and graphics pages, scrolling, and cursor control. Most of the commands really don't add anything new to *Applesoft*'s capabilities, they just make programming easier. For example, Tone P,L (where P=pitch and L=length) lets you create music without using Pokes or Calls. A set of Mode, Mix, Page, and Resl commands replace the cumbersome Pokes needed to manipulate the high-resolution graphics screen.

A bonus utility called Text Screen Formatter lets you format the 40-column text screen any way you like. It then converts the screen layout into VTab, HTab, and Print statements that can be appended to any *Applesoft* program.

A rather humorous but complete instruction guide (Tip Book #6 included) comes with the copyable disk. A handy keyboard command chart plus a chart of Peeks and Pokes is also included.

Requirements: Apple II, II+ or IIe, 64K RAM, disk drive
Beagle Brothers, $34.95

BEYOND-BASIC

The TRS-80's *Microsoft BASIC* is only a foretaste of the language it could be. In *Beyond-BASIC,* its possibilities are a lot closer to being realized.

There are disk and tape versions of *Beyond-BASIC* and *Packages I, II, and III,* each a superset of the last. Many of the features here are carried over from standard BASIC, including USR functions, most string functions, and such machine control commands as Load and Save—equivalent to Cload and CSave—and the clock commands. But it's the additions that are important.

Tape packages add up to 60 new BASIC commands, operators, and functions, disk versions up to 82. Common to all are such features as interconversion of hex and decimal numbers and ASCII codes, signed and unsigned integers, and degrees and radians; Peeking strings and 16-bit numbers from memory; Max, Min, and Mod functions; and an integer division operator, Div, which is faster than standard BASIC division. One particularly nice one is the "$" command; typed before a command, such as Dir, it routes output to the printer instead of the screen.

Package II provides, in addition, an extended program editor that gives most of the functions of a line-oriented word processor, comprehensible error messages, and extensive graphics commands similar to those of the TRS-80 Color Computer. *Package III* adds matrix arithmetic, array sorting, and a variety of utility commands designed to ease the process of programming. In the disk packages, there are several more new commands governing disk I/O.

Powerful as it is, this BASIC enhancement probably is not for the professional. Programs written in in can be run only under this interpreter, so the market for *Beyond-BASIC* programs is limited. And the system is known to be compatible only with TRS-DOS and DBL-DOS; users of LDOS, NEWDOS80, and other popular systems may find that some DOS functions will not work with *Beyond-BASIC*. But anyone writing for himself will find it an efficient, powerful replacement for the *Microsoft* interpreter.

Requirements: TRS-80 Model I or III, TRS-DOS or DBL-DOS

Excalibur Software, *Package I*: Tape $39.95, Disk $49.95; *Package II*: Tape $49.95, Disk $64.95; *Package III*: Tape $59.95, Disk $79.95

C (DESMET)

The *DeSmet C Compiler* is an excellent bargain. While lacking in some areas, it is a very good package with which to learn the C language, and it is continually being upgraded. The package includes a compiler, assembler, binder, library manager, and screen editor. The editor has proved so useful that it seems worth the price of the entire package.

It does contain limitations which will concern the serious programmer. No source code is included for library functions. The object code generated is not compatible with the IBM *Macro Assembler* or *Linker*. The compiler will also run out of memory when compiling large programs. There are a few known bugs, and some library functions are not currently compatible with their standard counterparts.

On the positive side, the compiler and the code it generates are extremely fast, the package is inexpensive, and it has a number of supporters. One very useful feature allows the insertion of assembler code anywhere in a C program. This can be very valuable for development. A routine can be written first in C to test it; then portions can be rewritten into assembler for speed and compactness. Purchase of the package includes an occasional newsletter. Technical help is available by phone.

The version now in use is version 2.2. A new version is currently scheduled for release in April 1984. The new release will offer a symbolic (source-level) debugger for an additional $50.

Mark has been trying to keep the package small enough to run on a 64K PC running DOS 1.1, but this has been so limiting that it will not be true for future releases. Perhaps the new release will solve some of the other problems.

Requirements: IBM PC, 64K RAM with MS-DOS 1.1, 128K RAM with DOS 2.0; CP/M-86

CWare Corp., $109; updates $20

C (DIGITAL RESEARCH)

There are roughly a dozen C compilers available for microcomputers, perhaps half of them in common use. Digital Research is a relative newcomer in the C market, but they have managed to produce one of the slickest packages yet available.

Compatibility is its strongest point. *DRC* is a nearly complete, wholly standard implementation of the C that comes with Unix version 7. Only Unix-specific functions have been omitted. Thus, any program written in *DRC* will run with any other standard compiler with little or no reworking. Digital Research made certain of this by testing their compiler against a DEC minicomputer running Unix 7. They were satisfied enough with the results to adopt their compiler for in-house system development. Their CP/M-68K was written using the 68000-processor version of this compiler.

Programs compiled under *DRC* are fast. In one test, it took only six seconds to run the standard Sieve of Eratosthenes benchmark program, while its nearest competitors took ten. The compiler is

easy to use—compiling a program requires a single command line—and its error handling is superior. Compilation time and program size are less impressive, however. It took *DRC* nearly a minute to compile the same benchmark, while the 8-bit *BDS C* compiler was through in under ten seconds. And at more than 25K, the compiled program was twice the size of that produced by the second-place competitor. This can be reduced significantly, however, if you are willing to do without command line redirection.

More than 90 standard C-language functions are included in the *DRC* package, and all are portable to other compilers. Regrettably, Digital Research has not included source code. Functions that do not work quite as needed cannot be revised; new ones must be written.

A series of utilities is also supplied with the 8086 version: *LINK-86,* the standard Digital Research linker; *XREF-86,* an assembly language cross-reference utility that helps to keep track of symbols used in a program; *RASM-86,* an 8086 relocating assembler; and *LIB-86,* the librarian. All are among the most versatile utilities of their kind.

In all, this is a powerful, reliable production language system. It deserves at least a close look from anyone who does high-level programming, yet needs to work at the machine level as well.

Requirements: CMP 86, PC DOS, 128K RAM, 2 disk drives

Digital Research, $395

C (LATTICE/MICROSOFT)

Lattice C is marketed by both Microsoft and Lifeboat Associates. The primary differences between them are the documentation and the associated utility programs included with the systems. Lifeboat is currently shipping version 2 while Microsoft is shipping version I.04 and plans to ship version 2 as soon as the documentation is updated. The Microsoft documentation is more readable than the Lifeboat manuals.

All four of the standard memory models are supported. The "small" model supports a 64K program segment and a 64K data segment. The "program" model supports a 1Meg program segment and a 64K data segment. While the "large" model supports a 1Meg program segment and a 1Meg data segment, the small model will run the most efficiently. Having three other choices allows you to choose the fastest model depending on your application needs.

Lattice C is a two-pass compiler, which speeds up the compilation process. Generated code is very efficient. Assembler output is not produced by the compiler, but a utility is provided to decompile object modules. If you have compiled your program with the proper options, you can produce a listing of the merged C source statements and the resulting assembler code.

The major shortcoming of *Lattice C* is the reduced library support when compared with *CI C86.* No source archives are provided, and 8087 support is an extra-cost option available from Lifeboat.

Requirements: CP/M-86 or MS-DOS, 128K RAM, two disk drives

Microsoft or Lifeboat Associates, $500

C86 (COMPUTER INOVATIONS)

C86 was one of the first versions of C available for 16-bit computers and has long been considered one of the best. There were two major problems in the initial release. The only memory model supported allowed 64K for programs and 64K for data areas. This is known as the small memory model. The other problem in IBM PC versions was that *C86* used its own object module format so that the standard DOS linker could not be used and libraries of functions in standard format could not be linked to *C86* programs. Both these problems have been corrected in Release 2.

C86 is an exceptionally complete set of tools for C programming. Both the large and small memory models are now supported. Floating-point support is provided for both software and 8087 hardware. The IBM version supports DOS 2.0 catalogs and paths, and graphics primitives are included. The base libraries in the PC DOS edition include a number of IBM PC-specific functions. Among these are functions to establish interrupt-driven routines, I/O to specified ports, and execution of DOS interrupts. As a result, there is very little need to purchase additional packages to get the functions you need to write real programs.

An unusual feature of *C86* is the inclusion of the archive libraries with the base system. These archives give you the source code for all functions within the working libraries. These are both an excellent learning tool and a lifesaver if you ever have to change the way a particular function works. Pro-

grams are also provided to allow both the archive and library files to be maintained.

C86 is a four-pass compiler with optimization. The original *C86* produced fast code, but the optimizing pass can improve even this. The only problem is the next update. In addition, the compiler will optionally produce assembler source code rather than object modules. Again, this is both a good learning tool and a big help where particular functions must be made to run at absolute maximum speed.

For completeness of function, ease of use, and price performance, this is a hard one to beat.

Requirements: CP/M-86 or MS-DOS, 128K RAM, two disk drives

Computer Innovations, $395

DATABUS COMPILER

If you are looking for a good language for business programming, Databus may be the language for you. The DATABUS language was originally developed by Datapoint Corporation for interactive business-application programming. Sunbelt Computer Systems, a developer of software for Datapoint Computers, has written a *DATABUS Compiler* to run on non-Datapoint systems.

The compiler supports most of the features of DATABUS, including full ISAM file support with key reading in forward or reverse order. ISAM is implemented through a full B-tree index system, which allows duplicate keys of up to 99 characters. An internal SORT verb is also implemented.

The Sunbelt compiler generates assembler code, which can then be assembled. Two versions of the compiler are available. *SUNDB80* is compatible with all Z-80 based processors executing CP/M 2.2. *SUNDB86* is compatible with most processors using MS-DOS 1.1 and all processors using MS-DOS 2.0.

The Z-80 version includes an assembler and linker as part of the package. The MS-DOS version requires the Microsoft (or IBM) *Macro Assembler* and *Linker*. Unfortunately, the Microsoft *Macro Assembler* is very slow. It also will not assemble very large programs without running out of space in its symbol table. Sunbelt is attempting to locate a faster, better assembler. If you are interested in the MS-DOS version, contact Sunbelt before purchasing to see if they have found one.

Testing the CP/M-80 version on an IBM PC using a Z-80 add-on card revealed no problems. Programming in *DATABUS* is easy to learn, and the language is very much oriented towards business applications. The majority of program commands involve program flow, string handling, interactive terminal I/O, and file handling. Arithmetic instructions are limited to add, subtract, multiply, divide, and compare. Numeric and character arrays are implemented.

Both compilers feature dynamic screen definition and support of function keys where available. Thus programs can be moved from system to system and terminal to terminal without the need to recompile or reconfigure individual programs. A royalty is required if you plan to market programs using the ISAM routines. Contact Sunbelt for more information.

Requirements: Z-80 processor, CP/M 2.2; IBM PC; disk drive

Sunbelt Computer Systems, SUNDB80 or SUNDB86 $495

DR LOGO

Functionally, this is the richest Logo available for the IBM PC. Although the color display is required for graphics, if the monochrome display is available, it will be used for text screens. The tone generator, joystick, and lightpen are all supported. Direct port I/O facilities are also provided. Documentation is excellent, with both tutorial and reference materials.

The normal turtle graphics functions are available. The shape of the turtle cannot be changed, but the aspect ratio of the drawing can be set for the printer or another target device. No Fill command is provided.

Since *Dr Logo* can run as a stand-alone system, functions are provided to format disks as well as to create, delete, and rename files. These are CP/M files, and they are not compatible with PC DOS. Memory Peek and Poke is supported but assembler subroutines are not.

Up to this point, there doesn't seem to be much about *Dr Logo* that is different, but now we get into its strengths. In addition to the normal workspace management facilities, *Dr Logo* provides help facilities, functions to compress and reorganize workspace, forced upper- or lowercase text, and expanded function display capabilities. Additional list processing functions display capabilities and are also included to extract multiple elements of a list, randomize the elements of a list, or determine

what element of a list matches a membership test. In addition to the normal property list functions, an extra command creates a list of all objects that have a desired property. These facilities strengthen the LISP-like nature of the language.

The standard math functions are available with the additional choice of using degree or radian values for trig calculations. Precision is fixed at 15 significant digits. All calculations are done in double precision and converted to single only where valid. *Dr Logo* also uses special identifiers for plus and minus infinity and any indeterminate such as O/O.

The final unique feature of *Dr Logo* is its debug facility. Three words—Debug, Watch, and Trace—provide a very powerful tool to monitor what a program is doing and help find errors. These features alone would be a powerful advantage and illustrate the power of *Dr Logo* and the thought that went into its design.

Requirements: IBM PC, 192K RAM, one disk drive, color graphics adaptor
Digital Research, $149.95

THE EINSTEIN COMPILER

The Einstein Compiler is a simple-to-operate utility that translates *Applesoft BASIC* programs into machine language. *Applesoft* programs must be interpreted a line at a time during program execution; this sometimes results in slow program operation. Compiling the program directly into binary machine code results in much faster program execution.

Because writing programs in *Applesoft* is far easier than writing them in machine code, it stands to reason that a compiler such as this one would have much appeal. But is it really worth it?

True, most programs do execute faster; but not 20 times faster as some ads lead us to believe. If your program runs two to five times faster, you have achieved good results. Furthermore, all compiled programs are much longer than the original BASIC version, which is the price you pay for speed. Because of this, some very large programs may not be compilable, although this problem can be overcome by breaking the program down into smaller sections and then compiling them separately. Typically, programs compiled by *The Einstein Compiler* are slightly less than twice the source code length.

Actual compilation is both easy and quick. In fact, if you select to use the standard parameters, the process is totally automatic. Simply boot the disk containing the source program, load the source program, insert *The Einstein Compiler* disk, type BRUN EINSTEIN, and watch the process proceed at the rate of several lines of code per second. When completed, the compiled program is in memory and has only to be saved to disk. The finished product is still an *Applesoft* program, but it only has one line, a call statement to the machine code.

If you like to get your hands into the works, you can modify the standard parameter settings that affect information output, program control, variable definition and storage, and memory management. Compiler directives in the form of REM statements can be placed inside your source program. These can set entry points, variable allocation, and string length.

As is the case with most compilers, *Applesoft* dimension statements cannot contain variables as arguments, nor can you dimension an array more than once. Instead, you must allocate the maximum value needed.

The manual is very thorough and discusses both chained and coresident multimodule programs. The program is supplied on a single protected disk; a backup copy is provided free upon warranty registration.

Requirements: Apple II with *Applesoft BASIC*, IIe, II+; disk drive on Apple III in emulation mode
The Einstein Corp., $129

FORTH (LABORATORY MICROSYSTEMS)

Laboratory Microsystems has implemented a family of FORTH systems for processors ranging from the 8080 and Z80 under CP/M (there are separate versions for each), through the 8086/8088 running MSDOS or CP/M-86, up to the 68000 running CP/M-68K. All versions are moving towards support of the FORTH 1979 and (pending) 1983 standards.

All FORTHs are packaged as an applications development system. These include a multitasking interepreter/compiler with virtual memory management, a full-screen editor, a decompiler, and a set of utilities. Separate native code compilers are available for all but the 68K processor. Cross compilers for other target systems are offered as well.

The PC/FORTH versions, for example, support a 16-bit FORTH machine and provide addressing for 64K of working memory. The PC/FORTH+, 8086

FORTH+, and 68000 FORTH+ versions provide a 32-bit FORTH machine that can use up to 1 million bytes memory for programs and the entire memory address space of the processor for data. The "+" versions provide the 32-bit addressing in a very convenient form. The stack is always 32-bits wide and requires no adjustments for mode switching. Threaded addresses are stored as 16- or 32-bit values, and the form is automatically detected by the address fetch routines. This means that linking to the words defined in the first 32K of memory is speeded up. Since these lower words are the most often used, this can be a significant improvement. It also relieves the user from worrying about what mode he or she is in. Definitely a plus.

IBM versions fully support DOS files and use DOS facilities to provide application-oriented screen subfiles. Both systems also support building an expanded FORTH nucleus containing user selected functions. Both of these are extremely useful functions.

The primary negative is the cost. Many functions, such as floating-point math and graphics, are supplied as extra cost options. By the time you add it all up, you can have a very complete FORTH system, but also a very expensive one.

Requirements: CP/M-80, CP/M-86, CP/M-68K, or MS-DOS; 64K RAM, disk drive

Laboratory Microsystems, FORTH (8080 or Z80 CP/M 2.2) $50.00; PC/FORTH (MSDOS or CP/M-86) $100; 68000 FORTH (CP/M-68K) $250; PC/FORTH+ (MSDOS or CP/M-86) $250; 68000 FORTH+ for CP/M-68K $400; software floating-point package (Z-80, 8086, IBM PC) $100; 8087 support (8086 or IBM PC) $100; advanced color graphics (IBM PC) $100

FORTH-32

FORTH-32 is an implementation of FORTH specifically for the IBM PC. It emulates a 32-bit FORTH machine one capable of manipulating 32-bit numbers within the 16-bit design of the PC. Although this makes *FORTH-32* somewhat slower than more traditional versions of FORTH, it does allow use of all of the PC memory.

FORTH-32 also provides an exceptionally complete use of DOS files in FORTH environment. DOS files can be used for application-oriented screen files, as well as for redirected input, output, and echo streams, much the same as in DOS 2.0. *FORTH-32* supports DOS 1.0, 1.1, and 2.0 files.

FORTH-32 includes a number of features in the base system that are extra-cost options in other versions of this language. The base price includes a symbolic debug facility; two full-screen editors (one for the monochrome, and a second that takes advantage of the additional screen memory on the color adapter); a decompiler; a utility to build an extended system containing user-selected functions; a full 8086 assembler; support for the lightpen, joystick, and communication I/O; and two files of utility and demo screens.

The base system does not provide floating-point math, but two options are available at extra cost, both based on the 8087 math coprocessor. The hardware version uses the chip directly, the software version simulates the 8087. A very nice feature is the ability to save and restore the state of the 8087. This means that one function can use the 8087 without destroying results left there by another.

Since *FORTH-32* supports both 16-bit and 32-bit modes of operation, some user functions can require two definitions. This can cause confusion if you are trying to get the speed of 16-bit operation and the memory access provided by the 32-bit mode.

Documentation and support are excellent. Overall, this is one of the better versions of FORTH for the IBM PC.

Requirements: IBM PC, 64K RAM, one disk drive

Quest Research, $195; floating-point software $95; 8087 support $95

FORTRAN (DIGITAL RESEARCH)

Digital Research's FORTRAN '77 is a complete implementation of the standard. The compiler handles both the small memory model and the large. The small model handles 64K of data and 64K of code. The large model will handle up to 1MB of code and data. The large model has advantage over Microsoft's overlay file for data for some applications. Single-precision complex functions are also supported.

For CP/M-86 users, this is clearly the compiler of choice. The documentation is detailed, well organized, and clearly written. I/O support such as *Access Manager* and *Display Manager* is readily available from Digital Research. The inclusion of a librarian makes it competitively priced. The attention to critical details, such as the documentation, and the expanded capacity make the compiler superior to Supersoft's *FORTRAN IV*. Digital Re-

search has also given the issue of the transportability of source code far more careful attention than the competition.

The MS-DOS version is at the moment, however, an open question. It is compatible with MS-DOS 1.1, but DOS 2.0 introduces fundamental incompatibilities with CP/M-86. This compiler was only recently released, so it is too early to know how well Digital Research has dealt with these problems.

Meanwhile, MS-DOS users are urged to compare carefully the Digital Research and Microsoft compilers. There are considerable differences between them. For example, the Digital Research compiler generates smaller intermediate files from the first pass. And there are subtle differences in the way each compiler implements, say, the Open statement.

Perhaps the most important point is not which is best, but that microcomputer users of FORTRAN have, for the first time, a choice among viable alternatives.

Requirements: CP/M-86 or MS-DOS
Digital Research, $450

FORTRAN IV (SUPERSOFT)

Supersoft's FORTRAN is a FORTRAN '66 (ANSI X3.9) compiler with extensions. The CP/M version 3.2 was last updated in September 1983. Unlike Microsoft's *FORTRAN 80*, further updates are planned. The compiler comes with a librarian and a linker. The compiler supports single- and double-precision calculations.

Dedicated and competent FORTRAN programmers have produced substantial programs with this compiler. They often claim that being forced to work on a resource-poor machine one with relatively little available memory and without a floating-point chip to speed calculations has made them write very tight, efficient code. The shortage of commercially available FORTRAN applications for CP/M machines is one indication of the problem. The type of applications FORTRAN is commonly used for are curtailed in range, and execute slowly on a CP/M machine. So FORTRAN on a CP/M machine is for dedicated programmers with pressing needs.

The MS-DOS and CP/M-86 *FORTRAN IV* has much greater potential. The 8087 chip offers speed, precision, and numerical safety for the first time on a microcomputer. And the 1 megabyte of available memory provides the additional resource required for serious FORTRAN work. The rapid release of major commercial applications is one indication that FORTRAN has found an inhabitable home on microcomputers.

Unfortunately, Supersoft's *FORTRAN IV* does not realize this potential. The current version allows for only 64K of data and 64K of code. A new version, expected shortly, will somewhat expand these limitations. Even so, Supersoft is lagging behind Microsoft and Digital Research in enhancing its compiler.

FORTRAN IV is a FORTRAN '66 compiler with many extensions. Unfortunately, many of these extensions are Supersoft's own. Substantial editing of source code is required to get compilable programs, even for FORTRAN '66 source code, and editing is required to transport your source code to another machine. In addition, Supersoft faces the problem that the three competing compilers are all full FORTRAN '77 compilers. So FORTRAN '77 is very likely to be the standard for microcomputers except for CP/M machines, where FORTRAN '66 dominates. If this happens, *FORTRAN IV* may become an orphan.

FORTRAN IV has other problems. The compiler assumes (and requires) the availability of a librarian to join the multiple object modules produced for even moderate amounts of source code. IBM owners will have to pay extra for it. Some MS-DOS machines, such as the Eagle PC, come with Microsoft's *Librarian*. The PC does not.

The manual is the only source of information about Supersoft's extensions. Given the number of them over 35 it is not enough. Not only is the documentation skimpy, it is often ambiguous. You are faced with a heavy investment of time or an expensive telephone bill whenever you need clarification.

The compiler comes only with the floating-point library. The 8087 library generates faster in-line 8087 code. Compilation is much faster than with the Microsoft compiler. Complex numbers are provided. A librarian is supplied with the CP/M-86 compiler. The RATFOR preprocessor comes with the FORTRAN source code, so you can edit and then compile it with the FORTRAN '77 compilers.

Requirements: CP/M-80, CP/M-86, or MS-DOS; 128K RAM
Supersoft, compiler $425; 8087 library $50; RATFOR preprocessor $100

FORTRAN (MICROSOFT)

IBM owners should not buy their FORTRAN compiler from an IBM product center or a dealer unless they are guaranteed delivery of the Microsoft 3.1 or 3.2 compilers. Earlier versions should not be accepted.

FORTRAN 3.1 was a full subset of FORTRAN '77. FORTRAN 3.2 is a major upgrade; it has the rest of FORTRAN '77, with a few minor exceptions. Version 3.2 also has single- and double-precision complex functions. A new version of the linker supplied with it supports overlay fields for handling arrays larger than 64K. Version 3.1 already allowed compilation of at least 320K of code. With the addition of overlay files for data in 3.2, substantial applications are now possible.

Versions 3.1 and 3.2 also have useful options for controlling the size of your .EXE file. The compiler requires a minimum of 128K but will take advantage of 192K of memory. Since there is little point in compiling programs you cannot test, a minimum of 512K of memory is suggested for 3.2.

This compiler comes only with the limited input-output support defined in the FORTRAN '77 standard, such as opening and closing a file. I/O support for graphics, reading the keyboard, and the like have been published but are not supplied with the compiler. A librarian must be purchased with one of Microsoft's other compilers.

The first pass of the compiler produces intermediate files roughly three times the size of the source; it is easy to compile a source file that will not fit on a dual 360K floppy-disk system. The manual offers ways to juggle your disks and get around this problem, but single-pass compilation of large programs requires either a 512K RAM disk or a hard disk.

The compiler comes with separate floating point and 8087 libraries. A useful feature is that the code from either library will take advantage of an 8087 if the chip is available. Of course, the in-line 8087 code runs much faster and requires an 8087 to run, but it is possible to have a production version of your program that runs with or without an 8087.

The documentation is a qualitative improvement over the IBM FORTRAN documentation. For example, the interface with Pascal and assembly language is adequately explained, and extensive error messages have been added.

Because of the large volume of sales, the extensive I/O support, and the frequent upgrades, this compiler is recommended for users who wish to learn FORTRAN. Customer support, however, is limited and requires long and expensive telephone waits. Since the manual is for reference, you will need a FORTRAN text.

Microsoft updates this compiler but does not publicize the fact. You must call customer service and get a return authorization number. To save time and postage, find out what is in the current update, and when the next update is due.

Requirements: MS-DOS, 128K RAM
Microsoft Corp., $350

IBM PC BASIC 2.00

BASIC 2.00 is the latest version of *Microsoft BASIC* for the IBM PC. Microsoft sells a similar BASIC to other manufacturers under the name *GW BASIC*. According to one computer-industry joke, the letters "GW" stand for "Gee Whiz," a tribute to the powerful music, graphics, communications, joystick, and screen-editing features of this BASIC.

BASIC 2.00 is respectable even without its gee-whiz extensions. Variable names can be up to 40 characters long, helping you to write readable programs. To the usual BASIC program-control structures (Gosub, GoTo, If ... Then ... Else, and so on), *BASIC 2.00* adds the While ... Wend loop. A rich variety of data types is provided, including 16-bit signed integers, single and double-precision floating-point numbers, strings, and n-dimensioned arrays of each type. *BASIC 2.00* lacks a decimal number type, desirable although not essential for financial programs. A full complement of built-in functions includes trigonometric, string, and algebraic operators. Both sequential and random-access data files are supported. Program entry and editing is assisted by a built-in full-screen editor and a renumbering command.

BASIC 2.00 includes a number of features that simplify the programming of complex graphics. Various commands draw circles, lines, and ellipses, color in arbitrarily shaped regions, set, reset, and test the color of a point. Lines and fill areas can be defined as patterns as well as solids. Figures can be copied from the screen into arrays, then rapidly redrawn. Graphics commands can be combined into macros.

Coordinate systems of different size than the physical screen limits can be simulated, and BASIC will automatically scale them. Areas on the screen

can be defined as viewports and they will scroll independently of the rest of the screen.

The Sound and Play statements let you create songs or sound effects within a BASIC program. The music can be played while graphics are being generated in a game or educational program.

Complete control of the asynchronous communication ports is provided, allowing you transfer data or even write a terminal emulator in BASIC.

Assembly-language subroutines can be loaded and called from within a BASIC program.

Joystick coordinates and trigger positions can be read with the Stick and Strig functions.

Microsoft BASIC is the common currency among microcomputer BASICs. *BASIC 2.00* is an especially full-featured version of *Microsoft BASIC,* suitable for both home and business use.

Requirements: IBM PC, 64K RAM, disk drive; IBM PC XT, 128K RAM IBM; DOS 2.00 and BASIC 2.00
Microsoft, $60

IBM PC MACRO ASSEMBLER

The IBM PC *Macro Assembler* was developed by Microsoft for IBM and is nearly identical to the Microsoft MS-DOS *Macro Assembler;* most comments apply to that version too.

The IBM PC *Macro Assembler* lets you write assembly-language programs that will execute directly on the PC's 8088, usually much faster than programs written in BASIC. What do you pay for this speed? The 8088 understands only far simpler instructions than the BASIC interpreter can. Assembly-language programs take longer to write than BASIC programs, and assembly language is harder to learn.

If you learned assembly language on a Z-80 or 8080-based machine, an 8088 assembler will seem both familiar and strange at the same time. The 8088 microprocessor is an outgrowth of the 8080 design, but its assembly language is considerably more complicated. The 8088 can address a full megabyte, 16 times more than the Z-80's 64K. The drawback is that it becomes much more difficult to organize memory references within a program.

The IBM PC *Macro Assembler* package includes two assemblers: *ASM,* the Small Assembler, which runs in 64KB; *MASM,* the Macro Assembler, requires 96K but adds macros, conditional assembly, and structures to *ASM.* You develop your assembly-language source code using *EDLIN,* the primitive line editor that comes with MS-DOS. You can use your word processor if it can create plain ASCII files.

After assembly, programs must be linked before they can be run. A cross-reference utility provides a cross reference of symbolic names used within an assembly. Unfortunately, it cannot do this across multiple assemblies.

The manual accompanying the IBM PC *Macro Assembler* is thorough and a good reference. Unless you are a very experienced assembly-language programmer, however, it will not stand on its own to teach you 8088 assembly-language programming.

The 8088 offers a high-powered assembly language. It borrows several concepts from high-level languages, such as procedures and structures. It is challenging to learn, but the package works well and programming in assembly language is one way to dig into your IBM PC and learn it inside out.

Requirements: IBM PC, 64K RAM, disk drive
IBM, $99.95

LC

The C language was developed at Bell Labs as an alternative to assembler for program development. In this it has been spectacularly successful. Versions of C have been used to write everything from database managers to the Unix operating system.

The *LC* compiler from MISOSYS is a subset of a full C compiler for Radio Shack computers. It lacks several useful features of the original. Floating point variables and structures and unions two very useful data types are the most significant. It is still possible to do floating point operations by calling on the TRS-80 ROM with the FP.LIB file, but this "kluge" makes it impossible to use the program on other computers. Programs developed in *LC* will run on a Unix system if the functions in FP.LIB are not used.

LC is packaged with the *EDAS* editor/assembler, which is required to create the executable object code. (*LC* also requires LDOS; it will not function on TRS DOS 1.3. However, there is a version for the Model 4 under TRS DOS 6.x.) The *EDAS* editor is used to create LC source code. The *LC* compiler turns this into an assembly-language source code, which *EDAS* assembles along with library files to create a runnable program. This may sound complex, but a supplied JCL file performs the whole process with one command.

The documentation gives adequate instruction in

the use of this compiler. It does not teach programming in C. With a good tutorial in hand, however, it is possible to turn out programs nearly as fast as the equivalent machine language, but in much less time.

If you have a TRS-80 and are interested in using a new language to develop compact and high-performance programs, the combination of *LC* and *EDAS* will probably be a good investment.

Requirements: TRS-80 Model I, 48K RAM; Model III or 4, 64K RAM; LDOS or TRS DOS 6.0
MISOSYS, $149.95

LOGO (COMMODORE)

Commodore's Logo programming language is one of the real bargains in personal and home computing. It was designed for the company by Terrapin, Inc., the leading Logo group in the United States and the developer of *Apple Logo*. To create this and other versions, Terrapin worked with and under license from the Massachusetts Institute of Technology, originators of the Logo language.

Commodore Logo includes the language's most familiar aspects: its turtle graphics and recursive procedures. Over 130 Logo primitives, or commands, are supported, most of which are common to *M.I.T. Logo*. In addition, new commands accommodate the Commodore 64's color graphics, sprites, and sound.

When Logo is loaded in the Commodore 64, it actually displaces BASIC. Thus, there is plenty of room in memory, not only to write programs, but to load predefined procedures from utility files. In Logo, a space in memory is defined as a node; 2,866 are available for programming in this version.

Even though this is an excellent implementation of Logo, the materials that Commodore packages with the language are almost more impressive. First is *Logo: A Language for Learning*, which is an adaptation of the original M.I.T. tutorial. This 367-page book is aimed at introducing Logo to children and other novice programmers. It is among the clearest and best-written computer books, and does an excellent job of demonstrating the language's power and usefulness. Commands are presented in a logical way and 20 projects ranging from simple games to grammar lessons show how commands and principles work.

An even more valuable bonus, however, is a second diskette containing demonstration programs, additional procedures (new Logo words), and utilities. This disk is jammed with programs that let you begin exploring Logo immediately. The goodies include: Instant, a system of single-letter Logo commands for nonreaders; Joy, a routine for drawing on the screen with a joystick; and Plotter, a routine for drawing on paper with Commodore's four-color plotter. Others are Adventure, a simple adventure game; Animal, a classic demonstration of recursion and artificial intelligence principles; Dynatrack, a turtle game; Grammar, procedures for generating random sentences; and a variety of utilities for creating sprites, playing music, and customizing Logo with assembly-language routines.

Logo, of course, isn't of interest to everyone. Still, the *Commodore Logo* package is so good and so inexpensive that it is worth the investment simply to play and experiment with this intriguing language.

Be sure to get the right version, however. There are two packagings of *Commodore Logo* currently in stores. The contents are identical, but one has a shrunken version of the manual. If you're shopping, look for the 8½-by-11-inch original. They both cost the same.

Requirements: Commodore 64, one disk drive
Commodore Business Machines, $50

LOGO (IBM)

This is an extremely rich Logo designed for the IBM PC. It supports either the monochrome (text only) or the color display. If both are available, the monochrome can be used for text, while the color is used for graphics. The joystick, tone generator, and communications port are also supported. Documentation is good to excellent for reference, and a tutorial introduction to turtle graphics is provided.

The normal turtle graphics functions are provided. In addition, the turtle can be changed to any user-specified shape, the aspect ratio of the drawing can be set for the screen or printer being used. A Fill command allows you to color enclosed areas. This facility is missing from most other Logos.

DOS files are fully supported and can be read or written sequentially or randomly. Graphics screens are handled with SAVEPIC and LOADPIC, binary files with .BLOAD and .BSAVE, and data files with various forms or READ, TYPE, PRINT, and SHOW. Memory can be inspected and modified by .EXAMINE and .DEPOSIT and assembler language routines can be invoked by .CALL.

Full workspace management facilities are provided based on the Logo packaging concept. A complete set of word and list manipulation functions is provided. Property lists are also allowed.

The standard set of arithmetic functions is provided, and math can be performed to any desired precision up to 1,000 digits. More digits will cause calculations to take longer. FORM and EFORM can be used to control the format of the output.

It's hard to give the full flavor of this package in a short review. Although more expensive than others, this version seems to be the best match between the unique features of Logo and the capabilities of the IBM PC in the MS-DOS environment.

Requirements: IBM PC, 128K RAM, one disk drive, DOS 2.0
IBM, $175

M-ZAL ASSEMBLER

M-ZAL is an excellent assembly-language development system for the Radio Shack TRS-80. It is menu-driven, includes a full-screen text editor, a macro assembler, a linker, a debugger/monitor, and a labelling disassembler. The last two features have been added since this review was written and have not yet been tested.

M-ZAL's text editor creates special format text files and is thus not suitable for other uses. It supports horizontal as well as vertical scrolling and allows lines up to 128 characters long. Editing commands can be applied to characters, lines, or blocks of lines. Reading and writing of Radio Shack *EDTASM*-format tapes is supported.

The *M-ZAL* assembler takes a unique approach to producing relocatable code. Its output is an executable command ("/CMD") file, plus an optional file containing relocation information. You only run the linker if you want to relocate a program, or create a single command file from multiple command files.

This approach gives you the best of both worlds. Like simpler assemblers (such as *EDTASM*), *M-ZAL* can quickly assemble small programs producing immediately executable code. This promotes a fast edit-assemble-test development cycle. However, like more complex assemblers (such as Microsoft's *M-80*), *M-ZAL* can also link the output of multiple assemblies together, letting you develop a large assembly-language program in small manageable modules rather than as one huge program. This is also assisted by an "Include" assembler pseudo-op, which automatically includes one assembler source file in the assembly of another.

The assembler includes macro definitions and conditional assembly with nesting. Macros can even be called recursively.

The *M-ZAL* manual is suitable for development of small and large assembly-language programs. Its menu structure, full-screen editor, and fast assembler combine to help novice assembly-language programmers. Its modular orientation helps the advanced programmer to develop large applications for the TRS-80.

Requirements: TRS-80 Model I or III, 32K RAM, two disk drives
Computer Applications Unlimited, $99.95

MACROSOFT

Every computer language has one thing in common with all others: It must be translated into machine language before the computer can run it. Computer languages such as BASIC, Pascal, FORTRAN, and COBOL, fall into two main types: compiled or interpreted languages.

Compiled languages must be translated from their high-level form into machine language before the computer can run them. Once compiled, they can be run over and over without having to be translated each time. Since the program is then in machine-language form, it runs fast.

Interpreted languages, on the other hand, are translated into machine language as the program runs a line at a time. If the program has repetitive loops, these same statements must be translated each time the loop is executed. This results in much slower-running programs.

Another "language" form, called assembler, is often used to write machine language programs, but it is difficult for many people to master.

Macrosoft is a language, like *Applesoft BASIC*, that is assembled directly into machine language. Consisting of a library of assembly language macros that resemble *BASIC* statements—a macro is a kind of assembly language routine—*Macrosoft* allows you to write "assembly-language" programs as easily as writing them in *BASIC*.

Why should you use *Macrosoft* instead of an *Applesoft* compiler? Well, the problem with most compilers is they take a short *Applesoft* program and turn it into a long machine language program. It runs faster, but if your program stores data in

arrays in memory, you may not have much space left by the time you run a compiled version. This is because most compilers require a "run-time package," which is usually quite large. Your assembled *Macrosoft* programs, while larger than native *Applesoft* programs, will still be smaller than compiled versions.

Because *Macrosoft* is not a compiler, it is able to have features that *Applesoft* does not. Among them are If-Then-Else, Repeat-Until, and While-While. And because it resembles *Applesoft,* it is easy to rewrite your programs in *Macrosoft.*

One requirement of this package is that you must have *The Assembler* by MicroSPARC. No other assembler will work! You must also have *Applesoft* in RAM or ROM to use any of the high-resolution graphics or floating point features.

An 80-page manual is provided which includes a tutorial, several program examples, and complete programming instructions.

Requirements: Apple II, II+ or IIe, DOS 3.3, 48K RAM, one disk drive
MicroSPARC, $49.95

MICROSOFT COBOL

Microsoft COBOL is one of the most widely used COBOLs on microcomputers, and it has a good track record. The MS-DOS version is essentially compatible with the older CP/M-80 version, so some programs from that world can be transported to the machines such as the IBM PC with a minimal conversion effort.

One of the strong points of *Microsoft COBOL* is the powerful screen programming capability, which lets you easily develop professional-looking, screen-oriented programs. A teletype-style question-and-answer approach to user dialog will mark your programs as amateurish. A better approach is to draw a screen full of prompts and let the user type in answers as if filling in a form. *Microsoft COBOL* lets you describe such a form in the screen section of your program, and then issue a single command to draw the screen and accept inputs from each field. This considerably simplifies screen programming and gives Microsoft an advantage over Ryan-McFarland, a competitive COBOL.

One drawback is that *Microsoft COBOL* only allows a single key for indexed files. Many COBOL programs use multiple keys, and conversion of such a program to *Microsoft COBOL* would be difficult indeed.

The *Microsoft COBOL* compiler is no speed demon. Most programs compile in the range of 50 to 100 lines per minute. After compiling, you must link your program before it can be run. As with other Microsoft languages, the common linker is used, making it easy to integrate assembly-language subroutines produced by the Microsoft assembler.

The manual is a suitable reference but you will need a good textbook to learn COBOL.

Although most computer science majors will snicker at COBOL as a verbose, cumbersome language, there are many sound reasons to use it: COBOL is still the most widely used business programming language. It will be around a long time, and learning COBOL gives you a marketable skill. COBOL'S decimal arithmetic is better suited to financial applications than BASIC's floating point. COBOL programs can be much more readable than BASIC. In trade, you must be willing to work harder than when slapping a BASIC program together. If you decide to try COBOL, *Microsoft COBOL* is a good version to start with.

Requirements: CP/M-80 or MS-DOS, 64K RAM, two disk drives
Microsoft, $750

MMS FORTH

FORTH is a programming language with a small but very devoted following. It is stack-oriented and somewhat cryptic in its notation. It is fast, generally around half the speed of assembly-language programs. It is compact; the core interpreter for a simple FORTH system can be developed in only a few hundred bytes. FORTH is an "extensible language." FORTH programs are usually written as a series of small procedures, each of which can be invoked by typing its name, once it has been defined. In effect, they become part of the language itself.

Miller Microcomputer Services (MMS) is one of the best known vendors of FORTH for the TRS-80 and has recently entered the IBM PC arena with their product. It is a fine product, and MMS has developed an excellent reputation for supporting and enhancing it.

MMS FORTH is a standalone system—it does not run on top of another operating system. This has pluses and minuses: It runs fast, and supports some unusual features for your programs. On the

other hand, there is no built-in way to transfer files between FORTH disks and your normal DOS disks.

FORTH programs see their environment in terms of blocks, usually 1,024 bytes each. A program is a series of blocks, each corresponding to a single screen. The disk is also viewed as a series of blocks. When your program runs, it can refer to a block by number, and the FORTH operating system either finds that numbered block in memory, or brings it in from disk. This is known as "virtual memory," mentioned above; it lets you create a program larger than will fit in memory at one time.

The manual that accompanies *MMS FORTH* is pretty spartan. A good introductory text is a must if you are new to this language. Try to find out more about FORTH before buying the system. *MMS FORTH* is a fine implementation if you like the language, but it is not for everyone.

Requirements: TRS-80 Models I, III, and 4, 32K RAM, disk drive; IBM PC, 64K RAM, disk drive

Miller Microcomputer Services, TRS-80, $129.95; IBM PC, $249.95

PASCAL (ALCOR)

Alcor Pascal is a full-fledged implementation of the Pascal language for both TRS-80 and CP/M computers. Alcor has made a determined effort to meet the Pascal standard; the compiler is almost identical in operation to the one described by Jensen and Wirth. Only a few little-used features are missing; the ones provided operate as expected. A large library of extension routines supplies convenience not found in Pascal itself without compromising this adherence to the standard. The result is powerful enough for commercial programming, yet suitable for those just learning this language: Examples found in many common Pascal texts will run with realtively little tinkering. Radio Shack apparently was impressed by this package; they now offer it as *Radio Shack Pascal 2.0*.

A full-screen text editor is used to create Pascal source programs, which are then fed to the compiler. Two versions of the compiler are provided: One compiles faster, the other compiles larger programs—Alcor claims up to 4,000 lines. An Include compiler-command lets you build libraries of Pascal routines and include them in a compilation simply by naming them. Compilation is not particularly fast. On a TRS-80 Model I—admittedly no speed merchant—the compiler processes Pascal programs at about 100 lines per minute.

Compiled programs can be run under an interpreter or linked with a runtime system using the supplied linker. Separately compiled modules can be linked together to form an executable "/CMD" file.

At runtime, the Radio Shack version of *Alcor Pascal* uses the TRS-80 ROM code to perform integer and floating point arithmetic, saving space in compiled programs. Both single- and double-precision floating point numbers are allowed. Strings can be up to 32,767 characters long. A library of string functions similar to those of *Microsoft BASIC* is provided.

Programs compiled by *Alcor Pascal* may run significantly faster than similar BASIC programs. One benchmark came out ten times faster when written in Pascal than in *TRS-80 BASIC*. Alcor also provides an advanced development package, which includes utility porgrams that compress and speed up your Pascal programs. When optimized using the advanced development package, that same benchmark ran 30 times faster than BASIC.

The *Alcor BASIC* manual is complete and well written. It includes a tutorial as well as a reference section, and the index could serve as a model for other software manuals. Supplemented by a good text, the manual will provide beginners with a good introduction to Pascal programming.

Requirements: TRS-80 Model I, III, or 4 or CP/M-80, 48K, two disk drives recommended

Alcor Systems, Pascal Development System version 2.0 $199; Advanced Development Package $125; Radio Shack, Combined package $249.95

PASCAL-80

Pascal-80 is a great interactive version of Pascal for the TRS-80. Unlike most compiled languages, which force you to switch diskettes while moving from text editor to compiler to linker to debugger and back again during program development, *Pascal-80* lets you edit, compile, and run a program without touching the door on your disk drive.

Pascal-80 runs under just about all the popular TRS-80 disk operating systems. Its main menu offers a choice of loading or saving a program to disk, entering the full-screen editor, compiling the program in memory, or running a compiled program. You get 23K bytes of free space for your program, or 32K bytes if you run a compiled program from disk. You can also build a "/CMD" file, directly executable from DOS.

The full screen editor is simple and fast. It automatically maintains your current indent level, making it easy to write neatly formatted programs. Most operations are intuitive, although the editor has a few annoying quirks; for example, it forgets changes made to a line if you don't hit Enter before leaving that line.

If you blink when you compile your program, you will miss the show. *Pascal-80*'s compiler is fast! In one test, it ran at over 1,000 lines per minute. Program execution speed is good, too—most computations run several times faster than equivalent BASIC code.

When compiling, if your program contains a syntax error, compilation halts and a plain-English error message points out the problem. When you re-enter the editor, the cursor is positioned at the error location, ready for you to make the correction and recompile.

The *Pascal-80* manual is modest, although it fully explains how to use the system. You will need a standard Pascal textbook for reference. For those wanting to learn standard Pascal, only a few little-used features like Get and Put are excluded from *Pascal-80*. A number of useful extensions for the TRS-80 hardware environment are provided. If you are looking for an alternative to BASIC but don't want to leave BASIC's friendly, interactive style of programming behind, take a look at *Pascal-80*.

Requirements: TRS-80, Model I, III, or 4, 32K RAM, disk drive

New Classics Software, *Pascal-80* $99; Trial version $14.77

PASCAL (TURBO)

Do you remember *JRT Pascal*? Priced at just under $30, it seemed an amazing bargain. But a program written in *JRT Pascal* was almost impossible to translate to any other version of the language. And *JRT* was buggy. For many programmers, its best feature was that the company seldom filled its orders.

Turbo Pascal is all that *JRT* claimed to be and more—$20 more, to be exact. With better performance than other Pascals and conveniences that none can match, *Turbo* is only $49.95, with an extra onetime license fee of $100 for commercial programmers who plan to sell products written with it.

What you get for the money is little short of astonishing. As far as it can be, *Turbo* is a standard Pascal; if you write a program using this compiler, it is relatively easy to translate it for another. It's small; including a built-in program editor, the 8-bit version takes up only 28K of working memory, the 16-bit version only 33K. It's fast: Because compilation is entirely in RAM, it takes only moments to compile a program. And because it produces native code, the programs run quickly; one standard benchmark takes 9 seconds to run in *IBM Pascal*, just over 2 seconds in *Turbo*. Chaining and overlays are easy, and an 16-bit option supports the 8087 mathematics coprocessor. The IBM version supports sound and color graphics, and the latest revision even does windows! As a final bonus, Borland International, the manufacturer, throws in the source code for a small spreadsheet program to show new users how a practical application is written in Pascal.

Turbo Pascal wakes up at a main menu, from which all other functions are accessible. It is possible to edit, compile, run, or save a program; examine the disk directory; or run an external program from this menu.

The program editor is one key to the package's overall efficiency. Though not as convenient as it might be—no editor that mimics *WordStar* could be—it gets the job done, and anyone familiar with *WordStar* can use it with only a few moments of scanning the manual. Having both the compiler and the editor in memory eliminates the long disk accesses that add to debugging time with other compilers. Best of all, when a run-time error appears an option switch will drop you back into the editor, with the cursor on the line where the problem occurred. At worst, this is a time saver; for someone just learning Pascal, it can prevent many lost hours.

Borland International, the manufacturer, might not be happy if a new programmer called to ask how to declare an array. Short of that, their support is far better than anyone could ask at this price. Experienced programmers are unlikely to need it; the reference manual is comprehensive and well organized.

The only obvious flaw with this compiler is that the 8-bit version compiles to Z-80 code. It will not run on an 8080 or an 8085. On the other hand, this may in part account for the execution speed of *Turbo Pascal* programs. For a majority of users, it should not be a problem.

There are three kinds of computer users who should buy this package: beginning programmers

who want an inexpensive route into Pascal; experienced programmers who want a fast, convenient, passably bug-free compiler that does its best to adhere to standard Pascal; and everyone else. Most software houses charge ten times what Borland does and deliver less. If enough of these packages are sold, they may get the message.
Requirements: Apple CP/M, CP/M-80, CP/M-86, IBM PC, generic MS-DOS
Borland International, $49.95; with 8087 support $89.95; software developer's license $100

PASCAL (UCSD)

Pascal, like BASIC, was originally invented as a teaching language. Its special features were intended to force the programmer to program well: to start by considering the problem as a whole, then break it into smaller problems, step by step, until each is simple enough to be coded. This is called structured programming, and while it is possible to write structured programs in BASIC, this is really what Pascal is all about. Structured programs are easier to write, modify, and understand in Pascal.

Pascal is also flexible enough to suit a wide variety of programming tasks. While it is not without its shortcomings, Pascal and its daughters, Ada and Modula-2, are supplanting older languages such as BASIC, COBOL, and FORTRAN for many applications.

Unfortunately, Niklaus Wirth's original definition of Pascal was not complete enough to stand on its own. Intended for use in classrooms where a real computer was not available, it did not even include I/O routines. String handling was also very weak. Therefore, every commercial version of Pascal has been extended to cover Standard Pascal's omissions. *UCSD Pascal*, developed at the University of California, San Diego, is one of the most popular Pascals for microcomputers, largely due to the popularity of the USCD p-System, a sophisticated operating system.

While different versions of Pascal handle the extensions differently, each is still true to the spirit of the language. No programmer familiar with any version of Pascal should have any problem adapting to another version.

The first thing a BASIC programmer would notice about a Pascal program is that it doesn't look like a program: There are no line numbers, no GoTo statements, and the variable names are ordinary words. The text is spread over the page, separated into blocks by blank lines and indentation. In fact, these blocks correspond to the logical parts of the program: definitions of data types, constants, variables, and subroutines. Each subroutine is miniature program, with its own definitions and subroutines. Once defined, each subroutine becomes, in effect, part of the language.

The p-system nicely accomodates the structured nature of Pascal by providing for program segmentation and separate compilation. Thus a collection of oft-used variables, procedures, and functions can be shared by several programs or subprograms, linked during compilation or execution.

Pascal's power stems from the language's ability to fit itself to your situation. It is not filled with obscure features that anticipate your every need. Instead, it is endowed with a relative few very powerful facilities.

One of the most important is Pascal's full range of data types: integers, reals, characters, Boolean (true/false), sets, arrays, records, and files. Once the use of these data types has been mastered, they can greatly simplify programs that would otherwise be needlessly complicated. In other languages, it is often necessary simulate some of these with many lines of code.

The *UCSD Pascal Compiler* extends the standard data types to include strings, long integers, text files, interactive devices, and packed arrays. It also includes a turtle graphics unit and provides for transcendental arithmetic, memory management, and for running sound, color, paddles, and so on. Some implementations even permit a computer to run several programs at once. For those who need to delve deeper, the fine print enables you to open the hood and control program flow, memory, and I/O directly, and to link assembly language or p-code into your programs.

If all this sounds like gibberish, many skilled programmers who work with other language might well agree. It takes quite a bit of experience in Pascal or one of its derivatives to reveal just how much control its features give over the computer. Once they are assimilated, however, languages with less power become difficult to tolerate.

There are some serious omissions as well, however. Best known is Pascal's clumsy I/O; it takes several manipulations to do simple things like overwriting a disk file or appending material to it. Pascal also suffers from a variety of structures that

tend to make programs less clear. And there is no equivalent of BASIC's Val function, which interprets strings as numeric values.

Nonetheless, Pascal's continued popularity seems assured by its elegantly structured programming. Like BASIC, it excels at nothing but succeeds at almost everything. It should be in every programmer's repertoire.

All versions of *UCSD Pascal* are required to must conform closely to the original University of California copyright. The differences between them seldom affect the way programs are written; instead they change such things as the speed of compilation and execution.

This language is not likely to be available for game-style computers, but the manufacturers of most larger micros supply a compiler for their machines. Probably the best known microcomputer version of *UCSD Pascal* is *Apple Pascal*. UCSD compilers are licensed from SofTech Microsystems, of San Diego, which owns the primary license from UCSD. SofTech also supplies its own compilers for the Apple and for various machines based on the 8080, 8086, 68000, and other chips. The fastest-running UCSD p-System for the IBM PC comes from Network Consulting, Inc., of Vancouver.

Requirements: UCSD p-System, available for virtually all micro- and minicomputers, and even mainframes

SofTech Microsystems, Apple $375; 8080 $650; IBM PC $845 (supplied with p-System); Network Consulting, $700

PC LOGO

Here is another high-capability Logo package for the IBM PC. Although an updated version is supposed to become available to users of version 1, it had not been received at the time of this review.

Documentation is good to excellent and includes both tutorial and reference sections. A second disk of utility functions and test or learning programs is included.

The normal turtle graphics functions are provided. In addition, the aspect ratio of the drawing can be set for the printer or another target device. No Fill command is provided, and the turtle cannot be changed to a user-specified shape.

DOS files are supported, although not as fully as in the IBM Logo. Memory Peek and Poke and assembler language subroutines are not supported. However, direct port I/O, execution of DOS commands, and DOS BIOS interrupts are included. The lightpen is supported, but the joysticks and communication port are not. The port I/O and BIOS commands could be used to build joystick and communications capabilities if needed.

Packaging and workspace management facilities are provided along with the word and list manipulation commands. However, no facility for property lists exists in version 1. Only part of the IBM PC's memory is used, so some limitations will be found in sophisticated list processing.

The normal arithmetic functions are provided along with expanded logical operations. This is also the only Logo available that allows numbers in decimal, octal, and hexadecimal bases. Calculations are limited to six significant digits.

There is a good implementation of Logo, but not as rich as either IBM or Digital Research versions. This could change once the new release is available.

Requirements: IBM PC, 64K RAM, one disk drive

Harvard Associates, $149.95

PILOT (COMMODORE)

Pilot has been hailed as a language for use by teachers and students in classrooms. It is a tiny but powerful language with special text-handling capabilities, but is known more for introducing children and other first-timers to programming. *Commodore Pilot* is an adaptation designed for the Commodore 64 computer.

One feature that is frequently added to modern versions of *Pilot* is "turtle graphics," the centerpiece of the Logo language. *Commodore Pilot* does not have a turtle, but is tailored to some of the machine's other capabilities. It uses a new, redefined character set, can define sprites (movable screen objects), and has new commands for sound generation and drawing in high-resolution graphics.

There are four distinct modes of operation. The "Command" mode is always the starting point, and can be compared to a crossroads where the user can decide in which direction to go. One choice might be the "Immediate" mode, where you can test *Pilot*'s single-letter commands, called "opcodes," and see what they do. Using these commands in the "Edit" mode, programs can be written, then executed in the "Run" mode. (Any

program in *Pilot*'s memory workspace is run in this mode.)

Commodore Pilot is a good adaptation of "common" *Pilot*, with only one glaring error that we found. It is impossible to see a disk directory while in the language, an omission Commodore should correct. And, like most *Pilots*, this one is limited to integer (whole number) arithmetic. Still, *Commodore Pilot* should quickly find its way into classrooms.

Requirements: Commodore 64

Commodore Business Machines, $59.95

POLYFORTH LEVEL 2

If any implementation of FORTH could claim to be the definitive one, this would be it. True, it does not conform to the Forth Interest Group standard, but Forth Technology, the manufacturer, was founded by Charles Moore, the astronomer who invented this powerful and idiosyncratic language.

Polyforth lives up to is origins. Implemented on a wide variety of machines, it makes for compatibility; a program written in this dialect of FORTH can be run on many computers with many processors. However, *Polyforth* is a stand-alone programming environment, with its own built-in operating system and its own disk format. Therefore, programs written in this FORTH cannot be stored on a disk with CP/M or MS-DOS programs, and *Polyforth* cannot take advantage of features provided by other operating systems. On the IBM PC, for example, PC DOS makes it possible to type ahead during keyboard input; with *Polyforth*, typing too quickly causes letters to be lost.

Balancing these disadvantages, at least in part, are some features that show Forth Technology's decade of experience in developing professional-level FORTH systems. As a stand-alone system, *Polyforth* can support such features as multitasking operation, interrupts, and vectored execution. The designers have done a particularly good job with these sophisticated machine-level processes. These facilities are among the safest and easiest to use of their kind available in any language.

Polyforth also offers a series of add-on features, including graphics, a database system, and a good package to take advantage of the 8087 mathematics coprocessor available for the IBM PC.

For someone who wants to develop applications in a stand-alone FORTH environment or who requires multitasking operation for a specific problem, there is probably no better product around at this time. The more casual user, one who needs fig-FORTH compatibility or whose major work requires CP/M or MS-DOS, will not be as well satisfied.

Requirements: CP/M, CP/M-86, IBM PC, or MS-DOS; 32K RAM for most implementations; one disk drive

Forth Technology, $149; 8087 extensions $129; graphics extensions $100; database extensions $75; report writer (requires database extensions) $25; documenter (requires database extensions) $75

RM COBOL

Why use COBOL on your micro? It requires a lot of typing, since COBOL programs tend to be wordy. It is not interactive as BASIC is; you have to type your program in, then compile it, and finally run it. If there are errors, you cannot hit Break, correct a line of your program, and rerun it; you must go back to the editor program, make the correction, and recompile.

On the plus side, there are more lines of COBOL code written than of any other programming language. If part of your interest in a microcomputer includes job training, COBOL programmers are still in high demand. *Ryan McFarland COBOL*, also called simply *RM COBOL*, follows the COBOL standard. It is a suitable learning vehicle, and programs written with it will run on many other machines. You will need a good COBOL textbook, since the manual is a reference, not a tutorial.

Another reason for using COBOL is its suitability for business programming. The biggest plus is the indexed file-management system built into *RM COBOL*. You can store information in a disk file and designate part of that information as a key. You can then get the information back by specifying the key value, rather than a meaningless record number. Unlike some other compilers, *RM COBOL* supports multiple keys, so you can index each record in your file by several values if you so choose. Also, *RM COBOL* stores numbers in a precise, decimal format; you will not lose track of pennies through conversion between decimal and binary, as is likely in most BASICs.

A line-oriented editor comes with *RM COBOL* for program preparation. You can also use your favorite text editor that creates plan ASCII files. The COBOL compiler runs at around 50 lines per minute, even when used with a TRS-80 Model I with

5¼-inch disk drives. Most other systems will go significantly faster.

The debugger lets you step through execution of your program and check the current values of variables. You cannot change their values, a minus. You cannot access variables by their names while you are debugging, so a printed listing is a must.

RM COBOL works well, and is a good fit to microcomputers. The TRS-80 version is particularly well regarded and faces little competition in its market. Check it out if you are interested in using COBOL on your micro.

Requirements: CP/M-80, CP/M-86, or MS-DOS, 64K RAM; TRS-80, Model I, III, or 4, 48K RAM; two disk drives

Ryan McFarland, $750; MS-DOS version $950

RSBASIC

Radio Shack's Compiler BASIC, or *RSBASIC,* has never really taken off. It's not a bad product, but it doesn't fit very well into the TRS-80 world. Almost everyone who programs in BASIC on a TRS-80 uses Microsoft interpreted BASIC. Most of these programmers long for a way to speed up their programs, and a compiler is one possible solution. Unfortunately, *RSBASIC* does not solve this problem; it suffers too many incompatibilities with *Microsoft BASIC.* It is best thought of as an alternative BASIC for the TRS-80, one that leans toward developing large, business application programs.

RSBASIC is derived from a minicomputer BASIC and has some big machine features. For example, subprograms may be called by name; you can say CALL "PRINTBAL" instead of "GOSUB 1000" to call a subprogram to print a balance. Other nice features include program CHAINing with COMMON variables, single-key indexed sequential files, and 14-digit decimal numbers. Sixteen-bit integers are also supported. Strings are allocated a fixed amount of memory each and must be DIMensioned.

The *RSBASIC* development environment is a cross between a compiler and an interpreter. You edit, compile, debug, and run from a single prompt. Unlike an interpreter, you must compile a program before running it. The compiled code is not Z-80 machine language, however, but an intermediate form that is executed by an interpreter. This accounts for some of *RSBASIC*'s lack of speed when compared to a true compiler. *RSBASIC* runs a simple 1,000-iteration FOR ... NEXT loop slower than the TRS-80 BASIC interpreter!

The *RSBASIC* manual is large and complete. If you are already familiar with compiler systems it will serve well as a reference. If your only programming experience is with TRS-80 interpreter BASIC, you may find the manual obtuse.

RSBASIC may have just the features you've been looking for; it might pay to check. But if what you want is a way to make existing TRS-80 BASIC programs go faster, look elsewhere.

Requirements: TRS-80 Model I, III or 4; 48K RAM, two disk drives

Radio Shack, $149

SIMONS' BASIC

Simons' BASIC is a language extension that adds 114 new commands to the Commodore 64's interpreter. To say that it improves the computer's performance would be an understatement. *Simons' BASIC* is almost a necessity for anyone who wants to program the 64 and exploit its considerable power.

Commodore BASIC isn't a bad version of the language. It was written for Commodore by Microsoft when the company debuted its PET computer. It has very few idiosyncrasies and practically no major bugs. But it hasn't grown with the Commodore computers. The PET was a small computer without color, high-resolution graphics, or sound capabilities. The 64 has all of those, but *Commodore BASIC* can't access these features, except through a series of Poke commands.

These and other problems were addressed by a young British programmer named David Simons who, at the age of 16, surveyed other extended BASICs to design this one. Simons focused his efforts on several areas where he thought *Commodore BASIC* needed improvement. These not only included the obvious graphics, color, and sound but also programmers aids, new mathematical functions, links for using joysticks, light pens, and game paddles, and, best of all, commands that give *Simons' BASIC* structured-programming power.

Simons' BASIC doesn't replace *Commodore BASIC,* but merely extends it. It is packaged on a cartridge and plugs into the back of the computer. When the machine is powered, a new message, indicating that the extension is in effect, appears on the screen. This sign-on also shows that about 8K of the nearly 39K of otherwise available RAM mem-

ory is missing. This is because *Simons'* requires the use of additional RAM both for itself and for workspace.

A detailed description of all of *Simons'* new features would be impossible in this space. It takes almost all of an excellent 138-page manual that comes with the cartridge to do this. Here, though, are the highlights:

Programming aids *Simons'* includes many of the classic "toolkit" commands that make writing BASIC programs easier. Among these are Auto, Renumber, and Find.

The only problem with any of these is Renumber, which does not renumber Goto or Gosub statements. Simons (the creator) assumes that you will be using structured programming style, in which these commands are seldom, if ever, used.

Input handling and text manipulation Programmers who have not been happy with BASIC's simple Input and Get commands will welcome the new words Fetch, Insert, Inst, Place, and Dup, which expand beyond BASIC's Left$, Mid$, and Right$ commands. Print At makes screen printing easy, as does Centre (British spelling) which accomplishes the obvious. Use is a form of Print Using, the absence of which many Commodore programmers have mourned for years.

Numeric aids These are new math and arithmetic functions, including Mod, Div, and Frac. Other new commands allow easy conversion from decimal to hex and binary numbers.

Disk commands While *Simons' BASIC* doesn't offer the full range of disk commands that BASIC 4.0 a previous version of *Commodore BASIC* did, it goes a long way in making a disk drive easier to use.

Graphics These new commands are reason enough to start using *Simons' BASIC*. They give you the ability to draw on both the high-resolution (320 by 200 pixels, or individual dots on the screen) and multicolor (160 by 200 pixels) mode. Some words give you shapes circles, rectangles, boxes, arcs and others let you paint or fill areas with colors. There are 18 of these commands in all. They are all excellent and very easy to use.

Screen manipulation The commands in this group are the frosting on the cake. While not vital, they can spruce up any program. Flash flashes particular colors on the screen at any chosen rate. Scrsv saves a screen of text to tape or disk. Copy dumps a high-resolution screen to a dot matrix printer. Hrdcopy (for hard copy) does the same thing for text. In all, there are 15 new commands in this group.

Sprites and characters New commands in this group allow a novice user to use sprites definable, movable graphic objects on the video screen. Some additional commands make it possible to redesign the computer's standard character set.

Music and sound Inside the Commodore 64 is a complex sound generator known as the SID (for Sound Interface Device) chip. These new commands give access to the SID and also set up a way to encode music and sound effects within BASIC.

Structured programming Someone should and probably will write a book about this aspect of *Simons' BASIC* alone. At the heart of structured programming is the idea of procedures, best described as programs within a program. Instead of using Gotos or Gosubs, you simply name "procedures," then "call" them. Also part of structured programming, as defined here, are new kinds of loops like For/Nexts in conventional BASIC using the words If-Then-Else, Repeat Until, and Exit. Veteran programmers will welcome these; novices should learn them to write better, easier-to-understand programs from the start.

In all, *Simons' BASIC* greatly expands the Commodore 64. Plugging it in is like creating a new machine, full of exciting possibilities and opportunities. Commodore is selling the cartridge very inexpensively, which means that serious programmers, hackers, and hobbyists almost cannot afford to be without it.

Requirements: Commodore 64

Commodore Business Machines, $25

SNAPP BASIC

SNAPP BASIC is a family of enhancements to TRS-80 Microsoft BASIC. *SNAPP-II Extended BASIC* is the product reviewed here. Other members of the series include *SNAPP-III Extended Built-in Functions, SNAPP-IV Extended BASIC Mapping Support* (a screen handler), *SNAPP-V Extended File Mapping Support, SNAPP-VI College Educated Garbage Collector,* and *SNAPP-VII Reverse Compression* (BASIC program pretty printer). An excellent way to try the SNAPP products is to buy the $35 trial package, which contains limited-use versions of the entire family.

SNAPP-II Extended BASIC is a collection of utilities designed to speed BASIC program develop-

ment and debugging. Single step with trace lets you step through a BASIC program a line at a time. *SNAPP-II* lets you enter 12 common BASIC commands with a single keystroke, including Edit and List. Two cross-referencing commands combine to find references to program variables, constants, character strings, and BASIC keywords. The XDump lists your variables and their current values to the printer or screen. A fast renumbering utility does all the usual things and also lets you move or duplicate blocks of your program. XCompress can strip your program of unnecessary remarks, blanks, tabs, colons, Lets, double-quote marks, GoTos, characters beyond two in variable names, unreachable code fragments, variable-type punctuation marks, and variables in Next statements. It also renumbers your program in a tight increment-by-one fashion, and can merge multiple lines into equivalent singles.

The main differences between the SNAPP utilities and their counterparts found in some TRS-80 operating systems are completeness and speed. As the details given above for the XCompress utility show, SNAPP squeezes the last bit of performance and function out of your machine. The overall combination of SNAPP utilities is expensive, and probably will appeal mostly to those who program for pay. On the other hand, you can buy the trial package for very little money, and add the utilities you like as you see fit. The price of the trial package is applied against your purchase.

Requirements: TRS-80 Model I with LDOS, or Model 4 with TRS DOS or LDOS, 32K RAM, one disk drive

SNAPP-WARE, Model III TRS DOS $99; Model I/III LDOS $39

ULTRABASIC-64

Described as the "ultimate" software package for Commodore-64 programmers, *Ultrabasic-64* is an extension of *Commodore BASIC*. Like other such extensions, including the popular *Simons' BASIC*, this one concentrates heavily on new commands for graphics and sound, without which programming these features is a cumbersome and complicated task.

Ultrabasic-64 allows programmers access to the computer's high-resolution and multicolor graphic screens, to sprites (movable screen objects), and to the workings of the 64's powerful sound generating chip. There are 50 new commands in all. With *Ultrabasic-64* loaded, about 23K of memory is left for writing programs.

Several aspects of this language extension are unique and very clever. All three sound voices can be used simultaneously (*Simons' BASIC* provides for only one), and programming the characteristics of the sounds waveforms, envelopes, filters, and so on seems very straightforward. It is easy to use sprites as well, and this is the first such extension that can rotate sprite pictures in increments of 90 degrees with no additional programming. Sprites themselves are defined in three ways: the conventional method of using data statements in BASIC; in hexidecimal form; or as a bit map in BASIC lines. For those who are interested, *Ultrabasic-64* also supports turtle graphics similar to those found in Logo.

One convenience is the ability to store any high-resolution screen image on tape or disk by pressing a single key. Screen images can also be dumped to a Commodore dot-matrix printer, an Epson printer, or its equivalent.

Besides these graphics and sound commands, *Ultrabasic-64* offers two unique innovations. One is a way of repeating commands without using FOR/NEXT loops. Instead, brackets [] and numbers are used. This new kind of loop can begin and end on widely separated lines, and be nested up to 30 deep. Finally, *Ultrabasic-64* offers ten very handy back-timing "counters," measured in either seconds or "jiffies," excessively cutesy but useful increments of 1/6 of a second.

Requirements: Commodore 64, one disk drive

Abacus Software, $27.95

VIC FORTH

Forth code is fast, compact, extraordinarily powerful and so wholly unlike BASIC or Pascal that few outside the evangelical priesthood of the Forth Interest Group ever brave its tangled syntax. *VIC Forth* could change that. For less than $50, it gives VIC-20 owners a nearly complete version of the 1979 standard *FIG-Forth*, augmented by special commands to control the VIC's color graphics and sound generator. This is by far the cheapest set-up-and-go Forth available and probably the most powerful language sold for the VIC.

Setting up *VIC Forth* is easy: Just plug in the cartridge. Turning the machine on puts you into direct-entry mode, equivalent to a BASIC interpreter's immediate mode. Tell it to add 2 + 3 (in Forth,

you'd say "2 3 +"), and it will do so without running a formal program. Hold the Shift key and press Insert/Delete to enter the built-in editor; horizontal scrolling then lets you write a program in Forth's standard format 16 lines of 63 characters on the VIC's 22-character wide screen.

After that, you're virtually on your own. *VIC Forth*'s weakest point is it manual, a small, poorly designed booklet that tells you nothing of how to write a program in this language. Get a good Forth text Leo Brodie's *Starting Forth* (Prentice Hall) is among the best and leaf through the manual, constantly, to find out where this variation of Forth varies from the FIG standard. It's well worth the effort.

Requirements: Commodore VIC-20. Extra RAM recommended, but will not work with the 3K expander cartridge

Human Engineered Software, $49.95

OPERATING SYSTEMS

Turn on your computer, and it will usually tell you that it is ready to accept some input from you. The seemingly simple "prompt" that shows up on your screen is just the tip of the iceberg, though. What the computer has to go through to produce that prompt would amaze many neophytes. The program that performs this little bit of magic is usually an operating system.

Operating systems are the basis upon which all other computer programs are built. They include the routines that allow your keyboard to accept your typing, then move the letters that you type into the microprocessor, interpret them, and print them on your screen. They also allow you to store the information entered on a diskette or a cassette and control the basic flow of data to your printer. Without the operating system, your spreadsheet program would have to be significantly larger, because it would have to do its own control functions. Without the operating system, your ability to program in BASIC or any other high-level language would be severely limited or nonexistent. Most high-level languages can function efficiently because the basic functions are already taken care of by the operating system.

Just think, instead of saving your program to disk by typing "SAVE MYPROG," you would have to enter the program's name, tell the computer where the program was stored in the computer's memory (in hexidecimal) and how long it is, to the exact byte. You would have to be concerned about what happens if the disk-drive door is open, or if the disk is write-protected. You would have to build a routine to take care of finding space on the disk for the program, and prepare to recover cleanly if the disk did not have sufficient space to hold the program. And this is just the start. Operating systems let a computer user produce programs or run applications without worrying about all of the minute details.

Any discussion of operating systems would be incomplete without a reference to the grandfather of microcomputer operating systems, CP/M. Back in the "old" days of the early 1970s, operating systems were rudimentary program sets that enabled the original Intel microprocessors to do their magic. As time went on, Gary Kildall developed the first user-oriented operating system while working at Intel. By today's standards, the first version of CP/M was not very sophisticated. User friendliness had not yet been defined or even thought about, and you really had to be a programmer to use that early system. But it was a start.

Today, operating systems are powerful, and they include many utility programs that take care of routine computer functions like disk formatting and file copying. An operating system is usually part of the package that comes with your computer, but most machines can use a variety of operating systems. When you first use your computer, almost any system will do. After a while, however, you may find yourself looking at needs that are not met by your current system. At that point, you can review the following section of this book and find an operating system that will do just what you want.

The two most popular operating systems being sold today are MS-DOS from Microsoft (called PC DOS when sold to run the IBM PC) and CP/M, in 8- and 16-bit versions, from Digital Research. But this is just the beginning. Some operating systems will allow a computer to run more than one program at once. This "multitasking" feature can dramatically improve user productivity by allowing a spreadsheet program to print out while the user enters a second sheet. Other operating systems allow more than one user to work with the computer at one time. These "multiuser" systems are helpful in an office environment because they reduce the need for hardware, making the small computer a cost-effective way to automate an office. Still other operating systems have special routines that make graphics easy. The Pascal operating system provides a good way to write "portable" programs that can run on various types of computers. Unix and Unixlike operating systems are becoming available on microcomputers, and are currently the darling of mainframe-trained software professionals, especially when combined with the C language.

When choosing an operating system, several basic pieces of information are usually necessary. The most important is what microprocessor chip(s) the operating system was designed to work with. If you have an Apple computer, you can't use MS-DOS, because the chip that the Apple uses is not supported by MS-DOS. If you have a special problem along these lines, however, several enterprising hardware manufacturers have designed computer boards that will solve your problem. Most operating systems were designed to work with either 8-bit or 16-bit chips. When 16-bit microprocessors became popular about two years ago, operating systems like CP/M had to be redesigned

to handle the new chips. If you have an 8-bit system with an 8080 or Z-80 processor, for example, you should buy CP/M. If, on the other hand, you have a 16-bit machine, you must buy CP/M-86 or MS-DOS or one of the other systems now on the market.

In the next few years, we will see significant improvements in the available operating systems. Because of the popularity of integrated software packages and windowing, a new type of operating system is being designed that will support these features in a more efficient manner. And because the need for multiuser, multitasking systems is stirring out there, you will also see these features becoming standard in the next year or two.∞

CONCURRENT CP/M

CP/M is a member of the Digital Research family of operating systems. The original CP/M was designed as a single-user, single-task operating system, and led the operating system field for several years. A later release added a simple multiuser capability, where one disk could store the files for up to 16 users, but the system could only accommodate one user at a time. Now, with Concurrent CP/M (CCP/M), the next important step in operating systems is available. CCP/M's most prominent feature is that it allows you to run four programs at once. If you use a word processor, CCP/M allows you to edit one letter, and refer to a spreadsheet on a fourth screen all at once. The time savings can be very important for today's busy computer user.

Concurrent CP/M allows you to use a double keystroke to switch between programs. Although CCP/M does not actually run all of the programs at once, it will usually appear that way to the user. What really happens is that CCP/M runs each of the programs for a short period, then moves on to the next one. Because the program handles all of the memory management and control, the user need not be concerned with what goes on, just that the programs all run efficiently. The operating system takes advantage of the fact that you input very slowly, in the computer's terms, and uses all of the time that you spend between keystrokes to work on other jobs.

Along with multitasking, CCP/M is endowed with a very sophisticated windowing system that you enter by typing "WMENU."After the window manager is loaded, it lets you manipulate your CP/M windows by pressing the Arrow keys on your numeric keypad.

A feature that many users will really appreciate is the sophisticated time and data stamping provided by CCP/M. Whereas PC DOS and most other operating systems allow you to keep only one date/time stamp on each file, CCP/M allows three different time stamps when the file is created, accessed, or updated. The limitation is that you may use either Access or Create, but not both at the same time.

CCP/M includes many commands, some built-in and some that must be loaded before use. Commands included in the system are Dir and Sdir to list the directory of the diskette, Era and Ren to erase or rename a file, Type to show a file's contents on the screen, and User to let up to 16 users each have their own files on the same system. Other commands allow you to assemble an 8086 program, assign peripherals, configure serial ports, edit and debug programs, combine and copy files, get help, submit a file of commands for CCP/M to process, program the Function keys, get a status of the disks, and maintain your disks. The program can handle the new hard drives and includes graphics capabilities.

Requirements: IBM PC, 256K RAM, two disk drives
Digital Research, $350

DAVID-DOS II

David-Dos II, a newly released version of the original *David-Dos,* is a replacement Apple II disk operating system. It features improved text file handling plus manual or clock file dating.

Simple to install, *David-Dos II* replaces the standard DOS 3.3 on your existing disks without harming any programs on the disk. New disks can be initialized with the improved DOS with just a few keystrokes. The result: load and save *Applesoft, Integer,* and binary programs four to five times faster, read and write text files three times faster, and gain ten new DOS commands that may be used within your programs or directly from the keyboard. Two commands, TLOAD and TSAVE, will speed load and save text files about ten times faster than DOS 3.3. This is in addition to speed improvements using the normal read and write commands.

File dating can be done either manually from the keyboard or automatically using most popular clock/calendar cards. A simple setup routine provides the option of date stamping files, verifying saves, displaying catalog free sectors, making data

disks without DOS, selecting a catalog listing page size and stop key, and setting the date/time format.

The new commands also let you catalog a disk with a single keystroke, list text files to the screen with variable speed scrolling, dump memory (with ASCII translation), disassemble binary code, and append random text files. A HIDOS command moves DOS to any language or memory card in slot *0* giving an additional 10K bytes of memory space.

As is the case with other DOS enhancement programs, use is generally limited to unprotected disks; don't try to use it with *VisiCalc*, for example. But for many programs using standard DOS 3.3 that constantly access disk files and overlay program modules, the speed gained is well worth the modest investment.

David-Dos II comes on a single unprotected disk and includes a ten-page instruction guide.

Requirements: Apple II, II+, or IIe; 48K RAM, one disk drive

David Data, $39.95

DIVERSI-DOS

"PLEASE COPY THIS DISK AND GIVE IT TO EVERYONE YOU KNOW!" This is the opening line in the *Diversi-DOS* instruction guide. The catch is, to use the program legally you must send a $30 licensing fee to the company. Still, it's not a bad deal.

A replacement operating system for the Apple II, *Diversi-DOS* offers many extra features. Any disk that is not copy protected and uses Apple's standard DOS 3.3 may be updated, and some protected programs work with it as well. You simply boot the *Diversi-DOS* disk, insert the disk to be updated in your disk drive, and the new DOS will be overwritten without harming any existing data. Not only will the loading and saving of BASIC and binary files be faster, but text file handling is also improved. Reading a 52 sector text file which normally takes 42 seconds is accomplished in just over 12 seconds with *Diversi-DOS*.

If you have a 64K Apple, you can have *Diversi-DOS* placed in upper memory or on a language or RAM card. With the 64K DOS, many new features are available wildcard file names; use "=" to avoid typing the entire name; ESC aborts a Catalog listing. "C" will catalog a disk from the keyboard. Pad will print the address and length of the last BLOAD. Tlist file name will list that file to the screen, either program or a data file. There is more. A built-in editor invoked by Control-I allows inserting text at the cursor, and a keyboard macro option lets you redefine any key to produce a new character, phrase, or command. The macro table can be saved to disk to be used as needed.

Other features include a software keyboard and print buffer that uses the 16K RAM card for temporary storage. And, if all this is not enough, the author has included a copy of the arcade game, *Dogfight II*.

Documentation is excellent and is contained entirely on the disk. You can look at it on the screen or dump it to your printer.

This is a tremendous value!

Requirements: Apple II, II+ or IIe, 48K RAM, disk drive

Diversified Software Research, $30

MULTIDOS

MultiDOS is an operating system for the Radio Shack TRS-80 Models I and III, and the LOBO MAX-80. It is largely upward compatible with TRS DOS, although some programs will require patching to run under MultiDOS, as with most alternative operating systems for the TRS-80s.

MultiDOS has three very strong points, as well as a host of lesser but useful features. MultiDOS is fast, it can read and write disks created by most TRS-80 operating systems, and MultiDOS's BASIC is one of the best, if not the best, BASIC development environment available for these machines.

The speed of MultiDOS comes through in many places. It has what is probably the fastest disk format and copy utilities available. The print spooler included is fast enough to allow concurrent disk I/O. Clock speed-up mods can run at full speed during disk I/O. The BASIC utilities are very fast.

With a couple of exceptions, MultiDOS can read and write single-and double-density disks created by Model I TRS DOS, NewDOS 2.1, VTOS, UltraDOS, NewDOS/80, NewDOS/80 Version 2.0, DOSPLUS, LDOS, and DBLDOS; Model III TRS DOS, DOSPLUS, LDOS, and NewDOS/80 Version 2.0. The exceptions are: Model I MultiDOS cannot read or write Model III TRS DOS or Model III NewDOS/80 Version 2.0; Model III MultiDOS cannot write Model III TRS DOS.

Once used to MultiDOS BASIC as a development system, few programmers would voluntarily go back to any of the others, and that includes all the Model I systems MultiDOS can read and write.

There are two versions of BASIC supplied: *SuperBASIC* and *Boss BASIC*. *Boss BASIC*, or *BBASIC*, is *SuperBASIC*, plus a set of commands to single-step and trace through your program's execution. Once you learn *BBASIC*'s somewhat obscurely named commands, BASIC program development is fast and gives you a sense of being in the driver's seat like no other TRS-80 BASIC. The amazing thing is that this is accomplished in less space than most competing TRS-80 BASICs, giving you more room for your programs.

Some of the language enhancements found in both these BASICs include disk records in sizes other than 256 bytes, the ability to delete and redimension arrays while your program is running, the ability to allocate a new file buffer from within a program, one or two dimension string array sort, and the ability to chain to a different BASIC program retaining the current values of variables.

BASIC program-editing aids include single-keystroke listing of the current, next, previous, first, or last program line, or editing of the current line; single-character commands to move or duplicate a line, and to list the next or a specified page of your BASIC program. A global editor lets you change variable names, constants, strings, and reserved words across your entire program with a single command. It will also split or merge adjacent lines.

The cross-reference command finds program lines containing specified variables or integers. It lets you edit the lines one at a time. The renumber command is flexible and fast.

CMD "C" compresses your program by removing unnecessary spaces or linefeeds. CMD "P" packs program lines together while retaining the original logic flow. CMD "U" removes remark statements. CMD "V" lists scalar variables and their current markers.

BBASIC lets you single-step through your program by line or BASIC statement; the last four line numbers executed are displayed in a scrolling window in the upper right corner of your screen. They can optionally be sent to the printer. Each of these functions can be turned on and off from within your program. A single command saves the screen contents and lets you review the current values of your variables.

These are the highlights of MultiDOS. Also valuable are such features as a menu-driven multifile copy, purge or move utility; a disk-drive timer; a utility that lists, copies, or kills files, and displays directories from inside any other program; a batch command facility; support for double-sided drives; device linking and routing; an RS-232C communications port driver; and a disk sector editor. MultiDOS can be recommended without reservations.

Requirements: TRS-80 Model I or III, or LOBO MAX-80; 32K RAM, disk drive
Cosmopolitan Electronics Corp., $99.95

PC/IX

"Big Blue" supports the "underground" operating system? Old-timers in the UNIX community are shaking their heads in wonder. For years UNIX was used only in Bell Labs and at universities, which were given very attractive licensing rates. In recent years graduates of those universities have been going out into the real world and saying "Hey! UNIX is where it's at!" Industry has been listening.

IBM has been listening, too. They know a trend when they spot one. When the introduction of hard disks for the IBM PC, and later the PC-XT sparked a flood of UNIX and UNIX look-alikes for third-party software houses, IBM decided to offer an official, supported version.

PC/IX is the name of this version. "Personal Computer Interactive Executive" is adapted from INTERACTIVE Systems Corporations' IS/3, which is in turn their implementation of UNIX System III, a standard version available from Bell Labs.

Make no mistake, this is a "real" UNIX! It has all the goodies heirarchical file system, flexible command language, time-sharing (compilations, text formatting, or what-you-will can run in the background while you edit, debug, or even play games in the foreground), and all the standard UNIX tools, as well as a few unique to IBM and INTERACTIVE Systems.

Standard UNIX tools include the shell, or command-language processor; the C compiler and all necessary libraries and support programs; SCCS, the "Source Code Control System," allowing control of software revisions; MAKE, a program that reads a file containing a "description" of the program to be made, and then compiles and relinks only those files that have changed since the last "make;" Nroff and troff, powerful text formatters; UUCP, a "Unix-to-Unix copy" program that allows communication between any other UNIX machines; and numerous other programs.

Some enhancements of PC/IX include the ability

to transfer files to and from PC DOS 2.0. PC/IX can even "co-exist" with PC DOS, so you need not throw away all your old programs. System management facilities file system checks, dump and restore of disk files, and system accounting are provided. System accounting how much time is spent on what, when and a flexible queuing system complete major enhancements.

INed is INTERACTIVE System's version of the "Rand Editor." It is a full-screen text editor that allows the user to bind strings of commonly-used commands to the function keys, allowing complex operations to be done with a single keystroke. It also supports multiple windows, allowing one to edit several files at once. Scrolling can be any number of lines desired. Automatic backup copies, online help, and cut-and-paste are also supported. One powerful feature is the ability to filter regions of the text being edited through arbitrary UNIX programs, allowing text formatting, global substitution, sorting, and so on without leaving the editor!

While PC/IX will run with 256K of memory, 512K is recommended if much background processing is to be done, as swapping of programs to and from the disk will adversely affect system performance. Support for the 8087 math coprocessor, additional memory, communications adapters, more disk, floppies and printers comes standard with the system.

PC/IX is distributed on 19 diskettes. A "General Information Manual," "User's Manual," "Programmer's Guide," "System Manager's Guide," and "Text Processing Guide" round out the package. The system is warranted by IBM through 1985, and a "hot-line" technical support number is available to registered owners of PC/IX.

This is a lot of bang for your buck. The price may seem like a lot for an operating system, but if you consider the mountain of tools that come with it, and the piles of public domain software for UNIX available, $900 is a real bargain!

Requirements: IBM PC-XT or PC with IOMB hard disk, 256K RAM
IBM, $900

PRODOS

When Apple introduced its long-awaited Macintosh personal computer, news of the birth obscured the unveiling of another important new Apple product: ProDOS, a brand-new disk operating system for the Apple II Plus and the Apple IIe.

Despite this lack of publicity, ProDOS has turned out to be the biggest news for Apple users in years. As Applephiles are beginning to discover, ProDOS has transformed the Apple II into a new machine. ProDOS runs faster than DOS 3.3, and it can support much larger files, using many levels of file directory and subdirectory. Furthermore, it can handle interrupt-driven processing, a type of computing that DOS 3.3 did not provide.

ProDOS also makes Apple II and Apple III computers file-compatible. ProDOS is based on the Apple III's disk operating system, so files generated using either system can be read by the other.

Moreover, Apple II owners can now use their machines with Apple's hard-disk drives instead of having to buy third-party equipment and modify their operating system to cope with it.

ProDOS is so transparent, that most users of applications programs written under it will probably never know or care what operating system they're using. But Apple programmers will notice many important differences between ProDOS and DOS 3.3.

One of the first is that DOS 3.3 disks and ProDOS disks are formatted differently. You can't boot a disk made with one system and then expect your computer to read a disk or run a program written under the other. Fortunately, the ProDOS package includes a utility to convert programs and files created under DOS 3.3 to ProDOS, and vice versa.

Unfortunately, getting a DOS 3.3 program to run under ProDOS may also take some rewriting of the program, and some may be virtually impossible to convert. ProDOS does not support *Integer BASIC*, one of the two languages built into Apple computers up to now. ProDOS does support *Applesoft BASIC*, but even *Applesoft* programs may not work under ProDOS if they contain DOS commands. The new system's DOS instructions differ from those of DOS 3.3

Those DOS commands, and the ProDOS file structure that requires them, are the major difference between the new operating system and the old one. DOS 3.3 was designed for use with limited-capacity 5¼-inch disks, not high-density floppy disks or hard-disk drives. Each disk was treated as a separate unit, and in a multi-drive system, it was necessary to name the disk drive in order to access its files. For example, to load a file called MYFILE

from disk in Drive 2 required a DOS command: "LOAD MYFILE, D2."

ProDOS, which is similar to the sophisticated Unix operating system, uses a much more versatile filing structure. Disk numbers can be used if desired, but do not have to be. Under ProDOS, it is not even necessary to know where a piece of data is stored in order to access it. Instead, ProDOS is designed to access information using "pathnames" that can include many levels of subdirectories. Just where these paths lead on the physical disks is the operating system's worry, not the user's. In a ProDOS file, the name Myfile could be used as a pathname prefix, or main directory heading. In ProDOS, pathname prefixes are separated from subdirectories by slashmarks. So the word Myfile could be used as a prefix for such full pathnames as Myfile/Names, Myfile/Addresses, Myfile/Games, and so on. Further divisions such as Myfile/Games/Arcade or Myfile/Games/Text could also be used, and this sort of nesting could continue for many levels.

One advantage of ProDOS is that it can be used to create gigantic files up to 16 megabytes long. And ProDOS files can be stored neatly on a hard disk under easy-to-find pathnames instead of under annoying and unnecessary disk-drive designators.

The main disadvantage is that the pathnames can get unwieldy, especially when many levels of subdirectory are used. Fortunately, it isn't always necessary to use a full pathname. Suppose, for example that you were editing a book stored on a hard disk under a series of pathnames extending from Books/Computer/Apple/ProDOS/Chapter.1 through Books/Computer/Apple/ProDOS/Chapter.12. You could type the command "PREFIX BOOKS/COMPUTER/APPLE/PRODOS," and then access any chapter by typing the last level of its pathname: "CHAPTER.3." To switch programs, you would use another Prefix command to get out of your book path and move one to another pathname.

ProDOS is available in two versions: a "user's disk" that is now being shipped with Apple IIe disk drives and can be purchased by Apple owners, and a "programmer's development disk" intended for professional use. The consumer version contains a ProDOS user's manual, a disk-based tutorial, a ProDOS BASIC interpreter, and several other useful aids. The programmer's kit adds a sophisticated machine-language assembler, a powerful debugging utility, a hefty volume entitled *Basic Programming with ProDOS,* and an "Applesoft Programmer's Assistant" package with an automatic line-numbering utility and other helpful items.

ProDOS was designed to be compatible with Apple's 5-megabyte ProFile hard-disk drive. The ProFile was originally designed for use with the Apple II, and was not compatible with Apple II-series computers until ProDOS came along. Now that ProDOS is available, Apple dealers are marketing a ProFile unit for the Apple II series, available at a suggested retail price of around $2,200.

ProDOS is such a radical departure from Apple DOS 3.3 that only a few of its highlights can be detailed here. Other important features include the ability to stamp dates and times on disks automatically using an optional Thunderclock or other timing device; the ability to use up to 256 types of files; and the ability to use the 64K of memory on Apple's extended 80-column card as an ultrafast solid-state disk drive.

In all, this is a powerful, convenient operating system and a giant step up from the ad hoc, amateur-oriented OS that Apple once supplied. Current Apple owners will find it costly and difficult to switch over from DOS 3.3-compatible software, but the transition is likely to prove worth the effort.
Requirements: Apple II+, 64K RAM; Apple IIe
Apple Computer, User's disk $40, Program developer's disk $75

PRONTODOS

ProntoDOS is an easy-to-use utility program designed to increase the speed of Apple's operating system. By making certain modifications to DOS 3.3, loading and saving of BASIC and binary files is accomplished up to three times faster. For example, BLOADing a high-resolution screen image that normally takes 10 seconds requires only 3 seconds with *ProntoDOS,* while a 60-sector *Applesoft* program is loaded in just 4 seconds instead of the usual 16 seconds. Unfortunately, text files are unaffected.

To use *ProntoDOS,* just boot the program disk, period. Any disk subsequently initialized using the Init command will contain *ProntoDOS* plus a bonus . . . 15 extra sectors of storage space.

Using the Pronto Update option, existing disks can be modified without harming any data con-

tained on them. All DOS commands and error messages remain the same. Several options are available with Update: disk catalogs can display free disk space, display the address and length (in hex) of the last BLOADed or BRUN file, Control-C will abort a long catalog listing, and ESC can be used to stop a file that is being read or executed. If you have a 64K Apple II or an Apple IIe, a DOS-Up command will move DOS into the RAM card or upper memory area, giving you an extra 10K of programmable memory space.

Provision to list text files directly is handled by a new command: Type filename. Both random and sequential files may be listed to the screen or printed.

ProntoDOS is supplied on a single unprotected disk with a 20-page user guide.

Requirements: Apple II, II+ or IIe, 48K RAM, disk drive

Beagle Brothers, $29.50

QNX

As operating systems go, QNX is one of the most complete packages available on the market today, especially for the demanding programmer. It is a Unixlike system that brings real time, multiuser, multitasking capabilities to the IBM PC and PC-compatible computers. A hierarchical file structure and 16 levels of tasks are standard in the system. A C compiler is also included in the package to round it out.

Over 60 utility programs are available in QNX. One utility that you'll need right away is called *DOS* (not to be confused with the PC-DOS operating system). It is designed to transfer files between PC-DOS and QNX so that your current files don't go to waste. Also available for an additional $60 is a program called *QDOS*, which allows you to run a standard PC-DOS program under the QNX system. Because QNX allows four tasks to run at once, including one PC-DOS program with *QDOS*, programmer and operator productivity is greatly enhanced.

Other utility programs included in the basic system allow the user to copy, split, join, erase, and backup files; create, read, release, and change directories; initialize diskettes and check them for bad blocks; compare and sort files; remove corrupted files; build a keyword index; compile and link programs; and set priorities for the various tasks to be performed. A complete, powerful full-screen editor, *ED*, is also included in the basic QNX package.

The Talk command allows QNX users to communicate over telephone lines with a modem. If the other computer is a mainframe system, Talk permits your PC to be used as a terminal. Talk also provides two QNX computers with the means to communicate and transfer files.

The C compiler conforms to the standard defined by Kernighan and Ritchie, with a few exceptions: initialization of Auto-variables; bit fields; expressions following the "#if" (only a simple constant may follow "#if"); and curly brackets (braces) may not be nested in initializations structures are initialized as though they were an array of Ints. These missing items will be included in the next release of QNX C. An extensive library of subroutines is provided, and the library may be shared with three other languages besides C FORTRAN, Pascal, and BASIC from Quantum. In order to use this powerful feature, your computer must have the 8087 chip, a math coprocessor from Intel. It is available through IBM and fits into an empty socket provided for it on the system board.

Additional programs available from Quantum that work with QNX include *QDOC, BTree, QSpell, QDOS*, and compilers for FORTRAN, BASIC and Pascal. *QDOC* is a sophisticated document processor and text formatter that automatically indexes your documents, sets up a table of contents, produces footnotes, does hyphenation, and changes type fonts in the middle of a document. *BTree* is a set of C library routines that provide database support. The four types of routines provided by *BTree* are lower-level access routines and utility routines. A B-tree file-access system such as this can save an applications programmer many hours of tedious coding. *QSpell* is a very fast spelling checker that can be used with a variety of files, and can even be used on-line while using the *ED* full-screen editor. *QDOS* provides the ability to run PC-DOS and MS-DOS programs as one of the tasks under QNX. The programs supported are listed in a file on the QDOS diskette. Due to the limitations of PC-DOS, QDOS can't run more than one PC-DOS program at one time.

The two manuals provided with the QNX system are full of information, but by themselves they will not make any converts to C or to Unixlike operating systems. They both assume a great deal of knowl-

edge on the user's part, and neither includes an index. The lack of an index is surprising, because Quantum markets the *QDOC* program, which automatically prepares indexes. The *QDOC* manual is much better and does include an index. *QSpell*'s manual is concise but complete except for an index. The *BTree* manual could use more general information, but it covers the commands completely. Again, no index is provided.

Requirements: IBM PC, 128K RAM, 320K disk drive; *QSpell* requires 256K RAM

Quantum Software Systems, QNX with C $650; *QDOS* $60; *QSpell* $199; *BTree* $150; *QDOC* $150

TRSDOS

Radio Shack's TRSDOS has been snidely referred to as "TrashDOS," and its shortcomings have inspired more than half a dozen competing operating systems for the TRS-80. There are probably more widely selling alternative DOS's for the TRS-80 than for any other popular microcomputer. But is TRSDOS really that bad? One clue is in the observation that most of the alternate DOS's use the TRSDOS command structure and programming interface for a foundation, and build their new features and commands on top of them. The basic TRSDOS design is sound; it just lends itself to enhancement.

Radio Shack uses the name TRSDOS for a number of similar but distinctly different products. This review will cover the Model I and III versions. The Model III version will also run on the Model 4 in "Model III mode," and Model 4 TRSDOS 6.0 is really LDOS 6.0, reviewed elsewhere in this publication. Model II TRSDOS has a lot of similarities to Model III TRSDOS; the Model II version came first.

One main function of a disk operating system is to make the storage of programs and data on floppy disks convenient and reliable. Model I and III TRSDOS give you commands to backup disks, list the disk directory, copy files from one disk to another, and delete files. TRSDOS lacks "wildcard" file specifiers that let you target a number of similarly named files with a single command. This feature is found in CP/M, MS-DOS, and many other operating systems, and is one of the major enhancements found in many alternative TRS-80 operating systems.

TRSDOS comes with a nice machine-language monitor called Debug. Using it, you can examine memory in hexadecimal and ASCII, modify it in hexadecimal, examine and modify Z-80 register contents, single-step or run through machine language programs in RAM.

An Auto feature in the DOS lets you specify a command string to be executed when a disk is booted. This lets you create applications that can be run by putting a disk in the drive and pressing the reset button. Model III TRSDOS even lets you build a file of commands that are carried out when the file is run.

One area where TRSDOS is ahead of much of the microcomputer DOS competition is in file protection. Passwords can be assigned to files, and the Attrib command lets you specify access levels ranging from execute-only through full update and delete privileges.

Model III TRSDOS adds some useful features to the older Model I version: a Help command to route screen output to the printer; a Forms command that sets printer page size; Purge to delete more than one file at a time; Patch to install fixes in machine language programs; Route to redirect input and output that normally would go to the screen, printer, serial port, or keyboard to another device; and Setcome, which sets up the RS-232 port configuration.

TRSDOS includes a version of Microsoft disk BASIC that builds on the BASIC in the TRS-80'S ROM. Features added include hexadecimal and octal constants and the abilities to call Debug from BASIC, start and stop the clock, define functions, support multiple machine-language subroutines, search one string for another, and replace a portion of one string with another.

Model III TRSDOS disk BASIC adds commands to compress a BASIC program by removing blanks and/or remarks, load a machine-language program while in BASIC, and sort a string array.

TRSDOS documentation is professional and thorough but is more of a reference than a tutorial.

The bottom line: If you own a disk-based TRS-80, you should definitely buy TRSDOS, if only because it is the TRS-80 operating system most widely supported by third-party software vendors. Better operating systems are available for the TRS-80, but TRSDOS is the common denominator in the TRS-80 world.

Requirements: TRS-80, Model I, III or 4; 32K RAM, disk drive

Radio Shack, $29

TURBODOS

TurboDOS is a multi-user operating system designed to work with the wide range of applications software that was developed for CP/M systems. The most important feature of TurboDOS is the hardware architecture of the systems that it runs on. Each user has his or her own microprocessor and memory and another microprocessor is dedicated to the disk drives, printers, and other common peripherals. This system could be a group of personal computers connected to a local area network or it could give each user his or her own printed circuit board, with all the boards plugged into a common card cage.

Unlike the patches to single user operating systems, such as MS-DOS, that are more commonly used on local area networks, TurboDOS supports such advanced functions as user passwords, print spooling and queueing, record locking, and communications. Record locking is the key to true multiuser business applications, where the users share the same files. Running this type of application without record-locking would, for example, allow two order-entry clerks simultaneously to check your inventory of widgets, discover that there is one in stock, and promise it to two different customers. If the system used record locking, then when the first clerk checked inventory the record dealing with widgets would be locked until he or she either placed an order for the widget or for some other item. The second clerk would be told that the widget record was in use and would have to wait the 20 to 30 seconds until the first clerk finished.

Print spooling is a feature usually found only on mini and mainframe computer systems. In short, the output of a program intended for the printer is intercepted and saved in a disk file. When the file is completed, it takes its place in a queue to be printed. This function allows several users to share one printer without fighting over it. It also functions as a printer buffer the size of the disk, so that a user need not wait for a long report to print. Other micrcomputer multiuser operating systems will either lock all others off a printer when it is in use or allows random access to the printer, so that garbage is printed.

TurboDOS's command structure is more similar to MS-DOS than CP/M since it uses the from-to convention. Most TurboDOS commands have many more options than either their CP/M or MS-DOS counterparts. The Copy command, for example, can copy from any user area to any other area and has features for backing up a hard disk.
Requirements: Z-80, 8086, 8088, 80186, or 80286 processor; disk drive
$99.95

UCSD P-SYSTEM

The UCSD P-System is the most popular alternative to the standard DOS microcomputer operating system. It is best known for its portability and for its association with the UCSD Pascal programming language, although it can be used with other compiled languages as well (FORTRAN, for example). Of course, programs developed under the P-system will not run under DOS, or vice versa.

The portability of the P-system exists because source text does not extend to machine language, but only to a pseudocode (or p-code, hence the *P* in P-system). When the program is run, the p-code is executed by an interpreter designed for that specific machine. In theory, the P-system can be implemented on almost any computer, and programs compiled into p-code can be run on any machine using the P-system. In practice, every version of the P-system has some idiosyncracies which may require that changes be made in the source text. Even worse, disks formatted in one version may not be legible in another.

The P-system is a high-level operating system in the same sense that Pascal is a high-level language, with similar pros and cons. For example, under the P-system you can quit the editor, write the source text to disk, compile it, link in routines from the system library, and run the program, all with three keystrokes. But it can be very difficult to do something unusual, such as chain or pipe the output from one program into another, or control block use on a disk. It is also not possible to call the operating system directly from within a program.

The operating system is divided into functional parts that reside on the disk when not in use: the command level, the editor, the filer, a compiler, the linker, an assembler, and various utility programs. The setup conserves memory and enables the system to offer features and user-friendliness not available to operating systems that remain in memory during program development and execution. However, the system uses up a lot of disk space, and you must make sure the boot disk is in the boot

drive when you return to command level. It is not advisable to use the P-system with only one disk drive, and it could easily function with three or more.

The user interface is modal, so that when you are, for example, in insert mode, you can only insert. To do anything else, you have to leave insert mode. Limiting the options available at any given moment means quick, convenient, one-key commands; with a little practice you will be flying around the operating system. But the commands mean different things in different modes; for instance, *X* can mean execute (a program), examine (a disk for bad blocks), or exchange (characters in text). Although a prompt line of available commands is always showing at the top of the screen, it is easy to make a mistake when working quickly.

The full-screen text editor is superb. Insertions, deletions, and both cursor and text movements are made easily and show up immediately. Thus, the mechanics of using the editor rarely intrude on the work itself. There is a full range of features that provide the difference between sheer adequacy and real power without overwhelming the user with arcane codes and obscure options. The editor is specifically designed to create Pascal programs, but it could also be used as a word processor. The only drawbacks to the system are with the set direction feature, which changes the function of other keys, and with the two-key end-of-file character, which can be reconfigured.

The file handler, or filer, is responsible for transferring information between the computer and the attached disk drives and printers. This includes saving files to disk, transferring them from disk to disk, loading them into memory, and printing them. The filer also keeps track of which disks and devices are online and which files are on what disks. Like most versions of DOS, it is awkward and picky as to appropriate syntax. For example, although the system knows a default disk, the disk must still be specified for many operations and must be suffixed with a colon, lest the filer confuse it with a file. Another weakness is no provision for file security. Nonetheless, most users will find the filer does everything they'd expect.

The compiler translates Pascal source code into p-code, and the linker can be used to incorporate precompiled routines, p-code, or even machine language into Pascal programs. An assembler is often included. The utility programs enable you to format blank disks, group compiled routines into libraries, reconfigure the system, and so forth. The only thing missing is a good debugging option.

For the programmer who has chosen to work in Pascal, the P-system offers convenience and portability. It is well documented and well supported, with implementation available for many machines. Its success testifies to its merits.

Requirements: available in machine-specific for most computers

UNIX

In 1969, Ken Thompson was trying to create an environment where he and the others who soon joined him at Bell Laboratories could pursue their work programming research in comfort. Starting with a cast-off PDP-7, he and Dennis Ritchie created a language and operating system that has grown to encompass many different computers and applications. The *Unix* operating system that was the result of this effort is now one of the most widely used operating systems in the world of mini- and microcomputers. It runs an incredible variety of hardware and has spawned a host of imitations.

What is *Unix,* anyway? It is an operating system, a programming environment, a set of tools, and even a philosophy of programming.

The base of the operating system is the "kernel." This is the program that runs the show. The *Unix* kernel performs all input and output, sharing resources between competing jobs, or "processes." It also schedules the processes to run if they are ready or puts them to "sleep" if they are not ready say, if they are waiting for a disk read to finish or even for the programmer to wake up and type something. While a process is sleeping another can use the CPU to execute, thus sharing that scarcest of resources.

The file system is one of the most important services provided by the operating system. There are three basic types of files: so-called "regular" files, directories, and "special" files. An ordinary file contains whatever a user puts in it: text, program source, executable code. All ordinary files are equivalent in the eyes of the system. Thus, there are no restrictions on the type of file any particular program may use. The data may or may not make sense to a certain program; applying the C compiler to an executable object file makes no sense, for instance, yet the operating system does not for-

bid it. This flexibility turns out to be very important in the making of software tools, as we shall see later.

A directory is a file containing a list of files and information the kernel can use to locate each one in storage. Except for the fact that a directory cannot be written by a user program, it behaves just like an ordinary file. It can be read by any program with the right permissions, for instance. A directory may contain other directories. This means that hierarchical organization of files is possible. For instance, the base of the file system is called the "root" directory, and is designated "/". It contains important system files, and several directories. One is /tmp, which holds temporary files; another is /dev, where most special files live. /usr holds user files; one of its sub-directories is /usr/src for the source code of programs. Another is /usr/bin for the executable copies.

Special files are interfaces to I/O devices. They can be opened, read, and written like any other file, but the kernel intercepts the commands and translates them into the appropriate commands for the hardware. Thus, to write on a magnetic tape one merely gives "/dev/mt" as the name of the file for the output of the program. The specific names of devices are system dependent, of course, and not all functions may be supported; for example, one cannot normally read from a printer.

Associated with each file are three types of "permissions." There are sets of permissions for the "owner" of a file, a group, and "everyone else." Each set includes read, write, and execute permissions.

The command processor, or shell, is a user process. This makes it easy to build custom command processors for specialized applications, like database, accounting, data entry, and so on. Two shells are most widely used. The original *Unix* shell, called "sh" and written by Steve Bourne, comes with all *Unix* systems. The C-shell, or "csh," written mostly by Bill Joy, comes with Berkeley-derived systems in addition to the Bourne Shell. Each has advantages over the other, but the *Unix* philosophy is to let the user choose which he likes.

Each shell allows redirection of input and ouput to a program. That is, the input can come from, or the output can go to a file instead of the terminal, or even to or from another program by means of a "pipe." This allows the user to build powerful chains of programs. Even the shell can be invoked as a user program with a file of commands as its input.

The basic philosophy of the *Unix* system can be best illustrated with an example. Let's look at the program "ls," which lists the files in a directory, one per line. The first time one lists a directory with more than 24 files in it a problem appears the first files scroll off the screen!

One solution is to modify the "ls" program to pause and wait for a key to be hit after each 24 lines, but this approach has several problems. First of all, what if the user's terminal doesn't have 24 lines? A home computer with a modem might have only 16; the Ann Arbor Ambassador has 66. Or a hard-copy terminal has essentially infinite lines; no pauses at all would be needed here.

Furthermore, if the user wished to place the list of files into yet another file, he might still have to press the keys to continue. No, let's not change "ls." Instead, let's write a filter that will take ANY input and display it screenful by screenful. It can use the Berkeley "termcap" or Bell "terminfo" databases to determine the user's terminal and behave accordingly. Say we call it "more." Then the user merely needs type "ls | more." The "|" symbol tells *Unix* to send the output of "ls" into the input of "more;" it's called a "pipe." Thus, "ls" need not be changed, and we have a powerful new tool, "more," that can work with any type of text, not just "ls" output.

This illustrates several of the basic rules for UNIX programs:

Expect the output of a program to be read by another, unknown program, so keep it simple.

Design and build systems quickly, and expect to throw away the parts that do not work or are too awkward.

Use tools to lighten the load, even if you have to detour to build the tools and throw them away when you are done.

Two main flavors of *Unix* are available. The first is sometimes called "vanilla" *Unix*. The current version is called System V and is available from AT&T or one of their many licensees. The other flavor of *Unix* is not chocolate, but Berkeley. (Baskin-Robbins take note.) Computer scientists at the University of California Berkeley campus have added many enhancements and additional tools to the system. Which to choose sometimes takes on aspects of a holy war, but both are good systems. Berkeley *Unix* does add a fine screen editor, "vi,"

that will work with any terminal in its database, an alternate shell "csh," and, for machines that support it, demand-paged virtual memory.

The *Unix* operating system may be the most portable operating system in the world. A partial list of computers it runs on includes Digital PDP-11 and VAX-11, Interdata, Amdahl 470, IBM 43xx and Series 1, Univac 1100, Intel 8086 (Altos, IBM-PC), Zilog Z8000, Motorola 68000 (Sun, Dual, Silicon Graphics), and the National 16000 family. If your computer's manufacturer does not supply a version of UNIX for your machine, they will almost surely know who does. One of the most commonly available implementations is Microsoft's Xenix, reviewed in this section.

Many other operating systems owe at least part of their inspiration to *Unix*. MS-DOS, PC-DOS, and OS-9 spring to mind. Eunice, UTS, and Tunis are examples of *Unix* emulations.

Unix is one of the most popular operating systems for 16-bit micros, but is by no means limited to them. Its main philosophy, "Small is beautiful," has led to a wide variety of powerful, portable software tools that are gaining wide use. Indeed, if only the concept of reusable tools survives, it was all worth it.

UTILITIES

When you read through your favorite computer magazine, you see hundreds of advertisements for spreadsheets, word processors, database management programs, checkbook programs, investment packages, general ledger and general accounting packages, graphics programs, and integrated application packages. These programs are usually called application programs because they can be applied to a generally recognizable application. Utility programs can be considered application programs with very limited uses. Each is usually designed to fit some specific need very well.

An overview of the types of program available on computers may help you to understand what the utility category includes. In general, if you wanted to group programs into five broad categories, you would probably call the categories operating systems, languages, application programs, games, and utilities. By their very nature, utility programs are hard to classify because they perform so many different but very useful tasks. They are most often found in the libraries of programmers, but often the average user will say, "I wish I had a program that would . . ." By carefully reviewing the utilities section of this book, you will acquaint yourself with the wide variety of programs available to solve your special problems. In general, utility programs are harder to find than application programs in your local computer store because the demand for them is so limited. The good news is that these programs generally don't cost a lot of money. You can solve that vexing problem for $30 or $40, instead of wasting a whole weekend or more trying to find a way to get around it.

Some of the more popular types of utility program are categorized and described here for your convenience. The broad categories are programmer's utilities, general-purpose utilities, and hardware-related utilities. Remember to spend some time reviewing this whole section, though, because you never know when you will run across a specialized problem that can be solved by a utility program. Then, if you remember reading about it here, you can find out who published it and give them a call to find out where your local dealer is.

Programmer's utilities are designed to help the busy programmer get the most out of his or her programming time. Programmer productivity would drop severely if utility programs were not available. Some of the more popular programs in this group are cross-reference programs, file transfer programs, file comparison programs, libraries of subroutines, sort and merge programs, copy protection programs, programs designed to trace the flow of your program, disassemblers, filters, compression programs, file access routines, encryption and security code programs, operating system translators, operating system emulators, device drivers, system-to-system conversion programs, coprocessor support packages, and debuggers.

General purpose utilities help the average user to get the most out of his or her time in front of the keyboard. Some examples of this type of program are print spoolers, electronic disks, full-screen editors, erased-file recovery programs, programs to reconfigure your keyboard, operating system menus to ease the beginner into the ins and outs of the "foreign" computer language, diskette catalogs and file managers, menu-builders, sound subroutines, custom character generators for your printer, screen designers, voice recognition packages, data entry systems, directory sorters, and online help utilities. This category also includes speed enhancers, directory manipulators, memory allocation programs, copying programs to help you back up those copy-protected disks, and programs to help you back up your hard disk drive to floppy disks or streaming tapes.

In addition, the general purpose category includes such interesting things as programs to allow you to print your spreadsheets sideways (allowing worksheets of many columns to be viewed without cutting and pasting), interprogram packages which let you use a file from your spreadsheet with your word processor, programs that let you start your computer without the laborious system check-out, and even packages to make your old spreadsheet do the things that those new, expensive spreadsheets do, like sorting, graphics, and statistical calculations.

If you are using peripheral hardware that is not supported by the manufacturer of your computer or the software publisher that produces your favorite program, utilities of all kinds are on the market to help you out. Some of these programs will redirect the computer's printing from a parallel printer port to a serial printer or vice versa. Others will allow you to use terminals with your computer that the computer manufacturer does not support.

Hardware-related utilities can help you to avoid

unnecessary repair costs on your PC by allowing you to do you own diagnosis and some hardware maintenance or repair on your own. Some of the programs available in this group can check the speed of your disk drives, analyze the performance of your memory, check the instruction processor of your CPU chip, test your printer, test and adjust your monochrome monitor, and be sure that your color monitor and graphics board are in proper working condition.

Utilities are not the most glamorous programs around, but they do save time and frustration, if only you can find the one that you need when you need it. With the rapid expansion of software retailing, maybe this final frustration will soon be eliminated.∞

ABC, MAKEBOOT

Any complex program may take an unacceptably long time to execute in BASIC, especially where complex graphics are needed. ABC, A BASIC Compiler, creates programs from *Atari BASIC* that run faster, use less memory, and operate without a cartridge. They either can be run from disk using Atari DOS or, after additional processing with *Makeboot,* can be automatically booted on power-up.

As an added benefit, the code into which the program is compiled cannot be Listed, as interpreted BASIC can. This will be most attractive to the user planning to sell software produced with ABC; the manufacturer allows this with appropriate credit.

There are some limitations to keep in mind, however. ABC uses only integers, not the floating-point numbers available in BASIC. This means that log, trigonometric, and random-number functions cannot be used in programs to be compiled. Likewise, division will always be rounded off to the nearest integer. The ABC manual suggests ways to get around these problems, and they should be sufficient for most applications. However, statements supported by the BASIC cartridge List, Run, New, Load, Save, and LPrint among them cannot be used, and there is no way to avoid this handicap.

Requirements: Atari, 40K RAM, disk drive

Monarch Data Systems, ABC $69.95; *Makeboot* $14.95

ACTIVE TRACE

If you program in BASIC, you need *Active Trace.* There is nothing as difficult as trying to debug a complicated BASIC program. The very lack of structure that makes BASIC easy to use initially makes it difficult to debug and maintain in the long run. *Active Trace* corrects this by providing an easy method of tracing the name and value of variables used throughout your programs. It works with both *IBM BASIC* and *BASICA* as well as *MBASIC5* under CP/M.

Active Trace consists of three programs. The first, *VRef,* provides the user with a sorted list of variables and the line numbers in which they occur. This enables the programmer to check for double use of the same variable. The second, *GoRef,* lists all of the line numbers called by a GOSUB or a GOTO statement. *Scope,* the third program, is the real workhorse of the system. It runs your program line-by-line, printing the values of chosen variables as it goes. This makes it easy to see where you went wrong.

The manual is well-written and easy for the beginner to use. In addition, the publisher provides a toll-free number to help the frustrated programmer who has been unable to solve his debugging problem. For the low cost of the program, this company provides an amazing amount of support.

Requirements: CP/M 2.2 or MS-DOS, 64K RAM, disk drive

Awareco, full package $79.95; Scope alone $49.95

A.M.P. 2.0 (AMPER MEMORY PROGRAM)

A great many Apple II users have expanded their 48K machines to 64K using various memory expansion boards or the Apple language card. Apple's DOS, however, does not normally take advantage of this extra memory space and will still reside in the upper 10K of the main memory. This prevents moving HIMEM up to provide any extra memory work space.

A.M.P. 2.0 is a simple to use utility that increases usable memory space by relocating DOS into the memory-expansion board. In doing this, approximately 10K of memory is freed for you to use.

Booting the *A.M.P.* disk automatically installs DOS into any memory board residing in slot 0. You may then run any program that takes advantage of this extra space. If you reboot with any other disk, DOS will move back to its standard location. This prevents you from using *A.M.P.* with any program that must be booted from itself such as *VisiCalc* and most word processors. Unfortunately, when

using *A.M.P.* the Init command is disabled, so you must boot a standard DOS disk in order to initialize any diskettes. Instructions are included to patch the *SFID, MUFFIN, RENUMBER, COPY* and *COPYA* programs to run with the relocated DOS.

A.M.P. is supplied in an unprotected form to allow production of turnkey systems. You merely transfer a binary file called A.M.P. to any other disk and create a special Hello program to execute it.

Requirements: Apple II or II+, DOS 3.3, 48K RAM, and a minimum 16K memory board in slot 0.

MicroSPARC, $29.95

AMPER-ARRAY

Amper-Array is a library of array-related, machine-language subroutines intended for use with *Applesoft* arrays. Using array-related BASIC enhancements, each of the modules in the library represents an additional command that may be added to any *Applesoft* program, thereby extending the *Applesoft* language itself.

Although not required, it is highly recommended that this library be used with *The Routine Machine* package (see separate review), thereby allowing any or all of the extended commands to be added permanently to any *Applesoft* program. You may then invoke any of the routines by using either of the ampersand, CALL, or USR functions.

All the routines use normal *Applesoft BASIC* variables, constants, or expressions for passing parameters, all routines are relocatable. There are no conflicts between routines or with *Applesoft*, the monitor, or DOS. The routines are automatically loaded along with your program and will work in any size memory.

Some of the routines include fast-disk read/write, fast garbage collection (memory housekeeping, if you like), USR functions, one- and two-dimension array search and sort, clear, rename, redimension, delete, random, value, STR$, and many others. There are more than 40 in all.

The *Amper-Array* library disk comes with an excellent user's manual of over 100 pages, many demonstration programs, plus its own copy program, which allows you to make three backups. Frequent users of *Applesoft BASIC* will find it a valuable addition to the language.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive

Southwestern Data Systems, $49.95

AMPER-CHART

The Apple II has long been known for its powerful graphics capability. However, plotting graphs and charts directly in *Applesoft* sometimes proves difficult. *Amper-Chart* is a library of 27 graphic-oriented commands that extend *Applesoft BASIC* to enhance the plotting capabilities of the Apple.

Some of *Amper-Chart*'s versatile routines include fast high-resolution load and save, axes generation, arc generation, full-user scaling, vertical and horizontal labels, area fill, pie charts, polar charts, page display and log scaling. A 3D-to-2D function transforms three-dimensional array data into two-dimensional data to be plotted on the screen. The screen plot will appear to be three-dimensional.

You may also select the portion, or window, of the Apple screen on which to plot your data. Commands are available for the generation of axes with tic marks and grid lines, and you can produce alphanumeric labels with a variety of positioning options.

Each of the 27 commands performs a single function similar to the mathematical functions built into *Applesoft*. They do in one statement the equivalent of many BASIC statements. The commands are as simple to use as any other *Applesoft* commands and even work in immediate-execution mode.

Amper-Chart and its routine library run as either a stand-alone package or with *The Routine Machine*. Routines can be attached to a program and used as any other *Routine-Machine* module. This gives the capability of using *Amper-Chart* with any number of other machine-language utilities.

In order to print hardcopy of the graphics, a graphics printer complete with a graphics-dump program is needed. Only eight dump routines are included with *Amper-Chart* and those handle only the Epson MX80 and MX100 and the Anadex printers. If you are not using one of those printers or a graphics interface such as the Grappler, you will need some type of Graphics-dump routine such as the *Printographer* program.

Amper-Chart comes with an excellent 100-page manual, along with 20 demonstration programs, each illustrating a different set of capabilities.

Requirements: Apple II or II+ with *Applesoft BASIC* in ROM or a language card, 48K RAM, one disk drive

Southwestern Data Systems, $49.95

AMPERSOFT

Has it ever happened to you? While looking at your video screen, watching your program execute just as planned, all of a sudden the cursor disappears. Nothing happens; no keyboard response, no flashing cursor, absolutely nothing. Wonder what happened? Well, you have probably just become a victim of the garbageman.

Garbage collection, or memory housekeeping, is a function that occurs when dealing with large strings. If your program has large arrays and your are constantly loading and saving information to and from them, garbage collection will occur very often. Sometimes it may take several minutes to clear the memory to where the cursor returns to the screen. Nothing is wrong with your computer. This is merely a function of how the *Applesoft* interpreter is implemented.

Contained in the *AmperSoft Utility Routines Library* is a command that performs this garbage collection 200 to 300 times faster than is available in *Applesoft.* Known as "& FRE," this is just one of *AmperSoft's* features.

A powerful programming utility, *AmperSoft* provides many useful extensions to *Applesoft BASIC* and DOS while offering extra programming space. DOS-Mover automatically relocates the Apple's disk-operating system during the booting process into the upper 16K of a 64K computer. This increases the usable program space by approximately 10K. Catalog enhancements included allow access to program files on disks with simple two-character commands.

The library of seven *AmperSoft* commands includes "& PRINT USE," which allows easy formatting and alignment of numeric and alphabetic output. Also included is "& SORT," a fast machine-language sort for numerical and string arrays. The "& MATRIX" function performs mathematical operations on every element of any two-dimensional real array. The "& STORE/RECALL" function permits storage and retrieval of numerical arrays as binary files. This utility packs disk files into half the usual space and permits them to be accessed up to 16 times faster than standard text files. The "& CLEAR" function selectively clears out arrays to free memory program space.

All the *AmperSoft* utilities are accessible from within *Applesoft* programs by inserting simple commands. These commands use the ampersand to direct them to *AmperSoft's* utility package.

Also available for *AmperSoft* is an add-on utilities library called *Amperkit No.1.* It includes several *Applesoft BASIC* programming enhancements, such as Chain and If-Then-Else commands, Go-To and Go-Sub Labels.

AmperSoft is compatible with *GALE, PLE, FID, MUFFIN, COPYA,* and all of Apple's *DOS Toolkit* programs. It is a useful package, but the library of included routines seem rather sparse seven compared to 30 or 40 in other packages in light of the rather high price of the package.

Requirements: Apple II, II+, or IIe, 48K RAM, DOS 3.3, *Applesoft, BASIC* one disk drive
MicroSPARC, $59.95

ARRANGER I, ARRANGER II

If you use your microcomputer for many purposes, your program and data diskettes will multiply like rabbits, leaving you with the problem of how to find a file among your many disks. For TRS-80 users, the *Arrangers* may be the best solution available.

Both *Arrangers* are stand-alone machine language programs supplied with the author's own operating system. Each has its own backup utility. Each will operate with only one drive, but this requires much extra disk swapping.

With *Arranger* in Drive 0 and any of your diskettes in Drive 1, *Arranger* will read and enter your directory information into its file, and will allow you to scan files alphabetically or by disk, find a file, or print out listings. The entire operation is menu driven and simple to operate.

The ADD function reads your diskette in Drive 1 and records the data, displaying it as it is read. It records up to 45 file names per diskette, the free grans, the disk name, the created and updated dates, the number of files, density, and whether it is a system or data disk, and the identity of the DOS. *Arranger* recognizes Model III TRS DOS, LDOS, NEWDOS 80, DBLDOS, MULTIDOS, and DOSPLUS. It will recognize most single-density DOSes but records them as NEWDOS. Invisible and system files are not recorded. *Arranger* will add up to 240 diskettes. The single-density version will add up to 200, with 30 file names each.

Other functions allow you to update your list of files, rename files to for easier recignition, view your directories and other information about the disks, call up a sorted list of filenames, find a given

file, locate free disk space, scan through your directories, or backup the *Arranger* disk.

Arranger II adds some features. It claims to be compatible with all double-density DOSes, all versions. Further, it will catalog not only single-sided 35- or 40-track disks, but double-sided 40- and 80-track disks.

A filter function has also been added. This will isolate a part of your catalog's library from the rest by the disk's name or physical characteristics. If, for example, you name disks so that the eighth letter tells their contents, then the command ???????G could select all game disks from your collection. You may filter by DOS type, disk type, or number of tracks.

Arranger is fast and easy to use, and there isn't much you could want in a disk cataloguer it hasn't got. The documentation is just a pamphlet, but *Arranger* really doesn't require more.

Requirements: TRS-80 Model I, III, or 4; 48K RAM; disk drive
Triple-D Software, Arranger I $29.95; Arranger II $49.95

AUTOSORT/86M; FABS/PC

Computer Control Systems offers the programmer a chance to concentrate on programming the application and forget about the mundane details of sorting records and writing routines to access them. Two programs accomplish these functions.

Autosort/86M can be used as a stand-alone sort routine or called from a high-level language such as BASIC. It sorts on as many as ten keys, ascending or descending, and provides four Select keys; records may be deleted or retained when the Select key is less than, equal to, or greater than the select field in the record. Output can be obtained as a full record or as a pointer. Record lengths in excess of 5,000 bytes are permitted. The speed is incredible, compared with BASIC, because the routines are written in assembly language.

Fabs/PC provides an easy to use subroutine that allows rapid access to very large data files up to 65K records, depending on the key size. Using the B-tree concept, average access time for retrieving a record is less than one second.

The manuals for both packages are complete, but a little hard for the beginner to use. The company does provide demonstration and test programs to make the task easier. Error handling is good in both programs.

Requirements: IBM PC, 64K RAM, disk drive
Computer Control Systems, PC $150; Autosort/86M $150

C TOOLS AND C TOOLS 2; PASCAL TOOLS AND PASCAL TOOLS 2

Blaise Computing offers a set of functions which will help both the experienced and novice programmer. They are available in either C or in Pascal. All source code is included.

Tools includes a number of string functions, general utility functions, screen handling, graphics interface, and application functions. All are written in either Pascal or C, except an assembler routine allowing access to the BIOS. An excellent reference manual documents the use of each function and gives examples of their use. A number of sample programs that use the functions are part of the package. Source code is included for all the functions. The source is well documented and is an excellent example for the new programmer as well as being available for the experienced programmer to enhance or modify.

Tools 2 contains utilities for program control, memory management, DOS file handling, directory maintenance, and DOS system information. As with *Tools,* all source code is included and all routines are written in C or Pascal, except for an assembler routine allowing access to all DOS functions.

You may distribute applications developed using these routines at your discretion. No royalties are required as long as you don't distribute the source code.

Technical support is excellent. *Tools* and *Tools 2* are a valuable addition to any C or Pascal programmer's library.

Requirements: *C Tools* MicroSoft (Lattice) C Compiler or CI-C86 Compiler; *C Tools 2* MicroSoft (Lattice) C Compiler, PC DOS 2.0; *Pascal Tools* IBM (MicroSoft) Pascal Compiler; *Pascal Tools 2* IBM (MicroSoft) Pascal Compiler, PC DOS 2.0
Blaise Computing, *C Tools* or *Pascal Tools* $125; *C Tools 2* or *Pascal Tools 2* $100

CALIFORNIA 10 PAC

Programmers using the IBM PC often find the basic DOS utilities too limited to accomplish their needs. California Software Products has placed ten useful tools into an easy to use package. Most functions can be performed using just four keys

Home, End, PgUp, PgDn. Both DOS 1.1 and DOS 2.0 are supported.

Browse allows a full-screen view of the data in any readable text file. *CFile* is a similiar program that can be used to view "unreadable" files. *CComp* lets the user compare any two files, either hex or alpha, and conveniently browse backwards or forwards. *CDiff* is also a file-comparison program, but it displays only the differences between the two programs. Automatic resynchronization is provided when the differences are within 100 lines of each other. *CDir* is similiar to DOS's *Dir,* except that the directory may be sorted into various useful orders. *CDisk* can be used to view the FAT file allocation table and any sector on the current disk. *CMem* displays selected areas of memory in both hex and alpha format, *CEnv* displays a variety of information about the current PC environment, including equipment configuration, memory layout, and diskette parameter table. *CSort* allows the sorting of files on up to five key fields. And *Disasm* can be used to disassemble selected areas of memory. It may also be used to disassemble COM and EXE files.

In all, this package is efficient, easy to use, reliable, and fairly priced.

Requirements: IBM PC, 64K RAM, disk drive
California Software Products, $100

CATALYST; DISCOURSE

Catalyst is a utility program for the Apple III that allows you to transfer both copy-protected and unprotected programs to a mass-storage device. In the process, the program is added as a menu option and may be called up after booting the Apple III with the *Catalyst* disk. This saves you the trouble of continually swapping disks and rebooting the machine. You must be careful, though, because copy-protected programs, once transferred, are not usable on their own. Should a defect occur in the mass-storage device, you'll be able to reinstall a program only by using the original serialized *Catalyst* diskette.

Discourse, another utility program, provides the Apple III with a convenient spooling feature. Once established, it occupies an external drive or a section of the Profile hard disk. By assigning it as the output device, all data are routed to the spooler and queued for sequential release to the printer. You can check the status of the queue and remove files waiting to be printed. Printing can be terminated at any time. Processing delay times during printout are not noticeable. The maximum queue capacity using an Apple III external disk drive is 140K and, unlike external buffers currently available, printing is terminated if the computer is shut off.

Requirements: Apple III, 128K RAM, floppy disk
Quark, Inc., Catalyst $149; Discourse $125

COMPUTER DISCOVERY

This is a computer literacy program for upper-elementary and junior-high-school students. (A separate version for senior high school is also available.) The tutorial format provides an introduction to computer operations, terminology, programming, and social issues. Drill exercises reinforce the material. Good high-resolution color graphics are included in the PC, Apple, Atari, and Texas Instruments versions.

The lessons cover logical analysis, programming, applications, and history of computers. The program is menu driven. The graphics are intriguing, but the explanations provided are skimpy and will require teacher guidance.

In a sample exercise from the programming lesson, a cartoon character and ball appear on the screen. The user must direct the character to the ball and kick it using several simple commands presented in the lesson. From this, the student learns that specific commands produce predictable results and that accuracy in entering them is important. More, the user learns how to solve problems through instructions to the computer the foundation of programming skill.

This program is a logical way to use the computer to teach about the computer. It is an excellent way to introduce computer concepts to children, but it should be used as part of an organized curriculum.

A good instructor's guide and a set of 20 student workbooks are included with the two program disks in the system. Use of the printed materials is essential to successful use of the system. The program takes from 15 to 30 hours for the average user to complete.

Requirements: Apple II, II+, or IIe with 32K RAM; Atari 400A or 800 with 16K RAM; IBM PC with color graphics board; TI99/4A with extended BASIC; TRS-80 Model III or 4 with TRS DOS 1.3; one disk drive
Science Research Associates, $184.25

THE COMPUTER MECHANIC

If nothing else, *The Computer Mechanic* is an inspirational program. That is, it makes you think of the possibilities that computers offer. Unfortunately, the good ideas behind this program don't assure its success.

This is really two programs. The first section is primarily a diagnostic, to be used if you are having trouble with your car. The second is a record-keeper, designed to track maintenance.

The diagnostic is very clever. You choose the problem either the car is running roughly, or it doesn't start at all then choose answers from a series of questions. At the end of the question sequence, an overall diagram of the car's running gear appears with the possible location of the problem, instructions on how to try to fix it, and a more detailed diagram. A variation on this sequence tells you when and how to check certain important systems, such as the brakes or ignition.

It is somewhat amazing to see the result, and the on-screen graphics are really quite good. The problem, of course, is that this is all generic information nothing is specific to the car you own. And when you try these remedies you must run back and forth between your computer and the car on which you happen to be working.

As for the record-keeping section, it doesn't go far enough. It allows you to set up records on several vehicles by entering the dates of the last oil change, brake job, tire rotation, and so on. But if that's all the information you need to keep, it would be better off on a card in your glove compartment. It would be much better if the program also kept track of all kinds of repairs, insurance payments, and other miscellaneous costs, then analyzed what the car actually costs to operate.

Someday, when those publishers who issue fix-it-yourself manuals for cars get into computer software, this kind of program will probably be very useful. It would be nice to see something like this specific to, let's say, a 1994 Toyota, wouldn't it?
Requirements: Coleco Adam; Atari, 48K RAM; Commodore 64; IBM PCjr; disk drive
Softsync, Inc., $26.95

CROSS REFERENCE UTILITY (CREF)

This is a simple program designed to give beginning programmers a way to review and analyze their BASIC programs. It will create a cross reference file of variables used in the program, making it possible to identify and correct any duplicate use of the same variable name. A line number cross reference file is also available. This can be used to find references to line numbers that do not exist or to pinpoint places where the wrong routine is being called. The package allows the user to add comments to the variable list, providing a handy reference tool when the program is reviewed many months later.

CREF has several severe limitations that serious programmers must keep in mind when considering a cross reference utility. First, it is limited to 425 program lines that contain variables or a maximum of 850 variable references. In practice, even these numbers are higher than can be accommodated in most cases. Second, the program is written in BASIC, and although it is compiled, it is relatively slow when working with moderate-sized programs.
Requirements: IBM PC, 64K RAM, disk drive
Prentice-Hall, $29.95

DIAGNOSTICS II

Diagnostics II is a comprehensive set of system diagnostic programs designed to test each major component of your microcomputer system. It is written to work with PC-DOS or MS-DOS and with any of the major Intel microprocessor chips: 8086, 8088, 80186, 80188, and 80286.

Diagnostics II contains programs to test your system's memory, CPU, disk drives, video terminal, and printer. It also contains a program to aid you in aligning your disk drives. All of the tests prompt you to enter the necessary information and, except for the disk alignment program, require no special knowledge or tools to use. Besides the comprehensive tests, a program called *Quick Test* is provided and should be run each time your system is powered-up. This insures that your valuable data is reasonably well protected from errors.

The memory tests that are included in the system can run for many hours, doing a wide variety of tests. It is a good idea to set them up and let the computer run a complete set of tests overnight about once a week. This can catch those "flaky" errors that you would never otherwise find until your good data turns flaky.

The documentation provided is complete and well written, including charts to show you how fast your particular microprocessor should be operating.

Requirements: IBM PC-DOS or MS-DOS, 32K RAM, disk drive
Supersoft, $125

DIRECTORY MASTER

Directory Master is a powerful machine-language utility that lets you customize and format your disk catalogs for a unique and professional appearance. You can dress up your catalog display with inverse, flashing, or control characters, create custom disk headers complete with attractive borders; sort or reorder any number of files within the directory; and insert subheadings at any point. Create invisible file names; recover deleted files; and delete, lock, or unlock blocks of files with a single command. *Directory Master* writes the modifications directly to the disk, so there is no need to inititialize a new disk or create POKE files.

Directory Master performs flawlessly and rapidly. In all, it is an excellent utility.
Requirements: Apple II or II+ with language card or *Applesoft BASIC* in ROM, 48K RAM, one disk drive; separate versions for DOS 3.2 and 3.3
MicroSPARC, $29.95

DISK FIX

Strictly for the knowledgeable CP/M hacker, this program makes it possible to examine or change any byte of data on a disk. It can be used to alter commerical software changing, say, the title of *WordStar*'s first menu from "No-File Menu" to a clearer "Opening Menu." It can restore an accidentally erased disk file. Or it can be used to examine a damaged disk and rescue data that would otherwise be lost even when the disk's directory has been destroyed, a condition that few disk repair utilities can cope with.

To use *Disk Fix,* a disk containing it is placed on one drive and the disk to be examined on another. Typing the name of the second drive leaves the program looking at the beginning of the directory on the second disk. Hitting the carriage return then displays the first four File Control Blocks (FCBs) on the disk; further carriage returns advance the display four FCBs at a time. Each FCB gives the name of a file, whether it is active or has been erased, the file's length, and the block numbers under which portions of the file are stored. Once this is known, the file itself can be examined by telling *Disk Fix* to display the tracks and sectors where it has been stored. Then it can be either modified or moved to another disk.

The key to using *Disk Fix* effectively is an understanding of how CP/M stores its files on the disk. File-control blocks and the like can be intimidating for the new computer user. But when important information suddenly vanishes into CP/M's warning: "BDOS ERROR ON B: BAD SECTOR," it will seem worth making the effort.
Requirements: CP/M, two disk drives
Software Store, $150

DISK INDEX

Many hobbyists and business users tend to accumulate a large number of program disks, and after a while it becomes difficult to keep track of what programs are on which disk. *Disk Index* alleviates this problem by reading the directories of all the user's disks and printing out a permanent record of their contents.

Disk Index's best feature is that it will read any TRS-80 disk, with the sole exception of those produced under CP/M. It reads every disk directory and puts contents into an alphabetized master index, even if the disk formats are mixed in a particular group. *Disk Index* can alphabetize up to 2,000 programs from 255 disks in less than 60 seconds. It can call up any one of those 2,000 programs in less than 3 seconds.

Disk Index not only places program names in order, it also records the amount of free space on each disk. This is a boon to programmers who plan ahead, allocating efficient use of each of their disks.

For many users, *Disk Index* is not necessary. But for those who have lost count of their program disks, *Disk Index* is well worth the price.
Requirements: TRS-80 Model III or 4, 48K RAM, one disk drive
Mumford Micro Systems, $39.95

DISKETTE LIBRARIAN

Diskette Librarian catalogs PC DOS diskettes and files for easy retrieval. It keeps track of the amount of space available on each diskette, tells you the last date that it was updated, and allows a three-line comment per disk. It also keeps track of each file's size and creation date. A nice feature is the program's ability to distinguish between files with the same name and to tell you which file is the latest version. Most commands make use of the

function keys, and disks are updated automatically without any typing.

Diskette Librarian will print listings of all files, diskettes, or both. It has the ability to search or list selectively, using global or wildcard characters to choose files that fit your specifications.

The manual is small but comprehensive, and is supplemented by an online help facility.

The program is written in BASIC, which causes it to be very slow when you have a large catalog. It is especially slow when it goes into its "garbage collection" routine, which it does more and more often as the catalog fills up. You can avoid this problem by dividing your diskettes up into smaller groups and using a separate catalog for each group. Unfortunately, this defeats the main feature of the system keeping all versions of each file together for easy reference.

Requirements: IBM PC, PC DOS, 64K, one disk drive
IBM, $45

DISKETTE MANAGER

Diskette Manager is a program for diskette and file management, and it has several nice features. The program prints a disk label that holds an incredible 64 file names, including extensions. Even after all 64 files have been printed on the label, there is room for a diskette name and an information line that contains the last date the diskette was used, the total number of files, and the number of bytes used and remaining. If the disk has fewer than 64 files, there is room for up to 8 lines of comments. In those special cases where the number of files is very high, a second label will be printed. A two-label set will hold up to 112 file names, plus 8 comment lines, the disk name, and the information line. The program even comes with 200 labels to get you started without the hassle of running down and spending a lot of money on a full box of labels. The program provides room for up to 6,000 file entries and 200 diskettes per catalog. They may be searched, sorted, or edited easily and quickly. File names do not have to be entered manually the program will read the directory of any disk that is in DOS format. Reports can be printed in one of four formats, providing you with an easy way to find that elusive program or data file.

The manual is the size of a diskette, so it may be easily kept with your disks. Most of the commands use the Function keys, making the program easy to use. For anyone with a large library of disks and disk files, it can be a real time-saver.

Requirements: IBM PC, PC DOS, 96K, two disk drives (double sided recommended), 80-character display, IBM GRAPHICS printer or Epson Graftax Plus Printer
Lassen Software, $59.95

DISPLAY MANAGER

There can't be many things more boring than writing program routines to set up data entry and report screens. It is easy work, but once you've written one such routine you've written almost all of them. Yet the details of making sure a prompt appears in the proper position, underlined, blinking, or in reverse video, as needed, never grow less tedious. Many programmers spend three-fourths of their time in this drudgery.

Many of them also work with Digital Research compilers, however, and they need never write another display routine again. Instead, *Display Manager* will do most of the work for them. Simply draw the displays on the terminal as they are to appear in the final program, enter a few screen attributes, and this utility will write the code for you.

A variety of valuable options can be built into the resulting screens. Prompts may be underlined or flashing, displayed in half intensity or inverse video. On-screen prompts may be assigned as either input or output fields, and input fields can be set up for invisible keyboard entry say, to protect a password against unauthorized readers. Extensive error checking is available: The program can set up input fields to accept any character, including controls; only function keys; any printable character; only letters, only integers, or only real numbers. Output fields can be right- or left-justified, numeric or in money format, with a leading dollar sign and a decimal point two places from the right. The 16-bit *Display Manager* can also assign background and foreground colors to the fields.

The manual that explains all this is somewhat intimidating, and the package seems a bit clumsy at first. But the process of building a screen becomes easy with a little practice certainly far easier than grinding through the chore unaided. In six months of occasional use, it has proved entirely reliable.

Digital Research is known for building sophisticated, relatively bullet-proof compilers. This addi-

tion provides a strong reason to use them. Any professional programmer should have it in his or her library.

Versions are available for use with both 8-bit and 16-bit compilers. *DM-80* works with Digital Research's Pascal/MT+, CB-80, and PL/I-80; *DM-86* works with the 16-bit versions of these languages and with the firm's C compiler.

Requirements: CP/M-80, CP/M-86, or MS-DOS; 64K RAM

Digital Research, *DM-80* $400; *DM-86* $500

DOS BOSS

DOS BOSS is an exceptionally easy-to-use disk utility that allows you to customize DOS to suit your needs. Rename any or all of the DOS commands with a few simple keystrokes. Typing CATALOG from the keyboard requires seven keystrokes, right? So change it to CAT or even LIST, which makes your programs un-LISTable. Rewrite Apple's error messages. Save-protect your programs, and have a "NOT COPYABLE" message print out if someone tries an unauthorized save. Note that this does not prevent them from copying your entire disk.

The disk catalog function is also easily customized. You may change Apple's Disk Volume to anything you like and even eliminate the volume number. Reformat your catalog listing to multiple columns so that all file names appear on screen at once. You may leave off or change the sector numbers and file codes, group programs by file type (A, I, B or T) when you catalog; or catalog only the file types you want. Also included is a program called *Key-Cat,* which allows you to run programs with one keystroke.

Perhaps the best part of *DOS BOSS* is the documentation. Extremely well-written and very humorous, it contains information about DOS, how to change DOS without *DOS BOSS,* and many other tips and tricks.

All of the programs are unprotected, so you may study and use some of the techniques contained therein. The manual even includes a complete listing of *DOS BOSS* itself!

Requirements: Apple II, II+ or IIe, one disk drive

Beagle Brothers, $24

DPATCH

DPATCH, for CP/M-80, combines a number of disk utilities into one easy-to-use package.

An install program sets up *DPATCH* for the terminal you are using. After that, all you need do is call up the program you need from a menu.

One can scan through and alter disk sectors or files directly, check a disk for bad sectors and exclude them from further use, recover data selectively from damaged sectors, and un-erase files as long as they have not been written over after being erased.

All of these functions are available in a variety of other programs, many of which are in the public domain and may be acquired for free from users' groups. Why, then, would one want to pay nearly $200 for *DPATCH*? The answer is that *DPATCH* really does what it is supposed to, with no surprises. And it makes it very easy. All operations are menu-driven and offer full-screen editing wherever it is needed. The un-erase feature, in particular, seems to work even when many similar programs fail.

Since utilities like *DPATCH* are most likely to be used after a major catastrophe, such as erasing all the files on a disk by mistake, this user-friendly and reliable program can be a life-saver. When you need it, chances are that you'll really need it.

Requirements: CP/M-80, disk drive

Advanced Micro Techniques, $195

DRIVER COMPILER

Driver Compiler is intended to make easier the job of creating character sets and stylized print fonts using the graphics mode of the Epson line of printers equipped with Graftrax or Graftrax Plus.

The BASIC program's main menu provides you with choices for loading and saving tables of character sets, amending or creating sets, compiling sets to machine-code print drivers, printing out a set to see how it looks, inverting (changing black-on-white to white-on-black), and rotating character sets in 90-degree increments.

The center of things is the Amend/Create choice and this is where you begin. You may start with a clean slate or load one of several sets supplied with the distribution diskette and amend or modify those characters.

In either case, the screen displays a 12 × 8 dot-matrix layout for you. Moving the cursor within its boundaries with the spacebar pressed will illuminate the current position of the cursor, telling the program that you wish that dot in the matrix printed. Clear turns the dot off if you wish to

change your mind. The Enter key stores the defined character in the table and opens a fresh display for your next character.

When your table is complete, it must be saved to be compiled or later modified. Then you compile it and give it a name. When you execute the driver program, it loads itself into high memory and functions in place of the ROM print driver for any character you have defined. Thus, you can mix the standard set with specially defined characters.

This program is not likely to be widely useful. It may be of value to some who have the desire to create some special characters and do not wish to cope with the more tedious approach necessary without the program as an aid. However, it is limited by the screen layout, which makes it impossible to be sure what a character will look like in actual use. In addition, the screen of the TRS-80 itself makes it difficult to display characters that will significantly improve on the machine's own. The problem is not that the programming is not well done. Rather, it is the concept that seems of limited value.

Requirements: TRS-80, Model I, III, and 4 (Model III mode); one disk drive
Powersoft, $29.95

EDAS

An editor/assembler is somewhat like a word processor adapted for writing assembly-language programs. But instead of merely producing a text, the program also translates it into usable a machine-language program. Combining these functions makes it possible to write a program, assemble it, and check it for errors in one process. Any errors can then be corrected and a second assembly attempted in a very short time. *EDAS* is one of the oldest and best editor/assemblers available for Radio Shack computers.

The *EDAS* editor is laden with useful features like those of most word processors: global search and replace block moves and copies, and many others. It uses commands almost identical to those of TRS-80 BASIC, making it simple for programmers to learn. Line numbers are used to ease editing the source code but are omitted when program is written to disk. They can be saved, however, if the program is to be used with *EDTASM*.

The assembler is equally functional. Labels can be up to 15 characters long. Expressions may be used as operands in any instruction. Mathematical expressions, evaluated left to right, may include add, subtract, multiply, and divide, but not parentheses. Bits can be shifted left or right. The logical OR, AND, XOR, and NOT are also supported. Pseudo-ops offer a variety of constant declarations, and a complete set of "conditionals" makes it possible to assemble different sections of code just by changing the value of a label helpful in, say, adapting programs to different hardware.

Most devoted assembly-language programmers will eventually produce a program too large for the source code to fit in memory. Fortunately, *EDAS* will assemble source code from several disk files, making it possible to create extremely large programs. For example, *EDAS* was used to assemble the LDOS operating system.

The user of MACROs permits in-line assembly of repeated code sequences without retyping them each time. It also permits the passing of parameters so the same MACRO can do different things each time it is is invoked. The *EDAS* manual made the use of macros clear enough to understand almost immediately.

Another feature stops the assembly if an error is found. One can either list the numbers of lines with errors or correct the error immediately and begin again. When the source code can be assembled without errors, it is done one last time, with a filename for storing the finished program. Assembling a 90K source file takes about 3½ minutes. The result is a working program.

Support from the vendor has been excellent. Most calls are answered by Roy Soltoff, who wrote *EDAS*. Not many software authors are that accessible.

Requirements: TRS-80 Model I, 48K RAM; Model III or 4, 64K RAM
MISOSYS, $99.95

EDIT-SOFT

If you do any programming in *Applesoft BASIC*, you will discover a serious limitation: It lacks convenient editing commands to correct errors in programming. *Edit-Soft* elegantly corrects this defect.

Edit-Soft is a utility that allows editing and manipulation of basic programs while they are being entered or run. The editor is coresident; once it is loaded, it does not alter the normal operations of your computer.

The editor is entered by typing an ampersand; after that, a built-in help function displays the com-

mand set to lead you through editing a program. In addition to basic editing commands, like inserting and deleting, *Edit-Soft* has such useful features as automatic line numbering, line-splicing, and a powerful macro definition ability.

The macro feature allows you to define up to 20 strings of 24 characters, each of which can then be inserted with a single keystroke. Nine different sets of these can be saved on a disk. The macros can be DOS commands (Brunn, Fid, Catalog, or Save), control characters, commonly used program statements or functions (PRINT CHR$(4) or TEXT:HOME:VTAB[10]), or any sequence of keystrokes that you can enter from the keyboard. This feature greatly reduces the tedium of programming.

Edit-Soft is an excellent program that is well worth the purchase price.

Requirements: Apple II+ or IIe, one disk drive, DOS 3.3

Sensible Software, $30

8086/8088 UTILITIES

Dynamic Microprocessor Associates (DMA) is a small software company located in New York City. They don't make much noise, but every once in a while they quietly drop a terrific product into the market. Their latest, the subject of this review, is a package called *8086/8088 Utilities.*

Utilities are not generally considered the superstars of the software world. No one gives them much thought until they're needed. At that point they become worth their weight in whatever precious medium of exchange you happen to use.

The *8086/8088 Utilities* package consists of four subpackages EM80/86, UT-86, CONVCP, and CONVMS. Each is designed for a different task.

EM80/86 is an emulator that runs 8-bit CP/M programs on 16-bit hardware. Versions operate under MS-DOS or CP/M-86 and build a "virtual" 8080-based machine in software. It is extremely easy to use, just type in EM80 and the program name. While DMA states that the application may run anywhere from 100 percent to 20 percent of the speed on the original 8080 processor, none of the applications tested ran significantly slower than normal.

UT-86 adds to MS-DOS's utilities. These enhancements include an extended directory function that produces a sorted, formatted directory; extended copy function, which allows an optional query and/or name change; and two programs that produce a formatted listing of an ASCII file and allow you to examine and modify any data on a disk file.

Except for the disk editors, each of these programs is simple to use. The disk editor is more complex than the rest of the programs in this set and requires that the user knows how data is stored on a disk. If you have ever used a disk editor before, you will find using this one a snap.

The last two subsections in the package are operating system converters. These allow you to run CP/M-86 programs under the MS-DOS operating systems and MS-DOS programs under CP/M-86. Because CP/M-86 and MS-DOS use different disk formats, utilities to transfer files from one operating system to another are included.

While these utilities won't appeal to everyone, those who are interested will find that DMA has done their usual outstanding job of providing high-quality usable software.

Requirements: IBM PC, MS-DOS, or CP/M-86; 64K RAM, one disk drive

Dynamic Microprocessor Associates, $115

FAST SORT

Fast Sort is an extremely fast and inexpensive sort utility that can be called from your BASIC program. It will sort 5,000 items in 22 seconds and 1,000 items in just 3 seconds. *Fast Sort* can be called from both interpreted BASIC and compiled BASIC. It uses machine language and a Shell sort routine to achieve this kind of speed.

The sort routine loads into the last 512 bytes of memory, leaving you with plenty of room for your program and data. It will sort an array into either ascending or descending sequence. Optionally, the sort routine can sort an index pointer along with the sort key. This index pointer represents the record number that has the proper data, allowing the user to leave the records in the original order, yet access them quickly in the desired order.

A major limitation is that only one level of sorting may be done. Quite often, the user will want more complex sorts, such as names alphabetically within zip code. In addition, all sorting is done in memory, leaving the user the chore of programming a multiple sort and merge a difficult task for an inexperienced programmer. The manual is small, and moderately difficult to understand for beginners. A demonstration file is included, which eases the task somewhat.

Requirements: CP/M or IBM PC, BASIC, 48K RAM, disk drive
Ensign Software, $24.95

FILETRAN

Filetran is a high-speed disk-to-disk transfer program. Available for the IBM-PC and Osborne I and Executive, this handy utility will transfer data from over 26 CP/M formats to MS-DOS format or from MS-DOS, TRS-DOS, and 20 CP/M formats to Osborne at nearly disk transfer speeds.

It is of primary use to software developers who wish to transfer software source code to their computer. Editors, printers and consultants will find it useful for processing text written under different operating systems, as will anyone upgrading a system who wants to continue using his old computer or at lease the files on it.

Filetran has nine main functions. Host and Xdirectory will display the names of all files on a disk, how much space they take up, and how much remains. You must "configure" a disk drive to an alien disk format prior to any "transfer" of alien data files to your host disk. Transfer is the heart of *Filetran* and does the job relatively quickly: A 30-page MS-DOS file moved to an Osborne in just under two minutes. A handy function for programmers is Disk, which displays the physical contents of selected disk sectors in hex and ASCII formats.

List is the most anomalous option in *Filetran*, though its functions are useful. You can scan a file for all occurrences of designated data helpful to programmers who wish to search source code for a variable or output message, or for commands incompatibile with some implementations of BASIC. Unfortunately, you can't pause or stop it once it has begun.

Estimate will display number of lines, average number of bytes per line, and total number of bytes in a file. Writers and typesetters can then figure charges by entering cost per byte, which *Filetran* follows up with average cost per line and total cost of file.

The documentation contains all the information you will need to run *Filetran* and some, such as 30 pages of sample scenarios, that you will not need. The few error messages within striking distance are all very clear, and though the manual suggests setup of available Function keys, the program is so simple as to make such configuration redundant.

In all, though, *Filetran* is easy to use and handy to have around.
Requirements: IBM PC, Osborne 1 or Executive; 64K RAM, two disk drives
Business Micro Products, IBM $79; Osborne $129

FILTER DISK 1

Running on the TRS-80 under LDOS, this package provides 14 utilities used to scan data as it arrives from the keyboard, goes to the printer, or is manipulated by a program, modifying selected pieces of it. Few users will need all these "filters," but almost everyone will find a use for one or two enough to justify the nominal cost.

The most powerful filter here is XLATE, which can take any character from standard ASCII code and replace it with any other character; XLATE might be used to translate the control codes in a file written by one word processor to those used by another program or to run a salvaged IBM printer that requires the firm's EBCDIC code. Other filters include UPPER/FLT and LOWER/FLT, which convert all caracters in a file to upper- or lowercase; PAGEPAWS/FLT, which halts printing when it senses a top-of-form character, giving you a chance to change paper when using single sheets; and CALC/FLT, which converts binary, decimal, or hexadecimal numbers entered from the keyboard to the other bases a godsend for assembly-language programmers.

These programs all work perfectly, and there is not much that can go wrong in setting them up or using them. Even newcomers to computing should find them no trouble, and almost everyone will find that they occasionally save hours of toil.
Requirements: TRS-80 Model I or Model III
Logical Systems, Inc., $40

V-UTILITY

V-Utility is a package of five utility programs designed to expand the capabilities of *VisiCalc, Lotus 1-2-3, SuperCalc 2,* and *Multiplan.* It was originally designed for use with *VisiCalc,* which was written years ago and really needed some additional features to keep it current. However, *V-Utility* add more features even to the newer spreadsheet packages now available.

V-Plot prints out a plot of one or two columns of the spreadsheet. *V-Overlay* establishes a series of templates that can be overlaid on the spreadsheet. You can even construct a time-series analysis. *V-*

Stat an easy-to-use method of calculating complex statistical equations, including T-correlation, and regression. *V-S* can rearrange the whole spreadsheet based on the values of a single column. *V-P* provides a means of printing the spreadsheet columns in any order that you want. This overcomes a major formatting problem common to most spreadsheet programs.

The documentation provided is complete and well written, including many examples and demonstration files for the user to practice with. *V-Utility* is menu driven, prompting the user for needed information as it proceeds.

Requirements: IBM PC, 64K RAM, disk drive
Yucaipa Software, $129.95

HESMON

You may not know what a monitor is, or might even confuse it with a video screen, but a monitor (or machine language monitor, or system monitor, it's all the same) is a program that allows you to inspect the logical inner workings of your computer. *Hesmon*, from Human Engineered Software, is a monitor for the Commodore 64 and VIC-20. Its purpose is to inspect, change, and manipulate the numbers stored in each byte of memory.

Hesmon appears to be a descendant of Bill Seiler's famous (among Commodore programmers) *Extramon* program for the original Commodore PET. It, in turn, borrowed ideas from DDT, the monitor for the CP/M operating system, and various Apple routines. Like its antecedents, it lets you read and write to memory locations in hexidecimal numbers or see their Commodore ASCII equivalents. (This version of ASCII differs slightly from standard ASCII in that the Commodore computers use 8-bit, rather than 7-bit, numbers internally.) You can also inspect the status of the microprocessor, its program counter, registers, and so on. The features of this excellent monitor do not stop there, however.

Hesmon also lets you transfer or copy the contents of the computer's memory from one location to another, compare blocks of memory, and search memory for the location of a number or string. A simple assembler and disassembler is available for writing programs in 6502 assembly code. You would not want to use *Hesmon* for programs of any great length; it does not support the features commonly found in more practical (and powerful) assemblers. Assembly code programs can be executed from the monitor and debugged using quick trace and walk functions. Programs can be loaded and saved from or to tape or diskette using *Hesmon*.

There are some new additions to *Hesmon*. These include memory tests for both program and color graphics RAM, an external relinker used to translate machine-language programs from one computer to another, and several invaluable arithmetic utilities for programmers. *Hesmon* will convert numbers back and forth between decimal and hexidecimal numbers and will perform addition and subtraction in hexidecimal, a real headache for all but those who do it every day.

One disadvantage to *Hesmon* is that it is packaged as a ROM cartridge, and therefore cannot be relocated in memory. This is unfortunate, mainly because it conflicts with the investigation of the workings of other cartridge programs and gets in the way of programs that may be loaded in the memory space it occupies. (When *Extramon* circulated among early PET owners, it was offered in several versions, each of which resided in different places in memory.)

Why do you need *Hesmon*? Well, for one thing, you wouldn't if Commodore had left its own monitor in place inside the operating system ROM. Apparently, it was removed to make room for other necessary routines. And, if you are strictly a BASIC programmer, the whole idea of a monitor may be alien to you. But a monitor like *Hesmon* is an absolute necessity if you want to delve into the computer's guts and learn assembly code or machine language.

Requirements: Commodore 64, VIC-20, 64K RAM, one disk drive
Human Engineered Software, $34.95

THE INSIDE TRACK

Data Base Decisions, the company that produced *Peeks 'n' Pokes*, has done it again. They have produced a collection of 61 utility programs to help programmers get better performance out of their IBM PC. It even includes a fold-out memory map showing all of the important memory locations of the PC and the PC/XT.

The Inside Track provides programs to read and write files in BASIC as fast as DOS, display data on the screen four to ten times faster than the BASIC PRINT statement, copy memory from one location to another (an easy way to do fast screen swap-

ping), force the shift keys and other control keys from your program, copy-protect your programs, and perform DOS 2.0 function calls. Additional functions are available to execute one program while keeping a second program loaded, delay execution of a batch job until a specified time, read and modify the diskette parameter table, access the Program Segment Prefix (PSP) to get DOS communication and control information, keep the diskette motor running for faster disk access, limit the memory used by compiled BASIC programs to allow concurrent program loading, and reboot the system in one of three way long, normal, or short.

The package comes with an interesting and informative 42-page manual. It is targeted to intermediate users, but can be followed by beginners for most of the utilities.

Requirements: IBM PC, MS-DOS 1.1, 64K RAM; or DOS 2.0 and 128K RAM; one disk drive
Data Base Decisions, $45

KEYNOTE

Keynote was one of the first macro generation facilities. It remains one of the most popular. Macro generators allow users to define a series of keystrokes consisting of anything from a single character to a long list of commands and store it for execution by a single keystroke. *Keynote* does this with simplicity and speed, but it does lack a few features found in similar utilities.

Keynote has eight commands, a bit more than other macro generators. For some reason, invoking *Keynote* within DOS requires a different command than from within an application program. Once *Keynote* is engaged, you may create multiple macros, display and store macro sets. Execution is fast.

Keynote enjoys its popularity by simple virtue of being one of the first of its kind; comparison with other more recent programs shows that it offers fewer functions. There is no ability to nest macros; one macro cannot call another. Also, *Keynote* does not allow the macro to pause for operator input.

Anyone who often uses MS-DOS micros can benefit from macro generation utilities. *Keynote,* like its counterparts, provides enormous convenience through its ability to customize and facilitate the implementation of almost any application. However, *Keynote* is more expensive and offers less than its newer competition.

Requirements: MS-DOS, 64K RAM
Advanced Software Inter-face, $99.95

LEXICOM 3.0

LexiCom is an easy-to-use utility designed to convert files between many different word processors and file programs. Among these are *Apple Writer I, Pie Writer, ScreenWriter II, Magic Window, Word Handler, Letter Perfect, WordStar, VisiCalc, Data Plot, Address Book, and Robot War.* It will even convert CP/M files to standard Apple sequential text files.

How can *LexiCom* help you? Let's say you have amassed a library of *Apple Writer I* files and decide to purchase *Supertext. LexiCom* will convert all your files for you without retyping.

If you wish to send documents to other people who use another word processor, just convert them to the appropriate format. On the other hand if you receive sequential files from others, you may easily convert those files to a readable form. Random-access text files generated by many database programs may be accessed by your word processor simply by converting those files to sequential files.

The *LexiCom* disk contains both DOS 3.2 and 3.3; if you are transferring files between 13 and 16 sector disks, you will not have to use Apple's *MUFFIN* program. As a spinoff from an earlier version of *LexiCom,* a utility to create your own *DEMUFFIN* program is still provided. This works like *MUFFIN* except that it allows conversion of 16-sector disks back to 13 sectors. This could prove handy to convert *VisiCalc* files from the newer versions back to the original 13-sector *VisiCalc.*

Menu driven, the program is very easy to operate and prompts the user along every step of the process. Error trapping is very minimal in order to save room needed to convert large files. Restarting after an error is done merely by typing "RUN" or "RUN LEXICOM." The 21-page manual seems to cover all the problems a user might encounter, and it includes a hot-line phone number to take care of any questions regarding the program's operation.

The program disk is copy protected; however the manufacturer will replace the disk for $10.00 should the original prove defective.

Requirements: Apple II or IIe, 48K, one disk drive, *Applesoft BASIC.* Two drives needed to split *Address Book* files and to convert CP/M files.
MicroSPARC, $49.95

LINKINDEX

This package is *Apple Pascal*'s answer to the Digital Research utility, *Access Manager*, for CP/M and MS-DOS computers a set of routines that can be used as the basis for such record-oriented programs as accounting packages, stock-market analyzers, and similar applications.

With *LinkIndex*, you can create a B-tree index of your data file and add, delete, or retrieve index entries; the user must add whatever routines are needed for manipulating the data file itself. A single index file may contain more than one key field, and character, integer, and long-integer indices may be mixed in the file.

These indexing routines are quick: Retrieving a record from its key value takes only a couple of seconds in a 500-record file, and because this is a B-tree system, performance slows only minimally as the file grows.

LinkIndex is easy to use as indexing systems go but new programmers may well have some difficulty in their first sessions with the program. The manual leaves many questions unanswered, and it is occasionally necessary to study the source code, included as a disk file, to understand the details of a procedure.

Once familiar with these routines, users will find this a quick and reliable indexing system. For professionals working Pascal, it will be an efficient way to speed the coding of many applications packages.

Requirements: Apple II or III, 64K RAM, two disk drives, *Apple Pascal*
Link Systems, Inc., $199

LINKVIDEO

Running under Apple's version of *UCSD Pascal*, this package offers a library of procedures and functions that aid in creating I/O screens for other programs. Included are both cursor-and screen-control procedures and a variety of input procedures that can accept keyboarded data.

To use *LinkVideo*, simply link the necessary procedures into your program; specify the screen messages and layout, whether parts of it should blind or appear in reverse video, and so on; and define data to be input and where on the screen the data will be typed in. Data types include real numbers, integers and long integers, Boolean values, and several business-oriented types; dates, telephone numbers, and Social Security numbers. Dates and similar data are automatically checked for validity, and the routines beep and begin again when invalid entries are made.

LinkVideo's routines work reliably and with enough speed to make them convenient. Incorporating them into a program will not be difficult for experienced programmers, but a thorough knowledge of Pascal is needed; beginners may find themselves lost. The manual will be relatively little help, as it omits many details of the package's operation. Source code is included as a disk file, however, and digging into the program itself may prove more enlightening for both new and experienced programmers than any manual could be.

This package is clearly of interest only to programmers. But for those who often use *Apple Pascal*, it can eliminate many tedious hours of screen construction.

Requirements: Apple II or III, 64K RAM, two disk drives, *Apple Pascal*
Link Systems, Inc., $54.95

MICROSHELL

If you have an 8-bit computer running CP/M but wish you could use some of the fancy features that you've heard UNIX gives you, then you should look into *MicroShell*. This program loads itself under CP/M-80 and gives you such UNIX-like features as redirection of both input and output, pipes, automatic program and file searching across disks and user areas, command-line editing using *WordStar*-like commands, and the ability to create shell files for automatic batch processing.

MicroShell replaces part of CP/M, the CCP. It uses up about 8K of memory, so some very large programs may not run under it; otherwise it is completely transparent until its features are called upon. All normal CP/M functions are still available, except for Submit and Xsub. Their loss is more than made up for by the shell facility, which allows you to automate many procedures, including those involving interactive programs like word processors or BASIC. You can even set up a fully menu-driven system.

MicroShell actually speeds up certain kinds of processing because it eliminates warm-boots between programs. The I/O re-direction feature allows you to keep a disk copy of any terminal input or output this alone is worth the price of the program to many programmers.

Requirements: CP/M-80, disk drive
New Generation Systems, $150

MONKEY WRENCH II

Atari's brand of BASIC is reasonably powerful, but there are times when it seems to lack needed conveniences. *Monkey Wrench II* supplies them. Used in conjunction with the BASIC cartridge, it provides a variety of utilities and programming aids.

Automatic numbering, renumbering, deleting, moving, and copying of lines help streamline programming. So does the search-and-replace routine. A scrolling function allows the user to scroll up and down an entire program. Other functions will display the disk directory without having to load DOS, change the screen margins, keep the keyboard locked in upper case, and allow use of the cursor keys without holding down the control button. These aids help avoid many of the little annoyances of programming. A memory-test function will check that RAM is functioning properly, a valuable tool when installing new memory modules and debugging programs.

For the more advanced programmer, *Monkey Wrench II* has hexidecimal-decimal conversion functions, and a series of machine-language commands. These will automatically display to the screen and, if desired, modify memory locations and the microprocessor registers; search for strings and hex characters; and disassemble memory and edit assembly code.

All *Monkey Wrench II* commands are entered with few keystrokes and work quickly, but may only be used in direct mode. The user is cautioned not to run programs with the *Monkey Wrench II* installed. Therefore, to check the progress of a program, the program must be saved, the *Monkey Wrench II*, cartridge removed, and the program rebooted. Though this takes time, it does force the user to save programs more frequently always a good practice.
Requirements: Atari, 16K RAM, BASIC
Eastern House, $59.95

NAMETAGR

Nametagr produces labels, badges, logos, and various small signs with a dot-matrix printer. The complete *Nametagr* kit includes two disks (program and file), 30 badge holders, 400 pin-feed badge stock, 240 3 ½-by-15/16-inch labels, 120 4-by-1 15/16-inch labels, and an instruction manual.

Among this product's many uses are name badges for conferences, table signs for restaurants, mailing labels, and distinctive mastheads for small businesses with eight predefined formats. It can print in various type sizes as specified by the user, including italics. Special styles of type can be generated by the logo-making features.

Nametagr is menu-driven. For each operation, a list of options appear on the screen. A one-key response gives the user what he or she wants. The name-tag feature allows the user to input a person's complete name, including title and nickname; company name, address, even end notes. The mailing-label feature shares the same file as the name-tag feature and operates much the same.

The logo-making feature is a separate program from the *Nametagr* package. It allows the user to create logos up to 100 dots wide by 6 print lines high at 9 lines per inch. This format translates into a logo about ¾-inch wide and ⅔-inch high. The user draws the logo by inputting a value for each print line.

The manual is well organized and it goes beyond instructing the user simply on how *Nametagr* works. It gives suggestions for using *Nametagr* in business and at home. An appendix shows, with photographs, how to calibrate the printer and adjust the form position for easier use of the program. Two other appendices give tips on designing name-tag formats and an example of logo creation.

However, *Nametagr* is one of those rare programs whose manual is needed only as a supplement. Except for the initial setup, *Nametagr* is well prompted to help the user along.

Nametagr is a versatile yet simple program with many uses in the small business environment. Restaurant owners and convention organizers will especially appreciate this program. The home user will find it handy just to label program disks.
Requirements: TRS-80 Model III or 4, 48K RAM, one disk drive, dot-matrix printer
ETS Center, $79

THE NORTON UTILITIES

The Norton Utilities is a set of 20 programs that provides the IBM PC user with valuable tools for viewing and manipulating the files on a diskette. These programs will allow users to view the contents of their disks in ASCII (English) or hexideci-

mal (computer language), recover erased files, fix damaged files, sort the diskette directory in order by name, extension, size, or creation date, view hidden files, hide files from view (and accidental erasure), optimize the location of files on the disk for speedier processing, and read, write, or change any data on the disk more easily than with *DEBUG* or *EDLIN* (the PC Dos programs). In addition, there are several programs here that make PC DOS more useful for the serious programmer. These programs will allow the user to sound the speaker and clear the screen from a batch file, show the elapsed time that a program has been in use, print files, change screen colors, and implement reverse video. The programs support DOS versions through DOS 2.00.

The documentation is well written and the programs are easy to use. Most of the utilities make liberal use of the Function keys and good error checking is provided. A must-have for programmers, it is also quite useful for casual computer users.

Requirements: IBM PC, PC DOS, 64K, one disk drive, 80-column display (monochrome or color)
Peter Norton, $80

OPT-TECH SORT

There are two programs in the *Opt-Tech Sort* package. Together, they provide an easy way to sort or merge data. The first program, *Sort,* is designed to be used as a DOS command. The second program, *BSort,* can be called as a subroutine from a BASIC program.

Both programs are written in assembly language for maximum speed. They can sort or merge text files with fixed or variable length records and binary files with fixed length records. Up to ten input files can be used, with the number of records limited only by the available disk space. *Opt-Tech Sort* allows the use of up to nine key fields. Output files can contain full records, record addresses, or record addresses and keys. Output may be directed to a disk file or a reserved file name, such as the printer or the console. If the file to be sorted is too large to fit into memory at one time, the program will break the information into as many as ten segments, writing out temporary files full of sorted data. It will then merge the files together, leaving one large, properly sorted file.

The package comes with a simple manual and an online help facility. Use of the *BSort* program requires the user to understand the use of the BASIC BLOAD and Call statements, but a tutorial guides the inexperienced user through an example.

Requirements: IBM PC, 48K RAM, disk drive
Opt-Tech Data Processing, $75

PARTITIONED DATA SET

The *Partitioned Data Set (PDS)* utility saves disk space and lets you create libraries of program or data files. It takes advantage of features of the LDOS operating system, and LDOS is a prerequisite for its use.

Most TRS-80 operating systems, including LDOS, allocate disk space in units called "granules." A granule is usually from three to six 256-byte disk sectors, taking from 768 to 1,536 bytes on your disk. Unless a file's length is an exact multiple of the granule size, disk space is wasted. Let's assume your granules contain six sectors. You create a small file containing a couple of half-lines of text, say 80 bytes total. Your 80-byte file takes up 1,536 bytes on the disk, wasting 1,456 bytes. Likewise, a file containing 2,000 bytes of useful data requires two granules, wasting 1,072 bytes.

PDS lets you build a single DOS file containing many other files. The *PDS* file itself may suffer the wasted space syndrome shown above, but that space is amortized over all the files you put in the *PDS* file. The total space wasted is far less than if all files were individually stored.

PDS commands include Append, to add a new file to a *PDS* file; Build, to create a new *PDS* file; Copy, to copy a file from *PDS* to a DOS file; Dir, to list the members of a *PDS* file; Kill, to delete a *PDS* file; List, to type the file out; and Restore, to unKill a file. Program files in a *PDS* file can be executed by typing "*PDS*-file-name (program-file-name)."

The second major use of *PDS* is to create a library. The MISOSYS EDAS IV editor/assembler language routines in *PDS* member files, and the assembler will access them as needed.

PDS is easy to use, works well, and comes with understandable documentation. If disk-space crunch is giving you grief, give *PDS* a try.

Requirements: TRS-80 Model III or 4, 32K RAM, disk drive, LDOS
MISOSYS, $40

PC PADLOCK

Pirates! The world is full of software pirates. What is an honest programmer to do? Simple. Just

buy a copy of *PC Padlock* and let its excellent encryption program take care of the rest. Most programs of this type cause the purchaser of the program to complain bitterly that there is no way to make backup copies of their program for his own protection. *PC Padlock* uses a new idea that will protect the programmer or publisher while giving the purchaser some protection as well.

The encryption scheme actually melds the programmer's code to the particular disk on which it is placed. Protection is provided for either COM or EXE programs, and works with all versions of DOS through 2.0. A program protected by *PC Padlock* may be backed up on an unauthorized diskette, but it will not run. This backup can then be copied back onto the authorized diskette, where it will run. This gives the final user some degree of protection while insuring against unauthorized use of proprietary programs. The protected program can even be copied to a hard disk, as long as the authorized diskette is available on the A drive to be verified when the program is started.

The protection scheme requires 2½ percent of the authorized diskette's space in order to run. This is a small price to pay for the advantages provided by this well designed program.

Requirements: IBM PC, 64K
Glenco Engineering, $99

PEEKS 'N POKES FOR THE IBM PC

Peeks 'n Pokes is a set of 58 programs, subroutines, and techniques for programmers and curious PC users who would like to explore PC DOS function calls and BIOS functions that are not available from BASIC or Pascal. These functions allow the BASIC or Pascal programmer to access routines with more power than the higher-level languages provide. The publishers even allow purchasers to use the programs and routines in their own programs. Supported in the package are routines to check and change the status of the keyboard, monitors (color and monochrome), disk drives, printers (serial and parallel), and the RS-232 ports used for communications. The user can access the directory, print the screen, read the amount of available memory, reboot the system, and read or change the default disk drive. *Peeks 'n Pokes* also provides some nice extra features, including a way to unprotect BASIC programs that have been protected by the P option, access to information about the operation of the BASIC interpreter, and the ability to pass data between programs.

A 38-page manual shows how to use the routines provided and and answers some common questions about why and when to use these routines. This is a good program for programmers and would-be technicians who can't understand the more complex instructions in the IBM manuals.

Requirements: IBM PC, PC DOS, 48K, one disk drive, 80-column display
Data Base Decisions, $30

THE PROGRAMMER'S POWER TOOLS III

This collection of utility programs for the Apple III's Business BASIC provides valuable programming shortcuts. The so-called power tools are actually six machine-language files on one disk.

PPT.INV file can convert lowercase or mixed upper/lowercase responses into all uppercase letters. It also lets you disable or re-enable the Reset key and format a diskette in any available drive. This last feature, though, should be used with caution, because PPT.INV doesn't check to determine whether the disk to be formatted is, indeed, blank.

NUMSORT.INV and SORT.INV will sort one-dimensional strings or numeric arrays in memory. From either file you can specify the starting position and the length of the sort string and whether you wish to sort in ascending or descending order. And for keeping track of the original elements' positions, you can specify an associated integer array whose elements will change as the sorted array changes. NUMSEARCH.INV and SEARCH.INV are similar to NUMSORT.INV and SORT.INV, but they are used for searching through, nor sorting, one-dimensional arrays.

GENINPUT.INV is the most powerful program of the six. By selecting the type of input (either NUMGET, DATEGET or TEXTGET) and including the prompt in the input command, you can input data with prompts and format it for data type. Also, GENINPUT.INV lets you specify resorting to *Apple Business BASIC*. And by using a coded numeric value, this utility checks each keystroke for special characters such as the Escape or Arrow keys automatically.

The Programmer's Power Tools III is hardly the indispensable utility package, even for a programmer. But then again, it would be a useful addition to any toolkit.

Requirements: Apple III, 128K RAM
CE Software, $79.95

PROKEY

Prokey is a utility for the IBM Personal Computer that allows the user to define keyboard macros. It can be run not only with all versions of DOS, but also with application programs running under DOS.

In *WordStar,* for example, you can transfer the "diamond" cursor movement arrangement to the ten-key pad. *Prokey* macros reside in memory, although they may be stored on disk, so the execution is fast.

Using *Prokey* is simplicity itself. Once loaded into DOS, *Prokey* is summoned up by the ALT plus the "=" key. You then "name" the macro by keying in any ALT with letter or digit, any function key alone or with CTRL, or any numeric key. Finally, you key in the character, string of characters, or command sequence that you desire. Execution involves merely calling the macro.

Prokey also allows the macro to pause, wait for the operator to key something in, then proceed. These entries may be of fixed or variable length. Macros may be nested and stored as ASCII files that can be edited.

Prokey is a simple, nifty utility that is easy to learn. Used in its simplest form, it can eliminate many repetitive keystrokes. More importantly, you can transform the awkward, laborious implementation that mars otherwise good programs into easy-to-use, single-stroke commands. Highly recommended.

Requirements: IBM PC, PC-DOS, 64K RAM, one disk drive
RoseSoft, $75

QUSORT

QUSORT is a utility called from your BASIC program to sort as many records as fit into memory. This memory limitation may cause problems if your BASIC program is large. More sophisticated programs of this type will allow you to sort very large data files by breaking them up into smaller segments and merging them back together automatically.

QUSORT is written in BASIC, making it very slow when used on larger files: 200 records take 100 seconds to sort, while 2,000 records take 20 minutes. If you own the *IBM BASIC Compiler,* you can improve these speeds dramatically, but the compiled program is rather large, taking up precious memory and further limiting the number of records that can be sorted.

The manual provided with *QUSORT* is only seven pages long and may be excessively technical for the average user. Three sample programs are included, apparently with the idea that the user can figure out how the program works by running the samples. Since the program requires the user to prepare all of the data before sorting can begin, this is harder than it might seem. The publisher will, however, provide the services of the programmer for the cost of a phone call.

Requirements: IBM PC, 64K RAM, disk drive
Miracle Computing, $35

THE ROUTINE MACHINE

BASIC, a relatively easy programming language to use, has one main drawback: speed. In its interpreted forms, such as *Applesoft,* BASIC can seem to take forever doing repetitive tasks such as sorting and searching. Visual presentations become agonizingly slow, taking forever to draw a graph. Machine-language programs on the other hand, perform with lightning speed, but are difficult for most programmers to master.

Putting machine-language code into your programs can create many problems: interfacing the routine to *Applesoft BASIC,* particularly the passing of variables back and forth; deciding where in memory to locate the routines; avoiding conflicts when using more than one routine; and so on.

Routine Machine allows the easy incorporation of a wide range of professionally written machine-language routines into your own programs. The concept is simple. Using a technique involving the internal *Applesoft* program pointers, machine-language programs can be attached to a standard *Applesoft* program. Many advanced programmers have been doing this for years. *Routine Machine* goes one step further and allows several routines to be attached to and used by the same program. This is done automatically; all the programmer has to do is pick the desired routines. It is very easy to use and requires no machine-language programming skills to use.

Comprised of two components, the *Routine Machine* itself and its companion *AmperSoft* program library-disks, the package extends the *Applesoft BASIC* programming language. Each module is in-

voked using a one-line command. Only three simple steps are required. First, insert a line in your program which sets up the ampersand vector to connect your program with the routines appended. Next, use the *Routine Machine* to append the routines of your choice. And finally, invoke these routines from within your program by using the ampersand followed by the name of the appended routine; for example, "&"SWAP",A$,B$."

One of the included routines is print-using. A big complaint among many *Applesoft BASIC* users is the lack of this function. It allows you to format numeric data for screen, printer or disk-file output easily for such things as monetary amounts, dates, and social security numbers. Most other BASICs include it as part of the language.

The "string-input" routine is an alternative to the usual *Applesoft BASIC* input statement in that commas and colons are allowed. Also included are powerful search and sort routines for single dimension arrays. Search a thousand elements in one second or sort a thousand elements in 90 seconds. A "binary-load" routine will load any binary file five times faster than normal. High-resolution pictures load in under two seconds. A "reset handler" allows you to trap the Reset key, causing it to execute an on-error function. You may then either run or reboot a disk.

A "high-res ASCII" routine provides you with a character set for mixing text with high-resolution graphics. A "turtle-graphics" routine allows versatile high-resolution graphics routines for easy drawing of figures. A "shape gobbler" will convert existing *Applesoft* shape tables into usable *Routine-Machine* library modules. (Ordinarily, to use a shape table you would have to go through a complicated procedure of loading and protecting the table in memory, setting pointers, and other manipulations.) A shape-table viewer is provided to examine raw shape tables.

The *Routine Machine* diskette includes 30 valuable routines. Additional routines are available on a continuing series of *AmperSoft* program library diskettes. The program can be used with other machine-language subroutines, either those you write yourself or routines obtained from another source, such as computer magazines.

A well-written, attractively bound 162-page manual is included along with more than 20 demonstrations programs. Becoming proficient with *Routine Machine* still requires some practice, but the manual does much to make this easier than learning machine language.

Requirements: Apple II, DOS 3.3 with ROM *Applesoft BASIC* or language card, 48K RAM, one disk drive

Southwestern Data Systems, $64.95

SIDEWAYS

For those spreadsheets users who turn to scissors and tape to produce wide reports, this handy utility prints reports of virtually unlimited width. How? Look at the name. *Sideways* takes the print file and actually converts the data into a page of graphics and prints it sideways.

This remarkably clever program has a lot going for it. It works simply and well. Instead of outputting directly to the printer, output to disk. Then run the print file through *Sideways*. Because files differ from spreadsheet to spreadsheet, the manual gives instructions on how to output files from *VisiCalc, Lotus 1-2-3, Multiplan* and *SuperCalc*.

Sideways gives you printing options. Two font sizes are available, and you can set character and line spacing for each font. Changing to another font brings the appropriate spacing with it. All your parameters may be stored in a default file and restored with a single keystroke. In fact, invoking *Sideways* with your specified settings can be accomplished without consulting the menu.

Sideways gives you printing capabilities beyond what most spreadsheets can handle. Because of this, the program provides what they call "glue lines" instructions for *Sideways* to reconstruct a wide report after a spreadsheet has truncated it.

Probably the only thing about this nifty program that doesn't shine is the speed. Remember that you are really printing graphics that your spreadsheet never intended you to get, and you may find it easier to accept the half-speed output.

Requirements: IBM PC; graphics printer

Funk Software, $60

SPACEMAKER

A major problem that professional programmers often encounter is trying to reduce the size of EXE and COM programs so that they will use less space on a diskette and load faster. *Spacemaker* was designed to reduce significantly the size of programs with large data or stack segments. This does not reduce the amount of memory that the program will use when the program is loaded into memory,

but it does save much of the disk space required by many commonly used programs. For example, *DOS Linker* (version 1.1) is 41,856 bytes long in uncompacted form. After compaction by *Spacemaker,* the *Linker* is only 30,369 bytes long, a savings of over 27 percent.

Spacemaker will completely replace *EXezbin,* converting any EXE program to COM format as long as the compressed version is less than 64K bites. The advantage of this is that in addition to the space saved by the compaction, the space needed for the EXE header is also saved.

The manual provided is not overly complex, yet it even goes into some of the more technical concepts of "near" and "far" calls in easy to understand language. Realia, the publisher, does not charge a licensing fee or a royalty when someone uses *Spacemaker* to modify a program, even if it is intended for resale.

Requirements: IBM PC, 64K RAM, disk drive
Realia, $75

SUPER DISK COPY

Are you a regular user of Apple's *FID, MUFFIN* and *COPYA* programs? Have you ever wished they could be easier to use? And wouldn't it be nice to access your old DOS 3.1, 3.2, and newer DOS 3.3 files all within one program?

Super Disk Copy is a first-class utility package that does all of this and much more. Bear in mind this is not a nibble copier and will not copy most protected disks. But it will copy everything else, including Pascal and FORTRAN disks. Using three different copy modes for entire disks, one can copy from DOS 3.2 to 3.3 and back again and works with either one or two disk drives. You can make a "quick copy" where only used sectors are copied or a "contiguous copy" when file sectors are scattered all over various tracks. This lays all your files down in a straight line contiguously on the disk. A "Brute-Force" option allows the copying of Pascal and FORTRAN disks that are normally difficult to copy.

Files may be copied from one disk to another even if the DOS structure is different, (e.g., to transfer your 13-sector files to a 16-sector disk or back again). You may copy just the DOS from one disk to another or delete the DOS to provide additional data storage space.

Many other helpful utilities are included: you can alphabetize all the file names on a disk, undelete a deleted file, correct file sizes (if you save a shorter file with the same name as a longer one, the extra file space is not freed up by Apple's DOS unless you delete the file first), make "hidden" characters in file names visible, and produce a sector map showing used and available disk space. You may also Initialize both 13- and 16-sector disks.

As with all Sensible Software products, the documentation is clear and concise and you can run most of the features of *Super Disk Copy* without even looking at the manual. The program is completely error proof and there are no traps. It is difficult to find any fault whatsoever with this excellent utility.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive
Sensible Software, $30

SUPER UTILITY PLUS

It is relatively easy to summarize Kim Watt's *Super Utility Plus* for TRS-80 computers. It is probably the most versatile, comprehensive, and useful single utility package ever written for a microcomputer. Describing everything it will do is much harder.

Start by booting the disk. *Super Utility Plus* provides its own operating system, and after booting the *Super Utility Plus* disk may be removed. The entire program resides in memory, making all drives available for subsequent operations.

There are more than two dozen separate programs here, organized under a main menu and nine submenus. Broadly, *Super Utility Plus* lets you examine and change the contents of diskettes or memory, and provides utilities for fast formats, backups, and copies of data from one place to another. In short, they let you reach deep into the workings of the machine to control functions that ordinarily cannot be reached.

A few of the high points:

Each disk drive may be configured for any of seven operating systems TRS DOS, LDOS, LDOS 8-inch, DOSPlus, MultiDOS, NewDOS 80 version 2, or DBLDOS. The drives may be further configured for number of sides, single or double density, number of tracks, and many other technical details. Thus disk files may be converted between a wide variety of incompatible formats.

Another menu provides choices for displaying, verifying, comparing, copying, zeroing, and exchanging disk sectors. It also provides for copying

or reversing sector data, and for string and sector searches. It will also read ID marks and alter data address marks (DAMS). These functions let you pin down and change the exact location and contents of any part of the disk, paging through the sectors and tracks much as a word processor does through text, working in hex, decimal, binary, octal, or ASCII code.

All these operations are accessible with a single choice from the "ZAP Utilities" menu. There are a dozen choices on this menu alone.

Another set of utilities performs similar functions on files, allowing you to page continuously through the file even through it is distributed across several regions of the disk. Yet a third set allow you to view and manipulate data in memory. Using one set or the other, sections of either files or working memory may be viewed, modified, moved, exchanged with other sections, or searched for the occurrence of a specified string.

The Copy File choice is much used and valuable. You may select one file, several, or all files on a disk and have them copied to one or more destinations, which may use other formats.

Another choice will format disks in any of the standard DOS formats, from single-density, single-sided, 35-track format used on the old Model I to double-density, double-sided with 80 tracks. It will also allow tricks like converting a 35-track diskette with data on it to a 40-track disk without destroying the data or directory. You can even mix single- and double-density tracks on the same disk.

Format Without Erase is one of the most frequently used routines. It aids in recovering older disks that have "sector not found" or "Data CRC" errors.

Super Utility Plus rapidly makes backup copies of disks for any of the operating systems it supports and will make more than one backup at a time. You may also backup a 35-track disk to a 40-track format. Not even a faulty sector stops the process; you can try again to read a bad sector and, if need be, skip to the next. The Special Backup procedure will even back up many diskettes that do not fit any of the DOS standards.

In many instances, a disk's directory sectors are damaged but in a way that is recoverable, and the Repair Utilities are aimed at these cases.

Another set of utilities, not available on disks for the Lobo Max-80, backs up and modifies data from tape cassettes.

Enough. There is no way to discuss everything this package can do. Most books would be far too small to do more than catalog its powers.

While *Super Utility Plus* will copy many "protected" disks, it will not duplicate its own. The package provides two serial-numbered copies of the program, and the publishers will provide a replacement for $8 when you return an original program that has become unusable, $5 more if the returned diskette is not usable.

Earlier versions of the manual were written pretty much in "hackerese," but the present version's manual does not suffer this malady. In fact, it is remarkably readable and understandable, given that it covers some complex topics.

This program is a bit like the English language. For some purposes, a two-year-old can use English effectively; in Shakespeare's hand it rose to glorious heights. So it is with *Super Utility Plus*. Almost anyone with a real interest in computers and a willingness to read a little can profit from using it. In the hands of a dedicated hacker, it becomes a tool of immense power.

Requirements: TRS-80, Model I, III, or 4, or Lobo MAX-80; 48K RAM; disk drive
Powersoft, $79.95

SYSTEM-BACKUP

System-Backup is designed to ease the task of making backup copies of IBM PC diskettes and to format diskettes as it copies, saving the user time during copying operations. It works on all unprotected programs and most protected programs that use DOS 1.10 or DOS 2.00 (8- or 9-sector versions). Because *System-Backup* can recover from track and sector errors, you can also salvage damaged diskettes. Many protection schemes are supported, including different-sector timing, multiple-sector sizes, or a combination of both. *System-Backup* works automatically in most cases. It provides a special parameter for use on single-drive systems and also provides parameters to allow you to analyze the disk's track and sector sizes, the timing between sectors, and the use of invalid synchronization address marks. During copy operations, Cyclic-Redundancy-Check (CRC) errors are spotted but not corrected. An optional parameter is provided to enable the copying of programs protected with CRC errors.

The manual lists available program options and error messages. This program does a good job of

copying protected software and of providing additional information for the serious programmer. A nice addition would be a section explaining the meaning of the analysis option output for beginners.
Requirements: IBM PC, PC DOS, 64K, one disk drive
Norell Data Systems, $50

TASMON

If you haven't already, sooner or later you will probably grow curious about assembly language programming. Maybe you need a fast assembly-language subroutine for a BASIC program; if you are ambitious, you may want to develop an entire program in assembler, or you may just want to understand how someone else's assembly-language program works.

In any of these cases and many more, *TASMON* is an invaluable assistant. It can mean the difference between frustration and fun for either a beginning or an experienced assembly-language programmer.

TASMON is available on disk or tape for the TRS-80 Models I, III, and 4. It takes up about 8KB of memory, so it can be run in as little as a 16KB machine.

TASMON combines the power of several utilities in one: a memory editor in ASCII or hexadecimal; a disassembler to the screen, printer, or disk file, including labels for later modification and reassembly; a machine language program execution monitor with single-step, trade and nine breakpoints with breakpoint counters; and a load module utility to transfer code between disk and tape, including automatic assembly-language program relocation.

An outstanding feature of the assembly-language monitor is its ability to single step through the execution of ROM code; you can explore the ROM of your machine and learn its inner workings. Another advance is the "keep screen buffer"; two screens are maintained, one with the output of your program, the other with the output of *TASMON*. This lets you debug a screen-oriented program without having the output of the debugger obscure the operation of your program.

TASMON's manual is not fancy, but it adequately describes the program and includes useful tips for its application. *TASMON* has an excellent track record of converting its users into admirers. It is a fine program and comes highly recommended.
Requirements: TRS-80 Model I, III, or 4; 16K RAM, one disk drive
The Alternate Source, $29.95

TRAKCESS

Trakcess is a best-selling program that appeals to two main audiences: those who want to learn about the details of diskette formats and programming at the level of the disk controller; and those who want to backup protected disks.

Its best-seller status is undoubtedly due to its copying ability. In backing up protected disks, it does a reasonably good job. However, software authors invent new protection schemes as fast as programmers gird their utilities to defeat them. If you are willing to learn about disk formats at the hardware level, *Trakcess* gives you the ability to do just about anything the controller is physically capable of doing. This capability, combined with patience and some detective work, will let you backup more disks than the built-in disk duplicator function.

As a programmer's utility, *Trakcess* is smooth and enjoyable to use. It is menu-driven and offers functions to move the disk head to a new track, read and write disk sectors or tracks, and scan disk sectors and identifying header information. You can also copy a track or an entire disk and build a custom track with any valid combination of sector sizes and numbers.

A very fast and versatile full-screen memory editor complements these disk-tampering facilities. The editor works in both hexadecimal and ASCII modes. You can rapidly scroll through and modify memory, even fill a block of memory instantly with a given value. To edit a disk, you read from it into the editor's buffer, then examine and modify memory as needed and write the results back to disk.

Like most of its maker's programs, *Trakcess* is a great value for the price and performs as advertised. Support is good and updates with new features are promised for the future.
Requirements: TRS-80 Model I, III, or 4, 48K RAM, two disk drives
The Alternate Source, Model I $24.95; Model III/4 $29.95

UTILITY CITY

Imagine being able to buy a useful utility program for less than $1.50! Here's a bunch of them all

on one unprotected disk that will keep *Applesoft BASIC* programmers busy for many a late night.

Utility City is a collection of 21 programs plus a Peeks and Pokes chart and a very interesting and humorous Tip book, included as part of the instruction manual. Two of the most useful programs on the disk are *Screenwriter* and *Xlister.*

Screenwriter allows you to compose very elaborate screen layouts directly on the screen and then save these as binary files, which may be be loaded from within your program. You may use inverse, flashing, and normal type; centered, flush left, and right copy directly to the screen. This utility allows you to create attractive screen layouts without having to use Print statements, V-TAB, H-TAB, Inverse and so on. You may enter both upper- and lowercase letters (if your machine supports lowercase) and numerous special characters. You can even do block moves. A simple command also allows you to dump the screen to your printer.

Xlister produces a very readable reformatted listing of any *Applesoft* program. Multiple program statements are listed one to a line and each statement following a FOR is indented until a NEXT is printed. An asterisk marks statements within a line following an If-Then statement. When Xlisting to your printer, page breaks are automatically taken care of. *Xlister* is a little slow when printing long listings, but the ease of reading makes it all worth while.

Other programs included are:

Bigliner which renumbers selected program lines to 65535 making them inaccessible to most users—unless they have this program and renumber them back!

Multi-Cat sends disk catalogs to your printer or screen in multiple columns and widths.

Key-Cat which allows you to run programs from the catalog listing with one keystroke (eliminates typing long file names). Also shows free sectors on disk. Use as your HELLO program!

Hex/Decimal/Binary Converter to convert between each number base easily without disturbing your program.

Text Dump enables you to dump the text screen to your printer from within your program. This eliminates the need to write a long series of Print statements.

Connect joins two programs together to make one larger one. Create a library of often-used subroutines, and then append them at any time.

The rest of the utilities included are of questionable value depending on your particular needs. However, the few mentioned above make the low price of *Utility City* more than worth it.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, one 48K Ram disk drive

Beagle Brothers, $29.50

TRIP HAWKINS, ELECTRONIC ARTS

William M. "Trip" Hawkins, president of Electronic Arts in San Mateo, California, looks at computer software as a popular art form, much like music or movies.

"So the best people to do software for this new medium will think of themselves as artists and will work as artists," says the 29-year-old Harvard graduate, whose view of the software industry has quickly taken his company to the top. Founded in July 1982, Electronic Arts issued its first six titles the following May and was marketing 17 programs in Apple, Atari, and Commodore 64 versions by mid-1984 with IBM PC disks on the way.

Like singers signing recording contracts, software programmers sign with Electronic Arts for individual projects, receiving technical assistance from studio engineers when necessary. The privately held company features pictures of the artists as well as screen shots of the programs on its sleek three-panel disk sleeves.

One of Electronic Art's designers is Bill Budge, creator of the best-selling *Pinball Construction Set,* a graphics-oriented program that lets you create and then play your own pinball machine.

But Hawkins also nurtures unknowns, "bluebirds who fly in over the wall," he calls them. One example is 16-year-old Will Harvey, who cooked up the idea for the best-selling *Music Construction Set,* a program that plays 12 tunes from baroque to rock and teaches you to read and compose music.

After graduating from Harvard, Hawkins went to Stanford Business School where his study of the personal computer market won him a job with Apple in 1978. He struck out on his own after helping develop and market Apple's Lisa.

AGWARE

Since its birth, the computer has revolutionized almost every industry. Agriculture is no exception. When market prices were high and growing costs were low, farmers had very little concern for business errors. Profits were a sure thing until recently. Now that the margins have shrunk and the government is adding complex programs every year, such as PIK, there is very little room for error. Even one wrong decision can create economic disaster. Universities around the country are stressing the importance of good farm management, and farmers are understanding the need as well. To improve management, many universities and business experts feel the computer is the best management tool ever invented. Since 1982, Purdue University in Indiana has required at least three hours of computer science before they will issue a degree in agriculture.

How can the computer improve farm management? Once it has been programmed, it can store enormous amounts of information in its memory. It can then process, analyze, and retrieve that information and calculate hard figures that can be used to make more accurate decisions. The ability to get access to and use information is the key to successfully managing a farm or ranch today, and as the need for more information increases, so does the time involved in collecting and analyzing information.

The computer cannot make decisions or solve problems by itself, but it can provide information to be used in decision-making. For example, the computer can be used to improve production capabilities. The computer itself will not grow more corn or soybeans per acre, but it can organize and sort field records so that a farmer can better decide what herbicides and fertilizer rates to use. The computer can be used to make better marketing decisions as well. It will not change the demand and supply for commodities, but it can aid in decisions that at selling time might bring above average prices. The computer will not change 16 percent interest rates to 9 percent, but it may anticipate a shortage in cash-flow; it will not reduce the amount of those shortages, but the warning may make them easier to deal with.

How a computer is selected will determine whether that computer will be used successfully on the farm. Universities and computer experts feel the correct approach to buying a computer system for any farm operation is to:

—Identify the farm's information needs. The most important part of selecting any computer system is defining what that system is going to do.

—Evaluate software that fulfills those needs. In this catalog you will find almost 60 programs written specifically for farm applications—programs for financial management, crop and livestock management, machinery management, commodities, spreadsheets, ag-business, and much more. You will be able to determine whether these programs can be used for a farm operation, what hardware is needed to operate the programs, and what costs are involved.

—Select the appropriate hardware system. This is the final step in selecting a farm computer system. After determining information requirements and evaluating the software available to fulfill them, you can then choose the most appropriate hardware the software will operate on. This can save money and frustration.

It is estimated that about 3 to 5 percent of the farmers today own a personal computer, and it is predicted that about 40 percent more will own one by 1987. Half of the county agents in the Midwest have personal computers which farmers can have access to. All 92 county agents in Indiana, the most advanced state, already have personal computers.

As the demand for better farm management increases, so will the demand for microcomputers. At present, there are an estimated 300 microcomputer manufacturers, with IBM and Digital Equipment Corporation being the two largest companies. The personal computer market has become so competitive that a new computer is introduced nearly every day, and it is projected that there will be only 25 microcomputer manufacturers left after the next three years. The rest will either merge or liquidate for one reason or another.

With this in mind, it is important to select a computer system that has plenty of support. Machines are not built to last forever. You should choose your computer where servicing is available close by. Software is a major concern also. Agriware Company, a publisher of agricultural software directories, estimates 170 firms are now writing agricultural software. Most of these are small and consist of farmers who have written programs themselves, but many of these small companies are starting to grow. Again, it is very important to find one that will support the software they write. Tax laws change every year, government programs are

added continuously, and farm procedures are changing often. You should buy from a company that will update the software so that the programs will remain useful.

Waiting to buy a computer system because it might become obsolete is not good reasoning. As long as a computer system will accomplish the objectives it is supposed to, it will never become obsolete. If the computer system will provide valuable information that can be used to make better management decisions, it will remain a useful tool. Today, there are many computers and agricultural programs that are useful and will continue to be useful in the future.

Articles written by universities, ag-consultants, and computer experts indicate that an important part of a farm computing system is the software purchased. By helping you avoid costly mistakes and saving you time in selecting suitable software, this catalog can be a most valuable asset to any agricultural computer user. It can be your guide to making farm computing profitable.∞

AGDISK CORN/SOYBEAN MANAGEMENT SERIES ONE

The *AgDisk Corn/Soybean Management Series One* contains six-crop management programs on one diskette. The *Grain Storage Decision* program first calculates drying costs and then calculates the net crop value and the break-even point after storage. The program has "what-if" capabilities that allow a person to review several different alternatives before making a management decision. The program produces a graph of break-even prices for on-farm and elevator storage, and it will also produce a printout.

The *Harvest Loss Calculation* program is used for determining combine efficiency. It will calculate soybean or corn losses during harvest. With this program the farmer can detect harvest problems before they can happen. The *Crop Yield Calculator* program is used to estimate wheat, oat, corn, soybean, barley, and rye yields.

The *Field Population Calculator* program is used to measure a more accurate plant stand population per acre. This program also makes it possible to detect pest infestations and will generate a printout. The *Planter Calibration Calculator* program makes it easier to figure planter settings.

All six of the programs are fairly easy to use and include excellent documentation. The manual may be purchased separately for $14.95.

Requirements: Apple II, II+, or IIe, IBM PC; 64K RAM, disk drive

Harris Technical Systems, Apple $140; IBM $170

AGDISK FARM ACCOUNTING PACKAGE

The *AgDisk Farm Accounting Package* is a complete double-entry accounting system customized for agricultural use and able to work on either a cash or an accrual basis. It will generate several nicely formatted reports, including trial balance, income statement, and balance sheet. An accounts payable option gives you a current review of all your outstanding debts and allows you to keep records on how much you owe specific accounts.

The package has six preselected account lists, which cover most farm or ranch operations. The chart of accounts can be customized to suit the user's needs, but the number of accounts is limited.

The *AgDisk Farm Accounting Package* is completely menu driven. This makes it very easy to use, but having so many menus to choose from also makes it very cumbersome. The program also operates very slowly in data entry. Nonetheless, because it is so easy to learn and operate, and so free from detectable programming errors, this is a good first program for the farm or ranch operator setting up a computerized accounting system.

The 230-page manual is excellent, with a clear description of each function and samples of screen displays. The manual may be purchased separately for $29.95.

Requirements: Apple II or II+, 64K RAM, disk drive, DOS 3.3; IBM PC, 128K RAM, disk drive

Harris Technical Systems, Apple version $600, IBM version $700

AGDISK FINANCIAL MANAGEMENT SERIES ONE

Financial Management Series One contains five different programs covering the area of money management. The first program, *Land Purchase Analysis,* is designed to help calculate cash flow per acre, loan balance per acre, loan payment per acre, and more. The program will produce a graph that illustrates projected market value of land, the loan balance, and equity. The *Depreciation Schedules* program allows a person to build individualized schedules using straight line, declining

balance, and sum-of-the-year's-digits methods. A printout of depreciation schedules can be generated which helps make the preparation of taxes easier. With the *Farm Profit Analysis* program one can set up several "what-if" situations. This is a great advantage with any program, because it allows a person to analyze several different alternatives. The program also generates detailed reports.

The *Loan Cost Calculator* is used to set up hypothetical loan situations for evaluation. Loan options can be analyzed by calculating the effects of various down payments on installments, the effect of balloon payments on loans, and others. The *Interest Income Calculator* is used to determine the best use of capital. The documentation is excellent, and the manual may be purchased separately for $14.95.

Requirements: Apple II, II+, or IIe, IBM PC; 64K RAM, disk drive
Harris Technical Systems, Apple $140; IBM $170

AGDISK MACHINERY MANAGEMENT SERIES ONE

The *Machinery Management Series One* contains four programs on one diskette. The *Operation Cost Estimations* program provides information on the cost of ownership and operation. With inputs the program will figure cost per year, cost per hour, and cost per acre for depreciation, interest, taxes, insurance, housing, fuel and lubrication, labor, and repair.

This program will also generate a printout for projected machinery cost. The *Lease/Buy Comparison* program allows a person to compare the cost of leasing machinery with buying machinery. This program will create "what-if" situations by inputing different variables. The "what-if" feature can be most helpful in making buying decisions.

The *Ownership/Hire Comparison* program is designed to aid in the decision of whether to invest in equipment or custom hire. The program will calculate the cost of ownership per year and per acre. This program will also generate printed reports. The last of the four, the *Loan Cost Calculator* program, calculates the cost of a loan for equipment purchases.

All four of the programs are easy to use and include complete documentation. The manual may be purchased separately for $14.95 and includes screen displays which are most helpful.

Requirements: Apple II, Apple II+, or Apple IIe; IBM PC, 64K, I disk drive, video monitor, and printer
Harris Technical Systems, Apple $140, IBM $170

AGDISK SWINE MANAGEMENT SERIES ONE

The *AgDisk Swine Management Series One* contains four programs:

Swine Ration Analysis creates reports covering the cost, weight, energy level, and nutrient value of rations, including their percentages of lysine, fiber, protein, calcium, and phosphorus. Bar charts are added to help illustrate the adequacy of rations.

Feeder Pig Analysis is used to calculate operation costs, profit return, and gross income from fattening feeder pigs, based on projected market prices and break-even prices.

The Hog Selling Decisions and *Sow Productivity Calculator* provide hog marketing and management information. The *Sow Productivity Calculator* is based on a sow productivity index developed by the Agricultural Extension Service at Iowa State University.

All programs are menu driven and easy to use, and they all handle errors quite well. However, the change of data is somewhat slower than in many other decision-aid programs.

The documentation is divided into two manuals, both aimed at beginning computer users. One explains such general considerations as loading programs and data-entry procedures, while the other is specific to programs in *AgDisk Swine Management Series One*. The second manual also contains pictures of the screens encountered as the programs are used. This makes the learning process much easier than it might be.

Requirements: Apple II or II+, 64K RAM, disk drive, DOS 3.3; IBM PC, 128K RAM, disk drive
Harris Technical Systems, Apple version $140; IBM version $170

AG-FINANCE VERSION 4.0

Ag-Finance is an accounting system that can be used on either a cash or an accrual basis. It stores information for quantities, prices, and enterprise records, using 99 overhead codes and 99 enterprise codes. Reports that can be generated by the program include transaction listing, account summary, trial balance, three different cash-flow budgets, three different balance sheets, and three

different profit-and-loss statements. It will also print checks.

Ag-Finance is fairly easy to use, and help messages throughout the program will assist you if you run into a problem. One particularly valuable feature is an exit function that allows you to abandon what you are doing anywhere in the program. This can save you time when you make an error and end up somewhere you did not want to go.

The manual is easy to understand. It explains the program's features quite well and includes examples that help make it easier to learn.

The company offers free updates for one year from the time you purchase the program. *Ag-Finance* also interfaces with other programs offered by Countryside Data.

Requirements: CP/M, 64K RAM, two disk drives with 140K per drive, 132-column printer
Countryside Data, $750

AG/PAC

Ag/Pac is a turnkey decision-aid package, containing nine programs for financial management, nine programs for crops and marketing, eight programs for livestock enterprises, and four programs for real estate investment.

The programs have the ability to recall data. For example, a program may require entry of 24 or more items of numerical data. It has a calculator on every input line and lets you do unit conversions and other calculations online. If you make mistakes, *Ag/Pac* lets you correct them without reentering the correct items. If you decide to rerun with a few changes, you won't have to retype all 24 entries. *Ag/Pac* will remember even if you shut off the computer. The next time the program is run, the data from the last run is still there and will be displayed on the screen for revision.

Some data has already been entered for you. Nutritional requirements for livestock, over 2,000 items of feed analysis, tax information, and other data are supplied with the packages. The programs are easy to learn and use. The programs themselves will walk you through with explicit prompts. The 180-page manual is complete and can be purchased separately for $30. The choice of screen or printer is made at the last possible point in the program and there are separate print routines for each.

Requirements: Apple II+, IBM PC, 64K RAM, two disk drives
Wisconsin Microwave, $1,500

AGRI-LEDGER

Agri-Ledger is a menu-driven, double-entry accounting program aimed at farm management. It can handle a large number of transactions, from 500 to 1,000 per month, and up to 26 different farms with 99 enterprises on each. Reports available include income statement, balance sheet, budget reports for the month and the year-to-date, a Schedule F report with information for your tax return, among others.

Agri-Ledger has several strengths, and some weaknesses as well. It uses *Diversi-DOS*, and the speed in loading the program seems very fast. However, posting entries moves rather slowly when compared with some of the other programs now available. The program includes a flexible chart of accounts, which can be modified for any operation; but it requires a considerable amount of time to set up or change account codes. After closing out an accounting month, *Agri-Ledger* disposes of all the transactions and keeps a running total for your accounts and enterprises. This is probably unfortunate, but agricultural accounting programs often do this to conserve needed disk space.

A manual and demonstration disk are available at $30 for those considering this accounting package. Once in use, the program's 300 pages of documentation are well written and comprehensive enough to answer almost any question you might have. The manufacturer provides excellent support by phone or mail, and will provide updates and corrections without charge for as long as you own the program.

Requirements: Apple II, II+, IIe, or III, 48K RAM, *Applesoft BASIC*, two disk drives, DOS 3.3; IBM PC, 128K RAM, two disk drives; printer
Small Business Computer Systems, $550

AGRI-VENTURE'S GENERAL LEDGER

Computer Agri-Venture's double-entry accounting system is fairly simple, both to set up and to use. To begin, you simply decide the format of the reports you'll need and which report you want the information printed on. Then get to work. The program prints balance sheets and income statements with all three balances. It will handle up to a 6-digit account number and up to 99 different cost centers or enterprises.

This general ledger package handles errors quite well. A visual check of your work is done at each

step, and the transaction must balance before each input is finished.

Two optional features are available. One is a complete depreciation schedule, including the new accelerated cost-recovery method. The other is a forecasting section. The forecast can be on an annual basis and have the computer spread the monthly costs, or the user can forecast on a monthly basis. The program will print an income statement compared to the forecast with both dollar differences and percent of variance. Both options can be very useful.

The program includes adequate documentation, and the company is very good at supporting its customers.

Requirements: Apple II, II+, or IIe, 48K RAM, disk drive, printer

Computer Agri-Venture, $195; $95 for each option

ASSET MANAGEMENT

The Red Wing *Asset Management* system is used for planning depreciation deductions and after-tax cash flow. The system provides a complete list of all farm assets, including the book value, market value, depreciation method, purchase date, useful life, asset basis, depreciation taken and remaining, and investment tax credit.

The program takes a considerable amount of time to set up, but once that has been accomplished, it will take very little time to operate. A sample data file and many prompts within the program makes the system easy to learn and use.

Some of the reports the system will produce are depreciation for tax reports; assets by enterprise; depreciation, investment tax credit, and investment tax credit recapture amounts; capital gains and losses from disposal of assets; nondepreciable assets; and five-year depreciation schedule by asset. The system will provide automatic "basis" calculation for traded assets, market value and replacement cost values by asset, investment tax credit earned and unearned reports, and more.

The Asset Management system is compatible with other programs offered by Red Wing Business Systems. Once the software licensing agreement is returned, you are assured of a 30-day, money-back trial period and all future updates to the system. Red Wing also agrees to provide continued support for an annual fee of $25.00. The program includes a comprehensive manual.

Requirements: Apple II+, 48K RAM; TRS-80 Model I and III, 48K RAM; TRS-80 Model II, 64K RAM; one disk drive; IBM PC, 128K RAM; two disk drives; 80-column printer.

Red Wing Business Systems, $250

BEEF PRODUCTION RECORDS

Beef Production Records is a record-keeping program for beef herd income and expenses. Data for up to 400 cows along with 12 monthly herd records can be kept on a single data disk. Expenses are entered for the total herd, while income and breeding information is entered for each individual animal. Monthly expenses and profit are calculated for each animal.

Data is entered in six different categories. Along with herd data such as the number of cows and capital investment, information is kept on individual cows. This includes ID number, sire ID, vet problems, yearling weight, and calving information, sex, sire, and birth weight. Weaning weight and date and the cow's age are all entered, and the program calculates the 205-day adjusted weight. Approximate calving dates are predicted by entering the previous breeding date.

Total Herd Direct Costs such as vet and breeding costs, marketing expenses, power, fuel, overhead, and labor can be entered. Data on corn, silage, hay pasture, supplement, and milk replacer is entered under Total Herd Feed Costs. The final entry is Cow Production and Income. Here the user is asked whether it is a cow or calf being sold and if by the pound or not. From the price, pounds sold, and cow sales figures, the program computes the year-to-date total income.

Printed reports include 205-day adjusted and yearly weights, feed and direct costs, a herd-breeding report, plus a year-to-date income report.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM, disk drive, printer

Cherrygarth Farm Software, $49.95

CASHBOOK MANAGEMENT PACKAGE

The *Cashbook Management Package* is a single-entry accounting system. The program is similar to the traditional manual cashbook, and it is very simple to use. It is also very flexible and can handle 160 heading codes and 1,200 transactions. Facilities include bank account, petty cash account, enterprise/departmental costings, bank reconcilia-

tion, and several others. Check and cash entries are presorted and allocated to enterprises, if required, following a single standard procedure. An integrated cash-flow budget is provided. The program will produce several reports, including comprehensive audit trail, bank balances and cash books, business summary, quarterly and monthly cash flows, profit estimator, and many others.

The program is written in Plan-A-Farm's own computer language, Programplan, which takes full advantage of the computer's capabilities and operates extremely fast. Complete training is provided, either at the home office or a regional center, without additional charge. A unique Plan-a-Farm feature called "Page Link" continuously displays on the monitor the relevant section and page reference to the operating manual. With this feature, guidance is immediately available.

Requirements: Apple IIe, 64K RAM; IBM PC, 128K RAM; Kaypro; two disk drives; 132-column printer
Plan-A-Farm America, $900

CROP MANAGEMENT

The *Crop Management* program is a production guide with cost accounting and in-depth land information to take the grower from seed to harvest, through packing, sales, and distribution. The program is menu driven, fully prompted, and cursor controlled; thus, it is very easy to use. Specific land-history information that can be recorded includes crops grown, variety, length of time, weather condition, soil condition, cultural practices used, applications of fertilizers, chemicals, pesticides, and much more. The program can also be integrated with other programs offered by Micro-Crop. When used with Micro-Crop's cost-accounting module, it provides the grower with the information needed for the best profit margin.

Some of the features included with the program are total production cost associated with a crop or land unit; user- or system-defined cost categories, including planting, harvest, fertilizer and pesticide; significant events; historical records developed by crop or land unit; recommendations for times, rates, and dates of fertilizer and chemical applications; soil test analysis; and many others.

Micro-Crop includes a 60-day warranty period with free telephone assistance. Thereafter, an extended-support plan is offered. Onsite support and custom programming are also available.

Requirements: CP/M, MP/M, TRS DOS, or Turbo DOS; Tandy, Altos, IBM PC, Televideo, or Apple Computers; eight-inch disk drive
Micro-Crop, $1,250

CROP MANAGEMENT PACKAGE

The *Crop Management Package* is designed to keep and analyze records for a crop-farming enterprise. Inventory control is maintained for all commodities, and production records are built up on a field-by-field basis over the life of each crop. The program is capable of handling up to 120 fields, 10 enterprises, 50 crops, 100 varieties, 10 soil types, 49 commodity application programs, and 230 commodities. With a larger disk system, up to 300 fields and 30 enterprises may be tracked. The program will generate several reports including commodity listings and balance sheets; field-budget summary; current-cropping summary; gross-profit inspector; individual field reports, which show all field details, costs, and applications and budgets; enterprise analysis; and many others.

The program is written in Plan-A-Farm's own computer language, *Programplan*, which takes full advantage of the computer's capabilities and operates extremely fast. Complete training is provided without additional charge, either at Plan-A-Farm's home office or a regional center. A unique feature called "page link" continuously displays the relevant operating manual section and page reference on the monitor. With this feature, guidance is immediately available.

Requirements: Apple IIe, 64K RAM; IBM PC, 128K RAM; Kaypro, two disk drives, 132-column printer
Plan-A-Farm America, $1,500

CROP PRODUCTION RECORDS

Crop Production Records is a record-keeping program that will track income and expense information for up to 400 fields planted with corn, ear corn, soybeans, wheat and oats.

Menu-driven, the program allows for the entry, listing, and changing of information contained in any field record. A final report option produces a printed copy of any record or range of records desired, plus a summary total of items such as total acreage, income, fertilizer cost, operating costs, labor costs, and so on.

Information is kept on many categories. Field identification keeps track of crop type, field size,

and seed data for each field. A fertilizer section keeps tabs on the total weight and cost of three different fertilizers; herbicides and insecticides are handled in a similar fashion. Other costs tracked include machinery and equipment, storage and drying, taxes, labor, and other indirect costs.

Income information shows the total income of a particular field. When yield, grain sales, and moisture test results are input, the computer calculates the total dry yield. Direct costs such as fertilizer, seed, herbicide, insecticide, machine operation, interest, and miscellaneous expense are provided for.

A data disk set up for 400 fields is provided.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM, disk drive

Cherrygarth Farm Software, $49.95

CROP PROFITABILITY DECISIONS

The *Crop Profitability Decision* package includes three programs. It is designed to determine the profit in producing, selling, or storing a variety of crops.

The Crop Production Costs program is used to determine the profit in producing corn, soybeans, corn silage, oats, wheat, or hay. Based on such inputs as operating, machinery, labor and land costs, the program calculates cash-flow costs and returns required to maintain net worth. As an option, is also gives net dollars per acre at various selling prices for each cost section.

The Grain Selling Decisions program will aid in marketing decisions based on storage costs. The grain drying and interest costs are also figured in. The outputs break down prices needed to cover farm costs and include such items as percent shrink, equivalent dry bushels, net dry grain, and others.

The Grain Interest Cost program is used to determine interest cost per bushel per month for storing grain. This is displayed as a table of interest cost, which may be refigured by changing the cost per bushel and interest rate.

Within the package, you'll receive a diskette with a backupdiskette, a complete and comprehensive manual with examples to help you through the program, a three-ring notebook to store the diskettes and documentation, and a telephone number to call for help with any questions or problems that may arise.

Requirements: Apple II+ or Apple III in emulation mode, 48K RAM; TRS-80 Model III, disk drive, 80-column printer

Successful Farming Management Software, $89

CROPMASTER

CropMaster is a fully integrated crop-management program. Essential data need be entered only once, and the program recalls and uses it as necessary. For example, request a printed field-crop history, and the computer will produce a comprehensive list of seeds and chemicals used, including application rates and costs for each item. The program summarizes that data into one table showing the total cost for this particular field, the per-acre cost and per-bushel cost for the crop produced by each major input item. The computer handles all the arithmetic.

CropMaster is easy to use. Like many programs intended for relatively unsophisticated computer users, it is menu driven. Yet it requires only one or two keystrokes to move from one section of the program to another.

Cropmaster can be used to plan cash needs for purchasing crop inputs, to provide detailed landlord/tenant plans and season's-end accounts of activity. The program will also complete input/productivity records for individual fields or farms, analyze sales by crop, and more. It will handle up to 99 different farms, 350 fields, 99 different chemicals, 99 different seeds, and 99 different crops.

You may purchase the operating manual separately for $25. This is applied to the purchase price if you decide to buy the program.

Requirements: Apple II; TRS-80 Model II and 16; IBM PC, 64K RAM; CP/M, two disk drives, 80-column printer

Professional Farm Software, $750

DAIRY JOURNAL

Dairy Journal is designed to monitor a herd's production and financial information. The program is capable of handling up to 1,000 cows. Data entry is made simple with "Field Event Sheets," standard forms printed from the program and kept in the barn for updating during the day as cows are bred, freshened, or moved. The entries are then made directly form these sheets. The program is also capable of separating income and expenses to each cow within the herd. *Dairy Journal* will produce several reports. These include: lactation summar-

ies, which report all the breeding, calving, and production information for the previous lactation of a cow; the "Ranking Report," for ranking cows by production; the "Master Group Report," which shows the current status of each cow and heifer; and the "Schedule Report," which shows cows due to freshen, turn dry, or whatever.

Other reports include production test, net-income report, calf records, medical treatments, and sire records. One feature that makes the printing of reports a little easier is the "auto-report." With this feature, one can schedule several reports to be printed automatically. Printouts for the program are available upon request, and the manual can be obtained for $15, with the cost credited towards later purchase of the program.

Requirements: Apple II with ROM *Applesoft BASIC*, II+, IIe, or IIl, 48K RAM, 3.3 DOS; IBM PC, 128K RAM, two disk drives, 132-column printer
Harvest Computer Systems, $600

DAIRY MANAGEMENT PACKAGE

The *Dairy Herd Management Package* consists of four interactive data files, covering milking-herd management, young stock management, bull semen stock management, and feeds and ration management. These data files are kept up-to-date by input of the individual cow's milk recordings and the herd and young stock activities.

In general, this is a convenient program to use. The procedures for data entry are very practical. The program is flexible and allows the user to create extra files of information about each cow. The program can produce several reports including action reminder lists for cows and heifers, standard and selective yield and fertility reports, individual animal records, monthly revenue summaries, and many others. It is also possible to create custom report specifications and formats from a wide range of choices. The program is designed to integrate with the *Financial Management Package* offered by Plan-A-Farm America.

The *Dairy Herd Management Package* is written in Plan-A farm's own computer language, Programplan, which gives this program considerably more speed than many similar ones can offer. Complete training, either at Plan-A-Farm's home office or at a regional center, is included in the purchase price. The unique Plan-A-Farm feature called "Page Link" continuously displays the relevent section and page reference to the operating manual, making it easy to find help when it's needed.

Requirements: Apple IIe, 64K RAM; IBM PC, 128K RAM; Kaypro; two disk drives; 132-column printer
Plan-A-Farm America, $1,500

DAIRY PRODUCTION RECORDS; SWINE PRODUCTION RECORDS

Dairy Production Records is a record-keeping program for dairy herd income and expenses; *Swine Production Records* is its counterpart for commercial farrow-to-finish hog operations. Data for up to 400 animals along with 12 monthly herd records can be kept on a single data disk. Expenses are entered for the total herd, while income and breeding information is entered for each individual animal.

Operation and type of data entered are almost identical to the *Beef Production Records* program. The main difference is in the Production and Income sections. Here the user enters information on the price of milk or pork, amount produced, and sales of calves and cows, or hogs and sows. The program then shows monthly and year-to-date milk or pork income, year-to-date total income, year-to-date production, and lifetime production.

Printed reports include monthly herd and year-to-date production, feed and direct costs, and a herd-breeding report. A user manual and a data disk are included.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM, disk drive, printer
Cherrygarth Farm Software, $49.95

DECISION SERIES

The *Decision Series* is a collection of decision-aid programs. The programs are similar in analysis to the *Worksheet* models also offered by Harvest Computer Systems, but that they work in a more "user-friendly" fashion and have additional reporting options.

The programs have "what-if" features, which can be a big advantage with any decision-aid program. With these features, several alternative decisions can be analyzed for each management problem without running the program separately for each possible course of action.

The first two *Decision Series* programs are *Feeder Cattle* and *Land Lease*. The *Feeder Cattle* program provides analysis of potential cattle feeder purchases. Based on purchase and selling

prices, feed costs, and overhead costs, a profit analysis is calculated showing expenses and returns per head, per hundred weight of gain, per hundred weight sold, and costs as a percent of sales.

The *Land Lease* program is designed to aid in a more profitable lease arrangement. When information on projected yields, projected prices, and crop costs is entered, the program evaluates and reports expenses and returns for both tenant and landlord.

Printouts for the programs are available upon request, and the documentation manuals can be purchased for $15. This fee is credited toward purchase of the programs.

Requirements: Apple II with ROM *Applesoft BASIC;* Apple II+, IIe, or III, 48K RAM, DOS 3.3; IBM PC, 128K RAM; two disk drives
Harvest Computer Systems, *Feeder Cattle* program $80; *Land Lease* program $80

FARM ACCOUNTING CONTROL SYSTEM (FACS)

The *Farm Accounting Control System* is a cash-based accounting system available in either single-entry or double-entry formats. The program is menu driven; program actions are chosen from a list of choice on the screen. This slows the progress slightly for experienced users but makes it very easy to learn and operate.

The system is flexible enough to allow users to design their own accounts. It can match accounts to your present system or help you create a more useful one. The chart of accounts can be changed after it is established, using up to 300 accounts and nine reporting levels. The expense journal keeps track of both paid and unpaid expenses, as well as units and weight. The sales journal records weight and units such as bushels or head. The program has five profit and loss formats of varying complexity, and it produces a trial balance. There are several depreciation schedules, including ACRS, straight line, declining balance, and sinking fund.

The *Farm Accounting Control System* has some special features not found in most other agribusiness accounting packages. They include unlimited enterprise analysis, extensive detail on the net worth statement, a program to convert *FACS* expense and income journals to *VisiCalc,* so you can project off of your own financial figures, cash flows and year-to-date reporting, and a complete checking system. They combine to make this one of the more flexible farm accounting packages available.

The manual may be purchased separately for $30.

Requirements: Apple II+ or III, 48K RAM; IBM PC, 64K RAM; two disk drives, 80-column printer
Vertical Software, $525

FARM AND RANCH ACCOUNTING SYSTEM, FAS-1000

The *Farm and Ranch Accounting System* is a standard double-entry accounting program designed to give detailed breakdowns of income and expenses, both for the entire farm and for individual enterprises. It will keep track of grain and livestock inventories and give cost, income, and profit information per acre, bushel, pound, head, or unit of use. It will also generate a balance sheet and give information for the Schedule F tax form. It is flexible enough so that most users will be able to customize it for their own operations.

One valuable feature allows you to play the "what-if" game. With this feature, it is possible to examine such things as the benefits of selling grain at harvest vs. storing it for future sales. It also can be used to examine various crop enterprises, cattle finishing, feed mixes, and land purchases.

An option provides check writing and vendor records. However, at $400 extra this feature is less than a bargain.

User-support is one of *FAS-1000*'s greatest benefits. The documentation is comprehensive, with step-by-step instructions that make it relatively easy to learn. Nonetheless, when the program is purchased Dickey-John sends a salesperson out to install it and set it up. For any problems or questions thereafter, the firm provides a toll-free help line.

Requirements: CP/M, 64K RAM, two disk drives with 180K per drive, printer
Dickey-John Corp., $1,240

FARM INVENTORY SYSTEM

The *Farm Inventory System* provides the information to answer such questions as: How much do I have available? What did it cost? What is it worth? And how long will it last? The system is flexible. Using either a cash or an accrual basis, you decide what items should be monitored and how you are going to measure those items. Establish a crop inventory, a feed inventory, a livestock inventory, a

produce inventory, or whatever inventory category you need. The inventory can be measured by bushel, ton, head, pound, or any other convenient unit of measure. *Farm Inventory System* follows sales, purchases, and usage of inventory items for a full year; maintains inventory information by lot, bin, or whatever or by group summaries; and produces a daily feed inventory. It even records contracts and futures information by commodity. The system also has the ability to reduce inventory by a fixed amount per unit of time; this is particularly convenient for feeding operations and similar enterprises. It also graphically displays projected inventory changes based on past performances.

The *Farm Inventory System* is compatible with other programs offered by Red Wing Business Systems. This makes it a good choice for farms that will eventually need a complete accounting system.

Once the software licensing agreement is returned, you may still send the program back at any time during a 30-day, money-back trial period. Registration also qualifies you for all future updates to the system. Red Wing also agrees to provide continued support for an annual fee of $25. The program includes a comprehensive manual.

Requirements: Apple II+, 48K RAM; TRS-80 Models I and III, 48K RAM; TRS-80 Model II, 64K RAM; disk drive; IBM PC, 128K RAM, two disk drives; 80-column printer

Red Wing Business Systems, $250

FARM LEDGER

The *Farm Ledger* is an accounting program designed for straightforward bookkeeping. It can handle cash, note, check, and account transactions. Entries can be divided up into 18 income and 32 expense categories, and the program even allows 6 subcategories for each.

The package is friendly to use and flexible. For example, it accepts the user's own category names instead of requiring number codes, and the categories are all displayed on the screen. Because of this, there's no need to remember codes or account charts.

The *Farm Ledger* is able to handle two quantities per entry and multiple checking accounts as well. Any entry may be marked with your own identifiers. The program also has a feature that makes it possible to enter noncash transfers between enterprises. With this feature, you can keep more accurate records of costs.

The program will generate several reports. Some of these reports include: month and year-to-date totals that give total dollars spent and received in each category; individual entry reports which list all individual entries; a resale report which provides taxable income to date; and an account report which monitors transactions and balances of loans. There are many others.

Printouts of the program are available upon request, and the manual may be purchased for $15. This cost is credited toward later purchase of the program.

Requirements: Apple II with ROM *Applesoft BASIC*, Apple II+, IIe, or IIl, 48K RAM, DOS 3.3; IBM PC, 128K RAM; two disk drives; 132-column printer is recommended

Harvest Computer Systems, $300

FARM PROFITABILITY DECISIONS

The *Farm Profitability Decisions* package includes two programs designed to help assess the profitability of an entire farm operation. The *Farm Profit Analysis* program is used to review various ratios and indicators of financial growth. One nice feature of this program is that you can create a file to save your inputs and create a history of your farm or make adjustments later without starting over. The program will generate a profit and loss statement with inventory adjustments, gross profits in terms of ordinary expense, management return, performance, capital, and equity ratios.

The *Annual Cost of Ownership* program is used to help you evaluate ownership charges allocated to your investments in machinery, breeding stock, buildings, and land. The program will calculate annual costs for each investment and production unit separately and in total.

Within the package you'll receive a program diskette, a backup copy, a complete and comprehensive manual with examples to help you through the program, a three-ring notebook to store the diskettes and documentation, and a telephone number for support in case of any questions or problems that may arise.

Requirements: Apple II+ or III in emulation mode, 48K RAM; TRS-80 Model III; one disk drive; 80-column printer

Successful Farming Management Software, $89

FARM SUPPLIES MANAGEMENT

The *Farm Supplies Management* program is de-

signed to provide an updated cost analysis of all farm supplies used. The program is menu driven; all program actions are picked from a list of choices on the screen. This makes the system easier to learn and operate, though it does slow its use for the experienced operator. The program is fully prompted and cursor controlled and can be integrated with other programs offered by Micro-Crop. *Farm Supplies Management* retains an online record of purchase information—what item was bought, how much was used, when, to whom, from where—of any or all items.

Some of the available features include centralized purchasing for several departments or companies, purchase history by vendor, warehouse inventory, monthly statement per company or department, monthly general ledger, distribution totals, price comparisons between vendors, supply cost information, stock entry and reduction, inventory inquiry, and direct purchase to department or to warehouse stock reduction.

Micro-Crop's warranty includes 60-days free telephone assistance. Thereafter an extended support plan is offered. Onsite support and custom programming are also available.

Requirements: CP/M, MP/M, TRS-DOS, or TurboDOS; Tandy, Altos, IBM PC, Televideo, and Apple computers; 8-inch disk drive

Micro-Crop, $650

FIELD MANAGER

Field Manager is a specialized database program. It can provide records of field's production history and profitability and perform break-even analysis on a field-by-field basis. The user may design his own report formats, selecting the items to be printed and the criteria for including records in the report. Records may be sorted into three levels with averages, subtotals, and ratios printed at each level. The program will even produce multiline "reports" such as mailing labels or index cards. There are models to be used with *VisiCalc* that help to plan crop inputs and analyze total crop costs.

The program can handle up to 200 separate pieces of information for each field. Indirect crop cost can be entered directly from Harvest Computer System's *Farm Ledger* or *Depreciation Log* programs and assigned to different crops or it can be entered manually.

Printouts for the package are available upon request, and the manual can be purchased for $15. The cost is credited toward purchase of the package. Support is handled by mail or phone directly from Harvest Computer Systems.

Requirements: Apple II with ROM *Applesoft Basic*, Apple II+, IIe, or IIl; 48K RAM, disk drive, DOS 3.3; IBM PC, 128K RAM, two disk drives; 132-column printer

Harvest Computer Systems, $350

FINANCIAL MANAGEMENT PACKAGE

The *Financial Management Package* is a complete, gross margin-based accounting system. Single-entry or double-entry accounting may be used. The program is primarily concerned with the recording, processing, and analysis of financial data and the production of accounting and management information. It can handle up to 40 enterprises, 800 general ledger codes, 32,000 transactions, and 32,000 items. To ease data entry, all entries except journals and corrections can be made from within the same program.

The package can produce both accountant's and management reports. The accountant's reports are produced as an audit trail. The following types of reports are produced: trail balance, profit and loss, gross margin summary, balance sheet, source and application of funds, enterprise gross margin analysis, overhead analysis, and many others.

The program is written in Plan-A-Farm's own computer language, Programplan. This provides uncommonly fast operation. Complete training is provided without additional charge, either at Plan-A-Farm's home office or at a regional center. The unique Plan-A-Farm feature called "Page Link" continuously displays the section and page reference to the operating manual's account of the feature being used. With this feature, guidance is immediately available.

Requirements: Apple IIe, 64K RAM; IBM PC, 128K RAM; Kaypro; two disk drives; 132-column printer

Plan-A-Farm America, *Financial Management Package* $2,250; Budget Module $750

FINANCIAL MANAGER

Extreme flexibility is the hallmark of this farm accounting program. Income and expense categories, crops, and livestock commodities produced on the farm are all defined by the person using the program. An almost unique advantage is the provision for a variety of ownership arrangements. This can be very useful if there are a combination of

partnerships or individual owners. *Financial Manager* allows up to 127 different ownership arrangements in all and will keep individual records for each.

Several kinds of reports are available. Among these are balance sheets, income statements, cash-flow reports, transaction reports, and budgets.

The entire program is menu driven, which makes it easy to use and reduces operator mistakes. Instructions are easy to understand, and making entries amounts to no more than answering multiple-choice questions. However, once one has learned to use this program, entering information in this way can be long and very cumbersome.

Error-checking and retrieval features are adequate.

The manufacturer provides training and assistance in the use of the program. Updates are available at no cost for the first year, and service contracts are available thereafter.

Requirements: CP/M, 64K RAM, two disk drives with at least 126K or hard disk, printer
Farm Management, $1,450

HERBICIDE SELECTION GUIDE

The *Herbicide Selection Guide* can help determine the most effective and lowest cost herbicide or tank mix to use in controlling specific weed problems in corn or soybean fields. The program is menu driven, which makes it easy to learn and use. Throughout the procedure, you're given opportunities to correct or change data, and many helpful prompts and menus are there to aid you. The program will generate a summary of field information, the recommended herbicide and its performance along with rate per acre, cost per acre, herbicide cost, total herbicide needed, and the total cost for both the minimum and maximum application rates.

Along with your *Herbicide Selection Guide,* you receive a *Pesticide Records* program. This allows you to keep information on all fields. It will allow you to keep track of insects, problem weeds, pesticides used, rate of application, amount of pesticide applied, and more.

Within the package you'll receive the program on a diskette with backup, along with a *Pesticide Records* diskette. Comprehensive documentation clearly explains how to operate the program. A weed control guide published by a leading university gives the basics of crop management and chemical control strategies. A telephone number for support is included to help take care of any problems or questions about the program.

Requirements: Apple II+ or III in emulation mode, 48K RAM; TRS-80 Model III; disk drive; 80-column printer
Successful Farming Management Software, $125

HERDSTAR

The *HerdStar* system is used for dairy management, and it includes programs for virtually every facet of this farming speciality. *Herd Manager,* which is the basis of the system, calculates schedules for breeding, springing, dry-up, pregnancy, and health exams; highlights problem cows; makes culling recommendations; produces vet attention lists; tabulates production levels; and maintains histories. *Heifer Manager* keeps track of each heifer's progress. It generates schedules and attention lists for medication, breeding, vet attention, pregnancy exams, and warm-up. *Reproduction Manager* controls semen inventory and ordering, creates family trees, etc. *Ration Manager* balances rations for the herd, production groups, or for each individual cow. *Accounts Manager* includes a general ledger, accounts receivable, accounts payable, and a program to maintain partnership records. *Crop Manager* compares income and expenses for growing individual crops. Other programs in this package include *Milk Manager, Feed Manager,* and *Machine Manager.*

The entire system is easy to use and operates very efficiently. The programs are flexible; for example, *Ration Manager* will not only perform least-cost balancing, but it allows you to analyze your own present ration, defining its deficiencies. Similar conveniences are built into the other programs in this series. As a group, they offer a comprehensive, capable dairy management system. The company offers a one-year limited warranty.

Requirements: CP/M or MP/M, 48K RAM; MS-DOS, 128K RAM; two disk drives or hard disk
Northouse Industries, $495

HOG MANAGEMENT PACKAGE

The *Hog Management Package* is a record-keeping system for pork producers. When monitoring and analyzing a farm's central production factors, this package will reveal which sows and boars are the best producers and which management practices are the best alternatives.

The Hog Management Package can be used by both farrowers and finishers. Separate analyses are provided for pigs on sows, pigs being finished, and breeding stock. The package provides flexible and detailed scheduling.

As an added convenience, this program uses the so-called data-interchange format for its disk files. This makes it possible to transfer data to other programs for further analysis—not only the products of Harvest Computer Systems, but such standards as *VisiCalc* and *VisiTrend.*

Probably the biggest disadvantage of this package is that it consists of four disks and leaves little room for protection against disk errors. In addition, it takes a considerable period to generate any report, and the package produces only one report at a time.

Balanced against this are the documentation and support from the company. The manual is more than 80 pages long and very well written. It also includes a demonstration program, which is helpful. Printouts for the package are available on request, and the manual can be purchased for $15, with the cost credited toward later purchase of the package. Support comes directly from Harvest Computer Systems, and like many agricultural-software firms, they respond much more quickly than is the standard in other fields.

Requirements: Apple II with Applesoft ROM, Apple II+ or III, 48K RAM, two disk drives, DOS 3.3; IBM PC, 128K RAM, two disk drives; 132-column printer recommended

Harvest Computer Systems, Apple version $300; IBM version $400

INSECTICIDE SELECTION GUIDE

The *Insecticide Selection Guide* provides information on when to use an insecticide, which insecticides would effectively treat a given problem, and which would be most economical.

Three menus offer a selection of insect problems that a farm might face: Soybean Insects; Corn, Above-ground Insects; and Corn, Below-ground Insects. Once you have chosen your most damaging insect from the table, the program will provide information to help you decide whether the problem warrants treatment. If it does, the program will then search for the different applications that can be used against the insect. Each recommendation can be examined for cost, using either the pesticide prices on file in the program or your own cost figures. The program will display the minimum and maximum rates of application, cost per acre, the unit cost, and total cost.

With the package, you'll receive the program diskette, a backup, and a *Pesticide Records* diskette to track the insecticides actually used. Comprehensive documentation explains the procedures in operating the program, and an insect control guide published by a leading university provides a briefing on insect control strategies. The program is menu driven, which makes it easy to learn and use, but the firm maintains a telephone support service to handle any problems or questions about the program.

Requirements: Apple II+ or Apple III in emulation mode, 48K RAM; TRS-80 Model III; disk drive; 80-column printer

Successful Farming Management Software, $125

LIVESTOCK DECISION AIDS

With the *Livestock Decision Aids* system a farmer can determine the cost of producing feeder pigs, finishing feeder pigs, market hogs, producing feeder calves, finishing feeder calves, and finishing feeder lambs. The system comes with preset prices from which it calculates costs and returns, or you change the given values to your own. It also includes a gestation calendar. With the system you can project your break-even price and decide whether or not to hedge your investment, and if so, at what price.

Using predetermined nutritional requirements, the system will tell whether a ration is balanced. It also shows the nutritional values of various feedstuffs, their cost, and the effect changing a feedstuff will have on your overall costs. The system will do almost everything except balance a least-cost ration.

Livestock Decision Aids is compatible with other programs offered by Red Wing Business Systems. It can make use of information from the firm's other financial management systems, or the information from any set of good books broken down by enterprise can be fed into it. The system is user-friendly and has prompts within the system to guide you through the program. The program also includes a comprehensive manual.

Once the software licensing agreement is returned, Red Wing provides a 30-day, money-back trial period. Thereafter, you will receive all future updates to the system.

Requirements: Apple II+, 48K RAM; TRS-80 Model I or III, 48K RAM; TRS-80 Model II, 64K RAM, disk drive; IBM PC, 128K RAM; two disk drives; 80-column printer
Red Wing Business Systems, $75

LIVESTOCK MANAGEMENT DECISIONS

Livestock Management Decisions includes two programs designed to help you evaluate the profit in feeding cattle and swine. *Cattle Profitability Decisions* aids in evaluating the profit in feeding cattle with basic costs and a wide range of variables. *Swine Profitability Decisions* is used to figure the profit in farrow-to-finish, farrow-to-40-pound, and feeder pigs-to-finish production systems. One can determine the value of corn-fed hogs, break-even prices for market hogs, and prices to pay for feeder pigs given future market prices. Inputs include litter costs, cost of rations and pigs, variable and fixed costs per head, and sales information. The outputs include break-even displays, value of corn fed for a range of selling prices, and return on feed for various selling prices.

With the package you'll receive a diskette with a backup diskette, a complete and comprehensive manual with examples to help you through the program, and a telephone number for support in case of any questions or problems that may arise.
Requirements: Apple II+ or III in emulation mode, 48K RAM; TRS-80 Model III; disk drive; 80-column printer
Successful Farming Management Software, $89

MACHINERY MANAGEMENT DECISIONS

The *Machinery Management Decisions* package includes three programs designed to help the farmer make the best use of money spent on tractors, plows, reapers, and other agricultural hardware. *Machinery Management Analysis* will aid in evaluating fixed and variable costs for owning and operating various farm machinery. *Leasing vs. Buying Decisions* is used to assist in deciding whether to lease or buy farm machinery and equipment. The program will produce in table form a summary of lease or loan terms. It also will weigh after-tax cash flow, present value, depreciation amount, return on invested funds, and other variables. *Loan Amortization* will analyze cost and benefits of equipment loans. When information is entered into the computer—payment periods per year, principal, number of years of the loan, interest, and similar details—the program calculates the number of payments, periodic interest rates, and the other factors needed to evaluate the loan.
Requirements: Apple II+ or III in emulation mode, 48K RAM; TRS-80 Model III; disk drive; 80-column printer
Successful Farming Management Software, $89

PAYROLL

This farm-oriented payroll system can handle up to 100 employees with four standard deductions and four variable deductions. In addition, there are eight possible pay types for each employee. The system allows you to keep a running total of the gross and net pay for each employee, and deductions. Month-to-date, quarter-to-date, and year-to-date totals are provided for an employee or all employees. The system will print payroll checks and W-2s without additional calculating. It also will properly handle IRA or Keough tax deductions. It can regulate different overtime rates, pay employees for piecework, and manage employee buy-ins. The system will provide general ledger journal entries report for posting to the general ledger system offered by Red Wing Business Systems and is compatible with the firm's other programs. It will also provide payroll history reports by month, quarter or year to date and you can use either a cash or accrual accounting basis.

Once the software licensing agreement is returned, the firm permits a 30-day, money-back trial and provides all future updates to the system. Red Wing also offers continued support for an annual fee of $25.
Requirements: Apple II+, 48K RAM; TRS-80 Model I or III, 48K RAM; TRS-80 Model II; IBM PC, 128K RAM; two disk drives; 80-column printer
Red Wing Business Systems, $250

PIG BREEDING MANAGEMENT PACKAGE

Pig Breeding Management is designed to provide day-to-day production control of the breeding herd. The operation of the program is centered on the records established for the animals in the herd. The program will handle 500 sows, 3,000 litters, and 60 boars on one data disk. With two data disks, the program can handle 1,000 sows, 6,000 litters, and 120 boars.

The main report is the Action Reminder List, which lists events and activities anticipated for the herd. Two significant reports are Boars, which is used to compare the service success of litter performance of all boars within the herd; Sows, which gives the sow's lifetime performance and current status.

The program is written in Plan-A-Farm's own computer language, Programplan, which permits it to operate faster than some of the competing packages. Complete training is provided without additional charge, either at the company's home office or at a regional center. The unique Plan-A-Farm feature called "Page Link" displays the manual section and page references covering the feature in use.

Requirements: Apple IIe, 64K RAM; IBM PC, 128K RAM; Kaypro; two disk drives; 132-column printer
Plan-A-Farm America, $1,500

RED WING'S GENERAL LEDGER

The *General Ledger* from Red Wing Business Systems is a double-entry accounting program designed for use with the firm's *Accounts Receivable, Accounts Payable,* and *Payroll* programs, and many others. This system allows you to set up your own account structure, year-end dates, headings, enterprises, and other options. Depending on the hardware being used, it can handle up to three partners, 99 enterprises, and 300 accounts. Expense and income items can be assigned automatically to their enterprises, but the program does not account for quantities. A variety of useful reports can be generated.

In general, the program is easy to use. It is fully menu driven, and procedures for error detection and correction help to ensure that only accurate entries are made.

The documentation is excellent, with many sample screens, printed reports, and an index. Red Wing's warranty states clearly that they will refund the entire purchase price if the customer finds it unsatisfactory within 30 days of receiving the package. The firm also agrees to provide continued support for an annual fee of $30.

Requirements: TRS-80 Model II, 64K RAM, disk drive; TRS-80 Model I or III or Apple II, 48K RAM, two disk drives; IBM PC, 128K RAM, two disk drives; printer
Red Wing Business Systems, $500

SECRETARY OF AGRICULTURE—DAIRY DIARY

This is an individual health, reproduction, and management record system for milk producers. It offers a database consisting of individual histories for any animal being used: cows, either lactating or dry, calves and bulls, or replacement heifers.

Dairy Diary's best feature is its flexibility. The user can define whatever inputs and specific criteria for evaluating data are needed. It allows the dairyman to set values in days for such factors as length of heat cycle and gestation, service age for bulls, weaning age for calves, pregnancy check invalidation of breeding date, if positive, and more. Four data disks are needed. Used with a TRS-80 Model I, the program will store data for 292 animals; with a Model III, it holds records for 352.

The program will generate six different reports, including herd status and inventory summary, future-status projections, and attention-needed group. Other reports may be defined as required. The documentation describes the standard reports in detail.

A demonstration package for prospective buyers includes an instruction manual and a program disk with limited capacity. The firm's warranty gives customers free program updates for one year from the date of purchase.

Requirements: TRS-80 Model I double-density or Model III, two disk drives, printer
FBS Systems, $695

SECRETARY OF AGRICULTURE—HERD AUDIT 2.2

Herd Audit 2.2 is a program designed for commercial swine herds of all sizes. From a built-in database, it will project trends in the herd and generate a bottom-line cost analysis for the outside investor, veterinarian, farm manager, or producer. The program will generate a weekly report, sales projection, beginning and ending inventories of livestock and feed, cost analysis, comparative analysis, and integrated data. Sales projection reports can be run, and graphic summaries can be displayed on the screen or sent to the printer.

Herd Audit 2.2 will interface with other programs offered by FBS systems. This can be a useful timesaver when you need to expand your system. Using other programs from the same firm makes it unnecessary to enter data again into incompatible programs.

Documentation and support from the company are both above average, and free updates are available for a year after the date of purchase. A demonstration package containing a manual and limited-capacity demonstration disk is available for $50.

Requirements: TRS-80 Model I or III, 48K RAM, two disk drives; TRS-80 Model II, 64K RAM, disk drive; 132-column printer

FBS Systems, TRS-80 Model I or III version $395; Model II version $595

SECRETARY OF AGRICULTURE—MARKET WINDOW

Designed to be used with electronic commodities-data networks, this program computes daily moving averages, draws trend lines, plots channels and commodities cycles, and provides daily volume and open-interest figures. Access to the network operated by Commodities Systems, Inc. comes with the program; AgriData's *Network* and *Instant Update* system is optional. When using the network, the program will automatically dial up the system and produce trading charts on command as data is downloaded. News, local and worldwide weather, commentaries on markets, and ten-minute price updates are also available through the networks when using *Market Window*.

New features are added to the program in quarterly updates and sent to customers free for the first year after purchase. A manual and demonstration disk are available for $50 for those considering the package.

Requirements: TRS-80 Model 2, 64K RAM, two single-sided, double-density disk drives; TRS-80 Model 12/16, 128K RAM, graphics board, two double-sided, double-density disk drives; Line Printer VIII or DMP series graphics printer, Modem II; or, IBM PC, 128K RAM, two double-sided disk drives, Epson MX-80 printer with Graftrax, Hayes Smartmodem

FBS Systems, $995

SECRETARY OF AGRICULTURE—MICRO-MIXER

Micro-Mixer is a least-cost ration program with the ability to solve, create, store, recall, and update an unlimited variety of livestock rations, ingredients, prices, and requirements. The program will calculate the most economical ration, on either a dry matter or an as-fed basis, and express it as feed per head per day. It can use almost any unit of measure, from percent to parts per million. A machine-language simplex linear equation is used, which makes solution times fast.

The program begins as a blank sheet, to be filled in with starting data. Reports are in the form of mill sheets, which record the pounds of each ingredient required. Shadow prices for the unused feeds and levels of requirements are also listed. Reports that can be generated include rations on file (used for choosing or adding a ration), feeds on file (for adding feeds or changing costs), requirements for ration (to review or update requirements for selected ration), feed (to select feeds on file), and several others.

Documentation included with the program is adequate, and the manufacturer's warranty allows customers free updates for one year after purchase. A demonstration package containing a manual and a program disk with limited capacity gives would-be buyers a chance to try out the system. It is priced at $50.

Requirements: TRS-80 Model I or III, 48K RAM; TRS-80 Model II, 64K RAM, disk drive; Apple II, II+, or IIe, 64K RAM, disk drive, Z-80 card, language card; Texas Instruments Professional Computer; IBM PC; CP/M, 64K RAM, disk drive with 180K; printer

FBS Systems, TRS-80 Model I or III version $250; TRS-80 Model II, Apple, or CP/M versions $350; IBM PC or Texas Instruments Professional Computer versions $450

SECRETARY OF AGRICULTURE—SOW AUDIT 2.2

Sow Audit 2.2 will collect, store, and update farrowing, weaning, breeding, and production records for individual sows and boars. With these data, the program can index individual performance and rank the whole herd using the N.S.I.F. Ohio State Sow Index. Used with a TRS-80 Model I, it will track 150 sows per data disk; with a Model III, it will handle 750 sows; and with a Model II, data for 1,500 sows can be stored on a single disk.

Bloodlines and progeny records can be maintained separately, and the program can establish inventory control and management schedules on the basis of age, sex, physical, location, and breeding status. Other reports available from this program include litter printouts by months, individual production summary, list by breeding value, list of

all sows and records, and a user-defined report. The program will generate worksheets and work schedules that can be tailored to the individual farmer's own methods.

A big advantage of this program is that it will interface with the other programs offered by FBS Systems. If a farm expands its system, there will be no need to make duplicate entries for use with incompatible software.

The program comes with adequate documentation and free updates for one year from the date of purchase. A $50 introductory package is also available.

Requirements: TRS-80 Model I or III, 48K RAM, two disk drives, 80-column printer; TRS-80 Model II, 64K RAM, disk drive, 132-column printer
FBS Systems, Model I and III versions $395; Model II version $695

SECRETARY OF AGRICULTURE—TRANSACTION

This is a cash-basis farm accounting system that can handle up to 256 user-definable enterprise costs. It is menu driven, which makes it easy to use and makes for consistent use of the keyboard. *Transaction* does an excellent job of error handling. Sometimes the program will actually help you find and correct errors, which can be very rewarding. Report summaries are available on screen as well as on paper.

One problem with this program is that all transaction data entries are treated as a deposit, a check, or a transfer. This makes it more difficult to handle accruals. And though the program is quite flexible, its overall performance is not very high. This is only partially offset by the advantage of integrating *Transaction* with the manufacturer's other products. Among these is an optional budget module, priced at $95.

Documentation includes some screen pictures, which are helpful, but in general it is less clear than it should be. Support from the company is good, but tends to be slow. Customers receive free updates for one year from the date of purchase. A $50 demonstration package containing a manual and limited-capacity program disk is available for those considering this system.

Requirements: CP/M, including Apple II, II+, or IIe with Z-80 card, 64K RAM, two disk drives; IBM PC, 128K RAM, two disk drives; Texas Instruments Professional Computer; TRS-80 Model I or III, 48K RAM, two disk drives; TRS-80 Model II, 64K RAM, one disk drive; printer
FBS Systems, Apple and TRS-80 Model I and III versions $595; others $795

SWINE HERD MANAGEMENT

This program is a record and management system specializing in sows, boars, and piglets. A ten-week nursery inventory is kept, with losses stored on a daily basis for each week. The program stores control group costs and feed information. The computer will know if an animal is a sow or gilt and the duration of the current gestation cycle. From these data, the computer determines the amount of feed and medication needed each day and sends the information to the feeder, so the feeder can dispense the correct amount of feed.

The program can measure each animal's individual productivity and compare it with the rest of the herd. This can help the farmer make better culling decisions. The program will also tell which type of breeding is giving the best conception. User-defined schedules for moves, shots, and special information are also maintained.

Data can be entered either manually or with a mark-sense card reader. The program will store data for 500 sows on two 5¼-inch diskettes or, with an adapter for large drives, for 1,500 sows on two 8-inch disks.

Adequate documentation comes with the program and is backed up by good support from the company.

Requirements: Apple II, II+, or IIe, 48K RAM, two disk drives, printer
Computer Agri-Venture, $695

WORKSHEET

Worksheet is a set of spreadsheet models designed for use with *VisiCalc, Multiplan,* or *SuperCalc;* at least one of these programs is required to use this package. If you do not understand spreadsheets very well, *Worksheet* provides a way to use them without programming; if you do, it can give you some new ideas about how to use spreadsheets to aid in decision making.

There are 14 models in the set: Feeder Pig Purchase Analysis, Grain-Marketing Alternatives, Capital-Planning Schedule, Feeder Cattle Purchase Analysis, Land-Purchase Analysis, Sprayer-Mixing Calculations, Chemical-Mix Cost Comparisons, Cash Flow, Hog Plan, Cash-Rent Analysis, Crop

Comparison, Farm-Metric Conversions, Grain-Marketing Plan, and Grain Volume. Few users will need all of them, but most farmers will find enough of them valuable to justify the cost of the package.

Harvest Computer Systems has upgraded three of their worksheets since this package was first released: Feeder Pig, Feeder Cattle, and Cash-Rent Analysis. The models now offer figures for profitability at several levels of analysis and profit matrices which show variance of profitability over a range of cost and sales figures.

The documentation is comprehensive; each decision-aid is described in detail. The manual is also available separately for $15.

Requirements: Apple II+ or III, 48K RAM, two disk drives, DOS 3.3, *VisiCalc* or *Multiplan;* IBM PC, 128K RAM, two disk drives, *VisiCalc, Multiplan,* or *SuperCalc*

Harvest Computer Systems, $75

MATHEMATICS/ENGINEERING

ACTIVE CIRCUIT ANALYSIS PROGRAM

The *Active Circuit Analysis Program (ACAP)* is designed to solve for the node voltages of both passive and active circuits. It will analyze circuits containing resistors, capacitors, inductors, voltage and current sources, and a voltage-controlled current source.

Circuit descriptions are entered in algebraic form with a built-in editor and may be saved to disk or cassette. The editor also permits changing, deleting, and inserting lines, as well as loading, saving, and printing of the circuit description.

The circuit description must have nodes numbered 0 through N, when there are N+1 nodes in the circuit. Up to 40 nodes allowed; a circuit of this size would require about 40 minutes to solve. Output node voltages are referenced to node 0, or you may select node gains in dB which are referenced to a specified node. A Stat command will calculate the mean and standard deviation of a node voltage, and an F command will specify the frequency to be used.

Active Circuit Analysis Program is supplied as a BASIC program on an unprotected disk. A 12-page instruction guide containing several examples is included.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive
Dynacomp, $43.95

CALCU-PLOT

Designed for professionals and students in business, engineering, science, and industry, *Calcu-Plot* is an equation solver and high-resolution graphics plotting program in one easy-to-use package.

Written in a simple, straightforward manner, all functions are selected from menu options. Without even reading the manual, one can select the Demonstration option and follow the exact procedure leading up to drawing a graph. If that isn't enough, an Orientation option provides you with a condensed set of instructions on the screen.

For example, to produce a graph you merely select either a Cartesian or polar plot, number of functions, whether to plot derivatives or integrals, and the equation to plot. (Choose from 16 Cartesian and 9 polar, or enter your own.) You then enter your values, constants, axes scales, graph title, and presto, the graph is drawn. Titles can be added to both the *X* and *Y* axes, and you can add notes and position the graph title where you like. The graph can then be printed directly from the program using an Epson MX series graphics printer; otherwise, it can be saved to disk to be printed later using various printer and graphics interface combinations.

Calcu-Plot can also use empirical data input from the keyboard, from sequential disk files, or from *VisiCalc* files. Data can be plotted alone or on the same graph with an equation for comparison to a theoretical function. *Calcu-Plot* disk files are also compatible with the *Regress II, Stats Plus,* and *Anova II* programs, also from Human Systems Dynamics.

The program is supplied on a single unprotected disk and uses the Diverse-DOS high-speed operating system for fast loading and saving of program and graphics. A completely indexed, 135-page comprehensive manual is included, plus a handy menu map reference card.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive
Human Systems Dynamics, $150

DAISY PROFESSIONAL

DAISY Professional (for Data Analysis Interactive System) is a statistical analysis package for students, scientists, educators, business planners, or anyone involved with data analysis. Previously sold as *Statistics with DAISY,* the current version includes many new features and improvements.

Command-driven, *DAISY Professional* has a repertoire of over 70 different commands covering data entry and manipulation, transformations, graphic display, statistics, correlations, regressions, nonparametric and hypothesis testing as well as various utility, print, and disk commands. Data is entered in a spreadsheet, which includes a split-screen mode for comparing nonadjacent columns.

DAISY utilizes high-resolution, low-resolution, and text graphics to produce histograms, sequence plots, and scatter plots. An optional regression line can be drawn through the points, and with the appropriate printer and interface/driver combination, the plots can be printed either from within the program or later, using a dump utility.

DAISY supports the Apple IIe keyboard, memory, and 80-column card as well as expanded memory and 80-column boards on the Apple II. The Ultraterm board for wide displays is also supported.

plied to the circuit, and results monitored. The Analyzer Module performs AC, DC, and transient analyses. Results are displayed as high-resolution oscilloscope displays and graphics. A complete network and tabular listing of node voltages is also provided.

Since *Micro-Cap* is highly graphics oriented, a printer with graphics dump capabilities is recommended. The actual circuit diagram, analysis plots and waveforms may all be printed directly from the program. Supported are the MX-80 and Silentype printers, along with graphics cards such as the Grappler+.

The program is supplied with an excellent large format 130-page reference manual complete with tutorial and many sample designs. A limited capability evaluation version is available for $50, which may be credited toward the purchase price of the main program.

Requirements: Apple II, II+ or IIe; IBM PC, 64K RAM, two disk drives
Spectrum Software, $475

MICRO-DSS/ANALYSIS

Micro-DDS/Analysis (DSS) is a specialized spreadsheet-based statistical analysis product designed to process raw data into meaningful information and trends. It is meant to offer the computing power of decision-support systems (that's what the *DSS* stands for), heretofore only available on mainframes, at the cost and convenience of micros. In addition to processing the numbers, *DSS* will produce presentation-quality charts and graphs from them.

The main components of *DSS* are a data entry/management base that resembles the typical spreadsheet model, facilitates to select relevant portions of the data, statistical functions, and a graphing utility. Among the statistical capabilities are standard deviation, frequency distributions, weighted averages, sum of values, minimum/maximum, variance analysis (weighted and unweighted), least-squares regression with multiple independent variables, and sum of values. Graph types include bar (both simple and stacked), line, and scatter.

DSS contains many useful features for anyone faced with the task of making sense out of large quantities of raw data. Operations are logical and relatively straightforward. The documentation includes a 150-page glossary of functions and commands. *DSS* contains its own run-time version of the UCSD p-System making its files incompatible with MS-DOS files. Perhaps because of the p-System, operations, particulary file handling and computation, are slow.

Requirements: IBM PC, 128K RAM, two disk drives
Addison-Wesley Publishing, $495

MICRO-LOGIC

Micro-Logic is a logic design and simulation system which allows the engineer to design and predict circuit performance with no actual construction required. Logic diagrams are drawn directly on the high-resolution screen, and timing simulations responding to user-defined inputs are produced.

Similar in operation and features to *Micro-Cap* (see review), *Micro-Logic* produces a network listing from your drawing which may be used for simulation. Alternatively, you may type in a netlist from existing logic drawings. Once a netlist is created, a timing simulation may be run to check for proper logic and timing.

Networks may be created from gates, macros, clocks and data channels, each user-definable. Using a "gate editor," up to 36 different 5-input functions may be defined and used. Several networks are provided on a sample data disk, with explanations in the manual. Data channel patterns to drive the network are created with a "pattern editor," allowing for random, binary, block, set/reset, and clock-time defined patterns.

Waveforms for each of the nine available clocks may be edited, and the system can create a "fan-out" report showing the gate and input pin number of every input driven by every gate. A "compare" function compares the results of best- and worst-case runs, thus identifying slow or faulty circuitry.

A printer with graphics capability is recommended so that hard copies of the logic drawings and timing simulations may be produced. The MX-80 printer and various graphics interfaces are directly supported. A limited capability evaluation version is available for $50 which may be credited toward the purchase price of the main program.

Requirements: Apple II, II+ or IIe; IBM PC, 64K RAM, two disk drives
Spectrum Software, $450

PC/CALCULATOR

PC/Calculator is an inexpensive program that al-

lows your MS-DOS computers to duplicate the function of an advanced, hand-held calculator. Main features include ten memory registers, six-number stack, printing, and optional mouse. Standard calculator functions include statistical, trigonometric, and logarithmic processes and variable expression of output.

If you've ever worked with Hewlett-Packard or Texas Instruments calculators and were going to convert it to a computer program, *PC/Calculator* is just about what you'd come up with. After loading, the left-hand side of the screen maps the ten function keys of the IBM-PC compatibles to math functions. In Trig mode, some of the key functions are Sin X, Tan X, Cos X-1, and Sinh X. Each of the function keys has two levels of commands.

There are five other modes—Calc, Calc(2), Stat, Prog, and Fin. The financial mode (Fin) allows calculation of net present value. In all cases, there are multiple options for expression, including fixed decimal with and without rounding, floating point, binary, and hexadecimal notations. *PC/Calculator* lets you track, print, and store on disk your numbers and outputs, but there is no way to load the file back into the program.

PC/Calculator works logically and flawlessly. Since it combines the power of several different types of calculators it is well worth its low price.
Requirements: IBM PC, 96K RAM, disk drive
MicroBusiness Applications, $35

STATISTICAL ANALYSIS

You can't expect too much from a statistics package that has to work under the Radio Shack Model 100's 32K of RAM, and no cassette-based program will ever be really convenient. But within those limits these programs are surprisingly workable.

There are seven choices on the main menu. The first is the Data Utility. The system allows up to four variables, one of the limits of the programs. The Data Utility allows you to enter the name and relative position of each variable in each record. This is then stored and used with a data file you create using the Model 100 Text program. You are allowed numeric variables only; if you want to indicate which participants in a survey were male and which female, you must use number codes. The variables are simply entered with the word processor, separated by a comma, one record to the line, and no blank entries. The file is then saved under the name specified in the Data Utility.

You are then ready to run the statistical programs: Descriptive Statistics, Histogram/Frequency Distribution, Correlation/Regression, Time Series, Multiple Regression, and One- and Two-Way Analysis of Variance.

Descriptive Statistics provide the number of records read, the mean, the sum of the data values, and sum of the squared deviations about the means, the variance, the standard deviation of the sample, an estimate of population standard deviation if your data file is a random sample of the population, the standard error of the mean, and the minimum and maximum values encountered in the file.

Histogram/Frequency Distribution lets you choose one of your stored variables and display the maximum, minimum, range, and number of records. Then you may choose from one to six intervals and view a table of the frequency distributions and a histogram.

The Correlation/Regression option analyzes relationships between two of your variables. The first result will be a display of the mean and standard deviation of the two variables, the correlation, the value of t and estimate the exact two-tailed probability of the t-test, degrees of freedom, and the number of observations. You may then plot a scattergram of the data, with or without the regression line. The slope, intercept, and standard error values are displayed. The program also gives predicted values of the dependent variable based on the regression and values you input from the keyboard.

The Time Series option projects trends in time series data. Statistics provided include the mean, the estimated standard deviation, and the percentage of variance counted for by the least squares regression.

Multiple Regression allows use of two independent variables as predictors for the dependent variable. A linear prediction model is used to obtain the statistics: residual and regression sums of the square; the R-square coefficient of determination; the standards of error of estimation; the constant and coefficients of the regression equation; and the F/DF test of significance. You may then obtain predicted values of the dependent variable for stated values of the two independent variables.

Anova models allow either one-way or two-way

DAISY will interface with *VisiCalc, VisiPlot,* and *DB Master* through the use of DIF files, and a separate utility is available to interface with *Multiplan, The General Manager,* and to download from mainframes.

Documentation consists of a 200+-page looseleaf manual complete with command summary, index, formula listing, file format description, and sample data disk which contains most of the data used for basis of discussion in the manual. The program disk is copy protected, but you can make working copies that require only the main program disk for initial boot. The supplied data disk also contains the boot program.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive
Rainbow Computing, $199.95

HI-RES ARCHITECTURAL DESIGN

Hi-Res Architectural Design is an extremely easy-to-use graphics program that allows drawing architectural floor plans on the high-resolution graphics screen. Using either paddles or joystick (paddles are more precise), you can draw thin, thick, or dotted lines and choose from a selection of 76 different floor plan shapes that can be moved, rotated, and placed anywhere. Shapes include stairs, bathtubs, doors, washbowls, squares, rectangles, arcs, and light fixtures. Shapes can be combined to produce different designs. Shape size is also adjustable by changing the shape-scale factor.

An onscreen calculator shows line lengths, diagonal lengths, and angle measurements before the lines are even drawn. By setting a scale factor, readings may be obtained directly in feet and inches or meters.

Other features allow lettering, including inch, feet, and degree marks, anywhere on the screen. You can erase portions of the screen, or the entire picture. Pictures may be stored on and loaded from disk or sent directly to a graphics printer. A Grappler-type interface is required to do this. Pictures are stored as standard DOS binary files.

While limited to floor plans or side views, this program offers a lot for its low price.

Requirements: Apple II with *Applesoft BASIC* or II+, disk drive, paddles or joystick
Avant-Garde Creations, $29.95

HI-RES ELECTRONIC DESIGN

Drawing electronic schematics is easy and fast with *Hi-Res Electronic Design.* Choosing from 98 different electronic symbols, you use the game paddles or a joystick (paddles work better), to position each component symbol on the screen. Symbols may be rotated in 90-degree increments. Most standard symbols are provided, including resistors, capacitors, logic gates, vacuum tubes, diodes, transistors, and many others. Lines are drawn, in color or black and white, by connecting points, and may be either solid or dotted.

Onscreen labeling is provided with capital letters, numbers, and punctuation marks, plus special electronic symbols such as the Greek letters for pi, mu, omega, and delta.

The program is limited strictly to schematic drawing; no calculations or formulas are supported. Drawings may be saved to disk for later printing or printed directly from the program if a Grappler-type interface is used.

Requirements: Apple II with *Applesoft BASIC* or II+; 48K RAM, disk drive, paddles or joystick
Avant-Garde Creations, $29.95

MATHEMAGIC

It's difficult to appreciate what this program does until you've used it. The simplest description is that it will turn your computer into a programmable calculator that can handle anything from elementary arithmetic on up to, but not including, calculus. Unfortunately this description somehow misses the point. If you're like most people, your immediate reaction was, "So what. I can do the same thing with my favorite calc clone." You can't.

If you want to add two numbers with most spreadsheets, you have to enter a formula that will look something like: "[1,A] + [1,B]." Then you have to go to cell [1,A] to enter the first number and go to cell [1,B] to enter the second number. With *MatheMagic* you don't have to think of cells. You simply enter the formula "A + B." *MatheMagic* will prompt you for A, prompt you for B, then give you the answer. The more complicated the formula, the more obvious the advantage of using *MatheMagic.*

MatheMagic can handle extremely complex calculations. Individual formulas can be up to 227 characters long and can be nested up to 6 levels deep. The IBM PC version can hold up to 100 variables in the computer memory at once; other versions hold 40 variables in memory. Most important, you can store as many formulas and variables as will fit on your disk. This means you can create a

dictionary of formulas instead of having to enter each one every time you use it. When needed, you simply call the formula up by name. If you've forgotten the name you've given it, the program will display the formula for you.

Like any good programmable calculator, *MatheMagic* has some built-in functions—more than 20 of them. These include trig and log functions, and even conversion functions to translate between the decimal and hexadecimal numbering systems.

Be forewarned that the program does have some minor annoyances. The interlinked menus make it easy to learn *MatheMagic*, but they also force you to do things through unnecessarily circuitous routes. This becomes bothersome once you are familiar with the program. Also, the manuals tend to be two or three revisions behind the software. This can be confusing, but it isn't as much of a problem as it might be. The program is so well designed and so self-explanatory that you can just about ignore the manuals.

The older versions of *MatheMagic* had to be run from drive A. The newest IBM PC version can be run from a RAM disk or a hard disk, either of which will speed up the program considerably. Also, while we're on the subject of speed, if you have an 8087 board installed in your IBM you can get *MatheMagic* with an optional module that will use the 8087 and speed up the number crunching. Another nice touch with the new version is that it can read data from files created with other programs, including *VisiCalc, SuperCalc,* and *dBASE II.*

MatheMagic can also share its data files for variables with the companion program *GraphMagic. GraphMagic* is reviewed separately, but be aware that these two programs are designed to work together. If you buy them as a package, you will save $30 over buying each separately.

Requirements: IBM PC, 128K RAM, one disk drive, and BASRUN.EXE (also available with the program); CP/M 2.0 or later, or Apple DOS 3.3, 48K RAM, one disk drive

Brightbill-Roberts, IBM version $100, with *GraphMagic* $160; Apple II version $90, with *GraphMagic* $150; CP/M version $100, *GraphMagic* not available for CP/M

MATHEMATICS SERIES

Mathematics Series is a group of four menu-driven analysis programs designed for students, teachers, engineers, and scientists. Apple's high-resolution graphics are extensively used to display the results.

Statistical Analysis I functions with numerical databases as 1,000 sets to compute and display mean and standard deviation, frequency distribution, and simple linear regression. The program also plots the data points and approximating equation.

Numerical Analysis plots any two-variable equation written using standard BASIC notation. It will plot the equation, its integral, and its derivative, as well as determine roots, maxima, minima, and integral value over the plot range.

Matrix solves for the inverse, determinant, and solution matrix for linear systems of up to 54 equations in 54 unknowns using standard Gaussian elimination.

The 3-D Surface-Plotter produces high-resolution, three-dimensional plots of any three variable equations written using standard BASIC arithmetic functions.

Plots may be saved to disk as standard DOS binary files and printed using a graphics printer with either a graphics dump program or a graphics interface such as Grappler. The programs are supplied on a single disk with a complete instruction manual.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, or Apple III in emulation mode, 48K RAM; IBM PC, 64K RAM, disk drive

Spectrum Software, $49.95

MICRO-CAP

Micro-Cap (Microcomputer Circuit Analysis Program) is a professional package for electronic-circuit designers. It provides an interactive drawing and analysis system with which the engineer can quickly design and predict the performance of an electronic circuit without actually building it.

The Designer Module allows the engineer to draw the electronic circuit diagram directly on the high-resolution graphics screen. A cursor, moved by simple keyboard commands, permits placement of standard component symbols and interconnecting wires anywhere on the screen, thus creating any type of circuit. Most standard components are supported: resistors, capacitors, inductors, diodes, OP AMPS, transistors, transformers, and more. Completed diagrams may be saved to disk.

Once the design is completed, signals are ap-

analysis of variance with up to five levels for each. The first screen of statistics includes the mean squares for the sources of variance and the F-ratio and probability estimates for the main effects. Several additional screens present the rest of the extensive Anova statistics.

Throughout the program, the screen may be printed at any time to provide a hard copy of the statistics, histograms, or scattergrams.

The documentation, though relatively brief, is clear. It provides a sample set of data, which the beginning user can type in and then run each of the procedures and check his results against those in the manual. There is also short introduction to statistics, but it will be of little use to anyone not already passably familiar with the subject.

Overall, the programs should be useful for anyone who does limited statistical analysis while on the go. The programs are easy to use and the displays are effective. The program is written in BASIC, so calculations are not particularly fast. For example, the sample multiple regression involving 27 cases required about 43 seconds to calculate. But overall, the programs are a nice group for the price and infinitely preferable to using a calculator for the same tasks.

Requirements: Model 100, 24K RAM, cassette recorder
Radio Shack, $29.95

STATISTICS WITH DAISY

Statistics With Daisy is a comprehensive statistics package able to manipulate data in many ways. Stat functions performed include correlations, hypothesis testing, multiple regression (six procedures), nonparametric stats, data and time-series transforms, and analysis of variance. The program is suitable for educational documentation and research applications, as well as for business, scientific, and social-science applications.

The program is menu driven. The user enters data as prompted, and the computer performs the statistical functions selected by the user. Output includes tables and graphs. The user with programming knowledge can write extension programs to create options that suit individual needs. The manual is clear and well organized, and a help file defining the various commands is built into the program.

The program does not teach how or when to use the various statistical procedures, and the prompt questions require knowledge of mathematical and statistical jargon. For the informed user, *Daisy* can make it easy to apply sophisticated statistical procedures once thought not possible with a microcomputer.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive
Rainbow Computing, $79.95

PORTIA ISSACSON, PRESIDENT OF FUTURE COMPUTING, INC.

When Portia Isaacson founded Future Computing, Inc., in August of 1980, she and a secretary were the sole employees. A few months later the staff was expanded and Isaacson's husband, Dr. Egil Juliussen, left Texas Instruments to join forces and is now the chairman.

Today, Future Computing is the premier market research firm of the microcomputer industry. At the end of 1983 the company's revenues totaled $3.8 million and its findings were consistently quoted as the top information about the field.

As Future's president and chief operating officer, Isaacson, now 41, leads a staff of 80 in preparing high-ticket research reports, organizing seminars and forums for industry leaders (a total of 65 days in 1984), and publishing five monthly newsletters on personal computers and software.

"We provide information about the industry to the industry," said Harold C. Kinne, Future's senior vice-president. "Before this, they had very little contact with the end user."

An Oklahoma native, Isaacson was in her 20s and divorced with two children when she began putting herself through Southern Methodist University. Graduating with a doctorate in computer science, she taught at the University of Texas before organizing a personal computer section of the National Computing Convention in 1977. Then she opened the state's first computer store.

According to Future Computing's all in-house research staff, Fortune 1,000 companies will buy more personal computers in 1984 than were sold to all major U.S. corporations before 1983.

INVESTMENT

Such a deal! The programs listed in this section are the kind of programs that make the wheeler-dealers of the world smile. Not only do they pay for themselves in time saved while evaluating various investment strategies, they offer two additional financial incentives. First, investment software is designed to help the user make money by sorting out the dogs from the deals. Second, Uncle Sam will usually foot some of the bill for these programs as legitimate investment expenses (but you must, of course, determine this individually with your tax advisor). In this category fall programs to help the computer-aided investor sort out such diverse investments as stocks, bonds, real estate, options, futures, IRA and Keogh accounts, commodities, various debt instruments, insurance, miscellaneous hard assets, precious metals, foreign currencies, and just plain old cash. To understand what investment software does, let's pose a problem that you may have run into recently and see how these packages could have helped.

It's April 10th, and your accountant is on the phone. He tells you that he has just finished preparing your income tax return and that you owe the IRS over $3,500. He suggests that you consider an Individual Retirement Account (IRA), and that you do it quickly. You know from listening to the ads on the radio that an IRA can be structured in many ways, and the one that particulary caught your interest was the "self-directed" IRA. This is an IRA where you put your cash in the hands of a financial institution, usually a stock brokerage or a discount brokerage, and then make your own investment decisions. The institution offers no-load mutual funds, stocks, bonds, a money market fund, covered options, and government securities.

Great. Now what do you do? You haven't looked at the stock market page in the paper for three months, and you have no idea of what to buy. You know that the local stock broker has a few stocks for you to review, but you're the independent type and make all of your own decisions. Wouldn't it be great if someone had developed a program that would allow you to log into a database of stock prices and company profiles that let you review the last five years' performance of over 1,500 stocks? And what if this program would load the information for you automatically while you were at work? Then you could come home, enjoy your dinner and get right down to business without a lot of boring data entry. After all, you barely passed your sophomore typing class. How about a program that would take all of this raw data and analyze it for you, showing you hot industries, stocks that are outperforming the market and stocks that are extremely undervalued?

What if this program used very sophisticated mathematical techniques to do the analysis, and then not only printed the results out on your printer, but also produced a variety of graphs? Even better, what if it then allowed you to enter your final decisions into your own database and did all of your record keeping for you? Maybe it could also show you the tax ramifications of your purchases, including dividend and capital gains reporting. If it could calculate the rate of return for you, and compare this rate of return to various industries, individual stocks, and the market as a whole, you could evaluate your decisions and move out of investments that aren't doing well.

Maybe your stock brokerage is one of those companies that see the potential of personal computing and have implemented a program of their own that lets you place your orders through your computer. Now you can place your order, go to bed, and know that your stocks will be purchased the next morning while you are driving to work. You can then log onto your office PC and get confirmation of your order with your morning coffee.

All of these functions are available to the computer user today. And while no program can supplement your own good judgement, they can make it a whole lot easier for you by reducing your choices to a more manageable level.

If you are an investment professional who helps others to invest, there are sophisticated portfolio management tools that can track and analyze hundreds of portfolios for you, allowing you to spend more time talking to your clients and prospective clients. If you are a private investor, you probably never have the time to do the kind of analysis and record keeping that you would really like to do. The software tools listed in this section can solve your problem. They come in a wide variety of price ranges, and they include features ranging from simple to extremely complex.

As with any purchase or investment, some time spent reviewing the offerings in investment software will usually pay big dividends. Look through the reviews listed here, and jot down the features that appeal to you; then pick out three or four packages that best fit your needs. Next, visit your local

computer store and sit down with each program for a while. Until you do your hands-on evaluation, you won't know which features aren't worth the price and which functions you can't live without. There are some very sophisticated packages available today, and you might be surprised at just how many of your investment needs your personal computer can handle for you.∞

CHARTMASTER

Chartmaster allows you to follow and chart commodities, cash markets, and stocks. Though aimed primarily at the agricultural market, it should prove helpful to nearly anyone involved in these forms of investment.

With high-resolution graphics, the program can display several months of trading activity, allowing you to draw up to ten different trendlines and inquire specific data on a particular trading day. The program will produce up to five different moving averages from 1, 4, 9, 18 and 60 days. It also makes it possible to examine inter- and intra-commodity spreads.

Chartmaster offers a number of features that make it particularly convenient and easy to use. Among them are "zoom," for focusing on specific segments of the chart; "scroll," for moving the screen forward or backwards to view the chart for life-of contractor any specific period; and horizontal grid lines that make charts easier to read and follow. The program will also print each chart selected for life-of-contract or for the information contained on a single screen.

The commodity-futures database can be updated automatically. Two additional software packages costing $50 each are required, as is a subscription to Instant Update or Technical Update Network provided by Professional Farm Software. Automatic updating on more than 80 different commodity contracts takes only minutes. Note: Before you can use the program, you must have access to Instant Update from Professional Farm Software, which costs $100 or $50, if you have Market Update from Professional Farm Software.

Requirements: Apple II, 80-column board, and CP/M 2.2x; TRS-80 Models II, 12 and 16, high resolution graphics board; IBM PC, high-resolution graphics monitor, 64K RAM, two disk drives, 80-column printer

Professional Farm Software, $400

CHART TRADER PLUS

Designed for stock, commodity, and option analysis, *Chart Trader Plus* consists of two main program modules: Data File Management and Graphics Charting with Analysis. Using these tools, in-depth market analysis is easy. Charts displaying up to 240 days of data can be displayed and printed, and price movements in both futures and equity markets can be projected.

The Graphics Charting module uses the high-resolution graphics screen to display a multitude of information. Along with an open, high, low, and close bar chart, moving averages, overbought/oversold indicator, high/low price band, moving average oscillator, percent price band, constant price band, relative strength index, and on balance volume can be displayed. A live cursor provides for display of daily data, and you can overlay any number of studies on a single graph. If you have a graphics printer with a Grappler-type interface, you may print your charts and graphs.

The Data File Management module lets you create and maintain the data files used in the graphics module. The manual states that you can track up to 589 weeks of information on as many stocks or commodities as you wish.

Unfortunately, information must be entered manually. Although a sales brochure states, "If you don't want to manually input data, telephone acquisition is a breeze," the user's manual states that you must acquire the market data using a separate program. The bottom line is that there is no provision from within the *Chart Trader Plus* program to load quote information via a modem. Furthermore, during program testing, the "Print a Data File" option in the Print File Menu resulted in a complete unrecoverable program crash when attempted.

A third feature, called Auto-Run, allows the setting up of procedures to automatically display combinations of methods to produce the charts. Data can be loaded, studies run, and charts created and printed—all automatically.

The program includes a backup disk, a 90-page instruction manual, and a sample data disk. A demo disk is available for $5.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive

Omega Microware, $199

COMMTRAC

Commtrac is a commodity tracking and charting

system. With a modem and the telephone lines, the user's computer can call one of the commodities data-access services and the day's open, high, low, and closing prices will be automatically downloaded. Once the updates are completed, the user is ready to chart price movements. The program asks which contract to display, then displays it as a bar chart. A wide variety of other graphs may also be charted. The most common are trend lines, moving averages of two to 40 days, channel lines, speed resistance lines, relative strength indices, and basis. The data charted can also be printed out and, with optional printer graphics software, the graphs may be hard-copied as well.

Farmers of almost every description can find uses for *Commtrac,* and it is primarily to them that this package has been marketed. However, nearly anyone involved in commodities speculation is likely to appreciate such conveniences as automatic contract updates by modem from Agnet, at the University of Nebraska, or with *Quicktrieve* from Commodity Systems, Inc.; the ability to track local cash prices and give commodity producers a basis chart; and such technical analyses as moving averages, trend lines, objectives/retracements, channel lines, relative-strength indexes, and ⅓ and ⅔ speed-resistance lines.

Requirements: Apple II with *Applesoft* card, II+, IIe, or IIl, 48K RAM; IBM PC, 64K RAM, two disk drives, game paddles or a non-centering joystick, printer with graphic capabilities, D.C. Hayes Micromodem

Vertical Software, Inc., $300

THE DOW JONES INVESTMENT EVALUATOR

The Dow Jones Investment Evaluator enables users to perform basic portfolio management functions using prices downloaded from Dow Jones/News Retrieval. The retail price of $195 includes one free hour of unrestricted News Retrieval usage, which could be worth as much as $72 during prime user time.

The hardest part of *The Dow Jones Investment Evaluator* is setting up the initial configuration, and that is by no means a complicated process. It's a simple matter of backing up the program disk, introducing the software to your modem, and inputting the communications details such as phone number and user password. The package is clearly designed, but a certain degree of trial and error should be expected. As with most Dow Jones software, more on-screen help and error messages would have made operations smoother for the first-time user.

The program's main menu accesses four functions: Portfolio Services, News Services, User Options, and Exit. Within Portfolio Services, the user can create, update, or display any one of up to 156 portfolios quickly and easily. When creating a new portfolio, you will have to answer questions on basic items—such as stock name, exchange, ticker symbol, number of shares, purchase price, and date of purchase—for which you must continually refer to the Dow Jones/News Retrieval Fact Finder supplied with the package. The most useful feature of Portfolio Services is the ability to tap into Dow Jones/News Retrieval for instantaneous updating of the prices of securities in existing portfolios. Once prices have been updated, the user can generate a report on the value of the portfolio(s), a listing of unrealized gains or losses, or a detailed presentation of every piece of information stored on that security. The report will even tell you whether your gains or losses would be considered short- or long-term for tax purposes. In the News Services section, you can access current headlines and news stories as well as any of the databases within Dow Jones/News Retrieval.

The Dow Jones Investment Evaluator is a basic portfolio management package that is most appropriate for home users who do not wish to know much more than how many shares they own, at what price, and what they're worth today.

Requirements: IBM PC, 128K RAM

Dow Jones, $149

DOW JONES MARKET ANALYZER

Whether it's the key to stock-market success or the investor's answer to astrology, technical analysis is both very popular and very time consuming: Investors must record stock prices and other market data, treat it with arcane arithmetic, graph it, and search for the patterns of market action that technical traders believe foretell price movements. This program will not help you interpret the footprints in the shifting sands of the Big Board, but for the rest it is a wonderful labor saver.

No market data comes with the *Market Analyzer.* Unless you buy your data on disk or subscribe to one of the online information services, you'll still have to enter the endless columns of price and

volume figures by hand. (Consider buying a numeric keypad for your Apple. It helps. A lot.) Buyers do receive a subscription to the Dow Jones News/Retrieval Service and an hour of free access to it; a built-in communications routine will let you talk to this or other online databases. But the Dow Jones system specializes in earnings reports and similar corporate and financial news; market data is a costly option.

Once the data has been entered, everything becomes easy. The *Market Analyzer* is completely menu driven. Going from the main menu to secondary menus to actual functions requires a single keystroke at each step. The eight working menus let you begin and delete stock histories, update price listings, create standard bar charts of price movements and trading volume, build graphs comparing the performance of two stocks, and carry out a variety of maintenance operations. Complicated procedures that you use often can be set up to run automatically.

The Dow Jones package can handle all the standard technical analyses—moving averages, oscillators, linear least-squares fit, and plotting of trend and resistance lines. Even on-balance volume is available. In addition, users can incorporate their own routines into the system.

This package is not without problems. The worst of these is in its error handling. Error notices are mere numbers rather than comprehensible messages. To find out what is wrong, you must consult the program's manual. Worse, if you make a mistake whatever is on screen vanishes, and the entire session's work goes with it.

One easy way to accomplish this is to put the disks into the wrong drives. Four disks come with the package: a master program disk and backup, a data disk, and a temporary work disk. The program expects to find the temporary work disk in drive 1, the data disk in drive 2. Get them reversed, and a error notice will soon replace your work.

The program disks, incidentally, are copy protected, yet must be used without a write-protect tab. They are covered by a year's warranty against defects, but replacing them thereafter costs $30 per disk.

In all, this is a convenient and powerful package. It cannot make you a better, more successful investor. But at least it will free you from much of the drudgery of technical analysis and let you concentrate on your trading.

Requirements: Apple with 48K RAM, at least one disk drive, printer, Apple RS-232 card and acoustic coupler or Hayes Micromodem II
Dow Jones & Company, Inc., $350

THE DOW JONES MARKET MANAGER

The Dow Jones Market Manager is a comprehensive software package for keeping detailed, up-to-date records on as many as 26 different portfolios with a combined total of up to 500 different securities, such as stocks, bonds, options, mutual funds, and Treasury paper. Buys, sells, short sales, and purchases to cover short sales can all be handled and reports can be generated by portfolio or security for interim accounting, annual tax filings, or unrealized gains. As with the other Dow Jones software packages, pricing information is obtained from Dow Jones/News Retrieval.

The Dow Jones Market Manager is easy enough to learn, but the user will need 20 minutes or so to configure the system to data disk, modem, printer, and communications. The next step is to establish the details of the portfolios: For each of the securities, the user enters vital transaction statistics, including price, date of purchase, ticker symbol, etc. Creating, editing, displaying, and logging onto Dow Jones/News Retrieval are accomplished with a few keystrokes.

Clear menus outline the path through the functions of this package. No more than a few keystrokes are necessary to update portfolio records or generate a record of one or more portfolios. Error correction is extremely simple.

The Dow Jones Market Manager is a well-conceived and well-executed portfolio management program that should suit the needs of most investors.

Requirements: Apple II, II+, or IIe, 48K RAM; IBM PC, 128K RAM
Dow Jones, $299

THE DOW JONES MARKET MICROSCOPE

The Dow Jones Market Microscope is a fundamental analysis package. It accesses information on selected companies from the Dow Jones/News Retrieval Service and then it sorts the data in user-specified order to provide an ongoing focus on key investment variables for companies of special interest. It can also screen a limited universe of

stocks to highlight those that most closely fit the user's requirements.

Almost immediately, the manual tells you that *The Dow Jones Market Microscope* can not be used right away. That's an understatement. First off, you must copy *Market Microscope,* the Communications Master, and some DOS programs onto the program disk. Then there is a rather involved on-screen setup called the Start-Up Trial. This readies the video screen, printer, modem, communications, and data disk that will store information from Dow Jones/News Retrieval.

Problems appeared throughout the Start-Up Trial. After horizontal adjustment of the color monitor, which was easy enough, the presentation remained in monochrome. Entering and storing the modem details and communications specifications also raised problems.

Using *The Dow Jones Market Microscope* is significantly less painful than learning its ins and outs. Identifying the companies to be observed is simple, as is the creation of the list of indicators to be stored for measuring the data about these companies. The user can then go online with Dow Jones/News Retrieval to access that data, flesh out the established files, and update when necessary.

Another main function of the *Market Microscope* is database screening, which is performed by first downloading information from Dow Jones/News Retrieval and then specifying criteria to be used in the screening. This function is rather inefficient for several reasons: First, the number of stocks to be screened at one time can be no greater than 50; second, subsets of information to be screened must either be in existence or downloaded before screening takes place; and third, the user must scroll through the available variables rather than view them all at once before making his selection.

The outstanding feature of the *Market Microscope* is its ability to extract information for thousands of companies and keep that information up-to-date with almost no effort on the part of the user. In most other respects, however, this package is a disappointment. Its screening capabilities are no match for those of *VALUE/SCREEN* or even *Stockpak-II,* and the fact that the data are more current cannot be considered enough of an advantage to offset its obvious weaknesses.

Requirements: Apple II, II+, or IIe, 48K RAM; IBM PC, 128 RAM; one disk drive, modem, printer
Dow Jones Software, $699

DOW JONES NEWS & QUOTES REPORTER

The *Dow Jones News & Quotes Reporter* is designed for the investor or other individual who needs fast access to stock-market news and information. It allows access to on line databases, retrieving past and current news stories and headlines from the Dow Jones News Wire, *The Wall Street Journal,* and *Barron's,* along with stock quotations from more than 6000 companies traded on the major exchanges. To conform to stock exchange requirements, quotes are delayed by a maximum of 15 minutes.

In addition, users can get financial operating data for thousands of companies through the Media General Financial Services, complete transcripts of television's "Wall Street Week," weekly money-market forecasts, and other such information as weather, sports, and financial databases.

Simple to use, *News & Quotes Reporter* requires a modem and a special password obtained at the time of purchase. News may be obtained by category or company, and either the headlines or the entire story can be printed. The optional Stock Quote Service allows access to the securities quote database to obtain current stock quotations.

News & Quotes Reporter can also be used with *Portfolio Evaluator,* which allows you to store, modify, and update approximately 100 individual portfolios of up to 50 stocks each on a single disk.

The program is supplied on one disk, complete with a 55-page manual, 198-page News/Retrieval "Fact Finder Guide and Directory," contract/password information sheet, and an hour of nonprime connection time.

Requirements: Apple II, II+, or IIe, 48K RAM, disk drive, modem
Dow Jones Software or Apple Computer, $95

THE DOW JONES SPREADSHEET LINK

The Dow Jones Spreadsheet Link enables the user to transfer information from any of the Dow Jones/News Retrieval databases into *Lotus 1-2-3, VisiCalc,* or *Multiplan* spreadsheets to be used in portfolio evaluation, fundamental analysis, technical analysis, and evaluation of options. The value of the package is largely determined by the creativity of the user, though *The Dow Jones Spreadsheet Link* is not intended to be as comprehensive as single-function packages. Also, the technical analysis capabilities tend to focus on percentage price

changes, except with *Lotus 1-2-3* and *VisiCalc IV,* which can provide some graphic displays.

The Dow Jones Spreadsheet Link is one of the simplest packages to get into operation. With the IBM XT, for example, it is an easy matter of copying the program to the hard disk and then setting up the printer, the modem, and one of the three specified spreadsheet packages. Thereafter, communications are established and you're ready to work through the main menu.

The Dow Jones Spreadsheet Link is extremely undemanding. Accessing Dow Jones/News Retrieval and getting in and out of the *Lotus, VisiCalc,* or *Multiplan* spreadsheet is effortless. Preparation of spreadsheets can be done either by using the sample templates supplied or by creating matrices using other items available within the various Dow Jones/News Retrieval databases. All of this is clearly explained in the documentation, and the innovative microcomputer owner may find that the extra time spent will produce valuable tools for developing and implementing investment strategies. Similarly, the process of editing or interfacing with *The Dow Jones Market Analyzer* is very simple, requiring almost no instruction to get under way.

The investor who has a fairly well defined investment strategy and needs only to assemble the data necessary to implement that strategy will find *The Dow Jones Spreadsheet Link* of considerable assistance.

Requirements: Apple II, II+, or IIe, 48K RAM; IBM PC, 128K RAM; two disk drives
Dow Jones, $249

FUND-IT

Sawhney Software specializes in tax and investment planning software for accountants and other professionals. This program is intended for the individual or financial adviser who needs to plan for major financial commitments years in advance. Such commitments might include children's educations, weddings, house purchases, or retirement.

The user enters the current date, the date of the event to be financed, a realistic budget for the event, an assumed average rate of inflation, and an assumed after-tax interest rate or rate of return on whatever assets will be employed. The program then cranks out a schedule of payments needed to fund the event. Projections take into account both inflation and compound interest.

So far, that's not much more than you could do yourself with a good calculator. The interesting part of this program is its approach to funding college costs. It incorporates the database of college costs compiled by the College Board and published in the College Board Cost Book. These costs include tuition and fees, books and supplies, room and board, personal expenses, and transportation costs for resident and nonresident students in private and public two- and four-year colleges. These costs are on the disk for 1983 as national averages or by region—New England states, mid-Atlantic, etc. They will be updated as the College Board updates its survey.

With this program, you can develop a plan for as many as five kids at a time, entering the name of each, the date he or she will start college, how many years in the course, and in what part of the country the college is located. You can then modify any of the cost categories according to your particular circumstances—for example, reducing the board and transportation costs if you expect the child to attend a local college. The display is continuously updated to show both the total costs and how much present value should be invested to fund them.

The print module will produce several schedules, including a consolidated cash flow showing how much must be invested each month or each year, from now until the last child has graduated, and how the cash must be paid out as each child's needs are met. The packaging and manual are no-frills but adequate, and the software does a useful, straightforward job.

Requirements: IBM PC, 96K RAM, one disk drive
Sawhney Software, $69

MARKET ANALYST

A complete integrated system for stock-market analysis and investment management, *Market Analyst* is really three programs in one: Portfolio Manager, Technical Analyst, and New, Views, & Quotes.

The Portfolio Manager section handles all your portfolios and tracks both open and closed positions. The open file displays holdings showing current price, cost, quantity, unrealized gains, term, liquid value, total portfolio yield, purchase date, and other vital information. It allows easy evaluation of your portfolios and will flag both short-term holdings and those ready to turn to long term. The history file keeps track of all closed positions. Along with sale price, the history display evaluates

realized gains, showing year-to-date performance, and provides reports for tax accounting. All reports and evaluations may be displayed or printed for later reference.

The Technical Analyst section is used to evaluate a stock's potential by analyzing historical data to forecast price movement. Using the computer's high-resolution graphics, the display is split into two halves. In one, historical quotes are presented in a standard high-low-close bar chart, where simple analysis can be done. The lower half is used for more complex analyses: Moving average, on-balance-volume, accumulation/distribution, price and volume, positive and negative volume indicators, trend/support/resistance lines, and user-customized studies can all be done with a keystroke. Plots can use semi-log or linear scaling and are aligned by date with the upper-price chart. Multiple plots can be overlaid to show when the price crosses the 30-day moving average.

With the News, Views & Quotes section and modem, the user can access many remote computer databases, gaining entry to current stock quotes, financial news, and other services. Included with the *Market Analyst* package is an account for the Warner service, which allows for immediate connection. To access any others, you must contact them directly to subscribe. Operation is simple: You log on to a database, download the desired information, and then sign off. Up to 30 pages of text may be stored by the computer for later review, thus saving on connect time.

The *Market Analyst* is a sophisticated and professionally written package with far too many features to discuss here. The program is supplied on both sides of a single disk (one side is a backup copy) and includes a sample data disk of historical quotes, plus a complete user's manual.

Requirements: Apple II, II+ or IIe, 64K RAM; IBM PC, 128K RAM; disk drive

Anidata, $495

MARKET MAVERICK

Market Maverick is a portfolio selection and management program that uses a few simple criteria to help the investor evaluate his market holdings. The program is menu driven, and it includes a 960-stock database. A monthly newsletter of statistical analysis of stocks as well as disk updates are available from the maker.

Assessments of stocks are based on estimates of per-share growth rates; percent of earnings paid in dividends; adjusted earnings per share; and the company's past volatility. By considering momentum, performance, and other factors, *Market Maverick* projects a price-to-earnings ratio. The program compares this figure to the current market quote, indicating whether the investor should buy or sell any given stock.

Accuracy is further enhanced by allowing you to input projected inflation rates and the percent of that inflation the nation's industries will be able to pass on to the consumer. (The user is advised to consult various business publications to derive the appropriate percentages.) These figures are then factored into the *Maverick*'s calculations.

Neither the estimation techniques used nor the program itself is particularly complex; this software is intended more for starting and middle-level investors than for experts. Nevertheless, *Market Maverick*'s evaluations are logical, intuitive, and, most important, effective.

Requirements: Apple II, II+ or IIe; IBM PC; 64K RAM, disk drive

Financial Software, PC version $175; Apple version $275; Newsletter and updates $120

MARKET WINDOW

Designed to be used with electronic commodities-data networks, this program computes daily moving averages, draws trend lines, plots channels and commodities cycles, and provides daily volume and open-interest figures. Access to the network operated Commodities Systems, Inc., comes with the program; AgriData's Network and Instant Update system is optional. When using the network, the program will automatically dial up the system and produce trading charts on command as data is downloaded. News, local and worldwide weather, commentaries on markets, and ten-minute price updates are also available through the networks when you use *Market Window.*

New features are added to the program in quarterly updates, and sent to customers free for the first year after purchase. A manual and demonstration disk are available for $50 for those considering the package.

Requirements: TRS-80 Model II, 64K RAM, two single-sided double-density disk drives; TRS-80 Model 12/16, 128K RAM, graphics board, two double-sided double-density disk drives; Line Printer VIII or DMP series graphics printer; Modem II; or

chases are handled with margin account equity automatically calculated. Stock splits, bond interest, and dividends are also handled. Money markets, C.D.s, and other cash investments can be tracked and a long term status option reports on any transactions that will go long term within the next 30 days.

A full range of reports are produced including current portfolio status, individual security status, tax year profit/loss, dividend income, interest income/expense, long term status, and dividend/bond interest due in 30 days.

A Dow Jones Terminal mode allows access to the Dow Jones News/Retrieval Service and will dial up and log on automatically using a Hayes Micromodem II. You will then have access to such services as quote retrieval, news and sports stories.

The program is supplied on a single diskette (a free backup is supplied upon registration) and includes a sample portfolio to practice with. An attractively bound 45-page manual is also provided.

Requirements: Apple II with *Applesoft BASIC,* II+, IIe or III, 48K RAM; IBM PC, 64K RAM, disk drive

Smith Micro Software, $185

STOCKPAK-II

Standard & Poor's *Stockpak-II* is a fundamental investment program that provides access to a series of databases covering the New York Stock Exchange, the American Stock Exchange, and Over-the-Counter. The package is sold on an annual subscription basis with one or more data disks sent monthly, each containing a different universe of stocks. The program has two main functions: information retrieval for individual companies or groups of companies, and database screening. Database screening uses the entire universe of stocks and selects those that meet specified criteria.

Getting started with *Stockpak-II* is simple and straightforward, although clearer on-screen prompts and messages would be helpful. The easiest of the functions to understand is Lookup, which allows you to access information on individual companies in the database. You simply enter the stock's ticker symbol (found in the S&P Stock Guide accompanying the documentation) and the file is quickly retrieved. Ticker symbols, which replace stock names through *Stockpak-II,* save space on the 40-column screen but significantly slow program operation due to the constant need to refer to the Stock Guide. Comparing information on several companies is a more elaborate process. You must specify the ticker symbols for each of the companies to be investigated and indicate the name or number of the data items to be used in the presentation. This again means referencing the documentation. Once the parameters have been set, *Stockpak-II* will quickly and neatly display the comparative data in either graphic or tabular form. Database screening is an important function of *Stockpak-II,* but it is also the most cumbersome; familiarity must be gained through trial and error. You may choose preselected screening variables or create your own, though the latter can be difficult. Unfortunately, data items are arranged in alphabetical order, rather than as they would be traditionally presented in financial statements or hard-copy investment publications. The display uses many abbreviations, which can also cause confusion.

Stockpak-II is commendable for the broad range of information in its databases. For individual stocks, the Lookup Data and Lookup Ratios pages provide some 70 separate data items. As virtually all of this is historical data, *Stockpak-II* will be of greatest benefit to the patient investor who is prepared to draw his own conclusions about the future.

Requirements: Apple II, II+, or IIe; TRS-80; IBM PC/XT, 128K RAM

Standard and Poor's, $265 yearly subscription

THE TECHNICAL INVESTOR

The Technical Investor is a three-part program that graphs stock activity—price, volume, and so on—on a daily or weekly basis. Though not an overly complex piece of software, *The Technical Investor* makes excellent use of the microcomputer's capabilities.

The three parts of the program are QuotePro, a database in which you can compile the year's market quotes; ChartPro, a bar-chart-generating utility; and Vector-S, a graphics module for evaluating trading patterns, breakouts, and so on. *The Technical Investor*'s forte is its point-and-figure charts. These multi-colored representations take the highest and lowest prices and quickly rescale the chart to incorporate the full range of data. The result is a clear picture of upswings, reversals, and overall stock volatility.

The program also features an exponentially

smoothed moving-average generator, animated price-vector charts, support/resistance-projection charts, and other fairly standard technical-analysis tools. Data can be entered manually or automatically, and the program can search for and replace data within any chart.

The beauty of the system is its simplicity. It's a reasonable choice for low- to middle-level private investors who want their computer to work for them—and not vice versa.

Requirements: Apple II, II+ or IIe, 48K RAM, disk drive

The Computing Investor, $395

VALUE/SCREEN

VALUE/SCREEN is a multifunction software package from Value Line. It selects stocks from a 1,650 stock database using parameters chosen by the user and stores information on as many as 50 portfolios of up to 20 stocks each. The package is available on an annual subscription basis, and data is updated by disks sent to the user each month.

The database contains 32 items of key investment information about each of the companies. In addition to screening, individual company data or comparative reports can be presented for any group of companies. The portfolio management and analysis function presents the details of existing or hypothetical portfolios and displays the performance of those portfolios or the stocks within them.

With abundant on-screen prompts, detailed documentation, and no need to configure the system or learn special commands, the user can easily gain the benefits of this package within minutes. The only real reason to consult the loose-leaf pages is to review the list of companies in the database or get an industry code when screening on that parameter.

When screening is selected, the video screen will display 32 variables from which the screening parameters can be chosen. As many as nine variables can be selected and an appropriate value is assigned to each. When the screening operation is complete (usually in less than a minute), stocks that have met the specified tests are displayed. The user can then modify the parameters or call up a report on the stocks selected. The report provides the names of the companies selected and up to five items of information (from a list of 34) about those companies. Further, *VALUE/SCREEN* can present a statistical analysis on any subset of stocks selected, using any of the variables in the database.

Switching to the portfolio management and analysis disk, a menu appears listing the various possibilities of portfolio data entry, modification, display, and analysis. Although the process of creating portfolios is done manually—there is no provision for downloading via modem—the instructions make it easy. With one or more portfolios loaded, the user can periodically transfer the stored files back into the report-writing function to examine updated evaluations.

VALUE/SCREEN has no graphics capabilities and the data for each of the stocks in the database are less comprehensive than those available in other investment programs. But the ease of use and the concise comparative reports and future projections make up for these deficiencies.

Requirements: Apple II, II+, or IIe; IBM PC, 64K RAM, one disk drive, graphics adapter

Value Line, $495 yearly subscription

WINNING ON WALL STREET

Winning on Wall Street is a comprehensive software package for the sophisticated investor. The system consists of three modules: Trader's Data Manager, a graphics module that tracks historical stock and market indicator information; Trader's Forecaster, a graphics module that uses technical analysis tools to project stock price movements; and Trader's Accountant, a portfolio management module that can perform detailed record keeping on a variety of accounts—short, cash, margin, and money market.

Winning on Wall Street is a powerful analytic tool, biased toward the technical side of investment analysis. Summa Software has chosen to walk the new user through its package using written tutorials that precede the documentation for each of its modules, rather than providing a tutorial disk and help screens as in the popular *Lotus 1-2-3*. The tutorials do the job, but more time will be needed to gain hands-on familiarity with the program.

To get under way, the user must configure the system to establish communications, a process that is time-consuming and involves a lot of moving from menu to menu; more on-screen prompts would have been helpful.

Despite some awkwardness in getting used to *Winning on Wall Street,* it is reasonably simple to

IBM PC, 128K RAM, two double-sided disk drives, Epson MX-80 printer with GRAFTRAX, Hayes Smartmodem
FBS Systems, $995

N-SQUARED MARKET ANALYZER

The *N-Squared Market Analyzer* lets you manipulate various general stock-market indicators to predict board trends within the market. By analyzing the market's mood, the investor can then make decisions on specific stocks.

The *N-Squared Market Analyzer* takes a strongly mathematical approach to the market game. You can generate complex comparison graphs of any number of market indicators. Though the program is menu driven, it is far from easy to operate, at least for beginning investors. You must choose the figures you wish to examine and then specify the operations to be performed on them.

The program includes its own database, and it can go online with several quote services. To set up a graph of, say, the Trading Index, you take figures from any of the program's 20 resident data sets (or one of your own creation), and program the operations you want performed on them (averaging, summing, division, exponential smoothing, transforms, time-lag analyses, and so on). The sequence of operations is critical, and some previous general programming experience is helpful. Then you input the essential plotting commands and voila, a customized graph.

If this sounds complicated, it is. The *N-Squared Market Analyzer* is a serious program. It has excellent step-by-step documentation, but even so, it is not for the mathematically inept or the market dilettante.

Requirements: Apple II, II+ or IIe; IBM PC; 64K RAM, disk drive
N-Squared Computing, IBM version $295; Apple version $295

THE PERMANENT PORTFOLIO ANALYZER

A lot of people who make a lot of money are surprisingly bad when it comes to managing their investments. Enter Harry Browne. He is the author of many books, including *How You Can Profit from the Coming Devaluation* and others. His controversial economic wisdom and forecasting talents have been distilled into a multitude of predictions about key economic factors.

These, in turn, comprise the major selling point of *The Permanent Portfolio Analyzer.* This long-term ("Permanent") investment manager not only tracks what you have invested where but makes recommendations, based on Browne's formulas, for improving you performance. The 19 investment categories include precious metals, foreign currency, stocks, real estate, T-bills, and other securities.

Once you input your portfolio—investments are stored as files, so you can have many—you can track them via option 3 from the main menu. This prints out a balance sheet showing each investment in units and value, both at purchsase price and current market value. Once your portfolio is entered, Browne's forcasts are applied and, if you believe in Harry Browne, you will see what you will be worth in ten years. This capability is not only powerful but flexible; you can alter the economic assumptions, for example, increase the long-term interest rate.

This program is quite easy to use. The documentation is good. Browne's investment wisdom consumes more of the manuals than does instruction. This is a good program. However, because it tracks only long-term investments it is limited compared to other investment managers. There is no way to access online stock databases, for example. If you are a Harry Browne devotee, this is what you want. Otherwise, you probably will want to lok at portfolio managers thast track both long- and short-term investments.

Requirements: IBM PC, Apple, 48K, one disk drive
C.R. Hunter & Assoc., $295

THE PERSONAL INVESTOR

If you have a large portfolio of stocks, bonds, options, and Treasury bills, the daily fluctuation of prices make timing an essential factor for success. *The Personal Investor* can help keep track of them. It automatically logs onto the Dow Jones service, records daily information on your investments, and prints out status reports on your holdings. However, it cannot track items over time. Thus, it does only part of what an investment system should.

When you purchase a security, you add it to *The Personal Investor*'s files by entering the name; purchase price; number of shares, bonds, or whatever; and broker fees. From then on, whenever you wish, it will dial the Dow Jones system, give your password, and check the latest prices. Five reports of

the results are available, including quotes, gains and losses, and dividends.

The Personal Investor is easy to learn and records current securities information quite well. However, it does not give you the security's in order to aid future buy/sell decisions. *The Personal Investor* shows current status well, but falls in the crucial question of "What should I do now?"

Requirements: Apple II+ or IIe, 64K RAM; IBM PC, 128K RAM; two disk drives; modem
PBL Corp., $145

QUIKCALC REAL ESTATE INVESTOR

Real Estate Investor puts all of the basic information that an investor needs to make a good real estate decision into spreadsheet templates. Included in the package are templates for analyzing both investment property and individual residences. The user must enter purchase price, financing terms, taxes, income, expenses, and assumptions about inflation. From these items, the model will provide loan schedules for three loans, depreciation schedules, pretax and post-tax cash-flow projections, information about the proposed sale of the property, and internal rate of return. Printed reports are complete and nicely formatted.

The user must have either *VisiCalc* or *SuperCalc*, because *Real Estate Investor* is a template, not a program. The package includes a manual that both explains how to use the template and introduces some basics of real estate investing.

Internal rate of return is the major tool for evaluating any real estate investment. If the user finds the number too low, models can be rerun with new variables until the deal can be structured with an acceptable return. Negotiations with the seller can then be based on hard facts, not guesses. Anyone who is serious about a real estate purchase should consider this template.

Requirements: IBM PC, PC DOS, 64K, one disk drive, display (monochrome or color) or TV set, *VisiCalc* or *SuperCalc*
Simple Soft, $129.95

REAL ESTATE ANALYZER

The *Real Estate Analyzer* is an easy-to-use, professional-quality package that will produce detailed cash-flow and return-on-investment (ROI) analyses on both commercial and residential properties.

Taking into account such variables as inflation rates, complex depreciation schedules, involved leases, creative loan packages, and the ever-changing tax laws, accurate buy and sell decisions can be made even on dissimilar properties. Pretax and after-tax cash flows can be projected, along with various rates of return.

Computer novices and real estate professionals will find the program simple to operate. It's menu driven, and you simply fill in the blanks while the program does all the calculation and produces a nicely formatted report.

The report section produces a customized cover page, useful if you are preparing a report for a client, for example, and four other printouts: background information, assumptions for analysis, cash-flow analysis, and ROI analysis. Analysis projections may be printed for up to ten years. If your printer is capable of printing 132 columns, the entire decade will fit on one page. The program accommodates a variety of printers and accepts the control codes necessary to activate compressed or enhanced print, and similar functions.

A demonstration file is included along with a tutorial. This will allow the user to get a feel for how the program operates and to try different "what-if" situations. The manual is of high quality and includes sections on understanding investment analysis and making investment decisions. A sample worksheet, which may be copied, is included to aid in collecting and entering the proper data. Sample printouts are also provided.

An update service is available to ensure that when the program is improved or modified to reflect changes in the tax law, you will always have the latest version. Supplied in copyable form, it is compatible with virtually every printer on the market.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM; IBM PC, 64K RAM, disk drive
Howard Software Services, $225

STOCK PORTFOLIO SYSTEM

Stock Portfolio System is a stock and option portfolio management program that will record sales, purchases, dividends, splits, and commissions, as well as producing reports showing net gains and losses.

Menu-driven, the program provides for easy update of the portfolio database, either through manual input or by using the Dow Jones News/Retrieval Service and modem. Both cash and margin pur-

get down to business once you've spent a few hours familiarizing yourself with the program.

Winning on Wall Street has several noteworthy features aside from the obvious benefits. First, the software is quick; don't plan on grabbing a cup of coffee while the data is being processed. Second, Summa makes clever use of highlighting to keep the user abreast of what is taking place within the system.

The price charting capability in Trader's Data Manager is quite good: *Winning on Wall Street* provides a broad range of tools to modify and underscore the displays, so the user need not rely on a default presentation. For example, you can simultaneously list the year-long prices of a specific stock and the high, low, close, and volume for any day during a given year.

In Trader's Forecaster, virtually all widely used technical tools and some that are rather exotic are at your fingertips. Moving averages, trading bands, resistance and support lines, oscillators or point-and-figure charting can be displayed with a few keystrokes. The technician may find Trader's Forecaster addictive.

Trader's Accountant, though it doesn't have the glamour of the charting modules, is an extremely comprehensive data management function. It will suit the needs of 99 percent of all investors. It tracks holdings, profit and loss position, and buying power, as well as prepares tax summaries on command.

For the serious investor seeking a first-rate technical analysis tool with superb graphics, *Winning on Wall Street* deserves serious consideration. All that's missing is a module for fundamental analysis.

Requirements: Apple II, II+, IIe, III (in emulation), 48K RAM; IBM PC/XT, 192K RAM (comp.)

Summa Software Corp., Trader's Data Manager $200; Trader's Forecaster (Trader's Data Manager required) $250; Trader's Accountant $350; all three $700

LEGAL

The office of a doctor or lawyer isn't like other businesses. So its computing needs are not like those of other businesses. A professional practice doesn't keep hundreds of products in stock, like a hardware store, so there is no need for an elaborate inventory-control program. It probably hasn't the dozens of employees of a supermarket, so a complex payroll package is unneeded. And though a physician may buy drugs, test kits, or surgical supplies, he or she probably does not deal with hundreds of suppliers; a lawyer doesn't buy that sort of product at all. So there is little reason for a sophisticated accounts payable program.

What a professional practice deals in is time—the minutes or hours that a doctor or lawyer spends working on a patient's or client's case. In the case of a physician, customers are unlikely to pay in advance and very likely to be late with their payments. Doctors particularly must keep a detailed case history for each patient. And certain legal questions require the kind of analysis in which computers excel. All these specialized needs make computerized practice management very different from other data processing fields.

The reviews in this category represent no more than a small cross-section of the practice management software available. Some are time and billing systems. Others are generalized accounting packages tailored for medical or legal use. Some medical office packages are even equipped with data management programs for recording and analyzing clinical findings. And there are a few special-purpose programs for both physicians and attorneys.

Unfortunately, no more than a limited cross-section is possible in anything less than a book dedicated to professional-practice software. There are an estimated 800 computer companies dealing in medical office programs alone. Nearly 100 medical accounting packages are advertised nationally. Many more practice management specialists market their products regionally, or even within a single city.

In studying these reviews, you are likely to notice a clear trend: The packages that got the highest marks from reviewers were the most flexible ones, the programs that offered the best chance of modification to fit the practice exactly. These are also likely to be the most difficult programs to set up. Automating a practice is a task that must be carefully planned if the transition from manual to computerized management is to be carried out smoothly. More than most business people, professionals with a practice to automate may find it worth their while to seek out a good consultant to help with the chore.∞

BLACK'S LAW DICTIONARY

Any person seriously interested in legal writing or research undoubtedly knows *Black's Law Dictionary*. In its standard printed form, it is the leading legal dictionary and is a powerful legal research tool, not only for its definitions of often cryptic legal terminology, but also for its value in locating cases that define legal terms. Ironically, the traditional book version of *Black's* is rarely used for the purpose that nonlawyers most often associate with a dictionary—the checking of spelling. Although *Black's* is a useful tool for lawyers, the book is awkward to use for quick spelling verification because the comprehensive definitions are often quite lengthy; in many ways, it is more like an encyclopedia.

Enter Sensible Software, Inc., with the official word list from *Black's Law Dictionary* on a floppy diskette for use with the *Sensible Speller*, for Apple II series computers, or *Apple Speller III*, for the Apple III. Although the product is also called *Black's Law Dictionary*, it is not a machine-readable version of the printed volume. Nor is it a stand-alone program; it requires one of the two spelling programs for use. (Both of these "limitations" or "caveats" are clearly indicated on the package from Sensible Software.)

You might ask, what exactly is Sensible Software selling for a list price of $99.95, and should I use it? A means of quickly and efficiently using *Black's* to verify spelling in a document. And, yes, you probably should.

Sensible Software has combined 20,000 words gathered from *Black's Law Dictionary* with 15,000 of the most commonly used words from the *Random House Dictionary*. The result is a fairly comprehensive legal dictionary on a single diskette that can be used either by itself, to minimize disk swapping, or with the *Random House Dictionary* diskettes, supplied with *Sensible Speller* and *Apple Speller III*, for more extensive spelling checking.

If you are using a computer for serious word processing, you probably should be using a spelling checking program. And if much of your work uses legal terminology, you can save time by using a

Requirements: Apple II, II+, or IIe; CP/M-80; IBM PC; 49K transient program area; two disk drives
Aardvark/McGraw Hill, $750

ESTAX

Estate planning is tricky, but *ESTAX* can help. In a nutshell, *ESTAX* figures and displays the tax consequences of common estate plans. It was written by Al Moses, a well-known master of estate planning.

ESTAX provides a set of eight plans for the husband dying first in a given year, and a like set for the wife dying first. The plans are: all the estate to surviving spouse; maximum marital deduction; 50-percent marital deduction; fixed-percentage marital deduction; estate equalization; fixed-dollar-amount marital deduction; minimum marital deduction; and no marital deduction.

A detailed recapitulation of any particular plan can be sent to the screen or the printer. You can also generate an income/principal analysis for a trust for either spouse.

Generally, *ESTAX* does a good job of checking for internally inconsistent input. If you want to review your previous question and answer, you just enter a negative 1. You can tinker with all the input information, either to correct mistakes, or to play with your assumptions until you have the results you want, then print your reports.

The manual for *ESTAX* is about 15 pages long and is reasonably clear.

ESTAX is useful. It does things most attorneys don't want to take the time to do, and does them well. If you do much serious estate planning, a program like this is a must.
Requirements: TRS-80 Model I, III, or 4, 32K RAM; TRS-80 Model II, 12, or 16; IBM PC; disk drive
Professional Data Corp., $295

IMMIGRATION PROGRAM

This is a case-management tool for lawyers and other professionals who handle a sizable volume of immigration cases. It places the necessary personal, occupational, and residential information on computer disk and enables the user, with a few keystrokes, to print out the appropriate answers on the most frequently used forms (I-130, I-485, G-325, I-140, ETA-750A and ETA-750B) of the U.S. Department of Justice's Immigration and Naturalization Service.

As many as 55 immigration files can be placed on one full-system diskette, twice that number on a minimum-system, "brainless" data disk. The program provides a client's master list for ready access to any of the programs you've stored. Each stored file may be printed out quickly, as may either a complete or partial master list.

Using the program is simple—once you place the instructions in order, Hudson teaches you the details of editing before showing you how to produce any editable document or describing exactly what it will contain.

It takes the better part of an hour to answer the 148 to 200 questions required to complete the government form. (Responding "yes" or "no" to certain questions makes others inapplicable, and the program skips those.) At the end, the program determines what immigration category the client fits by law, and you can call up categorized data pertaining to either the petitioner or beneficiary.

Files may be opened and edited as marital, residential, or employment data changes. But editing is limited while you are conducting the input session itself: You can backspace, but you cannot move the cursor to a previous answer once it's been entered; if you notice an error on the screen above, you must make a note and open the document using the editing option later. You cannot leave the questionnaire until the whole sequence of questions is complete.

Immigration Program generally is quite functional and promises to make paperwork easier for immigration specialists.
Requirements: TRS-80, Model II or 12, 64K RAM, two disk drives
Hudson Computer Bureau, $350

INDIVIDUAL TAX PLANNER

The ultimate in user-friendly software is when you turn on the computer, put the program disk in for the first time, and begin to use the program. *Individual Tax Planner,* progenitor of Tax Management Inc.'s planned *CAL-Q-TAX: U.S. Income Series,* comes as close to this as any program.

At first, it seems that while this program is not too expensive initially, the annual updates, estimated to cost 75 percent of the original subscription, could be prohibitive. But after using the program (and knowing how Congress meddles with income tax laws), it's clear the program will be worth it to many lawyers and accountants.

The main menu allows you to choose four basic

tax planning options: one year, multiple years, multiple cases, and lump sum; other options relate to printing, saving, or loading files. As you proceed, you have access to extremely useful <H>elp and <W>orksheet screens.

The demo package tested would not accept a six-figure number for ordinary income; Tax Management Inc. says the marketed program accepts numbers up to $9 billion. After you have made your entries, you can go back to your main worksheet and play with the numbers to see what changes can be made to give you a possibly better result.

With the program you get a manual, unlimited toll-free technical assistance, a quarterly newsletter, and any new or revised program disks and related materials issued during the annual subscription term.

Additional programs in this series, scheduled for release in 1984, are *Financial Planning, Corporate Tax Planning,* and *Estate Planning.* Each can be bought separately.

Requirements: IBM PC, 128K RAM, two disk drives
Tax Management, Inc., $595

INMAGIC

Inmagic is a legal data management and retrieval system designed for flexibility and power. *Inmagic* has been offered by Warner-Eddison Associates, Inc., since 1980 for use with mini- and mid-range computers. The newly formed Inmagic, Inc., now offers this software package for use with the IBM PC and other common microcomputers.

Many lawyers question the need for an information management and retrieval system, especially if their small law firms do not handle the massive cases that require frequent computerized litigation support. Yet, *Inmagic* is well suited for such small firm practitioners. In addition to offering such legal applications as litigation support, conflict of interest files, case tracking, will management, contract renewals, and deposition abstracts, the program provides applications appropriate for any small business. Among these are file management, memorandum retrieval, and profiles of job applicants.

Inmagic is a very powerful system. It divides its documents into variable length fields—for example author and addressee. These, in turn, may be broken into repeating subfields, say multiple authors. The fields may be indexed by a keyword or term for easier searching.

Searching may be limited to items in a specific field (authors named Smith) or throughout the entire document (anyone named Smith). Boolean operators (AND, OR, and NOT) are available to narrow or broaden a search. Intermediate results are shown while the search is in progress; this feature enables an easier reformulation of the search and helps in spotting database errors. Up to seven characteristics may be specified to control sorting and searching. The user may call for a numeric search, a letter-by-letter search, or a word-by-word search. He may also distinguish between upper- and lowercase letters.

In addition, an "exploded" or multiple-subfield sort enables the user to find a document authored by Doe, Smith, and Jones by searching with *D, S,* or *J. Inmagic* is not limited to searching by the first author's initial, *D.*

The price one pays for flexibility is relatively slower performance. Search time can be reduced by using appropriate indexing, but the more fields indexed, the longer it takes to enter new records and more disk storage is used.

Inmagic allows the user to control these tradeoffs to an extent. For example, a user may customize a database for quicker retrieval if he can afford to use up more disk space. While such a customized database may be somewhat taxing for the average IBM PC, a hard-disk machine will allow quick retrieval and not crowd the disk.

To help you get started, *Inmagic* offers some predesigned applications packages containing file designs and print formats, which may be modified. *Inmagic* also offers a demonstration package called *Test-Magic* to lure hesitant buyers. *Test-Magic* is designed to do everything its big brother does, but in a modest way.

Other user-friendly features include a fairly comprehensive set of online tutorials in addition to printed documentation. The Teach command calls up a list of seven detailed tutorials covering specific *Inmagic* applications. The user may read any of these tutorials or simply look at a summary to jog his memory.

Inmagic is both command- and menu-driven. A user familiar with the program may simply enter a command name. Beginners may pick their commands from a displayed menu. If even the menu proves too complex, the user can ask for Help, and the system responds with detailed explanations of available options.

The commands for searching, sorting, and print-

custom dictionary that includes legal terms. Think how long it would take you to add 20,000 legal terms to the dictionary provided with your spelling program.

You may wonder why you should use the *Black's Law Dictionary* word list if you are an exceptional speller. Are you also an exceptional typist and proofreader? Spelling verification programs point out all words that they do not recognize. Using a dictionary with the vocabulary that you regularly employ will save substantial time—the spelling correction program will not pause every time you use a properly spelled legal term that does not appear in the standard dictionary. Furthermore, if you have misspelled or mistyped a legal term, the use of the *Black's Law Dictionary* diskette may allow the spelling program to suggest the correct spelling to you.

How much time will it save? Use of the *Random House Dictionary* diskettes alone to proofread a 600-word case note resulted in 10 different suspect words. Using *Black's* diskette as well left only three suspect words. Checking the entire document against any one dictionary took approximately 30 seconds. Checking each suspect word in context took anywhere from 10 seconds to almost a minute. Using the *Black's* diskette in addition to *Random House* cut the proofreading time by more than half.

Even the *Black's Law Dictionary* diskette omits some variations of legitimate legal terms—for example, "enforceability," "injunctive," and "unenforceable." But the dictionary diskette is not copy protected, and if you have two or more disk drives, you can easily add any terms that you use frequently.

In all, *Black's Law Dictionary* will not make you a better lawyer; it probably won't even make you a better speller. But it will assist you in quickly preparing legal documents with fewer misspellings and typos. And saving time while producing accurate work is essential in legal practice.

Requirements: Apple II, II+, IIe or III, 48K RAM, disk drive, *Sensible Speller* or *Apple Speller III*
Sensible Software, $99.95

ESQ-1 COMPUTERIZED TIMEKEEPING AND BILLING

Legal work, particularly that done on a time-and-cost basis, lends itself to computerization. *ESQ-1* is a computerized time-and-billing program for CP/M-based microcomputers.

The manufacturer of *ESQ-1* recommend a 10MB hard disk, plus a floppy for loading and backup. This seems advisable, for there are too many disk functions for a floppy to handle alone.

ESQ-1 is actually a whole range of programs, over 50 in all, that can be called up or run by one main menu and many sub-menus. Beginning the program, you enter a previously established password (which can be changed by anyone with another system password). You then request the correct date. The full date is shown by the computer, which asks whether it is correct. The last backup date is shown as well. Backing up, or saving a copy of existing data, is crucial. *ESQ-1* can back up data files at any time and will also remind you to back up.

The main menu contains many different subprograms, which a user can go to by entering a number from one to ten. From the main menu, you proceed to subroutines such as entering transactions (time spent, costs advanced, vacation time, personal time, etc.). You can post these transactions to the various files, such as the client and summary files, and you can update and examine the various files. Billing operations are also featured.

Many attorneys, or "billers" as they are called here, can be included in the system. The company, however, suggests as a rule of thumb one-half megabyte of disk storage for each attorney. Up to 9,999 service codes—labor, postage, client, etc.—can be entered. They are shown as numbers, letters, or both.

Each attorney has about ten different hourly rates, which can be listed under his computer file. Each client, or matter (if a client has more than one matter), can be billed differently. The computer checks the rate automatically. Clients are accessed by client number, which can be any combination of letters and numbers, and matter number. Each client, like the attorney, has a separate computer file that can be viewed or printed. The file contains summary information, as well as client information (contact name, phone number, and address, etc.)

The operator entering transactions has a number of built-in programming aids. Transactions can be entered most expeditiously by lumping the timeslips by client and attorney. In this manner, all the operator has to do is hit Return to enter the same

information that was in the last entry. The program gives you the option of entering a single-line description or a multiple-line one. After entering the information, you can change any section or cancel it entirely. One attractive feature is that the entries can be in-putted in any order of dates; the computer merely sorts them out chronologically when the bill is printed. After all entries have been recorded, the computer prints out a summary of the transactions and prints a short error message if anything seems wrong. Most errors, however, are caught by the computer at the entry level. This "edit list" also includes a summary of fees billed, by whom, and at what rate. All such transactions are stored on the disk and can be examined later or changed. Another program from the main menu posts the transactions to the client, attorney, and summary files.

With *ESQ-1* you can bill on a daily basis if you wish. When you establish each client file, you simply indicate the billing cycle—monthly, yearly, semiannually, or whatever. The computer remembers how long it has been since a given client was billed. If a client is tagged as "monthly," and has been billed within the last 30 days, he will be skipped when the computer prints out current bills. Once 30 days have elapsed, the client will again be billed. This is one of the main reasons you are asked for the date when "logging on" to the system.

Before billing, a prebilling worksheet is produced for each client. The worksheet shows the transactions and other information regarding the particular entry. These worksheets can be delivered to the billing attorney, and the final billing can be based upon the sheet this attorney annotates. Billing can be handled by invoice form or by statement. You can designate actual time or not. The date and transaction can also be produced or a simple notation of "services rendered." A number of messages can appear on the bill, such as terms, past due, and so forth. Personal messages for a given client can also appear.

The *ESQ-1* program is constantly updated: The current version is 3.0, although many lawyers began with 1.0 in 1979. Problems can arise when one is too familiar with the program. Taking shortcuts can mean bypassing necessary safeguards. It is important to keep track of how many files you have on your hard disk so you don't go over the directory capacity. A command to "zero" the counter for printer lines would prove helpful. In this way, printing invoices would be easier.

In summary, the *ESQ-1* program is well written and unusually well supported by its manufacturer. Like any program, there are cosmetic improvements that could be made, but these do not detract from the basic program, which is very solid.

Requirements: CP/M, 48K RAM, 10MB hard disk, one floppy disk drive, BASIC

Micro Information Systems, $2,000 to $5,000 depending on installation, support, and training

ESTATE TAX PLAN

Intended to simplify estate planning for lawyers, accountants, and trust officers, this is a good program with strengths and weaknesses. Like similar software, it enables estate planners to make detailed projections in minutes.

Its strengths are its comprehensiveness, letting you consider a large number of alternatives; its faculty to lay out your alternatives side by side; and its ability to provide calculations on IRC Section 6166 payments under IRC Section 6166, a payment schedule of the installments under different circumstances, and will make calculations concerning IRC Section 303 redemptions.

Some weaknesses are that it does not allow you to enter individual assets but only totals by category, and it is a little (but not a lot) harder to master than some of its competitors.

Estate Tax Plan presents 76 different input categories—an advantage or drawback, depending on your style. If you, like many lawyers, prefer to jump into a program without reading instructions, it probably won't work in this case. Provided with the program are a ring-bound loose-leaf manual and a flip chart that lead you through an example as a tutorial; after you go through the tutorial you should be able to run the program with relative ease. The 76 items are useful, and you can skip the ones you don't want, but they create a bit of a psychological block.

After input is completed, the program calculates the taxes and asks whether you want them displayed, want them all printed, or want selected ones printed. After several prompts are answered, the printer produces for each alternative and each spouse: a gross estate calculation, estate tax liability, present value analysis of death taxes, and liquidity analysis.

ing from a previously defined format are straightforward and easy to master. The facilities for defining a new data structure or report format, however, are more difficult to use.
Requirements: MS-DOS 2.0; DEC Professional 350, 192K RAM, two disk drives
Inmagic Inc., $975

LAZY LAW

Lazy Law is a set of estate-planning forms on 11 disks and a large binder that reproduces the materials in printed form. It's hard to separate *Lazy Law* itself from the environment in which it works, *Lazy Writer,* for Radio Shack's Models I, III and 4.

Using *Lazy Law* is quite easy once *Lazy Writer* is mastered. The different provisions in a will are in modules on the disk, and are chained together by *Lazy Writer* for printing.

Lazy Law is well thought-out and extremely complete. It covers most estate planning situations, and is obviously the product of much thought and experience. It even includes sample billing forms, questionnaires, releases, letters of transmittal, and memoranda to clients discussing the estate-planning process. *Lazy Law* is written for use in Michigan, but it can be modified easily for use in your state.

You can, in theory, use *Lazy Law* with some other word processors. You'll be able to read its ASCII modules with most word-processing programs, but you may need to convert them to a special format. *SuperScripsit,* for example, has a built-in utility for this conversion. And you'll certainly have to set the margins, line spacing, and so forth, in a manner digestible by your non*Lazy* word processor. It may well be worth the effort, because *Lazy Law* seems to be the only such package for Radio Shack computers.

Apart from its other merits, the mere cost in terms of secretarial time to enter similar forms into my computer would far exceed the cost of *Lazy Law.*
Requirements: TRS-80 Model I, III, or 4, 32K RAM, two disk drives, printer, *Lazy Writer*
Alpha Bit Communications, $150

LEGAL BILLING

Every now and then along comes a high-powered specialized application package that is so simple to use and understand, it practically runs by itself. *Legal Billing* is such a program.

A professional time and billing program designed for small to medium-size law firms, it can also be used by CPAs, architects, consultants, or anyone who bills a client for time. Operated from a single master menu, the entire program is memory resident; no disk swapping is required at any time.

Centered around a "Video Time-Slip," charges and credits for each client are quickly entered. Client and lawyer name, date, matter, action or service performed, hours (in tenths), amount due (or credit), and remarks (40 characters), are all entered here. The client, lawyer, and action entries require only a number. Up to 36 user-definable action codes, 18 lawyers, and 200 clients can be handled. Automatic defaults fill in each blank with information from the previous slip, and the total charge is automatically computed from the lawyer's hourly rate. If an entry needs to be changed, you simply back up using the left Arrow key.

Detailed statements may be printed at any time showing all charges, credits, detail, prior balance, and the like. These may be printed on plain paper, with the computer entering the firm's name, or on printed forms. A detailed Lawyer Time Report listing a range of lawyers, clients, dates, and action can be printed any time. Other reports include a list of time/credit slips, client aging, and time slip search. The searching and printing of all information is user-controlled as to which date or range of dates, client numbers, lawyers, and action codes are used. When printing reports, you merely press the number key corresponding to the interface slot used. This way, you can use both a dot matrix and letter quality printer. If an 80-column board is used, output may be directed to it.

The program is advertised as accepting up to 200 clients and up to 3,500 transactions per month. These are, however, opposing maxima: If you have 200 clients, only 1,900 time slips can be entered in any monthly cycle. This translates into about nine or ten time slips per client. A more reasonable balance is 100 clients and 2,650 time slips, about 26 slips per client. Larger capacities can be attained by using separate sets of data disks and splitting either the clients or lawyers between them.

Documentation is straightforward and concise, although one can almost operate the program without the manual. Copy protected, a backup program disk is included.

Professionally done, this package will streamline any firm's billing operation.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM; IBM PC, 64K RAM; two disk drives
Satori Software, $399

THE LEGAL OFFICE MANAGER

The Legal Office Manager (LOM), produced by Applied Software Technology, is an application template intended for use with Applied's *Versaform*, a microcomputer program for processing business forms and data.

LOM's legal billing template allows law firms to identify matters by case name, file number, client name, or a combination of these or other data. Data can be further defined by attorney, type of case, and fee arrangement. New entries are automatically sorted by user-defined "key" items. After each line entry—which consist of the date, service rendered, attorney's hours, hourly rate, and disbursements validated—an automatic spreadsheetlike calculation of the total bill, payments received, and balance due is produced.

Item formats can be defined by the user so that entries may be limited to, among other possibilities, numeric or date formats. *LOM*'s automatic filing capacity minimizes the number of keystrokes necessary to enter data. When, for example, CA is entered as the service item, "Court Appearance" fills the description.

Similarly, standard print formats can be modified by the user. The capability of defining new options is also available. Three bill formats are provided that can be applied to the client file and used in conjunction with an automatic end-of-month billing feature. *LOM* also provides six report formats that aid in the analysis of client accounts by printing from specified files. Thus, clients who live in Oklahoma, balances due that are greater than $2,500, and cases involving copyright laws can all be selectively printed. Client data can also be put onto preprinted forms such as mailing labels.

Since *LOM* is superimposed upon pre-existing stand-alone *Versaform* software, a level of complexity exists that adds difficulty to using the program. Also, the absence of any capacity to calculate calendar dates or provide "tickler" reminders renders the time-scheduling facility, Caldate, less useful than might be hoped for. If a printed record of scheduling is needed each morning, Caldate will do the job. Otherwise, it is probably easier to use an appointment book.

One important caution: *LOM*'s major functions (design, file, print, etc.) are on different disks. One means of starting up a function is to place the desired disk in the boot drive and press Reset. To do this, the computer should be turned off and on or the disks should be removed from the drives to avoid overwriting.

In sum, *LOM* is a powerful and versatile tool to collect, file, retrieve, browse through, and print out client data. The capacity to design form and format enable the *LOM* to extend to many other tasks.

There are more expensive law packages that provide more templates in the basic package, but if price is of concern, the cost-effectiveness of designing one's own forms should be carefully considered.

The combined list price of $639 for *The Law Office Manager* and *Versaform* places it in the low-to-mid-range of software prices. Apple's *Expense Journal/Distribution Template* ($39.95) may be useful for trust accounts.

Requirements: Apple II, 64K RAM; Apple III, IBM PC/XT, 128K RAM; TI Professional, Del-Rainbow, Wang PC, Corvus Concept, 256K RAM; two disk drives
Applied Software Technology, $639

RESPA RESOLVER

If you don't know what RESPA means or when it applies, you probably don't need this program. If you know that RESPA stands for Real Estate Settlement Procedures Act and that it prescribes a form of closing statement for certain residential real estate transactions, *RESPA Resolver* may be for you.

RESPA Resolver will, for most transactions, prompt the computer operator for all information necessary for preparing RESPA forms A and B. The program performs necessary calculations and prints the information on the forms.

RESPA Resolver doesn't ask every question in its repertoire each time you use it. Rather, it asks questions based on your responses to prior questions. It will reject impossible dates, numbers where letters should be and vice versa, and answers other than Y and N (upper or lower case) to yes/no questions. You can correct mistakes at the end of a screen.

You can define items to prorate, such as water, roads, and pest control agreements. *RESPA Resolver* also will deal with new and existing mortgages. For new mortgages, it will calculate periodic payments if the loan provides for constant payment

amortization; you may override the program's calculation, however. *RESPA Resolver* also permits an assumption or satisfaction of existing mortgages.

The program will compute title insurance premiums and insert these appropriately into the final forms. You readily may set the program to take into account varying rate schedules. It also permits manual override of the automatically calculated rates.

RESPA Resolver is not copy protected; the actual program code is accessible and can be modified. This is useful because practices vary among jurisdictions. The program also permits a limited customization without any programming.

RESPA Resolver and its manual are set up for the computer illiterate, but are inoffensive to the veteran. Those with minimal training in computers or the substantive aspects of RESPA could use the program to good avail. This could be helpful if experienced employees are hard to find in your area.

In summary, *RESPA Resolver* is a classy program. You couldn't reproduce its function, much less its elegance, for twice its price.

Requirements: TRS-80 Model I, III or 4, 32K RAM, two disk drives, printer
Electronic Law Publishing, $250

SEQUITIR

Requiring 256K bytes of RAM, *Sequitir* is a space hog compared to most available databases. But the trade-off is worth it. *Sequitir* is a late-generation, table-oriented data management system combining the power of a relational database program with the capabilities of a simple word processor, a forms generator, and a reports generator.

The large program allows uncommonly large records and files. A record can contain up to 2K characters, or roughly the equivalent of 2½ pages of typed manuscript. Each database can include a maximum of 255 tables and as many as 1,024 distinct columns, while the number of records (rows) and the overall capacity of the database is limited only by the available disk space.

Data input and manipulation are quite easy, even for those with only a few hours of experience popping floppies into drives. Screen menus guide the user through all of *Sequitir*'s facilities. Each prompt has its own help screen listing all available options.

The first step is to define columns and name data tables. The user fills in on-screen charts to describe the database itself; templates hold the criteria for sorts, selections, merges, and other operations. The column headings on the tables and templates act as prompts. The system affords great flexibility in redesign, where renaming, inserting, and rearranging the order of columns become the simplest of editing chores.

During set up, column width and height can be specified. Any number of columns can be indexed, but the more one chooses, the slower the editing and cursor movement will be. Indiscriminate use of this feature can cause annoyingly sluggish reaction time.

There are five data types for the column entries: text, date, number (for integers), decimal, and money. Once a data type is entered, *Sequitir* will not accept a value of any other data type. Money entries are automatically adjusted to include two decimal places when entering dollar amounts.

Sequitir's default display is a typical table style, with column headings across the top of the screen and several rows at the bottom. Similar to spreadsheets, this restrictive format often does not allow viewing an entire record. To get around this, *Sequitir* can also present data one record at a time, with column headings at the left margin and field contents spread out to the right. This "zoom" feature also makes editing long text entries easier. Data can be printed in either style, with or without column headings.

Word processing is one of two modes for data entry and editing. Word-processing operations not present in the default editing mode include search and replace, block marking and movement, and automatic word wrap. Simple insertion, deletion, and cursor movement is available in either mode, assisted by use of "object" keys, which define the item—entry, row, word, sentence, or paragraph—to be acted on.

The forms generator is a sophisticated program used to build and store, among other possibilities, form letters and standard contracts and can print them using data drawn from specified tables. Excellent uses include labels, mailing lists, and entering data on printed forms. A reports generator allows the user to format and print reports and perform basic calculations on columns. Its strengths include the ability to sort records into groups and to provide totals, averages, maximums, and minimums.

Sequitir allows for deletion of records without

actually removing them from data files. In fact, *Sequitir* automatically keeps *every* edited and deleted entry and allows the user to search old versions and restore any one of them to the current record. Although a help to those who change their minds often, this is a space robber.

The program manual is a loose-leaf binder with tabbed chapter dividers. The software comes with a sample database used with a tutorial that quickly builds a rudimentary knowledge of the system. Also, a demonstration script provides in-depth examples of the major facilities. A plastic keyboard template is also part of the package.

Requirements: IBM PC, 256K RAM, two disk drives
Pacific Software, $795

SPELLBINDING FOR THE ATTORNEY

Spellbinding for the Attorney, from Lexisoft, Inc., is not so much a separate software work, but rather is an adaptation of the word-processing program, *Spellbinder,* for use in a law firm. *Spellbinding for the Attorney* relies on the basic manual sold with *Spellbinder,* but has its own manual as well. At times, the manual is not quite as clear as it could be, especially when contrasted with other word-processing programs.

Some of the complications of setting up print formats and the like are simplified by subroutines called macroprograms, called up from the command mode. One particularly distinctive feature is the catalog of paragraph markings, such as "IV," "FORTIETH," "(iii)," etc. These can be used in any documents so that the computer *sequentially* numbers the paragraphs where you indicate a Roman numeral (or a letter) should go. It is one thing to have Arabic (1, 2, 3, etc.) numbers added to a document, but quite another to see your computer automatically number paragraphs with Roman numerals (XLV, XLVI, XLVII).

The adapters suggest different ways of setting up legal documents, such as wills and contracts, as well as more routine letters, envelopes, and other basic printings. Such suggestions should prove helpful to the newcomer. There is a macroprogram included for time record keeping, but lawyers might find this feature too basic.

Spellbinder has many good features as a word processor; *Spellbinding for the Attorney* seeks to ease the burden of introducing a word processor into the law office, and, while the manual could have more "walk through" advice, it does help tailor basic word processing to the needs of legal secretaries and attorneys alike.

Requirements: Oasis, MS-DOS; 64K RAM; two disk drives
Lexisoft, Inc, $350

STEVE GIBSON, GIBSON LIGHT PENS

A self-described "entrepreneur by nature," Steve Gibson invented a state-of-the-art pen to write on the screen of the Apple II home computer.

The Gibson Light Pen, developed in 1981, enables you to design the house of your dreams, run animations and fill in the lines with a choice of 91 different colors and patterns. It fastens by wire to a small circuit board plugged into the back of the computer console.

"The light pen has been an absolute smash in the home marketplace," says Gibson, 28, president of his own Gibson Labs in Laguna Beach, California, and a "world-class programmer" in the words of a top designer.

Producing the highly rated pens with a $10,000 investment from his consultant earnings and a staff of 13, Gibson sold more than 4,000 at $349 each between 1982 and the end of 1983, carting them around in person to computer and software shows. Despite his success, he then decided to "align himself with quality manufacturers" for future merchandising despite substantial offers of venture capital.

The result: Atari has already begun production of a Gibson Light Pen compatible with its computers. And, beginning in 1984, Gibson will develop versions of the pen for the Commodore 64, the IBM PC and the PCjr to be manufactured and marketed by Koala Technologies. (Koala was the developer of a competing computer graphics system called a KoalaPad, where images drawn in miniature turn up on the screen.)

What's next? Gibson now wants to "play" in the home computer field, concentrating on education and entertainment. "So far we've seen mostly 'shoot-'em-up' arcade games, and it's very sad."

MEDICAL

APPLOINTMENTS

Applointments stands for Apple Appointment Systems. And it turns your Apple into a highly functional appointment manager that can be used in any medical or professional office that functions around an appointment book. Appointments can either be viewed on the monitor or printed.

Setup is easy: Dates, starting/ending times, appointment separation, and number of characters per entry are all variable. Appointments are stored both in memory and on disk. For example, with 32 appointments per day set 15 minutes apart between 9:00 A.M. and 5:00 P.M., up to 26 days may be stored in memory at one time. A single disk will hold up to 160 days. When more time slots are defined than will fit on screen, you can easily scroll up and down as well as move forwards and backwards a day at a time through the book. New dates can be activated and old dates deleted at any time.

Names are easily entered or deleted, with all functions selected by single-key commands, including a valuable help screen. You may search by name or partial name for an entry in a specified range of days and a Jump command takes you right to the requested day for speedy entry or verification. If desired, a single day's appointments can be entered in one batch. The appointment schedule for any day may be printed at any time and each day can have up to a 20-character comment line added to it.

This program is supplied on a single unprotected disk with complete instructions.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive
Andent, $75

COPRAM-M

COPRAM-M is an accounts-management package tailored to the specific needs of a medical practice. It can handle even complex billing and store patient information.

COPRAM-M can genrate reports of accounts receivable, cash balance, and credit balance at any time. Third-party accounts, bills payable by someone other than the patient, are tracked and aged in the same manner as personal accounts. A detailed report is also available, as are monthly summations with month-to-date and year-to-date information. The program is also capable of producing a printout on a "superbill," an all-purpose form that can be submitted to insurance carriers. Blanks, envelopes, and return envelopes are available from COPRAM.

Part of *COPRAM-M* is a small database from which labels or 3-by-5 file cards with patient information can be generated. And doctors can keep track of daily activities on the program's small appointment calendar.

COPRAM-M is not without its faults. It's written in Business BASIC, and even when used with a sorting utility program, the SORT.INV module from CE Software's *Programmer's Power Tools,* for instance, the sorting becomes time-consuming. A patient file of 300 names took three and a half minutes to sort into a new index. Equally bothersome, you must respond to all prompts by typing in "yes," "Y," or, in some instances, by pressing the Return key. This is fine for first-time users of the program, but there should be some way of skipping this once you are more experienced.

Even given these problems, *COPRAM-M* is a well-designed and versatile package. It isn't cheap, but it works.

Requirements: Apple III, 256K RAM, Profile hard disk
COPRAM, $4,000

DENTAL BILLING ACCOUNTS RECEIVABLE

Dental Billing Accounts Receivable is a sophisticated, hard-disk–based accounts receivable and patient database system for dentists. Designed for the Apple computer and Corvus hard-disk drive, the system will handle over 8,000 patients on a single-drive setup and over 32,000 patients using multiple drives. An unlimited number of monthly transactions can be processed, up to a total of 49,322 transactions.

Although complex in its functions, the system is extremely easy for the office staff to use. Using a master menu with many sub-menus, one can quickly go from one function to another, thanks to rapid loading of programs and data from the hard disk. If a menu option is selected by mistake, a simple press of the Escape key will return you to the main menu. The Left Arrow key, as well as backing up from entry to entry, will return you to the preceding menu level upon reaching the top of the screen. At no time can you get lost in the system.

The main function of the system is that of patient billing and collection of receivables. When enter-

ing a patient for the first time, a file is created showing a "guarantor," not necessarily a patient, and all the dependents. It is the guarantor who receives the statement. When the patients leave the office, they can be presented with a "superbill" printed either on plain paper or on an insurance claim form. At the end of the month, statements showing all activity itemized by patient and services performed are printed, either on plain paper or on printed forms. A practice analysis report shows separate activity and receivables status for up to six doctors.

Patients are indexed within the system using an alphabetical account code made up of the first five letters of the last name, plus the first initial, duplicate keys are allowed. This permits easy and rapid access to any account or patient file without the need to remember or look up account numbers. Any file can be found within four seconds.

A payment plan option provides for a contract amount and monthly payments to be made without incurring interest charges. An amount equal to one monthly payment is automatically "charged" to the account each month.

A substantial portion of a dental office's income can be generated by recalling patients on a regular basis. To this end, the system will automatically print checkup letters designed for window envelopes that will remind the patient of his next regular checkup.

To eliminate repetitive typing of service descriptions, up to 400 service codes, 99 remark-like descriptors, 99 insurance carriers, and 99 referral sources may be entered and changed at any time.

Many reports are available. These include a day sheet, patient list, practice report, service report (shows activity of each service code), referral report, account aging, appointment list, account history, insurance report, payment plan report, and birthday list.

One of the most critical factors in using any hard-disk-based system is that of backup. If a hardware failure should occur, reconstructing a database of several thousand patients could take many months. Backing up your data on floppy disks every day is not practical on systems with over 2,000 patients because of the time involved. The recommended method in this case is a system known as the Corvus Mirror. An entire 10-megabyte disk can be copied onto standard video cassette in a matter of minutes. When economically feasible, a second hard disk is recommended both for backup and hardware redundancy.

In larger offices involving much activity, a second Apple computer stationed at the front desk and connected into the system using the Corvus Constellation multiplexer is recommended for more efficient operation. The front desk computer can be used to add new patients, enter appointments, and look up information on current patients while the other can be printing statements, reports, recall letters, and performing general file maintenance.

A very powerful system, up to eight Apples and four 10-megabyte drives can be configured in a package rivaling that of many microcomputers.

Documentation, as might be expected, is complete in every detail. Full telephone support is supplied by the company, and if the user equips his system with a modem, program updates and changes can be accomplished over the phone lines.

A limited-capacity floppy-based version of this package is also sold.

Requirements: Apple II+ or IIe, two disk drives; Corvus 5-, 10-, or 20-megabyte hard disk, or combinations thereof; 80-column printer

Johnson Associations, hard-disk version $1,795; floppy-disk version $495

DENTAL INSURANCE FORM WRITER

Dental Insurance Form Writer (DIF) is a simple program to prepare universal ADA insurance-claim forms using an Apple and a standard 80-column printer. Forms can be prepared in advance (preauthorization), saved on disk, reloaded, edited, and then printed as many times as necessary.

Because each doctor has personal data that appears on each insurance form repetitively (name, address, SS#, license#, and so on), an initialization file is created so that this data is only entered once. As many of these files may be created as you like.

Completing the actual form requires merely filling in the blanks on the computer screen. Errors can be corrected easily, and when completed, the form is saved to disk under the patient's name. Up to 100 patient files can be stored per disk. When desired, the patient's data is loaded from disk, corrections or additions are made, and the form is printed out on standard tractor-feed ADA forms.

The program is supplied in unprotected form

(you can modify it yourself if you like) and includes complete instructions.
Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM, disk drive, 80-column printer
Andent, $100

MEDICAL BILLING ACCOUNTS RECEIVABLE

The Medical Billing Accounts Receivable package is a highly functional, easy-to-use system designed to automate medical office billing and accounts receivables processing. By utilizing the Apple computer and a Corvus hard disk drive, account information on up to 16,720 patients can be maintained. Up to 4,000 transactions per month can be processed with the system maintaining up to 24 months of history online to a total of 96,000 transactions. The system is expandable up to eight Apples and four 10-megabyte drives, for a total patient capacity of 63,000.

This system is very similar in configuration and operation to the *Dental Billing Accounts Receivable* system, except for the following differences.

Along with 4,000 user-defined service codes, up to 200 diagnostic codes can be specified. The system will keep track of up to nine doctors and report on activity and account status for each, individually as well as collectively. A limited-capacity floppy disk version of the program is also available.
Requirements: Apple II+ or IIe, 48K RAM, two disk drives, Corvus 10-MB hard disk, 80-column printer.
Johnson Associates, hard disk version $5,000; floppy version $495

MEDICAL MANAGER

The Medical Manager is a comprehensive office management program, written in CB80 or CB86 for a variety of CP/M, MP/M, and MS-DOS compatible computers and most of the common terminals. Though it will run on floppies, hard disks are strongly advised. A 132-column printer and some form of backup device are also necessary.

You create all the support files—including procedure and diagnosis codes, doctor names and data, insurance company names and data, and referring physicians—and format files, which tell the program how to print statements, insurance and encounter forms, and recall letters. If your vendor is medically sophisticated, he may do this for you.

You enter patient data on three consecutive well designed screens for demographics, dependents, and insurance companies. There are default entries for date; city, state, and zip code; type of billing; discount percentage; and finance charge. One of the nicest features of the *Medical Manager* is the ability to go back over your entries as often as you wish, before you store any, without erasing correct items. The Arrow keys allow you to move the cursor all over the screen.

Charges are entered in the same manner. This module lets you add similar entries, such as hospital visits, by inclusive dates and number of units, record the amount paid at the time of the visit, or bill the patient or a third party (primary and secondary). The most recent diagnosis and place and time of visit become default values until you change them. After entering the service you are prompted to add disability and hospital data on a separate screen.

Medical Manager allows you to custom design your insurance forms and statements with an almost unlimited array of formats. These forms are very complete and even include such items as family planning visit, outside lab work, and EPSDT visits for pediatricians. All statements and insurance bills may be created on a trial basis, and an insurance billing worksheet shows you what you are going to bill before you print it out.

Payments may be credited to any item, in part or fully, and you may write off or adjust any item and transfer responsibility for partially paid items to a secondary insurer or the patient. Payments may also be posted to unapplied credit if they exceed charges. Statements show the amount billed to insurance and indicate the patient's current responsibility.

Reports generated by *Medical Manager* are thorough and voluminous: daily and period close reports and deposit totals, yearly reports, open item and accounts receivable balances, aged A/R reports, and reports by diagnosis, procedure, doctor and insurance company are but a sampling of this feature.

An optional program called *Office Manager* lets you enter patient clinical data in any of nine areas, such as past history, current therapy, drug reactions, problem list, etc., and you may search your database for patients in any category, such as all those on a given drug or with a given diagnosis. A comprehensive appointment scheduler is included.

The author of *Medical Manager* promises that his

new version (4.08) will allow the user to support files alphabetically, make a default entry for just about any item, and jump directly from one module to another without going back through a nest of menus.

Medical Manager is one of the best medical office management systems available at any price. If you have a large and sophisticated practice, you'll find a program this complete indispensable.

Requirements: CP/M-80, CP/M-86, MP/M, or MS-DOS; 128K RAM; two disk drives, 132-column printer

Systems Plus, Price determined by dealer.

MEDICAL OFFICE MANAGEMENT II

Medical Office Management II is a complete medical office program designed for both solo practitioners and small group practices. The package consists of four main sections: appointment scheduling and patient records, accounts receivable, medical diagnostic records management, and insurance-claim forms preparation.

The appointment scheduling and patient records section will handle up to 10,000 patients and 22,000 appointments. Both permanent and temporary patient files can be set up. The appointment system allows you to enter, find, change, and cancel appointments as well as to print out both a daily appointment schedule and appointment labels that can be used with reminder cards.

The accounts receivable section provides for the setting up of procedure codes for 1,750 procedures and fee schedules along with the entry of payments and charges. The system will also produce daily billing activity reports, time of service superbills, patient statements, a collection report, and an accounts receivable aging report.

The medical diagnostics records management section is a word-processing system that may be used for entering, editing, and printing of letters, memos, and other office documents. In addition, it can be used to enter, edit, and print patient record files.

The insurance form preparation section provides for the setting up of procedure description, the use of RVS, ICDA, or other required third party codes, preparation of diagnostic reports, and completion of the standard AMA universal claim form.

Extensive documentation is provided, and a limited-capacity training unit is available for a nominal cost.

Requirements: Apple II, II+, or IIe; 48K RAM; two disk drives; 132-column printer. Also available for Corvus hard disk system.

CMA Micro Computer Division, $1,195; hard disk version $1,595

MEDICAL OFFICE SYSTEM

Radio Shack's *Medical Office System* is a specialized accounts receivable package for both individual doctors and group practices. It maintains patient records; prints invoices, insurance forms, and statements; reports on activities; and aids in notifying patients when an appointment is due. In general, it seems good at its job.

Using a Model II with 500K disk drives, the program will handle 450 standard procedures, 450 diagnostic codes, and records for 1,000 patients and 4,300 transactions. On a Model 12 or 16 with 1.25Mb drives, the figures rise proportionally. A hard disk, allows 64,000 patients, as many transactions, and 999 each of procedure and diagnostic codes. In all cases the system allows up to 10 physicians, 36 locations, 4 recall notes or medications per patient, 2 recall dates and insurance companies each, and up to 50 line items per invoice.

The *Medical Office System* is a comprehensive package with myriad features. The four main files hint at its extensive powers:

—The diagnosis file stores six-digit diagnostic codes and a 30-character description. An added field holds Medicare codes.

—The procedures file holds a five-character CPT and Medicare codes, the type of service, a standard charge, and a 29-character description of the procedure. The first two numbered procedures are used as keys in calling up entries.

—The patient file contains personal data: name, address, and birth date; sex and occupation; Social Security number; home and work telephones; insurance company, group, contract numbers, and policy holder; and dates and medications; and other details. The system itself adds such items as the date of last activity and the current aging status of the account.

—The fourth file contains records of office visits, medical procedures, and other billable items.

In general, records in all these files may be searched out, printed, modified, added, or deleted, using a combination of menu functions and cursor-controlled editing. Search criteria may be combined; for example, it is easy to select all patients

who have owed more than $75 for longer than three months.

To create an invoice, just pick from a menu and enter the patient number; the patient's data appears on the screen. Then add or change items as necessary. The amount charged is automatically calculated from the procedures and number of times they were performed, but it may be overridden. The user may also enter a 30-character "internal" note and a 28-character "external" note. The internal note is not printed on the invoice; the external one is.

Both notes appear on the physician's "Daily Recap" report, which shows all transactions. Running the Daily Recap also posts the transactions to the receivables ledger.

Insurance forms and invoices may be printed individually or in batches, for assigned or non-assigned cases, and selectively by alphabetical groups or by patient numbers. Patient statements may be printed once a month or automatically divided into groups to even out the workload. A message may be included on the statement.

The "Accounts Receivable" report provides an aging report on all accounts with a non-zero balance. Information is shown for each invoice and then summarized by physician, amounts due from patients and insurance companies, and age. Accounts may also be placed in "hold" or "collection" files, both noted in the report.

An "Activity Overview" provides figures for the year-to-date and month-to-date receipts, new charges, patient payments, insurance payments, adjustments to patient and insurance payments, accounts receivable, cash, and write-offs. A particularly nice feature is that the program turns the same data into bar graphs—one for the month-to-date and one for the year-to-date. Also available are graphs for any of the reported figures and periods.

Other reports summarize the procedures done by the practice, review charges and payments for all active invoices, and summarize each patient's account.

The program is set up to print standard vendor supplied statement and invoice forms, and the standard AMA Health Insurance Claim Form. If it is necessary to print other forms, the system will handle it, though defining custom forms is rather tedious and detailed.

The documentation is readable, understandable, and about as complete as is usually found. It lacks an index, but it is logically organized and the sections are tabbed for quick finding.

In all, this seems an excellent product well worth considering. The program's menus, keyboard commands, and controls are easily assimilated and easily used. Error trapping appeared adequate. Speed ranges from average in some functions to excellent in others. It never seemed objectionably slow. Yet the access to needed information and the amount of information provided seems well above average. The ability to browse through accounts and other data instead of depending on printouts is an exceptionally nice feature.

Requirements: TRS-80, Model II, 12, and 16, 64K RAM, two disk drives, 132-column printer
Radio Shack, $750

MEDICAL SECRETARY

Designed to take care of medical office functions such as records and appointments management, word processing, claim form preparation, and accounts receivable, *Medical Secretary* is available for both the Apple II and IBM PC computers.

Medical records such as patient histories and visit records can be entered into a free-form database where the user actually designs the form layout. The word-processing section can be used to prepare letters and reports or to edit chart records into reports or journals.

The accounts receivable portion can maintain records for up to 9,000 patients and up to ten doctors. Along with private patient billing, the system will prepare standard AMA insurance claim forms, print an aged accounts receivables report, daily appointment logs, recall notices, payment receipts, and "superbills."

Requirements: Apple II, II+, or IIe, 48K RAM, two disk drives; IBM PC, 128K RAM, two disk drives or hard disk; 132-column printer
Monument Computer Service, Apple version $1,100; IBM version $1,200; hard-disk versions $1,600

MICRO MED

Micro Med is a moderately priced medical office-practice system running under the CP/M operating system. *Micro Med* is delivered on five 8-inch floppy disks and must be configured to your particular microcomputer. A hard-disk drive is highly recommended. First-time users should have the system installed by the vendor. Once the system is

installed, you must enter your practice procedure and diagnosis codes and register names of all patients and physicians, a laborious but straightforward process.

The documentation is comprehensive and easy to understand. Well-formatted figures and tables, printed help screens, and well-documented error messages guide the first-time user through this involved program. A secret password prevents less-skilled or less-trusted users from accessing or erasing classified information.

The data entry conventions within *Micro Med* are standard. Default names, places, and dates are used extensively throughout the program and are easily definable prior to or during data input. Physicians, diagnoses, and procedures are identified by code number chosen from an on-screen table. Entered data can be edited on-screen before it is saved to disk. Unfortunately, the only way to correct an error after the Return button has been hit is to wait until the sequence of questions is complete and then run through the operation again.

One of the banes of any medical practice is double registration of patients: *Micro Med* helps to avoid this by treating upper- and lowercase letters equally and assigning each patient an account number. Only patients responsible for paying the bills are accessible directly by name or account number, a feature that works well as long as dependents have the same last name as the responsible party.

Micro Med records charges, posts receipts, and generates standard billing and management reports. It provides billing on demand, patient invoices, insurance billing, aged-patient accounts, productivity reports, and listings of transactions per day, month, and so on. You can design up to 99 insurance forms following instructions in the user's manual, and multiple insurance carriers with customized payment schedules are no problem. The system defines and tracks budget plans for patients who are in arrears of payment and has options for billing the patient rather than the insurance company. Fee slips generated by *Micro Med* simplify the job of recording what procedures were performed on a patient, and each day a hospital-rounds report will identify hospitalized patients by ward and room number.

Micro Med has a patient recall file that can be used to follow up lab results, to send appointment reminders, and to notify patients about needed tests or immunizations. Up to four lines of clinical information, such as diagnoses and drug prescriptions, can be entered on each patient's record. Global searches for such information are easily effected. You simply choose two characteristics of the text to be found from a list of 25—name, account number, or whatever—and the program generates a chart of patients fitting those criteria. Users may pass output from a retrieval to *WordStar* via *MailMerge,* thereby giving form letters a personalized look.

Micro Med is a well-written, versatile, and efficient medical office management program available for both single- and multi-user installations. It should be given serious consideration by any practice looking to computerize its operations.

Requirements: CP/M-80 or CP/M-86, 56K RAM (8-bit) or 96K RAM (16-bit), two disk drives

Articulate Publications, single-user $2,200; multi-user $3,500

PATIENT ACCOUNTING SYSTEM

Artificial Intelligence's *Patient Accounting System (PAS-3)* is a moderately priced office-practice system that is suited to practices with up to 20 physicians.

PAS-3 is a menu-driven system with either single- or multi-user capability that uses standard data entry conventions. Code numbers accessed from an on-screen table identify physicians, diagnoses, and up to 50 procedures; patients are identified by name or system number. Entry of an asterisk at most prompts will return you to the previous screen or menu, which allows you to back out of errors. Certain sequences, such as patient registration, cannot be left until all questions have been answered. *PAS-3* does not distinguish between upper- and lowercase letters, which helps to avert double registration of patients. However, it does recognize such special characters as apostrophes, hyphens, and embedded blanks in names, which could cause confusion. For instance, "O'Connell" is not the same as "OConnell."

PAS-3 records all charges and prints patient and insurance invoices. If receipts from one insurance carrier do not cover the charges, *PAS-3* will automatically bill a second carrier. Options are available for billing the patient instead of the insurance company, providing patient information about what was billed to the insurance company while

suspending charges to them, and identifying patients for whom assignment has been accepted. The program also permits a choice between open-item and balance-forward accounting.

PAS-3 uses a patient-recall file to inform patients of upcoming appointments, necessary innoculations, and tests and to follow up lab results. As with *Micro Med,* which is actually a substantially modified version of *PAS-3,* the user can design up to 99 different insurance forms. You choose the items to appear on a given billing report from a series of screens containing nearly 100 items of information from the patient's record and specify where the items are to appear on the report. *PAS-3* also allows you to dump retrieved data to a *WordStar* program using *MailMerge* for use in "personalized" form letters.

Installation of this program is straightforward, though the *CBASIC* interpreter needed for operation is not supplied with it. First-time users may find it best to have the vendor install the program; the manufacturer offers a three-day, on-site training program with installation. The user's manual is clear and thorough and includes a useful appendix that details the physical limits of the system.

Patient Accounting System is a smooth-running and complete medical office management system that should suit the needs of all but the largest practices.

Requirements: CP/M, CP/M-86, MS-DOS, MP/M, MP/M-86, UNIX, or ENIX; 64K RAM, two disk drives
Artificial Intelligence, single-user $1,195; MS-DOS and CP/M-86 $1,495; multi-user $1,995

PHYSICIAN'S OFFICE COMPUTER

Physician's Office Computer (POC) is a comprehensive medical office management system written in *CBASIC* for a variety of microcomputers.

POC is a menu-driven program with conventional data entry. Physicians, diagnoses, and procedures are identified by code numbers, which are listed alphabetically in a special section of the documentation. Defaults set by *POC* for patient name, account number, sex, city, and diagnosis are easily changed before or during data entry. When looking up a particular name in a file, which in *POC* is a fast operation, only the first few letters of the name need be typed in to call up all names starting with those letters. Unfortunately, *POC* does distinguish between upper- and lowercase letters; you must be careful not to enter "Smith" the first time and "SMITH" the second.

POC produces standard invoices for patients and insurance companies, and generates billing, management and productivity reports (for example, the number of procedures broken down by income). Tricky aspects of billing such as assessing finance charges, linking family members to one account number, and handling multiple physicians and insurance carriers are no problem with *POC.* However, only two insurance carriers are allowed per patient, and only MediCal and AMA Universal insurance forms are supported. It should be noted that *POC* does not have any knowledge of the coverage implied by a specific insurance plan; it is up to the operator to indicate which charges are billable.

POC has facilities especially adapted for entry of hospital charges. When you enter a range of days, a set of charges, and a patient or patients, the system automatically applies the charges to each patient for each of the days specified. *POC* automatically sends out reminders to patients due for an office visit and checks the office appointment book to verify the doctor's schedule before it confirms an appointment.

POC allows unlimited clinical information to be entered in a patient's file. This is necessary when describing a complicated condition or diagnosis, yet other medical management programs allow only a few lines or none at all. *POC* has a quick information retrieval system permitting any number of ICD-9 diagnostic or CPT procedure codes, and it can even infer the city and state of a patient or insurance company from the entry of a previously registered zip code.

Physician's Office Computer is a thorough and user-friendly office management system that does a remarkable job of squeezing most of the functions needed for billing and accounts receivable into one package. The price may, however, be prohibitive for some practices.

Installation of the program and registry of the 300 to 500 procedure and practice codes you use in your practice and all patient, physician, and insurance company data will take at least a day of steady input. The documentation makes this and all other operations in *POC* as smooth as possible, though delays may be encountered. Unfortunately, the manual does not have sample screens, an index, or a list of error messages; many users, especially first-time ones, will miss them sorely.

Requirements: CP/M, 64K RAM, two disk drives
Professional Systems Corp., $5,745 (includes installation)

THE SPECIALIST

The Specialist is a medical billing package written in CB80 or CB86 (compiled BASIC) for CP/M or MS-DOS computers. It may be tailored to fit any size of disk storage from two 5¼-inch floppies to a hard disk. Naturally, the greater the storage capacity, the more patients it will handle. It can be configured to run on a variety of terminals and computers, including most of the popular ones running the above operating systems. Versions of the program are available for various medical specialties, such as anesthesia, family practice, pediatrics, and surgery.

Three passwords get you into *The Specialist,* one for system entry, one for editing, and one for reports. Each time you choose one of these areas, you must re-enter the password, and it must be uppercase or lowercase, whichever you choose at first.

You enter the patient data one line at a time: name, address, phone number, date of birth, and insurance company data. If you make a mistake, you may back up a line by typing in "^ ", and reenter, but if you want to back up more than one line, you erase all the intervening ones. All files and codes may be edited, even payment records, though it is sometimes hard to find bills if you enter them in a batch for the same patient. Dependents are listed on a separate screen, and the last name of the guarantor is a default for the last name of the dependent.

Charges from up to eight doctors are entered by date, type and place of service, procedure code, doctor number, and diagnosis. These codes may be streamlined to a simple character or two; yet they will print out on the forms whatever standard codes (such as CPT and ICD/CM) you designate. You may choose balance forward bookkeeping for the family practice and pediatrics programs, but not for the surgery or anesthesia forms. There you must use open-item bookkeeping, in which each charge is kept separate, and payments are posted to each one as an individual unit. If you enter two or more charges at the same time, you may use defaults for the second and succeeding charge entries, which are the same values you entered for the first. However, if you wish to access those charges for editing, you must use the date of the first entry, as the program will not find the other dates of service.

You can produce insurance bills, which you design yourself using the supplied *Autoforms* program. The program does not provide disability data, nor can it distinguish accidents, relation to employment, first date of illness, or outside lab work. You send out a simple statement of charges and payments that does not show how much of the balance due is pending insurance and how much is due from the patient.

The Specialist provides several kinds of reports, including daily and period totals, aged account balances, and patient ledgers, summaries of all bills and insurance companies, and reports of support files (procedure codes, diagnosis codes, etc.).

The Specialist is easy to learn and use. It has some nice features, such as the short diagnosis and procedure codes and the ability to print a table right on the screen while entering data should you forget a code. The insurance forms are good and are not too difficult to design. However, there are too many case-sensitive passwords, and there is not enough room for details about the patient and the insurance carriers. The data entry is also rather primitive and the billing too simple. But if you do not require sophistication, the program is adequate.

Requirements: CP/M-80, CP/M-86, or MS-DOS; 128K RAM, two disk drives
Digital Marketing, $995 single user; $1,495 multiuser

VETERINARY BILLING ACCOUNTS RECEIVABLE

Veterinary Billing Accounts Receivable is a highly functional hard disk–based accounts receivable and information processing system for veterinarians. Designed to use the Apple Computer and a Corvus 10-MB hard disk drive, the system will maintain account balances on over 17,600 owners and 34,300 animals, aging each account monthly. Up to 4,500 transactions per month with up to 24 months of history can be maintained on line.

This system is very similar in configuration and operation to the *Dental Billing Accounts Receivable* system except that statements are itemized by animal and services as well as owner, and that each animal can be looked up by name.

Total transaction capacity is 109,900.
Requirements: Apple II+ or IIe, 48K RAM, two disk drives, Corvus 10-MB hard disk, 80-column printer
Johnson Associates, hard disk version $1,795; floppy version $495

ESTHER DYSON, EDITOR/ PUBLISHER OF *RELEASE 1.0,* COMPUTER INDUSTRY NEWSLETTER

Esther Dyson's clout in microcomputers and software comes from her newsletter, *RE-Lease 1.0,* with its inside dope on a booming industry.

Dyson writes and edits all the articles in the publication, using a breezy style and a lot of computer jargon. She never worries about being understood.

"It's for a special audience, and I'd rather have it be good and have it serve the people I respect than have it serve 100,000 people a year," she said. About 2,000 industry leaders pay $400 annually to get 18 issues of between 12 and 32 pages in length.

The 32-year-old Harvard graduate bought the newsletter for an undisclosed price in the spring of 1983 from Ben Rosen, now a venture capitalist with extensive interests in microcomputers. His *Rosen Electronics Letter,* since renamed, was launched during his earlier career as a Wall Street analyst in semiconductors.

"Personal computers are the most important application of semiconductors, and the newsletter gradually shifted its focus toward them," said Dyson, who was managing editor under Rosen in 1982. The two met while she was a technology analyst on Wall Street after working three years for *Forbes* magazine.

Along with the newsletter, Dyson bought rights to Rosen's yearly seminar of microcomputers, where "we invite the most significant leaders of the industry to speak."

Her company, EDventure, and its staff of three are based in New York, but Dyson spends about half her time in California, where the microcomputer industry is based. "I try to be an industry catalyst, having one industry leader meet another," she says.

EDUCATION

Computers are likely to be recorded in history as the most significant development in education since the invention of the printing press! They are changing the way students are taught as well as what they are taught. Schools are buying computers and software at an astonishing rate. There are estimated to be upwards of 300,000 small computers in our nation's schools, and that number now triples each year. Millions of parents are also discovering the educational value of computers. According to a recent Gallup poll, 42 percent of home-computer owners use their computers as a learning tool. An estimated 5.25 million educational programs were sold in this country in 1983, up from the 1.4 million the year before.

Both teachers and students are also realizing the importance of learning about the computer itself. In a few years, all but the most menial jobs are expected to require some familiarity with computers. Most of the best jobs will be in high technology fields in which knowledge of the computer is essential. Even those who do not work directly with computers are affected by them in everyday life—from the computerized bank statement to credit card bills to the volume of personal information maintained on all of us in large government computers. Understanding and learning to deal with these vocational and social factors are important aspects of "computer literacy."

There are three primary ways in which the computer is used to teach: drill and practice, simulations and games, and tutorials. In drill and practice, the computer's infinite patience can provide the student with practice in math, spelling, vocabulary, and just about anything else where memorization of facts is important. Good drill and practice programs, aided by stimulating color graphics, varied reinforcement, and good record keeping features can help take the drudgery out of factual learning. Simulations provide a computer-enhanced look at the real world. Color graphics and animation can show how an automobile engine works, help a pilot learn to land an aircraft before he ever takes off in a real one, or teach an elementary student the basics of private enterprise. Tutorials lead the student step by step through a sequence of instruction. Requiring answers, the computer can reinforce the student with appropriate responses, provide additional help for difficult concepts, and let the learner progress as fast or as slowly as desire and ability allow. Tutorial software can teach us to program a computer, to use the library, or to comprehend the concepts of advanced algebra.

The computer is also a powerful tool for the teacher. With an authoring system, teachers can create their own individualized instruction programs. Classroom management systems can maintain and average grades, print tests, and prepare written materials for class use.

One important advance in computer-assisted instruction (CAI) is the development of authoring systems that allow teachers to write courseware without any knowledge of traditional programming. Instead of trying to fit the available software into an existing curriculum, authoring systems enable teachers to create software tailored to their students' needs.

Authoring systems allow teachers to create lessons that operate somewhat like interactive multiple choice tests. The teacher can write questions to be asked of the student, and any information can be passed to that student before or after the question. Custom-written lessons and courses thus offer students the advantages of both personalized and interactive instruction.

Probably most important, the computer can be an extension of the human mind. Problem-solving skills, logical thinking, strategy, synthesis of information, and creativity can all be enhanced by the computer. From learning to glean the true meaning from written material to using the computer as a tool to design original art work, the computer seems to be limited only by the person controlling it.

For all of its capabilities, the computer is very dumb! It wakes up in a new world each time the power is turned on and has no idea what it is supposed to do—until it receives some instructions. The software is what gives the computer the magical ability to do all of these things. There are well over 3,000 educational programs commercially available to run on personal computers. Unfortunately, not all of them are top quality. Separating the good stuff from the mediocre is not easy. Poor programs may contain technical or factual errors; they may not always run properly; they may just not do anything very important; or they may not be very imaginative in design and therefore not take advantage of the many unique abilities the computer has to offer. Poor programs may not only be a waste of time and money, they may also do more harm than good.

The most important consideration with any piece of software is whether it accomplishes its purpose. In educational software, this means whether or not students learn from it. Does the program have good, clearly stated objectives, and does it accomplish them? That is your first question in evaluating any educational programs.

Documentation is also very important. Much software is accompanied by inadequate manuals. Good documentation will tell the user clearly and concisely what the program does and how to make it work. Poor documentation may be disorganized, overly technical, poorly written, or lack important information. Too often, software manuals suffer all these defects.

Cost is also an important factor in selecting educational software. Prices of educational programs range from free to thousands of dollars each. In all price ranges, one will find both good and poor software. Costs should be judged in relation to the task accomplished and in comparison to other available programs.

Lastly, technical quality is important. Programs should run smoothly, without errors. Displays, both text and graphics, should be professionally done. Programs should be well organized and operate efficiently. These virtues are not as common as they should be.

Several models have been developed to help educators evaluate computer software. One of the best known of these is the *MicroSift Evaluator's Guide for Microcomputer-Based Instructional Packages.* This publication, was developed by a team of prominent educators and computer scientists as part of the MicroSift project of the Northwest Regional Educational Laboratory. It stresses ten major concerns in evaluating any educational program: accuracy of content, educational value, freedom from racial and ethnic stereotypes, well-defined purpose and the extent to which the purpose is achieved by the program, clear and logical presentation of material, suitability of the difficulty level for the target audience, appropriate use of sound and color, the extent to which the program encourages creativity, effective feedback to user input, and learner control of the program.

Over 50 magazines and journals now contain reviews of computer software, which makes it a little easier to select high-quality educational programs. A few of the more prominent educational publications are: *Educational Computer Magazine, The Computing Teacher, The Journal of Software Reviews, The Digest of Software Reviews,* and *Monitor.*

No part of the computer software industry is changing as rapidly as the educational field. Traditional approaches of using the computer as a "page turner" or means of simple drill are giving way to innovative interaction, graphics, and simulation. Computers aided by high quality educational software will be able to help young and old alike learn more efficiently while enjoying it.

Demand high quality when selecting educational software. Before you select a program, learn what to look for in a good program, read about it, talk to others who have used it, and make sure it is right for you.

AFRICA PARTS ONE AND TWO

Part two of this program is a drill and practice on the countries and features of Africa. It is a good resource for this purpose. However, this review will concentrate on Part One, *Introduction to Africa,* which is an excellent tutorial program and more likely to fit the objectives of most teachers.

Introduction to Africa begins with a ten-statement true/false quiz covering common misconceptions about Africa. Examples include:

AFRICA IS THE LARGEST COUNTRY IN THE WORLD.
MOST OF AFRICA IS A TROPICAL RAIN FOREST.
MOST AFRICAN COUNTRIES RELY ON A SINGLE PRODUCT FOR MORE THAN HALF THEIR INCOME.

The program then reviews the student's answers and gives the correct one. This is followed up by supporting information reinforced by good graphics. Simple questions are used in this phase to keep the learner actively involved.

There is then a 20-item true/false quiz. The first ten are restatements of the misconceptions previously discussed. The final ten relate to information presented during the program. Explanations of answers follow each of the latter ten items.

While branching is limited, *Introduction to Africa* does present information and goes beyond the drill and practice format. This is a well-designed program which could serve as an excellent basis for the study of Africa.

An accompanying management program provides a chart giving the student's name, the number of attempts, the first score, and the present score. Scores are automatically entered and easily purged.
Requirements: Apple II+ or IIe, Atari, Commodore PET, TRS-80 Model I or III
Educational Activities, $39.00

ALICE IN LOGOLAND

Alice in Logoland (AIL) is a tutorial for the Krell version of Logo and comes in the Krell *Logo* package. The tutorial is a series of 21 programs designed to acquaint the user with commands, programming techniques, and other intricacies of the Logo language. The user, upon completion of the programs, should have a working knowledge of the language.

The lessons begin simply. In the first, the user is introduced to Alice (a graphic figure) and a turtle. Alice randomly produces simple Logo commands, which the user duplicates and the turtle then executes. This play continues as long as desired.

Later programs introduce more commands and more of the turtle's power. Program 4 introduces Logo conditionals and tests. Programs 10 through 14 deal with the list processing and manipulating features of Logo. The remainder introduce random numbers, Logo as a language for programming simulations, recursion, and the use of machine language routines to produce music. Program 20, the *Mock Turtle,* is a game of deduction where the user must decide which "mock commands" correspond to the real Logo commands. The final program, *Instant Alice,* allows the user to store a list of commands already typed as a procedure, which may be saved or edited.

Overall, the *AIL* is a good introduction to Logo, at least for the older novice. However, the presentation is occasionally erratic, limiting the tutorial's utility for younger students. After a very brief introduction to Logo commands, for example, the user is suddenly confronted in Program 4 with relatively obscure procedures for implementing logical tests and conditionals—this without ever having learned about procedures themselves, labels and variables, or what conditionals are designed to do. Older, more experienced programmers will be able to cope with such inconsistencies, but they are likely to find the text displays annoyingly slow.

Despite these problems, *Alice in Logoland* can be a valuable tool for a first course in Logo.
Requirements: Apple II, II+ or IIe, 48K, one disk drive, color monitor
Krell Software, $89.95

ALPHABET ZOO

Alphabet Zoo is a skill-building program for students three to eight years old. *Alphabet Zoo* is a race and a chase with a flood of letters on the screen. It teaches children the relationship of letters and sounds and provides spelling practice.

Game 1, the letter and picture association game, begins by drawing a maze on the screen, with a colorful picture in the center. The user uses his or her character to search for the first letter of the picture on the screen. For example, a picture of a rooster may be presented, and you must manuever the character about the maze to gather all the Rs. The purpose of the game is to help children strengthen their letter recognition skills as they associate letters with the sounds that they represent.

Game 2 is the spelling game. In this game, the user must maneuver around the maze and capture the letters necessary to spell the word that matches a picture in the center of the screen. For example, a bird may appear, and the user would have to gather the letters B,I,R, and D.

One or two players can play at one time. There are two games on the disk. In both games the player picks a character, for example, Tomato Head Fred or Millie Mushroom. The user can choose the size of letters to play with and one of six playing levels. Color graphics and sound effects are great.

Word-picture associations must be handled carefully since they are open to interpretation. For example, a child might interpret the rooster picture as a chicken or a bird and become frustrated when told this is incorrect. Nonetheless, this is a widely practiced technique for teaching letter sounds, and with an adult nearby to help occasionally, this can be an entertaining and educational program.
Requirements: Commodore 64, joystick
Spinnaker Software, $29.95

ANTONYM ANTICS

Antonym Antics is an educational game for children ages 6–13 that teaches words with opposite meanings: antonyms. Using colorful high-resolution graphic letters and only four keys on the key-

board, the program shows one word along with five possible answers. Matching the correct antonym results in a colorful high-resolution cartoon illustrating the matching words. The child's score is shown on a screen and in case of a wrong guess, the program will not advance until the correct words are matched.

At the end of the game is a review of the words covered. Two lists of 15 words are displayed, and the child is requested to match the antonyms. The program keeps score, and new words are added until all words have been reviewed.

The program functions well and the graphics are excellent; however, the vocabulary is fixed and limited (only 35 word pairs); consequently one should question whether the relatively high price merits the value received.

Requirements: Apple II with Applesoft, Apple II+ or IIe, 48K RAM, disk drive
Muse Software, $39.95

BARRON'S COMPUTER SAT STUDY PROGRAM

This monster package is a supplement to and is packaged with a set of Barron's SAT study guides —*How to Prepare for College Entrance Examinations,* and the *Verbal Workbook for College Entrance Examinations*—in a sturdy box that measures 4 × 10 × 13 inches.

It makes sense to keep the materials together because the tests are in the books. You enter your answers at the computer's keyboard and the computer programs keep score, analyze your weaknesses in relation to the SAT tests, and suggest specific areas for extra study. The analysis of verbal skills, for example, includes 15 categories of skill, from analogies to antonyms to contextual meaning, mood and literary technique. The program also provides explanations for all of the thousands of questions in the books.

The separate user's manual is clear and brief, and it deals with SAT strategies and scoring rules as well as how to work with the programs. For high-school students, this program seems to offer the potential of a competitive edge. (The other necessary element is, of course, the teenager's interest.) This package represents a good value.

Requirements: Apple II, II+ or IIe, Commodore 64, IBM PC
Barron's Educational Series, $89.95

BIBLIOGRAPHY WRITER, VERSION 4.0

BIBLIOGRAPHY WRITER is designed for librarians and teachers who create and distribute subject bibliographies from year to year. This specialized database program saves citations on a disk. The database can easily be added to, deleted, or changed. Seven data fields are possible: author, title, call number, publisher, city, copyright date, and annotation.

Bibliographies are built by typing in responses to screen prompts. The program automatically puts in the correct punctuation when printing. A single subject bibliography may contain up to 300 unannotated entries or 150 annotated entries per disk. The program uses a program disk and a data disk. An unlimited number of data disks may be used to create bibliographies. Bibliographies may be printed by author, title, or call number.

If the Shift key on the Apple IIe is used with the Apple version to obtain lowercase letters, it may cause problems in the sort routines. There is no problem if the Caps Lock is left down.

This program eliminates the need for tedious retyping of bibliographies. Punctuation and formatting, which is a special problem with this type of listing, is made easy. The manual is good. The program is well done and affordable.

Requirements: Apple II, II+, or IIe, TRS-80 model III or 4, 48K, one disk drive, printer
Library Software, $69.95

CBS: MASTERING THE SAT

You start this program with a five-question verbal and basic English test designed to show you your weak spots, then proceed to the main practice sessions. The vocabulary and analogies questions are standard. The reading comprehension test, sentence completions, and test of standard written English are very well done. The reading comprehension section allows you to go back to the reading passages, which appear on two screens.

When you finish the test, you return to the menu and choose the summary and score option to find out how you did on each type of question. You can also go back to the questions to learn the right answers and get explanations. With this information, you can decide which drills to use.

There are some valuable conveniences in this package. If you want to check your score, it appears when you return to the main menu. If you

take a break, *Mastering the SAT* restarts you where you left off. One excellent feature for multistudent families: It remembers data for up to three users. It does not time your responses or your total test time.

CBS recommends taking the pretest, using the results to choose drill segments, and taking another test after the lesson, both on paper—the manual contains questions—and on the computer. This program might not provide the individual attention that found Susan's every weakness, but it would come pretty close.

Requirements: Apple II+ or IIe, DOS 3.3, 48K RAM; IBM PC, 64K RAM; Commodore 64; one disk drive
CBS Software, $149

CARIS: COMPUTER-ANIMATED READING INSTRUCTIONAL SYSTEM

CARIS is a research-based program aimed at the primary and preschool low-readiness reader and is intended to improve word recognition and sentence-making skills in those children. The initial testing took place with learning-disabled children, but it can be used effectively with other children as well. *CARIS* allows the teacher to set up files on up to 60 students who use the program.

To begin the program a list of words is flashed on the screen. The type is very bold and easy to read. An arrow moves from one word to another until the student presses a key to make a choice. In the more complicated exercises, the student must type in the words. After a choice is made, an animated picture of the noun is shown and another list using the same process is provided. This time the noun is accompanied by the verb in a sentence, which is displayed under an animation showing the action.

There are three ways to use the program, from the simplest to the more complex: scanning—which can be used by a student with no knowledge of letters; cued typing—which introduces typing to the student; and typing—which allows the student to select a word by typing it in. The words are divided into two categories—nouns and verbs. Substitutions are possible by renaming a specific animation. For example, "house" may be renamed "casa." The program achieves its purpose to involve the child with sentence structure.

The documentation is friendly to the user. The only drawback is that the user may not add to the program. Other than that, the animation provided by the linking of noun to verb reinforces the meaning of words. The progression from simple to more complex allows room for the child to grow. Some delightful combinations can be made. For those who need the help, it is a well spent $69.00.

Requirements: Apple IIe, Apple II or II+ with language card, DOS 3.3, one disk drive
Encyclopedia Britannica Educational Corp., $59.00; backup disk $10 extra

COMPU-READ 3.0

Compu-Read is a series of four learning modules intended to improve reading speed and recall. Suitable from the youngest reader to the skilled adult, the program provides a variety of features, including excellent high-resolution graphics.

Each learning module deals with a different aspect of reading comprehension. In the first, a series of three letters is flashed on the screen. The student is then prompted to enter the same letters in sequence. Words are presented next, synonyms and antonyms follow, and finally short sentences are displayed and the student must recall one name from the sentence. Upon completion of each module, a "report card" displays the student's progress.

A system-generator option, which is invoked only during startup, allows the teacher to set such parameters as the number of questions asked, time allowed, learning sequence, and font size. A speed-increment function changes the display speed, depending upon the student's progress. File-building routines allow the creation of databases to suit various skill levels.

Compu-Read is suitable for both home and classroom environments, but is intended for one user at a time. Progress is tracked for only a single student, not an entire class.

Requirements: Apple II, II+, or IIe, DOS 3.2 or 3.3, *Applesoft BASIC*, one disk drive
Edu-Ware Services, $29.95

COMPU-SPELL

Compu-Spell is a spelling tutorial for both home and classroom use. Designed to give positive reinforcement for right answers, it offers words to be spelled in the context of sentences. Up to 25 spelling words may be placed in up to 20 lines of text in each lesson unit, and each data disk may handle up to 75 units. The system will handle up to eight

different data disks for a total capacity of 15,000 words!

Three separate routines lead the learner through each lesson, each taking a slightly different approach. The program loops back on misspelled words until all are correctly spelled, and reviews up to 11 misspelled words from previous tests.

Consisting of a system diskette and six prepackaged data disks (each sold separately), the system also allows for the production of customized data disks. Currently available are five data disks covering grade levels 4 through 8, plus one for adult-secretarial learners. The system diskette comes configured to only run its own demonstration, comprising sample lessons from all grade levels. This should help the user in deciding which additional data disks are needed. The program is then reconfigured for the appropriate disks, optional password, student's names, printerslot, second disk drive, etc.

One main feature not found on the companion programs *Compu-Read* and *Decimals* is that up to 60 individual learner's names may be entered and their progress tracked by the program. Results may be listed to a printer.

Requirements: Apple II with *Applesoft BASIC,* Apple II+, IIe, or Apple-compatible system, 48K RAM, DOS 3.2 or DOS 3.3, disk drive

Edu-Ware Services, system disk $29.95; data disks $19.95 each

COMPUTER MATH GAMES

Computer Math Games are drill/practice acitivites designed to help children in grades 1–9 learn such things as addition, subtraction, multiplication, division, place value, and low-level problem solving. The user selects the operation and type of number—whole, decimal, or integer—in many of the games. Some games provide speed drill.

There are seven volumes of *Computer Math Games.* The volume number has no relationship to the type of difficulty of activity.

The games are ones that teachers and students have used for years, such as *War, Secret Message, Boxes, Cover Up, NIM, Zero,* and *Math Baseball.* They provide only drill/practice on correct answers. There is no instruction in how to do the calculation. When the player gives a wrong response, the computer says "incorrect" or a similar word and flashes a number sentence including the correct response. Volume 7 includes a drill for spelling and vocabulary as well as a quiz/test maker for teachers.

Some children will be frustrated by certain aspects of the games. Although disk driven, the programs have a long load time; children spend a lot of time waiting. Instructions are lengthy and not always clear. The screen may be full of print. Most elementary grade children will have to ask an adult for assistance and a practice game.

This software is illustrative of the lack of imagination in programming which, if anything can, will send instructional microcomputers to join teaching machines in the oblivion of dusty school storerooms.

There is nothing unusual or particularly exciting about the graphics. The unfortunate conclusion is that these games are nothing more than expensive, computerized versions of activities which children can play with as much enjoyment using scratch paper and some sets of dice.

Requirements: Apple II, II+, or IIe, one disk drive

Addison-Wesley, $36 per set, $181 for the series

COMPUTER POWER

This system consists of seven diskettes, a teacher's manual, and student workbooks (30 included) designed for use in an introductory structured programming course in the Pascal language. It was developed in a project funded by the National Science Foundation at the University of Tennessee.

The program uses a unique graphic presentation technique and a play/work structure. A cartoon animated version of Pascal is employed to make the material enjoyable and easy to understand. The basic concept employed is that students learn best by doing. In addition to the basic sequence of instruction, a set of "blue sky" projects, which are open-ended problems in many fields of interest, such as science and art, is included.

The program is very comprehensive with much attention having been paid to details. It could be used as the core of a semester course in computer education at the high-school or college level. It is not designed to be used alone, as it requires considerable teacher interaction with students in a class setting.

Most activities are designed for students working in small groups, perhaps because the producers assumed that a limited number of computers would be available. Teachers with little experience with computers could learn along with their stu-

dents, but much material is involved, and a major commitment of time and interest on the teacher's part will be necessary to learn and to use the system.
Requirements: Apple II, II+, or IIe, Pascal language card, one disk drive, game controllers
McGraw-Hill Book Co., $385; teacher's manual $7.50

COUNTRY GUESS; STATE GUESS

Country Guess begins with the following screen:

COUNTRY GUESS
YOU ARE TO THINK OF ANY COUNTRY.
I WILL ASK YOU QUESTIONS ABOUT THAT COUNTRY.
BASED ON YOUR YES/NO ANSWERS TO THESE QUESTIONS,
I WILL TRY TO GUESS YOUR COUNTRY.

The student needs to know or be able to find out enough about the country to respond to the computer's structured questions. Samples of the questions asked are:

IS YOUR COUNTRY IN EITHER NORTH OR CENTRAL AMERICA?
DOES IT HAVE A MEDITERRANEAN COAST?
ARE THE ATLAS MOUNTAINS THERE?

State Guess has a similar format, but deals with states of the United States.

If the computer cannot guess the name of the country or state, it will ask for the name. After reviewing the data it will tell you to try again because you incorrectly answered a question.

These games offer an enjoyable means of gathering facts about a country or state. While they would wear thin after a while, they provide a means of enticing students into studying maps and reviewing their knowledge. Both programs are quite appropriate for middle-school/junior-high grades and are quite inexpensive.
Requirements: TRS-80 Model I, III or 4
The Micro Center, $19.95

DAILY LIVING SKILLS: CLASSIFIED ADS AND TELEPHONE DIRECTORIES

Part of a series of four survival skills programs, this piece of software is the most applicable to the intermediate grade levels. Other titles include *Prescription Medicine and p-Product Labels, Banking and Credit,* and *Job Applications and Paychecks.* In *Classified Ads and Telephone Directories* each topic is divided into five modules which may be independently entered. An animated character delivers pertinent information about the topic. Graphic examples are given to clarify some of the hard-to-grasp concepts. Each module is followed by multiple-choice questions. Correct answers are reinforced with computer responses such as "GREAT!" and "TERRIFIC!" while the first incorrect answer returns the student to repeat that part of the text. At the end of each program, a set of questions tests the student's comprehension. For those who were unsuccessful, the program suggests further study.

An advantage is that hardcopy of the questions may be obtained for large-group instruction. However, the questions are not suitable for all the students, as some may be too difficult. The reading level is high fifth grade. The program can be used alone as tutorial, but it could be more beneficial as enrichment or in a remedial course.
Requirements: Apple IIe, Apple II or II+ with language card, DOS 3.3, one disk drive
Encyclopedia Britannica Educational Corp., $59; backup disk $10 extra

EARLY GAMES FOR YOUNG CHILDREN

Early Games for Young Children is geared to the 2- to 6-year-old. It is a collection of nine games. A picture menu lets children choose a program. The 10 games are as follows:

Match Numbers displays a number on the screen that the child must match with the appropriate key. *Matching Letters* is similar. *Count* asks the child to input the correct number of blocks displayed on the screen.

Add displays two sets of blocks with a plus sign between them. The child must add the number of blocks and input the correct answer. *Subtract* uses the same setup, and the child subtracts the second ground of blocks from the first.

Alphabet displays a letter on the screen. The child must respond with the next letter of the alphabet. Unlike the other programs in this package, *Alphabet* will display the correct answer should the child give a wrong one.

Name helps children learn how to spell their names. A parent or teacher enters the name; the child then types it while the computer checks for

errors. In *Compare Shapes,* as its name implies, four numbered shapes appear on the screen, and the child must press the number of the one that is different from the others.

Draw is designed to bring out creativity. Using the keyboard, the child draws block shapes on the screen. Pressing keys on the upper part of the keyboard moves the cursor up, the lower keys move the cursor down, the right and left keys move the cursor right and left, respectively, and the keys on the corners move the cursor in the appropriate diagonal direction.

This is an interesting package that a young child can use with little help from adults. Its low price and availability in both disk and tape version are added advantages.

Requirements: TRS-80 Color Computer
Counterpoint Software, $29.95

EASY GRADER

This utility program offers a convenient way to organize, analyze, and print class records. The teacher can adapt the system to fit different courses. The program will alphabetize class rolls, print lists of assignments, and calculate class statistics. Student reecords can be retrieved by individual student or by class. The program can store records for up to 35 students with 100 assignments each.

This program is moderately useful, but it is not very well done. Error trapping is sometimes poor, allowing the program to crash because of an inappropriate response. Documentation is poorly organized and has no index. Once a grading method is chosen, it cannot be easily changed. Protection against casual access to confidential student data is missing.

Any computerized management system that works even moderately well can be an improvement over manual systems. Once use of the program is mastered and its limitations are taken into account, it can save time over conventional manual systems. But its limitations are severe.

The Atari Program Exchange has a large library of inexpensive programs similar in quality to this one.

Requirements: Atari 800, 40K RAM, BASIC language cartridge, one disk drive, printer recommended
Atari Program Exchange, $24.95

THE EINSTEIN MEMORYTRAINER

How easily do you remember the names of people you meet? Do you always forget addresses and phone numbers? Well, perhaps *The Einstein MemoryTrainer* can help. This unique set of five lessons plus a Memory Mix game uses proven memory techniques to help you develop a powerful memory.

The first lesson, Names and Faces, teaches you to remember people's names. Using hi-res graphic pictures, you learn to associate unusual facial features with "peg" names. For example, if a fellow named Harry has an abundant head of hair, he's "hairy."

In the next lesson, the ancient "method of loci" technique (*loci* is Latin for places) is used to help you remember long lists of information. You make a mental map and associate the information with familiar locations. Lesson three uses a "peg-word" system to link numbers with sounds to create pictures to help you remember dates or phone numbers. The fourth lesson extends the peg-word system to help you remember appointments or other important dates. You will also learn to link the dates with the associated person.

In lesson five, remembering phone numbers and linking the number with the person's name is taught. Finally, the Memory Mix game lets you practice all the techniques learned in the lessons. Using hi-res graphics and dynamic displays, points are racked up by remembering changing sequences of names, dates, and phone numbers.

In this program, the manual plays an important part in the training process. Using many illustrations, charts, and tables, it covers memory training concepts and techniques along with *The MemoryTrainer* instructions. It is supplied on three unprotected disks.

Requirements: Apple II with *Applesoft BASIC,* II+, IIe, or IIl in emulation; 48K RAM, one disk drive
The Einstein Corp, $89.95

ERNIE'S QUIZ

Ernie's Quiz is one in a series of four packages of entertaining and educational games developed by the Children's Television Workshop, producers of *Sesame Street.* Utilizing all of the Apple's capabilities—animation, color graphics, sound, and interactive responses—children can practice skills, learn problem solving and recall, exercise creativity, and master the basics of computer operation.

Ernie's Quiz consists of four delightful games for children ages 4–7. *Guess Who* and *Ernie's Quiz* are guessing games featuring the Muppets. In one, pictures of each Muppet are slowly drawn in color on the screen, and the player's job is to guess which one appears. In the other, clues are written on screen, and the child must guess the correct Muppet.

Jelly Beans helps develop a child's counting skills. A colorful jar with jelly beans is drawn on the screen, and the child must type in the number of beans in the jar. *Face It,* which requires game paddles, is an exercise in creativity where the child can construct happy faces, sad faces, or anything at all. Choosing a head shape first, the child then adds different noses, ears, eyes, moustaches, glasses, and other features to create an unlimited variety of colorful faces.

Included in the well-illustrated instruction book are many fun variations of the computer games that a child can play using simple objects found around the home.

An excellent package, it does require reading skills at the basic level.

Requirements: Apple II, II+, or IIe, 48K RAM, *Integer BASIC,* disk drive, game paddles; Apple II+ requires *Integer BASIC* firmware card or 16K memory expansion board
Apple Computer, $50

ESSENTIAL MATHEMATICS

Essential Mathematics drills students in basic mathematical skills. It is designed specifically for the classroom not only in how it works, but also in the way Betamax markets it.

Betamax offers all its educational software for a group licensing fee of $250 to consortiums of 50 or more schools. They also charge an additional $250 startup fee. For schools able to find others willing to go in on this arrangement, this offer represents a tremendous savings over traditional ways of purchasing software.

This package is actually a series of math problems geared to a wide range of skill levels. *Essential Mathematics* is meant to supplement in-class instruction with review problems, so any school that bought the entire series could use it throughout the students' entire education.

Each disk in the series has a menu. The teacher selects the lesson, say an addition drill, by moving the cursor via the arrow keys to the appropriate heading. Then, the teacher can adjust the sound level against some test beeps. (*Essential Mathematics* uses sound to indicate right and wrong answers using high and low tones, respectively.) The teacher can also choose the number of problems and set the time limit in which the student must answer each one.

The program keeps track of the student's performance, giving a total number of correct answers and a percentage correct. It then suggests which lesson that student should go to next—a clever feature.

A parent could use *Essential Mathematics* in the home, but only as a supplement to other tutoring. Betamax's pricing arrangement is a welcome innovation for schools with little money for software. It is a valuable tool for teaching basic math skills.

Requirements: TRS-80 Color Computer
Betamax, $24.95 each level

FACE MAKER

Face Maker is a simple program for young children. It doesn't do much, but its great visual appeal more than makes up for its simplicity.

The basic idea is to give children a face on which to place predrawn eyes, ears, noses, mouths, and hair—kind of an electronic Mr. Potato Head. The combinations produce suitably amusing, cartoon-like faces that can be animated. Eyes, for instance, wink, and the face can be manipulated to smile, stick out its tongue, wiggle its ears, frown, or cry. Each action uses a single-key command and has a corresponding sound effect.

Face Maker also contains a game in which the child must memorize and match a randomly generated sequence of these actions. Finally, the program can be used to introduce the concept of programming. Instructions for animating the face can be combined in a string of up to 30 commands.

Like many educational programs published by Spinnaker, *Face Maker* is simple and direct, with very good graphics, music, and sound effects. The company recommends the program for children 4 to 12 years old, but considering its extremely elementary objectives, the younger the child, the better.

Requirements: Apple II, II+, or IIe, Atari, Commodore 64, IBM PC; one disk drive
Spinnaker Software, $34.95

Requirements: Apple II, II+, or IIe, one disk drive, game controller recommended
The Learning Company, $44.95

GRADE BOOK II

Grade Book II is designed to aid teachers in keeping, maintaining, and reporting student grades. The program will average grades, alphabetize class rolls, and print several types of reports. *Grade Book II* stores student records and automatically updates and averages them each time the teacher enters grades.

The system consists of a program disk and data disks. Records of up to 8 classes of 40 students with a maximum of 50 grades may be kept on each data disk. Any number of data disks may be used with the program.

Eight different reports may be displayed on the monitor or printed: individual student records, student averages, ranked student averages, missing-assignment reports, student grades for a specific assignment, class averages, class rolls, and failing-student lists. The system not only maintains grades and averages, but may also be used to generate progress reports.

The system is menu driven and easy to use. The program allows the teacher to name and designate a weight for each assignment. For elementary teachers who often have the same students in several subjects, an option is provided to duplicate the roll from one period to another. Several teachers or an entire school may use one copy of the program by maintaining separate data disks. A teacher's manual with complete instructions and examples is included with the program.

Grade Book II will save the teacher much time in the necessary but laborious task of maintaining grades. While its price is higher than some other grade-keeping programs, it is well designed and incorporates many features that similar programs do not have.

Requirements: Apple II, II+, or IIe, two disk drives, printer desirable; TRS-80 Models III and 4
Schoolhouse Software, $150

HAIL TO THE CHIEF

The object in this simulation is to be elected president. In your campaign, you set your strategy and carry it out week by week. You may run TV or magazine ads, hold news conferences, or participate in a debate. You must take a position on ten campaign issues. You must manage fund-raising activities. The package includes four simulations, each of which may be used at ten levels of difficulty.

The major factor in success is the user's rating in public opinion polls, which are generated by the program. Users learn that by changing their positions to correspond to public opinion, they can increase their chances for election.

Few graphics are included. Much reading is required. The text requires at least average high-school level reading and vocabulary. Instructions are not well explained. A player could waste considerable time figuring out how the game works. The computer is slow in analyzing student responses. This will frustrate some students. Principles and ethics do not enter into the user's success; image and cleverness are the relevant factors.

This program is a good example of poorly designed educational software, of which there is an abundance. In summary, the program is somewhat superficial in content, the game is unnecessarily difficult to learn to use, and it is not likely to hold a user's interest for long.

Requirements: Apple II, II+, or IIe, 48K RAM; Atari 400 or 800, 40K RAM; TRS-80 Model I or III; one disk drive
Compuware, $24.95

HANDS ON BASIC

Hands On BASIC is a self-paced BASIC-programming tutorial that does its job well. Because *Hands On Basic* is an infinitely patient teacher, you can make an unlimited number of mistakes, and *Hands On Basic* will show you where you went wrong. It has a built-in syntax checker that suggests possible alternatives when you mis-enter a command, and extensive debugging aids that can ease the pain of troubleshooting.

The tutorial starts with simple counters and loops and moves on to more complex subroutines and applications. *Hands On Basic*'s designers believe that a beginning programmer learns faster when he understands how a computer processes information, so they have included eight program-tracking screens: command; chronological trace; for-loop; list trace; data; gosub; print; and variables. These screens, which are called up with a single keystroke while a program is running, show you how various loops, subsystems, and other

parts of a program are operating. They're marvelous teaching aids that help explain why a program acts as it does.

Hands On Basic spoils you; it automatically numbers lines in increments of ten (all you do is hit the Space bar), and it won't let you type RUB when you mean RUN (you'll get a beep and a suggestion to "TRY N"). But the course itself is hard enough to keep you interested, though easy enough to keep you from getting too frustrated. The manual is particularly well conceived. It's divided into 11 chapters, including a step-by-step tutorial; 11 appendices, with quiz answers, programs, glossaries, error messages, and other handy listings; and an index.

The version of BASIC taught differs slightly from the resident BASIC in the Apple II series machines, but marginal notes in the manual explain the differences and give the appropriate commands used in *Applesoft* or *Integer BASIC.* This thoughtfully-designed course may not teach you everything you've always wanted to know about BASIC, but it will certainly get you on your way.

Requirements: Apple II, II+ and IIe, disk drive
Edu-Ware, $79

HBJ: COMPUTER SAT

Harcourt Brace's study package for the college entrance exams is nothing if not large. It comes with 4 full-length exams, 540 drill items, and 1,000 electronic, vocabulary-building flashcards.

You start by taking the tests in the workbook and typing your answers into the computer. The program records answers along with time spent. You can answer questions in any order and even go back and change answers. You can also take a break, and the computer will store your answers. When you return later, the program starts where you left off. One problem: Storing wipes out previous results, even if two people are practicing. Families with twins, beware!

At the end of the test, the computer figures your score and shows the graded answer sheet. Then, if you wish, you can ask it to design a study plan based on its analysis of your weaknesses.

This scientific approach helps students to find their weaknesses fast, but typing answers to tests in a book makes for dull computing. After the instant responses of other programs, this part of the program was hard to stick with.

The flashcards don't supply much interaction, either, mostly explanations that one could get in a book. The drills supply more conventional interaction. You answer by choosing the correct letter. The drill problems allow more than one guess and calculate percentage right on first and second guess. Each problem also offers an explanation if you want one. You can quit or omit a question at any time. The program times you on each question and gives an average when it summarizes scores. If you retake the test, you'll often find the questions in a different order, which prevents memorization of order alone.

Overall, the documentation was adequate, and the program as a whole offers a comprehensive, efficient way to study. Whether students benefit fully depends on whether they stick with the diagnostic tests and the flashcards. You'll have to weigh the costs and benefits against your children's motivation and resistance to boredom.

Requirements: Apple II with *Applesoft BASIC,* II+, or IIe, 48K RAM, DOS 3.3; IBM PC, 64K RAM; Atari; TRS-80 Model III or IV, 48K RAM; Commodore 64; one disk drive
Harcourt Brace Jovanovich, $79.95

HEARTBEAT/HEARTWORK/HEARTFLOW

Heartbeat/Heartwork/Heartflow, a graphics-oriented program designed to teach basic facts about the heart, is a valuable aid to the student or anyone else who wants to understand how this vital organ works.

The program begins with a two-part tutorial: heartbeat and heartwork/heartflow. Spread throughout are quizzes that test you on the material presented; you can also review information at the end of each section. As you run through the tutorial, the information becomes increasingly specific; the opening screens alternate text with a life-sized graphic representation of a beating heart. Later screens display text alongside the illustration and highlight the part of the heart that is being discussed. In some cases, while an area of the heart is being described, the cursor outlines it on the screen. The quizzes are well-designed tests of your concentration; they are neither absurdly difficult nor easy, but are designed to clarify common misconceptions.

Once you have mastered the tutorial, you can select various options from the main menu: a "heartsaver game," a glossary of terms, an anatomy test, and several reference appendices. The

FRACTION FEVER

Among educational computer programs, there is a subgenre of "learning video games." This type of program assumes that because children love to play video games, they will learn from them if the subject matter of the game is educational in nature. *Fraction Fever* is one such game.

The object of the game is to control a screen figure who leaps what look like sidewalk squares on a pogo stick. These tiles are stacked 20 high, although only one is visible on the screen at any time. At the top of the screen is a fractional number, and there are graphic representations of other fractions under certain squares. There might be a total of ten dots, for example, and three of these will be filled in. Obviously, this represents 3/10. Others, such as vertical bar graphs, are more difficult to decipher, especially if you're racing by on a pogo stick. The idea is to match the fraction at the top of the screen with its graphic version. The character then moves to the next level of play.

As a game, *Fraction Fever* could be better. It is less than obvious and not nearly as enjoyable as the strictly for fun video games. As for learning, the program seems likely to be of limited help. In all, this type of program reminds one of those "educational" comic books, which were neither good education nor good comics.

Requirements: Apple, IBM PC, Atari 400/800/XL series, PCjr., Coleco Vision, 64K RAM, Commodore 64; one disk drive
Spinnaker Software, $34.95

FRIENDLY INTRO; FRIENDLY ARCADE

With all the hoopla about personal computers, many people are buying them because they feel they have to, not because they have much interest in them. Many of these computers end up on a desk somewhere, unused because of an owner's computer phobia.

If you find yourself in this category, help is available. FriendlySoft, Inc., has produced two packages they call Friendlyware to help you make the transition from computer phobe to computer user. They have recognized that games provide a nonthreatening method of interaction between you and your computer.

The *Friendly Intro* set contains three single-sided diskettes of programs. Disk 1 contains a brief introduction to computers and eight games including Master Mind, Nevada Dice (craps), Sea Battle, and several others. Disk 2 gives you 12 more games, including a very well done Concentration-type game called Match and a simulation of golf called (not surprisingly) PC Golf. By the time you are finished with these two disks, you'll be ready to settle down to business. Disk 3 provides a simulation of a computerized accounting system, as well as a variety of useful financial programs to do depreciation and amortization analysis, inventory reorder, economic order analysis, a present and future value analysis, break-even analysis, and stock ratio analysis. All the programs in this set are unprotected, so you can List them to see how the programmers accomplished what they did.

If, by now, you've really gotten into the spirit and would like a few more challenging games, then pick up the *Friendly Arcade* package. This gives you ten more games, including a version of Donkey Kong called Gorilla Gorilla, Robot War, and eight others. *Arcade* lets you turn the sound effects on and off and includes a Boss key, which, if pressed, suspends and displays a bar graph. When the boss leaves, press the F1 key again to resume your game where you left off.

Friendly Arcade is copy protected but FriendlySoft gives you their "Lifetime Guarantee"—they will replace a failed disk within 48 hours at no cost. If you damage the disk, they will at no cost replace the program onto a disk you supply. If this isn't good enough, get a bit copier and make your own backup copy.

Both of these packages are fun ways to get used to your IBM PC. While the graphics are not the same quality as those found in many arcade games, they also don't require the use of a graphics adaptor card. At this price you can hardly go wrong.

Requirements: IBM PC, 64K RAM, one disk drive, keyboard or joystick
FriendlySoft, $49.95 each

THE FUNCTION GAME

The association between mathematical equations and the graphic presentation of their functions is sometimes difficult to understand. So, why not put a little fun into *FUN*ctions?

The Function Game is just that. Through the use of excellent high-resolution graphics, immediate feedback, scoring and skill ratings, the student

plays a "game" of recognition, attempting to identify the functions presented.

From a library of over 70 single-variable functions (more can be added), the student picks several. Then the program selects one and plots a graph, gives hints, and asks you to guess the function. Your guess and the actual function are then plotted together, allowing you to compare your answer.

Menu driven, *The Function Game* will also plot your own equations, and you may overlay two or more functions to show the effect of a change in constants, for example. You may even print your graphs providing you have the proper hardware setup. The manual states that only MX-80, Silentype or Trendcom 200 printers are supported, but the System Options menu allowed for a Grappler interface, which worked quite nicely with a Microline 93. (A program with as much potential as this one should be able to talk to just about every printer/interface combo available.) Many other parameters, such as starting ranges, range of constants, number of wrong guesses allowed, are user definable.

Other features include an editor that allows you to modify and add to the function list so you may design your own set of functions (an unlimited number of function data disks may be created); password protection to prevent unauthorized access to the editor, files and system options; an excellent onscreen tutorial that won't accept wrong answers; plus a complete 50-page user's manual.

Requirements: Apple II+ or IIe, 48K RAM, disk drive

Muse Software, $39.95

GERMAN VOCABULARY DRILL

German Vocabulary Drill is a drill and practice program designed to provide students studying the German language a means of practicing their vocabulary skills. It is intended to make learning fun and requires little effort.

Many word lists are included in categories such as vegetables, beverages, classroom objects, parts of the body, numbers, family, fruit, colors, animals and kitchen items. The program also allows teachers and parents to include their own word lists. The student merely selects a word list and whether German or English meanings are to be practiced. Words are shown at random, and missed words are presented again until the student either responds correctly or chooses to quit. Scores are calculated and presented after each session.

Also included is a supplemental manual, which provides sections on pronunciation, basic grammar, and lists of common expressions. The complete vocabulary lists provided on the disk are also included, with the English and German translations and German pronunciation.

This program is also available in French and Spanish versions.

Requirements: Apple II, II+, or IIe, DOS 3.3, one disk drive

Compu-tations, $29.95

GERTRUDE'S PUZZLES

This is a colorful game for children in grades 1–9. Gertrude the Goose flies in and out of the video screen with puzzle pieces of different shapes and colors. In trying to decide which pieces they need to complete the puzzle, children learn how to solve problems with incomplete information and how to analyze what they see. Gertrude delivers prizes for puzzles solved correctly. Children can also design their own puzzles using the *Discovery Tool Game*, which is included. Children as young as six can enjoy this game, yet harder puzzles still challenge adults. The program is valuable in developing problem-solving skills.

The program is very creative in its use of graphics and is very imaginatively done. Secrets to unlock and treasures to find spark the imagination and interest of the user. Technical quality is exemplary. *Learning Magazine* awarded this program its best-of-the-year Learning Computer Software Award in 1982.

The program encourages the use of many coordinated skills such as problem solving, strategy, reason, and logic. Eye-hand coordination is improved by using the game controller to move puzzle pieces. The user also learns to follow instructions and practice visual interpretation.

The colorful manual is addressed to the child, not the teacher or parent, and is a good quick guide to the program, but it does not provide a description of the program content and applications. Some information about the concepts explored would have been helpful to teachers and parents. There is no remediating feedback, and there is no help option for those who may need assistance in playing the game. Nonetheless, this is an excellent program.

game is a particularly nice touch and adds some fun to a program that is otherwise strictly educational. The game describes a patient's diagnosis and asks you what part of the heart to operate on. If you perform improper surgery, woe to the patient. You won't find out the consequences, but the game will tell you where you went wrong and will prompt you to "Roll in the next smoker."

Heartbeat is a valuable tool that can be used by anyone with at least a fifth-grade reading level. It may not win the support of the tobacco industry, but it will no doubt be welcomed by the educational community.

Requirements: Apple II, II+, IIe or III
J & S Software, $39.95

HEY DIDDLE DIDDLE

Hey Diddle Diddle is Spinnaker Software's video version of a child's first book of rhymes. Printed on the screen and accompanied by appropriate music are 30 two-verse rhymes, mainly of old English origin.

A main menu offers three choices: When Storytime is selected, all 30 rhymes play continuously; Storybook slows down the pace and forms the words and pictures in slow motion; the Rhyme Game uses the verses and illustrations in a game, asking the child to arrange the scrambled lines of text in the correct order.

The nicest aspect of *Hey Diddle Diddle* is the way the illustrations appear on the screen. Each is drawn, as if by some invisible hand, in about 15 seconds. This way, the finished image is revealed piece by piece. In all, the art direction, including some very nicely redesigned characters for the text, is colorful and attractive.

This is a gentle and uncomplicated program; Spinnaker, the publisher, recommends it for children three to ten years old.

Requirements: Apple, Atari 400/800/XL series, Commodore 64, IBM PC, 64K RAM; one disk drive
Spinnaker Software, $29.95

I AM THE C-64

It has always been something of a mystery that computer tutorials don't come packaged as programs with the computers they are meant for. Probably because of the success of computer books—many of which are alternate manuals anyway—a few tutorial programs have begun to appear.

One nice thing about the *I Am the C-64* series is that it demonstrates Commodore 64 music, sound effects, and graphics far better than any book can. And the tutorial method itself can't be criticized for much. The programs though, are ordinary—nothing special.

There are two program disks in the series, the first consisting of volumes 1, 2, and 3; the second completing the set with volumes 4, 5, and 6. Volume 1 is an overall introduction to the Commodore 64, detailing the machine's relevant features. This could be useless to those new owners who are already familiar with the machine from shopping or working with a friend's. The second and third volumes are a tour of the keyboard and an introduction to the BASIC programming language.

Volume 4 in the second package begins immediately with advanced BASIC programming techniques. The series is rounded out with the last two programs on sprite graphics (the Commodore 64's movable screen objects), music, and sound effects. It is recommended that somewhere between volume 3, the introduction to programming, and volume 4, the advanced techniques, you actually take time to learn to program, either from a book or similar computer tutorial. If you rely on these programs to teach you, you won't learn enough.

Still, this is a good start, and for the rank beginner, the *I Am the C-64* series is a fairly good introduction to the machine.

Requirements: Commodore 64, one disk drive
Creative Software, $29.95

INSTANT ZOO

Instant Zoo, for children ages 7–10, is another in the series of Children's Television Workshop packages designed to make learning fun.

The first of four colorful games, *Instant Zoo* slowly constructs low-resolution color pictures of animals and asks the child to type the animal's name on the screen. The second, *Star Watch,* is a reaction game that displays an ever-increasing number of stars on the screen and requires a key press when a moving star is first spotted. Reaction time is computed and reported along with some clever and humorous comments.

The other two games are word matching and unscrambling exercises utilizing several built-in word lists. *Quick Match* displays two words that may be identical or slightly different; the player must decide which and press one of two keys to indicate

his decision. Score is kept, and if your answer is wrong or you don't respond fast enough, the computer gets the point. In *Scramble,* the best of the bunch, the player must unscramble the letters walking in tennis shoes across the screen before they march to the bottom. If they make it before the word is correctly spelled, the computer will unscramble the word for you and score the point.

A fifth option, Word Editor, lets you create or change the word lists for both *Quick Match* and *Scramble.*

This one should prove to be fun for the whole family.

Requirements: 48K Apple II, II+, or IIe, *Integer BASIC,* disk drive; Apple II+ requires *Integer BASIC* firmware card or 16K memory-expansion board

Apple Computer, $50

THE INSTRUCTOR

The Instructor is a beginner-level tutorial that aims to make the user familiar and comfortable with the IBM PC keyboard, and some PC-DOS and BASIC commands. Designed to be entertaining, *The Instructor* combines some amusing graphics, chatty language, and music as it instructs and quizzes you on the keyboard of your presumably new machine.

Like other beginning instruction packages, *The Instructor* has its own mini-operating system. Just load the diskette and turn on the machine. A dazzling display of graphics—if you have a color monitor it is even better—and upbeat music greet you. The main menu gives you your choice of keyboard instruction, a glossary of computer terminology, a quick keyboard/DOS command reference and a functions menu. The last section allows some tailoring of the program operations. You may select music, speed, and even whether the program will run by itself in demo mode.

Functionally, the program, specifically the keyboard instruction section, has few options. There is no reverse paging. *The Instructor* accomplishes its purpose well in that novices will enjoy and feel comfortable with the PC right away. However, if you have purchased an IBM PC recently, it probably arrived with IBM's own beginning tutorial, *Exploring the IBM Personal Computer.* This program contains all the keyboard instructions of *The Instructor,* plus simple word processing and some other application introductions. It hurts to say this, but although *The Instructor* is excellent at what it offers, your money is better spent on other programs.

Requirements: IBM PC

Individual Software, $44.95

INTRODUCTION TO GENERAL CHEMISTRY

Introduction to General Chemistry is a set of lessons designed to supplement a classroom course in general chemistry. Supplied on 7 different diskettes, the set consists of 28 lessons plus review exercises. Supplemented by excellent high-resolution graphics, instruction and drills teach students about chemical elements, inorganic nomenclature, chemical formulas and equations, atomic weights, percent composition, and gas laws.

Included also is *Chemaze,* a general chemistry game. In it, the player attempts to remove obstacles in a maze by hitting them with a flask containing a reagent which will react with the chemical in the obstacle. A beaker tries to protect the obstacles from destruction.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, disk drive

COMpress, $340

JIGSAW

Jigsaw is one of Island Software's *Mindstretcher Series* programs for gifted and talented third to ninth graders. In many ways, it is probably the best of the five disks. It would appear that any child (or adult, for that matter) could benefit from the program, not just the gifted and talented.

The idea is simple: The user selects from a menu of sixteen high-resolution pictures in four categories, ranging in difficulty from relatively simple cartoons to highly complex representations of world cities and recreations of art masterpieces. Upon selection, the chosen picture is shown for as long as the user desires. Pressing the Space bar dissolves the picture, which is replaced by a 4-row by 6-column checkerboard, each cell of which contains a letter from *A* to *X.* At the lower right of the screen, the computer displays a rectangular piece of the original picture. Using visual memory and deductive reasoning, the user decides which cell the piece belongs in, and types the letter of that cell. The piece is then moved to the chosen location, and another piece takes its place in the lower right. The procedure continues until all the pieces

are properly matched, whereupon the computer flashes the number of moves required to solve the puzzle, a perfect score being 24. If a mistake is made, and a piece entered into a wrong cell, the piece remains, but a copy of the piece will be randomly re-presented to the user until placed correctly, when the piece is removed from further resubmission. The remedying of mistakes often requires sharp eyes and good reasoning power as well as good visual memory.

The program has few flaws from an educational standpoint. The pictures are appealing, the play simple, and the somewhat sparse documentation gives teachers several useful hints for the use of the game and outside activities as well. One handy feature which can help avert frustration is that pressing the Commodore-logo key will abort the picture and return the user to the main menu without losing program control. One related technical weakness is that the Run/Stop key has not been disabled, so that accidentally pressing that key will terminate the puzzle prematurely. This could be a problem for younger users.

In short, the program is a delightful mix of superb high-resolution graphics and a nice update on that old standby, the jigsaw puzzle. *Jigsaw* is a very entertaining and valuable program for aiding the development of keen observation and reasoning skills.

Requirements: Commodore 64, one disk drive
Island Software, $19.95

JINX

Jinx is one of the *Mindstretcher Series* of programs for gifted and talented third through ninth grade students. The game is played on an array of numbers whose pattern changes according to complex rules based on choices by the player. This is baffling at first, but soon becomes somewhat addictive.

At first glance, the program seemed too obscure to be of educational value. However, there are strict mathematical principles at work in the operation of *Jinx*. The real beauty of the game is that it allows a playful approach to some very abstruse mathematics. It is not necessary to spend hours with pencil and paper calculating the effect of a different initial configuration—the computer does it in seconds. *Jinx* can be useful in teaching problem-solving strategies, and the somewhat skimpy documentation provides ample teaching hints to promote thinking about the processes involved in the game.

The program has merit for those students who are mathematically motivated, though it is somewhat doubtful that most students can derive maximum benefit. The major weakness is that the game at first seems incomprehensible. Teachers and students alike may have to play *Jinx* many times before the game begins to have meaning for them. Those who stick with it will probably find themselves developing an intuitive grasp of mathematics, patterns, and problem solving that they have never felt before.

Requirements: Commodore 64, one disk drive
Island Software, $19.95

K-8 MATH PROGRAM

This program is designed to be used in the classroom to aid in drilling students in math concepts. Part one of the program consists of skill building exercises in numeration, addition, and subtraction for use in grades K–3 or remedial math in higher grades. Part two contains more skill building exercises, a testing mode, and a placement mode that helps to diagnose the student's level. A worksheet-generator module prints worksheets and answer sheets for exercises in addition, subtraction, multiplication, and division.

The drill portion of the program presents math problems, and the user enters the answer. Two chances are given on each problem. Immediate feedback is provided for right or wrong answers. The program keeps score, and moves the user to higher or lower levels of difficulty based on performance. The teacher may select the lessons, the display, and other optional features for use by the students.

Documentation contains a few technical errors but is otherwise good. The instructions are clear, and there are good examples of how problems might be approached. A "K–8 Cross-Reference Guide" is included to help the teacher fit the program into the curriculum.

Drills go through their operations in a step by step manner; this reinforces the proper procedure for doing arithmetic, but may tend to bore faster students. Once started, any child should be able to continue on his own with this package. The program is standard drill and practice. No element of excitement or fun is included, but it is quite sound from a curriculum and design standpoint.

Requirements: TRS-80 Model I or III, Level II BASIC, one disk drive or cassette
Radio Shack, $199

KIDS ON KEYS

Typing tutors—those programs that teach you to type by running you through video-game-like contests—are among the most popular programs for home computers these days. It's doubtful that anyone is really using a computer just to teach himself or herself to type, but learning to use the QWERTY keyboard is a necessary computer skill.

Kids on Keys is a junior version of the typing tutor, aimed at children and posing simpler challenges. Still, on the most difficult level, the program is fast enough to put even experienced typists to a real test.

There are three different typing games here. In the first, letters and numbers float down from the top of the screen, and the appropriate keys must be pressed in order. After 15 seconds, a picture of a balloon carrying a word appears, and it too must be typed. The number of correct characters and the proper spelling of the words are used to form a score. In the second game, pictures replace the characters and entire words must be typed. The third game concentrates on number skills—the top row of the keyboard—and uses the pictures from the second game.

Kids on Keys is a simple but useful program. Spinnaker, the publisher, recommends it for children from three to nine years of age. This doesn't mean that parents couldn't use it to sharpen their own skills as well.

Requirements: Apple, Atari 400/800/XL series, Commodore 64, IBM PC, 64K RAM; one disk drive
Spinnaker Software, Apple, Atari, Commodore disk $29.95; IBM disk $34.95; Atari, Commodore 64 cartridge $34.95

KINDERCOMP

This is a collection of extremely simple activities that give very young children an opportunity to interact with a computer on an elementary level. Activities are selected from a main menu to which the child can always return by pressing a specific key, which differs from machine to machine. Each of the activities takes advantage of the computer's color graphics and sound to keep kids interested.

The routine named Draw does just that: It allows drawing on the screen with large blocks in different colors. Scribble fills the screen with the letters of any key pressed. Names draws a child's name in big letters on the screen. Sequence teaches number sequences. Letters asks the child to press the key corresponding to the letter on the screen. Match challenges the player to match a sequence of symbols to one of three others.

In the last three activities, the child is rewarded for a correct answer. Each time the right key is pressed a portion of a small illustration is added, and when the drawing is completed, it moves off the screen or is otherwise animated.

This is probably a very good program for children two to five years of age. Any older, and they may already be zapping aliens.

Requirements: Apple, IBM PC, Atari 400/800/XL series, Commodore 64, 64K RAM; one disk drive
Spinnaker Software, $29.95

KRELL

Released in the summer of 1980, Krell's was the first SAT preparation program on the market and had sold more than 10,000 copies by December 1983. The company claims that many customers report increases of 150 points or more when using the program after an unsatisfactory score.

Krell features multiple-choice problems; you choose answers by letter. Mistakes don't stop the program. When you repeat a lesson, the questions appear in a different order, slightly changed. For instance, the first time through the standard English section, this sentence appeared: "Running along the beach, the hat blew into the water." Of course, the mistake is the use of the word "running"; it shouldn't describe the hat. Later, the sentence became: "While I was running along the beach, my hat blew into the water." Several other sentences had also been changed, not all of which had been answered correctly the first time.

An automatic learning feature tracks a student's progress and concentrates on areas that seem to cause problems. It lets students save their results under a file name, which they specify when they start using the program. A network license is available.

Krell is the only company to give a money-back guarantee. If a student uses the program for at least six hours and doesn't improve total SAT results by at least 70 points over an earlier score, you can get your money back by presenting the before and after results.

Requirements: Apple II, II+, IIe, or III in emulation mode; Acorn; Commodore 64; Commodore Pet; IBM PC; TRS-80 III or IV; one disk drive
Krell Software Corp., $299.95

LIBRARY SKILLS, WHAT'S THERE AND HOW TO FIND IT, VERSION 4.1

This is a tutorial program designed to teach the Dewey Decimal System and basic use of the library to upper elementary-school through high-school students. A series of lessons covers use of the card catalog, using reference materials, and the Dewey system. Following each lesson, several exercises intended to reinforce the user's understanding of the material are presented. Graphics are used extensively. Throughout the program the user helps Allie Gator select the right kind of library material and then find it. A concluding master quiz offers the user a chance to do away with Allie if he or she can demonstrate an ability to use the library.

Although some of the graphics are clever, the sequence of lessons is poor and likely to frustrate the student. The program suffers from a lack of focus, both in content and audience. Instructional content is shallow and incomplete. The program provides only minimal tutorial assistance, allowing students to progress through the program giving wrong answers and still receive a passing grade. Definitions are vague, and documentation is skimpy. The various portions of the program are difficult to access at random. Like most of Micro Power and Light products, this program uses a lock-step sequence that gives the user few options. Spelling and factual errors are also present. Previous versions of the program also produce sounds which are not under user control; this has been changed in *Version 4.1*.

Overall, the few strengths of this program do not seem to offset its weaknesses.
Requirements: Apple II, II+, or IIe, 32K RAM, one disk drive
Micro Power and Light, $24.95

LINCOLN'S DECISIONS

This program is a tutorial designed to present the student with 12 decisions that President Lincoln faced during his career. The student's role is to select, from the alternatives presented, which decision Lincoln made. Based on the student's selection, the program responds with explanatory material.

A point system is used to motivate students. Seventy percent must be achieved in part one in order to advance to part two. At the end of both parts a large graphic of Lincoln's stovepipe hat appears with the student's name and number of points achieved.

To begin with, the student may review facts about Lincoln's life. This includes 15 screens of information covering his childhood through his marriage.

There is also a Help menu, which can be consulted before making any decision. This includes up to four clues per decision, a timeline, a series of maps, and an opportunity to review the decision that is to be made.

After a decision is made, whether it is correct or incorrect, explanatory information is provided. This program provides very little branching. However, it does provide a great deal of information and is much more than a drill and practice program. Many of the questions used in quizzes for each section feature upper-level questions.

The content and grade level are appropriate from seventh grade up. No inaccuracies or spelling errors were noted. In fact, the material is accurate to the point of dispelling some myths about Lincoln.

Directions are clear, and students should have no problem completing the program on their own. Reinforcement consists of feedback concerning the answers and periodic updates of progress: "YOU HAVE 2 OUT OF 4 CORRECT SO FAR."

Vocabulary words that might be new are underlined and defined via synonyms. For example: ". . . EMANCIPATED (FREED)." Graphics are used both as reinforcement and in the content.

The management system included is quite sophisticated. It provides the teacher with information regarding whether the student correctly or incorrectly answered each question and gives the student's total score. New students are automatically included in the records. Individual scores or the entire set may be erased by a one-word command.

This program is well conceived and well constructed. It is an example of the better software that is now making its way to the market.
Requirements: Apple II+ or IIe, Atari 400 or 800, Commodore PET, TRS-80 Model I, III, or 4
Educational Activities, $49

MAP READING

This program is an introduction to direction and distance for grade 4 and up. It provides instruction in the use of the simplified compass rose, the concept of scale, and map notations. The program is essentially drill and practice, although it contains some elementary elements of a tutorial program: It instructs by showing and explaining a model of the correct expected behavior.

The program presentation is visual-symbolic in nature, as maps are intended to be. Distance is counted by dots and "bleeps," which hold interest while distance is determined according to an assigned scale. Program escapes are provided at the end of lesson sequences.

There are a number of design errors in the program. First, directions are assigned in a nonstandard format. Directions are generally stated in clockwise format. Northeast (NE) comes before east (E) and southwest (SW) before west (W). Here answers are written in nonstandard presentation, such as "5 miles W / 8 miles S." Presented in any other format, the answers are judged incorrect. Worse, this format is never explained. It took two experienced teachers eight tries to find the correct answer format. Generally, this is a poor program.

Requirements: Apple II+ or IIe, 32K RAM, one disk drive

Micro Power and Light, $19.95

MASTERTYPE

Being the master of a computer keyboard is an absolute necessity in order to function in today's computer society. *MasterType,* a fun-to-use typing instruction game, will appeal to basic and advanced users alike. Designed as an outer-space arcade game, it uses both sound and hi-res graphics to make learning fun.

Eighteen lessons designed for all ages and levels of ability are provided. Starting with home-row letters and words, you advance through short and long words using the entire keyboard, and finally numbers, symbols, and BASIC programming words. You must protect the Command Ship against enemy word stations that appear in the corners of the screen. As the enemy first hurl letters, and then increasingly complex words, you must type the same letters or words and press the space bar to fire a laser blast to destroy the attacking symbols. As you progress from one level to another, the situation gets tougher, demanding even faster response. At the end of each game, your score, average speed in words/minute, words typed, and the number of mistakes are displayed.

If the 18 included lessons aren't enough, you can make up your own. Lessons can be saved on any standard initialized disk.

MasterType comes on a single copy-protected disk complete with instruction guide. An excellent training device for everyone!

Requirements: Apple II, II+, IIe, or III in emulation mode, 48K RAM; Atari; IBM PC, 64K RAM; Commodore 64; disk drive; Atari and Commodore cartridge versions also available

Scarborough Systems, $39.95

MILLIKEN MATH SEQUENCES, 1980 REVISED VERSION

Designed to supplement classroom instruction, this program provides a wide variety of tutorial, drill, and practice exercises based on a fairly comprehensive math curriculum for grades 1–8. Students move through defined sequence levels by achieving skill and performance objectives specified by the teacher.

In a sample program, a first grader is asked to name the correct number of shapes inside a rectangle, and the correct answer is rewarded with a rabbit popping out of a hat. In another sample, an eighth grader is shown the borrowing procedure in long division on the screen in high-resolution graphics. Such attention to detail is typical of this program.

The manager program available with Apple and Atari versions only enables teachers to maintain individual records for up to 100 students. The teacher can make assignments for individuals or an entire class. Student performance records are automatically updated and printouts may be generated.

The material is not entirely self-instructional, but the steps are small and good reinforcement and reteaching features are provided by the program. The student who works a minimum number of problems and achieves a minimum score of 70 percent is congratulated and moved up to the next level. Students who miss three consecutive problems are moved to a lower level. There is immediate feedback to each student response. Responses to correct responses include a variety of animated smiling creatures, fireworks, and blooming flowers. Graphic displays are much better in the Apple

and Atari versions. In early versions of the program, responses to answers include a large red *X* across the screen; this seems unnecessarily harsh, embarrassing, and frustrating. Later releases have replaced the red *X* with an explanation and tutorial for incorrect answers.

While the system includes most math topics, some, including the topic of measurement, are omitted. Like all detail work, the exercises can become tedious. The teacher's management system requires some time to learn. The program must be supervised by a qualified teacher to be effective.

Educational Technology Magazine, October 1981, reported an evaluation of the program in two elementary schools. The report stated that the programs were easy to use once students became familiar with them. All students were positive about the experience and said that they preferred it to a workbook. Most stated that they felt more confident carrying out the skills which they had learned.

The system utilizes many of the unique aspects of the computer and provides a good supplement to classroom teaching.

Requirements: Apple II, II+, or IIe, 48K RAM; Atari 800, 48K RAM; Commodore PET, 8K RAM; TRS-80 Model I, Level II BASIC

Milliken Publishing, Apple and Atari versions $450; TRS-80 and PET versions $200

MIND BEND

Mind Bend is an educational game, offered in both home and classroom versions, that combines action and learning theory. The program revolves around word meaning and verbal reasoning puzzles, which are presented in a clever graphics formats.

Players may elect to play the game with full sound, some sound, or no sound. The sound consists of clever tunes and noises, which add to the excitement of the game but which could be distracting to others in a lab or classroom. A speed of play is selected by the player, and players then shoot a game of pinball to select one of the four categories of play: Word Puzzles, Riddles, Odd Balls (a "what-does-not-belong-here?" game), or Rhymes. The program then presents a puzzle and the user must enter his response before time runs out. The ultimate goal in the game is to achieve a high enough score to play a bonus round, the Word-Hunt Game. Players are rewarded for both correct answers and timely completion.

The classroom version of the program contains a supplementary module that provides the teacher with an evaluation of the student's performance and suggestions for improvement.

Mind Bend is a clever resource to provide kids with challenging and stimulating word meaning and verbal reasoning activities in a game format. However, it will be frustrating for average or below students. The reinforcement can be overly negative. No one likes to be told by a computer that they are a "verbal vegetable," as this program does if the user gets a low score. The inventory of words and puzzles is limited and a student will go through all the puzzles after a few sessions. It is too bad that the program does not include a means of adding new puzzles to the program.

Requirements: Apple II, II+, or IIe, 48K, Commodore 64; one disk drive

Princeton Software, Classroom version $64.95; home version $39.95

MIX AND MATCH

The entire family can have hours of fun in this series of games called *Mix And Match* from the Children's Television Workshop.

The first game, *Mix And Match,* lets the player choose parts from *Sesame Street* characters and put them together on the high-resolution screen. How about putting Oscar's head on Ernie's body with Grover's feet? What would you get if you mixed parts of Big Bird with Bert and Cookie Monster?

In the game of *Animal,* you think of an animal while the computer tries to guess what it is. Is it big or small, does it walk or fly? By answering these questions, you "educate" the computer with facts it can store for future games. At the end of a game, everything "learned" by the computer may be saved to disk to be used in the next session. The computer then gets smarter and smarter and never forgets.

In *Layer Cake,* you must move a cake, a layer at a time, from one plate to another. The game gets more complex as you change the number of layers in the cake. *Raise the Flags* uses excellent high-resolution color graphics in a letter and word guessing game. As you attempt to spell the mystery word, a little animated helper raises correctly guessed letters on a flag pole. A fifth program, *Word Editor,* allows you to create your own word lists for *Raise the Flags.* Up to 45 words may be

placed in each list; the only restriction is that words must be between 3 and 6 letters long.

As in the other Children's-Television-Workshop programs, a well-illustrated manual is provided. It includes many other ideas for related activities not requiring a computer.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, disk drive
Apple Computer, $50

MOPTOWN PARADE, MOPTOWN HOTEL

The *Moptown Series* teaches basic skills of association to children ages 6–13. The lessons on each package get increasingly difficult. *Moptown Parade* is intended for the younger group, and it has the most lessons: eight. *Moptown Hotel*, for older children, has three lessons.

Moptown is the home of the Moppets, and they come in a variety of shapes and sizes. One *Moptown Parade* lesson, Make My Twin, presents one type of Moppet. The child must describe it using one-character inputs such as "F" for fat, "S" for short, or "R" for red. Other *Moptown Parade* lessons ask the child to locate the Moppet unlike the others on the screen, or to pick out the feature that is common to a group of Moppets.

Moptown Hotel deals with more complicated relationships. The lesson *Moptown Hotel*, for instance, has the child put Moppets in hotel room based on three rules. These rules are variable, and the parent or teacher can change them according to the student's weaknesses.

The Moptown Series makes good use of the Color Computer's color and graphics capabilities. The biggest problem a parent or teacher will have is deciding which lessons each student will get the most from. *Moptown Parade* and *Hotel* are reasonably priced for what they deliver.

Requirements: TRS-80 Color Computer
Follett Library Book Co., *Moptown Parade* disk $45, cassette $40; *Moptown Hotel* Disk $35, cassette $30

MOTHER GOOSE RHYMES

This program is geared to very young beginning readers. Upon selecting a rhyme from the menu, the user is shown a Mondrianlike collage of brightly colored rectangles, with a line or two from the rhyme appearing at the bottom of the screen. One of the words in the fragment of the rhyme is missing, as in this example: "AND WHIPPED THEM ALL SOUNDLY AND SENT THEM TO——"

The child is expected to enter the first letter of the missing word. This is a nice idea. Unfortunately, *Mother Goose Rhymes* suffers flaws that destroy its value for young readers. Compacting the words in the rhyme fragments at the bottom of the screen can confuse early readers, whose visual skills may not be good enough to let them discern just which word is missing. The graphic displays are colorful, but have no relation to the rhymes themselves and, according to one youthful user, are "boring!" The most advanced poem on the disk, "Paul Revere's Ride," seems inappropriate for the age to which this program is geared. And the feedback for right and wrong answers is confusingly similar, and monotonous as well.

Mother Goose Rhymes has little to commend it.

Requirements: Apple II, II+, or IIe, DOS 3.2 or 3.3, 32K RAM, one disk drive
George Earl, $24.95

PC PAL; PC TUTOR

Personal computers frighten many people. But once you have used them for a while, you wonder what all the fuss was about. Still, that first step after taking the system out of the box is a big one.

Comprehensive Software has addressed itself to making sure that the first big step turns out well with two "introduction" packages, *PC Pal* and *PC Tutor*.

PC Pal gives you the basics, beginning with the PC's keyboard. The program identifies the three areas of the keyboard—function keys, main keyboard area, and cursor/numeric pad—and offers interactive exercises to help you become comfortable. A second section introduces you to the concept of software and teaches a bit about spreadsheets, word processing, and the BASIC programming language. *PC Pal* finishes with a section on hardware and possible add-ons.

A companion package, *PC Tutor*, teaches you how to use PC-DOS 2.X. It explains what a disk-operating system is and what it is comprised of, then moves on to the use of files, directories, and subdirectories; EDLIN, the line editor; the BATCH utility; and redirection, filters, and pipes. *PC Tutor* comes with a template for the function keypad that allows you to move forward and backward in the topic, go back to the main menu, or bring up a DOS reference on the screen.

Both packages are effective and well done, with imaginative use of graphics. Yet there are two problems. At times it is unclear exactly what response is required of the user. Should he or she just sit and wait for the next screen to come up, hit the Space bar, or type in a response? (Usually just sitting there or hitting the Space bar works.) At least as annoying is the program's corny humor. After a while it begins to grate.

Still, these programs are excellent, informative, and enjoyable introductions to computing. If you need to get started or know someone who does, this is an excellent first step.

Requirements: IBM PC, 64K RAM, double-sided disk drive

Comprehensive Software, *PC Pal* $39.95; *PC Tutor* $59.95

PDI: PREPARING FOR THE SAT

You start this program with Taking Aptitude Tests, the first of several disks or tapes. Together with audio instructions they explain the SATs and tell you how to take tests. If your child doesn't like reading, this combination will get across valuable information.

You move through the program by choosing options from a numbered menu. Choose one and two to learn about the test and get strategies for test taking. Choose four to quit.

Choose three and you get trouble. Option three lets you take a sample SAT test of your choice, perhaps from a book. You can set the timer in the program for the length of time the test is supposed to take. For each question you enter the question number and either answer it or give its level of difficulty for you.

It is much too easy to get lost. Without a reference card to remind you what information to enter when, there is no way to give the proper answers. The program will not even let you quit. The idea of a practice test situation is useful, but this program will confuse more than help. Unlike the Harcourt, Brace program, this test form doesn't analyze answers and supply a study plan.

As the accompanying booklets promise, *Vocabulary Builder I* presents easier words than *Builder II*. Each disk contains five lessons of synonyms and five of antonyms followed by a choice of taking a test or leaving the program. You can choose which question to start with, but then must work through to the end or quit. The questions stay in order; you can't mix them. The program flashes up a word and five choices of synonyms or antonyms. If you choose the right one, you get sound effects and "That's correct!" If you don't, you can choose again, up to five times. "No, try again" greets every error unless you make the wrong choice twice. Then you get, "You've already guessed that one."

It is not easy to coordinate the audio and the computer. Two tones signaled when to touch Return for a new screen and when to stop or start the audio. Some students will have trouble telling the two apart. The biggest problem, though, is that you need your hands in more than two places at once. The best way to cope, finally, is by letting the audio run and reading the screen faster.

The word choices challenge the mind and build in difficulty, but the program doesn't tell why one choice is better than another. Occasionally, *PDI*'s choices seem questionable. Some sections lack hints and explanations that are in the books, and students must decide for themselves when to move to a new level of difficulty.

When you take quizzes, you don't find out right away whether an answer is right or wrong. At the end you get a summary and a list of the question numbers with errors marked. By that time, though, you've forgotten what question goes with that number.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive; Atari, 16K (cassette) or 24K (diskette)

Program Design, cassette $99.95; disk $119.95

PROGRAMMING YOUR APPLE

This program is a very earnest and systematic course in beginning BASIC. It starts from zero knowledge and progresses in nine lessons through loops and simple graphics, lists, (single dimension arrays), bugs and debugging, functions and subroutines, hi-res graphics, strings and string functions, and concludes with an introduction to tables (multidimensional arrays). Both the program and the manual are very clear, direct, and businesslike, and terms like "multidimensional array" are avoided altogether.

The program menu lets you choose among chapters and programs within the chapters, but once a particular lesson has been chosen, the student must go through every step outlined in the manual. After a particular program has been selected, it is listed on the screen. The student is then asked to run it and to modify it in specific ways to illustrate

the points in the lesson. If the manual suggests that you try a variation on line 130, you must try that variation before you can go on to the next step. (The back of the disk contains working copies of all the programs that can be modified at will.)

There are some program examples that are deliberately beyond the scope of the text, designed to challenge the more advanced students. Needless to say, the manual, which runs to 166 pages, is essential for any study program. There are occasional congratulatory messages, but there is no music, no flashing lights, no billboard scorecard, no concessions to the arcade. However, if you follow through with this highly structured plan, you will know the elements of BASIC. The manual could be improved by the inclusion of chapter, lesson, and program running heads on each page, as well as an index.

Requirements: Apple II+ or IIe, 48K RAM, one disk drive

Encyclopaedia Britannica Educational Software, $59; $69 with backup disk

READABILITY INDEX

This program enables the user to determine the approximate grade level of reading materials. The program uses the Bormuth Formula, which checks the word length, average sentence length, and calculated estimate of the difficulty of the words. The teacher or parent will find it useful in determining the appropriate reading materials for students whose reading level is known. Writers who must target their work to young readers might also benefit from it.

To determine the readability (grade level) of any text, the user types in three paragraphs from the work being analyzed. The program then calculates the readability and presents the results. A printout option is available for systems with a printer. The program output includes the average length of words in the sample text, the percentage of the words that are on the Dale readability index, the number of letters, words, and sentences, and the grade level.

The documentation for the program is somewhat technical and difficult to understand, but the program is useful and easy to operate.

Requirements: Apple II, II+, or IIe, one disk drive; TRS-80 Model I or III, 16K RAM, disk drive or cassettte recorder

Educational Activities, $26.95

READING AND THINKING

Designed to help in drawing inferences from reading, the *Reading and Thinking* programs are composed of a series of passages, each passage followed by questions based on the text and experience. According to the short manual, the passages of disks 1 and 2 are written at roughly the second- and third-grade levels. Disks 3 and 4 are written at the third- and fourth-grade levels.

All programs are menu driven, with nine modules on disk 1, ten each on disks 2 and 3, and seven on disk 4. Each module contains a total of 16 questions about the various passages. Students are presented multiple-choice questions to answer after each passage. Students select their answers to the questions using the A,B,C,D, and E keys. Not all questions have five possible answers; some have as few as two.

The program developers made sure that any response besides the appropriate keys (A,B,C,D,E) would direct the student to select again. Unfortunately, there is one problem which they failed to trap. If a student selects the answer "C" for a question that offers only "A" and "B" as possible answers, it is counted as an incorrect response instead of an inappropriate choice.

The programs were easy to run and should present few problems to second through fourth graders. The instructional format is basically drill and practice with one tutorial aspect. When a student makes an incorrect response to a question, the program provides a comment that could have reflected a reason—i.e., inference—for selecting the correct response. This type of limited tutorial involvement is a step in the right direction.

Each of the disks reviewed also has a management utility that allows teachers to check the number of questions the student missed and the percentage correct.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive

Intellectual Software, $120

RENDEZVOUS

Rendezvous, a space-shuttle flight simulator, is neither strictly a game—it has no aliens, no missiles, none of the usual trappings—nor quite a standard educational program. On this flight, you'll have fun while learning something about ballistics, vectors, inertia, and orbits.

As shuttle pilot, your mission is to rendezvous

with an orbiting space station. This is accomplished in four very demanding phases: earth liftoff, orbital rendezvous, approach, and alignment and docking. You can run through an entire mission or pick just one stage. In either case, you won't be flying in the dark: graphic displays and extensive listings of flight data—time, altitude, vertical and horizontal velocity, angle, range, and so on—will guide you.

Your first goal is to achieve optimal earth orbit—at the proper altitude and speed—without expending too much fuel. That accomplished, you're ready for orbital rendezvous, in which you use trial and error and *Rendezvous*'s orbit projector to alter your coordinates so as to overlap the space station's orbit.

The approach phase is just that—an approach. Armed with radar data, you must maneuver to within 2 kilometers of the station while cutting speed to 20 meters per second. In this stage and the next, you control your craft's forward/back, left/right, up/down movement, and its rotation—pitch, heading, and bank. In the docking stage, you see your target ahead, and try to bring the shuttle into port. Upon completion of the mission, you will receive a ranking based upon elapsed time, energy consumption, and piloting.

The manual is full of navigation tips, explanations of physical phenomena, and even some historical data. It's clearly written and interspersed with useful mock transcripts of conversations between Houston and the shuttle—step-by-step accounts of the various phases of the mission. Such thoughtful touches make *Rendezvous* accessible, which is a good way of getting you to think you're playing a game when, in reality, you're learning physics.

Requirements: Apple II, II+, or IIe, one disk drive
Edu-Ware, $39.95

REPORT CARD

The Report Card is a teacher's grading system designed to make the process of compiling students' marks more efficient and accurate. An important feature is the ability to weigh activities according to importance and not just score. Precise student grades can be viewed or printed at any time.

Student and class averages are easily calculated, and the various sorting and printing options offer such records as class averages with letter grades, individual student grades, class activities and results, and class rosters. Most reports can be sorted by first or last name, grades on selected activities, or by overall grade on all activities.

A permanent record of scores, including incompletes, is kept for all tests, quizzes, lab work, and homework assignments. Whenever a student is excused from an activity, a special "no grade" mark can be entered; it does not affect the student's overall average. This "no grade" mark can easily be replaced at any time should the student make up the work.

Up to 300 students can be stored per disk, with no limit on the number of disks. Each class may have up to 40 students and 50 graded activities, with up to 12 classes per disk or 300 students total.

A comprehensive user's manual, complete with an easy-to-follow tutorial is included, along with two copies of the program disk.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 48K RAM, disk drive
Sensible Software, $59.95

RUN FOR THE MONEY

In the great tradition of Monopoly, *Run for the Money* is a game that depends on some basic facts of economic life, as well as on chance.

The setting here is the planet Simian, a far remove from Atlantic City. Two entrepreneurial critters from outer space crash land on Simian with their spaceship in need of repair. To make the repairs, they have to buy local raw materials (rufs), convert them into something they can sell (synannas), and get the native Simians to buy them for local currency. With local currency, they can buy the special paint with which to repair their ship.

The variables are the cost and availability of rufs, the amount of advertising, the price of synannas, the number sold, and the price and availability of the special paint. Some are chosen by the player, and they are almost all interdependent. The game includes a set of graphs that show you how you are doing at the end of each week, and a planning module that indicates the results of changing the variables you can control or affect—cost, price, advertising—and predict the sales and profits that will accrue from a particular strategy.

This economic model was developed by M.I.T. professor Arthur Lewbel, and it illustrates such sophisticated economic principles as supply and demand, competitive markets, and bidding and

investment strategies without requiring the player to be an economist. The game is rated for ages "10 to adult." But if your kids get good at it, they will understand more about the way our market-oriented economy works than most adults.

The user-guide is well done, except that the only place it tells you where the "plungers" are (the "S" key and the "5" key) in print is on the reference card. It also includes a chapter on game strategies drawn from strategies used when the money is real —the Burger Strategy with heavy advertising and similar pricing and product, the Fly-Away Strategy of competitive discounting, the Pot Roast Strategy of lowering product quality, and so on. The manual includes a short glossary of business terms and a bibliography of related children's fiction and nonfiction, parent-teacher books, and magazines. There is also a detailed online tutorial. One or two can play.

Requirements: IBM PC, 64K RAM, or PC/XT, 128K RAM; one disk drive, graphics adapter
Scarborough Systems, Inc., $49.95

SAT ENGLISH I

This program drills students in grammar and usage, much as other SAT-preparatory programs do. In some ways, it does a good job. For example, it explains the reasons for both right and wrong answers; students who make a lucky guess find out why it was right. A wrong answer gets a hint followed by another chance to guess.

The program designers worked hard to provide reinforcement. Right answers get responses that start with "Correct" and "Perfect" and range to "Inspired answer," "Oh, such brilliance in one so young," and "This person should be course leader." It sometimes keeps you going just to see what witty phrase will appear next. A college student who tried the program, though, didn't like being told "You must have the book open."

SAT English I suffers from several problems. One is a painfully slow response. A bright child's patience probably would soon wear out. However, an average child or one who feared tests might find the intervals a welcome break.

Another problem is duplication of material between the instruction sets, which include excellent explanations, and the tests. It is too easy to memorize correct answers.

Some of the grammar questions contain more than one error, or at least poor sample sentences. For instance, one sentence reported that "The club would be closed for renovating for five weeks in the months, September and October." "For renovating" clearly errs, but so does "in the months, September and October," which could be expressed much more clearly as either "in the months of September and October" or "in September and October." Students need sample sentences without ambiguity.

One minor irritation: The "quit" function, which supposedly returns you to the main menu, doesn't work.

Requirements: Apple II, II+, or IIe, 48K RAM; Commodore 64; IBM PC; Atari 800; one disk drive
Micro Lab Learning Center, $30

SAT WORD ATTACK SKILLS

EduWare's word attack program teaches vocabulary by focusing on prefixes and root words. The program is cumulative, with words from early lessons appearing later in other contexts. You can start and stop wherever you wish, but once you start with, say, question 10, you can't skip to question 14. You must do the questions in between.

The explanations and the practice on synonyms and antonyms offer rich payoffs. Learning roots and prefixes helps students to grasp not only the specific words they practiced, but also other words that have those roots and suffixes in them. Students who use this program will probably learn almost as much about how to think as about the English language.

There is one problem, though: The program responds slowly. If you type an answer before it is ready, it marks the answer wrong. This could handicap students who are fleet of finger from years of video games. Typing an answer and then another stray character, as might happen with a poor typist, also gets marked wrong.

Requirements: Apple II with *Applesoft BASIC*, II+, or IIe, DOS 3.3, one disk drive
EduWare Services, $49

SCIENCE, VOLUME 3

This simulation program guides the student through the calculations necessary to find the location of an earthquake.

The first option is a lesson which describes earthquakes and how they are measured. Primary and secondary shock waves are defined and even plotted on a graph using high-resolution graphics.

Information from three reporting stations is displayed graphically, just as it would appear on the seismographs. The user can compute the distance of the epicenter from each station. The computer will then follow the same process and draw three circles on the map and tell you how close your estimate came to the actual epicenter.

The user can choose the lesson, an explanation, or a quiz. The student learns how to calculate distances, and to apply some geometry. Worksheets are provided to help guide students through the program.

This is not one of the best MECC programs. It provides little but practice. The introductory tutorial part of the program is difficult to understand, and no explanations are given on how to solve the problems. The program could be frustrating to those who have not learned the basic science concepts involved, but it could be a good supplement to classroom study of earthquakes. Graphics are good. A strong point of the program is documentation, which is good with all MECC programs.

A collection of programs has been developed by this nonprofit group. All programs are developed by educators and are field tested before release. All MECC programs are at least O.K. Some are excellent. All are reasonably priced. A licensing arrangement allows schools unlimited duplication of programs in the MECC software library.

Requirements: Apple II, II+, or IIe, 32K RAM, one disk drive

Minnesota Educational Computing Consortium Publications (MECC), $30

SIMULATED COMPUTER

This program simulates the operation of a small machine-language computer. The video screen becomes a computer. The user can input programs, run them, single-step them, and see the results on the screen of every step. Ten different options permit the writing of a variety of demonstration programs. A display mode displays messages as the simulated computer executes each instruction. Error messages are also displayed to help the user debug programs. The program comes with a tutorial and a manual.

This is a good first step in learning the operation of the 6502 or Z-80 microprocessors. Twenty memory locations are displayed on the screen, as are boxes for input, output, accumulator, program counter, and instruction register.

The program uses graphics to demonstrate complex but essential computer processes. It is suitable for high school through college level, where there is a teacher present to provide guidance. The user's guide that accompanies the program is a valuable tutorial, which can be duplicated locally.

Requirements: Apple II, II+, or IIe, Atari 400 or 800, TRS-80 Model I or III, 16K RAM, one disk drive or cassette recorder

Edu-Soft, disk $19.95; cassette $14.95; site license for network systems $35

SOCCER MATH

A competitive math teaching program for use by two students at one time, *Soccer Math* uses high-resolution graphics to display a soccer field, players, and the math problem. The players choose between addition, subtraction, or multiplication problems in one of ten skill levels and type their answers in turn. A correct answer results in a field goal, while a missed answer results in a missed goal. When an answer is missed, the correct answer is displayed at the bottom of the screen.

Designed to be used in a classroom or at home, the program has a "teacher-management" file that allows a parent or teacher to set the number of problems presented in each session and the default skill level. It keeps track of up to 35 students so that each may advance independently of others depending on their score. Strong students are advanced level by level, while weaker ones are held at their current level or dropped back if their score falls below 80 percent. A list of students and skill levels may be sent to a printer.

Designed for primary grades, skill levels range from simple addition and subtraction using random numbers from 1 to 5 through multiplication using numbers from 20 to 99.

Requirements: Apple II, II+, or IIe, DOS 3.3, one disk drive

Compu-tations, $29.95

SPANISH FOR THE TRAVELER

Spanish for the Traveler is a seven-part language program that can teach the skills required to communicate easily in a Spanish-speaking country. It can also serve as an instructional aid for the beginning student or for the adult who wishes to brush up on high school or college Spanish.

The program is made up of seven instructional units each containing five lessons. These units

cover your arrival, shopping for souvenirs, sight seeing, touring the country, getting acquainted, dining out, and number skills. The five lessons in each of the units deal first with places and things, next with people, and finally with sentences and expressions. Each lesson contains 40 words, 15 sentences, and 120 common expressions. Following each lesson is a vocabulary quiz, and following the first six units is a unit test which tests your mastery of the complete unit.

Four audio cassette tapes are included with the package to teach the correct pronunciation of the language. The 70-page compact manual includes all the words, sentences, and phrases contained in the lessons and is designed to be taken with you along with the tapes for review during your trip.

Through the use of high-resolution graphics and sound reinforcement, lessons are presented in very readable upper/lowercase text complete with all the correct accents. Your score for each lesson is also presented.

In all, this is an effective and fun way to learn a new language.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM; IBM PC, 64K RAM; disk drive
Roger Wagner Publishing, $59.95

SPEED READER II

Speed Reader II is designed to help build reading speed and improve comprehension. Thirty-four reading selections with questions are included on the disk. When the user chooses one of these to read, the program displays the text on the screen, followed by a series of questions designed to measure reading comprehension. Teachers and parents may enter their own reading materials. A grade-level analyzer measures the grade level of text typed in by the user.

The program may be used with high-school through adult users to improve eye span and movement and sharpen perception to improve reading speed and comprehension.

This program, like all reading materials, is best used in a quiet atmosphere that allows concentration. The program should be used as a supplement to a comprehensive reading improvement program, not as a stand-alone teaching method. No workbooks or teaching strategies for the teacher are included. The number and variety of selections are limited, and individual users will soon tire of repeating the selections unless the teacher or parent creates new ones.

Requirements: Apple II, II+, or IIe, Commodore 64, IBM PC, one disk drive
Davidson and Associates, $69.95

SPOTLIGHT

A Children's Television Workshop set of four advanced learning games, *Spotlight* teaches logic, strategy, and angles of reflection.

Using the game paddles, *Reflect* allows you to position a mirror to reflect a light beam, which in turn must hit an object on the screen. Successful attempts score a point and produce a musical fanfare. *Spotlight* gets a little tougher. Depicting a theater stage, you must move the spotlight to light up a moving performer named Steve. To make things more difficult, there are a stationary second mirror and a screen in the middle of the stage that blocks the light beam from certain angles. Far from easy, the game forces you to take careful aim to succeed.

Hot Stuff is a game of number logic where you must guess a secret three-digit number. For each number you enter, you receive clues to whether the numbers are cold, warm, or hot. But the game won't tell you which numbers are which! You must figure that out yourself. *Boxed In* is a strategy game fashioned after the game of *Othello,* but with a smaller playing board. A game of squares, you must capture the computer's squares by boxing them between your own. There can be one or several in vertical, horizontal, or diagonal sandwich arrangements. Of course, while you are doing this, the computer is trying to capture your squares. It usually wins!

Intended for audiences ages 9–13, this one is fun for the entire family.

Requirements: 48K Apple II, II+, or IIe, *Integer BASIC,* disk drive, game paddles; Apple II+ requires *Integer BASIC* firmware card or 16K memory-expansion board
Apple Computer, $50

STATES 'N CAPS

States 'n Caps is a simple, friendly program in a testing format designed to teach facts about the states, their capitals, and their names and locations. The program interacts with users, offering quizzes by state, capital, or both. Some graphics and sound are included.

The program allows users to select the state,

capital city, or combination which with they wish to work. It then provides a quiz on their selection. Scores and elapsed time are kept and shown on the screen. Correct answers are provided if the user fails to give them.

As a learning tool, this program will not win any prizes for originality of design or for stimulating higher-level thinking. One could probably accomplish more by looking up the states and cities in the encyclopedia, and the pictures would be better too!

However, the cost of the program is minimal and the novelty of interacting with the computer may add temporary interest to the study for some students. The testing will also serve to provide users with feedback on how much they know about the states and their capitals in a nonthreatening manner.

Requirements: IBM PC, one disk drive, color graphics board, color monitor recommended
Alphanetics Software, $29.95

STICKY BEAR SERIES

The *Sticky Bear Series* is a delightful series of learning games for primary-level children. The programs are well designed and full of colorful graphics. Together they are fun way to help youngsters learn their numbers and alphabet while also improving eye-hand coordination and learning some computer literacy.

Sticky Bear Numbers presents colorful groups of big, animated objects such as sticky bears, trucks, ducks, and planes to teach numbers and counting. Each group corresponds to a numeral from 1 to 10. The game features over 250 picture combinations, so that kids will enjoy playing it over and over. The program reinforces number recognition and counting skills.

Sticky Bear ABC is essentially an animated book of letters. Pictures, sounds, and letters are presented at the touch of the appropriate key on the keyboard.

Sticky Bear Bop contains three animated color shooting galleries of sticky bears, ducks, planets, balloons, etc. Children will like the bright, colorful pictures. Beginners and young children will be able to hit the larger, slower-moving targets with little trouble, but even grownups will be challenged by the levels of play. The game is mainly for fun, but it also helps children develop eye-hand coordination.

The programs each come with supplementary books, posters, and stickers. The user's manual is clear and well done.

The programs would be useful at home and in kindergarten or first-grade classrooms. They might also be used in special-education programs. This series combines the highest quality programming with sound educational theory.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive, color graphics board and monitor
Xerox Education Publications, $39.95 each

STORY TREE

The logistics of keeping track of a story that can branch at any moment into as many as four paths, each of which can branch again or loop back to a previous page, are formidable. Yet this program makes it so easy and logical that the elementary schoolers for whom it is intended will have no trouble with it.

A single story can have up to 100 pages—one screen full, perhaps two paragraphs—and a diskette will hold up to six stories, with about 200 pages altogether. The story disks are standard Apple DOS format, so you can create as many as you want.

The story disk that comes with the program has three samples, a simple story with considerable branching and looping; a student research report organized in multiple branches with different kinds of information in each; and a set of book reviews, organized in different branches by type of story and type of main characters. The embryo user guide that came with the demo disk promises a professional job to match, and is addressed to the young user.

There are some good classroom applications possible, say with different kids responsible for working out the story line along different tracks. Yet it is not too complicated for kids of eight and up to use on their own. The built-in word processor is adequate, and the stories can be printed out. In all, this is an unusual and interesting idea, well carried out.

Requirements: Apple II, II+, or IIe; Commodore 64; IBM PC; one disk drive
Scholastic Wizware, $59.95

STUDY QUIZ FILES

Study Quiz Files is an easy-to-run program that allows teachers or parents to create lessons in quiz

form on any subject. Modular lessons of up to 30 questions each can be loaded, run or revised at will without having to rewrite them. Lessons are saved as text files on disk, and there is no limit as to to the number of lesson files that may be created.

When a quiz is run, the answer choices are displayed at the top of the screen with one question displayed at the bottom. The student then enters his or her choice. Questions are asked randomly, and missed ones are repeated until every question is correctly answered. Upon completion of each quiz, the screen displays the student's name, quiz name, the number of questions, and the percentage of correct answers.

Menu driven, *Study Quiz* allows you to write the questions and answers, review and revise the quiz, save it to disk, delete quizzes from a disk, and print a hardcopy of the quiz that may be used as a classroom test. The program is written to print on an MX-80 and would not print on a Microline 93. However, the disk and programs are not copy protected so changing the printer routine is quite simple.

Two versions of the program are provided. One requires the user to enter only the answer's number, while the other requires the full answer to be typed in.

Study Quiz may be used at home or in the classroom and from elementary school through college. Considering the price of systems that do little more, it is a remarkable bargain.

Requirements: Apple II, Applesoft, DOS 3.3, one disk drive
Compu-tations, $29.95

SUPER QUIZ II

One of the most routine chores for most teachers is making out multiple-choice tests. Typing, filing, revising, duplicating and grading these tests is a time-consuming and repetitive task. This program makes the teacher's job a little easier by storing test questions, printing tests and answer keys, and making additions and changes to test questions easy. Several options are available to allow the teacher to customize the test to his or her specifications. The program does not give tests or grade them.

Super Quiz II is menu driven and easy to use. Its functions are more or less self-explanatory, but their use is explained in a clearly written manual which accompanies the program. Prompting is included, which leads the user through construction and printing of the tests. For example, choosing option 1, "ENTER TEST QUESTIONS," will produce the question: "WHICH CHAPTER DO YOU WANT TO WORK ON?"

Teachers may build a test bank all at once or enter a few questions at a time as they need them. A maximum of 500 characters is allowed for each question, which may have up to 5 choices. This permits storage of about 250 questions per disk. Several disks may be used when larger numbers of questions are required.

Tests may be generated and printed in a variety of ways. The teacher may determine which question numbers are to be included on the test, or the computer can pick a specified number of questions at random. Customized headings and instuctions may be entered. The test is output to the printer. Duplicate copies of tests may be made. Printing of a key is optional.

The program runs somewhat slowly while questions are being entered, and the number of questions stored per disk may be inadequate for some users. For example, a test bank of 25 questions each for 20 chapters will require 3 data disks. This will require some disk swapping for preparation of the final exam. However, the program is well done and will save most teachers much time and effort compared to conventional methods of test preparation.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive; printer
Sterling Swift Publishing, $49.95

TROLL'S TALE

Designed for children ages 8 and up, *Troll's Tale* is an exciting adventure-learning game, and somewhat more. Excellent high-resolution graphics and multiple-choice answers lead the player through a fantasy land to find 16 treasures and return them to the Troll guard.

Intended to teach such skills as map making, reading comprehension, and identifying details contained in the color graphic pictures, the game also compels the player to predict outcomes of events and draw conclusions based on accumulated facts.

In most adventure games, the player must enter answers in a specific form, such as "GO DOOR"; *Troll's Tale* offers the child answers and then asks which is desired. No typing skills are required; only the Space bar and Return key are used. As long as

the player can read at a third-grade level, he or she can play the game without supervision.

Provided with the program is a large map containing certain clues and 16 colorful stickers depicting the hidden treasures. As the child progresses through the game, the map and stickers are used to keep track of progress.

The program takes a rather long time to load, over one minute, and if the player is using an older Apple, pressing Reset will cause the system to reboot and the game will start over, with all previous accomplishments lost forever. Newer Apples that require the Control key to be held down in order for reset to function will not have this problem. There is no provision to "SAVE GAME" as on some other adventure games; however if the player plots a trail carefully on the map, retracing past progress should not be difficult.

Complete instructions are contained on the disk, and the player may ignore them once the rules are memorized. These instructions require reading abilities only at the third-grade level, as does the game itself. It's an excellent teaching program and lots of fun, too.

Requirements: 48K Apple II, II+, or IIe
Sierra On-Line, $29.95

TYPING TEACHER

Typing Teacher is an educational program that applies behavorial learning principles to teach one to type or use a computer keyboard. Written by a psychologist, this is not a speed test but a drill program that uses repetition and reinforcement to accomplish its goal.

Very easy to use, the program offers eight practice levels and ten exercises in each level. It starts with the home-row keys and advances the student through the whole keyboard. In each exercise, the student is presented with letters, words, or phrases to type and must type each group four times successfully to advance to the next level. A diagram of the keyboard is displayed at the top of the screen with the new keys highlighted.

At the end of each exercise your score is displayed, and you may advance to the next level or quit.

Requirements: Apple II, II+, or IIe, one disk drive
Compu-tations, $19.95

TYPING TUTOR

Typing Tutor is an interactive drill-and-practice program that will teach you to type and help you build typing speed and accuracy. The unique ability of the program to monitor the user's progress constantly and use this information to create lessons sets the program apart from most drill and practice programs.

The menu offers several options. These include: Learn Keys, Practice Typing, and Typing Test. The program times the user's typing, counts the number of errors and the keys missed. Speed in words per minute and accuracy are continually measured and reported at the end of each drill and test. A beep signals any mistakes. Records of individual users are stored on the disk. The program uses these records to place the student at his level at each subsequent session. Records may also be checked to monitor the student's progress.

The program can add interest to the repetitious drill and encourage the student to keep typing. Interaction between the user and the computer is constant. Regular feedback helps keep the user motivated. Of course, drill and practice are still drill and practice, and much time and effort will be required to make effective use of the program.

The program may be used effectively in the home or at school. Preliminary lessons will be needed to familiarize beginners with use of the keyboard. After an initial orientation, the user may use the program without further instruction.

Requirements: Apple II, II+, or IIe; TRS-80 Model I or III with Level II BASIC, 16K RAM; disk drive or cassette recorder
Microsoft Consumer Products, $29.95

U.S. CONSTITUTION TUTOR

Well, no, actually it isn't. This is a good drill program dealing with the U.S. Constitution. It is not a tutorial at all.

Seven 25-question modules are included on the double-sided disk. The instruction is designed for beginner to advanced levels, grade 8 and up.

In teaching, the program presents a question and five choices. If the answer is correct, the student is rewarded and the choice explained; if the answer is wrong, the student's choice is explained in relation to the question and the student is asked to make another choice.

To test the student, it presents a question and five possible answers. All questions must be answered before one can end the test. In this mode the "Escape key" allows the student to change the

weaknesses here. First, a copy of the Constitution should be a part of the information provided in the software package; it is the model. Second, very little true guidance is provided. And third, the program is not sequenced carefully enough to be self-instructional.

Yet this is a very useful supplementary program. It can be used at several levels of instruction and offers details that even the average teacher may have forgotten.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive

Micro Lab Learning Center, $30

WORD ATTACK

This is a vocabulary builder. It has four working modules and an editor/filer for building your own lists or words and definitions. Word Display shows each word, followed after a few seconds by its definition. Multiple Choice Quiz is just that, a word and a list of possible definitions. It has an elapsed time indicator, and responds to correct answers with a musical fanfare (which can be turned off!). Sentence Completion requires typing in the missing word. The Word Attack module works a bit like an arcade game. Words are flashed at the top of the screen, a definition at the bottom. You must move the cursor under the right definition and press the fire button. At the higher speeds, it is quite challenging.

The data disk includes noun, adjective, and verb lists and definitions in nine levels of difficulty. Lists are limited to 25 words and their sentences and definitions, but the editor permits the creation of an unlimited supply.

This program is crisp looking. It moves right along, without boring delays between the answer to one question and the display of the next. It keeps score, for the current user, but does not maintain any running records of performance.

Requirements: Apple II, II+, or IIe, IBM PC, Commodore 64

Davidson & Associates, $49.95

ENTERTAINMENT

Computerized entertainment has come a long way since Atari's original *Pong* set the world to bouncing a luminous dot around a televised tennis court to the sound of hollow beeping. More than 1000 computer games have been published, and many have hit the lists of best-selling software. Even in the costly, business-oriented world of the IBM PC, games are a perennial favorite; *Softalk* magazine's monthly list of the 30 top-selling IBM programs consistently includes four games: Microsoft's *Flight Simulator* and the entire *Zork* series from Infocom.

Computer games have formed themselves into several clear categories over the years. There are arcade games, strategy games, and adventure games. Arcade games are the fast-moving shoot-'em-ups, mazes, and dodge-'em challenges; quick reflexes and stamina are the keys to success. Strategy games require cunning more than speed; favorites are war games, computerized fantasies modeled on *Dungeons and Dragons,* updated board games such as chess, *Scrabble,* and *Monopoly*. Adventure games are text stories, some with illustrations and some without, in which you are the hero seeking treasure, or simply survival, in an alien environment filled with hidden dangers. Some of the best games combine elements from two or three categories.

And today there are more than games in the entertainment field. Music software has become extremely popular. Some sophisticated programs let you sculpt the pitch, timbre, attack, and decay of each note with a precision that few dedicated electronic-music machines could have equalled only three or four years ago. A few make it easy to duplicate virtually any traditional instrument, and any of them will create sounds unavailable by any other means. A growing number of computer users are finding in these programs an involvement with music that once only a professional composer could have enjoyed.

Whichever kind of entertainment is your fancy, you'll find an ample choice in the following pages.∞

ARCHON

On the surface, the game of *Archon* is clouded by a long-winded explanation—something about gnostics and agnostics, evil empires, witchcraft, etc. If you can cut through this hokum, you'll find a new twist on board games, one that's clever and well presented, but hardly the battle of cosmic importance that's introduced.

Very simply, this is a kind of living chess game. Thirty-six pieces (18 per side) inhabit the checkered squares, each with a rough equivalent to pieces in chess, each with particular rules of movement and attributes that allow it to take or be taken by an opposing piece. The intriguing question asked by the game is this: What if, as in chess, simple rules like "knight takes pawn" didn't always hold true? What if the characters the game pieces represent had to do battle for possession of a square on the board?

So, when two pieces square off in *Archon,* one doesn't automatically take the other. The square in contest expands to a video game arena for battle, and, controlled by joysticks, the pieces fight each other with fireballs, clubs, swords, whirlwinds, spears, and other exotic weapons. Naturally, lesser pieces—knights or goblins, the equivalents of pawns—have less of a chance than superior pieces like wizards or sorceresses. Their relative powers are represented in the battle phase by graphic bars which decrease in length as "power" is spent in combat.

Now here's the twist. In the game, one player represents the "light" players, the other the "dark." The squares on the board start as alternates of light and dark, but soon begin to change shades and go from darkest to lightest in a cycle. So, at one point, the lesser light piece might occupy a square in its lightest phase and be relatively powerful, but when the square turns dark, it may be completely powerless. This makes for constantly changing rules and adds a new and sometimes unpredictable dimension to the game.

Archon can be played by two players or against the computer; the computer plays a relatively stupid strategic game but is almost impossible to defeat in the combat portion. Animation is exceptional, and watching the auto-running demonstration is like sitting through a miniature movie. Especially good, too, is the title screen music, even if it does sound suspiciously close to the score from *Star Wars.*

Requirements: Apple, Atari, Commodore 64; disk drive

Electronic Arts, $40

AXIS ASSASSIN

Axis Assassin, like all of the programs from its

publisher, comes in a package so beautiful it makes your mouth water and your mind race, dreaming of the challenge to come. However, unlike most Electronic Arts programs, *Axis* doesn't live up to the promise.

Basically, the game is similar to Atari's coin-operated hit, *Tempest.* In that game, you fire down oblique, geometric grids at approaching attackers. The same premise is true here, although a variation sends the player to a new shoot-'em-up screen.

The problem seems to be that *Axis* tries to duplicate the *Tempest* graphics. *Tempest,* however, uses an ultra-high-resolution vector-graphics screen, and just about every personal computer uses pixel-based graphics. Consequently, even the best attempts to match *Tempest*'s sleek look fail. The *Axis* screens are confusing, and are made up of lots of jagged lines. The individual enemy characters—the so-called Hunters, Drones, Spinners, Spores, and Xterminators—are difficult to distinguish from one another, too.

Finally, this could be a classic case of making a game too fast and difficult. For first-timers, or those without the jumpy adolescent nerves this thing requires, early games end in the blink of an eye. There is no simple "entry" level of play to become familiar with the rules and action.

Requirements: Apple II, II+, or IIe, Atari, Commodore 64; one disk drive
Electronic Arts, $35

BAT-STAT

Keeping track of statistics for a baseball team is a chore no one likes, so why not let your Apple do it for you? *Bat-Stat,* an easy-to-use, menu-driven program, handles up to 20 players and tracks 10 different statistics such as batting averages, runs, hits, doubles, triples, and home runs.

Data entry is quick and easy, with plenty of error traps and editing features. Once each player's name and initial data has been entered, a revise option allows entry of data for the next game, either for each player or for the entire team.

Batting averages are automatically calculated for each player. They are included in a nicely formatted printed report showing itemized team statistics for the current game and season. Team totals for both game and season are shown at the bottom of the printout. Also available is a printed scoring sheet containing each player's name with spaces for recording data. Extra lines are printed to handle additional players.

Finally, a "roster" option is included to store and print a team roster consisting of player's names, addresses, and phone numbers.

Requirements: Apple II with *Applesoft BASIC,* II+ or IIe, disk drive; printer required for reports
Rainbow Computing, $49.95

THE BATTLE OF GETTYSBURG

The Battle of Gettysburg is a simulation/strategy game based on the Civil War battle. The player controls Union forces against the computer-controlled Confederates.

The game has three difficulty levels, which vary in the time the player gets to make his moves. The player deploys his forces with a joystick that is a little awkward. A skirmish occurs when the player or the computer places a unit on top of an enemy unit. The outcome is determined by a probability algorithm in the program.

There are three stages in the game. In the first two the Union is on the defensive; the player's task is to keep the superior Confederate forces from capturing the field headquarters. The third round evens the odds for the Union side, and the Confederates seem to lose more skirmishes.

The author of *The Battle of Gettysburg* says in the instructions that he has tried to simulate the historical odds as much as possible in this game. Given the limitations of the Color Computer, this is probably impossible to accurately reproduce.

The Battle of Gettysburg is challenging. A good game will last an hour or more, just the thing for a rainy day.

Requirements: TRS-80 Color Computer
Eigen Systems, cassette $20.95; disk $24.95

BENJI'S SPACE RESCUE

This isn't the first time that a computer program or video game has been created around a licensed character from another medium. But the coupling of Benji, that little puppy from the popular kids' movie series, with a hardcore space game, is certainly bizarre, if nothing else.

It was something to joke about. What would happen if, behind the cartoon-like title screen, there was a hideously complicated game? Ironically, the fear was confirmed. *Benji's Space Rescue* is confusing and complicated, far beyond the reach of the tiny dog's fans it is obviously intended for.

The scenario, according to the printed instructions: "Benji, faithful dog he is, is on board the spaceship *Star Woof* with you. He needs you to help him rescue our scientists and engineers who have been snatched by warlike people from another galaxy. The aliens, intent on invading our galaxy, have stashed the scientists on several of our own planets. There, they hope to vacuum the brains of our people for their own evil purposes."

Vacuum the whats out of whom? Well, you probably get the idea. The game itself resembles the old *Star Trek* games rather closely, although this one is much more visual. Though the graphics are fairly good, this is not an arcade game.

It isn't clear who would enjoy this difficult and rather pointless activity. Older kids would never buy the premise, and young children would be left scratching their heads. Still, there seems to be some educational value to it, since the names, sizes, and distances to other planets are included as part of the game.

Requirements: Commodore 64, disk drive
Human Engineered Software, $34.95

BLUE MAX

Your World War I biplane lifts off the runway and within seconds begins antiaircraft batteries and chasing enemy fighter planes. You perform aerial maneuvers of extraordinary skill, shooting down passing and oncoming planes, bombing ships, tanks, vehicles, bridges, buildings, even airfields, with ease. Then a pursuit plane tragically ends your streak of aerial dexterity.

A message appears on the command screen: "Kamikaze Trainee." You realize, as pilot, that you did not perform so spectacularly after all and, resettling yourself on the edge of your chair, you press Start for your eighteenth harrowing round of *Blue Max*.

Or is it your eigthieth? After a few hours with this game, you're sure to lose track. The graphics are excellent, the music and sound effects are up to Synapse's high standard, and the enemy is as skillful and determined as you are. This is a sure prescription for addiction.

Your ultimate goal as you careen through this 3-D shooting gallery is to reach the enemy's city and destroy three specially marked targets. Depending on your agility and the strength of your wrists—jerking the joystick around for hours can give you tendonitis—you may never see this city. *Blue Max* presents a challenge so involved and exciting, that it nearly bridges the gap between mind games like *Adventure* and *Zork* and the best arcade action games.

Requirements: Atari 400/800/XL Series; Commodore 64; 32K RAM, one disk drive
Synapse Software, $34.95

BUZZARD BAIT

Buzzard Bait is a clone of the popular arcade game, "Joust." The player, on a bird-steed, must fly around similarly equipped opponents and knock them off their mounts. If you take too long, the dreaded pterodactyl appears to challenge you. The only way to defeat it is to lance it in its open mouth.

The game is joystick controlled. Rapid tapping of the fire bottom flaps the wings of the player's mount, making it fly. The player maneuvers the warrior around airborne islands and swooping opponents. In later rounds, lava pits appear at the bottom of the screen, along with a lava creature that pulls any bird and rider, friend or foe, into the pit.

Buzzard Bait offers one- and two-player options. It is more fun with two players, who may choose to cooperate, be enemies, or switch roles depending on the situation.

This game's graphics are unsurpassed, but sound effects are lacking. *Buzzard Bait* rates high for playability and sustained interest.

Requirements: TRS-80 Color Computer
Tom Mix Software, tape $27.95; disk $30.95

CANYON CLIMBER

Canyon Climber is a jump-and-climb-ladders game in the *Donkey Kong* tradition. But rather than avoid barrels thrown by a lust-lorn gorilla, the player must make his way up a course populated with angry billy goats.

The game's graphics are very good. The goats look like goats, and when the canyon climber is bucked off a ledge, his arms and legs flail convincingly.

Like *Donkey Kong*, *Canyon Climber* has several different screens. The player progresses to a new one when he reaches the goal of the previous screen. The joystick control works well and can be mastered with little practice. In fact, this game might be ideal for young children.

Unless the player enjoys this sort of game, *Canyon Climber* could become a little monotonous.

However, it is a professional product, as one would expect from Radio Shack.
Requirements: Apple II, II+, or IIe; Atari; TRS-80 Color Computer; joysticks
DataSoft, $34.95 (also available from Radio Shack)

CASTLE WOLFENSTEIN

Let's face it. Computers can be boring, what with managing databases, recalculating spreadsheets, and processing words. But work need not be all we do with them. There's a little of James Thurber's Walter Mitty in most of us, and *Castle Wolfenstein* was created to satisfy it.

Load this program and your workspace becomes a Nazi SS command post where you've been captured and brought for interrogation. Imprisoned in a dungeon, a cellmate gives you a fully loaded Mauser M-98 pistol and, with his dying breath, tells you of Operation Rheingold, Nazi war plans hidden somewhere within the castle. You must find them and escape the treachery of the Reich, dodging storm troopers and prison guards.

Castle Wolfenstein is a cleverly written computer game that combines the elements of both a video game and an adventure. Each "room" in the castle is pictured on the screen, along with the location of doorways, stairs, guards, and SS officers. Any room might contain a chest with the plans you're looking for. Doors lead to adjoining rooms, and staircases to different levels of the castle. Searching dead guards and SS men, you may find some supply items you need to continue your quest. The most you can carry is ten bullets, three hand grenades, a bulletproof vest, and an enemy uniform, if you can find them.

Even though this game's graphics are rudimentary, it is effective and enhanced by the addition of digitally synthesized speech. Guards and storm troopers shout German exclamations throughout the action. Though the game is "winnable"—you can, with practice, find the plans and escape—a system of military ranks keeps the game fresh in repeated play sessions.
Requirements: Apple II, II+, or IIe, Atari, Commodore 64, IBM PC; one disk drive
Muse Software, $29.95

CHOPLIFTER

A long-time best-seller and masterpiece of animated graphics, *Choplifter* remains one of the best action games available. The objective? You must fly a helicopter (you actually have three of them) into the desert to rescue 64 hostages held captive in four different barracks. Along the way, you encounter tanks, jet fighters with air-to-air missiles, and drone air mines that home in on your chopper.

Using a joystick, the chopper is easy to fly up, down, and sideways. By using the push buttons, direction can be reversed and the on-board cannon fired.

The animation is really outstanding. When you set down near one of the barracks, the prisoners will run toward the chopper and climb in. If you take off and leave some behind, they wave at you. After rescuing 16 of the hostages (that's all the chopper can carry), you return to base, let them out, and head back to rescue more. Of course, each of the three levels gets progressively harder.

Maximum score is obtained by rescuing all 64 prisoners—an almost impossible achievement.
Requirements: Apple II, II+ or IIe, 48K RAM, disk drive, two-button joystick; Atari, 16K (cartridge version) or 48K (disk version); Commodore 64
Broderbund Software, $34.95

CRUSH, CRUMBLE AND CHOMP

Here's one of the more unusual themes for a computer game. Although it calls itself the Movie Monster Game, *Crush, Crumble and Chomp* is based, not on Frankenstein, Dracula, or the Wolfman, but on that brand of screen hero who routinely leveled a metropolis with the merest tap of its dainty foot. The artwork on the program's box depicts a scene we'd all like to see: A Tyrannosaurus rex going after the offices of AT&T, the post office, and the I.R.S.

This isn't an arcade game—maybe that was the intention, but it's written in BASIC and way too slow—but rather a kind of fun exercise in strategic planning. You are given printed statistical sheets on six monsters—Mantra, Kraken, Mechismo, Arachnis, The Glob, and Goshilla. Movie fans will recognize at least of few of these, their names changed to avoid copyright infringement. These "baseball cards" list the single-key commands that instruct each monster to grab humans, immolate surrounding buildings, or emit ultrasonic screams, among other goodies, as well as a biography detailing the monster's strengths and weaknesses.

The object of the game is to pick a creature, then move into one of four cities—New York, San Francisco, Washington, or, of course, Tokyo—and de-

stroy, pillage, raise havoc as much as possible, munch on human beings, and, in general, be obnoxious. A scenario in the game consists of combinations of monster, objective, and city. The wittily written manual suggests a few possibilities: Goshilla vs. the Smog Monster, It Came From Beneath Its Budget, and Breakfast at Tiffany's, the last appropriately set in New York.

This is a role-playing game that requires the player to think much like the ruffian he or she is portraying. Graphics and sounds are minimal, but *Crush, Crumble and Chomp* rates high in the creative fun division.

Requirements: Apple II, II+, or IIe, Atari, Commodore 64

Epyx, $30 for disk and cassette

DANCING FEATS

Occasionally, there comes along a computer program so unusual that you don't quite know what to make of it. One of these is *Dancing Feats,* described as a "One-Man Joystick Band."

What's that? Well, that description is both accurate and vague. *Dancing Feats* combines an hypnotic on-screen graphic display with music that you make by moving a joystick back and forth. Still confused? Here's how it works:

Christopher Chance, who designed *Feats,* has cleverly programmed it with various tempos, rhythms, bass lines, and chord progressions. Once you select these from the screen menus, the program begins playing a drum-and-bass background. When you move the joystick to any of eight positions—an Atari-type, switch joystick is used—you play notes within the chord currently assigned by the bass line. Pressing the "fire" button on the joystick lowers the notes one octave. So the total number of note choices is actually 16 within any given chord.

Simultaneously, the screen display fills with multicolored vertical bars that rise and fall in time to the music, giving you something to look at while "playing." Actually, this display can sometimes be very attractive, especially when sounding dozens of notes rapidly.

Another feature of the program is its ability to record and play back the music you've created. The instruction book that comes with *Feats* claims that up to an hour of music can be contained in memory, then saved to disk and reloaded into the machine.

Feat's only major drawback seems apparent. You are limited to the musical elements selected by programmer Chance. It might have been better for him to have created a kind of all-purpose music machine based on the same principles—one in which either the user could program his own bass, drums, and chords, or at least load new ones in from a disk library.

Still, this is a very clever program that provides at least a degree of musical satisfaction almost from the start.

Requirements: Atari, 16K RAM or disk and 32K RAM; Commodore 64; Coleco Adam; IBM PCjr

Softsync, Inc., $29.95

DAVID'S MIDNIGHT MAGIC

This is one of the most difficult computer pinball games. At the same time, its colorful, high-resolution playing field is deceptively simple. There are few bumpers and targets and even fewer goals to achieve.

Still, there is something appealing about this game. Perhaps it is because it is so frustrating. You seem to be forever using the flippers to send the ball to the top, only to have it return without doing much. One key feature of play is the ability to trap several balls in special areas on the playing field. When a target is hit (or the ball "dies" in the correct manner), these are released simultaneously.

Overall, the action is quick and realistic, and the simulation of gravity is very good. The sights and sounds are traditional arcade pinball style.

One nice feature of *David's Midnight Magic* is the use of the space bar to "jostle" the machine. You can add unusual speed to the game this way. This can also bring its quick end, as the program is set up to "tilt" easily, with only a few quick taps of the space bar. There are also "magnets" that can be activated to save a ball from going down the side drains, and a feature that allows the game to be paused and restarted.

High-game scores are saved on the same disk that contains the program. For this reason, be certain that your disk drive is aligned properly. If it isn't, you could destroy the program.

Requirements: Apple or Atari, 48K RAM; Commodore 64; disk drive

Broderbund Software, $64.95

DROL

Computer games come and go, and most live a

short life and die a quick, undistinguished death. Let's face it, bad arcade-style games—shoddy shoot-em-ups and idiotic imitations—outnumber good ones. Maybe that's why anything vaguely attractive, original, or entertaining stands out from the pack. One of these is entitled *Drol*, as in droll, defined by Webster as strange and amusing.

Drol is aimed at children, as indicated by its scenario. You guide the toylike robot *Drol* through four labyrinthian levels on the video screen, moving left and right, up and down in search of a little girl chasing a balloon, her brother (who similarly pursues a toy helicopter), their pet lizard (who is zooming the hallways with an odd jet backpack), and their mother, bound, gagged, and stashed in a corner of the playing field. In contrast to this childish innocence, the antagonists in this nightmare—which you must avoid or stop by shooting them—are leaping scorpions, boogeymen, seahorses, turkeys (which turn into roast turkeys when shot), honking vacuum cleaners, carnivorous plants, a witch doctor, and flying battleaxes, daggers, and spears. Some cast of characters, eh? To help plot your strategy, a radar screen helps you locate the enemies as they approach.

What makes *Drol* so entertaining is a keen sense of art direction (these are among the most detailed and appropriately cartoonlike game figures yet devised), excellent animation, and a cacophony of noisy and humorous sound effects. Programmer Aik Beng has a very rare sense of design.

That the game is aimed at children shouldn't discourage gamers. The action, beyond the opening couple of rounds, gets swift and very challenging. There also seems to be enough variation that players won't soon grow tired. *Drol* is a clever and charming winner.

Requirements: Apple or Atari, 48K RAM; Commodore 64; disk drive
Broderbund Software, $34.95

THE DRUMESISER

The Drumesiser uses the Atari sound generator to mimic a variety of musical instruments. There are three modes of operation: the Editor permits the user to create up to 16 sounds, each with a particular pitch, volume, timbre, and decay, and to assign them to particular keys on the keyboard. The Player allows the user to trigger the sounds by pressing the assigned keys. And the Memory option records and stores to disk or cassette sounds created and whole tunes.

The program has a default "tuning" which comprises a set of 16 percussion sounds, from snare drum to hand claps. In addition to playing the sounds through the keyboard, a function permits control through the joystick ports, either with joysticks themselves or with user-created hookups. Parameters affecting the sound quality are displayed on a grid and may be easily adjusted.

The most serious limitation of the program is that only one sound may be played at a time. Furthermore, the range of tones is limited to 16 at any one time. It is therefore impossible to compose music of any sophistication.

Requirements: Atari, 16K RAM, disk drive or cassette
Gemini Software, $49.95

ENCOUNTER

Suddenly you are face to face with an alien saucer. It fires a shot, a cold glimmering ball growing like a downhill snowball as it zeroes in on you. You pull back frantically, hoping to avoid destruction. A deafening explosion and your screen is splintered fragments of white light; you have been hit.

When *Encounter* loads amid suitably existential music, you are staring out a command window onto a solid green field stretching into eternity. Cotton clouds hover in a blue sky over distant mountains. Haybale pylons, which can block your own (and alien) shots and stop you dead, dot the landscape. On the instrument panel below the window, a small radar screen blips the presence of saucers, drones, and (if you're good) gateways to higher levels. Warning lights are as follows: white means enemy saucer present, check radar screen for position; blue indicates enemy saucer firing, avoid and destroy source; and flashing red warns of low-slung drone on a beeline for your ship—pull back, fire indiscriminately, and pray.

Once you have eliminated all aliens on a level, an ominous hum and a blip on your radar screen reveal the presence of a gaping black gateway leading to the next brutal level. On passing through this fissure, your ship is suddenly propelled at warp speed through a dense asteroid shower; if an asteroid hits your ship, you find yourself back in the landscape you so recently left, with as few shields. If your time/space travel is successful, you gain one shield and alight on a fresh landscape (which, un-

fortunately, is not new, but simply recolored) teeming with aliens and added complications.

You may choose novice, advanced or expert modes and may jump to any level already reached in a play session by pressing the "*" key. There are 17 different enemies which score between 100 and 1,600 points when hit. For the weak-hearted, a tap on the space bar will make the game pause.

Encounter is an austere three-dimensional fast action game to which, quite easily, one can become irrevocably addicted.

Requirements: Atari 400/800/XL Series, 32K RAM, disk drive
Synapse Software, $34.95

FEMBOT'S REVENGE

Fembot's Revenge is an adventure/arcade/maze game. As is usually the case when game genres are combined, something suffers in the process. As an adventure or arcade game, *Fembot's Revenge* is mediocre at best. It is, however, a good maze game.

A novice adventure player will find *Fembot's Revenge* a reasonable challenge, but the game lacks the complexity that serious adventurers seek. The player must find a way through several levels of mazes while searching for various objects needed to win the game. You are attacked frequently by the female robot guardians that patrol the different levels.

The battles with the robots represent the arcade aspect of *Fembot's Revenge.* These encounters require little skill from the player; you just fire away until either you or the robot is destroyed.

The graphics are good, but they don't compensate for the game's weak points. Grade-school-age children will probably enjoy *Fembot's Revenge,* but it will soon bore older players.

Requirements: TRS-80 Color Computer
Color Quest, 16K cassette $29.95; 32K disk $34.95

FLIGHT SIMULATOR

If you've ever wanted to "fly" one of those simulators that the airlines train their pilots on, here's you chance. *Flight Simulator* is an entertaining program with beautiful graphics. It is intended to reproduce, as nearly as possible on a small computer, the look, the feel, the experience of flying in a small airplane. The cockpit view is based on what you would really see in a Cessna 182, with a realistic instrument panel and eight views out covering 360 degrees, plus straight down. Also included is a World War I fighter game, using mostly the same instrument panel.

The program has data for 20 different airports, including JFK, O'Hare, and LA International. This is a real-time simulator, so at 120 kts it will take you two hours to fly from JFK in New York to Logan in Boston. The program has navigation coordinates for all North America, but you can't fly from LA to Chicago, because the program doesn't show any airports in between at which to refuel. The range with the gas tanks provided is about 1,500 miles.

The manual is very thorough, and very long at 94 pages plus fold-out charts, and it covers all the fundamentals of flying, including how to use the radios and instruments in the plane. You may learn to fly in a theoretical vacuum with no weather; after you have mastered the basics you can program the weather, including cloud cover, wind speed and direction, temperature, rain or snow, and even time of day.

The only real shortcoming in *Flight Simulator* is a lack of scale when you are using the radar. The little airplane figure that represents your position on the screen stays the same size whether the scale on the screen is one foot to the inch or 10,000 feet to the inch; consequently, when you are in the larger scale radar screens, you can't tell how far you really are from the airport. Most of the time, this won't matter, but it makes it much more difficult to land, particularly at a strange airport where you don't know the landmarks.

The graphics of *Flight Simulator* will work with a composite monitor or color TV, a black-and-white TV or monochrome monitor, or an RGB monitor. The graphics are their best, though, on a composite monitor (or a normal color TV with a radio-frequency filter added). Pilots swear that aside from the lack of motion, this is almost as good as the real thing for learning what it's like to fly.

Requirements: MS-DOS, 64K, one disk drive
Microsoft, $50

FLIGHT SIMULATOR II

SubLOGIC's *Flight Simulator* program was originally released in 1979 to run on a 16K cassette-based Apple II. It soon became a classic and set many standards in the area of high-resolution, 3D graphics. Enhanced and updated to the point where it barely resembles the original, *Flight Simulator II* now takes to the skies!

Picture yourself at the controls of a new Piper PA-28-181 Archer II sitting on the deck at Chicago's Meigs field. A full complement of instruments and radios appears in front of you on the high-resolution color screen. You tune in one of two VOR radios to O'Hare field, and one of the two comm radios to the ATIS frequency to receive current weather and airport information. Everything looks good as you peer out the window; front, back, or in any of eight directions. Nothing but blue sky ahead. You ease the throttle forward, dial in a little up elevator trim, and before you know it, you're airborne!

Sound exciting? It is, and it's only the beginning. This program provides amazingly realistic flight simulation based on 47 important aircraft characteristics. It includes full shaded color, out-the-window 3D dynamically moving views, extensive flight controls using either keyboard or joystick, and the minimum VFR and IFR instrumentation specified by the FAA.

No longer are you restricted to a 36-square mile area to fly in. Now your world is ten thousand miles square, encompassing the entire United States. Scenery for all this is not yet available, but you do have over 80 airports in four areas—New York, Chicago, Los Angeles, and Seattle—at your disposal. Four ILS approaches, one in each area, are provided. More will be made available on optional area-scenery disks.

The program now includes an edit mode that stops the simulation and presents you with two screens of options and variables. Here you can position your aircraft anywhere desired, switch between "easy" and "reality" modes of flying, set the time-of-day clock, specify the season, cloud layers, wind, and a reliability factor. (Your engine might unexpectedly fail.) Different flight modes can also be chosen to simulate conditions from easy flight through night flying to bad weather.

Two separate manuals are included. The "Pilot's Operating Handbook and Flight Manual" explains the aircraft and flight instrumentation controls, editor use, and program features. A "Flight Physics and Aircraft Control" manual is provided for users with no previous aviation experience. It includes the theory and physics of aircraft flight, plus eight beginning flight lessons to train the user in different aspects of aircraft control and use of avionics. Finally, a section on aerobatics teaches loops, spins, rolls, and other fun maneuvers. Aviation charts that resemble actual FAA aeronautical charts are provided and include airport coordinates, altitudes, and radio frequencies. The "WW I Ace" aerial battle game that was included in the first *Flight Simulator* is also included. Here you pit your flying skills against six enemy fighters.

This is truly the epitome of realtime 3D graphics programming!

Requirements: Apple II, II+, or IIe, 48K RAM; Atari, 48K RAM; Commodore 64; disk drive
SubLOGIC Corp., $49.95

GRIDSTAR

Next football season, football fans might find themselves listening more to their TRS-80s than to Jimmy the Greek for outcomes of each week's game. *Gridstar* is half database-manager, half statistical-analysis program, designed specifically to predict which way the pigskin will bounce.

Gridstar stores ten year's worth of football statistics: home and away teams, score, betting line, date, and number of games into the season. The user can search these data in a wide variety of combinations. The analysis section of *Gridstar* provides a point spread, makes allowances for Monday Night Football games, and gives a power rating based on previous performance. This last feature constantly changes throughout the season.

The same unexpected circumstances that affect the predictions of human oddsmakers affect *Gridstar.* Injuries or a snowstorm could throw off point spreads or a game's outcome.

For $195, any potential buyer must be a serious gambler—or have an insatiable need to know football statistics. *Gridstar* cannot stand on its own; the user must still rely on intuition. This program is well done, though, and its success rate is respectable.

Requirements: TRS-80 Model III or 4, disk drive
Gridsoft, $195

GUARDIAN

Guardian is one of several *Defender* clones. Of them all, *Guardian* comes closest to reproducing the arcade version in graphics, play, and sound.

The player controls a spacecraft flying through a horizontally scrolling landscape. He or she must do battle with a variety of enemy craft, making sure they don't start carrying away the figures at the bottom of the screen. The player destroys enemy craft with forward-shooting missiles, but in case

things get too hairy, he or she has a limited number of smart bombs that clear the screen.

The joystick control has a good feel, and the game is reasonably fast. *Guardian* should challenge even the most experienced arcade-game player.

Guardian is classic arcade action. It's a human versus alien shoot-'em-up with arcade-quality graphics and sound.

Requirements: Apple II, II+, or IIe; Atari; TRS-80 Color Computer

Quasar Animations, cassette $27.95; disk $29.95

HARD HAT MACK

No doubt inspired by the popular arcade game, *Donkey Kong, Hard Hat Mack,* by Michael Abbot and Mathew Alexander, is satisfying without constantly reminding the player of its heritage. Like most of the "running, jumping, climbing" games of this sort, you must move the protagonist—in this case a construction worker trying to avoid his enemies, vandals, and inspectors from the Occupational Safety and Health Administration—through a maze of girders and ladders.

The real game in most of these is discovering how to overcome the challenges presented while racing against a "bonus" clock. For example, in level one, the object is to put four girders in place while avoiding rivets flying from a foundry at the top of the building. In the second level, the challenge is to pick up all of the lunch pails strategically scattered about the structure. The third level asks you to pick up steel blocks and deposit them into a rivet machine. There are enough obstacles, intricacies of play, and considerations of timing that it takes you dozens of games just to get through the first level.

What makes *Mack* more playable than most games of this type is that it is excruciatingly difficult to learn. There's always an opportunity to develop an alternate strategy for survival and, even when you master the game, it challenges you to run the race better and faster for more points. As for graphics and animation, *Mack* is fairly attractive with some interesting action.

Requirements: Apple, Atari, or Commodore 64; disk drive

Electronic Arts, $35

HI-RES COMPUTER GOLF 2

Hi-Res Computer Golf 2 is a remarkably realistic sports-simulation game that stands up to repeated play. It offers three 18-hole "pro" courses, a novice course for duffers, a golf lesson, and even a scorecard processor so you can save your best scores for posterity.

You and up to three other players each have two woods, five irons and a putter at your disposal. Standing at the tee of hole 1, you can see one screen's worth of fairway (because the holes are drawn to scale, longer holes may require as many as three screens). Some screens you can summon display the hole's green or its remaining fairways. Others list such factors as length and par of the hole and ranges of the various clubs. Wind speed and direction, determined randomly before every shot, are displayed automatically.

You choose your club and the strength and direction of your swing, and you're ready to tee off. The ball appears at the bottom of the screen; the clubhead, directly above it at the top. You press any key to start the stroke and tap that key continuously as the club moves down in a brisk arc toward the ball. Every keystroke changes the direction of the clubhead by 22.5 degrees. Hooks, slices, tops, undercuts, and misses—all identified immediately after the swing—are common.

Your "stroke" sends the ball zooming across the screen, avoiding, with any luck, the ubiquitous trees, sand and water traps, and rough. Once the ball lands, you can use another display, the distance indicator, to judge your next shot. After two or three strokes—all holes are par 3, 4, or 5—you should be on the green, which is graced with arrows indicating slopes and contours. You "read" these irregularities, estimate the right distance and direction, and shoot. Congratulations, a par! Press another key, the scorecard appears, and you're ready for the next hole.

True, it's not real golf. But consider this: You may never have to tip a caddy again.

Requirements: Apple II, II+, or IIe, one disk drive

Avant-Garde Creations, $34.95

INFIDEL

Latest in a line of interactive prose adventures and mysteries that began with *Zork*, this is the first in a new *Tales of Adventure Series.* The package is a portfolio that includes letters and maps in addition to the disk and a user guide disguised as an adventure magazine. The letter purports to be from the adventurer to his client back in Boston, and

gives the details of how he came to be stranded in the desert looking for a lost pyramid. In now classic fashion, the user becomes the adventurer by entering such instructions as "BREAK LOCK WITH PICKAX. REMOVE LOCK. OPEN TRUNK. TAKE MAP. READ MAP," etc. The game is designed to take many hours to complete, and provides for saving your place on another disk.

A strong and zany sense of humor pervades all of the materials, which makes the going easier. It requires enough keyboard skill to type in the short instructions, but there is no time limit to penalize the two-fingered among us.

Requirements: Apple II, II+ or IIe, Atari, IBM PC, Commodore 64, TRS-80 Model III or 4
Infocom, $59.95

JUMPMAN, JUMPMAN JR.

The *Jumpman* game—the original and the sequel—are more like quests than games, more like puzzles than competitions. They are among the most playable games available to computer users.

These are probably not children's games, although their basic premise is lifted almost directly from *Donkey Kong*, a Japanese import and arcade hit of the not-too-distant past. Still, intuition is as important to successful playing as is skill and understanding. *Jumpman,* a disk-based game with 31 different screens, and *Jumpman Jr.* (another obvious nod to *Donkey Kong*'s follow-up), with another dozen screens, are agonizingly addictive. These are running-jumping-climbing games in which the player attempts to run the course (gathering game pieces) while avoiding a multitude of obstacles and enemies.

The real secret to winning either of the games—and it is difficult to find anyone who has—is to outwit, second-guess, and generally read the mind of Randy Glover, their designer. Glover, somehow, has created 43 screens (both games, total) not only different enough to sustain interest, but devious enough to make players actually want to know what comes next. By selecting, in the original *Jumpman,* a playing option called randomizer, which selects screens at random instead of their usual order, it's possible to see most of the 31 screens, providing you play long enough. This option isn't available in the sequel, a cartridge game, so you must work for a glimpse of the challenges ahead, each revealing itself like layers of an onion, one by one. Who knows what is buried in the code at the end of *Jumpman Jr.?*

Requirements: Atari, 48K RAM; Commodore 64; one disk drive
Epyx, Inc., $40 each

LODE RUNNER

There's a genre of games that has emerged over the past year or two that might be best called "running, climbing, and jumping" games. The first of these was probably the Japanese game, *Donkey Kong.* Basically, these involve putting a little character through his paces on the video screen while trying to dodge obstacles, outwit pursuers, and learn to maneuver a complicated, mazelike structure.

Lode Runner is one of these. Its scenario finds a miner trapped in a series of underground caverns, escaping several other characters who are not only pretty smart for this kind of game, but quick as well. The protagonist can climb ladders and foil his foes by digging holes in the multilevel structures, into which they are unwittingly lured. (Moving the character and digging the holes is controlled with a joystick and the "fire" button, or from the computer's keyboard.) The goal of each screen is to collect several boxes, representing golden treasure, scattered around, including a few that the enemy picks up and moves from time to time.

This program would seem fairly routine if it weren't for several unique aspects. First, the on-screen animation of the figures, which run, climb ladders, drop, and jump from level to level, is true to life—something quite unusual for arcade-style games. The layouts of the screens, too, are diverse and challenging.

While other running and jumping games have multiple screens, *Lode Runner* seems to have set a record that isn't likely to be easily broken. There are an astounding 150 screens to figure out, and each is very different. These are contained as files on the program disk, and the next one is loaded each time a screen is finished.

Finally, *Lode Runner*'s authors have included a game editor that allows players to play any of the screens—great for those who have no hope of ever making it through all 150, due to either lack of skill or time. The editor will also allow the construction of additional screens. This feature should be standard on arcade games; and it adds a welcome degree of creativity to the video-gaming pastime.

Requirements: Apple or Atari, 48K RAM; Commodore VIC-20 or 64; IBM PC; disk drive
Broderbund Software, Apple, Atari, Commodore 64, or IBM PC $34.95; cartridge for Commodore VIC-20 $34.95; Commodore 64 $39.95

MONTY PLAYS MONOPOLY

How good a capitalist is your TRS-80? Radio Shack tries to answer that question with *Monty Plays Monopoly.*

Up to seven people can play with *Monty.* He plays a conservative, but competent, game of *Monopoly,* always buying his way out of jail and rarely going over book price when bidding for properties. *Monty*'s graphics are good, considering the limitations of the Models III and IV. A train chugs across the screen when a player lands on a railroad, a tub fills with water on Water Works, two cars appear on Free Parking, and Monty himself looks rather dapper. Music and sound effects are available to those with amplifiers.

Monty does not eliminate the need for a playing board. In fact, the only aspect of the game that *Monty* controls is the dice roll, and only if the human players don't choose to roll for themselves. He depends on the other players' honesty, as he has no way of knowing how much money the other players have or what he owes them for rents. If the other players grow tired of Monty, they can easily conspire to bankrupt him.

Monty adds nothing to the game, except the novelty of playing against a computer. Children might find him amusing, but he will bore adults once the novelty wears off.
Requirements: TRS-80 Model III or IV, disk drive
Radio Shack, $34.95

MONTY PLAYS SCRABBLE

Can't find a Scrabble partner? Your computer can be a creditable opponent with *Monty Plays Scrabble.*

Monty plays by standard Scrabble rules using a 54,000-word vocabulary. You need a Scrabble board and pieces to play along with *Monty. Monty*'s vocabulary and computer logic make this game a reasonable challenge for the average Scrabble player, but advanced players might find it too easy. *Monty* seems to go for points at the expense of long-term strategy.

The game is very slow, because *Monty* must do lengthy searches of its vocabulary on each turn. This requires a lot of disk accessing, which is *Monty*'s biggest drawback. The constant disk I/O will shorten the life of the game disk, and Radio Shack has made the game so the player can make only one backup. Still, lonely Scrabble fans will find *Monty* a worthwhile investment.
Requirements: Apple II, II+, or IIe; TRS-80 Model III or 4
Ritam, $34.95 (also available from Radio Shack)

MUDPIES

Mudpies is one of those games that makes everything else seem boring. It's clever, challenging, and just plain fun.

The player finds him- or herself in the shoes of Arnold, a boy who went to the circus only to encounter hordes of mad clowns. Arnold's only weapons are the mudpies scattered about. He runs from room to room fighting off the clowns and eating junk food to keep his energy up.

Arnold is joystick controlled. He throws a mudpie in the direction that the joystick points when the player presses the fire button. This method takes a little practice.

Mudpies features good sound effects and outstanding graphics. It's more fun than going to the circus.
Requirements: TRS-80 Color Computer
Computer Shack, cassette $27.95; disk $29.95

M.U.L.E.S

M.U.L.E.s is an acronym for Multiple Use Labor Element, a fictitious machine for production in this game, which is based on a novel economic model. In it, you, your *M.U.L.E.s,* and any combination of three other human or computer opponents set up shop for an exploration of resource management on an alien planet. The basic idea behind *M.U.L.E.s* isn't a new one. In fact, it is close in concept to *Hammurabi,* an early computer game classic.

The authors of *M.U.L.E.s* have greatly expanded on *Hammurabi*'s ideas and have added unexpected twists, excellent animation, music, a touch of whimsy, and lots of personality.

The game begins by choosing a character from species with names like Mechtron, Bonzoid, Spheroid, and, of course, Humanoid. Each player begins with $1,000 in money and $300 in "goods"—food and energy. After selecting a plot of land from an

overall map of the planet's surface, you decide what to produce on it: either food, energy, Smithore—which is used in the production of more *M.U.L.E.s*, or the mythical Crystite. When the decision is made, players go "into town" to outfit a *M.U.L.E.s* for production, and stop, perhaps, for a gambling session at the local pub (a random money award is made here).

After a round of production (the success or failure of which is determined by the program), a "store" is set up for buying supplies and selling what has been produced. Prices are determined by player dynamics during the "auction" phase until buyers and sellers run out of products or money. There are three different levels of play: a short beginners' game; the standard game, which differs in the length of play and the requirement of a certain standard of production; and the tournament game. The tournament game includes Crystite mining and collusion between players to inhibit other (richer and leading) players from advancing.

M.U.L.E.s is the kind of cutthroat game that can make enemies. It is conceivable that it could become the computer-age equivalent of that other capitalist classic, Monopoly. As a kind of bonus, the game has an extremely entertaining animated title screen and a catchy theme song.

Requirements: Apple II, II+, or IIe, Atari, Commodore 64; one disk drive
Electronic Arts, $40

MUSICALC

Too little attention is paid to the creative aspects of computing, to art and music, for example. And when a good visual or musical program does come along, it tends to reflect the traditions and style of the real world. *MusiCalc* is a program that breaks more rules that it respects. It is a very radical approach to computer music that in the end turns out to be extremely logical, and very powerful as well.

For a real-world model, *MusiCalc* uses the electronic music synthesizer and sequencer. For those unfamiliar with synthesizers, a sequencer allows a musician to store passages of music, from complete compositions to snippets of melodies, so that they can be performed and played along with as accompaniment. The synthesizer controls the creation of a sound, and provides a way to play these sounds as music.

Since the SID (Sound Interface Device) chip inside the Commodore 64 is itself patterned after a music synthesizer and capable of most of the same sound-shaping functions, this software emulation is a natural. *MusiCalc*'s main screen depicts the sliders and switches common to most synthesizers. By touching a key and moving the sliders up and down on the screen, values and choices relating to the creation of sounds are selected. In addition to sounds, such factors as tempo and volume are also controlled by the sliders and switches. Individual notes are played from the 64's keyboard.

This is only the beginning, though. Moving from the main screen to another allows the selection of presets, which are both sounds and scores, or collections of notes. A single preset for sound actually contains the values for three different sounds—one for each voice the the SID chip can generate. *MusiCalc* can store up to 32 of these groups in memory. A score contains up to 240 notes or chords, and the program stores as many as 32 of these. Both scores and sounds are selected by pressing either the Shift or Commodore key in conjunction with another number or letter key on the keyboard.

Besides presetting sounds and scores, *MusiCalc* will also redefine the Commodore 64 keyboard so that the keys follow any kind of scale. This is useful when creating music in certain genres, blues for example, and for making music that follows scales of the folk music of some nations.

Much of *MusiCalc*'s power comes from its ability to edit and manipulate the music and sounds created. "Links" can be set to control the order and repetition of elements within scores, and individual notes within a score can be changed. In keeping with the program's approach, none of this is depicted on the screen in standard musical notation.

MusiCalc 1 is the first of several modules and products from Waveform, the company that publishes it. Also available is *MusiCalc 2*, which includes programs for printing the music you compose in standard musical notation on a dot matrix printer and for linking scores together into longer compositions. Another program in this package actually lets you synchronize your Commodore 64 with digital drum generators, synthesizers, or even another Commodore 64 running *MusiCalc*. *MusiCalc 3* has a program to create custom keyboards in unusual scales and also contains a library of over 80 "scales of the world," a musicologist's dream. Two additional packages of pre-

sets, one of Latin and African rhythms and sounds, and another of rock and "technopop" presets, should be available by the time you read this. Waveform is also publishing individual disks of compositions produced with *MusiCalc,* though the program is not required to play them. (Think of them as digital records.)

The value of *MusiCalc* may be difficult for some people to realize. Like any musical instrument, it demands time to learn how to use it and a willingness to absorb its complexities.

Requirements: Commodore 64, disk drive
Waveform Corp., *MusiCalc 1* $79.95; *MusiCalc 2* and *3* $39.95 each

MUSIC COMPOSER

Amateur musicians are likely to find themselves spending hours with this program. *Music Composer* edits, arranges, plays, and displays using the Atari sound registers. Though it can be slightly tedious to use, the results are often satisfying.

Music is entered note by note by specifying the pitch, duration, and octave of each one. Duration can range from thirty-second notes to whole notes, including dotted values and rests. Notes are displayed in screen graphics, on standard musical staves, and may be played back as the writing progresses. Up to ten phrases may be written, each divided into measures. Each of four voices can then be programmed to play phrases at different volumes and transpositions and in varying order. Functions allow the composer to change key signature, tempo, and meter. Any or all phrases and voice arrangements may be filed to disk or cassette.

Writing music with this program is considerably easier than with BASIC, but there are some limitations. Entering each not is a rather slow process. Only one musical line can be edited at a time, and only one line is displayed on screen during playback. Tone quality and attack cannot be adjusted. But in partial compensation, saving music files for later modification or incorporation into other compositions can save much time and effort.

While *Music Composer* is geared toward those with prior musical knowledge, it can be useful tool for those just learning about music and beginning to experiment with it. Relatively sophisticated music can be written with this program. At the price, it is a good value.

Requirements: Atari, 16K RAM
Atari, $25

MUSIC CONSTRUCTION SET

Every once in a while there comes a computer program so good, so cleverly crafted, that it must be admired, even applauded. *Music Construction Set* is one of these. On screen, it is attractive and appealing. Its code—the programming itself—is undoubtedly complex beyond most users' imaginations. That it was written by one Will Harvey, a 17-year-old Eagle Scout, crack science student, and football star, makes it the stuff of legends.

In short, *Music Construction Set* does for music composition what Apple's Lisa did for computers. It introduces a visual system for creating, writing, and playing music. Just how Mr. Harvey has squeezed this much power out of tiny computers remains a mystery.

The working environment of the video screen is simple. At the top is a window that contains a horizontally-scrolling, standard musical staff treble and bass. Beneath it are the elements of musical notation: notes—sixteenth, eighth, quarter, half, and whole, plus a "dot" for extending their durations, rests, sharps, and flats. Nine visual "icons" are used for control. A picture of a hand is selected, and the notes and other symbols can be picked up and placed on the staff in the window. With the scissors and paste-pot icons, measures of music can be cut out into a memory buffer, then pasted anywhere in the score. The keyboard, a joystick, or a KoalaPad touch tablet can be used to operate the program. Files can be saved and loaded to and from the diskette.

Pictures of slider switches are touched to change the tempo at which the music is played, the instruments playing, and volume. Time signatures can be selected that synchronize the scrolling to music as it plays. Perhaps most powerful of all, music can be composed in one key, then by touching the word "key" on the screen, transposed—actually rewritten—into another. Finally, the compositions written with *Music Construction Set* can be printed on paper using a dot matrix printer.

Those who have had no musical experience aren't excluded from *Music Construction Set.* In fact, this is probably one of the very best tools for teaching music ever created. The excellent manual included is a virtual short course in music theory and details the program's few limitations. (One is

length—up to 700 notes can be entered. The other is that notes of different durations cannot be mixed within a single chord. This is easily worked around, however.)

For the sake of instruction and demonstration, the program disk also includes several sample scores for experimentation and some excellent compositions, several of which were written especially for *Music Construction Set* by California composer Douglas Fulton, a specialist in electronic music at Stanford University.

Music Construction Set varies slightly from computer to computer only in the number and type of instruments that can be played. The Apple version, for instance, plays only four instruments in two simultaneous voices. When a special sound board is installed in the Apple—the Mockingboard, at an additional cost of about $100—the program will handle up to six simultaneous voices. The Commodore 64 version allows chords of only three voices, but offers 13 distinct instrument choices. The Atari computers yield four simultaneous soundings.

Not enough can be said for this program, and this is not an idle boast. It deserves to be in every home, classroom, and library in the nation.

Requirements: Apple or Atari, 48K RAM; Commodore 64; IBM PC or PCjr; disk drive
Electronic Arts, $40

MUSIC MACHINE

Music Machine was one of the early attempts to exploit the Commodore 64's music and sound. Since then, much better programs have appeared—namely Electronic Arts's *Music Construction Set* and Waveform's *MusiCalc*. But the *Music Machine* is a simple and relatively inexpensive place to start learning about music and understanding how the 64's famous SID (Sound Interface Device) chip works.

The program defines the top two rows of the keyboard as a piano; *Q* is the note C, and the remainder of the keys are measured against this position. The 2 key, for example, is C# (C sharp). This isn't a perfect arrangement, of course. Experienced keyboardists, whether typists or pianists, will find it uncomfortable at best.

There are other groups of control keys, as well. The "Commodore" key controls the function labeled "keyboard," and changes the sound of the note from one that decays to a sustained or held note. The Shift key controls effect, a choice of "glide," "vibrato," or "special." Four different waveforms can be selected with the *Z* key—a square, triangular, sawtooth wave; or a narrow pulse. Up to three voices can be sounded simultaneously—each must be the same note, however—in one of six octaves. Octaves are controlled by cursor keys, the number of voices by the right Shift key. In addition, one of four different percussive backgrounds can be selected, and the tempo can be quickened or slowed.

Unfortunately, the *Music Machine* doesn't allow true manipulation of the marvelous sound of the SID chip, nor does it allow melodies to be saved, either in memory or on tape or disk. This is strictly a way to bang on the keyboard, make expressive sounds, and—with a little practice—maybe actually play a tune.

Requirements: Commodore 64
Commodore Business Machines, $19.95

MUSIC MAKER

Music programs for the Apple are certainly nothing new. Many of them have been around for several years. Some will allow complex voicing of different instruments and let you enter virtually a full-score orchestra. Others although simpler are intended for musical instruction instead of actually playing music, and still others are just toys, fun to play with but not very useful. Most however, require expensive hardware devices such as internal plug-in boards and keyboards.

Music Maker requires no additional hardware of any kind. Entirely software-based, you may develop elegant compositions with a minimum of musical knowledge. You can enter songs from sheet music or create and save a library of your own music and sound effects to be played back at any time. The program can also be used as a sound utility in conjunction with other programs. Once a song is created, it can be used anyplace you want. It requires nothing on the original disk to replay and no special programming knowledge to use.

Be aware this is not an ultimate music program; it does have its limitations. You can't enter the entire score of a symphony. If the song exceeds 1,000 notes, it must be divided and then linked. With a range of 50 notes from F below low C to F sharp above high C, it provides all the notes necessary for virtually every melody ever written.

The *Music Maker* program is comprised of three main components. The Songmaker/Editor module is used to construct a song, the Song-Part Linker is used to create a song longer than the 1000 note limitation, and the Module Maker is used to create a song module from the assembled songs you've saved on disk. This is the final form a song (or songs) must be in to run from *Applesoft BASIC* or to be incorporated into one of your own programs. It's interesting to note that once a song has been created into a song module, the *Music Maker* program is no longer required to run the song. Anyone, anywhere on an Apple, can play the song using a simple program command.

You don't even have to be a musician to use this program. A complete music refresher section is included in the manual along with a tutorial. Very easy to use, you may enter whole to 256th notes, dotted notes, triplets, quintuplets, stacatto, regular or legato notes, plus all sharps and flats. The Songmaker/Editor allows you to insert, delete, repeat, edit, set keys, and change tempo. A command-summary card is provided, along with several samples of sheet music included for practice music entry.

Music Maker allows the development of specialized sound effects. A grace—64th—note is about as short as the Apple can play on tune, but is actually four times longer than the computer can handle. Added to this are two other note types that can be used for sound effects: A and B. B is one-half the duration of a grace note, and A is one-quarter the duration. These can be blended together in various combinations to create chords and multiple-voice melody lines of any length or complexity.

A complete section of technical information in the manual describes how to use the song from within your own *Applesoft BASIC, Integer BASIC,* or machine language programs. Completed song modules can be relocated to any memory location to accommodate your own program requirements with the Module-Relocator program included. The sound signal can be sent to either the Apple's own internal speaker or routed to the cassette port to drive an external amplifier and speaker system. Included also is a self-running demonstration program that shows the musical and sound effects capabilities very effectively.

A colorful added feature is the Kaleidoscopic Maestro, which adds color graphics to your songs while they play.

Requirements: Apple II or II+, 48K RAM, one disk drive
SubLOGIC, $39.95

MYSTERY MASTER: MURDER BY THE DOZEN

The personal computer offers some unique opportunities for creating new fictional forms. And one genre that seems to translate well is the mystery novel. *Murder by the Dozen,* along with Infocom's *The Witness* and *Deadline,* and Electronic Arts's *Murder on the Zinderneuf* all explore the genre differently.

While the Infocom games are closer to interactive fiction—they are limited to text—*Zinderneuf* and *Murder by the Dozen* are more like games. And, of the two, *Murder by the Dozen* is more like a board game.

After the program is loaded, one case is selected from a graphic menu of 12, and the program asks for the number and names of the detectives who will be sleuthing. At the beginning of a turn, seven choices are offered. These are interviews with suspects and examinations of evidence. A running total of "time"—actually a point score based on the number of interviews and investigations—is kept for each player, and at the end of a round players have the chance to continue at a different "location," that is, a new set of questions.

What makes *Murder by the Dozen* so much like a board game is its reliance on noncomputer materials. In effect, the computer is just managing a game played by consulting two booklets—one of clues, the other of solutions. A preprinted worksheet, including a generic map, is also a necessary part of the game. There seems to be no real reason why these materials could not have fit, instead, on the program disk, except perhaps to thwart pirates who only get some useless code by copying it.

The mysteries themselves are not outstandingly clever, only adequate. One very alluring feature, however, is the excellent design of the video graphics. This could have been a better program—even a classic one—if it were as challenging as it is beautiful.

Requirements: Apple II, II+, or IIe, Commodore 64, IBM PC; one disk drive
CBS Software, $34.95

NECROMANCER

Ready to plunge into a kaleidoscopic shadow-

land of wisp-wielding druids, walking trees, and wiggling eye pods fecund with unborn seed? Then don the robes of the goodly druid and enter the first of *Necromancer*'s three eerie landscapes. Your task here is to plant and maintain as many friendly trees as possible before your strength gives out and your are magically transported to the second level. As you fling the seed-planting wisp around with the joystick, nimble-footed ogres run like freight trains over baby trees, while a gangly gray spider turns adult trees into dead stumps unless your wisp can wipe the screaming face off the doomed tree in time. The druid loses strength if touched by the spider, but gains if he hits the spider with the wisp; similarly, strength is lost but points gained for killing ogres and curing trees. The myriad factors to juggle while frantically planting and curing trees make this level both unforgiving and exhausting.

In the second scenario your mission is to destroy as many spider larvae as you can. Walking trees lumber onto vaults of larvae and erode the brickwork, crashing down upon the evil larvae to kill them. While your druid is busy directing the demise of larvae, gargantuan Hands of Fate and salivating spiders drain druid fluid and kill trees. If you run out of strength here (or in Act Three), you die and the game is over.

If you manage to descend alive through all five levels of the second scenario, you find yourself in the nefarious Necromancer's lair. Here you must remove 13 gravestones by walking your druid over each one—without succumbing to the deadly attacks of the Necromancer and his evil crew of zombies and immortal poison-spitting spiders. Wipe out all 65 headstones on five levels, and the forest will explode in a rainbow of colors, a sight most druids will probably never live to see.

Necromancer is eerie, weird, and superb. The music is suitably otherworldly, and the sound effects, as with most Synapse games, are right on. It is one of the most imaginative and exciting games on the market and is highly recommended.

Requirements: Atari 400/800/XL Series; Commodore 64; 32K RAM, disk drive
Synapse Software, $34.95

NIGHT MISSION PINBALL

Night Mission Pinball is one of those games that you've got to admire even if you're not a game fan. It is a skillfully designed simulation of a pinball game; the emphasis is definitely on simulation.

From *Night Mission*'s "Adjustment Manual": "Machine inclinations (gravity) are considered in ball travel. Ball-surface collisions consider restitution (bounciness) and tangential friction (stickiness) effects. These effects are user-adjustable."

That's not all, either. There are 38 different variables that players can set to customize *Night Mission*. Settings can be saved to disk or tape, and even "locked up" with a six-digit code to prevent anyone else from further tampering with the game.

But how good is *Night Mission*? Very good, but very unusual. The screen action matches a real pinball machine very closely, though artistic license has been taken with reality in at least one case. The "ball" leaves a trail of images of itself when the action gets speedy. The theme of the game, too, is unorthodox.

As the title implies, *Night Mission* is keyed to a World War II bombing run, and the sounds, instead of the traditional bells, beeps, and "ka-chings" of pinball, are electronic renditions of howitzer fire, the whine of B-17 airplane engines, and the whistling of falling bombs. Pacifists might find these a bit disturbing.

Graphics—you choose between multicolor and high-resolution versions—are exceptional. Control is via either the computer's keyboard or joysticks.

Requirements: Apple, 48K RAM; IBM PC, 64K RAM; Commmodore 64; disk drive; Atari with 48K RAM and disk drive or cassette
SubLogic Corp., Apple $34.95; IBM PC $39.95; Atari or Commodore 64 $29.95

PINBALL CONSTRUCTION SET

Legend has it that Steve Wozniak, inventor of the Apple II, once called *Pinball Construction Set* "the most powerful program ever written for an eight-bit machine." If that's the case, then writers of more practical software better sharpen their programming skills.

Nonetheless, one look at *PCS* is enough to make even the most serious computerists sit down and play for a while. At the heart of the program is a pinball simulation—an arcade game. Playing pinball, however, may not be the object of this game.

After the program is loaded, the video screen displays a blank pinball playing field. Next to it are an assortment of odd shapes. Most of these are the

elements of pinball game design: bumpers, flippers, elastic rails, drop targets, and so on. Also included are a set of icons used for the operation of the program itself. The most potent is a small hand with a pointed finger.

By moving the hand around the screen with a joystick and using the "fire" button to pick up and drop pieces, an almost unlimited number of different pinball games can be designed. (There seems to be no limit to the "stock" of pieces.) After the game pieces have been placed on the playing field, it is time to complete the design. By picking up an arrow icon, geometric shapes, as well as the shape of the playing field itself, can be altered by stretching and squashing the geometry. The icons of a hammer and scissors are further used to this end.

By choosing the icon of an electronic logic symbol, the board is turned over and, with wire cutters and screwdriver, the machine can be "wired" to yield points and bonuses when sequences are completed and to sound any of a variety of musical notes when a bumper or other object is hit.

Turn the board over once again, and touch the tiny image of a paintbrush to illustrate either the playing field or the scoreboard. Finally, by selecting the icon that symbolizes "the world," values for elasticity, "kick," and even gravity can be set to any taste. After the machine is finished, touching another symbol, a floppy disk, allows you to save the design to disk or to load another already-constructed game.

Naturally, any pinball game that is designed with *PCS* can be played. But this program soon begins to pose an interesting question: Is it more fun to play a game or design one?

Credit must be given to Bill Budge, creator of the program (and to the others who have adapted it for other computers), not just for its ingenuity and visual appeal, but for arriving at a shrewd balance of challenge and satisfaction. Creating a game with *PCS* is not easy; it can take hours of tinkering and refinement. Nonetheless, every step taken, either toward the perfect design or just some playful experimentation—is rewarding. Very clever.

Games come and go, oftentimes quickly, but *Pinball Construction Set* has already become a classic with a special place in many, many software libraries.

Requirements: Apple or Atari with 48K RAM; Commodore 64; disk drive
Electronic Arts, $40

POGO JOE

Like television, the video game business often displays a certain lack of originality. Designers of computer games freely adapt ideas from one game and incorporate them in a new one. To be fair, the original game probably benefits, since official home versions of the arcade classics come slowly. Hence, there are dozens of *Pac-Man* and *Space Invaders* knock-offs.

Pogo Joe owes a lot to a current arcade favorite, *Q*bert*. Both games are built around little characters who hop from space to space, changing the colors of the spaces as they land. Both games, too, feature odd adversaries who get in the way of this activity.

Pogo Joe, however, goes beyond *Q*bert* in several important ways. First, there are 64 unique screens in *Pogo Joe,* each a different layout of cylinders, rather than cubes. Characters are more varied, and some members of the supporting cast are not threatening, but offer additional points if the player comes in contact with them. The overall graphic design is much better, too. This program is so laden with features of game play, animation, sound, and musical effects that it even lists credits, like a minimovie, for art and musical direction. (The music, a kind of hurdy-gurdy theme, is quite good, but since it plays incessantly it can become annoying.)

Unfortunately, the game would be better if it were more controllable. All of the movement is diagonal, and with even the best Atari-type joysticks it is difficult to position the stick correctly.

Still, with enough practice, dedicated video gamers will most likely overcome this inconvenience and enjoy this nicely designed contest.

Requirements: Commodore 64, Atari 400/800/XL series; 64K RAM; one disk drive
Screenplay, $24.95

POOYAN

The official Color Computer version of the popular arcade game, *Pooyan* pits pigs against wolves. In its cutesy scenario, a pig moves up and down in a basket, shooting arrows and hunks of meat at wolves that float past hanging onto balloons.

You, as the pig, must shoot down a quota of wolves in each round, avoiding the acorns they hurl at you. If you let too many wolves get by, they will either come up behind you and shove you out

of the basket or push a boulder onto you, depending on the round of the game. The action is brisk.

You can use either the keyboard or a joystick to manipulate your character, but you have much better control using the keyboard.

Pooyan is one of the most entertaining and professionally done games for the Color Computer. It costs more than many others, but it's a better value because it holds the player's interest much longer.

Requirements: TRS-80 Color Computer
Datasoft, $29.95

PSYCHE

Can machines possess intelligence? Computer scientist Alan Turing maintained that a machine should be considered intelligent if a person chatting with it at a terminal could not determine whether he was talking with a machine or a human.

Psyche is an interesting attempt to reach that level. Modeled on the famed *Eliza,* developed some years ago at MIT, *Psyche* simulates a Rogerian counselor. No matter what you say, it throws back a question designed to spur introspection. Tell *Psyche* "I'm sad today," and it will return with "Could you be more specific?"

Psyche's responses are sometimes keyed to specific words if they are in its vocabulary of "1,000 psychologically significant words." Things like "mother" or "hate" trigger surprisingly appropriate comebacks. And, yes, it knows four-letter words. However, most of the time, responses are vague, such as "Interesting. Tell me more."

As a novelty, the conversations tend to become one-sided and boring very quickly. The concept of *Psyche* is intriguing, much more so than the program itself. Those factors notwithstanding, *Psyche* is an eye-opening way of introducing your computer to beginners.

Requirements: IBM PC, DOS 1.1 with 64K RAM or DOS 2.0 with 96K RAM, one disk drive
Balis Computing, $50

ROBOTTACK

Fail to save the world in your last video game? Here's a chance to save the survivors. *Robottack* pits the player as a "super human" against a horde of robots bent on destroying the remnants of mankind.

The player has the entire screen in which to maneuver around swarming robots while whisking humans out of harm's way. The action is extremely quick, and two joysticks are required: one for movement and the other for firing a weapon.

Manipulating two joysticks takes some getting used to, and if the joysticks are not firmly mounted on a solid surface, play is nearly impossible. Self-centering joysticks are recommended.

With good joysticks well mounted, using two of them turns out to be an entertaining challenge. *Robottack* is a well-executed game that even the most jaded arcadian can enjoy.

Requirements: TRS-80 Color Computer
Intracolor Communications, cassette $24.95; disk $27.95

ROBOTWAR

Robot War is NOT a game! At least not in the usual sense of the word. Instead the player programs robots to do battle against other robots. No manual dexterity is required; just skill and cunning.

Designed to teach computer literacy and basic programming skills, *Robot War* uses a programming language that is sort of a cross between BASIC, Logo, and assembler. A robot action-scenario is designed, programmed, tested, and finally executed on the battlefield. Up to five robots engage in battle simultaneously.

Programs are written using a full-screen text editor (shades of *SuperText*), and then "assembled" into robot object-code. The robot is then bench tested; the program is executed, a step at a time if desired, and the results monitored. Here you check such things as speed, direction, radar sensors, and weapon firing. If everything checks out, then you pit your robot against one or more others on the battlefield.

Robot War programming is fun but not easy. The discipline required to do assembly-language programming is required here also, but the rewards are fun and challenging.

A detailed 75-page programming manual is included.

Requirements: Apple II with *Applesoft BASIC,* Apple II+ or IIe, 48K RAM, disk drive
Muse Software, $39.95

ROGUE

You're a novice fighter, armed only with a short sword, a bow and a few arrows. You cautiously enter the dungeon, sword at the ready, in search of treasure and wealth. The first few levels are not

very dangerous—snakes, bats, a few jackals. Once in a while a Hobgoblin or Kobold attacks, but they aren't very tough. You find a long sword, a few undecipherable scrolls, the odd gold piece. Gaining experience and strength you become bolder and plunge down the staircase in search of the mystical "Amulet of Vendor." If you can find it where so many others have failed, wealth beyond imagining will be yours—and you've got a pretty good imagination! But the deeper you go, the tougher the monsters, and the greater the rewards.

Now available for the IBM PC, *Rogue* has long been popular on PDP-11s and VAXes-running UNIX. It was originally written at Berkeley by Michael Toy and Ken Arnold, who then adapted it for the PC.

The similarity to *Dungeons and Dragons* isn't accidental. This game has similar concepts—experience points, ability levels, hit points, strength points. The display has a line at the top of the screen for messages, and at the bottom for status information. In between is shown a network of rooms you must explore by moving your "rogue" with cursor keys.

When each level of up to nine rooms has been explored, you go down to the next. If you are good enough, you will probably find the next Amulet of Vendor around level 22 or so. Each game is different, all aspects of the dungeon—size, shape, treasure distribution—being controlled by a random number generator.

Once the amulet is found, the game is only half over. You still have to get out alive—if you can!

Requirements: IBM PC

Artificial Intelligence Design, $44.95 plus $2.00 handling and postage

S.A.M. (SOFTWARE AUTOMATIC MOUTH)

It is always exciting to see software that does the work of hardware. Most computer speech synthesizers use special talking microchips; the most popular of these is the Votrax talker. But a program called *S.A.M.*, the *Software Automatic Mouth,* talks all by itself.

S.A.M. uses the sound chips inside the Commodore 64 and Atari computers, or a simple digital-to-analog card supplied with the Apple version, to produce completely intelligible speech. The quality is, in some ways, not as good as the speech produced via a hardware-based synthesizer, but it is still very acceptable. If you listen to *S.A.M.* closely, you can more easily hear the individual phonic elements that make up a spoken word. This can be a bit distracting until you've grown familiar with *S.A.M.*'s voice.

There are some advantages to using *S.A.M.* instead of a hardware speech synthesizer, though. A feature called Knobs lets you modulate the "mouth" and "throat" to produce some very distinctive voices. The most effective of these in the demonstration that comes with *S.A.M.* is a convincing "little old lady" voice.

S.A.M. also shines in the quality of its text-to-speech program, called the *Reciter.* This adds new commands to BASIC, so that words can be spoken as easily as they are printed on the video screen. After telling the synthesizer that you will be using *Reciter,* you use the word *say* instead of *print* to make *S.A.M.* talk. The speech produced from a string of English words (phonetic spelling can also be used) is quite good, and *S.A.M.* knows enough to add its own inflection in response to commas and question marks.

S.A.M. is a novel and perhaps even useful experimental tool that, at the very least, will startle you with its capability. Since it is priced at about half the cost of current hardware speech synthesizers, it is practical for those computer owners who want to tinker with talking.

Requirements: Apple II, II+, or IIe, Atari, Commodore 64; one disk drive

Tronix, Commodore 64 and Atari versions $59.95; Apple version $99.95

SEAFOX

Arcade games can be fun, as any computer owner will tell you. But the trend of recent years has been to try and create better games by making faster games. This isn't always successful, and lightning-fast games that require the jumpy nerves of an adolescent aren't always good games.

Seafox is, frankly, a slow game. Still, it is a good game that relies as much on strategy as on movement. Played against the computer, its scenario has you commanding a submarine armed with torpedos that can be fired forward, toward enemy subs, or up at cargo ships and destroyers. Other underwater obstacles include enemy torpedo fire, mines, and even a giant clam that periodically robs a trained dolphin being sent to your submarine with supplies of fuel and torpedos.

This is a deceptive game. The first round is easy, leading one to imagine that the rest of the game will be as tame. Soon, however, depth charges begin dropping, enemy subs are more plentiful and faster, mines appear, and the giant clam—which looks suspiciously like "Pac-Man"—gets aggressive. It quickly becomes apparent that split-second decision making is just as important as the ability to manuever your sub.

Perhaps the only criticism of this game that can be made is of its video graphics. In this department, *Seafox* is really no better looking than many games for the tiny and limited Atari video game. Still, the play's the thing, and *Seafox* plays well.

Requirements: Apple with 48K RAM and disk drive; Atari, Commodore 64, or VIC-20

Broderbund Software, Apple or Atari disk $29.95; Atari or Commodore 64 cartridge $39.95; VIC-20 cartridge $34.95

SONGWRITER

Humming or whistling a tune comes pretty easily to most people, but understanding how the notes fit together and how music is composed is remarkably difficult. *Songwriter* is intended to aid in the teaching of music structure and composition to very young children (5 and up), but it has enough levels of sophistication to provide diversion and enlightenment to musically knowledgeable adults, as well.

This program could be called a "song processor." It operates on music in much the same way as a word processor operates on text. Notes can be entered, deleted, inserted, played forward or backward, phrase by phrase or note by note. Tempo can be increased or slowed, and musical keys can be transposed at will, at the stroke of a keyboard key or two. The sound can be produced by the computer's built-in speaker or shunted through a stereo with a cable provided with the program. Macros, which in word processing are complex words or commands that can be recalled with a single key, are also possible—a motif of as many as a hundred notes can be recalled and inserted anywhere, with one keystroke. Up to nine such macros can be saved on a single diskette (Apple version), in up to 48 different songs, of up to an aggregate of 5,000 notes. Songs can be saved onto disk and recalled, combined with other songs, or edited.

The "native" scale is the twelve-step diatonic scale, but the program provides for the use of a pentatonic scale as well as for the creation of entirely new scales. In other words, this is in every way a remarkable piece of work.

The graphics show a piano keyboard of 30 notes, or two and a half octaves. Arrow keys move up and down the scale, and the notes appear as blocks of color rolling up behind the keyboard, like the paper roll of an old-fashioned player piano. The authors believe that standard musical notation is more confusing than it's worth in this context, but the color blocks appear over the notes as they are played, and their lengths are in proportion to the time value of the notes. There is a way of showing the letters that go with the notes as they are played, but even this is not shown unless you ask for it specifically.

Songwriter does not produce multivoice music or any kind of chording, but it is really comprehensive in its treatment of scale and melody. The user guide is well written, considering the complexity of the subject, but a young child will need some adult help to get started—the program itself is not difficult to learn.

Requirements: Apple II, II+ or IIe, Atari, Commodore 64, IBM PC

Scarborough Systems, IBM $49.95; all others $39.95

STORY MACHINE

The objective of the *Story Machine* is to introduce young children to sentence structure in an entertaining way. After combining nouns, articles, adverbs, verbs, pronouns, and prepositions from a 47-word dictionary, the child types a sentence and sees it turned into pictures on the video screen in colorful high-resolution graphics, accompanied by a musical theme.

For example, when the sentence "The girls eat apples near the house" is typed on the computer's keyboard, the simple story is played out. First, pictures of two girls appear on the screen, followed by two apples next to a green-roofed house. The girls are then seen gnawing the apples, which disappear.

Several options are available. The computer will also compose random sentences by itself, or the child may alternate words with the machine in writing a sentence. These little stories can then be saved to tape or disk and replayed. On some computers, the program will also allow the child to type in proper names for the characters of a boy, a girl,

and their pets. If a word is not in the program's dictionary the computer will question its spelling and not accept it. This makes the program limited, although some of the more absurd combinations are sure to be amusing to kids.

The real value of the *Story Machine* is probably in breaking down a very young child's resistance to the computer. Playing with the program is a very gentle activity and, even when the inevitable mistakes are made, it responds with pleasing sounds and encouraging words.

Requirements: Apple, IBM PC, Atari 400/800/XL series, Commodore 64, 64K RAM; one disk drive
Spinnaker Software, $34.95

SUPER BUNNY

Games run from serious to silly, just like everything else. *Super Bunny* is on the silly end of the spectrum, but as much fun as most of the animated games you will find. Using joystick, paddles, or keyboard, you must hop a bunny from one side of the screen to the other, from platform to platform. The platforms move up and down in alternating directions and at varying speeds. To add to the fun and challenge, these platforms are as likely as not to be already carrying some interesting and hungry carnivore.

On the opposite side of the screen, your bunny might be able to snatch some magic carrots. These carrots have the power to transform him into the "Lepine Legend, a rampaging rabbit, a cotton-tailed crusader," a magical creature able to leap from platform to platform, destroying carnivores as he goes. If he gets them all in the 40 seconds or so allowed, he advances to the next level of play. If not, he reverts to mere bunnyhood. The game has good graphics and requires a fine sense of timing.

Requirements: Apple II, II+, or IIe; 48K RAM, one disk drive
Datamost, $29.95

SUPREME RULER PLUS

What's it like running a country? *Supreme Ruler Plus* is an engrossing strategy/simulation game that puts the player in charge of a nation with one or more hostile neighbors. These neighbors are controlled by either other players or by the computer. The player must not only defend his or her country, but also keep the people happy and make sure the GNP stays healthy.

The player has many decisions to make throughout the game, and all the player's actions affect one another. For instance, if you give the people too little grain and too heavy taxes, you'll find the population dwindling, providing fewer recruits for your army. If you don't pay the army enough, its efficiency rating drops. If you don't invest in private industry, you'll be forced to borrow at high interest rates.

The winner of each *Supreme Ruler* session (a game can easily last two or more hours) is usually the one who can conquer and hold the most land, boosting his or her ability to finance the armed forces. The player must be aggressive to win; a defensive strategy will not work unless all the other players are unaggressive.

Also, it is possible to get too big and unable to finance the day-to-day operations of the country or the building up of the army. Since all players start out more or less equal in strength, the key is finding the right formula for industrial and military growth.

Supreme Ruler Plus is in a class of its own. It provides hours of challenging play and for a moderate price.

Requirements: TRS-80 Model III or 4, disk drive
JMG Software International, $26.50

TIME RUNNER

Time Runner is a simple enough game. The player directs a morose-looking creature around a grid while avoiding the other creatures chasing it.

There are two different screens. On the first, the player gets points as he or she traces the grid. A timer counts off throughout play, and once you complete the grid, you get any remaining time as bonus points. The second screen gives point values to each square within the grid. These screens alternate throughout play, but the number of chasers increases with each new set. A catchy tune plays between each screen.

Available on both cassette and disk, *Time Runner* is thoroughly enjoyable, simple without being simplistic. Many people who usually disdain computer games find it entertaining.

Requirements: TRS-80 Model III or 4
Funsoft, $24.95

UP FOR GRABS

Here is an attempt to create a novel computer word game on the order of *Scrabble* or *Boggle*. It is

a bit difficult to understand at first—the instructions aren't especially clear—but it could be fun.

Up for Grabs is a game for one to four players, although, as in *Scrabble,* a single player would gain nothing but practice. Players use either joysticks or paddles to select letters of the alphabet from a rotating, three-dimensional cube. As the cube rotates, letters appear on each of the three visible faces, and once a face rotates out of view, a new letter takes its place and the previous letter moves to a new face. Letters change in value from a minimum to a maximum as they move from face to face. Get it? Neither did we first time around, and it is tough to describe without actually seeing the game. (Maybe that's why the instructions are so difficult.) In any case, it's at least a nifty twist on using dice, and the animated graphic of the cube itself is quite good.

All players simultaneously try to pick up one of the three visible letters that are "up for grabs," then position it on a 70-square grid to make words. Making a word down as well as across multiplies the letter scores. There are also four intermissions during which players may remove unwanted letters from their playing area. At the end, each player uses the joystick or paddle to total scores, taking penalties for unused letters. Since the computer doesn't actually know whether the sequence of letters is a real word, other players can challenge the constructions.

How much you'll like *Up for Grabs* depends on your attraction to word games. For those who become addicted, Spinnaker, the program's publisher, has established an *Up for Grabs* Players Association and a "world cup" prize.

Requirements: Atari 400/800/XL series, Commodore 64, 64K RAM; one disk drive
Spinnaker Software, $39.95

VC

This is a strategy game based on the Viet Nam War. The player must seek out and destroy Viet Cong (VC) and North Vietnamese Army (NVA) units among friendly or neutral Vietnamese civilians. The object is to eliminate the Communist forces before they outnumber the rest of the population.

The player controls ten ARVN (South Vietnamese Army) units, a U.S. air-cavalry unit, and a U.S. artillery unit. By deploying the ARVN units, the player can turn neutral Vietnamese into "friendlies" and flush out the Communist forces. VC and NVA forces can be destroyed by direct ARVN attack, by the U.S. air cavalry, or by artillery shelling. The computer decides the outcome of all confrontations based on one of five difficulty levels.

The playing screen is a 10-by-18 grid. The game begins with the player's forces concentrated in the bottom middle of the screen. Winning or losing depends on the strategy used in deploying the forces.

In *VC,* Avalon Hill has managed to capture some of the flavor of its board-based strategy games. *VC* will hold the player's attention longer than most of the shoot-'em-up arcade games, and at the price it is a much better buy.

Requirements: TRS-80 Color Computer
Avalon Hill Games, Co., $20 cassette

VOICE BOX II

Voice Box II is a software/hardware package that synthesizes speech using the Atari's built-in sound generator. The main program reproduces any sequence of words typed onto the screen. The computer voice uses a set of phonetic syllables, which represent the sounds of the English language. Inflections can be added to the syllables to produce a more natural cadence of speech.

Voice Box II also has two graphic faces—one a line drawing, and one more detailed—that mimic talking. The line-drawn face can be edited at the user's discretion. There is also a program that sings songs accompanied by music, which can be either chosen from a preprogrammed list or created by the user. Routines can be loaded to incorporate *Voice Box II* into the user's own BASIC or machine-language programs.

Techniques for using this program range from simple to complex. The instruction booklet is clearly and cleverly written, and it provides a good introduction to speech synthesis. The package also includes a series of games on a separate disk as examples, but, except for the spelling game, they are not very inventive uses of computerized speech.

Requirements: Atari 800 or XL model 800 or above, 40K RAM, disk drive, *Atari BASIC;* AC adapter required for XL models
The Alien Group, $169

WIZARDRY: PROVING GROUNDS OF THE MAD OVERLORD, KNIGHT OF DIAMONDS, LEGACY OF LLYLGAMYN

Wizardry is similar to *Dungeons and Dragons,*

the popular fantasy/adventure game—but where *Dungeons and Dragons* has a kingly human games master who determines your fate, *Wizardry* leaves you at the mercy of the computer's merciless silicon brain. *Wizardry* is a series of three "scenarios," which are sold separately. You must master the first one, *Proving Grounds,* before proceeding to later adventures.

To begin, you create your own six-person party of fighters, magic users, thieves, and similar adventurers from such varied races as humans, elves, and gnomes. This group, in search of gold, adventure, and experience, then embarks on a 3-D, high-resolution journey through a multilevel maze. In the process, it encounters countless numbers of nasties—creatures humanoid and otherwise, magical and prosaic—as well as treasures, clues, and other mysteries. At any step of the way, you can instruct your merry band on what action to take—turn right, go forward, fight, run, inspect, cast a spell, to give a few examples—and the computer will tell you the consequences of your action. It's all great fun, though there are a few catches.

Most notably, *Wizardry* is not a game you can expect to enjoy immediately. First there is the rather involved and time-consuming procedure of assembling your entourage. You must create your characters, bring them together to form a party, have them buy armor and sundries, and finally equip them. This all sounds very imaginative, but it's not. The process has all been reduced to repetition and drudgery. To make matters worse, the instructions are regrettably vague on the setup procedure, leading to much pregame frustration.

That done, you're ready to tackle the maze, but beware: You will almost certainly be killed or meet other grievous misfortunes, at least until you have mastered the knack of the game.

Occasional tedium aside, *Wizardry* is a challenge that many gamesters will enjoy. The graphics are good, if not exciting, and they give you a fairly accurate representation of the inside of the maze. *Wizardry* supports only a limited number of commands, but logical thinking and intuition are rewarded. And because the maze is vast, you can play the game over and over again without getting bored. In addition, when your characters have become sufficiently advanced, you can move on to the next scenario. It's an entertaining way to spend several hours—especially if you can't scrape up a group of flesh-and-blood humans and an indulgent games master.

Requirements: Apple II, II+, or IIe, one disk drive

Sir-Tech Software, *Proving Grounds of the Mad Overlord* $49.95; *Knight of Diamonds* $34.95; *Legacy of Llylgamyn* $39.95

WORMS?

It is difficult to call *Worms?* a game. Whatever it is, it certainly stands as one of the first cult programs in personal computing. *Worms?* is tough to understand and even tougher to describe. Chances are either you'll fall in love with it immediately or you won't know what's going on.

Worms? is an abstract game by David S. Maynard, who was inspired by one of Martin Gardner's columns in *Scientific American.* In his column, Gardner discussed a group of M.I.T. scientists who theorized about mathematical "worms" trained to create geometric patterns. Maynard's translation of this idea to the computer has up to four such worms capable of being trained to make decisions. The worms travel on a grid of dots, each representing territories. A territory is comprised of a dot and the six paths—straight lines in a star shape—leading to it. The last worm to enter a territory claims it and awards points to its sponsor.

Worms are trained in realtime as the game progresses. This way, each builds a library of rules of movement for situations it might encounter. Once trained, a worm can run in the auto mode, competing against other players' worms or wild (random) worms.

All this probably still sounds confusing. The best analogies to the game—albeit inadequate ones—are Conway's mathematical Game of Life and the child's game of Dots. It is really quite a simple game that just defies description on paper. An eight-page booklet comes with the program, but leaves strategies to be discovered by the player. Still, the brochure is a good place to start and much better than jumping in without an explanation, as the package suggests.

By the way, *Worms?* is very enjoyable to watch in action. The patterns can become colorful and complex, and the chimelike sounds are appealing and harmonious.

Requirements: Atari, Commodore 64; one disk drive

Electronic Arts, $35

ZORK I, II, and III

Do you long for high adventure, swordfighting with giants, and exploring caves and jungles? Do you love to match wits with clever and crafty wizards? Do you like to solve puzzles? If so, then *Zork* is for you.

One of the great drawbacks of most computer games is that they just aren't challenging mentally and soon lose their ability to hold your interest. Not so with the *Zork* adventure games from Infocom. If you aren't stumped by some of the things you'll find in these mazes, then you have a remarkable intellect indeed. Some of the problems posed are downright sneaky. The clues are not obvious, nor are the actions associated with objects you find in the maze. You'll have to be both creative and lucky to come up with the solutions to some of the problems. It is a good idea to play *Zork* with other people so they can contribute different points of view and help solve the puzzles that you can't fathom.

In *Zork I,* the simplest and most straightforward of the games, you strive to obtain the 20 Treasures of Zork. In *Zork II* you meet the Wizard of Frobozz while piling up experience points and gaining proficiency at unraveling Zork's cryptic clues. *Zork III* is the home of the Dungeon Master, and the climax of your adventures underground is your encounter with him. *Zork I, II,* and *III* are three completely different adventures, rather than three parts of one long adventure; in theory you could play *Zork III* without trying the others first. But there is a progression of difficulty in the Zorks, and it is unlikely that you will get far in the third without surmounting the challenges of the first two.

The instructions that accompany *Zork* say you can speak to the program in plain English sentences, but the vocabulary is really very limited. The grammar in the program can be anything from mildly annoying to a real pain. For instance, *Zork* doesn't necessarily understand all the words it uses. When *Zork* tells you there is a unicorn nearby "with something hanging around its neck" and you ask, "What is hanging around the unicorn's neck?" it replies, "I don't know the word *neck.*"

The program also makes some strange assumptions about knowledge you have already gained. You find the trapdoor that is the entrance to Zork by telling the program to "Look under the rug." Zork announces, "There is a trapdoor here." If you tell it, "Open the trapdoor," Zork replies, "I see no trapdoor here." It turns out that before Zork can open the trapdoor, you must tell it to "Move the rug." Apparently, the assumption is that if you looked under the rug but didn't move it, then you must have put the rug back down, and, not seeing the door under the rug anymore, you have forgotten it.

In spite of these sometimes-frustrating drawbacks, the Zork trilogy is exciting and most challenging. It is highly recommended.

Requirements: CP/M-80 or MS-DOS; IBM PC; Commodore 64; Atari; Apple II, II+, or IIi; one disk drive

Infocom, $40 per game

MCI Mail

MCI Mail isn't a program for your computer. It's an electronic mail service that you use through your telephone, and it should interest anyone who needs to rush documents across the country. It's hard to imagine how it could be done faster than with MCI Mail—or more dramatically. When printed, your mail is delivered in a fiery orange envelope sure to capture the recipient's attention.

MCI Mail is easy to use. You can create text using the service's text editor, much like sending a message on CompuServe or The Source; or you can write it off-line with your own word processor and log on only to send it.

Unlike some telecommunications systems, MCI Mail requires no initiation charge or monthly minimum for its basic service. You pay as you go. The cost depends on which delivery option you select.

Prices range from $1 for a one "ounce" (about 7,500 character) Instant Letter, which is delivered electronically, to $25 for a one "ounce" Four-Hour Letter, which is laser-printed and hand-delivered in major cities within four hours. Extra "ounces" cost $1 each, regardless of which delivery option you choose.

You can sign up by calling (800) MCI-2255. It takes only a terminal or a computer with an RS-232 port, a terminal emulation program, a modem, and a telephone line.

HOME MANAGEMENT

Want to balance your checking account, plan your next vacation, or track down your ancestors? Your computer can help. The software market is rich in programs intended to help organize your home and your personal life.

By far, the greatest variety of programs for the home is intended to help manage your money. These packages range from simple checkbook programs, which may be more trouble to update than they are worth, to full accounting programs and tax-planning aids. With the best of them, even the most disorganized among us can whip their finances into line—given the discipline it takes to use it consistently.

In this chapter, however, you will find more than first aid for your economy. Here there are a computerized bartender, a genealogical database manager, a cookbook and a diet planner, and a memory trainer—among others.

This is not intended as a comprehensive survey of software for the home; none is possible. The variety of programs already available is endless, and more come out each day. Rather, this section is meant as an introduction to the possible—a mind-stretching look at what computers can do for you.

Like any other major change in the way we live, the computer revolution has its skeptics. Computers, many will tell you, are great for business, but the average person has no use for them other than playing a few games. Here is some proof that they are wrong.∞

A FINANCIAL WIZARD

The *Financial Wizard* keeps records of income, expenses, and budget items. The program allows up to 21 expense categories, 1 income category, and 4 record categories. Each may be divided into 36 subcategories. The user inputs date, payee, amount, and category for each expense and for income, and the program calculates running balances. The file may be balanced and audited as a checkbook, and searched for particluar entries according to any combination of the data entered.

A budget function permits planning by category, then comparing forecasts and actual transactions. This information may also be displayed in bar graphs.

The main file for financial data is treated as a checkbook, so that dealing with cash and credit transactions is a bit complicated. The advantage is that the user's combined financial records are kept in a single file, allowing easy overview of total activity by category or by time period. This also permits easy organization of data for tax returns and financial reports.

Functions allow quick correction and editing of entries, and hardcopy may be printed of any of data. Bar graphs may be printed only with certain printers, including Epson with Graftrax, NEC, Prowriter, and Centronics 739. The *Financial Wizard* will also print custom checks on any 80-column printer.

Requirements: Atari, 32K RAM, disk drive
Computari, $59.95

BIO-DETECTOR

Most people are aware that biofeedback lets one get in tune with bodily functions and manipulate them in order to gain a desired state of mind or physical response. Despite what the name of this product implies, it has very little to do with biofeedback; it merely measures the electrical resistance of the skin on a subject's fingers. Within very broad limits, this resistance is inversely proportional to the amount of stress the subject is experiencing. Both lie detectors and some serious work in biofeedback have been based on this phenomenon. But such uses require far more sophistication than this package has to offer.

Bio-Detector consists of a program and a cable that plugs into the joystick port of the Color Computer. At the other end of this cable are two probes, which the subject wraps around two fingers. The video screen then graphically displays a resistance reading, which is interpreted as the subject's stress level.

Bio-Detector amounts to little more than a parlor game. It performs roughly as advertised, but not all the time. The setup apparently is not sensitive enough to give an accurate picture of the subject's state of mind. Many things can produce deceptive readings, such as the subject holding hands with his girlfriend just before donning the probes.

Requirements: TRS-80 Color Computer
Computerware, $34.95

COLOR PROFILE

Radio Shack's *Color Profile* is a wonderfully easy-to-use, easy-to-learn database manager that is well suited for any home application and many small-business uses. It features a straightforward

setup procedure and an attractive, well-written user's manual.

The manual is so easy to follow that it hides the fact that *Color Profile* has some pretty sophisticated capabilities. It allows for mathematical operations on the data, which allows *Color Profile* to do inventory control or sales records on a moderate scale.

The user can sort whole or partial files by any record field, and can also create a number of report formats to print out the sorted data in the manner he or she chooses. Thus, you can print out two copies of the same file with different formats, such as one mailing list sorted by name and the other sorted by zip code.

Color Profile will work with a 16K-memory Color Computer, though there are only about 2,000 bytes with which to manipulate data. For uses other than common household chores, such as storing phone numbers or recipes, at least 32K is required. Similarly, this program will work on a one-disk system, but doing so will cut down on the number of records the user can store on disk. A one-disk system can store about 1,300 records of average size.

A useful feature of *Color Profile* often overlooked on other database managers is a spool function. This lets the user work with the program at the same time it is printing out data. Anyone who has waited for long files to be printed before continuing the work will appreciate the spool function.

Color Profile was created with a wide range of uses in mind. Each user can custom-make a database without knowledge of programming or even computer jargon. Buyers of *Color Profile* will get their money's worth.

Requirements: TRS-80 Color Computer, 32K RAM, disk drive
Radio Shack, $59.95

THE COMPLETE PERSONAL ACCOUNTANT

Some predictions never seem to come true—like the one that said someday computers will enable us to keep our personal finances in order. If you own a computer, chances are you've never used it to balance your checkbook or plan the family budget. Most of us still make mistakes, bounce a check every so often, and generally have no idea of how much money we have even though we may own the most sophisticated calculating and record-keeping machine man has yet invented.

The Complete Personal Accountant (CPA) is the first software system that combines all of the elements of personal financial record keeping into one neat package. It could be a real help for those who have long considered themselves terminally disorganized.

This is not a flashy program. Text screens are neat and businesslike, just like the accountant you wish you could afford. You choose record-keeping functions from a menu. The choices include: a chart of accounts, 99 separate, named departments with ten subcategories in each; checkbook maintenance, on a screen that looks suspiciously like those in automatic bank teller machines; checkbook search, for locating any check you've written and recorded in the system; summary budget analysis, for reports on your spending habits; budget analysis, for comparing spending against your planned budget; and financial statement, to obtain your net worth or an income vs. expenses report.

Besides these bookkeeping functions, *CPA* also offers two calendar programs for scheduling appointments and reminding you of payment schedules, a mailing list database manager, and a graphing program that prints bar graphs in color on the video screen or on paper when a dot-matrix printer is used.

Several features are particularly impressive: moving from function to function using only the screen menus, and being able to isolate tax-deductible expenses. This program seems to have all the contingencies covered—predefined household categories and the flexibility to expand to include professional expenses. Best of all, it is extremely well documented, and the flip side of the floppy disk contains an excellent, though somewhat fast-paced, automatic tour of the system. Software packages this complete are very rare.

Requirements: Commodore 64, one disk drive
Futurehouse, $79.95

DECIMALS

Designed for home and school use, Edu-Ware's *Decimals* is a computer-aided instruction program that can help develop and reinforce skills in the use of decimals. It is not intended to replace the teacher but to augment classroom instruction. It is ideal for remedial instruction of slow learners.

The program consists of four major sections: the Learning-Manager system, which allows the parent

or teacher to "tune" the program to an individual's needs; a Pretest, which assesses the student's skills before attempting any of the learning units; seven Learning units, which teach skills in various aspects of decimal computation; and a Post–Test, which rates how much the student has learned at the end of the lesson.

The seven learning units cover addition, subtraction, multiplication, and division of decimal, along with conversion from fractions to decimals, rounding off, and percentages. Each unit starts with a short lesson, followed by a hands-on practice session. The test itself comes last and consists of 12 randomly generated problems, though this may be changed through the Learning Manager.

The Learning Manager provides a lot of flexibility. The number and sequence of the problems presented may be changed. So may effects, the number of re-tries allowed, and passing scores on Pre- and Post- Test units.

Decimals is set up for use by only one person at a time. It will not track scores of multiple students. However, with several monitors connected to the same computer, a teacher could set up group instruction quite easily.

All problems and instructions are presented in excellent high-resolution graphics combined with animation—which tends to be somewhat slow—upper- and lowercase text, and color.

Requirements: Apple II, II+, or IIe, *Applesoft BASIC;* one disk drive
Edu-ware Services, $49

EASY FINANCE

Easy Finance is a series of five software packages for the Commodore 64. Each contains a number of menu-driven routines for financial calculation aimed at home users and individual investors.

The series is fairly comprehensive. *Easy Finance I* offers 12 loan analysis functions; volumes II and III contain a total of 32 different capital and stock investment routines; volume IV is aimed at small business management; and volume V is directed to statistics, assessment of sales trends, and forecasting.

The packages are well-presented and very straightforward, with excellent documentation. For example, after asking a few questions, *Easy Finance I* quickly calculates principals, payments, balloon payments, balances, terms, and interest rates with the known loan information. A set of routines relating to mortgages is equally helpful when approximating payments and comparing mortgages. This would be extremely helpful for first-time home buyers who want to analyze mortgage information privately before dealing with a lender. Using the "rule of 78s" routine, a common financial formula, we could also figure how much of a loan payment was actually being paid against the principal.

There are slight variations in lending practices that may lead to differences between the figures obtained from *Easy Finance* and those from a financial institution. We did, however, compare the information from the program's mortgage routines against a bank's, and the two sets of numbers varied by only pennies.

To be honest, there probably isn't much information in these programs that couldn't be found in a business school textbook, but the method of presentation, and having them grouped into a series, makes the *Easy Finance* packages a valuable addition to a working home software library.

Requirements: Commodore 64, one disk drive
Commodore Business Machines, $24.95 per volume

THE FAMILY BUDGET

Really two programs in one, *The Family Budget* is a simple financial record system for the home. The first part, Budget, will track cash and credit expenses along with income on a daily basis for a one-year period. Three tax-deductible categories are provided: interest and taxes, medical expenses, and charitable donations. The second program, Charge Accounts, keeps track of credit transactions.

Both programs are supplied unprotected on one disk; you copy each onto a separate disk for use. The Budget program is used for one calendar year, with a new disk started each year. The Charge Account program is used continuously until the disk becomes full, about 1,000 entries spread over as many as 50 accounts.

The program is supplied with 28 predefined transaction categories, which cover most household requirements. These may be changed, but you must modify the program itself according to the instructions supplied. Bear in mind, this is not a checkbook program, as it doesn't keep track of check numbers, payees, or description. All it does

is record how much is spent in each assigned category.

The programs themselves are written in very basic BASIC, with minimal error trapping. In view of the many other excellent home accounting and checkbook programs available for the Apple, one would have to question the usefulness of this one. However, for someone interested in programming who would like to see how a program of this type operates and possibly modify and enhance its operation, it might prove worthwhile.

Requirements: Apple II with *Applesoft BASIC*, II+ or IIe, 16K RAM, disk drive
Dynacomp, $34.95

FINANCIER PERSONAL SERIES

In many ways, *Financier Personal Series* ranks as a superior program. Complete and well-designed, it has several outstanding, unique, and thoughtful features.

In the three main functions common to all personal finance programs—category creation, transaction entry and report generation—*Financier Personal Series* provides flexibility and power. The number of accounts, categories and income sources is, for all practical purposes, unlimited; the manual says the maximum is 37,000. Transaction entry contains some useful and unique aids. Besides the normal expense and income entries, you can transfer money from one account to another. It is easy to exit the entry process, create a new category and return to where you left off. Split transactions are easily made over as many as nine categories. Nine deductions from income are built in, giving you the ability to record tax, Social Security, and voluntary witholdings. Editing is very flexible. Reports can be made for any time period in either detail or summary listings, by income, expense or tax category. They can be displayed or printed. *Financier Personal Series* also includes a personal property inventory system for recording assets. Various reports can be generated from this system.

Two items distinguish *Financier Personal Series*, one internal to the package and the other external. The first, documentation, merits special attention. Good manuals should give clear, precise and complete instructions on system use. This one does. There are numerous menu and display samples, enough to walk a user through the system without even turning the machine on. It is also well indexed for reference. Besides explaining how to use the program, the manual reviews basic accounting principles and practices. Nice touches like these are characteristic of high-quality programs whose designers really want their users to get the most out of their product.

The second feature is the ability of Financier, Inc.'s other financial products, specifically their *Tax and Investor Series*, to interface directly with the data stored using *Financier Personal Series*. The *Tax Series* lets you create multiple tax cases, store them, perform "what-if" spreadsheet calculations, and generate graphics charts. The *Investor Series* is a securities portfolio management system. Both would probably be of interest to users of *Financier Personal Series*.

This is a well-designed, flexible, and powerful personal finance program. At $190, it is among the more expensive home accounting systems around, but if you want the best, this is it.

Requirements: MS-DOS, 64K RAM
Financier, Inc., $190

THE HOME ACCOUNTANT PLUS

The Home Accountant Plus claims to be "The 1 Best Selling Program For Home and Small Business Accounting in the World." Indeed, it does rank high on SoftSel's "hot" list.

But does popularity constitute excellence? In the case of *The Home Accountant Plus*, it seems so. This program has all the basic features of a complete personal finance system plus enough extensions to handle a small business. In addition to thorough budgeting and recording, *The Home Accountant Plus* produces graphs, charts, and forecasts for analytical purposes as well as net worth positions.

Users have the option of up to five checkbooks, each with its own cash account, and two hundred budget categories. Categories are designated as assets, credit cards, liabilities, income, or expenses. Assets, for example, include the value of your home and your car. You must set budget amounts for each, even if the value is zero. Categories themselves are not designated as tax-deductible unless you describe and use them as such. There is theoretically no limit to the transactions that can be recorded per month, as you may "chain" data disks.

The transaction entry process is not explained very well by the manual but is generally efficient.

Check numbers are incremented automatically with override capability. Amounts up to $9,999,999.99 may be entered. A running balance is displayed on the bottom of the screen. Tax-deductible items are marked, but only with a "Y" or "N" designation. Keying in an "*" followed by the first few letters in both the "Paid to" and "Category" fields will make *The Home Accountant Plus* search the categories and display matches. Inadvertant entry is minimized as *The Home Accountant Plus* only records transactions when an "R" is used in the last field rather than when the enter key is hit. Split transactions are allowed among multiple categories. Implementation, however, requires manual effort, an unnecessary encumbrance for such common transactions.

The Home Accountant Plus allows you to set up five automatic transactions per checking account. Automatic transactions are logged by the system itself at the beginning of each new month. Although transactions are stored in a single file, you must open and close months. The manual states that this speeds report generation, as the program has fewer records to sort. Opening a month makes *The Home Accountant Plus* log automatic transactions. Rent, mortgage, and loan payments are examples. While convenient, this process does not allow you to split mortgage payments accurately between interest and principal.

Reporting options available from this program resemble financial statements more than normal personal finance-choices. Beside comparisons between budgeted expenses and actual costs, *The Home Accountant Plus* prints a personal balance sheet and an income statement. The balance sheet lists all assets on page one and, on page two, liabilities and net worth. Each item is also compared to budgeted amounts. The Income & Expense Summary compares actual figures to either budget or prior months. Some reports require a 132-column printer. Additional printing capabilities include a check register, checks themselves (the manual lists printing houses that will sell you customized checks) and activity reports.

The icing on this cake is a variety of forecasting functions. Tracking finances really tells only historic and present conditions. As stated in the manual, [Forecasting's] function is to help you determine what to do *now* to reach a future goal." This section asks you to input an investment amount, expected return, period of the investment, and anticipated inflation rate. Given these data, *The Home Accountant Plus* produces both a table and a graph showing the value of the investment in both future (inflated) and today's (current) dollars. Graphs are produced on monochrome displays as well as color monitors. A second program asks for a dollar objective and, given return, inflation, and time parameters, calculates a table to be invested each month. Finally, if you think you know what the long-term average inflation rate is, the program will calculate and display your budget 20 years from now based on your input.

What prevents *The Home Accountant Plus* from being an all-around superb package is the lack of learning aids and the manual. There is a lot to this program. The accompanying manual explains how the system is designed rather than how to use it. Examples with pictures of menus can be found under each functional topic. Yet even users knowledgeable in accounting principals found the information insufficient for a thorough grasp of the program.

The Home Accountant Plus would be greatly enhanced by comprehensive and well-indexed documentation. It could use some other improvements as well: an easier method of recording split transactions; an online tutorial.

The Home Accountant Plus's price of $150 puts it in the middle range for personal finance programs. Its CP/M sister, *The Home Accountant* (no plus) has somewhat fewer functions—it lacks graphics, forecasting modules, and automatic transactions—but retails for under $100. It is easy to see why *The Home Accountant Plus* is a best-seller.

Requirements: IBM PC, Osborne, Atari 400/800, Apple II/IIe, Commodore 64, or TRS-80 Model III
Continental Software, $150, $99.95, or $74.95 for *The Home Accountant,* depending on computer system used

HOME BUDGET PROGRAM

Although *Home Budget Program* is often compared with personal finance programs, it is not a complete personal accounting system. The title implies that you may use it for budgeting. Actually, *Home Budget Program* does not allow you to plan financially as one might assume. Rather, it is more a simple tracking system for income and expense. Nine income and 35 expense categories are in the

standard configuration, but they are expandable to 16 and 48. Nine may be classified as tax-deductible.

Transaction entry is fairly straightforward but unsophisticated. Split transactions are possible but must be done manually. You are only allowed to enter only check number, amounts, categories, and dates, not descriptions nor even the party to whom the check was written. Changing transaction input later is possible, but access is by program-assigned transaction number; if you did not write down the numbers, you must review your entries. Credit card charges are possible as a normal account transaction. This is not an electronic checkbook—withdrawals and deposits are entered and tallied separately. Reports are simple—listings by month or year. Since there is no budgeting provision, there is no way to compare planned and actual costs.

As a way to record income and expenses, *Home Budget Program* works tolerably but with few convenient and useful features. Anyone willing to take the time to record financial data would probably want to invest a few extra dollars and a little more time in a program that allows for true budgeting as well as record-keeping.

Requirements: IBM PC, 64K RAM, *BASICA*
House Software, $59.95

HOME ENERGY OPTI-MI$ER

The goal of this program is to analyze home heating alternatives, allowing you to cut your fuel bills. In this, it is partially successful, though slightly disappointing.

The program begins by leading the user though a series of questions about present heating costs and fuels. Then it makes recommendations about how fuel efficiency can be increased and estimates the savings to be achieved by turning to alternative fuels or heating mechanisms.

To benefit from this program, the user must first assemble some necessary data, including monthly heating bills for a year. If your costs for electric heat and other electrical uses are combined on one bill, you must figure out how to separate heating costs from the rest. This may be a difficult process.

Though *Home Energy Opti-Mi$er* does a number of mathematical calculations, the most important information is found in the manual, and most of the work must be done by hand before using the program—the research and compilation of fuel bills. Because of this, the program offers only a small advantage over a good book on the subject and a pocket calculator.

Requirements: Atari, 32K RAM, *Atari BASIC,* disk drive with DOS 2.0
Shelter Software, $24.95

HOME FINANCE PROGRAM

This personal finance program is rather sparse both in function and ease of use when compared to other offerings on the market. However, it does have some features that, while not earthshattering, distinguish *Home Finance Program* from the competition.

Like many personal finance programs, you begin *Home Finance Program* by setting up your categories and their corresponding budgeted amounts. There are 13 expense categories, but only one income category is available. The expense items have been chosen for you; they include shelter, food, medical, and clothing. Ten subcategories may be designated. One tax-deductible category is allowed.

Entering transactions is not difficult, but this implementation lacks features normally found in many other personal finance programs. Automatic split transactions, the chance to enter deposits and withdrawals in a single session, and automatic totalling of expense accounts are all missing. On the plus side, several useful financial calculation tools are built in, yield anaysis and amortization tables among them. Basic report choices include a comparison of actual and budgeted expenses over selected time periods.

Compounding the lack of sophisticated function are numerous instances of weak design. Error-trapping is minimal. Convenient aids such as the ability to print category listings are missing. Reconciling a bank statement requires that you enter all the checks again. For the price, there are much better personal finance programs around.

Requirements: IBM PC, 64K RAM, BASIC
Design Data Systems, $100

HOW TO PROGRAM IN THE BASIC LANGUAGE

This a comprehensive tutorial on BASIC programming. The concepts of branching, for-next loops, arrays, character strings, functions, subroutines, and graphics are covered. Examples of various applications are given.

The program is organized into separate lessons.

The user may access any lesson from the main menu. Each lesson has a submenu that allows users to review the entire lesson or any part of it. Short tests are included frequently to stimulate student interest and test their understanding.

Students need no previous programming background to use the program. The program must be used with the student workbook and functions best when it is used as part of an organized class as covered in the teacher's manual.

The reading level required makes this program generally suitable for grades 10 and up. The vocabulary is somewhat difficult, and the graphics section assumes a good basic knowledge of graphing.

Like much programmed instruction material, the program can become tedious. It uses the computer primarily as a "page turner." Graphics and sound effects are minimal, and there is no record keeping. However, the student can easily work at his or her own pace, and the reinforcements, for both right and wrong answers, are good. A highly motivated user would have good results with this program. Others will need extra help and encouragement from a live teacher.

Requirements: Apple II, II+, or IIe, 48K RAM; Atari 800, 32K RAM; Commodore 64; Commodore PET, 32K RAM; TRS-80 Model I, III, or IV, 32K RAM; TI 99/4A, 16K RAM; one disk drive or cassette recorder
Sterling Swift Publishing, $69; workbook $5.95; teacher's manual $5.95

HOW TO READ IN THE CONTENT AREAS —SOCIAL STUDIES

Five stories provide developmental practice in reading within social studies. Readings are presented in numbered paragraphs. Questions which measure comprehension and vocabulary follow. Many of the items are "thought questions" as opposed to recall. Feedback is given for each question, and if the student responds incorrectly twice, an explanation of the answer is given.

Stories include "The Great Lakes," "Disappearing Island," "Women, Yesterday, Today, and Tomorrow," "Goldrush," and "The British Commonwealth." These appeal to a wide range of interests. Reproducible masters are included for follow-up activities in the classroom.

The program is useful for correlating social studies content with reading. Although it is primarily a reading program, it could be used by a teacher with students who have problems comprehending social-studies materials. The reading level for the material is on approximately the seventh-grade level and may be useful to junior-high-school teachers.

Requirements: Apple II+, Atari 400 or 800, Commodore PET, TRS-80 Model I, III, or 4, one disk drive or cassette recorder
Educational Activities, $49

KOUPON KEEPER

Let's face it, no data-handling program will help people who are chronically disorganized; a person must be serious about the records he or she wants to keep. *Koupon Keeper* is not for the person who wants to make sense out of a drawerful of coupons; it is for the hard-core coupon collector who already uses a more primitive form of record keeping.

Koupon Keeper lets you set up a coupon file in 12 categories. The program has no protection scheme, so anyone unhappy with the categories that come with *Koupon Keeper* can edit the appropriate program lines to suit his or her needs. Once the user has entered all the data, coupons can be grouped according to category, expiration date, product name, or coupon amount.

The program is very easy to use. The cassette loads and saves are slow, but to most home users this is a minor problem. A bigger problem is the lack of a print option. Smart shoppers must write down information from a screen display before running off to the A&P.

Requirements: TRS-80 Model III or 4
Kensoft, $15.95

MASTER MIXOLOGIST

Want an unusual novelty to add to your bar? Let your Color Computer play bartender. *Master Mixologist* is a simple database of 152 alcoholic and nonalcoholic drinks with recipes that can quickly be called from disk.

The program is menu driven. The main menu has three options: liquor type, all drinks in alphabetical order, and end-the-program. The first option lists ten types of drinks, and the alphabetical list is copied in the program's instructions.

For anyone who doesn't worry about a tipsy friend spilling a Gin Coco or a Dirty Mutha on his Color Computer, *Master Mixologist* is a unique accessory to the household bar. It might even make a clever gimmick for a commercial bar. Anyone with

a little programming knowledge could change the list to include favorites not on it originally.
Requirements: TRS-80 Color Computer, disk drive
Armadillo International Software, $19.95

MICRO COOKBOOK

What do Duck à l'Orange, Tex-Mex Hash, and your PC have in common? Answer: *micro Cookbook,* a program that may make your micro nudge your Cuisinart off the kitchen counter. As one might expect, there are recipes, over a hundred, stored in *micro Cookbook.* The choices range from exotic (Sengalese Soup) to plain (Meat Loaf) to bizarre (Warm Beer Soup). They can be accessed either by name, by ingredient, or by classification (Hawaiian). Selection by computer does have its advantages. You may search for French recipes that contain beef, tomatoes, pimento, kasha, and chives if that is all that is in your pantry and such a recipe exists. And once you find it, you may tell *micro Cookbook* how many people you wish to serve and it will adjust the measurements accordingly.

micro Cookbook has other features. It will print hardcopy recipes in case you'd rather not risk spilling Worcestershire sauce on your keyboard. You may specify the recipes you will make for the upcoming week and *micro Cookbook* will print out a consolidated grocery list. Recipes may be added, modified, and deleted. Be warned that the directions for creating each recipe are limited to half a screen. Accordingly, they tend to be a bit brief. Moreover, the recipe library represents standard American fare—a pedestrian mishmash of cuisines. Paul Bocuse was not consulted when this program was written.

P.S. Don't forget to try *micro Cookbook*'s sister, *micro Bartender.*
Requirements: Apple II, II+, IIe, or III in emulation mode; IBM PC; disk drive
Virtual Combinatorics, $40

THE MODEL DIET

The title of this program is somewhat deceptive, as the accompanying instruction booklet admits. There is no perfect diet, and *The Model Diet* doesn't presume it can give you one. What the program does, and appears to do fairly well, is to calculate nutritional data, determined by eating information you give it. These calculations are based on the Recommended Daily Allowances as set by the National Academy of Science.

You start using the program by answering an onscreen questionnaire. Then the program recommends an ideal weight, how much you should lose, and a reasonable period of time over which to lose it. It then outlines a program of caloric reduction and offers certain nutritional requirements that will be used if you choose to undertake this regimen.

If you start to diet, the program will ask you to consult it daily to compare your eating habits with its own library of nutritional data on almost 2,000 foods in 16 categories. This step is also intended to help you plan your meals to conform more closely to these recommendations. Storage routines let you keep a daily record of how you have been doing and aid in planning.

Rudolph Daniel, the program's author, must be commended in presenting a commonsense approach to what could have been a ridiculous program. In essense, *The Model Diet* is little more than a database, record-keeper, and sophisticated calculator, but then, that's what computers do best.
Requirements: Commodore 64 with disk or cassette; Atari with 48K RAM and disk drive; IBM PCjr with disk drive; or Coleco Adam
Softsync, Inc., $29.95

MONEY COMMAND

Money Command helps the individual or small business control checking and savings accounts, keep track of expenses by category, reconcile the accounts, and print reports in a variety of ways.

The program has a nice feature called "ADE," for Automatic Data Entry. Most of the tedious job of entering information into the computer has been reduced to using a single function key. Included in the ADE system are date, type of transaction, payee, transaction number, tax/budget code, and reconciliation month. The program will provide a balance between any two items, making reconciliation easier than most programs of this type. Also, the number of accounts and tax/budget categories that can be handled is very large—99 accounts and 999 categories. When the user has entered a transaction, and the program asks for a tax-budget code, it lists all IRS 1040 categories, making tax preparation easy. The program uses a database to hold the transactions, allowing the user to sort the information quickly on any data element and to

print reports of all transactions or any desired subset of transactions.

The program is supplied in two versions—BASIC or compiled BASIC. The compiled version is faster, but the user must have 96K of memory available. The manual is large and well-written, including useful hints for the user who doesn't like being an accountant.

Requirements: IBM PC, PC DOS, 64K, one disk drive

McSOFT, $99.95

MONEY MAESTRO

Money Maestro is a basic personal finance program that distinguishes itself in two ways—its almost conversational approach to transaction entry and a method of creating a "future" file of expected expenses and incomes.

Functionally, *Money Maestro* is a fairly complete, though basic, offering. Transaction entry departs from the normal fill-in-the-blanks screen. Instead, *Money Maestro* asks a series of questions, like "How much did you pay?" While this may be attractive to the novice, repeating the process eventually makes you long for the less "friendly" but more efficient data entry screen. It lets you set up a "Payee" file, in addition to normal categories, so that during the transaction entry process you can just key in an abreviation and *Money Maestro* will insert the full name. *Money Maestro* defines categories by attributes rather than by category number or sub-category. Attributes must start with either "E" for *E*xpense or "I" for *I*ncome and can then have up to seven additional letters, for example, "D" for *D*eductible or "M" for *M*edical.

Money Maestro also lets you create future transaction files they call "stockpiles." When it comes time actually to pay the bills you can reference your entry in the stockpile file, and it will be logged as an actual expense. The standard report of actual and budgeted costs can either be displayed or printed.

Requirements: IBM PC, Apple II+, or CP/M-80; 48K RAM; one disk drive

Innosys, Inc., $100.25

THE MONEY MANAGER

The Money Manager is a simulation of personal finance designed as a supplement to high-school personal finance or consumer-education classes. The program provides an individual focus to help students bring together the variety of activities taught in consumer education. Budgeting, banking services, credit, insurance, consumer purchases, and taxes are all simulated. Each student works with his or her own personal financial information, which is protected by a password.

When students begin the simulation, they are each given a randomly selected financial history and within this must prepare and manage a budget, maintain a checking and savings account, pay monthly bills, select appropriate housing and transportation, evaluate their credit status, make investment and insurance decisions, manage a charge account, and prepare tax returns. Unexpected events will occur at random, and their impact on the simulated finances must be analyzed. The program allows for repetition and progressive inclusion of more detail in the simulations as students demonstrate more complex understanding of the processes.

The teacher has considerable control over the exercises through use of the teacher disk. The program is very well designed and easy to use. The documentation is thorough, but it will take some study on the teacher's part to learn to use the program effectively. The program assumes familiarity with basic budgeting procedures. Several types of reports and printouts are available to provide feedback and documentation.

The Money Manager is not a new concept, but its use of the unique power of the computer to manage information makes individualized learning and record keeping on consumer education practical. This program lives up to its promise.

Requirements: Apple II, II+, or IIe, 32K RAM, one disk drive, printer

Sterling Swift Publishing, $74.95; extra copies $37.48

MONEY PROCESSOR

Though not as sophisticated as some personal finance managers available for computers with a stronger reputation in business, this is one of the better choices for Atari owners who need to keep track of their income and expenses.

Money Processor creates worksheets and permanent statements for a variety of financial accounts. The preset formats include credit card, checking, and savings accounts, cash expenditures, employee expenses, tax return items, and budget items. The screen and information for each

account is divided into appropriate categories—checking accounts, for example, into checks, deposits, miscellaneous charges, and miscellaneous credits.

To use the program, simply input the date, amount, and comments line by line on the screen, as in a ledger, and the program prints running totals. A function allows the user to verify each entry and records it permanently in a statement. A verified statement can thus be created each month and stored to a disk. Statements can be re-opened to correct errors at any time. Editing functions allow the user to search for, copy, insert, delete, and restore information. Others allows entire statements to be copied or moved to new disks.

Some thought has gone into making *Money Processor* easy to use. The menu of accounts, statements, and the worksheets and statements themselves can all be printed out for reference, and the graphics format makes data easily accessible. Procedures are simple and clearly explained, and a handy reference card indicating which keys control which functions fits at the top of the keyboard. A back-up disk is included.

Requirements: Atari, 48K RAM, disk drive
Luck Software, $69.95

MONEY STREET

Checkbook programs for the Apple II have been around a long time, and most leave much to be desired. *Money Street* is a refreshing approach to the subject. Simple to use, the computer balances your checkbook and creates a file of financial data that can be sorted, listed, totaled, printed, or reviewed.

You may define up to 100 named categories for income and expenses. For example, you can track heating, telephone, or medical expenses; auto and food expenses; or any household or business transaction. On the computer screen is displayed a facsimile of your checkbook register. You may view 17 items per screen, and easy two-way scrolling allows instant access to any item. If you run a small business, you can print year-to-date (YTD) and monthly totals of sales, as well as departmental expenses or salaries.

One of *Money Street*'s best features is its "real-time data bank," which accumulates and instantly displays YTD totals in each of the assigned categories. For example, if you enter a check and look at the bottom of the screen, the YTD total for that category code will appear with each new entry.

The onscreen code dictionary, which lists all 100 categories, is always available merely by pressing "CTRL 0." You can add, change, or delete the categories at any time without affecting your data. Also shown are the YTD totals plus a count of the number of items in that category. This is handy for checking on items requiring monthly payments. The code dictionary will also let you subtotal groups of category codes. By using one or two asterisks to define certain sections, subtotals and group totals are automatically created. An instant income statement is available if you like. You may also code deposits to track income and sales as well as taxable items, and you may mix checks and deposits into one category, create net amounts, and split entries between codes.

Reconciling your bank statement is easy. You enter your returned check numbers, confirm your deposits and debits and the statement balance. Locating errors is easy; print a trial reconciliation that shows every entry. One interesting feature helps out when entering your cancelled checks: If all the checks are in sequence from, say, number 100 to 125, it will automatically reconcile all of them in one block.

Written in machine language, the program is fast, so you can sort and search for any item very quickly. The authors claim you can locate any cancelled check in a file in less than 60 seconds or scan a file of 2,400 checks—the maximum capacity of each data disk—in 300 seconds, or 5 minutes.

Money Street's report generator is first class. You have a choice of 15 reports, which can be printed or displayed. Note, though, that several of the reports require a printer. In addition to the reports, you may print any screen at any time by pressing "CTRL P."

Reports include: checkbook history, check register, deposits, uncleared checks and deposits, and a reconciliation history. You may request a listing sorted by amount or search for a particular payee, and wildcard searches are supported. Printer-only reports include sorts by month or selected months, monthly totals, and sort by code or selected codes.

Program limits are adequate for most users: up to 2,400 items per data disk (200 uncleared items) with an unlimited number of data disks, and a $999,999.99 maximum amount.

The program is copy protected, but available is a

special utility disk that allows making two backup copies, quick copies of your data disk, and fast sorts of selected months or code categories. *Money Street* comes with a 48-page manual that includes an easy-to-use and understandable tutorial.

One final note: *Money Street* is not a home-accounting program nor is it advertised as such. It will not produce balance sheets or formatted income statements. It will not do budgets or handle multiple checking and charge accounts simultaneously; however, you may set up separate data disks to handle these as well as accounts receivables or other financial applications.

Requirements: Apple II, II+, IIe, or Apple III under emulation, 48K RAM, one disk drive

Computer Tax Service, $99.95; utility disk $25.00

PERSONAL ACCOUNTING

Personal accounting software has a long history in the microcomputer field. They were some of the first programs to become available for micros, and almost anyone who has had a micro for any length of time has at least one electronic checkbook in their collection.

One of the major problems with personal accounting software is that most of us have no need for it. We have extremely simple financial situations, writing a few checks every month, and not having a vast portfolio of assets to manage. Added to this is a second fault: Most personal accounting packages require much more effort than doing the same thing manually.

These problems have not deterred many software companies from marketing home accounting software. A recent entrant is BPI Systems, Inc. BPI is one of the oldest and largest producers of business accounting software for micros. Their *Personal Accounting System* reflects both their experience and their business heritage. It is full featured, relatively simple to operate, and equipped with capacities and features similar to their business-oriented *General Accounting System*.

Personal Accounting allows you to set up payees (people you pay frequently) and payors (people who pay you frequently), and will handle up to ten separate checking accounts and ten separate credit card accounts. It allows you to prepare monthly and yearly budgets, print checks, and reconcile your bank statements. PA produces numerous reports, financial statements based on cost or fair market value of your assets, and amortization schedules for loans and/or mortgages.

Operating around a personal general ledger, *Personal Accounting* allows you to enter checks to be computer-printed, hand-drawn checks, deposits to your bank accounts, and general journal entries to record transactions not covered elsewhere—such as savings account transactions or transactions affecting other assets, such as investments. It has more than adequate capacity for most, allowing 1,500 transactions per month, and a total of 640 accounts between general ledger, payor/payee prompts, and budget accounts.

Using the system is fairly easy. There are three program disks used. A start-up disk is required to bring the system up and provides access to the operating system utilities for formatting and copying disks. Data entry and file maintenance (as well as printing some of the reports) are accomplished with a disk of the same name. The third disk is used to post your transactions and close your books at the end of each month and year. This disk also provides additional reports. Other than considerable disk swapping, this process is entirely menu-driven, and you are well guided by BPI's excellent documentation.

The major problem with this package is not with the software. It's just that few of us have complex enough financial circumstances to need a computer to keep track of them. One exception is the person who runs one or more small businesses. If you fall into this category, this package will most likely provide all the accounting functions you need.

Requirements: IBM PC, 64K RAM, two disk drives, printer

BPI Systems, $195

PERSONAL COMPUTER/PERSONAL FINANCIAL PROGRAM

This comprehensive personal financial package establishes itself as a standard for others to follow. Transaction and categories are very complete. Five income and 37 expense categories are allowed and assigned numbers to be used during transaction entry. Monthly budgets for each category can be input and later compared with actual costs.

Balanced against this is one disadvantage: This program provides for only a single checking account per program. Multiple accounts require sep-

arate program/data disks. Most people will find this only a minor annoyance, offset by many conveniences.

Entering transactions—called "checkbook" mode—is simple and flexible. Split transactions, credit card charges, and up to nine tax-deductible items are allowed. Both deposits and withdrawals may be entered in one sitting. A running balance is maintained on-screen. This always tells you how much you have left but it slows the entry of transactions, particularly during editing and corrections.

To analyze your financial situation, *PC/Personal Financial Program* generates reports, either on-screen or in print. These include listings by category for such time periods as the month and year-to-date, including comparisons to actual, tax-deductible items, and a comprehensive report covering all categories. *PC/Personal Financial Program* also displays bar charts. For easy bank reconciliation, *PC/Personal Financial Program* displays a listing of checks that have not cleared so you merely have to mark them following receipt of your bank statement. Rounding out the program is complete, well-designed documentation.

Inexpensive compared to other personal finance programs, this quality package is a good buy.

Requirements: IBM PC, 64K RAM, one disk drive, *BASICA*

Best Programs, $95

PERSONAL FINANCE MASTER

Personal Finance Master (PFM) is a home and small-business checkbook accounting program. It will handle multiple checking and charge accounts, savings accounts, loans, IRA accounts, or any of up to 25 asset or liability accounts.

With up to 50 budget categories, *PFM* also allows you to assign up to 50 standard names, which can be used to identify check payees and sources of income. The program will also store addresses for these names. You may enter up to three lines of information, which may be used to print mailing labels or address checks.

Entering transactions is simple and straightforward. You pick the account to update and then proceed to an onscreen data entry form. The entry screen displays up to 18 transactions in the order entered, and you may edit or remove them as desired. Split transactions allow an item to be distributed to as many as ten expense categories.

Cleared checks and deposits are easily reconciled. Each item is marked with an asterisk, and the system will compute and display what your ending balance should be.

A search module permits scanning of the transaction files for particular records. Account names, type, day, transaction number or amount and tax flag may all be specified, and all six search keys may be used together.

The report module produces a check register report, search report, actual vs. budget report, and net-worth report, as well as a printout of your defined accounts with initial balances. A listing of assigned standard names and budget categories is also available. A high-resolution graphing option produces plots of up to six expense items together. However, there is no way to print out the graph, nor to save the graph to disk.

The program has a few restrictions in setting up accounts. As you define each account, checking, savings, charge cards, or whatever, you must decide how many transactions per month to allocate to each. The maximum for the program is 250, 5 to 100 in each account. Also, account information can be edited only during initialization. Once you leave that function and start entering data, you may only add accounts.

PFM comes with a 43-page manual, which includes a tutorial and sample printouts.

Requirements: Apple II or II+ with *Applesoft BASIC*, 48K RAM, disk drive; IBM PC, 64K RAM, disk drive

Spectrum Software, $75

THE PIZZA PROGRAM

The Pizza Program does not make pizzas, does not phone your pizza store and automatically order for you, and does not control your oven while you are cooking one. What it does do is generate meal menus and prepare shopping lists automatically.

The menu-generation portion of the program produces a set of menus corresponding to your shopping period. If you are a weekly shopper, it suggests one complete meal for each day of the week and gives a shopping list of the main ingredients needed to prepare those meals. In setting up your ingredient list, items may even be placed in the same order as they are found in the store.

Each menu consists of from one to five food items selected from five categories: main course, starches, vegetables, salads, and deserts. The pro-

gram randomly selects food items for each category based on frequency factors set by the user. For example, an item with a factor of four will only appear on your menu once a month. You may have items appear every day or only once every 99 weeks.

The Pizza Program comes complete with a standard list of food items for each category, so that you may start generating menus immediately. You may also modify the list to remove items you don't like and add items you do. You may print out the menus and the shopping lists. Also included is a per serving calorie counter, although you must include the approximate caloried count for each item you add to the list.

Well thought out, the program is not a recipe file but a practical way to plan and avoid repetitive and boring meals. It contains enough user-definable parameters to avoid such things as suggesting potatoes with spaghetti or potato salad with macaroni and cheese. Finally, if you like to eat out often, you may enter a restaurant as the main course, and the computer will remind you to go out to eat as often as you desire.

Requirements: Apple II+, Apple IIe, or Apple-compatible system, one disk drive
Gourmet Software, $34.50

ROADSEARCH

Roadsearch, a computerized road atlas, is a good idea that doesn't quite work. The program, which is designed to help you plan car trips, contains a database of 406 cities and road junctions in the United States and Canada. *Roadsearch* will determine the shortest practical routes, using the U. S. highway system, between any of these points. And it will calculate the distance traveled and time and gas consumed en route based upon your average speed and your car's mileage.

Unfortunately, *Roadsearch* is merely an adjunct to, not a replacement for, a map. The program gives just a text description, not a maplike representation of your route; for that you need *Micro-Atlas,* an accessory program. Also, *Roadsearch* does not list local roads or other scenic routes, though you can specify roads you do not want to take and the program will calculate an alternate highway route.

If your destination is not listed among the 406 cities, you're not out of luck—unless you spring for *Roadsearch-Plus,* an advanced version that lets you add 50 additional cities and 100 road segments to the existing database. And if that's not enough, the sophisticated, and more expensive, *Routeplanner* lets you customize even further, adding route stops by programming in coordinates taken from actual maps.

Roadsearch is an aid in general planning and cost/time estimates. Plus, the city-by-city printout —with mileage, gas consumed, time elapsed, and time remaining—is a handy thing to take with you in the car. None of the information *Roadsearch* provides, however, is particularly revelatory. You could find it all in a good atlas.

Requirements: Apple II, II+, or IIe, one disk drive
Columbia Software, *Roadsearch* $34.95; *Roadsearch-Plus* $74.95; *Micro-Atlas* $24.95; *Routeplanner* $149.95

ROOTS/M PLUS

Interested in your family roots but don't know how or where to begin? Frustrated with endless searches for that great-great-aunt through countless boxes of lists and letters? *Roots/M Plus* is for you.

Start with the manual, which is itself an entire first course in genealogy. Beginning with a capsule history of immigration and the tools and goals of genealogical search, this enjoyable and easy-to-read guide then tells you how to dig for genealogical goodies in the home and in public repositories, and how to conduct interviews with older relatives who may have good tales of quirky ancestors. Detailed instructions on how to use *Roots/M Plus* are interspersed with amusing drawings, quotes, and proverbs. Add to that a complete index, a bibliography listing over 40 books, and even a full appendix of places to write for help, and you have one complete and user-friendly manual.

The program itself is equally thorough. Once you have entered names of ancestors and information on them, *Roots/M Plus* will perform many useful functions. It will List all the names in the basefile, which can contain up to 99 generations. The Family routine allows you to list the spouses and offspring of any individual, including dates of birth and death, and the F and R keys enable you to view the composition of previous and next generations. With the Trace function, you can graphically display an individual's pedigree chart, which traces lines back though both sides of the family. Anniversary lists all subjects born, married, or deceased on

a given day, and Relationship determines the relationship of any two persons in the basefile.

In the lower portion of the screen is a holding area for names drawn from the basefile. this "fetch-table," or f-table, is the most important feature in the program, as it does not change as you move between routines. While you are running *Roots/M Plus*, either entering new individuals or making inquiries about others already in the file, you will be shuffling them in and out of the f-table, using the same names often in more than one routine. This procedure is more convenient than it sounds.

Roots/M Plus lets you store data files on separate disks for use in the default or other drives. Technically, therefore, even if you're descended from Julius Caesar, *Roots/M Plus* can handle your family. The program also saves space by listing common name-strings, such as your last name, which could recur hundreds of times in the basefile, only once.

Roots/M Plus will accomodate 72-, 80-, and 132-column printers, and will print out full or empty pedigree charts and family group sheets. The *Roots Basefile Print Utility* is an added program, run from CP/M, that will print the entire contents of a basefile so that you have a hardcopy of all the information you have entered.

Genealogy is the type of study—one that deals with large amounts of data that must be efficiently and easily stored, retrieved and displayed—that software programs in general, and *Roots/M Plus* in particular, complement perfectly. Both the beginner and advanced genealogist will find *Roots/M Plus* indispensable.

Requirements: CP/M, 32K RAM, disk drive
Commsoft, $49.95

SUPERTAX 1, 2, 3

Designed for home users, *Supertax* comes in three versions. *Supertax 1* calculates 12 federal forms and schedules but does not print the results on standard IRS blanks. *Supertax 2* deals with the same schedules and prints them on government-issue forms. *Supertax 3* includes those features, calculates depreciation, using both ACRS and pre-1981 methods, and prints out Schedule C.

These programs are menu-driven. Using the fully prompted mode, corrections cannot be made until all input questions have been answered. Otherwise, it is possible to correct errors at any time by calling up the item and re-entering data. In the direct mode, filing status and exemptions must be entered before income or deductions.

All input data is saved on disk. Any new data entered will write over existing information. The only way to retrieve overwritten information is to re-enter the old data. Input sheets are provided to aid in this process.

Supertax does not calculate any state forms, nor does it print the client information a professional tax preparer needs. Within its limits, it is convenient and reliable. Written in MBASIC, it is not as fast as it might be, however.

The 25-page manual is clear and does not assume that the user has any prior experience with computers. A hotline is available to help with any remaining questions. The packages are updated for each tax year.

Requirements: CP/M-80; IBM PC; Apple II, II+, or IIe; Commodore 64, one disk drive; TRS-80 Model III or 4 with two disk drives
Rockware Data Corp., *Supertax 1* $29.95; *Supertax 2* $49.95; *Supertax 3* $59.95

TALLYMASTER

Tallymaster is a home or office money-tracking program. It is menu driven and easy to use. It can add, multiply, subtract and divide dollar values, and it can give totals in percentages.

The user has at his or her disposal up to 702 data lines in 27 screens. The data lines are labeled A to ZZ. The user assigns labels and values to each data line, and *Tallymaster* automatically sums the values as each data line is updated. A total value appears at the bottom of the screen, and each data screen has its own subtotal.

Every item in a data file can be multiplied or divided by a constant. This is handy if you want a yearly average for monthly inputs or if you want to make projections. You can also add, subtract, multiply, or divide one group of data items by another.

Tallymaster will sort by label or value in ascending or descending order. This function can give a quick display of where the most or least money is being spent. The sort works whether the values are listed as dollars and cents or as percentages.

The program is very easy to use. Instructions are available at any time on the screen without losing any data. The disk's directory can be called from the main menu if the user can't remember the file name under which data is listed. The manual has

many facsimiles of screen displays, which are helpful when learning the program.

Tallymaster is ideal for the home user or office worker who likes to keep a running tab on where his or her money is being spent. Anyone who has a hard time keeping a checkbook balanced is not likely to keep the *Tallymaster* files updated. This program will not replace the accountant's spreadsheet, but it is a valuable aid to careful people who want to stay within a budget.

Requirements: TRS-80 Model III or 4, disk drive
Prosoft, $79.95

THE TAX ADVANTAGE

April 15th. We all know what that means, right? You guessed it . . . taxes! Let's face it, none of us enjoys doing our own, so why not let your personal computer take on the task?

The Tax Advantage can help prepare your tax forms and assist in tax planning throughout the year. Taking you step by step through each form, it will prepare your Form 1040; Schedules A, B, C, D, E, G, W, and SE; and Form 4562 (Depreciation).

A breeze to use, the program uses prompts and explanations that even a novice can understand. Every form and schedule is completed from within the 1040; whenever a line must be itemized, just press the letter I, and the correct form will be displayed. For example, at line 34A you wish to itemize deductions; press "I," and you are transferred to the first line of Schedule A. Complete it, press "Q," and you are back to line 34A of the 1040. Simple and fast, your tax liability is recalculated after each entry and can be displayed on screen at the touch of a T. If you go back and make changes, your tax is also refigured.

Designed for the individual who prepares his own return, it may also prove helpful for people who use the services of a tax preparer or accountant. By organizing tax data in advance, you will not only have an estimate of tax liability, but will save much of your accountant's time. That means dollars for you.

Bear in mind, this program is not intended for the professional preparer. Although it could be useful for such an application, the program does not actually fill in a 1040 form, nor does it produce Schedules that IRS would accept. Instead, the printouts provide the data needed to fill out the IRS form. A separate data disk is also required for each return. IRS regulations concerning computer-generated schedules change from time to time; thus, it is possible that certain printed schedules might be acceptable. Check with IRS before submitting any computer printouts, however.

Other features include printing of up to three Schedule Cs for different businesses, income averaging, and the printing of all itemizations, up to 30 items for each. If you are using *The Home Accountant,* the appropriate data may be directly transferred to the tax forms and schedules.

Although the internal tax tables cannot be changed by the user, an update service costing $10 allows purchasing the new year's version for half price. This is not a bad deal if it is offered every year and the retail price is held low. An excellent, easy-to-use manual, complete with tutorial and a demonstration program, is included.

Requirements: Atari, 24K RAM; Apple II with *Applesoft BASIC,* II+ or IIe, 48K RAM; Commodore 64; IBM PC, 64K RAM, disk drive, printer
Continental Software, $59.95

TAX MANAGER

Tax Manager assists individual taxpayers in preparing their federal returns. Although many people might appreciate any kind of tax aid come April 15th, *Tax Manager* provides little more information than the instruction booklet supplied with your federal forms.

Tax Manager is divided into three modules: Tax Guide, Tax Checklist, and Tax Preparation. The first module asks you yes-or-no questions to determine which tax forms and schedules you will need.

Module two, the Tax Checklist, is a database that comprises nine lists: taxable income items, nontaxable items, allowed deductions, nondeductible items, tax credits, and so on. To check whether an item falls into one of the nine categories, you type in a key word, and *Tax Manager* will search for it. For instance, under itemized deductions, you might type in "eyeglasses"; after some whirring, the program would inform you that this item is deductible. You can also select an option that allows you to view all the listings in any given category. In so doing, you can discover, for instance, that "bribes" and "illegal transactions" are nondeductible items.

The tax-preparation module consists of tax tables and forms. To fill them in, you simply move the cursor to the appropriate spot and type the data. As you enter the figures, *Tax Manager* recalculates

everything that follows. Once you have determined your taxable income, the program indicates the amount of your federal tax and tells you whether you owe the government, or vice versa. You can also generate a printout of the completed form.

Tax Manager may sound great, but it has more flash than substance. You actually save only the few minutes it takes to check the tax tables provided with your forms, and this time saving is probably absorbed while you wait for the program to boot. In addition, you still have to enter all those figures—even if it is on a computer.

Because tax laws, forms, and tables change every year, *Tax Manager* offers a $30 extended warranty that allows you to update the program each year. That's one good reason to get *Tax Manager;* the Tax Checklist is another. Now, if only there were 15 more, H & R Block might have to worry.

Requirements: Apple II, II+, IIe, or III, disk drive
Micro Lab, $180

TIME IS MONEY

If you have an Apple and need a financial-management program, *Time Is Money* may be just the software package for you. In the words of its creators, it was designed "for the person with no accounting or bookkeeping background who wants a fast, no-nonsense financial-management system. *Time Is Money* will balance your checkbook, calculate and monitor your budget, determine your net worth, print your checks, and record tax-deductible expenses. In short, *Time Is Money* offers you the capability to create your own personal financial management system which will grow as your needs grow."

Can *Time Is Money* really do all that? Yes, it can —and much more. It can keep track of up to 240 asset and liability accounts, 240 types of income from 240 income sources, and up to 240 categories of budget items. It can print out hardcopy reports of your income, expenses, or both, in many different formats and indexed in many different ways. The program even prints either line graphs or bar charts, either on paper or on your computer screen.

The first time you thumb through the 162-page manual, it's a little frightening, since it presents a vast number of details about the program. Once you start using the manual, however, it isn't nearly as difficult to understand as it seems. A well-written tutorial leads the user rapidly but gently through the program's many features, using some sample transactions stored on the master program disk. Once you've worked your way through these sample entries, you'll find that you're pretty familiar with most of the basic features of *Time Is Money*—and perhaps even ready to start learning about the many, many advanced features that are available.

When you load *Time Is Money,* the first menu you see offers you a choice of seven operations. You can choose to enter transactions, view transactions, balance a checking account, generate reports by various categories, create or change names of transactions, print checks, or take advantage of various program utilities.

Using *Time Is Money* to balance a checkbook is a snap. Simply take your canceled checks to your computer, and type in the number of each check that the bank has paid and returned to you. Type the number of each cleared check, and an *X* will appear on the screen next to the check with that number. At the same time, the amount of the check will be deducted from your current balance. When you've typed in the numbers of all of your cleared checks, the balance shown on the screen and the balance on your bank statement should match. If they don't then it's easy to track down the discrepancy.

Most of *Time Is Money*'s other features are just as easy to use, and just as powerful. None is extraordinarily difficult to understand.

Time Is Money may not be the ultimate personal-accounting program, but it's one of the best available for the Apple II, II Plus, and IIe. You may not require all of its advanced features, but if you have any desire at all to computerize your household or small-business financing, *Time Is Money* can probably go a long way toward meeting your needs.

Requirements: Apple II, II+, IIe, or III in emulation mode; disk drive
Turning Point Software, $100

TUTOPROGRAM: MECHANICS OF ENGLISH

This program is designed for students in grades 5–9 with at least a fifth-grade reading level who need to improve their understanding of sentence construction, capitalization, and punctuation. The program is a tutorial that presents the student user with small frames of information. Frequent responses are required. The material is organized into lessons that most students can complete in 15–

30 minutes each. A test is included for each lesson. Records on student progress are saved on the disk for the teacher.

The complete system consists of 18 disks, which cover the following topics: sentence patterns, verbs, modifiers, and pronouns, capitalization, and punctuation. Students may choose to run the lesson, a summary, or take a printed test over each lesson. By taking a pretest, which is provided, students may be placed at their appropriate level and allowed to skip material which they already know. A module contained in the program allows the teacher to direct entry into the program at any point. Teachers may also access individual student records or class records.

The program is designed to be self-instructional; this material need not be used in conjunction with classroom instruction. The program uses the Apple's high-resolution graphics to display large print in upper and lower case. Some graphics are included, but these are not impressive and consist mostly of frames and arrows.

Information is presented in small bits. The user may progress at his own rate by pressing the RETURN key when ready to proceed. The user must answer multiple-choice questions every few frames. Wrong answers produce more information to help clarify the lesson. At the end of each lesson, the program offers a summary of the material and a short test on the material presented. The results of the tests are recorded and stored for the teacher to examine. The program will begin subsequent lessons at the point where the user left off.

This is one of a series of *TUTOPROGRAMS* from BLS which cover the basic skills of mathematics, reading, grammar, English, and spelling.

Documentation for the programs is skimpy. It consists of the printed pretest and a short course description which explains how to run the program. The material on which these programs are based is from material developed by the Criterion Test Bureau of McGraw-Hill for the California Test Bureau Services.

Like most programmed instruction, this can become tedious. It requires motivation on the student's part and presents no flashy "whistles and bells" to help maintain the student's interest. However, it is very comprehensive and well designed from the standpoint of curriculum and instructional design. It could be a definite asset in most schools.

Requirements: Apple II, II+, or IIe, 48K RAM, one disk drive
BLS, $918

C. DAVID SEUSS, CHAIRMAN OF SPINNAKER SOFTWARE

Two management consultants, C. David Seuss and William H. Bowman, built Spinnaker Software into an $11.7 million a year business in 24 months by designing—and advertising—a top-rated line of educational programs.

"We have products that are as much fun as games, they are educational and they promote positive social values. No other company can make that complete set of claims, and so we hammer it home," says Seuss, 33, Spinnaker's chairman, who pronounces his name "seese" and is no relation to children's author Dr. Seuss.

In 1983, Spinnaker spent $1.3 million on ads in national magazines to promote its 15 handsomely packaged titles, which include such hits as *nooper Troops,* a detective game where note-taking and map-drawing help solve a mystery.

By the spring of 1984, the Cambridge, Mass., company had expanded its product line to 24 items, its ad budget to $6 million, and was predicting revenues of $50 million for the year. Spinnaker software, sold on disk, is compatible with Atari, Apple II models, Commodore 64, IBM PC, PCjr, and Coleco-Vision.

In a separate licensing agreement, Spinnaker agreed in 1984 to create, produce, and distribute a separate line of moderately priced, cartridge-based educational software for Fisher-Price to be sold along with that company's toys.

Seuss and Bowman, the 34-year-old company president, majored in industrial engineering as undergrads and studied management and marketing at Harvard Business School. They founded Spinnaker in April 1982 after researching the computer market, finding a void in the educational sector and raising $800,000 in seed money from TA Associates in Boston, a major venture capital firm.

FREEWARE

The CPMUG library was started by Tony Gold and Bonita Taylor during the winter of 1976/77. At that time, floppy-disk systems were expensive; the early version (I.3) of the CP/M operating system then current lacked many of the facilities now available in version 2.2, and, because the Digital Research documentation was so confusing, the rules for requesting service from the CP/M operating system were poorly understood. Thus, the first 20 or so volumes of this library contain programs (of widely varying quality) intended to supplement the facilities provided by CP/M. For this reason, many programs are hardware dependent and frequently need radical surgery to make them run on modern systems. Nevertheless, bad as some of these programs are, they provide admirable learning exercises—if only because it is a challenge to get them to work for you. And, mixed in among the dross are quite a few really good programs that are still useful today.

Later contributions to CPMUG and SIG/M (from CPMUG volume 40 and SIG/M volume I0 onward) are far more reliable. If you have a fairly standard Z80 system, many programs can be loaded and run with no changes, because the rules for system service requests are far more strictly followed and documentation is far better. At worst, you may have to make minor changes in the system definition statements so that these match your hardware configuration.

You should not, however, take anything for granted; read the accompanying documentation, then study the programs to see how they work and to learn new techniques. My own experience has been deep gratitude that so many generous experimenters have provided me (at minimal cost) with ideas, with pointers on how to go about setting up programs that I needed, and often with complete programs or subroutines that saved me from reinventing the wheel.

It appalls me to hear computer club members of the more passive kind grumble, "???.COM is a terrible program—it doesn't work on my system." Or, worse yet, "Why do I have to buy the whole disk? There's only one program on it that I want." I tend to get very testy with people who don't (or won't) understand that a disk for which they are reluctant to pay $5 is the free gift of people who probably spent hundreds of hours designing and coding these programs.

There are approximately 3,000 programs on 250 disks in the CPMUG and SIG/M libraries alone, not to mention the BDS C and Pascal users' groups—all designed, coded, edited, copied, assembled into categories, and copied for distribution by enthusiasts who believe that knowledge should be shared. It's not necessary to feel grateful (I am told Japanese has fifteen ways of saying "thank you," each one of which implies a greater or lesser degree of resentment!), but it is worth learning to appreciate the magnitude of the gift—who knows, you might be inspired to share one of your own better efforts in the same way! A standard software submission form is included on almost every disk in the CPMUG and SIG/M libraries.

CP/M-80 GAMES

Games abound in the early CPMUG volumes. You will need to check the version of BASIC under which they run, however. *EBASIC* (an early version of *CBASIC*) predominated before Microsoft's *BASIC-80* and its derivatives became so widespread. Lunar Lander, Craps, Star Trek, Keno, and many others are in CPMUG volume 3, 5, 15, 20, 22, 26, and 27, though some of these run under Microsoft version 4.0. If you want to be selective, go look at Zoso's reviews of these games, which are included on the disks but also reprinted in the catalogs issued by the Amateur Computer Club of New York (see the previous article, "Software for Free"). Zoso is not exactly famous for kindness, so when he says a game is good you can be sure of getting some hours of enjoyment from the program. If he says it's poor, you may want to have a shot at making it better. But if he says a game is terrible, forget it and write your own version. Probably the best and most sophisticated game is the version of Adventure in volumes 1–3 of the SIG/M library. Volume 1 has the executable 8080 code of the original version, and volume 2 has the FORTRAN source code. Volume 3 has the executable Z80 code of an expanded 550-point version. Volume 121 also has the expanded version but senses whether you are using an 8080 or Z80 chip and uses the Z80 code where possible to make the game run faster.

IBM PC GAMES

Several volumes of games are available from the New York Amateur Computer Club's PC Users' Group; these appear in the catalogs mentioned in "Software for Free," above. A number of IBM PC clubs now exist on the West Coast, and these also

have games among the public domain software they make available. The most extensive catalog I have seen is that of the SVCS (Silicon Valley Computer Society), in whose library volume 1, 20, 24, 25–31, 34, and 39 are largely or exclusively devoted to games. Volume 39 contains "ATTACK.BAS Game. Destroy the Apple computer manufacturing plant." Have any Apple fans come up with a counterattack on the IBM plant?

LANGUAGES

Several versions of BASIC, ranging from the tiny to the elaborate, are available. The tiny is *TINIDISK* in CPMUG volume 11, a version of the Wang Palo Alto Tiny BASIC described in Dr. Dobb's journal in 1976 and subsequently adapted for CP/M. This was designed in the days when a 4K memory board could cost $300, so the interpreter occupies only 3K and is somewhat limited. At the other end of the scale are the Lawrence Livermore interpreter in volume 2 and 10 of CPMUG, and *EBASIC* in SIG/M volume 26. *EBASIC* is a semicompiler, the ancestor of *CBASIC* and CB-80, which has higher precision, better control structures, and requires no line numbers except in statements that are the targets of GOTO or GOSUB branches. Floating-point routines for *EBASIC,* together with the PL/M source code for the compiler and run-time interpreter are in SIG/M volume 29 and 30.

Other procedural languages include an *Algol/M* compiler in CPMUG volume 28 (this is a subset of *Algol-60*) and a *Pascal* compiler (written in Pascal) in CPMUG vol. 50. A single-pass preprocessor scans the source code, generating a kind of p-code; a two-pass translator then scans the p-code, generating a native 8080 object code that is linked to a run-time library by use of the CP/M utility PIP. Differences between this implementation and standard Pascal are few and fully documented.

A *Small-C* compiler for CP/M-86 is available on volume 149 of the SIG/M library. This is built on Ron Cain's original version, published in Dr. Dobb's journal. The compiler has some limitations, but it is a good tool for learning inexpensively to program in C, and is generally considered to be reasonably free of quirks—that is, programs written for this compiler will probably run with little or no change when recompiled with more extensive compilers that provide the functions and data types missing from *Small-C.*

If you are interested in Artificial Intelligence (AI), you may wish to explore one of the principal languages used in this field: LISP. A public domain implementation of LISP is available in volume 148 of the SIG/M library, contributed by the Pascal Z Users' Group. It is written in Pascal Z, and if you want to make changes in any of the facilities you will need a Pascal compiler. However, if you merely want to create and run LISP programs, the executable version of the LISP interpreter will run on any CP/M 2.2 machine. Full documentation of the interpreter is contained on the disk; however, it is not a tutorial, and to learn LISP you will need a book of this type.

Another version, *XLISP,* contained in volume 118 of the SIG/M library, is of particular interest to AI explorers because it is object-oriented. That is, this version of LISP is particularly suited to the creation of software "objects" that have particular attributes and can interact with other "objects." The Xerox language *Small-Talk* is of this type, and such languages are of particular value in creating "Expert" applications, such as medical diagnosis programs or geological prospecting information systems or user-friendly shells that display icons on the screen, to which the user can point with the aid of a mouse.

FORTH is also popular in some circles, and several public domain versions are available. *FORTH 11* (SIG/M volume 13) is an implementation of FIG-FORTH, and the user should obtain the manual of this implementation from the FORTH Interest Group (FIG); the documentation supplied on the SIG/M disk is concerned mainly with how to run this version under CP/M-80. A FORTH implementation for a 68000-based machine is contained in volume 151 of the SIG/M library, and Disk 6 of the SIG/86 International MS-DOS Users' Group has an updated and enhanced implementation of FIG-FORTH. In particular, this version has an interface both to FORTH screens and to MS-DOS files, better documentation and commented source code, the source for the FORTH assembler, and the source for the FORTH screen editor. A FORTH implementation written in IBM PC BASIC is available in volume 45 of the Silicon Valley Computer Society's library of public domain software for the IBM PC. (For the address of SVCS, see below.) Volume 14 of this library contains both the source code and an executable version of the Mountain View Press public domain implementation of FORTH, and volume 15 contains FORTH screens for volume 14.

Other languages include SAM76 (CPMUG volume 34), an extensible macro and string-processing language; PILOT (CPMUG volume 12), a programmed learning and inquiry language for use in computer-aided instruction; PIDGIN (SIG/M volume 43), a systems programming language; and TINCOMP, a compiler generator written in PIDGIN (also in SIG/M volume 43).

WORD PROCESSING

The text editor, *ED,* supplied as part of the CP/M package is nothing short of abominable. It is extremely powerful, but also extremely difficult to use. There are, of course, plenty of good commercially available editors (at stiff prices); however, the public domain libraries have several editors that are friendlier to the user than *ED* and may provide an interim solution to the problem until the budget allows the purchase of *WordStar* or *Perfect Writer,* which are among the most commonly used.

Some of the public domain text editors were designed in the days when a printing terminal (such as the Teletype ASR33) was the most common device. Thus, they mostly assign a number to each line and require the line number to be specified if a line is to be changed. *EDITM* (CPMUG volume 81) and *TED* (CPMUG volume 36 and SIG/M volume 80) are of this type; they work well and are reasonably friendly. *ICE* (In-Context Editor) is essentially a line editor that provides a window over a text file on a CRT screen, editing commands appearing on the bottom line. However, file handling is not as good as for *EDITM* and *TED,* requiring a submit file to create and maintain a backup file in the same way that *ED* does.

Much more useful is *ED* (a screen editor written in C) based on *ED2,* described by Edward K. Ream in the January 1982 issue of Dr. Dobb's journal. This was contributed to SIG/M volume 76 by the Software Tools of Australia group.

It seems that the only public domain editor for the IBM PC is *PC-Write* on volume 52 of the SVCS library. This is copyrighted by Quicksoft, but you are allowed to freely copy and share your *PC-Write* disk. No support is given. If you want support, you must register your diskette with Quicksoft, which costs $75. This editor has certain limitations: maximum file length is 62K and the file being edited must reside completely in memory; lines can be of any length, but horizontal scrolling is not supported and only the first 80 characters are visible. A formatter is part of the package; there is no direct support for underlining or boldface, but printer codes for these and other print-time functions can be inserted, according to the catalog.

For CP/M-86, the SIG/86 library has *TOP* (Text Output Processor), which allows 52 embedded commands to perform underlining, centering, paragraphing, chapter and appendix handling, revision bar printing, table-of-contents construction, and most of the other desirable features of a good formatter. SIG/86 Disk 3 contains source code as well as an executable .COM file, documentation files, and examples of use. The disk contains copyrighted material, and purchasers (for example, members of SIG/86) will be required to sign a nondisclosure agreement. To go with *TOP,* SIG/86 Disk 4 contains a UNIX-compatible spelling checker; this is not public domain, but SIG/86 does have the right to release binaries only to its members. Seems as though it would be well worth joining SIG/86.

Among CP/M-80 text formatters available in the public domain, the most useful are probably *POW* (Processor of Words, SIG/M volume 82) and *ROFF4* (SIG/M volume 126). *POW* is an updated version of a formatter described in Dr. Dobb's journal; it uses embedded commands to provide most of the features required for straightforward text formatting.

ROFF4 is a far more powerful tool, written in C and patterned after the UNIX formatter. *ROFF4* is designed to allow dot-matrix printers (specifically the Epson MX-80) and daisy-wheel printers to construct acceptable mathematical and chemical formulae. *ROFF4,* too, uses embedded commands to set up line length, indenting and outdenting, headers, footers, and footnotes. But most of the work is done by macro instructions; some of these are provided, but you can design your own for special purposes. You can also design special type fonts (Arabic, Cyrillic, Scandinavian, or even Elvish if you are a student of Tolkien's *Lord of the Rings*!) to which characters from a standard ASCII keyboard are translated. If you insist that you must see right on the screen exactly what you are going to get on the paper, then *WordStar* or *Magic Print* is your only hope; but if you want the most powerful and versatile formatter available for microcomputers, then *ROFF4* is for you.

MAILING LIST AND DATABASE MANAGERS

Almost everyone needs a mailing list at some

time or another, if only to send out Christmas cards to the many business acquaintances with whom one would like to keep in touch. There are a number of simple, specialized mailing list programs available in the public domain; most of these are written in some version of BASIC, so you will need the appropriate interpreter as well as the program itself.

The simplest (and probably the most convenient) of the mailing list programs is *XMAIL*, in SIG/M volume 26. This requires *EBASIC* for support, but a COM file of the interpreter (EBASIC.COM) is included on the disk. This system consists of eight separate programs, each with a separate function. Modification is therefore relatively simple if you are familiar with BASIC. XEDIT allows you to enter new names and addresses into an empty file; when you complete a record, there is a pause to allow you to verify what you have entered before the record goes into the file. If you make a mistake, you reject the entry and re-enter it—there is no facility for changing part of an entry. When the session is complete, a bubble sort automatically sorts your entries into last name order. If you have more than 100 or so entries, you should replace the bubble sort (which is simple but abominably slow) with a *Shell-Metzner* or *Quicksort* routine. Now XMERGE allows you to merge your sorted entries into the master file. XSCAN allows you to scan a designated file, 20 names per page, and to delete one name at a time. XEXTRACT allows you to extract one name at a time from a file so as to create a new output file that is a subset of the master file. There are also programs to find a particular name, list a name/address file, and query telephone numbers in the file. Finally, XLABELS allows you to print mailing labels three-up.

But mail list processing is really only a small subset of the information processing that can be performed by a generalized file manager or database manager. There is a difference between these two applications. A file manager provides a generalized method of creating files with specific record structures and retrieving the information in various formats. However, there is seldom any facility for combining the information from several files, and usually information that appears in more than one file is actually duplicated in every file. A database manager, on the other hand, stores information in such a manner that, although the separate data elements can be retrieved and formatted in many different combinations to satisfy the needs of different users, there is no duplication of any data element. A true database manager is therefore a complex program that requires complex satellite programs to allow a user to retrieve the data elements in the form he or she requires. I do not know of any true database manager in the public domain, but there are a number of good file managers whose facilities approach those of a database manager.

The best of the CP/M-80 file managers is *DIMS* (Dan's Information Management System), contributed by Dan Dugan of San Francisco and available on volume 61 of the SIG/M library. This is a series of MBASIC programs that allow the entry, selection, modification, and retrieval of fixed-length records in a file. The records may be 128 bytes long, with up to 15 fields, or 256 bytes long, with up to 30 fields. Field lengths can vary from record to record, the only restriction being that the total length of all used fields may not exceed the specified record length; the entry routines display an end-of-record marker as a guide, and do not accept the record if too many characters are entered. The programs are "chained" so that any facility can be called up either from the main menu or from within a program that is running. Excellent correction and error-handling routines are built in, a backup file is automatically created (normally on the alternate disk drive) when the main file is closed, and the user interface is, on the whole, very easy and friendly. Of particular interest are the report generating facilities. These include the printing of mailing labels (one-up) in one of three standard formats; the printing of reports with page headings, and with or without field names. The fields of a record can be printed in any order and at specified columns on the page, and any fields irrelevant to the current report form can be skipped. This flexibility in printing is achieved by creating a separate format file for each report format desired. Because the record format and the data for each individual field must be specified in detail, it takes care and attention to create a format file that produces the result you want, but there is nothing difficult about it, and plenty of examples are provided. The useful facilities include DPUT, which outputs the current database to a standard MBASIC file for processing by other application programs, and DGET, which brings a standard MBASIC file into the currently open *DIMS* file and fields in the input

file being directed to any desired fields in the *DIMS* file. This allows an existing *DIMS* file to be converted to a new structure without having to re-enter the existing data.

I understand that *DIMS* is currently in the process of being adapted to ABASIC for use on the IBM PC, and may be available in that form soon. Until the new version of *DIMS* becomes available, IBM PC users don't seem to have much available to them except *DBMS* and *PC-File,* on volume 4 and 5, respectively, of the SVCS library. I have not had the opportunity to see either of these in operation, but the file names indicate that both have entry, correction, retrieval, and file-merging facilities.

STATISTICS

I do not know of any public domain statistics packages to run under CP/M-80, but volume 53 of the SVCS library is dedicated to such a package, called *EPISTAT,* for the IBM PC. The programs are all written in BASIC, and include a data entry, edit, and print program (DATA-ONE.BAS), and a utility to transfer data samples from one file to another (FILETRAN.BAS). There are 18 statistical programs, which perform analysis of variance (one-way and two-way), false positive and false negative tests, binominal distribution, chi-square distribution and test, Pearson's correlation coefficient, normal distribution, Poisson distribution, selection of a sample from a population and the assignment of paired and unpaired cases, sample size calculations for paired and unpaired cases, sample size calculations for paired and unpaired case control, and a number of other commonly used functions including rank sum and correlations tests.

TELECOMMUNICATION PACKAGES

Telecommunication programs are proliferating in the public domain. The difficulty is to know which programs will best suit you and what the latest version of your chosen package is. Ever since Ward Christensen put his MODEM program into the CPMUG library, people all over the country have been enhancing it with new major features, adapting it to suit specific machines (such as the Osborne 1 and Heath/Zenith Z-100), and changing code to make it work on machines (such as the Lobo MAX-80) that have memory-mapped I/O instead of the more usual port I/O.

If you are running CP/M-80 and will be communicating mainly with other microcomputers, then *MODEM712* is probably your best bet. To install it, you need sufficient knowledge of assembly language to change EQU statements in the source code (to match the program to your system) and to reassemble, or else to follow simple instructions for patching the .COM file with DDT, *MODEM712* is probably your best bet. Despite appearances, *MODEM712* is actually more recent than *MODEM798.* When some bugs were eliminated and enhancements made to *MODEM798,* the Remote CP/M operators responsible for coordinating updates took the numbers back to 711 to avoid conflict with an existing *MODEM8xx,* which was a different program specifically for Televideo systems. *MODEM712* is easy to work with, because it allows you to perform many CP/M functions (directory display, reading and writing files, etc.) without leaving the main program and without losing a telephone connection you have already made. A similar program (*COMM723,* on volume 127 of the SIG/M library) has even better disk file manipulation facilities from within the communications program, but requires somewhat more knowledge to install.

A version of *MODEM7* for the IBM PC is available on volume 9 of the SVCS library, and is designated *MDM7I.COM;* source code and documentation are also on this disk. Another version of MODEM is on volume 45. This is designated version 3.0; it is not clear whether this is a PC adaptation of MODEM V3.0, or PC V3.0 of *MODEM7* (version 7xx of MODEM, which is menu-driven and has the latest enhancements). The difference would lie in whether this implementation has the batch file transfer facility (first implemented in *MODEM7*) and the CRC (Cyclic Redundancy Check) method of error detection during file transfer. Earlier versions of MODEM used a simple checksum for error detection; this gives a probability of approximately 97 percent of detecting any type of transmission error. *MODEM7* and later versions use a CRC check that raises the probability to 99.997 percent, thus increasing confidence that the file was received without errors. These differences also apply to many commercial communications packages; about half of those that claim "XMODEM compatibility" do not yet support batch file transfers or CRC checking, but vendors of about half of the non-CRC/batch packages say that the batch and CRC packages will be implemented soon.

Users who will communicate chiefly with mainframe host computers such as CompuServe or The

Source, or DEC computers running UNIX or DEC operating systems, may find that the *KERMIT* package serves them better. *KERMIT* for the IBM PC and Heath/Zenith Z-100 machines is available in volume 113 of the SIG/M library; volume 41 of the SVCS library contains ASM (source) and EXE files of *KERMIT* for the IBM PC; volume 40 has the *KERMIT* Users' Guide, Protocol Manual, and a summary of the changes to *KERMIT* that were made from June through December of 1983.

SYSTEM UTILITIES

The number of system utilities in the public domain is very large indeed. This is because almost everybody who becomes a heavy user of computers, and especially those who develop their own programs, finds that the most convenient way to do a particular operation is not provided for in the system software supplied with the machine. Thus, the first programs written are programs to make life easier. The prime example of this is the directory display—CP/M-80, until version 2.2, displayed file names one to a line. Thus, on a video terminal with only 16 or 24 lines, half the names raced by and disappeared before they could be halted. The result was a proliferation of transient programs such as *WDIR* or *XDIR* that displayed the directory in four or five columns, showed file sizes, and in some cases alphabetized the display. The latest development in this field is *Super Directory (SDIR),* which searches not only the default drive but all other drives as well for specified files. The latest version I have found is *SD-44,* in volume 66 of the SIG/M library. This is for CP/M-80 systems only. For CP/M-86 systems there is *SD-48B* in volume 146 of the SIG/M library, and for the IBM PC there are *SDIR* (SVCS volume 11) and *SD20* (SVCS volume 44) for DOS 2.0.

It is impossible to list all of the valuable utilities, and even to make a selection would be of little value, since what suits my system and my activities would be totally irrelevant to many other people. The only sensible way of making a choice is to scan the catalogs issued by CPMUG, SIG/M, SIG/86, SVCS, NYACC, and other bodies that provide public domain software to their members. The NYACC catalogs are the most valuable, because they reprint the documentation files in full; thus, it is possible to see not only the possibilities but also the restrictions that apply to the CPMUG and SIG/M programs listed there. The catalogs with brief one- or two-line descriptions can give only a general clue to the nature of the programs—but if there are things that look interesting on the disk, why not buy it and try it? It is seldom that a "volume" of public domain software will cost you more than $15; most are only $8 (less if you supply the disk). Even if nothing at all on the disk turns out to be of use to you, you will at least have learned something in finding that out, and if you study the programs you will get even more value from your purchase.∞

SourcePB CP/M Users' Group
1651 Third Avenue
New York, NY 10028

SIG/M
P.O. Box 97
Iselin, NJ 08830

New York Amateur Computer Club (NYACC)
P.O. Box 106
New York, NY 10008

Silicon Valley Computer Society
P.O. Box 60506
Sunnyvale, CA 94088

SIG/86
Joseph Boykin
47-4 Sheridan Drive
Shrewsbury, MA 01545∞

DISK MAGAZINES

There's a whole new communications medium being developed, and almost any computer owner can join in. The medium is the disk magazine, and it has some unique benefits. On all levels, a disk magazine is interactive. When a new issue arrives, you don't just sit and read it; you *work* with it. When a program appears in print, the reader must pore over the description of the program to learn its merits. If it seems interesting, the entire program must be input into a disk in order to run it. If it turns out not to be useful after all, the keyboarding time is wasted, except as a few hours of typing practice. With a disk magazine, the program is ready to use. Rather than reading a review of what it can do, the "reader" just loads it and runs it. What better way to determine its usefulness?

Some of the magazines reviewed are interactive in another way. The editors want readers to provide them with programs, questions, or problem solving techniques, many of which appear in later issues and are credited to the subscriber. To foster this, these magazines come with mailers in which to return the issue after adding comments, suggestions, or programs. One magazine has two subscription rates, one for one-way subscribers who don't intend to return one of the disks, and one for two-way, interactive subscribers. Interactive subscribers become part of a network, or of a nationwide club.

So far, publishers have chosen to lay out their disk magazines in two basic ways. Some are simply disks with a collection of programs; others more directly imitate print magazines. In each style, the programs are self-contained; but with the magazine format, menus and submenus list sections of the magazine. When the reader touches a key, an individual article pops onto the screen. This makes it a little easier to move from section to section of the magazine. Within the next year or two, it will become clear which method of writing and editing a disk magazine the readers prefer.

The fact that the magazines have very few bugs is remarkable considering that software companies spend many thousands of dollars and often well over a year in developing new software releases. As the various editors hear from their readers, any weaknesses in the instructions for reading the magazines are being eliminated. The result is that there is very little frustration in using them. Since a magazine must provide pleasurable and informative reading, that is important.

There is one notable difference between magazines that run on the IBM PC and PCjr. or PC-compatibles and those designed for the Apples and Apple compatibles like the Franklin: The Apple comes with a graphics card as standard hardware while the PC does not. Thus, Apple magazines tend to use graphics more often and the graphics are more sophisticated than in PC magazines.

Putting out a disk magazine involves a far smaller labor force than publishing a print magazine. Thus, many disk magazines are available at a price which is not tremendously higher than the retail cost of a blank disk. Yet the magazines are filled with programs and information. In time, the price may even drop.

There are two memory listings in each of the reviews below. One gives the minimum RAM needed to read the magazine. The other indicates about how much information is stored on the disk. Since disks vary, this is a fairer comparison of the size of the magazines than to say "one disk per month." A floppy disk, for those who have never used one, is one which has two sides but which must be removed from the computer and turned over to have the second side read. Thus, it will run on a single-sided drive.

If a subscription to a disk magazine brings just one useful program, reviews one commercial demonstration which is just what was needed (and even then offers it at a discount to subscribers), or discovers one game that children find both entertaining and educational, then the cost of the subscription will be returned every time that program is loaded. After taking the plunge into the computer age, the computer owner can dive much deeper with a modest investment for a subscription to a disk magazine.∞

A+ DISK MAGAZINE

A+ Disk Magazine is published and edited by the same people who publish *PC Disk Magazine*. The format of the two magazines is similar—a single-sided diskette with about 160K of text—and *A+ Disk Magazine* attempts to provide at least one article and program per issue on the five categories in *PC Disk Magazine*.

Since *A+* is geared toward family and home use, and since the Apple has a color card as standard hardware, there are more graphics and there are more games in *A+* than in *PC Disk*. While there may be more educational programs and games for

children, there are still articles on programming and applications for home use. The format and the philosophy are the same as *PC Disk Magazine,* and *A+ Disk Magazine* also comes with an accompanying printed user's guide.
Requirements: Apple II, II+, or IIe, 48K RAM
A+ Disk Magazine, single issue $29.95; three issues $69; six issues $119

I.B. MAGAZETTE

Running on an IBM PC, PC-XT or PC compatible computer, *I.B. Magazette* is issued monthly on a single "floppy" disk that must be removed from the drive and turned upside down so the other side can be read. This allows subscribers to use either a single-sided or dual-sided disk drive. Thus, the magazine contains about 320K of features and programs.

I.B. Magazette is short for "Inter-active Bi-Directional Magazine on Diskette," and that gives a clue to the magazine's thrust. Even more than with other disk magazines, the reader actively participates in *I.B. MAGAZETTE.* With each issue comes a sturdy velco-sealed disk mailer, which the magazine hopes readers will return with answers to questionaires, with suggestions, programs, problems, and helpful hints. Any program that is published wins the creator a free issue, and the best program wins a box of diskettes. Good programs will be published, whether written by novices or professionals; each month, the magazine publishes the best of what it receives, so the percentage of what is written by professionals versus novices varies from issue to issue. The earliest issues—it began as a bimonthly—were written chiefly by the magazine's staff. The contents of the magazine are almost all public domain or user-supported programs; they may be copied and utilized but may not be resold. There are also some commercial demos.

I.B. Magazette uses a traditional magazine format; it's not just a collection of programs. It runs in advanced BASIC, is easy to use, and each issue has instructions on how to read it. While most disk magazines don't divide their issue into regular departments, this one does: "Programs," "Helpful Hints," "Features," and "Readers' Comments" are a few. This helps the reader categorize the contents of the issue immediately. The editors also let you bypass the magazine's theme music, a convenient time-saver. As in a print magazine, the reader may turn to any department or page through the magazine screen by screen. Each section has a self-contained menu, so that when you finish one article, you may review a list of the other articles in the same section. At the bottom of the screen there is usually a list of function key options to remind you how to exit, return to the menu, turn back one screen—a good feature not found in all magazines—or ahead one screen.

The editors say that they will not publish something that would be better handled in print. The value of a disk magazine is its inter-active capability. Thus, a feature article may demonstrate a programming or computer principle; nine consecutive issues have had an interactive feature demonstrating different kinds of sorting programs. The most recent series of feature articles focuses on systematic programming, including a graphic demonstration of flowing charting, pseudo code, and the use of BASIC in systematic programming. (This is geared for the novice.) The magazine often features a demonstration of a commercial program—*BASEII, Main Street Filer,* and *Volkswriter Deluxe* among others—and occasionally the demonstration comes with a substantial discount for subscribers who decide to order the program.

Games in each issue are at least on a par with those available from most computer clubs, and there are utilities and programs of varying degrees of usefulness and sophistication. A menu-creation routine, a program to reassign your Function keys when programming in BASIC, and a simple but effective graphics program for screen drawing have been in recent issues. Several programs were very sophisticated.

Each issue has a table of contents for all available prior issues, should someone want to order one. A convenient feature is that when you stop reading the magazine, it sets an electronic bookmark. The next time you load it, you will be asked whether you wish to resume there or begin again.

Some demonstrations of commerical software will not run unless you have two disk drives. The editors feel that readers with only one disk can view the demonstration as a gift diskette, which they can reformat and use.
Requirements: IBM PC, 64K RAM, single-sided disk drive
I.B. Magazette, 12 issues $150; $160 outside the United States

JR'S MAGAZETTE

Not yet available, this magazine will be a 320K quarterly supplied on a floppy disk. The editors say that it will be oriented toward the home and family, including more games and home applications than other disk magazines. Because of the PCjr.'s color screen and high resolution, *Jr's Magazette* will feature more graphics than *I.B. Magazette,* its sister publication. Sound will also be prominent, since this is appealing in games; but because some subscribers may read *I.B. Magazette* in the office, the programs can be silenced.

Requirements: IBM PCjr, disk drive

Jr's Magazette, $55 per year; $75 outside the United States

MENTOR . . . THE MAGAZINE ON DISK

In the first issue of *Mentor,* the executive editor told his readers that the magazine would guide them to achieving the highest productivity from their existing software: "The templates, worksheets and procedures in *Mentor* provide ready-made applications that tap the power latent in the major software packages." Lest the reader have any doubt, the first five articles in a recent issue require the reader to have a copy of one or more of the following programs: *dBASE II, Lotus 1-2-3, VisiCalc, WordStar,* and *ProKey.*

Mentor is aimed at the businessperson or heavy computer user who needs good applications and doesn't want to spend the time or energy to create them. Many of the articles in this magazine could save such a user a good deal of money as well.

Mailing lists for *dBASE II* or *1-2-3,* a program to import small or medium-sized files from *dBASE* into *1-2-3* (to capitalize on *1-2-3*'s faster and easier sorting and searching features), a buyer's worksheet for *1-2-3,* a keyboard enhancement program for BASIC, another for *WordStar,* a critical path project schedule—for the hacker, this is heavy stuff. Some of the programs stand alone, while others are designed to enhance commercial software. The software packages are extensive and are written by experts in the applications field they are writing for. Most of the magazine is written by freelancers. However, commercial demonstrations have been included in some issues; *pfs:Write, VisiWord, and Trace86* are among those to have appeared to date.

With your first copy of *Mentor,* you receive a start-up disk, a system disk, and the monthly issue, which may contain more than one disk. You must use the start-up disk to set up your system disk, much as you would with most commercial software for the PC. This provides a backup disk should something go wrong with the system disk. A soon-to-be introduced version of the magazine compatible with both the IBM PC and the PCjr. will probably change the routine slightly.

Mentor is set up in magazine format, with a brief explanation of how to read it accompanying each issue. There is a main menu which is descriptive and sequential and a shorter, one screen menu. You can bypass the main menu any time to see any section of the magazine. There was a kaleidoscope program in one issue, but no other games or entertainments have been run.

Requirements: IBM PC or PCjr, DOS 2.0 or 2.1, dual-sided disk drive

Mentor, $19.97 per issue; $99 per year

MICROZINE

The parallelogram design used for the packaging and 48-page booklet that accompany the *Microzine* disk has an obscure connection with computer flow-charts, but little else is obscure in *Microzine.* Designed for children age 10 and up—the editors estimate a fourth grader can read it—each issue utilizes very sophisticated graphics. Each contains four features, a descriptive index, a future issues page, and a section called "computer stuff." That section gives a procedure for initializing a data disk for use with the magazine. It can also reconfigure the magazine to take advantage of a second disk drive. The instructions are available both screen and in the booklet. School subscriptions include a 16-page teacher's guide that suggests ways in which *Microzine* can stimulate language skills as well as programming and logical ability.

Microzine comes as a menu-driven floppy disk with about 320K of text. Issues always contain "Twistaplot," an interactive story that usually involves two readers by name. One issue contained a mystery which the user can solve by piecing together clues, suspects' statements, and a companion's observations. The reader makes choices about what to investigate next until logic and analytic reasoning reveal the whereabouts of the stolen statue.

Other "Twistaplots" are like the current "choose your own adventure books." The reader chooses what to do next, and the story progresses to any of

about 15 different endings. In these stories, line drawing rapidly fills the screen, then colors fill in the detail. A game appears in each issue, but in the 1984-85 academic year that will be dropped in lieu of a letters column, puzzles such as word searches and matching games, and similar activities.

A third feature often aims to build programming skills while it captures the child's interest and improves other academic areas. "The Amazing Robot" featured 10 to 15 screens—pictures of mazes or stairs, for instance—through which the user could move a robot with Logolike commands. Those commands can be strung together to create a program. At the same time, awareness of angles, distance, and cause and effect all enter into the user's choices. In a later issue, "Amazing Robot II" uses the robot to draw. It also prints out the child's drawings.

Several issues include databases. One, "Bookstore," contains 200 reviews of books for school-age readers. One can browse through it by categories—mysteries, romance, or magic/science fiction—or by requesting certain type of book. The program will offer, for example, a book about family conflicts, one set in medieval times, one where the main character is a young girl, or one that is very short. Another database allows the child to create a record file for a paper route, baseball scores, or any other numerical application.

The instructions for all such utilities are clear, and the reader is often given a choice of bypassing them. When the programs demand a separate data disk, the magazine supplies a routine for creating the disk. Should anything go wrong as disks are removed or returned to the drive, the magazine will reload itself to the beginning.

A quotation from Tom Snyder (creator of Spinnaker's *Snooper Troops* and *In Search of the Most Amazing Thing*), who is interviewed in one issue, conveys the appeal that *Microzine* would have for children: "Adults aren't as brave as kids," he comments. "Adults are scared to push the wrong buttons; kids aren't."

Requirements: Apple II with *Applesoft BASIC* card, II+, or IIe, 48K RAM

Scholastic Software, $149 per year, discounts for teachers and home subscribers

PC-DEMO

PC-Demo is different from all the other disk magazines. While the others include occasional demonstrations of commerical programs, *PC-Demo* focuses on them. In addition to the five regular sections, each issue contains four running demonstration programs of commercial software.

PC-Demo comes on a dual-sided, double-density disk and runs from DOS, which is not on the disk. After *PC-Demo* is started, a menu lists the sections of the magazine and the four demo programs included, giving a brief description of each. The Function keys are used to go from section to section and to scroll up or down in each section. Each section begins with a musical introduction, which can be suppressed. Any section can be printed out.

The introductory section is a sort of editorial that gives the philosophy of the magazine, introduces the demonstrations in the current issue and describes future issues. An instruction section demonstrates how to use the magazine, how to run the demonstrations, and how to get out of them. The section also tells what to do if the postal service has mangled your diskette.

The third regular section is a catalog of 50 or 60 demonstrations in the PC-Demo library, many of which have not yet been in the magazine, and some never will be, because they require too much memory. These may be ordered for $15.

A section called software sales comprises screens of advertising. 800-Software, a mail-order house, has a listing every month and includes a $6 coupon toward the purchase of any item listed. The final monthly feature, the subscription section, describes the magazine, and includes an order form which, after filling in the blanks (including credit card information, if you wish), prints out the order form.

The demonstrations run across a wide range of programs: *VisiWord* has been in an issue; *Select, Proofwriter,* and *Electric Pencil* are likely to be forthcoming. (A *WordStar* demonstration must be ordered individually, since it takes too much room.) *PC Crayon* for graphics; *Quickcode,* a *dBASE II* enchancement program; *Home Accountant* and *Financier* for home accounting; *Integrated Six,* a not yet released Lotus-lookalike; *Prokey: The Next Step; DataEase*—these are among those either released or in the library of programs that may be released. There are many more.

The demonstrations work almost exactly the same way the actual program would but have been disabled in some way. For example, a word-processing program may do everything but print out

the text. The *Prokey* demonstration would work with *WordStar* but would not create a file for the Function key assignment. For database programs, records could be created and manipulated but not stored. Demonstrations often come with a window saying, for instance, "You are now in the format definition section of the program." Thus, the demonstration can act as an excellent tutorial service.

PC-Demo and its library could spare a software buyer from the hype of print advertising and save hundreds of dollars in poor software investment by providing valuable hands-on information about programs the reader is considering. For anyone shopping for costly programs, it would be a bargain at a significantly higher price.

Requirements: IBM PC, 64K RAM, disk drive

PC Demo, $6 per issue, three-issue subscription $18

PC DISK MAGAZINE

PC Disk Magazine provides readers with between eight and ten programs in each monthly issue. The magazine is designed to provide its readers with fully functional, ready-to-use original software. Such software will give the readers both ready made programs and examples of good programming techniques if they choose to list those programs which can be listed (BASIC programs are listable, compiled programs are not, but all programs can be copied).

In addition to the diskette, the reader is provided with a 5 ½ by 7½ magazine which varies in length from 48 to 64 pages, depending on the issue. It is a user's manual which really must be read and referred to as the reader uses the disk, since the programs included are generally sophisticated. The editors are aware that several times in the early issues, the manual omitted some significant information (for example, that a program must be copied onto a formatted diskette which is used to run the program) or occasionally used commands that didn't run on DOS 1.1. That should not be a problem in the future. *PC Disk*'s editors feel that the level of online instruction and documentation is not advanced enough to allow for relatively complex programs to be unaccompanied by a user's guide. The user's guide has a page which gives problem solving procedures and an up-and-coming page.

Each issue attempts to include at least one program from the following categories: business, education (broader than simply computer education: for example, astronomy, children's math and reading), utilities, games, and personal use. The programs come from three principle sources: unsolicited programs (about 50 percent), staff designed programs that are commissioned to various programmers and writers, and pre-existing software which the staff feels might be useful to the readership. In the last instance, the magazine works out an arrangement with the authors of such software to use part or all of the software in the magazine. The caliber of the programming is high. The games are complicated and superior to most of the games one would see on a club disk. In an air traffic control game, the player must keep multiple aircraft from destroying one another while each is brought to a landing at one of two airports. The planes relentlessly proceed at 1 mile/15 seconds. A number of the Norton Utilities have been provided in several issues, as well as a sort/merge program, a BASIC program editor that allows for split-screen display of two sections of a program simultaneously, and a cross reference program that will display an index of all the key program elements in a BASIC program. An education program that can also be applied is a greatly slowed down Shell Sort which enables the user to see exactly how the computer does the sorting. The same article then has the computer do the same sort of at normal speed and then lists the program that does the sorting.

Some of the programs require additional hardware or software but are clearly labeled as such. For instance, several programs require a graphics color card and some might be geared to assist other software, such as *WordStar*'s configuration program. Such programs list the special requirements necessary to use them.

There is some shuffling of disks with *PC Disk Magazine* since some files must be copied. Also, some files run from BASIC but some run from DOS. The operating systems and PC BASIC aren't on *PC Disk* so you must change disks if you have one disk drive. Since the programs and games are all rather lengthy, however, this is not an obstacle. It would make a quick overview of the issue's contents on the screen more difficult but such an overview would not be very productive anyhow since the programs are lengthy. *PC Disk* is not in magazine format on the screen.

The programs are not public domain and the

user's guide warns the reader that you are to make copies solely for your use, with any other use of the programs a violation of the copyright law.
Requirements: IBM PC, 64K RAM, single-sided disk drive
PC Disk Magazine, 6 issues $119.00/3 issues $69.00/single issue $29.95; each issue is 1 single-sided double-density diskette totaling 160K, and a user's guide.

PC FIRING LINE/PC UNDERGROUND

PC Firing Line/PC Underground's first issue appeared in February 1984 and was only one dual-sided double-density disk. The editors intend to deliver two separate magazines beginning with the second issue.

The magazine is freeware; all programs are copiable and may be given away, though not sold for a profit. Some programs in *PC Underground* may recommend a fee to send the developer of the program if the reader decides to use it. Permission to recode, reproduce, or modify the format is any way that will make the contents of the magazine available to the handicapped.

Running under DOS, the magazines are data disks, in true magazine format. The main menu lists a number of departments, accessible through the Function keys, and each department's menu lists articles. Leaving an article returns you to the department's menu. You can also scroll up or down within any article. At the end of each is the name of the text in the disk directory so that you may print it out using DOS. The source code is indicated at the top of each article and can be run under the appropriate processor, such as a Fortran compiler, a C processor, a BASIC compiler, or whatever.

PC Firing Line is for the serious programmer and is truly a technical magazine. Among its goals are the study of software development and the definition and promotion of good programming practices. In the process, the developers hope it will act as a guide to beginning programmers.

In the languages department, the first issue discussed ADA, and had sections on BASIC, C, FORTRAN, Assembler, PASCAL, and Lisp. Other features dealt with hardware, languages, the operating system, and other technical concerns. The first issue also contained a three-screen explanation of a bug in DOS 2.0 in the program loader that appears when using Pascal as well as a patch to remedy it. Readers are invited to send in suggestions for project development.

Despite the orientation toward the programmer, some ideas here would help many a nonprogrammer as well. One item warned that it is best to avoid DOS 2.0 unless you have a very serious reason for using it: A potential time bomb due to the double naming of file Metabastxt may cause DOS to erase data. The latest, it seems, is not necessarily the best. And under "Creative Thinking," there was the idea that keyboards might be changed so that the key cap becomes tied into the circuitry—if you move the cap with "A" on it, you have moved the key that tells the computer "this is A". Thus, instant customized keyboards—a thought to tickle anyone who wonders about Dvorak keyboards.

PC Underground, at first thought of by the editors as an appendage to *PC Firing Line,* will be aimed at the more general user. It is likely to contain a number of freeware programs and will be far less technical than its sister magazine. The editors feel it will have broad appeal and will serve as a helpful complement to *PC Firing Line.*
Requirements: IBM PC, 64K RAM, double-sided disk drive
PC Firing Line/PC Underground, $12 per issue, $72 for a six-issue subscription, $6 per issue if the reader supplies two dual-sided double-density formatted disks and a stamped disk mailer.

SOFTDISK

Supplied on two floppy disks containing about 148K per side, this monthly magazine seems uniquely committed to two-way communications: agreeing to return one disk per monthly issue reduces the subscription price by $20.

The editors of *SoftDisk* think of the magazine as being a "modem by mail," and the dual subscription rate only emphasizes their commitment. Having the disk returned, postage paid by the magazine, costs *SoftDisk* as much as supplying a new one for the next issue.

The network aspect of the magazine is evident in other ways as well. Ninety percent of *Softdisk*'s contents are supplied by readers. As a result, some of it may not be the finest programming, nor are the graphics as sophisticated as they might be for an Apple. But a glance at an issue shows that many features are quite good.

Put out by *Softalk,* the print magazine, each disk contains the program listings from the most recent

issue of the paper publication. They don't run from the magazine's menu—they must be loaded from BASIC or DOS—but they have been keyboarded so the reader can read a *Softalk* article and then run the program discussed.

SoftDisk is aimed at both family and business environments. The main menu lists all the categories on all four sides and can be reached from any of the sides of the disks. One entire side is devoted to the best of the programs submitted by readers; hence the title "Harvest." There are quite a few games; recent issues have included concentration, poker solitaire, and a clever and rather difficult jigsaw puzzle of only 20 pieces. Programming techniques (a program to make the flashing cursor awaiting an input more interesting) and useful programs for home and business (a diet regime and an address book) are among the offerings. One special feature game would intrigue everyone: The operator picks a card and the computer accurately guesses the proper card every time. Let anyone else try, and the chances the computer will guess the right card are 1 in 52.

In addition, there are ongoing features. "Micromoonlighting" offers realistic advice on making money with one's computer. Another continuing feature, while explaining random access files, will help the reader create a general ledger program. The result is increased programming knowledge and a useful running program. A group of routines recently published—disk check, disk scan, and disk track—allows the user to be sure files don't overlap and explains how to recover at least one of them if they do. In addition, it checks disks for trashed sectors, copies multiple files, and at the end lists any files that couldn't be read or copied. There have been DOS tutorials with several demonstration programs exemplifying the features under discussion.

There is a section devoted letters from readers, in categories from kudos to gripes to readers' reviews of software. In addition to the letters, there is a bulletin board section which, like many online bulletin boards, seems to include interchanges between specific parties. If the reader wants to write a letter, an internal word-processing program will record it on the magazine disk. Another subsection called "The Evaluator" includes a lengthy review of a piece of commercial software.

Any time the reader leaves an article, game, or program, he returns to the submenu of the section he is in. Within any article, he can scroll forward or backward. There is a small advertising section and an index to back issues. Sides one and two are for personal use only, sides three and four are distributable. Schools may make one copy for each Apple.

Requirements: Apple II, II+, IIe, or III, 48K RAM, disk drive

SoftDisk, $89.95 per year, $69.95 if the reader agrees to return one disk per issue

WINDOW: THE LEARNING MAGAZINE ON DISK

Window is one magazine that takes full advantage of Apple graphics. At the very beginning, the logo scrolls across the top of the screen and the subtitle "on learning" snakes its way toward the bottom of the screen, doing a switch so it reads backward, while curtains blow in the graphic window and clouds drift by outside.

This magazine is educational in the broad sense. It is intended for family use and for both new users and those with some knowledge of programming. On average, there are 10 to 12 programs or articles per issue. All are well presented, and may are clear enough for any child who can read at the third- or fourth-grade level.

The double-density floppy disk is self-booting and runs under a fast version of Apple DOS. There are some basic instructions on the magazine's jacket, and each issue offers instructions for the new user shortly after the disk is loaded. When the table of contents first appears, the new reader may not notice the "page one of five" at the top of the screen. The other screens are accessed with the scroll arrow.

The programs are sophisticated and informative; most succeed in their goals of helping families. There have been a database program, a music writing program for the computer, a series of programs using aspects of *VisiCalc* (often in game playing format and most geared at developing math skills), and an issue that looked at "Turtle Power," a turtle being a character used for drawing.

Many issues are thematic. In the Turtle Power issue, there was a clear, interactive essay on the basic commands to move the turtle, then several games requiring turtle movements, and two graphics programs, one for children and one for designers. The same issue contained a comparative review of six graphics programs, showing the re-

sults of drawing a sailboat using each program. This section continued with a one-screen essay on each program, and a checklist of ease of use, breadth of options, quality of documentation and drawing capabilities. Issues may also contain a compressed version of a commercial piece of software. *Snooper Troops* by Spinnaker was one.

It is sometimes necessary to remove the disk and insert it upside down, and occasionally it is necessary to copy a program or routine onto a formatted disk so that you may write on it, but there is no need for a separate system disk. The programs may be copied for personal use. In a school, they may be copied for each Apple in the school or department. More extensive licensing can be arranged, but the magazine asks that the copyright laws and their own copyrights be respected.

Requirements: Apple II, II+, or IIe, 48K RAM, disk drive

Window, $95 per year

GLOSSARY

Access: To obtain data from or put data into memory; alternatively, to log on to an on-line database or bulletin board.

Acoustic coupler: An electronic device that converts computer data into audible tones that can be transmitted over ordinary telephone lines via the telephone's handset.

Add-on: Attached circuitry or components that upgrade or modify a computer's functions.

Address: A specific location in memory where information is stored; also, the identification code of an I/O port.

Algorithm: A sequence of mathematical or logical steps designed to solve a problem.

Alphanumeric: Alphabetic (A-Z) and numeric (0-9), as in the phrase "alphanumeric characters."

Analog computer: A computer that operates on the input of continuously fluctuating physical variables, such as temperature, flow or pressure, representing them as changes in voltage, electrical current, or some other physical variable rather than as binary numbers; mostly used in specific scientific applications. Compare with digital computer.

Application program: Software designed to solve specific problems; word processing and database management are examples.

Artificial intelligence: A field of computer science that deals with the programming of computers to mimic functions of the human mind. See robotics.

ASCII: Acronym for American Standard Code for Information Interchange (pronounced "ass-kee"), a standard method of encoding characters used in sending data between computers and peripherals.

Assembler: A computer program that translates assembly language programs into binary-coded machine language.

Assembly language: Low-level, symbolic programming language easier to use than machine language but harder than high-level languages like BASIC, FORTRAN, or Pascal.

Asynchronous transmission: A mode of transmitting data between computer devices one byte at a time. Compare with synchronous transmission.

Auto answer: A modem that automatically answers the telephone.

Auto dial: A modem that automatically dials and redials specified telephone numbers.

Auxiliary storage: Storage of data on media other than the computer's main memory, such as magnetic disks and tapes.

Backup: A duplicate of important data made on a separate storage medium in case the original is damaged or lost.

BASIC: Acronym for Beginner's All-purpose Symbolic Instruction Code, an easy-to-use high-level programming language.

Baud rate: The rate at which information is transferred between computer devices, roughly equivalent to bits per second (bps).

Benchmark: A program designed to test the performance of a computer system, compiler, or other equipment or software.

Bidirectional printing: A means of increasing printing speed by printing both right-to-left and left-to-right.

Binary: Notation system in which only two digits, 0 and 1, represent all numeric values.

BDOS: Basic Disk Operating System; the part of the CP/M operating system that governs disk functions.

BIOS: Basic Input/Output System; the part of the CP/M operating system that routes data between the keyboard, screen, printer, and other components. BIOS must be configured for each computer, usually by the manufacturer.

Bit: Basic unit of data in a computer. Bit is short for binary digit and can have a value of 0 or 1.

Block: A group of juxtaposed records in memory treated as a logical unit.

Boot: To start up a computer by loading initial instructions into RAM. A cold boot occurs when the computer is first turned on, while a warm boot loads a new program without a system reset.

Bps: Bits per second, indicating speed of data transfer. See baud rate.

Branch: A program instruction that will initiate

transfer from one sequence to another; a branch is "conditional" if it checks for certain conditions before executing, "unconditional" if it does not.

Bubble Memory: A solid state mass storage device used in place of disks.

Buffer: A temporary storage device that compensates for transfer speed differences between computer devices, such as computers and printers. Also, an area of memory set aside by a program for temporary storage.

Bug: An error in a computer program or system.

Bulletin board: An electronic communications service where messages can be stored and read by all users.

Bus: A signal pathway that transfers information within a computer.

Byte: A group of eight bits representing one character of data.

Canned software: Packaged software designed for specific applications that is difficult to alter.

Card: A printed circuit board.

Cartridge: A plastic case containing computer software,such as BASIC, in a ROM chip; or a magnetic tape storage device.

Cassette: Standard magnetic tape used to store computer data.

Cathode ray tube (CRT): Picture tube of a television or monitor used to display computer output.

Cell: A memory location containing one unit of data, usually one byte or character. In a spreadsheet, the intersection of a row and column, where a formula, message, or data is stored.

Central processing unit (CPU): The core of a computer system, which interprets and executes instructions.

Character: A single alphanumeric piece of information.

Chip: An integrated circuit etched onto a small piece of silicon.

Circuit: An interconnected assortment of electronic devices used to perform specific functions.

Clock: A timing device which generates regular pulses to synchronize operations within a computer.

Coaxial cable: A form of cable used to connect computers and peripherals for rapid communication.

COBOL: Common Business Oriented Language, a high-level business programming language.

Code: Any system used to represent symbols of data with binary numbers. Alternatively, the series of programming-language statements used to express an algorithm as a runnable program.

Compatible: The ability of computer devices, including software and peripherals, to work with a particular computer system or with each other; a computer is designated "upward compatible" if it can run software designed for the next generation computer and "downward compatible" if it runs software made for the previous model.

Compiler: A program that translates high-level language (source code) into machine language (object code), saving a machine-language program that can later be run directly on a computer. See also interpreter.

Computer: A electronic system consisting of a CPU, memory, I/O devices, and a power supply that stores, retrieves, and processes information.

Computer aided instruction (CAI): Using computers in an educational environment.

Conditional: A transfer of control within a program, dependent upon certain conditions being met.

CP/M: Control Program for Microcomputers. Perhaps the most popular operating system for 8-bit micros, also available for 16-bit computers.

Cps: Characters per second, indicating speed of data transfer.

CPU: Central processing unit.

Crash: The failure (usually fatal) of a program or piece of hardware.

CRT: Cathode ray tube.

Cursor: A special character on the video screen that shows where the next character or symbol entered will appear.

Cursor tracking: Using a stylus and graphics tablet to move a cursor on a video screen.

Daisy wheel: The disk-shaped print element used in letter-quality printers in which a hammer strikes raised characters mounted on projecting spokes, thereby imprinting that character on the page. Also, the kind of printer that uses such an element.

Database: A collection of data files systematically organized for easy access, input, and update of a particular topic.

Data processing: The input, storage, manipulation, and processing of data by a computer.

DBMS: DataBase Management System; application software enabling user to manipulate, store, and retrieve information quickly.

Debugger: Software designed to help users locate programming errors.

Decoder: Software or hardware that translates coded signals; an encoder translates data into code.

Default: A value, state, or option that a computer program or system sets and maintains unless the user specifies otherwise; e.g., the default drive used in a system with two disk drives is automatically the "A" drive.

Degausser: A device used to bulk-erase magnetic tape.

Delimiter: A special character marking the boundaries of a group of related characters in a program; commas, asterisks, slashes, colons, and semicolons are typical delimiters.

Density: Number of bits that can be stored on a magnetic disk or length of tape.

Desktop computer: A computer that fits conveniently on a desktop.

Digital computer: A computer that uses binary numbers to represent data, rather than continuously changing physical variables, such as voltage or electrical current. Most computers are digital computers. Compare with analog computer.

Direct memory access (DMA): A method whereby a peripheral can access a computer's memory without tying up the CPU during input and output operations.

Directory: A list of all files on a disk.

Disassembler: A program that converts machine language into assembly language.

Disk drive: A device that permanently stores data on a magnetic disk and can retrieve it later.

Diskette (floppy disk): Magnetized, flexible plastic disk of (most commonly) 5¼ or 8 inches in diameter used for storage of data.

Disk operating system (DOS): An operating system using disks as secondary storage. Typical functions include formatting disks, allocating space, and saving and retrieving files.

DMA: Direct memory access.

Documentation: The set of written instructions accompanying hardware and software, often including sample work sessions and typical error messages.

Do loop: Programming statement which requires repetition of a program segment until a particular condition is met which halts the loop.

DOS: Disk operating system.

Dot matrix printer: A printer that forms characters of densely packed dots. Cheaper and much faster than a letter-quality printer, but with poorer quality characters.

Double density: A disk capable of storing twice the bits of a normal single-density disk in the same amount of space.

Double-sided disk: A disk capable of storing information on both sides.

Download: To transfer data from one computer to another; usually said of a micro receiving data from a mainframe.

Driver: Program segment that operates a peripheral, such as a printer or modem.

Dumb terminal: A video display terminal not capable of editing or storing data or performing other computer functions on its own.

Dump: To print, display or save the contents from a computer's memory.

Dynamic RAM: A type of memory ciruit that is less

expensive than static RAM, but that requires continual "refreshing" to hold its data.

Electronic mail: Electronic transmission and reception of data between two computers over normal telephone lines.

Electronic spreadsheet: Program that creates a data grid or worksheet in which data relationships can be analyzed and manipulated; the program will automatically recalculate the entire grid when any data are changed.

Electrostatic printer: A non-impact printer that charges characters onto specially coated paper and then melts dry ink onto the charge, as many photocopiers do.

Embedded command: A special sequence of characters placed within a word-processing text file that is not printed out but commands the program or printer to perform a certain function—halt page numbering, set margin parameters, center a line, or whatever.

Emulate: To imitate the operation of another system, such as a different microprocessor, or communications protocol.

EOF: Acronym for End of File.

Ergonomics: The study of humans using machines.

Fanfold: Continuous-feed paper connected by perforations.

Field: A unit of data within a record.

File: A group of organized data under a common name.

Firmware: Permanent programs stored in ROM.

Floating point representation: A system for processing large numbers quickly in which the decimal is not fixed, but is represented as an exponent.

Floppy disk: Diskette.

Flowchart: A graphic representation of the sequences of a program.

For/next loop: BASIC logic statement that details repetition of a segment a specified number of times.

Formatting: Organizing disk tracks prior to data input, or preparing text for printout.

FORTH: A programming language in which the user's programs, called "words," may be used as new parts of the language. Intended for use in device controllers, it contains a built-in assembly language and is now widely used in business and scientific applications and arcade game programming.

FORTRAN: Acronym for FORmula TRANsfer, a high-level programming language designed primarily for mathematical, engineering, and scientific applications; one of the oldest and most popular languages.

Full-duplex: Means by which two systems communicate simultaneously using different signals. Compare with half-duplex.

Function keys: Command keys that will perform user-defined operations when depressed.

Gateway: A device used to connect two different networks; e.g., domestic and foreign.

Glitch: Any temporary or random hardware malfunction.

Global search: The search for specified data through an entire file, program, or database.

Goto: An unconditional branch statement in high-level programming languages.

Graphics: Symbols, drawings, charts, and graphs formed on a video screen or printer.

Graphics tablet: A device for drawing pictures onto a video screen and into computer memory with a special stylus.

Gulp: Slang for a group of bytes.

Half-duplex: Bi-directional data transmission, but in one direction at a time. Compare with full-duplex.

Hard copy: Computer output of any type on paper.

Hard disk: A mass storage device that uses a rigid magnetic disk to hold megabytes of information.

Hardware: All computer equipment other than programs, including CPU, disk drives, printer, keyboard, video display terminal, etc.

Heuristic: Solving a problem by a mix of rules of thumb and trial-and-error rather than by programming a fixed solution.

Hexadecimal: A concise numbering system based on 16 digits (0-9 and A,B,C,D,E, and F), used by programmers as a shorthand way to represent binary numbers.

High-level language: Programming language that enables user to program with English-like statements and mathematical notations, each of which is a kind of shorthand for many machine-language statements. High-level means closer to humans, low-level closer to machine language.

High resolution (hi res): Indicates image quality on a video screen or printer.

IC: Integrated circuit.

If-then-else: High-level programming language statement that acts on the comparison of data, e.g., If A = B Then C, Else D.

Image processing: Enhancing an image using techniques such as digitizing to analyze subtle relationships between colors, shades, and other elements of a picture.

Impact printer: Printer that forms characters on paper by striking an inked ribbon with a tiny hammer or printhead. Drum, chain, dot matrix, and daisy wheel printers are examples.

Implementation: The installation and testing of computer system hardware and software for specific applications.

Ink-jet printer: Non-impact printer that sprays droplets of ink onto the paper.

Input/output (I/O): Data flow in or out of a CPU.

Instruction set: Built-in procedures which a central processing unit uses to manipulate data; all statements in higher-level languages are made up of many of these instructions.

Integrated circuit (IC): Group of interconnected circuits on a silicon chip.

Interface: The circuitry and software used to connect computers to other computers or peripherals so that data can be transmitted and received; also the act of setting up such a connection.

Interpreter: A program designed to translate high-level language source code into machine-language object code one line at a time during program operation; no machine-language program is saved, so the interpreter must be used each time the high-level program is run. See also compiler.

Interrupt: A brief pause in a program's operation, usually in response to a control signal from a peripheral, so that the CPU can service an input/output device such as a printer or perform some user-specified operation.

I/O: Abbreviation for Input/Output.

Joystick: A manual control lever that directs movement of the cursor around the screen, used principally in computer graphics and games.

Jump: A branch or Goto statement in a program; particularly an assembly-language statement.

Justification: Vertical alignment of the right or left margins of text or graphics.

K: Stands for kilobyte. One kilobyte equals 2^{10} or 1,024 bytes; hence, a 64K RAM board can store 65,536 bytes.

Keyboard: A set of keys like that of a typewriter that allows alphanumeric characters and commands to be entered into a computer.

Keypad: An array of numeric keys either standalone or to the right of the QWERTY keyboard used for special purposes.

Keypunch: Keyboard device that records data by punching holes in computer cards.

Kilobyte: 2^{10} or 1,024 bytes. See K.

Language: Software that allows humans to program computers with alphanumeric characters and phrases rather than binary digits.

Laser printer: A non-impact printer that produces dot-matrix characters on a page by electrophotography, much like a photocopy machine.

Letter-quality printer: A daisy wheel, ball, or thimble printer that produces letters of the quality of electric typewriters.

Light pen: A photosensitive pen-like instrument that enables the user to "draw" directly on a video screen.

Line printer: A printer that outputs an entire line of text at one time.

LISP: Acronym for LISt Processing, a high-level programming language used especially in artificial intelligence applications.

Load: To place a program in computer memory.

Log: To "log-on" (or "log-off") means to initiate (or break) communication with a computer.

Logo: A programming language initially designed for children in which versatile "turtle graphics" can be created after minimal coding. Sophisticated data handling functions have made it a good candidate for artificial intelligence studies and other "serious" programming.

Loop: A sequence of instructions in a program that repeat until a certain condition is met.

Low-level language: A programming language that is close to the pure binary language the machine understands, as in machine or assembly language. Faster operation and more compact programs are advantages over high-level language.

Machine language: Lowest-level programming language; a computer can only execute instructions that have been translated (usually by a higher-level language) into its particular machine language.

Magnetic tape: Magnetized recording tape used to store binary computer information.

Mainframe: A large, multi-user computer, primarily used in corporations, universities, and government bureaus.

Main memory: See random access memory.

Mass storage: External, large-capacity storage, such as magnetic disks and tape.

Megabyte: 1,024K bytes, or just over one million bytes.

Membrane keyboard: A flat, pressure-sensitive keyboard.

Memory: The circuitry that stores data in a computer.

Menu: A list of options in a program from which a user can choose various functions; such a program is termed "menu-driven."

Microcomputer: Any relatively small, inexpensive computer that contains a microprocessor using a word length of (most commonly) 8 or 16 bits; used primarily in small businesses and the home. The distinction between micros and minicomputers is rapidly blurring.

Microfloppy: A diskette with a diameter of 3 to 3½ inches.

Microprocessor: A microcomputer's central processing unit (CPU) occupying a single chip.

Minicomputer: Usually refers to a 32-bit computer with 256K or more of RAM and principally used in small business systems. Compare with microcomputer and mainframe computer.

Mnemonic: An easily remembered word used in place of one harder to remember; assembly-language instructions such as JMP (for "Jump") are mnemonics.

Modem: Acronym for MOdulator/DEModulator, a communications device that translates digital pulses into analog signals (and analog to digital) for rapid transmission of data between computers over telephone lines.

Modular programming: The development of programs by modules, in which logical subsections are written separately by one or many programmers and merged into one, permitting individual modules to be saved for use in other programs.

Monitor: A video display terminal.

Motherboard: The main board in a computer into which printed circuit boards are plugged.

Mouse: A small, hand-held device that, when moved, shifts the cursor around a video screen.

Multiprocessor: A computer with several CPUs handling separate functions for increased efficiency of operation.

Multiprogramming: Technique that allows several unrelated programs to be executed, apparently at the same time, by a single processing unit.

Multitasking: The concurrent execution of two or more related tasks within a single program.

Multi-user: A mainframe system with concurrently usable terminals.

Nesting: Placing instructions as subroutines within other instructions in a program; used most commonly when one For-Next loop contains another or when one subroutine calls another.

Network: The interconnection of computers, terminals, and other I/O devices via cables or telephone lines.

Nibble: One-half byte; four bits.

Non-impact printer: A printer such as a laser or ink-jet printer that does not strike a hammer against a ribbon.

Non-volatile: Memory that retains its contents after power has been turned off.

Number crunching: Large amounts of mathematical computation.

Object code: Machine-language instructions, which are the output of assemblers and compilers.

On-line: Communicating directly with the CPU or a data transmission network.

Operand: Individual data item on which a program operation works. In the statement "If A=10," A and 10 are operands.

Operating system: Control system that performs such functions as input/output, disk formatting, and file transfer, and resides in main memory while other programs run. Usually includes nonresident utilities supplied with the operating system itself.

Operation code (OP code): An assembly-language instruction.

Optimizer: A program that modifies another program to make it run faster.

OS: Operating system.

Overflow: A condition caused by an arithmetic operation that returns a number too large to be stored in a computer's register. Also used when a program attempts to store too much data in the memory area set aside for it.

Overlay: A technique used when a program is too large for a computer's memory; one part of the program is executed and then removed so other routines can take its place.

Parallel interface: A connection between a computer and peripheral in which all bits are transmitted simultaneously, each over its own wire. Compare with serial interface.

Pascal: High-level programming language often taught to first-time programmers in universities. Named after the 17th-century mathematician Blaise Pascal, it is meant to teach structured programming and is available in both interpreted and compiled versions.

Peripheral: An input/output device under the control of a CPU, including terminals, disk drives, and printers.

Pipelining: A means for increasing computer speed in which an instruction is fetched from memory before the previous one has been completely executed.

Pixel: Any of the small elements that make up the picture on a video screen; acronym for picture element.

Plotter: A graphics device that draws computer images on paper with a pen.

Port: A male or female input/output connection that links computers and peripherals.

Portable computer: Usually refers to a typewriter-sized general purpose computer that is easily transportable.

Power supply: A device within the computer that converts outlet AC power to the DC power required by the computer.

Printed circuit board: A flat, insulating board containing circuits and electrical components such as transistors, diodes, and switches.

Printer: An output device for producing text and graphics on paper; dot-matrix and letter quality are types of printers.

Printout: Hardcopy (paper) from a printer.

Problem-oriented language: A programming language designed to make it easy to express a particular kind of problem to be solved rather than for efficient translation into machine language. Compare with procedure-oriented language.

Procedure-oriented language: A programming language like COBOL or FORTRAN designed to ex-

press the sequence of steps used to solve a problem. (Compare with problem-oriented language.)

Program: Software instructions that tell a computer how to perform specified functions.

Program generator: An application program that generates another program from descriptions of the problem to be solved.

Programmable Read-Only Memory (PROM): A memory chip that can be programmed only once and cannot be altered later except by complete erasure and reprogramming.

Prompt: A message from a program that demands user input for further operation, such as "Quit system (Y/N)?"

Protocol: The set of rules governing the exchange of information between computers in a communications network.

Public-domain software: Software not under copyright and available to everyone.

Pulse: A sudden, but brief surge in voltage or current.

Query language: A high-level programming language that permits access to database files with simple, English-language commands.

QWERTY: The standard typewriter keyboard layout used in most microcomputers.

Random access memory (RAM): Read/write memory directly accessible to the CPU. Programs and data loaded into this storage area can be altered but will not remain in memory after power has been turned off. Compare with read-only memory.

Raster: The pattern of horizontal lines in a video screen scanned by the electron beam of the cathode ray tube to create an image.

Read-only memory (ROM): A memory circuit that holds data permanently and cannot be altered.

Read/write head: A electromagnetic mechanism that reads or records data on a magnetic disk or tape.

Read/write memory: Same as random access memory.

Record: A group of related fields of data treated as a unit, such as the collected information on one person in a mailing list.

Refresh: To regenerate signals continually on a video screen or in dynamic RAM so that the image or information does not fade out.

Registers: Temporary storage locations within a CPU that contain data or instructions to be processed.

Relocatable: Programs or instructions in a program not fixed to any particular address, so that it can reside anywhere in main memory.

RF modulator: Radio Frequency modulator, a device that modifies a computer output signal for display on a television screen.

ROM: Read-only memory.

RPG: Report Program Generator, a high-level programming language specifically designed for business applications.

RS-232: A widely used communications standard for serial interfaces.

Run: To execute a program.

Scrolling: Advancing text vertically or horizontally on a video screen to examine material outside the original viewing area.

Secondary storage: Same as mass storage.

Sector: A pie-shaped section of a magnetic disk used to organize the storage of data. Each block of data on a disk is located by the track (see also) and sector it occupies.

Semiconductor: A material with an electrical conductivity between that of metals and that of insulators; the raw material for transistors and integrated circuits.

Serial interface: A connection between computers and peripherals in which bits are transmitted one at a time. Compare with parallel interface.

Smart terminal: A terminal with a microprocessor that can perform certain functions without assistance from a computer, such as editing, formatting, and simple arithmetic. Compare with dumb terminal.

Software: A set of instructions that tell a computer

what to do and how to do it. Compare with hardware.

Solid state: Small, efficient electronic components made of semiconductors.

Source code: A set of instructions written by a programmer that must be translated into machine language by an interpreter or compiler before the computer can execute them.

Speech synthesizer: A computer that simulates the human voice by constructing strings of digitized phonemes, the recognizable sounds that make up a spoken language.

Spreadsheet: See electronic spreadsheet.

Stack: A block of successive memory locations in which data is stored and retrieved on a last-in/first-out basis, like plates on a stack.

Static RAM: RAM that retains its contents as long as power is supplied. Compare with dynamic RAM.

String: Any group of characters treated as a unit; for example, "unit" is a string of four characters.

Structured programming: A group of programming techniques that simplify design, testing, and documentation functions by imposing a structure on all programs.

Subroutine: A group of instructions in a program separate from the main program that perform a discrete function and are often used more than once during a program's execution.

Symbolic language: Any programming language other than machine code.

Synchronous transmission: A mode of transmitting data between computer devices at timed intervals, an expensive, but higher-speed mode of communication than asynchronous transmission.

SYSGEN: SYStem GENerator, a utility that generates an operating system to fit the memory and peripheral parameters of a particular computer. Part of CP/M.

Telecommunications: The long-distance transmission of data by telephone, TV, or radio waves.

Teleprinter: A terminal with a built-in printer used in telecommunications.

Terminal: An input/output device consisting of a keyboard attached to a video display and/or printer.

Thermal printer: A non-impact printer that uses a heated element to form dot-matrix characters on specially coated, heat-sensitive paper. Some new models use the element to melt ink from a transfer material onto the paper.

Thimble printer: An impact printer that uses a thimble-shaped print element with raised characters to print letter-quality characters on paper.

Timesharing: The use of one central processing unit (usually a mainframe computer) by more than one user at a time.

Toggle: Any command that, given repeatedly, alternately turns a function on and off.

Top-down programming: Development of a program by breaking the task to be accomplished into smaller and smaller subproblems until they can be translated directly into programming-language statements. One of the techniques of structured programming.

Track: One of the concentric rings on a disk (or parallel channels on a tape) used to organize the storage of data.

Tractor feed: A printer mechanism that guides fanfold paper by means of sprockets that fit into precut holes in the paper.

User friendly: Easy to understand and operate.

User group: A group of people who share information for a specific computer system or program through vendors, publications, or meetings.

Utility: A program that performs special tasks such as copying programs and initializing data disks to other computer formats.

Variable: Memory location used by a program for temporary storage of data that may change as the program is run; referred to in the program by a variable name. In the statement "A=2," "A" is a variable with the value 2.

VDT: Video Display Terminal.

Very large scale integration (VLSI): Etching of a large number of integrated circuit components onto a silicon chip; usually between several hundred thousand and 1,000,000.

Video display terminal (VDT): A screen such as that of a television set on which data and graphics are displayed.

Virtual memory: A system that simulates greater storage space than actually exists in main memory by loading parts of a program or data into memory and replacing them as necessary.

Voice recognition: The ability of a computer to recognize spoken words and phrases.

Volatile memory: Memory that does not retain data once the power has been turned off.

Winchester disk: A hard disk.

Word processing: The creation, manipulation, storage, and printing of text documents such as letters and manuscripts.

Word wrap: A function in word processing in which a word too long to fit within a margin is automatically placed on the next line.

Write-protection: The ability to designate a magnetic storage medium such as a disk or tape "read-only" to avoid inadvertent writing over (erasing) of data.

DIRECTORY OF SOFTWARE FIRMS

Aardvark/McGraw-Hill
1020 North Broadway
Milwaukee, WI 53202
(414) 225-7500

Abacus Software
P.O. Box 7211
1307 Philadelphia S.E.
Grand Rapids, MI 49501
(616) 241-5510

ABW Corp.
P.O. Box M1047
Ann Arbor, MI 48106
(313) 971-9364

Accent Software
3750 Wright Place
Palo Alto, CA 94306
(415) 856-6505

Accountants Microsystems, Inc.
1404 140th Place N.E.
Bellevue, WA 98007
(206) 643-2050

Addison-Wesley Publishing Company
Jacob Way
Reading, MA 01867
(617) 944-3700

Advanced Data Institute of America
1215 Howe Avenue
Sacramento, CA 95825
(916) 925-2229

Advanced Software Interface
2655 Campus Drive, Suite 260
San Mateo, CA 94403
(415) 573-1347

Aeronca, Inc.
7415 Pineville-Matthews Road
Charlotte, NC 28226
(704) 541-1700

Alcor Systems
13534 Preston Road
Suite 365
Dallas, TX 75240
(214) 494-1316

Allen Gelder Software
Box 11721 Main Post Office
San Francisco, CA 94101
(415) 387-3131

Alpha Bit Communications
13349 Michigan Avenue
Dearborn, MI 48126
(313) 581-2896

Alpha Software
12 New England Executive Park
Burlington, MA 01803
(617) 229-2924

Alphanetics Software
P.O. Box 339
Forestville, CA 95436
(707) 887-7237

The Alternate Key
1400 Thatcher Road
P.O. Box 148
Williamston, MI 48895
(517) 655-7320

The Alternate Source
704 N. Pennsylvania Avenue
Lansing, MI 48906
(517) 482-8270

Andent, Inc.
1000 North Avenue
Waukegan, IL 60085
(312) 223-5077

Anderson-Bell Company
P.O. Box 191
Canon City, CO 81212
(303) 275-1661

Anidata
315 South Black Horse Pike
Blackwood, NJ 08012
(609) 228-3034

Anitek Software Products
P.O. Box 1136
Melbourne, FL 32935
(305) 259-9397

A+ Disk Magazine
One Park Avenue
New York, NY 10016
(212) 725-7770

Apollo Software
6338 Wisteria Lane
Apollo Beach, FL 33570
(813) 645-3153

Apple Computer
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010

Applied Software Technology
14125 Capri Drive
Los Gatos, CA 95030
(408) 370-2662

Armadillo International Software
P.O. Box 7661
Austin, TX 78712
(512) 835-1088

Artificial Intelligence Design
P.O. Box 3685
Santa Clara, CA 95055
(408) 296-1634

Artsci, Inc.
5547 Satsuma Avenue
North Hollywood, CA 91601
(213) 985-2922

Ashton-Tate
9929 West Jefferson Boulevard
Culver City, CA 92660
(213) 204-5570

ASK Micro, Inc.
100 Blue Ravine Road
Folsom, CA 95630
(916) 722-8000

ATC Software
Route Z, Box 448
Estill Springs, TN 37330
(205) 837-4718

Automated Simulations, Inc. (EPYX)
1043 Kiel Court
Sunnyvale, CA 94086
(408) 745-0700

Avalon Hill
4517 Harford Road
Baltimore, MD 21214
(301) 254-5300

Avant-Garde Creations
P.O. Box 30160
Eugene, OR 97403
(503) 738-4387

Aware Company
P.O. Box 695
Gualala, CA 95455
(707) 884-4019

Axel Johnson Corp.
Stemmos Division
666 Howard Street
San Francisco, CA 94105
(415) 777-3800

Balis Computing
P.O. Box 273261
Boca Raton, FL 33427
(305) 391-4610

Barron's Educational Series, Inc.
113 Crossways Park Drive
Woodbury, NY 11797
(516) 921-8750

Batteries Included
186 Queen Street West
Toronto, Canada
(416) 596-1405

Beagle Brothers Micro Software, Inc.
4315 Sierra Vista
San Diego, CA 92103
(619) 296-6400

Beaman Porter
Pleasant Ridge Road
Harrison, NY 10528
(914) 967-3504

Benchmark Software
6509 W. Frye Road Suite 12
Chandler, AZ 85224
(602) 961-0003

Bertamax, Inc.
101 Nickerson/Ste. 550
Seattle, WA 98101
(206) 282-6249

Berzurk Systems
1434 Parker Street
Berkeley, CA 94702

Best Programs
P.O. Box 2370
Alexandria, VA 22301
(703) 549-3663

Binary Corp.
3237 Woodward Avenue
Berkley, MI 48072
(313) 548-0533

Blaise Computing
1609 Acton Street
Berkeley, CA 94702
(415) 524-6603

BLS, Inc.
2503 Fairlee Road
Wilmington, DE 19810
(302) 478-2451

BPI Systems, Inc.
3423 Guadelupe
Austin, TX 78705
(512) 454-2801

Brightbill-Roberts Company, Ltd.
Suite 421, University Building
120 East Washington Street
Syracuse, NY 13202
(315) 474-3400

Brock Software Products, Inc.
P.O. Box 799
Crystal Lake, IL 60014
(815) 459-4210

Broderbund Software, Inc.
1938 Fourth Street
San Rafael, CA 94901
(415) 456-6424

Business & Professional Software, Inc.
143 Binney Street
Cambridge, MA 02142
(617) 491-3377

Business Micro Products
51241 Highway 6 and 24
Glenwood Springs, CO 81601
(303) 945-8166

Business Software, Inc.
12021 Wilshire Boulevard, Suite 194
Los Angeles, CA 90025

Business Solutions, Inc.
60 East Main Street
Kings Park, NY 11754
(516) 269-1120

C-Ware Corp.
P.O. Box 710097
San Jose, CA 95171-0097
(408) 736-6905

C.R. Hunter & Associates
1527 Northwood Drive
Cincinatti, OH 45237
(513) 761-9322

California Software Products
525 North Cabrillo Park Drive
Santa Ana, CA 92701
(714) 973-0440

CBS Software
One Fawcett Place
Greenwich, CT 06836
(203) 622-2503

Cdex Corp.
5050 El Camino Real, Suite 200
Los Altos, CA 94022
(415) 964-7600

Central Point Software, Inc.
P.O. Box 19730
Portland, OR 97219
(503) 244-5782

CE Software
601 73rd Street
Des Moines, IA 50312
(515) 224-1995

Champion Software Corp.
66 South Van Gordon
Suite 155
Lakewood, CO 80228
(303) 987-2588

Chang Laboratories
5300 Stevens Creek Boulevard
#200
San Jose, CA 95129
(408) 246-8020

Cherrygarth Farm Software
101 South Dewey Street
Auburn, IN 46706
(219) 925-1093

City Software
735 West Wisconsin Avenue
Milwaukee, WI 53233
(800) 558-4801

CMA Micro Computer
55722 Santa Fe Trail
Yucca Valley, CA 92284
(714) 365-9718

Cognitec
704 N. Nob Street
Del Mar, CA 92014
(619) 755-1258

Colorquest
9072 Lyndale Avenue South
Minneapolis, MN 55420
(800) 328-2737

Columbia Software
5461 Marsh Hawk Way
P.O. Box 2235
Columbia, MD 21045
(301) 997-3100

Commercial Software Systems, Inc.
7689 West Frost Drive
Littleton, CO 80123
(303) 761-8062

Commodore Business Machines
Computer Systems Division
1200 Wilson Drive, Brandywine Industrial Park
West Chester, PA 19380
(215) 431-9100

Commsoft
665 Maybell Avenue
Palo Alto, CA 94306
(415) 493-2184

Comprehensive Software
P.O. Box 90833
Los Angeles, CA 90009
(213) 743-5508

ComPRESS
P.O. Box 102
Wentworth, NH 03282
(603) 764-5831
(603) 764-5225

Computari
9607 Athlone
Dallas, TX 75218

Compu-tations, Inc.
P.O. Box 502
Troy, MI 48099
(313) 689-5059

Computer Agri-Venture
105 South Third
St. Peter, MN 56082
(507) 931-6060
(800) 642-1185 (Minnesota only)

Computer Aided Design
764 24th Avenue
San Francisco, CA 94121
(415) 387-0263

Computer Applications Unlimited
P.O. Box 214
Rochester, NY 10580
(716) 937-6286

Computer Control Systems
298 21st Terrace S.E.
Largo, FL 33541
(813) 586-1886

The Computer House
Box 1051
DuBois, PA 15801
(814) 371-4658

Computer Innovations, Inc.
980 Shrewsbury Avenue
Tinton Falls, NJ 07724
(201) 542-5920

Computer Marketing Services, Inc.
300 West Marlton Pike
Cherry Hill, NJ 08002
(609) 795-9480

Computer Shack
1691 Eason
Pontiac, MI 48054
(313) 673-2224

Computer Stations, Inc.
11610 Page Service Drive
St. Louis, MO 63141
(314) 432-7019

Computer Systems Design
2139 Jackson Boulevard
Rapid City, SD 57701
(605) 341-3662

Computer Tax Service
P.O. Box 7915
Incline Village, NV 89450
(702) 832-1001

Computerware
4403 Manchester Avenue Suite 102
P.O. Box 668
Encinitas, CA 92024
(619) 436-3512

The Computing Investor
29-A Eustacia Drive
Marana, AZ 85238

CompuView Products
1955 Pauline Boulevard
Suite 200
Ann Arbor, MI 48103
(313) 996-1299

Compuware
7 Mechanic Street
Dover, NJ 07801

Comshare
1935 Cliff Valley Way
Atlanta, GA 30329
(404) 633-8737

Conceptual Instruments Company
4730 Warrington Avenue
Philadelphia, PA 19143
(215) 726-7856

Conduit
P.O. Box 388
Iowa City, IA 52244
(319) 353-5789

Context Management Systems
23864 Hawthorne Boulevard, #101
Torrance, CA 90505
(213) 378-8277

Continental Software
11223 South Hindry Avenue
Los Angeles, CA 90045
(213) 410-3977

Control Data Publishing Co.
P.O. Box 261127
San Diego, CA 92126
(800) 233-3784

COPRAM
20631 Deer Bluff Drive
Chillicothe, IL 61523

Cornucopia Software
P.O. Box 6111
Albany, CA 94706
(415) 524-8098

Cosmopolitan Electronics Corp.
P.O. Box 234
Plymouth, MI 48170
(313) 668-6660

Cosmos, Inc.
Revelation
1346 14th Avenue
P.O. Box 1237
Longview, WA 98632
(206) 423-0763

Counterpoint Software, Inc.
4005 West 65th Street
Suite 218
Edina, MN 55435
(612) 926-7888

Countryside Data
718 North Skyline Drive
Idaho Falls, ID 83402
(208) 529-8576

Creative Software
230 East Caribbean Drive
Sunnyvale, CA 94089
(408) 745-1655

Crow Ridge Associates, Inc.
P.O. Box 1
New Scotland, NY 12127
(518) 765-3620

Data Access Corp.
4221 Ponce De Leon Boulevard
Coral Gables, FL 33146
(305) 238-0012

Data Base Decisions
14 Bonnie Lane
Atlanta, GA 30328
(404) 256-3860

Data Consulting Group
877 Bounty Drive, #EE203
Foster City, CA 94404
(415) 349-4001

Datamension Corp.
615 Academy Drive
Northbrook, IL 60062
(312) 564-5060

Datasoft, Inc.
9421 Winnetka Avenue
Chatsworth, CA 91311
(213) 701-5161

Data Transforms, Inc.
616 Washington Street, #106
Denver, CO 80203
(303) 832-1501

David Data
12021 Wilshire Boulevard, Suite 212A
Los Angeles, CA 90025
(213) 478-7856

Davidson and Associates
6069 Groveoak Place, #12
Rancho Palos Verdes, CA 90274
(213) 378-7826

DEG Software
11999 Katy Fairway, Suite 150
Houston, TX 77079
(713) 531-6100

Derringer Software
P.O. Box 5300
Florence, SC 29502
(803) 665-5676

Design Data Systems, Inc.
2300 Perkins Place
Silver Spring, MD 20910
(301) 588-4465

Desktop Software Corp.
228 Alexander Street
Princeton, NJ 08540
(609) 924-7111

DG/Systems
23145 Bigler Street
Woodland Hills, CA 91364
(213) 716-1655

Dickey-John Corp.
Agricultural Management Division
P.O. Box 10
Auburn, IL 62615
(217) 438-3371

Digital Marketing Corp.
2670 Cherry Lane
Walnut Creek, CA 94596
(415) 938-2880

Digital Research, Inc.
160 Central, P.O. Box 579
Pacific Grove, CA 93950
(408) 649-3896

Diversified Software Research, Inc.
5846 Crampton Court
Rockford, IL 61111
(815) 877-1343

Don't Ask Software
2265 Westwood Boulevard, #B150
Los Angeles, CA 90064
(213) 397-8811

Dow Jones & Co.
P.O. Box 300
Princeton, NJ 08540
(609) 452-1511

Dynacomp, Inc.
1427 Monroe Avenue
Rochester, NY 14618
(716) 442-8960

Dynamic Microprocessor Associates
545 Fifth Avenue
New York, NY 10017
(212) 687-7115

E&S Software Services
P.O. Box 238
Bedford, MA 01730
(617) 275-8534

Eastern House Software
3239 Linda Drive

Winston-Salem, NC 27106
(919) 924-2889

Educational Activities
Microcomputer Dept./Box 87
Baldwin, NY 11510
(516) 223-4666

Edu-Soft
Box 2560
Berkeley, CA 94702
(415) 548-2304

Eduware
28035 Dorothy Drive
Agoura Hills, CA 91301
(213) 706-0661

Edu-Ware Services
(*see* Peachtree Software, Inc.)

Eigen Systems
P.O. Box 10234
Austin, TX 78766
(512) 837-4665

The Einstein Corp.
11340 West Olympic Boulevard
Los Angeles, CA 90064
(213) 477-4539

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171

Electronic Law Publishing
P.O. Box 1027
Buies Creek, NC 27506

Elite Software
Box 11224
Pittsburgh, PA 15238
(412) 795-8492

Encyclopedia Britannica Educational Corp.
425 North Michigan Avenue
Chicago, IL 60611
(312) 347-7400

Enertronics Research, Inc.
150 North Meramec, Suite 207
St. Louis, MO 63105
(314) 725-5566

Ensign Software
7337 Northview
Boise, ID 83704
(208) 378-8086

Epyx
(*see* Automated Simulations, Inc.)

ETS Center
Box 651
35026A Turtle Trail
Willoughby, OH 44094
(216) 946-8479

Executec Corp.
12200 Park Central Drive
Dallas, TX 75251
(214) 239-8080

Execuware
7415 Pineville-Matthews Road
Charlotte, NC 28211
(704) 541-1199

Farm Management Systems
1208 South Cedar Road
New Lenox, IL 60451
(815) 485-4955

FBS Systems
Box 201
Aledo, IL 61231
(309) 582-5628

Financial Software, Inc.
11401 Westridge Circle
Chardon, OH 44024
(216) 338-6811

Financier, Inc.
2000 W. Park Drive
P.O. Box 670
Westboro, MA 01581
(617) 366-0950

Fogle Computing Corp.
357 E. Blackstock Road
Spartanburg, SC 29301
(803) 574-4950

Follet Library Book Co.
4506 Northwest Highway
Crystal Lake, IL 60014
(815) 455-1100

Forth Technology
432 15th Street
Santa Monica, CA 90402
(213) 372-8493

Fourcolor Data Systems, Inc.
7011 Malabar Road
Dayton, OH 45459
(513) 433-3780

Fox & Geller, Inc.
604 Market Street
Elmwood Park, NJ 07407
(201) 794-8883

FriendlySoft, Inc.
313 Pebblebrook
Arlington, TX 76014
(817) 277-9378

Friends Software Corp.
Tioga Building, Suite 440
P.O. Box 527
Berkeley, CA 94710
(415) 540-7282

Funk Software, Inc.
685 Chestnut Hill Avenue
Brookline, MA 02146
(617) 497-6339

Funsoft
28611 Canwood Street
Agoura, CA 91301
(213) 991-6540

Futurehouse
P.O. Box 3470
Chapel Hill, NC 27514
(919) 967-0861

FYI, Inc.
4202 Spicewood Road #204
P.O. Box 26481
Austin, TX 78755
(512) 346-0133

Gary Keenliside & Associates
Star Route One
Chino Valley, AZ 86323
(602) 636-2990

Gemini Software
12 Scamridge Curve
Buffalo, NY 14221

George Earl
1302 S. General McMullen Drive
San Antonio, TX 78237
(512) 434-3681

Gourmet Software
671 Eden Avenue
San Jose, California 95117
(408) 866-0887

Graphic Communications, Inc.
200 Fifth Avenue
Waltham, MA 02254
(617) 890-8778

Great Plains Software
123 North 15th Street
Fargo, ND 58102
(701) 293-8483

Grid Soft, Inc.
7777 Keele Street, Suite 8
Concord, Ontario
L4K1Y7 Canada
(416) 738-1700

Haba Systems
15154 Stagg Street
Van Nuys, CA 91405
(213) 901-8828

Harcourt, Brace Jovanovich
1250 Sixth Avenue
San Diego, CA 92101
(619) 231-6616

Harris Technical Systems
624 Peach Street
Lincoln, NE 68501
(402) 476-2811

Harvard Associates
260 Beacon Street
Somerville, MA 02143
(617) 492-0660

Harvest Computer Systems, Inc.
102 S. Harrison Street
Alexandria, IN 46001
(317) 724-9527

Hayden Books
10 Mulholland Drive
Hasbrouck Heights, NJ 07654
(800) 631-0856

Hayes Microcomputer Products, Inc.
5835 Peachtree Corners East
Norcross, GA 30092
(404) 449-8791

The Headlands Press
P.O. Box 862
Tiburon, CA 94920
(415) 435-9775

Heritage Holdings
611 Anton Boulevard, Suite 720
Costa Mesa, CA 92626
(714) 662-6999

HFK Software
Old Danbury Road, P.O. Box 150
Danbury, NH 03230
(603) 259-0059

Houston Instrument (Bausch & Lomb)
One Houston Square
Austin, TX 78753
(512) 837-2820

Howard Software Services
8008 Girard Avenue, Suite 310
La Jolla, CA 92037
(619) 454-0121

Howe Software
14 Lexington Road
New City, NY 10956
(914) 634-1821

Hudson Computer Bureau
6135 Bergenline Avenue
West New York, NJ 07093
(201) 868-6134

Human Engineered Software
71 Park Lane
Brisbane, CA 94005
(415) 468-4111

Human Systems Dynamics
9010 Reseda Boulevard, Suite 222
Northridge, CA 91324
(213) 993-8536

Humansoft, Inc.
661 Massachusetts Avenue
Arlington, MA 02174
(617) 641-1880

I.B. Magazette
1306 Petroleum Tower
Shreveport, LA 71101
(318) 222-8088

IBM Systems Product Division
P.O. Box 1328
Boca Raton, FL 33432
(800) 447-4700

Ideaware, Inc.
225 Lafayette Street
New York, NY 10012
(212) 334-8043

Image Processing Systems
6409 Appalachian Way, P.O. Box 5016
Madison, WI 53705
(608) 233-5033

Individual Software Inc.
24 Spinnaker Place
Redwood City, CA 94065
(415) 591-4166

Infocom, Inc.
55 Wheeler Street
Cambridge, MA 02138
(617) 492-1031

Information Unlimited Software, Inc. (IUS)
2401 Marinship Way
Sausalito, CA 94965
(415) 331-6700

In-home Software, Inc.
2485 Dunwin Drive, Unit 8
Mississauga, Ontario
Canada L5L 1T1
(416) 828-0775

Inmagic, Inc.
238 Broadway
Cambridge, MA 02139
(617) 661-8124

Innosys, Inc.
2150 Shattuck Avenue, Suite 901
Berkeley, CA 94704
(415) 843-8114

Innovative Software, Inc.
9300 W. 110th Street, Suite 380
Building 55

Overland Park, KS 66210
(913) 383-1089

Insoft, Inc.
P.O. Box 608
Beaverton, OR 97075
(503) 641-5223

Institute for Scientific Information
3501 Market Street
University City Science Center
Philadelphia, PA 19104
(215) 386-0100
(800) 523-4092

Intellectual Software
798 North Avenue
Bridgeport, CT 06606
(203) 333-7268

Interactive Microware, Inc.
P.O. Box 771
State College, PA 16801
(814) 238-8294

International Microcomputer Software, Inc.
633 Fifth Avenue
San Rafael, CA 94901
(415) 454-7101

International Software Marketing, Ltd.
120 E. Washington Street
Syracuse, NY 13202
(315) 474-3400

Island Software
Box 300
Lake Grove, NY 11755
(516) 585-3755

J & S Software
140 Reid Avenue
Port Washington, NY 11050
(516) 944-9304

Jim Button
P.O. Box 5604
Bellevue, WA 98006
(206) 746-4296

Jini Micro Systems, Inc.
Riverdale, NY 10463
(212) 796-6200

JMG Software International
P.O. Box 598
Falls Station
Niagara Falls, NY 14303
(716) 389-6086

Johnson Associates Software
P.O. Box 3069
Redding, CA 96049
(916) 221-0740

JR's Magazette
1306 Petroleum Tower
Shreveport, LA 71101
(318) 222-8088

Kensington Microware, Ltd.
919 Third Avenue
New York, NY 10022
(212) 486-7707

Kensoft
2102-50th Street
Kenosha, WI 53140
(414) 654-2722

Key Software, Inc.
2350 E. Devon Avenue
Des Plaines, IL 60018
(312) 298-3610

Koala Technologies
3100 Patrick Henry Drive
Santa Clara, CA 95050
(408) 986-8866

Krell Software Corp.
1320 Stonybrook Road
Stonybrook, NY 11790
(516) 751-5139

KSoft
318 Lakeside Drive
Brandon, MS 39042
(601) 992-2239

Laboratory Microsystems, Inc.
4147 Beethoven Street
Los Angeles, CA 90066
(213) 306-7412

Lassen Software
P.O. Box 1190
Chico, CA 95927
(916) 891-6957

The Learning Company
545 Middlefield Road, No. 170
Menlo Park, CA 94025
(415) 328-5410

Lexisoft
706 5th Street
Davis, CA 95616
(916) 758-3630

Library Software
Box 23897
Pleasant Hill, CA 94523
(415) 687-0280

Lifeboat Associates
1651 Third Avenue
New York, NY 10028
(212) 860-0300

Lifetree Software, Inc.
411 Pacific Street, Suite 315
Monterey, CA 93940
(408) 373-4718

Lindbergh Systems
49 Beechmont Street
Worcester, MA 01609
(617) 852-0233

Link Systems/Naru Enterprises, Inc.
1655 26th Street
Santa Monica, CA 90404
(213) 453-8921

Logical Systems, Inc.
8970 N. 55 Street
P.O. Box 23956
Milwaukee, WI 53223
(414) 355-5454

Lotus Development Corp.
161 First Street
Cambridge, MA 02142
(617) 492-7171

Luck Software
1160 Niblick Road
Paso Robles, CA 93446
(805) 238-2585

MAG Software, Inc.
21054 Sherman Way, Suite 305
Canoga Park, CA 91303
(213) 883-3267

Management and Computer Services, Inc. (MACS)
Great Valley Corporate Center
Valley Forge, PA 19482
(215) 648-0730

Mark of the Unicorn
222 Third Street
Cambridge, MA 02142
(617) 576-2760

Mathtech
P.O. Box 2392
Princeton, NJ 08540
(609) 799-2600

Maxtek, Inc.
2908 Oregon Court
Torrance, CA 90503
(213) 320-6604

MBS Software
12729 N.E. Hassald Street
Portland, OR 97230
(503) 256-0130

McGraw-Hill Book Co.
1221 Avenue of the Americas
New York, NY 10020
(212) 997-1221

McSoft Corp.
2044 North 1300 East
Logan, UT 84321
(801) 753-1274

MECC Instructional Services
2520 Broadway Drive
St. Paul, MN 55113
(612) 376-1118

Megahaus Corp.
5703 Oberlin Drive
San Diego, CA 92121
(619) 450-1230
(800) 358-8882

Mentor
147 S. River Street, Suite 213
Santa Cruz, CA 95060
(408) 425-8520

Metasoft Corp.
711 E. Cottonwood, Suite E
Casa Grande, AZ 85222
(602) 961-0003
(602) 836-0268

Micro Business Applications, Inc.
12281 Nicollet Avenue, South
Burnsville, MN 55337
(612) 894-3470

The Micro Center
Department MG7
P.O. Box 6
Pleasantville, NY 10570
(914) 769-6002

Microcompatibles
P.O. Box 570
Yorktown, VA 23690

Micro Computer Taxsystems, Inc.
6203 Variel Avenue, Suite A
Woodland Hills, CA 91367
(213) 704-7800

Micro Control Systems
143 Tunnel Road
Vernon, CT 06066
(203) 877-0602

Micro-Crop
8245 N.W. 53rd Street
Miami, FL 33166
(305) 594-2925

Micro Data Base Systems, Inc.
P.O. Box 248
Lafayette, IN 47902
(317) 448-1616

Micrografix
8526 Vista View Drive
Dallas, TX 75243
(214) 343-4338

Micro Information Systems, Inc.
Richardson Plaza
Route 309 & Richardson Road
Montgomeryville, PA 18936
(215) 855-2700

Micro Lab Learning Center
2699 Skokie Valley Road
Highland Park, IL 60035
(312) 433-7550

Micro Power and Light
12820 Hillcrest Road, Suite 219
Dallas, TX 75230
(214) 239-6620

The Microperipheral Corp.
2565 452nd Avenue N.E.
Redmond, WA 98052
(206) 881-7544

MicroPro International Corp.
33 San Pablo Avenue
San Rafael, CA 94903
(415) 457-8990

Microrim, Inc.
1750 112th N.E. Street, Suite A200
Bellevue, WA 98009
(206) 453-6017

Microsoft Consumer Products
400 108th Avenue, N.E.
Bellevue, WA 98004
(206) 828-8080

Micro-Sparc, Inc.
P.O. Box 325
Lincoln, MA 01773
(617) 259-9710

Microstuf, Inc.
1845 The Exchange Suite 140
Atlanta, GA 30339
(404) 952-0267

Micro-Systems Software, Inc.
4301-18 Oak Circle
Boca Raton, FL 33431
(305) 983-3390
(800) 327-8724

Miller Microcomputer Services
61 Lake Shore Road
Natick, MA 01760
(617) 653-6136

Milliken Publishing
1100 Research Boulevard
P.O. Box 21579
St. Louis, MO 63132
(314) 991-4220

Miracle Computing
313 Clayton Court
Lawrence, KS 66044
(913) 843-5863

Misosys
P.O. Box 4848
Alexandria, VA 22303-0848
(703) 960-2998

Monument Computer Service
Village Data Center, P.O. Box 603
Joshua Tree, CA 92252
(619) 365-6668

Mosaic Media Inc.
P.O. Box 711
Glen Ellyn, IL 60137
(312) 790-1117

Mumford Micro Systems
Box 400
Summerland, CA 93067
(805) 969-4557

Muse Software
347 N. Charles Street
Baltimore, MD 21201
(301) 659-7212

Mycroft Labs, Inc.
P.O. Box 6045
Tallahassee, FL 32314
(904) 385-1141

Network Consulting, Inc.
A106-1093 West Broadway
Vancouver, Canada VGH 1E2
(604) 738-3500

New Classic Software
239 Fox Hill Road
Denville, NJ 07834
(201) 625-8838

Norell Data Systems Corp.
3400 Wilshire Boulevard
P.O. Box 70127
Los Angeles, CA 90010
(213) 258-1653

Northouse Industries, Inc.
Farm Computer Systems
7110 West Fond du Lac Avenue
Milwaukee, WI 53218
(414) 438-0610

N-Squared Computing
5318 Forest Ridge Road
Silverton, OR 97381
(503) 873-5906

Olive Branch Software
1715 Olive Street
Santa Barbara, CA 93101
(805) 962-4682

Omega Microware, Inc.
222 S. Riverside Plaza
Chicago, IL 60606
(312) 648-4844

Open Systems, Inc.
430 Oak Grove
Minneapolis, MN 55403
(612) 870-3515

Optimized Systems Software, Inc.
1173-D Saratoga-Sunnyvale Road
San Jose, CA 95129
(408) 446-3099

Opt-Tech Data Processing
P.O. Box 2167
Humble, TX 77347
(713) 454-7428

Owl Software Corp.
6927 Atoll Avenue
North Hollywood, CA 91605
(213) 982-6243

Pacific Software
2608 Eighth Street
Berkeley, CA 94710
(415) 540-5000

PBL Corp.
1745 Fagerness Point Road
P.O. Box 559
Wayzata, MN 55391
(612) 473-3769

PC-Demo
1724 Sacramento Street, Suite 444
San Francisco, CA 94109
(415) 974-5134

PC Disk Magazine
1 Park Avenue
New York, NY 10016
(212) 725-7770

PC Firing Line/PC Underground
P.O. Box 5503
North Hollywood, CA 91616
(213) 509-9002

PC Software
4155 Cleveland Avenue
San Diego, CA 92103
(619) 279-2482

PC Underground
(*see* PC Firing Line)

Peachtree Software, Inc.
3445 Peachtree Road, N.E., 8th Fl.
Atlanta, GA 30326
(404) 239-3000

Pearlsoft/Relational Systems Int'l.
3700 River Road N, Suite 3
P.O. Box 13850
Salem, OR 97303
(503) 390-6880

Perfect Software
1400 Shattuck Avenue
Berkeley, CA 94709
(415) 644-3001

Persoft, Inc.
2740 Ski Lane
Madison, WI 53713
(608) 233-1000

Personal CAD Systems
15425 Los Gatos Boulevard
Los Gatos, CA 95030
(408) 356-3183

Peter Norton Computing, Inc.
2210 Wilshire Boulevard
Santa Monica, CA 90403
(213) 399-3948

Phoenix Software, Inc.
64 Lake Zurich Drive
Lake Zurich, IL 60047
(312) 438-4850

Plan-A-Farm America, Inc.
220 Division Street
Northfield, MN 55057
(800) 448-5198

Portware, Inc.
5724 Tucher Lane
Edina, MN 55436
(612) 935-6226

Powersoft, Inc.
11500 Stemmons Fwy Suite 125
Dallas, TX 75229
(214) 484-2976

Prentice-Hall
Englewood Cliffs, NJ 07632
(201) 592-2000

The Princeton Software Co.
195 Nassau Street
P.O. Box 1317
Princeton, NJ 08540
(609) 683-0044

Professional Data Corp.
6449 Goldbranch Road
Columbia, SC 29202

Professional Farm Software
219 Parkade
Cedar Hills, IA 50613
(319) 277-1278

Professional Software, Inc.
51 Fremont Street
Needham, MA 02194
(617) 444-5224

Professional Systems Corp.
3858 Carson Street
Torrance, CA 90503
(213) 316-5345

Program Design, Inc.
95 E. Putman Avenue
Greenwich, CT 06830
(203) 661-8799

Prosoft
P.O. Box 839
N. Hollywood, CA 91603
(213) 764-3131

Pro/Tem Software
814 Tolman Drive
Stanford, CA 94305
(415) 497-3573

Pyramid Data
P.O. Box 10116
Santa Ana, CA 92711
(714) 639-1527

Quantum Software Systems, Inc.
6940 Santa Teresa Boulevard
Suite #6
San Jose, CA 95119
(408) 281-1586

Quark
2525 W. Evans, Suite 220
Denver, CO 80219
(303) 934-2211

Quarterdeck Office Systems
1918 Main Street
Santa Monica, CA 90405
(213) 392-9851

Quasar Animations
1520 Pacific Beach Drive
San Diego, CA 92109

Quest Research, Inc.
P.O. Box 2553
Huntsville, AL 35804
(205) 533-9405

Quick Tax, Ltd.
319 Clawson Street
Staten Island, NY 10314
(212) 351-6143

Radio Shack
1800 One Tandy Center
Fort Worth, TX 76102
(817) 390-3011

Rainbow Computing, Inc.
9719 Reseda Boulevard
Northridge, CA 91324
(213) 349-0300

Realia
10 South Riverside Plaza
Chicago, IL 60606
(312) 346-0642

Realty Software Co.
1116 E. 8th Street
Manhattan Beach, CA 90266
(213) 372-9419

RealWorld Corp.
Dover Road, Willow Hill Building
Chichester, NH 03263
(603) 798-5700

Red Wing Business Systems
P.O. Box 19
Red Wing, MN 55066
(612) 388-1106

Rockware Data Co.
P.O. Box 1493
Plano, TX 75074
(214) 596-0588

Rocky Mountain Software Systems
1280C Newell Avenue, Suite 147D
P.O. Box 3282
Walnut Creek, CA 94596
(415) 680-8378

Roger Wagner Publishing
10761 Woodside Avenue
Santee, CA 92071
(619) 562-3670/3221

Rosesoft
P.O. Box 3850
Seattle, WA 98105
(206) 632-3603

Ryan-McFarland Corp.
609 Deep Valley Drive
Rolling Hills Estates, CA 90274
(213) 541-4828

Satellite Software International
288 West Center
Orem, UT 84057
(801) 224-8554

Satori Software
5507 Woodlawn N.
Seattle, WA 92103
(206) 633-1469

Savant Software
Box 42888, Suite 164
Houston, TX 77042
(713) 556-8363

Scarborough Systems
25 North Broadway
Tarrytown, NY 10591
(914) 332-4545

Scholastic, Inc.
P.O. Box 7502
2931 East McCarty Street
Jefferson City, MO 65102
(314) 636-5271

Schoolhouse Software
1509 Egan
Denton, TX 76201
(817) 382-6358

Science Research Associates, Inc.
155 N. Wacker Drive
Chicago, IL 60606
(800) 621-0476

Screenplay
P.O. Box 3558
Chapel Hill, NC 27514
(800) 334-5470

Sensible Designs
5244 Edgepark Way
San Diego, CA 92124
(619) 560-4583

Sensible Software, Inc.
6619 Perham Drive
West Bloomfield, MI 48033
(313) 399-8877

Sierra On-Line, Inc.
Sierra On-Line Building
Coarsegold, CA 93614
(209) 683-6858

Simple Soft, Inc.
480 Eagle Drive, Suite 101
Elk Grove, IL 60007
(312) 364-0752

Simutek Computer Products, Inc.
4877 E. Speedway Boulevard
Tucson, AZ 85712
(602) 323-9391

Sir-Tech Software
6 Main Street
Ogdensburg, NY 13669
(315) 393-6633

Small Business Computer Systems
4140 Greenwood
Lincoln, NE 68504
(402) 467-3591

Smith Micro Software
P.O. Box 604
Sunset Beach, CA 90742
(213) 592-1032

Snappware, Inc.
3719 Mantell
Cincinnati, OH 45236
(513) 891-4496

Sof/Sys, Inc.
4306 Upton Avenue
Minneapolis, MN 55410
(612) 929-7104

Softdisk
3811 St. Vincent
Shreveport, LA 71108
(318) 868-7247

Softech Microsystems
9494 Black Mountain Road
San Diego, CA 92126
(714) 578-6105

Softkey Publishing
P.O. Box 44549
Tacoma, WA 98444
(206) 581-6038

Softlink Corp.
3255-2 Scott Boulevard
Santa Clara, CA 95051
(408) 988-8011

Soft Path Systems
c/o Cheshire House
105 N. Adams
Eugene, OR 97402
(503) 342-3439

Softrend, Inc.
P.O. Box 1462
Charlottesville, VA 22902
(804) 979-8194

Softronics, Inc.
6626 Price Edward Place
Memphis, TN 38119
(901) 683-6850

Softsync, Inc.
14 East 34th Street
New York, NY 10016
(212) 685-2080

Software Libraries, Inc.
P.O. Box 844
Pasadena, CA 91102
(213) 793-1700

Software Options, Inc.
P.O. Box 970
Bowling Green Station
New York, NY 10274
(212) 785-8285

Software Publishing Corp.
1901 Landings Drive
Mountain View, CA 94043
(415) 962-8910

Software Solutions, Inc.
305 Bic Drive
Milford, CT 06460
(203) 877-9268

The Software Store
706 Chippewa Square
Marquette, MI 49855
(906) 228-7622

The Software Toolworks
14478 Glorietta Drive
Sherman Oaks, CA 91423
(213) 906-0414

Sorcim Corp.
2310 Lundy Avenue
San Jose, CA 95133
(408) 727-7634

Southwestern Data Systems
10761 Woodside Avenue, Suite E
Santee, CA 92071
(619) 562-3670

Spectrum Software
690 W. Fremont Avenue
Sunnyvale, CA 94087
(408) 738-4387

Spinnaker Software
215 First Street
Cambridge, MA 02142
(617) 494-1200

S.S.R. Corp.
1600 Lyell Avenue
Rochester, NY 14606
(716) 254-3200

Star-Kits
P.O. Box 209
Mt. Kisco, NY 10549
(914) 241-0287

State of the Art, Inc.
3191 C Airport Loop
Costa Mesa, CA 92626
(714) 850-0111

Sterling Swift Publishing Co.
1600 Fortview Road
Austin, TX 78704
(512) 444-7570

Strobe, Inc.
897-5A Independence Avenue
Mountain View, CA 94043
(415) 969-5130

STSC, Inc.
2115 E. Jefferson Street
Rockville, MD 20852
(301) 984-5000

Sublogic Communications Corp.
713 Edgewater Drive
Champaign, IL 61820
(217) 359-8482

Successful Farming Management Software
Locust at 17th
Des Moines, IA 50336
(515) 284-2916

Sunbelt Computer Systems
5525 East 51st Street, Suite 111
Tulsa, OK 74135
(918) 660-0670

Sun Data
95 West 100 South
Logan, UT 84321
(801) 753-8410

Sunflower Software
13915 Midland Drive
Shawnee, KS 66216
(913) 648-1333

Sunshine Computer Software Co.
1101 Post Oak Boulevard, Suite 9-493
Houston, TX 77056
(713) 552-0949

Superior Graphics Software
P.O. Box 451
Canton, NC 28716
(704) 648-6015

Supersoft, Inc.
1713 S. Neil Street
P.O. Box 1628
Champaign, IL 61820
(217) 359-2112

Suttle Enterprises
29844 West Chicago
Livonia, MI 48150
(313) 477-6485

Synapse Software
5221 Central Avenue
Richmond, CA 94804
(415) 527-7751

Systems Plus, Inc.
1120 San Antonio Road
Palo Alto, CA 94303
(415) 969-7047

Tax Management, Inc.
1231 25 Steet N.W.
Washington, DC 20037
(800) 372-1033

TCI Software
6107 West Mill Road
Flourtown, PA 19031
(215) 836-1406

TCS Software, Inc.
3209 Fondren Road
Houston, TX 77063
(713) 977-7505

Techland Systems, Inc.
25 Waterside Plaza
New York, NY 10010
(212) 684-7788

Tid Bit Software
P.O. Box 5579
Santa Barbara, CA 93108
(805) 969-5834

T/Maker
1742 Willow Road, NR 206
Palo Alto, CA 94304
(415) 326-6103

Tom Mix Software
4285 Bradford N.E.
Grand Rapids, MI 49506
(616) 957-0444

Transend Corp.
2190 Paragon Drive
San Jose, CA 95131
(408) 946-7400

Transparent Data Systems, Inc.
15066 Los Gatos-Almaden Road
Los Gatos, CA 95030
(408) 559-0288

Triple-D Software
P.O. Box 642
Layton, UT 84041
(801) 546-2833

Tronix Publishing, Inc.
701 S. Manchester Avenue
Inglewood, CA 90301
(213) 671-8440

Turning Point Software
11A Main Street
Watertown, MA 02172
(617) 923-4441

Tylog Systems, Inc.
9805 S.W. 152 Terrace
Miami, FL 33157
(305) 253-5942

U.S. Robotics
1123 West Washington
Chicago, IL 60607
(312) 733-0497

Universal Synergetics
16510 S.W. Edminston
Wilsonville, OR 97070
(503) 625-7168

Vector Graphic, Inc.
500 North Ventu Park Road
Thousand Oaks, CA 91320
(805) 499-5831

Vernier Software
2920 Southwest 89th Street
Portland, OR 97225
(503) 297-5317

Vertical Software, Inc.
502 East War Memorial Drive
Peoria, IL 61614
(309) 688-2377

Via Computer, Inc.
7177 Construction Court
San Diego, CA 92121
(619) 578-5356

Virtual Combinatics
P.O. Box 755
Rockport, MA 01966
(617) 546-6553

Visicorp
2895 Zanker Road
San Jose, CA 95134
(408) 946-9000

Waveform Corp.
1912 Bonita Way
Berkeley, CA 94704
(415) 841-9866

Window
824 Boylston Street
Chestnut Hill, MA 02167
(617) 734-0023

Wisconsin Microware
5201 Old Middleton
Madison, WI 53705
(608) 233-4559

Woolf Software Systems
23842 Archwood Street
Canoga Park, CA 91307
(213) 703-8112

Workman & Associates
112 Marion Avenue
Pasadena, CA 91106
(213) 796-4401

Xerox Educational Software
Computer Software Division
Dept. B-I
245 Long Hill Road
Middletown, CT 06457
(203) 347-7251

Xiphias
13470 Washington Boulevard
Suite 100
Marina Del Rey, CA 90291
(213) 821-0074

Xtrasoft
4910 Roman Drive
P.O. Box 91063
Louisville, KY 40291
(502) 499-1533

Xybion Graphics Systems Corp.
240 Cedar Knolls Road
Cedar Knolls, NJ 07927
(201) 538-5111

XYQuest, Inc.
P.O. Box 372
Bedford, MA 01730
(617) 275-7194

Yucaipa Software
12343 12th Street
Yucaipa, CA 92399
(714) 797-6331

Ziff-Davis Publishing Co.
One Park Avenue
New York, NY 10016
(212) 725-3500

Zsoft
P.O. Box 49382
Atlanta, GA 30359
(404) 425-3766

CONTRIBUTORS

SPECIAL CONTRIBUTORS

Dave Hardy is a contributing editor to *Microsystems* magazine. He is also a freelance computer consultant and writer.

Carl Helmers is a prominent computer consultant and president of North American Technology in Peterborough, NH, which publishes *Robotics Age, Barcode,* and *Sensors.* He was founding editor of *Byte* magazine.

Seymour Papert, professor of mathematics and education at the Massachusetts Institute of Technology, is the designer/creator of *Logo.* He is co-founder, with Marvin Minsky, of M.I.T.'s Artificial Intelligence Laboratory. He has two Ph.D.s in mathematics—from the University of Witwatersrand, in South Africa, and Cambridge University. His book, *Mindstorms,* is widely considered the best study of the role of computers in education published to date.

Jerry Pournelle, a best-selling writer of science and science fiction, is the author of *Byte* magazine's monthly "User's Column." He is one of the preeminent computer writers in the United States. In past years, he has earned a Ph.D. in psychology, taught history at the college level, and been an engineer with the National Aeronautics and Space Administration.

Peter Runciman is the pseudonym of a prominent computer-magazine editor living in New York City. We regret that his professional commitments do not permit us to acknowledge his contributions under his real name but are certain that his graceful writing and thorough knowledge of public-domain software will make him instantly recognizable to computer cognoscenti.

SENIOR CONTRIBUTORS

Mark Andrews is a free-lance computer writer living in the New York area. He is now writing his fifth book about microcomputers.

Steven C. Fox is copy chief of *Omni* magazine. A resident of New York City, he is a long-time Apple II user.

Gregory R. Glau is business columnist for *inCider* magazine and has over 125 fiction and non-fiction pieces in print. He recently published a book on Apple software called *Business Power for Your Apple,* and has two others in production.

Larry Hewin and **Duane Saylor** are general partners of Volks Micro Computer and Volks-80 Software in Williamsburg, VA. They are free-lance computer writers specializing in TRS-80 hardware and software. Hewin has written *Desktop Computing*'s "Issues and Answers" column.

Chip Hilts is a vice-president of Computer Services for a major West Coast bank. He has published two programs and his clients include many Silicon Valley companies. An expert on integrated software and investment packages, Hilts reviewed the *Lotus 1-2-3* and *Symphony* programs among many others.

Scott Kariya writes feature stories for *PC* magazine and was a contributor to the *Omni Online Database Directory.* An evaluator of software business packages, Kariya covers the development of personal computers in the business field.

Gary Keenliside, a free-lance small systems consultant and writer, has been a computer specialist for over 20 years. His experience in engineering, programming, technical writing, and sales ranges from military data systems to microcomputers.

Wes Lewis is a free-lance computer writer and a software-development specialist for a major computer company. He writes a monthly column for *Personal Computer Age* magazine and reviewed many of the MS-DOS programming languages and utilities covered by this catalogue.

Michael Nadeau is editor-in-chief of *HOT CoCo* magazine, which supports the Radio Shack Color Computer and has been Senior Editor at 80 Micro, the leading TRS-80 publication. For this volume, he evaluated many software packages for the TRS-80 series.

Theodore Needleman is a practicing accountant and a principal in the computer consulting firm, Idea Technology. He is Lecturer at the Academic Computer Center at Queens College CUNY. He is the author of *Microcomputers for Accountants* (Prentice-Hall 1983) and is preparing two books on database management.

Tim Onosko is a frequent contributor to *Omni* magazine. He is the author of a best-selling book on the

Commodore 64 and has written hundreds of articles on technology and popular culture.

Robert V. Price, Ph.D is director of educational computing at Texas Tech University and serves as contributing editor for *Educational Computer* magazine. He is the author of *How to Use Your Apple II and IIe* (Dilithium Press).

Robert Rivlin is editor of *Broadcast Management/ Engineering* magazine and is author of *Deciphering the Senses: The Expanding World of Human Perception* (Simon & Schuster, 1984) and the upcoming *Computer Graphics: A Mirror Up to Nature.* Rivlin evaluated over 50 graphics packages for this book.

David Fay Smith is an information-industry consultant and writes a regular column of computer book and software reviews for *Publishers Weekly.* He is the author of *A Computer Dictionary for Children and Other Beginners* (Ballantine, 1984). His reviews of *Run for the Money, Superbunny, Fund-It, Letterform 1000, Programming Your Apple, Songwriter, Word Attack, Infidel, Story Tree, Dancing Feats,* and *Homeword* first appeared in altered form in *Publishers Weekly.*

Gary and **Scott Smith** are general partners of Agriware Publications, which publishes the *Agricultural Software Directory* in separate editions for the Apple and for IBM and CP/M and the *Commodity Software Directory* for the Apple. Together they have written four books on farm computing.

M. David Stone is a science and computer writer and a computer consultant. He is the author of *Getting the Most from WordStar and Mailmerge: Things MicroPro Never Told You* and *Getting On-Line: A Guide to Accessing Computer Information Services.*

Peter Tyson is an editorial assistant with the book division of *Omni* magazine. He served as project coordinator for this book and reviewed packages in the fields of personal software and home entertainment.

CONTRIBUTORS

Rowland Archer, Jr., is software development manager for a Fortune 500 company. His special interests include writing, programming, and the use of microcomputers by professionals.

Andrew Berger is music director of WNYC-FM, New York. He writes software for Atari computers and is currently at work on a study of new developments in electronic and computer music.

James I. Block is an attorney and free-lance computer consultant. He has over nine years' experience in the design and development of software intended for lawyers and other nontechnical business people.

Frank Bolton is a free-lance writer and the coordinator of the new-users special interest group of the NY IBM Personal Computer Users Group. The reviewer of the disk magazine section in this book, Bolton also writes for *PC* magazine and other computer publications.

Marvin J. Cohen is president of MJC Consulting Associates, Inc., a New York-based accounting systems consultancy. He is a graduate of the Harvard Business School and a member of the American Institute of Certified Public Accountants.

James Creane has been a contributing editor to *Personal Computer Age* for three years. He lives in New York, where he works as a software engineer for a major computer manufacturer and as a free-lance consultant.

Jean Crichton is a free-lance writer in New York. She specializes in computer books, software, and contemporary culture. Her profiles of computer executives and celebrities frequently appear in *Publishers Weekly.*

Dr. Matthew Cushing is a practicing internist in Andover, Massachusetts. He is a hardware hacker and has taught himself five computer languages. He reviewed several medical packages.

Jennifer C. De Jong is senior copy editor of *PC* magazine. She frequently evaluates computer software in the educational and word-processing areas.

Steven Erde is an inveterate hacker and a part-time reviewer of both software and hardware. In moments away from his Apple, he has earned a Ph.D. in anatomy from Columbia University and is now a medical student at Cornell University.

Deborah Gobert is a financial consultant specializing in computerized corporate planning and micro-

computer-based financial management systems. She was formerly a vice-president at a major New York bank.

David Grayson has been writing in the investment field for nearly 20 years. He is an associate at a major New York research house, where he oversees the use of computers in stock analysis.

Joseph A. Greenleaf is an attorney in Jackson, Michigan. He has been published widely on computers and is now writing a book on computers and law. His review of *ESQ-1* originally appeared in the *National Law Journal*.

Daniel E. Harmon and **Sarah R. Wilkins** are managing editor and administrative assistant, respectively, of *The Lawyer's PC* and *The Lawyer's Microcomputer*, newsletters for attorneys using IBM and Radio Shack computers. Their review of *Immigration Program* originally appeared in *The Lawyer's Microcomputer*.

Mark Hilts is a professional programmer and systems analyst working for a Chicago food service equipment company.

Michael Hilts is a writer and editor currently working for Petersen Publishing Company. Working with Radio Shack and IBM computers, he has been a part-time computer consultant for five years.

Paul Hilts is managing editor of *Omni* magazine. Also a free-lance writer, he specializes in the evaluation of entertainment and word-processing software.

Kenneth Jackson is president of Micro Business Systems, a computer consultancy in Livonia, MI. He frequently evaluates computer hardware and programs for *Microsystems* magazine.

Jeff Jacobson is president of Frontier Computing, a consulting firm in Logan, UT. He is a free-lance programmer and reviewer.

Christopher Johnson studies mathematics and computer science at Utah State University. He is owner of United Software House Co., a software marketing firm in Illinois.

Berry Kercheval is a senior software engineer with the Computer Systems Technology group at Zehntel, Inc., in Walnut Creek, CA. He is a member of IEEE and ACM.

William J. Lynott is a full-time management consultant and free-lance computer writer. He writes frequently on word-processing and database software.

Clement J. McDonald, M.D., is professor of medicine at Indiana University School of Medicine, director of computer science Research at the Regenstrief Institute for Health Care, and a practicing internist. His reviews of *Micro Med* (Ver. 3.1), *Physician's Office Computer* (Ver. 2.3), and *Patient Accounting System* (Ver. 1.91) originally appeared in altered form in *M.D. Computing* magazine (October, 1983).

Howard A. Marks is an engineer for Pro-Comp Systems, Inc., in New York City and a free-lance computer writer. He is now completing his first book, about the TurboDOS operating system.

Carolyn J. Mullins is visiting associate professor in both the English department and the Computer Center at Virginia Polytechnic Institute and State University. Her latest book is *Harnessing Information Technologies* (Prentice-Hall, 1984, coauthored with Thomas West).

Mark Nichols is a free-lance computer writer living in New Jersey. He specializes in software for the Atari computers.

William O'Brien writes monthly columns for *A+* and *InCider* magazines and is a free-lance writer for *PC* magazine. He is the author of the upcoming books, *Macintosh Survival Manual* and *Apple IIc Survival Manual* (Bantam, 1984).

Charles Raisch is a system operator/consultant for a private network of portable-computer enthusiasts and has written for a wide variety of general-interest magazines as well as for the *Columbia Journalism Review* and the *Pacific News Service*.

John A. Records is a contributing editor of *The Lawyer's Microcomputer* and *The Lawyer's PC*. He is a member of the New York and Oregon Bars and formerly was adjunct professor at the University of Oregon School of Law. His reviews of *Lazy Law*, *Respa Resolver*, *ESTAX*, and *MCI* originally appeared in altered form in either *The Lawyer's Microcomputer* or *The Lawyer's PC*.

Arthur Salsberg is publisher of the forthcoming magazine *Modern Electronics*. He was formerly ed-

itorial director of *Computers and Electronics* magazine.

Peter Sims is a practicing attorney and a reviewer of computer software for law offices. Living in New York City, he wrote reviews of legal software for this volume.

Jan Werner is a computer consultant and president of Jan Werner Data Processing, a firm specializing in survey research.

Robert P. Wilkins is an attorney and a frequent lecturer on law office computerization. He is editor of two legal newsletters, *The Lawyer's PC* and *The Lawyer's Microcomputer,* and the author of *Drafting Wills and Trust Agreements: A Systems Approach.* Wilkins's reviews of *Estate Tax Plan* and *CAL-Q-TAX* first appeared in altered form in *The Lawyer's PC.*

COMPATIBILITY INDEX

Use index that follows to find the page number for individual reviews.

APPLE

Accounting
Bookkeeping
Books!-The Electric Ledger
Hardisk Accounting Series
Infotory
Inventory Manager
Invoice Factory
Multi-tool Financial Statement
Payroll
Payroll Manager
Peachtree Series 40 A/P
Peachtree Series 40 A/R
Peachtree Series 40 G/L
Practical Accountant
Supertax 1, 2, 3
Tax Preparer

Databases
BIMS (Business Information Management System)
Bookends: Reference Management System
Delphi's Oracle
Keystroke
Magic Memory
NPL
pfs:report
Quick-Search Librarian
The Data Factory
The General Manager
The Mini Factory
Versaform
VisiFile

General Business
Asset-Manager
Brainstormer
Managing Your Business with MultiPlan
Managing Your Business with VisiCalc
Personal Datebook
Property Listings and Comparables
Property Management Systems
Restaurant Profit Analysis
The Landlord
Time Is Money
VisiSchedule

Integrated Software
Appleworks
III E-Z Pieces

Spreadsheet Programs
Desktop Plan III
MagiCalc
PROOF
Senior Analyst

Graphics
Alpha Plot
Apple Flasher
Apple II Business Graphics
Apple II Business Graphics
Apple Mechanic
Arbplot
Business Graphics III
Calcu-plot
Combined Enhanced Graphics Software
Copy II
Delta Drawing
Demografix
Dicomedia 1
Enhanced Business Graphics
Face Maker
Font Generator III
Fontrix
Frame-up
Graphical Analysis II
Graphicmaster
Graphics Department
Graphics Wizard
Graphmagic
Graphmatic
Higraph-III
Imaginator
Micro Illustrator
Micro-Painter
Painter Power
Picturewriter
Poor Man's Graphics Tablet
Printographer
Rainbow Graphics
Scientific Plotter
Screen Director
Softslide
Space Tablet/Advanced Space Graphics
Spelling for the Physically Impaired
Strobeview
Surface
Target Image Maker
The Graphic Solution
The Semantic Calculator (SEMCALC)
Type Faces
VisiTrend/VisiPlot
Zoom Grafix

Word Processing
Applewriter III
Bank Street Writer
Cut & Paste
The Executive Secretary
Format II
HomeWord
MacWrite
Magic Window II
Megawriter
pfs:write
PIE Writer
Power Text
Screenwriter II
Superwriter
The Write Choice

Word Processing Accessories
Bulk Mailer
Dic-tion-ary
Electric Webster
The Executive Speller
FCM with Form Letter
Magic Words
Mail List Manager
Megaspeller
Sensible Speller
Wordy

Communications
ADBS
ASCII Express "The Professional"
Datalink
Info-net
MTERM
P-term "The Professional"
P.I.T.S.
Softerm 2
Teletext
Transend 1, 2, 3
VisiLink
VisiTerm

Computer Languages
The Assembler
Beagle BASIC
Macrosoft

Operating Systems
Diversi-DOS
ProDOS
ProntoDOS
UCSD p-System

Utilities
A.M.P. 2.0 (Amper Memory Program)
Amper-Array
Amper-Chart
Ampersoft
Catalyst
Directory Master
Discourse
DOS Boss
Edit-soft
Lexicom 3.0
Linkindex
Linkvideo
Super Disk Copy
The Programmer's Power Tools III
The Routine Machine
Utility City

Agware
AGDISK Corn/Soybean Management Series One
AGDISK Farm Accounting Package
AGDISK Financial Management Series One
AGDISK Machinery Management
AGDISK Swine Management Series One
AG/PAC
Agri-ledger
Agri-Venture's General Ledger
Asset Management
Beef Production Records
Cashbook Management Package
Crop Management
Crop Management Package
Crop Production Records
Crop Profitability Decisions
Cropmaster
Dairy Journal
Dairy Management Package
Dairy Production Records
Decision Series
Farm Accounting Control System (FACS)
Farm Inventory
Farm Ledger
Farm Profitability Decisions

Farm Supplies Management
Field Manager
Financial Management Package
General Ledger
General Ledger
Herbicide Selection Guide
Hog Management Package
Insecticide Selection Guide
Livestock Decision Aids
Livestock Management Decisions
Machinery Management Decisions
Pig Breeding Management Package
Secretary Of Agriculture Herd Audit 2.2
Secretary Of Agriculture Micro-mixer
Swine Herd Management
Swine Production Records
Worksheet

Mathematics/Engineering

Active Circuit Analysis Program
Daisy Professional
Hi-Res Architectural Design
Hi-Res Electronic Design
Mathemagic
Mathematics Series
Micro-cap
Micro-logic
Statistics With Daisy

Investment

Chart Trader Plus
Chartmaster
Commtrac
Dow Jones Market Analyzer
Dow Jones Market Manager
Dow Jones Market Microscope
Dow Jones News & Quotes Reporter
Dow Jones Spreadsheet Link
Market Analyst
Market Maverick
N-squared Market Analyzer
The Permanent Portfolio Analyzer
The Personal Investor
Portware
Real Estate Analyzer
Stock Portfolio System
The Technical Investor
Winning on Wall Street

Legal

Black's Law Dictionary
Estate Tax Plan
Legal Billing

Medical

COPRAM-M
Dental Billing Accounts Receivable
Dental Insurance Form Writer
Medical Billing Accounts Receivable
Medical Office Management
Medical Secretary
Veterinary Billing Accounts Receivable

Education

Africa
Alice in Logoland
Antonym Antics
Barron's Computer SAT Study Program
Bibliography Writer
CARIS
CBS: Mastering the SAT
Compu-read
Compu-spell
Computer Discovery
Computer Math Games
Computer Power
Daily Living Skills: Classified Ads
Decimals
Eduware SAT Word Attack Skills
Ernie's Quiz
Fraction Fever
German Vocabulary Drill
Gertrude's Puzzles
Grade Book II
Hail To The Chief
Hands On Basic
HBJ: Computer SAT
Heartbeat/Heartworks/Heartflow
Hey Diddle Diddle
How to Program in the BASIC Language
How to Read in the Content Areas
Instant Zoo
Introduction to General Chemistry
Kindercomp
KRELL
Library Skills
What's There And How
Lincoln's Decisions
Map Reading
Mastertype
Milliken Math Sequences
Mind Bend
Mix and Match
Mother Goose Rhymes
PDI: Preparing for the SAT
Readability Index
Reading and Thinking
Rendezvous
Report Card
Robot War
SAT English Skills
SAT Word Attack Skills
Science Volume 3
Simulated Computer
Soccer Math
Songwriter
Spanish for the Traveler
Speed Reader II
Spotlight
Sticky Bear Series
Story Tree
Study Quiz Files
Super Quiz II
The Function Game
The Money Manager
Troll's Tale
Tutoprogram: Mechanics of English
Typing Teacher
Typing Tutor
U.S. Constitution Tutor
Word Attack

Entertainment

Archon
Axis Assassin
Bat-Stat
Canyon Climber
Castle Wolfenstein
Choplifter
Crush, Crumble And Chomp
David's Midnight Magic
Drol
Flight Simulator II
Guardian
Hard Hat Mack
Hi-Res Computer Golf 2
Infidel
Lode Runner
M.U.L.E.
Monty Plays Scrabble
Music Construction Set
Music Maker
Mystery Master: Murder by The Dozen
Night Mission Pinball
Pinball Construction Set
Pooyan
Seafox
SAM (Software Automatic Mouth)
VC
Wizardry: Knight of Diamonds
Wizardry: Legacy of Llylgamyn
Wizardry: Proving Ground of the Mad Overlord
Zork I, II and III

Home Management

The Family Budget
The Home Accountant Plus
Micro Cookbook
Micro-Atlas
Money Maestro
Money Street
Personal Finance Master
Roadsearch; Roadsearch-Plus
Tax Manager
The Einstein Memory Trainer
The Pizza Program
The Tax Advantage
Time Is Money

Disk Magazines

A+ Disk Magazine
Microzine
Softdisk
Window

ATARI

Databases

Delphi's Oracle

Graphics

B/graph
Delta Drawing
Face Maker
Micro Illustrator
Micro-Painter
PM Animator

The Semantic Calculator (SEMCALC)

Word Processing

Bank Street Writer
PIE Writer

Communications

Chameleon
T.h.e. Smart Terminal
Telelink I, Telelink II
TSMART

Computer Languages

Action

Utilities

ABC, Makeboot
Monkey Wrench II
The Computer Mechanic

Education

Africa
Computer Discovery
Easy Grader
Hail To The Chief
HBJ: Computer SAT
Hey Diddle Diddle
How to Program in the BASIC Language
How to Read in the Content Areas
Kids On Keys
Kindercomp
KRELL
Lincoln's Decisions
Mastertype
Milliken Math Sequences
PDI: Preparing for the SAT
SAT English I
Simulated Computer
Songwriter

Entertainment

Archon
Axis Assassin
Blue Max
Canyon Climber
Castle Wolfenstein
Choplifter
Crush, Crumble And Chomp
Dancing Feats
David's Midnight Magic
Drol
Encounter
Flight Simulator II
Guardian
Hard Hat Mack
Infidel
Jumpman
Lode Runner
M.U.L.E.
Music Composer
Music Construction Set
Necromancer
Night Mission Pinball
Pinball Construction Set
Pooyan
Seafox
SAM (Software Automatic Mouth)
Story Machine
The Drumesiser
Up For Grabs
Worms?
Zork I, II and III

Home Management

A Financial Wizard
The Home Accountant Plus
The Model Diet
The Tax Advantage

COMMODORE

Accounting

Supertax 1, 2, 3

Databases

Delphi's Oracle
Mini-Jini

General Business

Timemoney Manager

Spreadsheet Programs

Calc Result
Omnicalc

Graphics

Chartpak-64
Delta Drawing
Doodle
Face Maker
Micro Illustrator

Word Processoring

Easy Script
Paperclip Word Processor
PIE Writer
Quick Brown Fox
Skiwriter II
Wordpro 3 Plus/64

Communications

Autoterm 20
Autoterm 64
Easycomm 64
Term 64
Victerm 1
Victerm 40

Computer Languages

Logo (Commodore)
Pilot (Commodore)
Simons' BASIC
Ultrabasic-64
VIC FORTH

Utilities

Hesmon
The Computer Mechanic

Education

Africa
Alphabet Zoo
Barron's Computer SAT Study Program
CBS: Mastering the SAT
Fraction Fever
HBJ: Computer SAT
Hey Diddle Diddle
How to Program in the BASIC Language
How to Read in the Content Areas
I Am the Commodore 64, Volumes 1–6
Jigsaw
Jinx
Kids On Keys
Kindercomp
Krell
Lincoln's Decisions
Mastertype
Milliken Math Sequences
Mind Bend
SAT English I
Songwriter
Speed Reader II
Story Tree
Word Attack

Entertainment

Archon
Axis Assassin
Benji's Space Rescue
Blue Max
Castle Wolfenstein
Choplifter
Crush, Crumble And Chomp
Dancing Feats
David's Midnight Magic
Drol
Flight Simulator II
Hard Hat Mack
Infidel
Jumpman
Lode Runner
M.U.L.E.
Music Construction Set
Music Machine
Musicalc
Mystery Master: Murder by the Dozen
Necromancer
Night Mission Pinball
Pinball Construction Set
Pogo Joe
Seafox
SAM (Software Automatic Mouth)
Story Machine
Up For Grabs
Worms?
Zork I, II and III

Home Management

The Complete Personal Accountant
Easy Finance
The Home Accountant Plus
The Model Diet
Money Processor
The Tax Advantage

CP/M-80

Accounting

Accounting Plus PC
BOOKS! The Electric Ledger
The Champion
Client Ledger System
Client Manager
Cyma Accounting Software
MBA Accounting Series
Microtax
Multi-Tool Financial Statement
Peachtree Series 40 Accounts Payable
Peachtree Series 40 Accounts Receivable
Peachtree Series 40 General Ledger

Peachtree Series 8
Quick-tax
The Software Fitness Program
Supertax 1, 2, 3
The Tax Machine

Databases
Abstat
Autocode
Dataflex
dBase II
Dbase Window
dBplus
DGraph
sPatch
dProgrammer
dUtil
Fastbase
Formula II
Infostar
Personal Pearl
Quickcode
Sci-Mate Personal Data Manager
TIM

General Business
Brainstormer
Field Companion
Planfin
Profin
Property Listings and Comparables

Integrated Software
T/maker III

Spreadsheet Programs
CalcStar
Microplan
Plan80
SuperCalc
SuperCalc 2
SuperCalc3

Graphics
dGraf
DR Graph
Graphmagic
Graphmatic
Ugraf

Word Processoring
Newword
Peachtext
Spellbinder
Superwriter
VEDIT
Wordmaster
WordStar
WRITE

Word Processing Accessories
Microspell
Perfect Speller
Spellguard
Spellstar

Communications
ASCOM
Benchmark Telecommunications Program
Conect
Crosstalk
Crosstalk XVI
Micro Link II
Mite
Move-it
Sci-Mate Universal Online Searcher
Smartcom II
Softcom
Telpac
Z-Term "The Professional"

Computer Languages
BASCOM
Databus Compiler
Fortran IV (supersoft)
Microsoft Cobol
Pascal (Alcor)
Pascal (Turbo)
Pascal (UCSD)
Polyforth Level 2
RM/Cobol

Operating Systems
TurboDOS

Utilities
Active Trace
Disk Fix
Display Manager
Fast Sort
Microshell

Agware
Ag-finance 4.0
Crop Management
Cropmaster
Farm and Ranch Accounting System
FAS-1000
Farm Supplies Management
Financial Manager
Herdstar
Secretary Of Agriculture-Transaction

Mathematics/Engineering
Mathemagic

Legal
Estate Tax Plan

Medical
Medical Manager
Micro Med
Patient Accounting System
Physician's Office Computer

Entertainment
Zork I, II, and III

Home Management
The Home Accountant Plus
Money Maestro
Roots/m Plus

Freeware
Adventure
Algol/M
Basic-e
Comm723
Craps
DIMS (Dan's Information Management System)
ED
EDITM
FIG-FORTH
Forth11
ICE (In-Context Editor)
Keno
Lawrence Livermore BASIC
Lisp
Lunar Lander
Modem712
Pascal Compiler
Pidgin
Pilot
POW (Processor of Words)
ROFF4
SAM76
SD-44
Star Trek
TED
Tincomp
Tinidisk
Top (Text Output Processor)
UNIX Spelling Checker
XLISP
Xmail

CP/M-86

Databases
Abstat
Autocode
Dataease
Dataflex
dBase II
dBase Window
dBplus
dGraph
dProgrammer
dUtil
Fastbase
Formula II
InfoStar
Knowledgeman
Personal Pearl
Quickcode

Integrated Software
T/Maker III

Graphics
dGraf
DR Graph
Softplot/BGL

Word Processoring
Newword
Spellbinder
Superwriter
VEDIT
Wordmaster
WordStar

Word Processing Accessories
Microspell
SpellStar

Communications
ASCOM
Benchmark Telecommunications Program
Crosstalk
Crosstalk XVI
Micro Link II

Mite
Move-It

Computer Languages

BASCOM
C (Digital Research)
C (Lattice/Microsoft)
C86
Fortran (Digital Research)
Fortran IV (Supersoft)
Pascal (Turbo)
Polyforth Level 2
RM/Cobol

Operating Systems

Concurrent Cp/m
CP/M-86
UCSD p-System

Utilities

8086/8088 Utilities
Display Manager

Agware

Farm Supplies Management

Medical

Medical Manager
Micro Med
Patient Accounting System

Freeware

SD-48b
Small C Compiler

PC-DOS/MS-DOS

Accounting

Accounting Plus PC
Bookkeeping
BOOKS!—The Electric Ledger
BPI Accounting Software
The Business Library
The Champion
Client Ledger System
Client Manager
Cyma Accounting Software
General Ledger (State of the Art)
Hardisk Accounting Series
Infotory
Inventory Manager
Jewel
MBA Accounting Series
Microtax
Multi-Tool Financial Statement
Payroll
Peachtree Series 40 A/P
Peachtree Series 40 A/R
Peachtree Series 40 G/L
Peachtree Series 8
The Profit Center
Realworld Accounting Series
The Software Fitness Program
The Tax Machine
Supertax 1, 2, 3
Tax Preparer

Databases

Abstat
Aladin
Autocode
BPI Information Management
Data Ace
Data Design
Dataease
Datakeep
dBase II
dBase Window
dBplus
dGraph
dProgrammer
dUtil
Fast Facts
Fastbase
Formula II
FYI 300
Knowledgeman
Mag/base3
Next Step
PC-File
Personal Pearl
pfs:report
Quickcode
R:Base 4000
Revelation
RL-1
Sci-Mate Personal Data Manager
The Quad
TIM
Versaform
VisiFile

General Business

Agenda
The Bottom Line Strategist
The Desk Organizer
The Landlord
Executive Appointment Secretary
Managing your Business with Lotus 1-2-3
Managing your Business with MultiPlan
Managing your Business with VisiCalc
Perfin
Personal Datebook
Personal Secretary
Property Listings and Comparables
Property Management
Salesminder
Shoebox
The 25th Hour—25:01 Time Scheduler/Organizer
Time Manager
VisiSchedule

Integrated Software

DESQ
Jack 2
Series One Plus
Starburst
Symphony
T/maker III
The Idea Processor
VisiOn

Spreadsheet Programs

CalcStar
EasyCalc
Easyplanner
Micro/Prophit
Microplan
Number Cruncher
Perfect Calc
Plan80
Planstar
Proof
Report Manager
SuperCalc
SuperCalc 2
SuperCalc 3
Target Financial Modeling
VisiCalc
VisiCalc IV

Graphics

4-point Graphics
Artist
Banner Builder
Benchmark Graphics
Big Print
Bps Business Graphics
Cadplan
Data*Easy Bar Graph Generator
Delta Drawing
dGraf
Dicomedia 2
DR Graph
Energraphics
Enhanced Business Graphics
ES Painter
Executive Picture Show
Face Maker
Grafmatic
Graphics Mantus
Graphics Utility
Graphmagic
Graphmatic
Graphplan
Graphwriter
Higraph-III
Keychart
Micro Illustrator
PC Crayon
PC Draw
Peachtree Business Graphics System
Pixon
Softplot/BGL
Space Tablet/Advanced Space Graphics
Strobeview
Type Faces
uGraf
Videog[illegible]h
VisiGraph
VisiTrend/VisiPlot
Word-Plot

Word Processoring

Bank Street Writer
Easywriter 1.1
Easywriter II
MSCRIPT
Newword
Peachtext
Personal Wordperfect
Pfs:write
PIE Writer
Power Text
Proofwriter
Quick Brown Fox
Qwerty
Spellbinder
Superwriter
VEDIT

VisiWord
VisiWrite
Volkswriter
WordPerfect
Xywrite II

Word Processing Accessories

Bulk Mailer
Ddplus
Electric Webster
FCM with Form Letter
Footnote
Letterform 1000
Microspell
Perfect Speller
Spell-It
Spellguard
Spellstar
Textplus
VisiSpell

Communications

ASCOM
Benchmark Telecommunications Program
Crosstalk
Crosstalk XVI
Filetran
Interlync
Micro Link II
Mite
Move-It
MTERM
P-Com
PC-talk III
PC/Intercomm
Plato Access Disk
Sci-Mate Universal Online Searcher
Smartcom II
Smarterm/PC
Telpac
Transend/pc
Visilink

Computer Languages

APL (IBM)
APL*/Plus/PC
Baby/34
BASCOM
C (Desmet)
C (Digital Research)
C (Lattice/Microsoft)
C86
Databus Compiler
Dr. Logo
Forth-32
Fortran (digital Research)
Fortran (Microsoft)
Fortran IV (Supersoft)
IBM PC BASIX 2.0
IBM PC Macro Assembler
Logo (IBM PC)
Microsoft Cobol
MMS FORTH
Pascal (Turbo)
Pascal (UCSD)
Pc Logo
Polyforth Level 2
RM/Cobol

Operating Systems

PC/IX
QNX

Utilities

8086/8088 Utilities
Active Trace
Autosort/86
C Tools
C Tools 2
California 10 Pak
Cross Reference Utility (CREF)
Diagnostics II
Diskette Librarian
Diskette Manager
Display Manager
FABS/PC
Fast Sort
Keynote
Opt-Tech Sort
Pascal Tools
Pascal Tools 2
Peeks 'n Pokes for the IBM PC
ProKEY
Qusort
Sideways
Spacemaker
System-backup
The Computer Mechanic
The Norton Utilities
V-utility

Agware

AGDISK Corn/Soybean Management Series One
AGDISK Farm Accounting Package
AGDISK Financial Management Series One
AGDISK Swine Management Series One
Agri-Ledger
Asset Management
Cashbook Management Package
Crop Management
Crop Management Package
Cropmaster
Dairy Journal
Dairy Management Package
Decision Series
Farm Accounting Control System (FACS)
Farm Inventory
Farm Ledger
Farm Supplies Management
Field Manager
Financial Management Package
General Ledger
Herbicide Selection Guide
Herdstar
Hog Management Package
Livestock Decision Aids
Pig Breeding Management Package
Secretary of Agriculture—Transaction
Secretary of Agriculture—micro-mixer
Worksheet

Mathematics/Engineering

Mathemagic
Mathematics Series
Micro/Cap
Micro-DSS/Analysis
Micro-Logic
PC/Calculator

Investment

Chartmaster
Commtrac
Dow Jones Market Analyzer
Market Analyst
Market Maverick
N-Squared Market Analyzer
The Permanent Portfolio Analyzer
The Personal Investor
Portware
Quikcalc Real Estate Investor
Real Estate Analyzer
Secretary Of Agriculture—Market Window
Stock Portfolio System

Legal

Estate Tax Plan
Estax
Individual Tax Planner
Inmagic
Legal Billing

Medical

Medical Secretary
Patient Accounting System

Education

Barron's Computer SAT Study Program
CBS: Mastering the SAT
Fraction Fever
Friendly Arcade
Friendly Intro
HBJ: Computer SAT
Hey Diddle Diddle
Kindercomp
KRELL
Mastertype
PC Pal
PC Tutor
SAT English I
Songwriter
Spanish For The Traveler
Speed Reader II
States 'n Caps
Story Tree
The Executive Package
The Instructor
Word Attack

Entertainment

Dancing Feats
Flight Simulator
Gridstar
Infidel
Lode Runner
Music Construction Set
Mystery Master: Murder by the Dozen
Night Mission Pinball
Psyche
Rogue
Zork I, II and III

Home Management

Financier Personal Series
The Home Accountant Plus

Home Budget Program
Home Finance Program
Micro Cookbook
The Model Diet
Money Command
Money Maestro
Personal Computer/Personal Financial Program
Personal Finance Master
The Tax Advantage

Freeware

ATTACK.BAS
DBMS
Epistat
FORTH
FORTH (Basic Version)
FORTH (Mountain View Press)
Kermit
MDM71.com
PC-File
PC-Write
SDIR

Disk Magazines

I.B. Magazette
JR's Magazette
Mentor . . . The Magazine on Disk
PC Disk Magazine
PC Firing Line
PC Underground
PC-Demo

RADIO SHACK

Accounting

Bookkeeping
General Ledger
Payroll
Supertax 1, 2, 3

Databases

Color Profile
Data-Writer
ENB
Filmastr
Flexi Filer
Pascal Data Base System
Pro-Color-File
Profile III+
Superlog

General Business

Brainstormer
Business Checkwriter
General Ledger
Property Listings and Comparables

Spreadsheet Programs

Elite-Calc

Graphics

Business Graphic Pak
Computer (Hi-Resolution) Graphics
Graphics Enhanced BASIC
Higraph-III
Powerdraw
The Semantic Calculator (SEMCALC)
XCEL Graphics

Word Processoring

Color Scripsit
Copyart III
LeScript
MSCRIPT
Newscript
PIE Writer
Superscripsit
Telewriter-64
Zorlof

Word Processing Accessories

Electric Webster
Powerdriver
Powermail Plus
Powerscript
Scriplus
Spell 'n Fix II

Communications

MTERM
Omniterm

Computer Languages

BASICO9
LC
M-Zal Macro Assembler
MMS FORTH
Pascal (Alcor)
Pascal-80
RM/Cobol
RSbasic
Snapp BASIC

Operating Systems

MultiDOS
TRSDOS

Utilities

Arranger I, Arranger II
The Basic Answer
Beyond-BASIC
Disk Index
Driver Compiler
EDAS
Filter Disk 1
Partitioned Data Set
Super Utility Plus
Trackcess

Agware

Asset Management
Crop Profitability Decisions
Cropmaster
Farm Inventory
Farm Profitability Decisions
Farm Supplies Management
General Ledger
Insecticide Selection Guide
Livestock Decision Aids
Livestock Management Decisions
Machinery Management Decisions
RedWing's General Ledger
Secretary of Agriculture—Transaction
Secretary of Agriculture—Dairy Diary
Secretary of Agriculture—Micro-Mixer
Secretary of Agriculture—Sow Audit 2.2

Investment

Chartmaster
Commtrac
Market Window
Secretary of Agriculture—Market Window

Legal

Estax
Immigration Program
Lazy Law
Respa Resolver

Engineering Mathematics

Statistical Analysis

Medical

Medical Office System

Education

Africa
Bibliography Writer
Computer Discovery
Country Guess
Early Games for Young Children
Essential Mathematics
Hail to the Chief
HBJ: Computer SAT
How to Program in the BASIC Language
How to Read in the Content Areas
K-8 Math Program
KRELL
Lincoln's Decisions
Milliken Math Sequences
Moptown Hotel
Moptown Parade
Readibility Index
Simulated Computer
Talking Speller
Typing Tutor

Entertainment

Battle of Gettysburg
Buzzard Bait
Canyon Climber
Fembot's Revenge
Gridstar
Guardian
Infidel
Monty Plays Monopoly
Monty Plays Scrabble
Mudpies
Pooyan
Robottack
Supreme Ruler Plus
Time Runner

Home Management

Bio-Detector
The Home Accountant Plus
Koupon Keeper
Master Mixologist
Tayllymaster

OTHER COMPUTERS/ OPERATING SYSTEMS

Accounting

Hardisk Accounting Series
Infotory
Microtax

Databases
Pascal Data Base System

General Business
Executive Appointment Secretary
Managing your Business with MultiPlan
Managing your Business with VisiCalc
Perfin
Salesminder

Integrated Software
DESQ

Graphics
Artgraphics
BPS Business Graphics
Chartgraphics
Ed-a-Sketch
Enhanced Business Graphics
Graphplan
HP-85 Business Graphics
Keychart
Osboard 1
Osbrief
Osgraph
Peachtree Business Graphics System
Strobeview
Videograph
Viewer
VisiTrend/VisiPlot
Wordgraphics
XCEL Graphics

Word Processoring
MSCRIPT
Wordperfect

Word Processing Accessories
Spell-it
VisiSpell

Communications
Filetran
MTERM
Talk

Computer Languages
Pascal (UCSD)

Operating Systems
UCSD p-System

Utilities
The Computer Mechanic

Agware
Cashbook Management Package
Crop Management
Crop Management Package
Cropmaster
Dairy Management Package
Farm Supplies Management
Financial Management Package
Pig Breeding Management Package
Secretary of Agriculture-Transaction

Legal
Inmagic

Medical
Micro Med
Patient Accounting System
Physician's Office Computer

Education
Computer Discovery
How to Program in the BASIC Language
KRELL

Education
Dancing Feats

Home Management
The Home Accountant Plan
The Model Diet

Freeware
68000 Forth

INDEX

A+ Disk Magazine, 418
ABBS (Apple Bulletin Board System), 193
ABC, 262
A.M.P. 2.0 (Amper Memory Program), 262
Abstat, 66
Accounting Plus PC, 10
Action, 224
Active Circuit Analysis Program, 304
Active Trace, 262
Adventure, 412
Africa Parts One and Two, 341
Ag-Finance 4.0, 288
AG/PAC, 289
Agdisk Corn-Soybean Management Series One, 287
Agdisk Farm Accounting Package, 287
Agdisk Financial Management Series One, 287
Agdisk Machinery Management Series One, 288
Agdisk Swine Management Series One, 288
Agenda, 71
Agri-Ledger, 289
Agri-Venture's General Ledger, 289
Aladin, 39
Algol/M, 413
Alice In Logoland, 342
Alpha Data Base Manager II, 88
Alpha Plot, 112
Alphabet Zoo, 342
Amper-Array, 263
Amper-Chart, 263
Ampersoft, 264
Antonym Antics, 342
APL (IBM), 224
APL*Plus/PC, 225
Apple Flasher, 112
Apple II Business Graphics, 113
Apple II Business Graphics, 116
Apple Mechanic, 112
Appleworks, 88
Applewriter III, 147
Applointments, 331
Arbplot,113
Archon, 371
Arranger I, 264
Arranger II, 264
Artgraphics, 114
Artist, 114
ASCII Express "The Professional," 194
Ascom, 195
Assembler, The, 226
Asset Management, 290
Asset-Manager, 72
Attack.Bas, 413
Autocode, 66
Autosort/86M, 265
Axis Assassin, 371

B/Graph, 115
Baby/34, 226
Bank Street Writer, 148
Banner Builder, 115
Barron's Computer SAT Study Program, 343
Bascom, 226
Basic Answer; The, 40
Basic-E, 415
Basicoq, 227
Bat-Stat, 372
Battle of Gettysburg, The, 372
Beagle Basic, 228
Beef Production Records, 290
Benchmark Graphics, 115
Benchmark Telecommunications Program, The, 196
Benji's Space Rescue, 372
Beyond-Basic, 228
Bibliography Writer, Version 4.0, 343
Big-Print, 145
BIMS (Business Information Management System), 41
Bio-Detector, 395
Black's Law Dictionary, 322
Blue Max, 373
Bookends: Reference Management System, 41
Bookkeeping, 11
Books! - The Electric Ledger, 12
Bottom Line Strategist, The, 72
BPI Accounting Software, 12
BPI Information Management, 42
BPS Business Graphics, 116
BPT, 73
Brainstormer, 74
Bulk Mailer, 179
Business Checkwriter, 74
Business Graphics III, 118
Business Graphics Pak, 117
Business Library, The, 14
Buzzard Bait, 373

C (Desmet), 229
C (Digital Research), 229
C (Lattice/Microsoft), 229
C Tools, 265
C Tools 2, 265
C86 (Computer Inovations), 230
Cadplan, 118
Calc Result Spreadsheet, 100
Calcstar, 101
Calcu-Plot, 304
California 10 Pak, 265
Canyon Climber, 373
Caris: Computer-Animated Reading Instructional System, 344
Cashbook Management Package, 290
Castle Wolfenstein, 374
Catalyst, 266
CBS: Mastering the SAT, 343
Chameleon, 196
Champion, The, 15
Chart Trader Plus, 311
Chartgraphics, 114
Chartmaster, 311
Chartpak-64, 119
Chopilfter, 374
Client Ledger System, 16
Client Manager, 17
Color Profile, 395
Color Scripsit, 149
Combined Enhanced Graphics Software, 119
COMM723, 416
Commtrac, 311
Complete Personal Accountant, The, 396
Compu-Read 3.0, 344
Compu-Spell, 344
Computer Discovery, 266
Computer (High-Resolution) Graphics, 120
Computer Math Games, 345
Computer Mechanic, The, 267
Computer Power, 345
Concurrent CP/M, 250
Conect, 197
Copram-M, 331
Copyart II, 149
Country Guess, 346
CP/M-86, 413
Craps, 412
Crop Management, 291
Crop Management Package, 291
Crop Production Records, 291
Crop Profitability Decisions, 292
Cropmaster, 292
Cross Reference Utility (CREF), 267
Crosstalk, 197
Crosstalk XVI, 197
Crush, Crumble and Chomp, 374
Cut & Paste, 150
CYMA Accounting Software, 17

Daily Living Skills: Classified Ads, 346
Dairy Journal, 292
Dairy Management Package, 293
Dairy Production Records, 293
Daisy Professional, 304
Dancing Feats, 375
Data Ace, 43
Data Design, 43
Data*Easy Bar Graph Generator, 122
Data Factory, The, 54
Data-Writer, 44
Databus Compiler, 231
Dataease, 45
Dataflex, 45
Datakeep, 46
Datalink, 198
David's Midnight Magic, 375
David Dos II, 250
Dbase Add-Ons, 65
Dbase II, 66
Dbase Window, 68
DBMS, 416
DBplus, 68
DDplus, 179
Decimals, 396
Decision Series, 293

Delphi's Oracle, 47
Delta Drawing, 122
Demografix, 123
Dental Billing Accounts Receivable, 331
Dental Insurance Form Writer, 332
Desk Organizer, The, 75
Desktop Plan III, 101
DESQ, 89
DGRAF, 69
Diagnostics II, 267
Dic-Tion-Ary, The, 189
Dicomedia 1, 123
Dicomedia 2, 123
DIMS (Dan's Information Management System), 415
Directory Master, 268
Discourse, 266
Disk Fix, 268
Disk Index, 268
Diskette Librarian, 268
Diskette Manager, 269
Display Manager, 269
Diversi-Dos, 251
Doodle, 124
DOS Boss, 270
Dow Jones Investment Evaluator, The, 312
Dow Jones Market Analyzer, 312
Dow Jones Market Manager, 313
Dow Jones Market Microscope, 313
Dow Jones News & Quotes Reporter, 314
Dow Jones Spreadsheet Link, 314
Dpatch, 270
Dprogrammer, 69
Dr Graph, 124
Dr Logo, 231
Driver Compiler, 270
Drol, 375
Drumesiser, The, 376
Dutil, 47

Early Games for Young Children, 346
Easy Finance, 397
Easy Grader, 347
Easy Script, 151
Easycalc, 101
Easyplanner, 102
Easywriter 1.1, 151
Easywriter II, 152
Ed, 414
Ed-A-Sketch, 124
EDAS, 271
Edit-Soft, 271
EDITM, 414
8086/8088 Utilities, 272
Einstein Compiler, The, 232
Electric Webster, 179
Elite-Calc, 102
ENB, 47
Encounter, 376
Energraphics, 125
Enhanced Business Graphics, 126
Epistat, 416
Ernie's Quiz, 347
ES Painter, 126
Esq = 1 Computerized Timekeeping and Billing, 323
Essential Mathematics, 348
Estate Tax Plan, 324
Estax, 325
Executive Appointment Secretary, 75
Executive Package, The, 76
Executive Picture Show, 136
Executive Secretary, The, 152
Executive Speller, The, 180

FABS/PC, 265
Face Maker, 348
Family Budget, The, 397
Farm Accounting Control System (FACS), 294
Farm and Ranch Accounting System, FAS-1000, 294
Farm Inventory System, 294
Farm Ledger, 295
Farm Profitability Decisions, 295
Farm Supplies Management, 295
Fast Facts, 48
Fast Sort, 272
Fastbase, 69
FCM With Form Letter, 180
Fembot's Revenge, 377
Field Companion, 76
Field Manager, 296
Fig-Forth, 413
Filetran, 273
Filmastr, 48
Filter Disk 1, 273
Financial Management Package, 296
Financial Manager, 296
Financier Personal Series, 398
Financial Wizard, A, 395
Flexi Filer, 49
Flight Simulator, 377
Flight Simulator II, 377
Font Generator II, 126
Footnote, 181
Format II, 153
Formula II, 49
Forth, 232
Forth (Basic Version), 413
Forth (Mountain View Press), 413
Forth-32, 233
Forth11, 413
Fortran (Digital Research), 233
Fortran (Microsoft), 235
Fortran IV (Supersoft), 234
4-Point Graphics, 127
Fraction Fever, 349
Frame-Up, 127
Friendly Arcade, 349
Friendly Intro, 349
Function Game, The, 349
Fund-It, 315
FYI 3000, 50

General Ledger, 18
General Ledger, 19
General Ledger (State of the Art), 20
General Manager, The, 50
German Vocabulary Drill, 350
Gertrude's Puzzles, 350
Grade Book II, 351
Grafmatic, 128
Graphic Solution, The, 128
Graphical Analysis, II, 128
Graphicmaster, 129
Graphics Department, 129
Graphics Enhanced Basic, 130
Graphics Mantis, The, 130
Graphics Utility, 130
Graphics Wizard, 130
Graphmagic, 131
Graphplan, 131
Graphwriter, 132
Gridstar, 378
Guardian, 378

Hail to the Chief, 351
Hands on Basic, 351
Hard Hat Mack, 379
Hardisk Accounting Series, 20
HBJ: Computer SAT, 352
Heartbeat/Heartworks/Heartflow, 352
Herbicide Selection Guide, 297
Herdstar, 297
Hesmon, 274
Hey Diddle Diddle, 353
Hi-Res Architectural Design, 305
Hi-Res Computer Golf 2, 379
Hi-Res Electronic Design, 305
Higraph-III, 132
Hog Management Program, 297
Home Accountant Plus, The, 398
Home Budget Program, 399
Home Energy Opti-Mi$er, 400
Home Finance Program, 400
Homeword, 154
How to Program in the Basic Language, 400
How to Read in the Content Areas, 401
HP-85 Business Graphics, 133

I Am the C-64, Volumes 1-6, 353
I.B. Magazette, 419
IBM PC Basic 2.0, 235
IBM PC Macroassembler, 236
ICF (In-Context Editor), 414
Idea Processor, The, 90
Imaginator, 133
Immigration Program, 325
Individual Tax Planner, 325
Infidel, 379
Info-Net, 198
Infostar, 51
Infotory, 21
Inmagic, 326
Insecticide Selection Guide, 298
Inside Track, The, 274
Instant Zoo, 353
Instructor, The, 354

Integrator, The, 90
Interlync, 199
Introduction to General Chemistry, 354
Inventory Manager, 22
Invoice Factory, 22

Jack 2, 91
Jewel, 23
Jigsaw, 354
Jinx, 355
Jr's Magazette, 420
Jumpman, 380

K-8 Math Program, 355
Keno, 412
Kermit, 417
Keychart, 134
Keynote, 275
Keystroke, 52
Kids on Keys, 356
Kindercomp, 356
Know Your Client, 76
Knowledgeman, 52
Koupon Keeper, 401
Krell, 356

Landlord, The, 76
Lawrence Livermore Basic, 413
Lazy Law, 327
LC, 236
Legal Billing, 327
Legal Office Manager, The, 328
Lescript, 155
Letterform 1000, 181
Lexicom 3.0, 275
Library Skills, What's There and How to Find It, 357
Lincoln's Decisions, 357
Linkindex, 276
Linkvideo, 276
Lisp, 413
Livestock Decision Aids, 298
Livestock Management Decisions, 299
Lode Runner, 380
Logo (Commodore), 237
Logo (IBM PC), 237
Lunar Lander, 412

M-Zal Macro Assembler, 238
Machinery Management Decisions, 299
Macrosoft, 238
Macwrite, 155
Mag/Base³, 53
Magic Memory, 54
Magic Window II, 156
Magic Words, 182
Magicalc, 102
Mail List Manager, 182
Mailing Label Program, Merge 'n Print, 183
Makeboot, 262
Managing Your Business with Lotus 1-2-3, 77
Managing Your Business with Multiplan, 77
Managing Your Business with Visicalc, 77
Map Reading, 358
Market Analyst, 315
Market Maverick, 316
Market Window, 316
Master Mixologist, 401
Mastertype, 358
Mathemagic, 305
Mathematics Series, 306
MBA Accounting Series, 24
MDM71.Com, 417
Medical Billing Accounts Receivable, 333
Medical Manager, 333
Medical Office Management II, 334
Medical Office System, 334
Medical Secretary, 335
Megaspell, 183
Megawriter, 157
Mentor . . . The Magazine on Disk, 420
Micro Cookbook, 402
Micro Illustrator, 134
Micro Link II, 199
Micro Med, 335
Micro-Cap, 306
Micro-Dss/Analysis, 307
Micro-Logic, 307
Micro-Painter, 135
Micro/Prophit, 103
Microplan, 103
Microsoft Cobol, 239
Microshell, 276
Microspell, 183
Microtax, 25
Microzine, 420
Milliken Math Sequences, 358
Mind Bend, 359
Mini Factory, The, 54
Mini-Jini, 55
Mite, 200
Mix and Match, 359
MMS Forth, 239
Model Diet, The, 402
Modem712, 416
Money Command, 402
Money Maestro, 403
Money Manager, The, 403
Money Processor, 403
Money Street, 404
Monkey Wrench II, 277
Monty Plays Monopoly, 381
Monty Plays Scrabble, 381
Moptown Hotel, 360
Moptown Parade, 360
Mother Goose Rhymes, 360
Move-It, 201
Mscript, 158
Mterm, 201
Mudpies, 381
M.U.L.E.S., 381
Multi-Tool Financial Statement, 26
Multidos, 251
Multiplan, 104
Music Construction Set, 383
Music Machine, 384
Music Maker, 384
Musicalc, 382
Music Composer, 383
Mystery Master: Murder by the Dozen, 385

Nametagr, 277
N-Squared Market Analyzer, 317
Necromancer, 385
Newscript, 158
Newword, 159
Next Step, 55
Night Mission Pinball, 386
Norton Utilities, The, 277
NPL, 56
Number Cruncher, 104

Omniterm, 202
Opt-Tech Sort, 278
Osboard 1, 135
Osbrief, 135
Osgraph, 135
P-Com, 202
P-Term "The Professional", 194
Painter Power, 135
Paperclip Word Processor, 159
Partitioned Data Set, 278
Pascal (Alcor), 240
Pascal (Turbo), 241
Pascal Compiler, 413
Pascal Data Base System, 56
Pascal Tools, 265
Pascal Tools 2, 265
Pascal-80, 240
Pascal (Uscd), 242
Patient Accounting System, 336
Payroll, 299
Payroll Manager, 27
PC Crayon, 136
PC Disk Magazine, 422
PC Firing Line, 423
PC Logo, 243
PC Padlock, 278
PC Pal, 360
PC Tutor, 360
PC Underground, 423
PC-Demo, 421
PC-Draw, 136
PC-File, 57
PC-Talk III, 203
PC-Write, 414
PC/Calculator, 307
PC/Intercomm, 203
PC/Ix, 252
PDI: Preparing for the SAT, 361
Peachcalc, 105
Peachtree Business Graphics System, 160
Peachtree Series 40 A/P, 28
Peachtree Series 40 A/R, 28
Peachtree Series 40 G/L, 28
Peachtree Series 8, 29
Peachtree Telecommunications, 204
Peeks 'n Pokes for the IBM PC, 279
Perfect Calc, 105
Perfect Speller, 184
Perfin, 78
Permanent Portfolio Analyzer, The, 317
Personal Accounting, 405
Personal Computer/Personal Financial Program, 405

Personal Datebook, 78
Personal Finance Master, 406
Personal Investor, The, 317
Personal Pearl, 57
Personal Secretary, 79
Personal Wordperfect, 160
PFS: Report, 58
PFS: Write, 161
Physician's Office Computer, 337
Picturewriter, 137
Pidgin, 414
Pie Writer, 161
Pig Breeding Management Package, 299
Pilot, 414
Pilot (Commodore), 243
Pinball Construction Set, 386
P.I.T.S., 203
Pixon, 137
Pizza Program, The, 406
Plan80, 106
Planfin, 79
Planstar, 106
Plato Access Disk, 205
PM Animator, 138
Pmate, 162
Pogo Joe, 387
Polyforth Level 2, 244
Poor Man's Graphics Tablet, 138
Pooyan, 387
Portware, 162
Pow (Processor of Words), 414
Powerdraw, 139
Powerdriver, 162
Powermail Plus, 184
Powerscript, 163
Powertext, 163
Practical Accountant, 30
Printographer, 139
Pro-Color-File, 58
Prodos, 253
Profit Center, The, 30
Profile III+, 59
Profin, 79
Programmer's Power Tools II, The, 279
Programming Your Apple, 361
Prokey, 280
Prontodos, 254
Proof, 106
Proofwriter, 164
Property Listings and Comparables, 80
Property Management, 81
Property Management System, 81
Psyche, 388

QNX, 255
Quad, The, 59
Query!2, 60
Quick Brown Fox, 165
Quick-Search Librarian, 60
Quick-Tax, 31
Quickcode, 70
Quikcalc Real Estate Investor, 318
Qusort, 280
Qwerty, 165

R:base 4000, 61
Rainbow Graphics, 139
Readability Index, 362
Reading and Thinking, 362
Real Estate Analyzer, 318
Realworld Accounting Series, 32
Red Wing's General Ledger, 300
Rendezvous, 362
Report Card, 362
Report Manager, 107
Report Writer, 60
Respa Resolver, 328
Restaurant Profit Analysis, 82
Revelation, 61
RL-1, 33
RM Cobol, 244
Roadsearch, 407
Roadsearch-Plus, 407
Robot War, 388
Robottack, 388
Roff4, 414
Rogue, 388
Roots/M Plus, 407
Routine Machine, The, 280
RSBasic, 245
Run for the Money, 363

Salesminder, 82
Sam76, 414
S.A.M. (Software Automatic Mouth), 389
Sat English I, 364
Sat Word Attack Skills, 364
Sci-Mate Personal Data Manager, 62
Sci-Mate Universal Online Searcher, 205
Science Volume 3, 364
Scientific Plotter, 140
Screen Director, 140
Screenwriter II, 166
Scriplus, 185
SD-44, 417
SD-48B, 417
SDIR, 417
Seafox, 389
Secretary of Agriculture—Transaction, 302
Secretary of Agriculture—Dairy Diary, 300
Secretary of Agriculture—Herd Audit 2.2, 300
Secretary of Agriculture—Market Window, 301
Secretary of Agriculture—Micro-Mixer, 301
Secretary of Agriculture—Sow Audit 2.2, 301
Senior Analyst, 107
Sensible Speller, 185
Sequitur, 329
Series One Plus, 92
Shoebox, 83
Sideways, 281
Simons' Basic, 245
Simulated Computer, 365
68000 Forth, 232
Skiwriter II, 167
Small C Compiler, 413
Smartcom II, 206
Smarterm/PC, 207
Snapp Basic, 246
Soccer Math, 365
Softcom, 207
Softdisk, 423
Softerm 2, 208
Softplot/Bgi, 141
Softslide, 141
Software Fitness Program, The, 33
Songwriter, 390
Space Tablet/Advanced Space Graphics, 142
Spacemaker, 281
Spanish for the Traveler, 365
Specialist, The, 338
Speed Reader II, 366
Spell 'N Fix II, 187
Spell Wizard, 187
Spell-It, 186
Spellbinder, 167
Spellbinding for the Attorney, 330
Spellguard, 187
Spellstar, 187
Spotlight, 366
Star Trek, 412
State Guess, 346
States 'N Caps, 366
Statistical Analysis, 308
Statistics with Daisy, 309
Sticky Bear Series, 367
Stock Portfolio System, 318
Stockpak-II, 319
Story Machine, 390
Story Tree, 367
Strobeview, 126
Study Quiz Files, 367
Super Bunny, 391
Super Disk Copy, 282
Super Quiz II, 368
Super Utility Plus, 282
Supercalc, 107
Supercalc 2, 108
Supercalc^3, 108
Superlog, 63
Superscripsit, 168
Supertax 1, 2, 3, 408
Superwriter, 168
Supreme Ruler Plus, 391
Surface, 142
Swine Herd Management, 302
Swine Production Records, 293
Symphony, 93
System-Backup, 283

T.H.E. Smart Terminal, 208
T/Maker III, 94
Talk, 209
Talking Speller, 188
Tallymaster, 408
Target Financial Modeling, 108
Target Image Maker, 143
Tasmon, 284
Tax Advantage, The, 409
Tax Manager, 409
Tax Machine, The, 35
Tax Preparer, 36
Technical Investor, The, 319

Ted, 414
Telelink I, Telelink II, 209
Teletext, 210
Telewriter-64, 169
Telpac, 210
Text Wizard, 170
Textplus, 188
III E-Z Pieces, 95
Tim III, 63
Time is Money, 410
Time Manager, 84
Time Runner, 391
Timemoney Manager, 85
Tincomp, 414
Tinidisk
TOP (Text Output Processor), 414
Trackcess, 284
Transend 1, 2, 3, 210
Transend/PC, 210
Troll's Tale, 368
Trsdos, 256
Tsmart, 212
Turbodos, 257
Tutoprogram: Mechanics of English, 410
25th Hour = 25:01 Time Scheduler/Organizer, The, 85
Type Faces, 143
Typing Teacher, 369
Typing Tutor, 369

U.S. Constitution Tutor, 369
UCSD P-System, 257
Ugraf (uGRAF), 143
Ultrabasic-64, 247
UNIX, 258
Unix Spelling Checker, 413
Up for Grabs, 391
Utility City, 284

Value/Screen, 320
V-Utility, 273
VC, 392
Vedit, 170
Versaform, 64
Veterinary Billing Accounts Receivable, 338
Vic Forth, 247
Videograph, 144
Viewer, 114
Visicalc, 109
Visicalc IV, 109
Visifile, 64
Visilink, 212
Vision, 96
Visischedule, 85
Visispell, 190
Visiterm, 213
Visitrend/Visiplot, 144
Visiword 1.1, 171
Voice Box II, 392
Volkswriter, 171

Window, 424
Winning on Wall Street, 320
Wizardry: Knight of Diamonds, 392
Wizardry: Legacy of Llylgamyn, 392
Wizardry: Proving Ground of the Mad Overlord, 392
Word, 172
Word Attack, 370
Word-Plot, 145
Wordgraphics, 114
Wordmaster, 173
Wordperfect, 173
Wordpro 3 Plus/64, 174
Wordstar, 174
Wordy, 190
Worksheet, 302
Worms?, 392
Write, 176
Write Choice, 177

Xcel Graphics, 145
Xlisp, 414
Xmail, 415
Xywrite II, 177

Z-Term "The Professional," 194
Zoom Grafix, 145
Zork I, II, and III, 394
Zorlof, 178

8530980

The Definitive W[illegible]ter Sof[illegible]

001.6425 D288 AD
OMNI COMPLETE CATALOG OF COMPUTER SOFTWA
AN MCPL
3 0000 00024044 4...

MCPL /AN
DATE DUE
MCPL - AN
MCPL - AN
DATE DUE
07 11 96

OMNI

COMPLETE CATALOG OF COMPUTER SOFTWARE

is the most comprehensive work on the exploding world of computer software. Almost 1,000 software reviews in 22 categories include accounting, word processing, graphics, medicine and law, home entertainment, business and home management, and much more. Featured also is advice from leading computer experts Carl Helmers and Seymour Papert. *Omni*'s follow-up to their first acclaimed computer book, the *Online Database Directory*, this book will prove to be the ultimate sourcebook for computer software.

MACMILLAN PUBLISHING COMPANY
866 Third Avenue, New York, N.Y. 10022