

# The Commodore 64 Software Buyer's Guide



Gary Phillips • Terry Silveria • Sanjiva K. Nath



# THE COMMODORE 64 SOFTWARE BUYER'S GUIDE

Gary Phillips,  
Terry Silveria, &  
Sanjiva K. Nath

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Brady Communications Company, Inc., Bowie, MD 20715  
*A Prentice-Hall Publishing Company*

Thanks to **Holiday Inn** Union Square, San Francisco for use of the Sherlock Holmes room, in which the cover photo was taken.

## The Commodore 64 Software Buyer's Guide

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Library of Congress Cataloging in Publication Data  
Phillips, Gary.

The Commodore 64 software buyer's guide.

Includes index.

1. Commodore 64 (Computer)—Programming. 2. Computer programs—Purchasing. I. Nath, Sanjiva K. II. Silveria, Terry. III. Title. IV. Title: Commodore sixty-four software buyers guide.

QA76.8.C64P45 1984 001. 64'25 84-2965

ISBN 0-89303-382-0

Prentice-Hall International, Inc., London  
Prentice-Hall Canada, Inc., Scarborough, Ontario  
Prentice-Hall of Australia, Pty., Ltd., Sydney  
Prentice-Hall of India Private Limited, New Delhi  
Prentice-Hall of Japan, Inc., Tokyo  
Prentice-Hall of Southeast Asia Pte. Ltd., Singapore  
Whitehall Books, Limited, Petone, New Zealand  
Editora Prentice-Hall Do Brasil LTDA., Rio de Janeiro

Printed in the United States of America

84 85 86 87 88 89 90 91 92 93 94 1 2 3 4 5 6 7 8 9 10

Publishing Director: David T. Culverwell  
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Copy Editor: Kay Adams

Typesetter: Mid-Atlantic Photo Composition, Baltimore, MD

Printer: R. R. Donnelley & Sons, Harrisonburg, VA

Typefaces: Souvenir (text), Helvetica & Eurostile (display)

# ACKNOWLEDGMENTS

The following persons and organizations have contributed in various invaluable ways to the completion of the *Commodore 64 Software Buyer's Guide*:

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# 1 INTRODUCTION—HOW TO SELECT COMMODORE 64 SOFTWARE

## **Software - The Magic Ingredient**

Your Commodore 64 is a powerful computer, capable of performing an amazing variety of tasks. Yet without proper software, the Commodore 64 does nothing at all. Finding the right software is the most important part of setting up a smooth running and useful Commodore 64 system.

Your *Commodore 64 Software Buyer's Guide* makes software selection easy and fun. We provide a simple method that makes software selection completely straightforward. Reading the step-by-step directions in this chapter, the introduction to each type of software, and the detailed reviews allows you to find programs exactly suited to your needs. The tables at the end of each chapter make it easy to compare programs and select the best ones for you.

## **Selection vs Browsing**

The main purpose of this book is to guide you in selecting a program to fill a specific need. Still, there are many programs which are widely useful tools for Commodore 64 users. In order to learn about these handy programs, there is no substitute for browsing though the various program descriptions that follow to see if any would be of use to you.

Another major purpose of the *Commodore 64 Software Buyer's Guide* is to provide information about the various types of software available. Each section and chapter provides an introduction to a type of software. This introduction will define programs such as spreadsheets, database managers, word processors, etc. It will also explain how you can use these programs.

There are four major areas of software for the Commodore 64: Commerical software for the Commodore 64, CP/M software for the Commodore 64, public domain software for the Commodore 64, and PET software which can be used on the Commodore 64 with the PET emulator program. This book focuses primarily on commerical software. One chapter covers CP/M software very briefly. A few public domain programs are mentioned. See our book *Free Software for your Commodore 64* for complete background and coverage of public domain programs. You can also get a catalog of public domain programs for the Commodore 64 from Practical Applications, 2022 Taraval, P.O.

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Box 6427, San Francisco, CA 94116. For information on PET programs which can be run on the Commodore 64, see the *Commodore Software Encyclopedia*. For a comprehensive guide to Commodore 64 hardware expansion, programming, and general background information, see our book *The Commodore User's Encyclopedia (Commodore 64 Edition)*.

Selecting software is one of your most important undertakings as a Commodore 64 owner. Your computer can do marvelous things with good software. Without good software it is very limited. Three fundamental assumptions underlie our discussion of software selection.

1. you have a goal in mind that you expect the software and your Commodore 64 will help you to accomplish;
2. your time is limited and valuable; and
3. you have a limited budget for computer software.

These assumptions will not apply to everyone. If you are a computer hobbyist, you may enjoy spending ten hours learning to use all 500 programs, keeping careful notes on each of them. Or perhaps you can afford to buy hundreds or thousands of dollars worth of programs to compare. But if you are like most Commodore 64 users, your time and budget are limited. You will need to conduct a systematic and efficient survey which quickly finds a program that will serve your ultimate purpose at a reasonable price. Your time will then be spent mastering this program and using it to accomplish larger goals.

### **Defining What You Want**

The first step in selecting a program is to define what ultimate goal you hope to accomplish using your Commodore 64. For example, you may want to reduce the time it takes to keep the books for your small business, or to keep the minutes of club meetings. Or, you may wish to improve the accuracy of your budgeting efforts or your child's spelling or school work. Perhaps your goal is to learn about or use spreadsheets or databases.

Once you have defined what you hope to accomplish with a program, you can identify the features you will need. For example, if you plan to improve your child's homework scores by eliminating misspellings, you may want a word processor with a spelling checker. Or, you may want an entertaining spelling bee game.

For each type of software a number of features are commonly supported. Each chapter in the review section that follows defines the features which may be available and lists which features are and are not supported by each program. The features mentioned for some types of programs include the questions of required hardware (diskettes, memory, light pen, joystick, etc.) and the size limits for data (numbers of customers, size of fields, length of document, number of files, etc.).

In addition, you will want to consider whether the program you are seeking will need to work in conjunction with one or more other programs. For

example, you may need to incorporate data from a spreadsheet or graphics package into reports prepared on a word processor. In such cases, compatibility or integrality with other programs may be a major factor in selecting features. The comparative chart at the end of each chapter permits rapid identification of programs which have a desired feature.

An excellent way to start your search for a suitable program is to separate the features for that type of program (as listed in the review section of this book) into three groups, based on your particular objectives in using the program:

1. features required to achieve your goals;
2. features which might be useful but are not required; and
3. features which would be a nuisance or dangerous (e.g., the ability to all erase fields with a single keystroke might be a feature you don't want in some applications).

Once you have sorted the features in this way, you can quickly eliminate those programs which lack essential features or contain objectionable features. We hope at least a few programs will survive this first cut to be further compared, based on features which are useful but not required, on more general criteria of quality and price. If not, see "Increasing the Number of Candidates" below.

## General Criteria for Quality Programs

There are some general criteria for quality which apply to all types of programs. There are also criteria which apply to only one type of software, specific criteria. Because features and specific criteria vary so widely from one type of software to another, these are defined and discussed in the introduction to each chapter dealing with a specific type of software.

We have identified five major general criteria for evaluating and comparing software of all types:

1. Price/Performance
2. Ease of Use
3. Vendor Support
4. Documentation
5. Error Handling

Each of these will be rated from A (Absolutely Outstanding) to D (Deficient) as explained below. In addition, a discussion of any noteworthy aspect of the program is provided in the review which follows the ratings. A subjective overall rating is also assigned to each program.

These general criteria are highly interdependent and often closely related to specific criteria for a type of software and even to features. Still, a coherent discussion of the selection process and rating system requires that these

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interrelated criteria be artificially separated and defined. Our general criteria may be defined briefly as follows:

1. *Price/Performance*—The main issue in performance is speed. Does the program perform functions rapidly, or is a five-minute wait typical? Allowance must be made for the volume and complexity of the work you have requested. A database search will not be instant with any program, but some programs may perform the same search ten or a hundred times faster than others.

There are other factors to consider in performance. How effectively does the program use diskette space (i.e., how much data can it store in a certain amount of diskette space)? Does the program require frequent and/or time-consuming maintenance operations such as reorganizing files or building indexes?

Finally, the issue of price must also be weighed. While many Commodore 64 programs are reasonably priced, some are very expensive. In the final analysis, price must be weighed against performance, features, and other criteria. A small improvement in performance or features may not justify a large price increase. Similarly, a small sacrifice in performance or features may save you a lot of money. And, as so often happens, price is not always proportional to performance and quality in software. Our rating for price/performance is essentially our subjective evaluation of how a program compares to its competitors when price as well as raw performance is considered.

2. *Ease of Use*—How easy is the program to use in routine and exceptional cases? Are the functions and commands logically organized and named? Are they easy to learn and remember? Are clear prompts and messages provided? Is additional "help" available on request? Is the overall functioning of the programs clear and easy to follow? Although we have rated the ease of use under General Criteria for all programs, the ease of use with programs that provide additional commands needs special emphasis. Generally, the more versatile the commands the more complex they become. Has the right balance of versatility and simplicity been achieved? Some programs simplify commands by allowing the user to use a single letter of a command word. Consider, for example, a program to help you create music. The command PLAY might be programmed with a single letter P. Some programs provide additional features to make editing more convenient.

3. *Vendor Support*—Problems sometimes come up with programs. It's a fact of life, or Murphy's law if you prefer. The key question here is what happens when you call the producer of the software for assistance? Do they have a toll-free "hot-line" for user questions? Do they have support personnel at all? Do their support people understand the program and its potential uses clearly? Can they give prompt and accurate information and advice? Few experiences are more infuriating than calling up the vendor of a software product that doesn't work as documented and getting a busy signal. Even worse is getting somebody that you have to educate on the product. Vendor support should be part of what you are paying for when you shell out your hard-earned dollars for software.

A related issue concerns payment for updates and backup copies. When a software vendor corrects bugs in its software or makes minor improvements, these should be available to you free as an exchange for your existing tape or disk, except for a very small service charge. If a new tape or disk is mailed, a charge for the media is reasonable. But a company that demands that you pay a substantial part of the original purchase price to get its mistakes fixed should be avoided.

Some software is copy-protected by a scheme that prevents you from making a backup copy. This is a reasonable step taken by the company to protect their investment in the software. But the company must provide you with at least one backup copy at minimal cost. Otherwise, if anything should happen to your software disk or tape in the middle of a time-critical project, you would be out of luck! A few companies even charge full price to replace a damaged original copy of the program. If waiting a week or more for replacement software doesn't fit your schedule, be sure you can make your own backup copy or get an inexpensive backup from the vendor.

If you find a vendor to be excellent in these respects and like what you've seen of their output, consider their other products and new releases. A vendor which has brought you good products and service in the past is likely to continue to offer good products and service in the future.

4. *Documentation*—Is a thorough and readable manual or set of instructions included with the program? Is it well organized with a good index and quick reference guide? Are on-line prompts and help features available? Are these available at different levels of detail and simplicity that can be selected by the user?

5. *Error Handling*—If anything goes wrong (out of memory, out of disk space, file not found, diskette not in specified drive, wrong key pressed, etc.) does the program provide a helpful message and allow a simple recovery without loss of data? Can the effects of a major and erroneous action (such as deleting the wrong records) be easily reversed? Can errors in data entry (wrong data, wrong menu item selected) be easily corrected? Can fields with errors be edited rather than retyped? Does the program automatically provide a backup of your data? Does it require verification before proceeding with a potentially disastrous action (such as deleting a file)? These issues are of the greatest importance in determining the overall value of a software package.

## The Selection Process

You probably don't have time to carefully examine each of a large number of programs of a given type. Nor would you want to clutter your mind with all the special commands and options of all these programs. The first step in the selection process might well be to eliminate from consideration as many programs as possible. The comparison chart at the end of each chapter allows a simple and rapid elimination of programs that lack features you have identified as necessary for your intended use of the program. Similarly, a

program which offers objectionable features may be eliminated. And any that are clearly beyond your budget limitations can be crossed off.

We hope at least a few programs will survive this first round of eliminations. If not, see "Increasing the Number of Candidates" below. From among the survivors, pick the ones that have the highest ratings under General and Specific Criteria and the most additional features. Read the detailed descriptions of these and select a small number which you can realistically expect to examine in detail. You may want to write to the manufacturers of these programs for more detailed data. With some perseverance, you may be able to try out all of these at a retail store and make your final decision based on first-hand use of the programs. You may also want to compare notes with other users of the final contenders by talking with friends and user group members who have used the programs.

### ***Increasing the Number of Candidates***

Eliminating all the programs of a certain type which clearly fail to meet your needs may leave few or even zero candidates. In this case you have a number of options:

1. Reexamine your list of required or objectionable features to see if you can be a little less demanding.
2. Consider stretching your budget to include some of the programs eliminated as too expensive.
3. Consider adding some features to existing programs. This may be easy or may be quite involved.
4. Consider using public domain programs. The public domain library is vast, totaling thousands of programs. Or consider a CP/M commercial or public domain CP/M program. This will require that you use a CP/M (Z-80 or 8080) processor cartridge or 8080 emulator program. See Chapter 10 for information on CP/M programs.
5. Consider converting a public domain program written for another computer to run on the Commodore 64. For programs written in a high level language—such as BASIC, Pascal, C, etc.—this may be fairly simple. And you can contribute the results of your labor to the public domain as a service to other Commodore 64 users.

### **Software—A World of Rapid Change**

New software for the Commodore 64 appears every week. This book covers every significant software package for the Commodore 64 that vendors were able to supply to us by press time—Spring of 1984. Many additional programs were "almost ready" or "undergoing revision" when this book went to press. So that you can compare new programs with those covered in the book, we have provided a fill-in-the-blanks worksheet for each type of software. The summary tables at the end of each chapter also contain blank lines so you can transfer a summary of your data on new products for quick comparisons.

Prices, features supported, and even the addresses and phone numbers of vendors are subject to change at any time in this rapidly changing field. It is also possible that an error may have been made in noting which features are supported by each program. We encourage readers and software vendors to write us concerning any discrepancies in features supported for correction in future printings. The ratings, however, are our subjective evaluations. They represent the consensus opinion of our panel of over a dozen reviewers, each of whom is highly experienced with the type of programs reviewed. We cannot undertake to defend or explain our ratings. Each person may have a slightly different personal basis for performing evaluations. We trust that your evaluation will agree reasonably closely with those of our panel of reviewers in most cases. Vendors who have new or improved products for inclusion in future editions should submit a copy for review.

## The 264 Computer

In January of 1984, Commodore revealed its newest line of computers, the 264 series. These computers are similar to the Commodore 64 and much of the software currently available for the Commodore 64 will be available for the 264.

The 264, like the Commodore 64, is a 64k machine. The Commodore 64 however has only 39K of RAM available for BASIC programs. The 264 has 60K of RAM. This increase in BASIC memory space makes it probable that even more sophisticated software will be developed for the 264.

As with the Commodore 64 there are 16 primary colors that can be displayed but unlike the Commodore 64, 8 different luminance levels will allow the creation of 264 variations of color.

The 264 contains a graphic character set on the keyboard and produces high resolution graphics of  $320 \times 200$  pixels. There are four separate cursor keys, 8 programmed function keys, a help key, and keyboard color controls. The 264 will recognize 75 BASIC commands and have a built-in Machine Language Monitor that recognizes 12 commands.

The main appeal of the 264 is its built-in software. Each 264 will come with a particular program built into the computer. You will select the 264 with the particular program you desire from the list of those available. Simply turn the computer on and the 264 is ready for word processing, spreadsheet analysis, or whatever application you have chosen. You can still use the 264 for other applications by loading programs available using cartridges, tapes, and diskettes. Most of the same peripherals that work with the VIC 20 and Commodore 64 will work with the 264. The similarities between the Commodore 64 and the 264 will make it relatively easy for vendors to translate Commodore 64 programs into 264 programs. In fact, some programs for the Commodore 64 that use only BASIC statements may actually run on the 264.

If you are considering the purchase of a 264 you can still use this book to scout out your software before you buy.

Vendors will know long in advance of distribution whether their programs will also run on the 264 or if they plan to convert their Commodore 64 programs into 264 programs. If you find some programs in this book that are particularly appealing you may want to call and find out if and when the new version will be available. See the vendor list at the back of the book for numbers and addresses.

The introductions and glossaries to each chapter can still be a handy guide for the 264 owner. The types and criteria for evaluations are just as applicable for the 264 as for the Commodore 64.

Software for a computer is usually released sometime after the release of a particular computer. You generally must wait for an even longer period of time before comprehensive reviews of the software are available. This book provides a unique opportunity in reviewing much of the software that will be available for the 264 before the computer is released.

### The Reviews

The following chapters review, evaluate, and compare currently available software for the Commodore 64. The majority of all Commodore 64 software of significant merit is included. Each program is rated for general and specific criteria and assigned an overall rating. The overall rating takes into consideration all criteria and features as well as price and other characteristics and the strengths and weaknesses of the program. Ratings all given according to the following scale:

- A = Absolutely Outstanding
- B = Better than Average
- C = Commonplace (Average)
- D = Deficient

The features are identified by:

- + = Program supports this feature.
- = Program does not support this feature.

The discussion following the ratings for each program explains the reasons for the ratings. Often particular strengths or drawbacks which are not readily apparent in the ratings are discussed. Wherever possible, we have provided a brief overview of how the program operates and have attempted to remedy any deficiencies in the documentation.

Each section also includes a sample worksheet to guide you in reviewing new programs for the Commodore 64 as they come on the market. The blank lines in each chapter summary table allow you to add data on new products for rapid comparison.

We hope you find Commodore 64 programs that you will value as much as we do ours, and that this book will serve you well in your quest for useful programs. Happy hunting!

## 2

# EDUCATION

When you hear of computer applications in education, many of you who have children at home will immediately think of the educational games that you are thinking of buying for your children.

Some of you who are educators may even think of the English and arithmetic tutorial programs that were the backbone of computer-assisted learning a few years ago.

Others, who are neither parents nor teachers, may not be convinced of the value of educational programs.

This is not surprising. Most of us have a limited exposure to the uses of computers, especially in education. Just a few years ago computers were very expensive. Only big corporations could afford them and very few schools expressed any interest in teaching students with the aid of computers. Because of the high cost of setting up the hardware and the paucity of quality software, educators did not suspect the overwhelming effectiveness of computers as tools for learning.

Recent advances in the large scale integrated (LSI) circuit technology have brought computers closer to home by making them very personal and affordable. Their application in our daily lives is only limited by our imagination and not by the cost of the hardware or software. It is now possible for us to set up a powerful and versatile system (the Commodore 64 and peripherals) at prices in the order of \$300 to \$500, and we can use it for a variety of applications at home or at work.

Education may be one of the most important applications of microcomputers. It encompasses all age groups and all levels of interests. The computer provides a self-paced and interactive learning environment. Learning with computers can also be fun. In fact, most of us find it hard to associate the idea of "study" with computer-assisted learning.

So whether you are a parent interested in buying some educational programs for your children or an educator interested in developing tutorials for your students, the following chapters are designed to guide you through the maze of software that make the Commodore 64 an inexpensive and effective tool for learning while at the same time broadening the spectrum of its applications.

This chapter is divided into two sections: Computer-Assisted Learning-Tutorials and Games, and Educational Languages.

The role of microcomputers in schools is not limited to educational tutorials and games. Microcomputers are capable of performing a wide variety of tasks outside the education arena and many educators are looking forward to using

these micros for applications related to the actual running of the schools. These applications may be considered under the following headings:

**Word processing**—Already one of the most popular applications of microcomputers, word processing is useful for any organization that handles a lot of writing. In schools, word processors may be used for interdepartmental correspondence, preparing lessons and quizzes for students, and generating research manuscripts.

**Information management**—Schools have to constantly deal with maintaining student records, grades, personnel records, library catalogs, and many other types of information. A computer-based information management system (database managers) is useful in processing these and many other records with ease, speed, and accuracy.

**Accounting**—This involves management of finances. With constant budget cutbacks, school administrators have the need to maintain accurate records of finances so that they may implement tuition increases and fund collection drives (if need be) to keep the school running. Accounting through a microcomputer not only helps them keep an accurate record of their finances, but also participates in generating payroll for employees, financial aid for needy students, and funds for affiliated organizations (such as the student associations).

There are many software developers who manufacture programs designed specifically for use by schools to assist in one or all of the above applications. There are also many general application programs available that may be implemented in any setting (classroom or the school's budget office) and perform similar functions. Both types of programs have been reviewed in Chapter 5 under the appropriate sections (Spreadsheets, Accounting, Writing and Correspondence Tools, and Information Management). In order to choose the right kind of software to fit the needs of your organization, look at both the general application programs as well as the programs that are specifically developed for your particular needs. The difference is that the general application program will be more versatile but the specific application program easier to use.

## 2.1 COMPUTER-ASSISTED LEARNING TUTORIALS AND GAMES

### Introduction

The concept of computer-assisted learning (CAL) through the use of tutorials and games is not new to educators. It has, however, acquired a new feasibility in recent years due to the falling prices of personal computers and maturation of the software market.

What is so special about computer-assisted learning?

First of all, CAL is individualized instruction—one student per computer. The subject material to be learned is preprogrammed into the computer and is presented to the student in a systematic and logical sequence. The computer systematically branches to various lessons depending upon the student's performance.

CAL is interactive. The computer presents tutorials in the form of lessons and the student reads and learns. The computer presents exercises and the student responds with the answers. The computer progresses to the next lesson if the answer is correct or branches to a remedial lesson if it is wrong.

CAL is self-paced. A student can sit for as long as he wants and progress at the pace that he feels most comfortable with. Many find this approach to learning very convenient and productive.

And last, but not least, CAL is fun and interesting. With the increasing popularity of personal computers, it is another reason for you to go out and buy one. It is another way you can expand the potential applications of your favorite micro (the Commodore 64). Many educators feel CAL can play an extraordinary role in your child's development by teaching him to enjoy learning. This is far more important than the particular information taught in the CAL lesson.

There are many features of computer-assisted learning (CAL). Perhaps the most important features for home or school use is tutorials and drills. The computer continuously stimulates the student—visually with graphic images, aurally with music & sound effects, and intellectually with practice problems and exercises. Even the body is involved through typing answers. The material learned in the tutorials may be reinforced in the student's mind with frequent practice problems, quizzes, and drills.

An advanced feature of CAL (unique to computers) is simulations. Computers are able to imitate a real life situation or condition. Whether you are an airlines flight trainee or a biology student learning population migration, through computer simulation you can test the values of various factors that affect the situation that you are studying. You can change those factors and study the effects of those changes. Simulation allows you to develop models

which tend to change in the same way as real situations. Simulation has wide use in schools as well as in professions such as engineering and business.

An extension of tutorials and simulations is educational games. The distinction between a tutorial and an educational game is quite arbitrary. In view of the available software, it is easy to think of a tutorial or a simulation as a game if it meets any of the following criteria:

- offers a reward or incentive every time the student picks the correct answer
- maintains a score of the student's progress
- offers entertainment through the use of graphic images and sounds
- requires input from more than one student
- induces a sense of competition among the players.

On the other hand, a game can be a tutorial if it serves to teach something while the student plays it. We usually think of a game as having some form of entertainment quality. Tutorials on the other hand may be interesting but not entertaining.

Whatever the difference, the objective of both the tutorials and the educational games is almost always the same—to aid in learning. For this reason, we chose to include educational games with the tutorials. In the reviews, however, we try to make a distinction for the sake of the program developer who wishes that the product be identified that way, and for the sake of the parents and teachers who may have a specific interest in acquiring one or the other.

### **Applications**

The practical applications of computer-assisted learning (using your Commodore 64), whether it is by tutorials, simulations, or by educational games, are many. Furthermore, they encompass all walks of life, all age groups, all interest levels, and all professions.

In the classroom or at home, the Commodore 64 can be used to assist in teaching a wide variety of subjects such as English, math, or the sciences. Through the use of the Commodore 64, students can develop their skills at reading, spelling, and arithmetic. They can learn to write computer programs in languages like BASIC and PILOT. They can familiarize themselves with the operating environment of the computer and learn to use it for diverse applications. Many programs are also available for vocational training (like typing tutors, etc.).

There are many software developers who specialize in instructional packages for specific groups by age, grade, or subject. There are some who specialize in tutorials for children with learning and other forms of disabilities. A list of these vendors with a brief description of their specialty software is included at the end of this chapter.

A favorable factor for educators considering or using the Commodore 64 for the classroom is Commodore's consistent commitment to educational excellence through computer technology. Through its Education Resource Center,

Commodore has established extensive education support groups, newsletters, information updates on software and hardware, and electronic bulletin boards that provide continuous access to all relevant information in this area. These are available to any nonprofit organization or agency that is involved in serving students. Additionally, with the success of its PET computer in the schools in the 1970s, there is also an extensive public domain library of PET educational programs, available from Commodore, that may be implemented on the Commodore 64 computer by the use of the Pet emulator program.

### **Specific Criteria**

There is an extensive collection of tutorial programs and educational games available for the Commodore 64. These vary in subject matter, audience, quality, and approach.

For example, one program may be a series of tutorials in French for high school students, and another may be a game designed to teach preschool math to young children.

In order to review such a diverse collection of educational software, we established certain criteria that are common to all these programs. These criteria are discussed in detail in the following section.

**TUTORIAL DESIGN AND IMPLEMENTATION**—The effectiveness of a program in providing an environment for self-instruction depends primarily on the way it presents the material to the student. The course material may be divided into many small, logically-linked sequences of lessons. Each of these may be presented to the student in a sequence determined by his level of performance. The program may also present a set of exercises at the end of each section. If the student provides the correct answers, then the program proceeds to the next lesson in sequence. If the student provides wrong answers, then the program branches off to a remedial lesson or the help section where wrong answers may be explained. Drill and practice exercises are often built into the programs to reinforce material learned from the tutorials.

A similar format is used in educational games, except that the emphasis is on scoring and receiving immediate reinforcement by answering correctly. These games prove to be as effective as the tutorials; however, they may not be designed as a linked sequence of lessons.

**INTERACTION**—What makes CAL tutorials more effective than traditional classes as teaching tools is the automatic interaction and the feedback that they can provide to the student. The computer acts as an audiovisual device in which the program displays the information in the form of graphic images and text on the screen. It presents the information and then frequently tests the student on that information. It also responds to any queries presented by the student. It is responsive to the student at his level of performance.

This one-to-one (student-computer) interaction seems to be very effective in helping young children develop reading and arithmetic skills.

**INTEREST LEVEL**—Even if the program is very sophisticated in design and implementation, if it does not provide an interest-filled environment for the student, its effectiveness is considerably reduced.

**VERSATILITY**—Programs may be versatile in the collection of examples, questions, and exercises that they present to the student via the tutorials. Some tutorials go through the same example every time. Others have an extensive pool of examples from which they randomly select a few each time the student goes through the tutorials. Still others will let the student or teacher/parent add new examples to the sample pool (for example, adding new words to the vocabulary list) and will only present new and unused examples.

Another factor that determines the versatility of the program is the progressive increase in the level of difficulty of the examples as the student's performance improves. A tutorial should be able to determine the student's performance level and present exercises with progressively higher levels of difficulty, and, conversely, if the student's performance deteriorates, then the program will decrease the level of difficulty of the examples (and ideally branch to a remedial or help section).

## Glossary

**AGE GROUP/GRADE LEVEL**—Age groups are stated only where they are provided by the vendor. The following codes are used for grade levels: KG = Kindergarten, P = Primary, I = Intermediate, J = Junior, S = Senior, A = All.

**COLOR**—Since there are 16 colors available on the Commodore 64, it is desirable for a program to make use of that facility in its graphics to maintain interest level in the student.

**DRILL/PRACTICE**—Drill programs are designed primarily as problem-solving sessions in which the material learned from another source is reinforced in the student's mind by constant practice and drills.

**GAME**—In this context, game refers to educational games. We have arbitrarily defined a game as a program (tutorial, drill, or simulation) that meets some of the following criteria:

- offers a reward or incentive everytime the student picks the correct answer
- maintains a score of the student's progress
- offers entertainment through the use of graphic images and sounds
- requires input from more than one student
- induces a sense of competition among the players.

**GRAPHICS**—The display of visually pleasing, colorful images on the screen is bound to stir children's interest in tutorials and other educational games.

**LESSON SUMMARY**—In programs that are designed in a tutorial format, a summary at the end of each lesson is helpful to students. The lesson summary

presents summarized concepts presented in the lesson as well as any concluding remarks before the student progresses to the next lesson.

**LEVELS OF DIFFICULTY**—Ideally, as a student progresses through a tutorial program, drill, or game, the level of lessons and exercises should progressively get more and more difficult. Conversely speaking, if the student's performance is less than satisfactory, then the program should branch off to remedial lessons, thereby lowering the level of difficulty of the lesson and exercise.

**LEVELS OF HELP**—This refers to any helpful hints that a program may provide if the student experiences difficulty with a certain exercise or lesson. On-screen prompts that aid in guiding the student through the execution of a program are also considered here.

**POSITIVE REINFORCEMENT**—This refers to an encouraging comment, a reward, or some sort of positive feedback that a program provides to the student every time the student answers correctly.

**SIMULATION**—Simulation is a process by virtue of which the computer is able to simulate a real life situation or condition. You can test the values of various parameters that affect the situation you are studying, change those parameters, and study the effects of those changes. The most popular application of simulation is developing models in business and engineering. An example of this is the NASA Research Center where thorough use of simulations is made to study the effects of various atmospheric and gravitational conditions on satellites before they are sent into orbit. Another example of simulation is a flight simulator program that is used by the Navy to train its pilots while they are on the ground.

**SOUND**—Similar to graphics, the use of sound (to create music and other special effects) in a program is also effective in making a particular program more interesting to students.

**USER FRIENDLY**—For a program to be effective, it must be designed in a user-friendly format so that the beginning student (who may not be familiar with computers) will be able to easily use and benefit from the program. There is also emphasis on simplicity of implementation of the program by a teacher for a particular application.

**VOICE GENERATION**—Many upcoming programs will feature a software-generated voice, which will add to the versatility and level of interest of a particular program. This feature has been added in anticipation of those programs.

**WRONG ANSWERS EXPLAINED**—During an exercise or a drill, if the question is answered incorrectly then the program should explain the reasons for not accepting the answer as correct.

**ABC's  
J M H Software**

**\$9.95 Tape/Disk**

**GENERAL CRITERIA**

- B Overall rating
- B Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- B Interaction
- B Interest level
- C Versatility

**FEATURES**

- \* Age group
- KG Grade level
- Tutorial
- + Drill/Practice
- Simulation
- Game
- + User friendly
- Lesson summary

**FEATURES**

- Levels of difficulty
- + Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- Sound
- + Color
- Voice generation

**DESCRIPTION**

The program is designed for preschool and primary students. It is designed as a drill to increase their facility with upper case letters.

**TUTORIAL DESIGN AND IMPLEMENTATION**

There are two options in the program. The first option presents to students a sequence of upper case letters with one letter in that sequence missing. The student must type in that letter. Helpful hints are available if the student answers incorrectly. The second option asks the student to match the lower case letter with the upper case.

**INTERACTION**

The program is in a drill format and students must type in the proper response each time. No other interaction is offered.

**INTEREST LEVEL**

Positive reinforcement is offered in both options. In the first option, a bright shower of stars rewards the correct answer. In the second option, an eye-winking clown appears out of a box.

**VERSATILITY**

The program chooses the letters randomly.

<b>Addition Concepts</b>		<b>\$9.95 Tape/Diskette</b>
<b>J M H Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	* Age group	- Levels of difficulty
C Price vs performance	KG Grade level	- Levels of help
B Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	- Game	- Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
C Interaction		
B Interest level		
C Versatility		

### DESCRIPTION

The program is designed for preschool children. The program graphically illustrates the addition process and provides exercises for the student. With each correct answer, a car is added to a train as an incentive. At the end of the exercise, the train takes off if all the answers are correct.

### TUTORIAL DESIGN AND IMPLEMENTATION

The tutorial is designed in the form of graphic illustration. Each digit is accompanied by an equal number of dots. These dots move during the addition process, showing exactly how two numbers are added together. The student is then given that problem to solve.

### INTERACTION

The program interacts with the student only via the input.

### INTEREST LEVEL

The graphic representation of the numbers as dots creates interesting effects. As an incentive to answering correctly, a car is added to the train engine. If all answers are correct, then the train takes off.

### VERSATILITY

The program has only two levels of difficulty.

<b>Arith-magic</b>		<b>\$35.00 Diskette</b>
<b>Quality Education Designs</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	* Age group	- Levels of difficulty
C Price vs performance	E/S Grade level	+ Levels of help
B Ease of use	+ Tutorial	- Wrong answers explained
B Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	+ Game	- Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
B Interaction		
C Interest level		
C Versatility		

### DESCRIPTION

Arith-magic is a collection of math tutorial games designed for elementary and secondary students. It consists of Diffy Square, Tripuz, and Magic Squares.

### TUTORIAL DESIGN AND IMPLEMENTATION

The programs implement some of the widely used puzzles in math to design tutorials and practice examples in addition, subtraction, division, and multiplication. Three different programs are available on the diskette. Diffy provides an exercise in subtraction; Tripuz is a drill in multiplication, addition, and subtraction; and Magic Squares is an exercise in averages and arithmetic sequences.

### INTERACTION

All three programs provide tutorial and drill exercises in an interactive manner. In each program, the computer converses with the student and prompts for inputs. If the student answers incorrectly, the program continues to prompt until the right answer is typed in.

### INTEREST LEVEL

The game design of the three programs creates some interest in the drills and exercises.

### VERSATILITY

The numbers for each exercise in all three programs are picked randomly. There is no facility available to alter or add to the example pool.

**Basic Concepts of Electricity  
Merlan Micro Series**
**\$80.00 Diskette**
**GENERAL CRITERIA**

- B Overall rating
- B Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- A Interaction
- C Interest level
- C Versatility

**FEATURES**

- \* Age group
- J/S Grade level
- + Tutorial
- + Drill/Practice
- Simulation
- Game
- + User friendly
- + Lesson summary

**FEATURES**

- Levels of difficulty
- + Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- Sound
- Color
- Voice generation

### DESCRIPTION

Basic Concepts of Electricity is a series of programs designed to teach just that. Two diskettes are available in the package, one containing the tutorial and drill problems and the other containing tests in the form of multiple-choice questions.

### TUTORIAL DESIGN AND IMPLEMENTATION

The programs present lessons on the basic concepts of electricity. Each lesson is presented in a sequence of small frames, and the student is drilled on each concept or lesson as the lessons progress. Some graphics are displayed to demonstrate the various experimental effects of electricity.

### INTERACTION

The tutorials are very interactive and require a frequent input from the student in the form of question and answer drills.

### INTEREST LEVEL

Some graphics are displayed in the program. There is no sound or use of any color graphics to display any special effects.

### VERSATILITY

The tutorials are designed for a specific subject and the example set may not be altered or added to.

**BASIC – Tutor**  
**Pacific Coast Software**

**\$19.95 Diskette**

**GENERAL CRITERIA**

- B Overall rating
- B Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- B Interaction
- C Interest level
- C Versatility

**FEATURES**

- A Age group
- \* Grade level
- + Tutorial
- + Drill/Practice
- Simulation
- Game
- + User friendly
- Lesson summary

**FEATURES**

- Levels of difficulty
- + Levels of help
- Wrong answers explained
- + Positive reinforcement
- Graphics
- Sound
- Color
- Voice generation

**DESCRIPTION**

BASIC—Tutor is a tutorial in BASIC programming language.

**TUTORIAL DESIGN AND IMPLEMENTATION**

The program is designed as a tutorial. It is divided into a number of lessons, each presenting some aspect of BASIC (arrays, variables, etc.). At the end of each lesson, the student is given a series of true and false questions. A score is maintained (based upon the answers) to evaluate the student's performance in that particular area, and review lessons are provided for each incorrect answer.

**INTERACTION**

The problem solving at the end of each lesson is the only interaction between the student and the computer outside of TOUCH <RETURN> TO CONTINUE.

**INTEREST LEVEL**

Positive reinforcement is offered in the form of encouraging remarks every time the student types in a correct entry.

**VERSATILITY**

This program is strictly tutorial. There are few options available to provide any versatility and once a student has mastered the lesson plans the usefulness of the program comes to an end.

<b>Biorhythm + New Leaf Inc</b>		<b>\$14.50 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	A Age group	- Levels of difficulty
B Price vs performance	* Grade level	- Levels of help
B Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	- Drill/Practice	- Positive reinforcement
B Documentation	- Simulation	+ Graphics
B Error handling	- Game	+ Sound
	+ User friendly	- Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
B Interaction		
B Interest level		
B Versatility		

**DESCRIPTION**

This program creates and prints a biorhythm chart for any month based on any birthdate.

**TUTORIAL DESIGN AND IMPLEMENTATION**

You are prompted for your name and birthdate and the month for which the chart is desired. The program then proceeds to print the chart on a Commodore compatible printer. The chart displays overlapping cycles for the physical, emotional, and intellectual self, revealing which days are the best and worst for each cycle.

**INTERACTION**

You input the pertinent data from the keyboard and the program produces a printout.

**INTEREST LEVEL**

If you are tired of attempting to calculate your own biorhythm, this utility will do all the work for you.

**VERSATILITY**

The program will work for any possible birthdate and month.

**SUMMARY**

This program is a pleasant little utility that does what it says it will do.

<b>Decimal Concepts</b>		<b>\$9.95 Tape/Diskette</b>
<b>J M H Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	* Age group	- Levels of difficulty
B Price vs performance	J/S Grade level	- Levels of help
A Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	- Game	- Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
C Interaction		
C Interest level		
C Versatility		

### DESCRIPTION

The program teaches the concepts of decimals (tenths and hundredths).

### TUTORIAL DESIGN AND IMPLEMENTATION

The students are shown a diagram representing integer decimals of 10 and 100 (i.e., one-tenth, two-tenths, etc.) and then they are drilled on decimal concepts using those two as examples. The tutorial makes it very easy to understand the decimal concepts.

### INTERACTION

The only interaction is the input from the student during the exercise phase of the program.

### INTEREST LEVEL

The program has positive reinforcement in the form of a score and encouraging remarks.

### VERSATILITY

There is no facility to change the examples in the program. Only two levels of difficulty are available, and the program numbers for the practice exercises are generated randomly.

**Dungeons of The Algebra Dragons  
Timeworks**
**\$24.95 Diskette**
**GENERAL CRITERIA**

- B Overall rating
- B Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- A Interaction
- A Interest level
- B Versatility

**FEATURES**

- A Age group
- \* Grade level
- Tutorial
- + Drill/Practice
- Simulation
- + Game
- + User friendly
- Lesson summary

**FEATURES**

- + Levels of difficulty
- Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- + Sound
- + Color
- Voice generation

### DESCRIPTION

Dungeons of the Algebra Dragons is an adventure game designed to drill students in algebra.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is designed in a game format. It is an adventure game in which the student is trapped in a dungeon full of dragons, spiders, ghosts, etc. The student must find the two keys to escape and in the meantime solve algebra problems to survive the dragons.

### INTERACTION

The game is an algebra problem-solving drill. It is very interactive and requires constant input from the student.

### INTEREST LEVEL

The adventure game design of the program and its music background provide a very interesting and stimulating environment.

### VERSATILITY

The program offers four levels of difficulty. There is no facility to add to the pool of exercises in the program. The problems are generated at random.

<b>English Achievement Microcomputer Workshop</b>		<b>\$29.95 Disk \$20.00 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	* Age group	- Levels of difficulty
C Price vs performance	J/S Grade level	- Levels of help
B Ease of use	- Tutorial	+ Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	- Graphics
A Error handling	- Game	- Sound
	+ User friendly	- Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
C Tutorial design & implementation		
B Interaction		
B Interest level		
B Versatility		

### DESCRIPTION

This program is actually one of a series of five programs to help high school students prepare for the English composition exam for college entrance. There are over 200 sentences selected in groups of 16 at random. The student must pick from four highlighted words the incorrect word. The error could be a fragment or run-on, inappropriate verb tense, dangling element, a misplaced modifier, a cliché, faulty comparison, punctuational error, or any of over a half-dozen other types of errors. There is also a choice for no errors.

### TUTORIAL DESIGN AND IMPLEMENTATION

This program is not designed for tutorial instruction. Instead it is simply a drill or practice in the format the student would receive on a college entrance exam.

### INTERACTION

The program is strictly menu-driven and multiple choice.

### INTEREST LEVEL

The program simulates the college entrance exam. At the end of each battery of questions there is a summary of overall performance indicating in which area a student is weak.

### VERSATILITY

This program works with 200 sentences. Sixteen at a time are picked at random. At some point they will become repetitive for the student.

### **SUMMARY**

This program does what it sets out to do and that is to improve a student's capability for performing well on the College English Entrance Exam. The questions are difficult and simulate very well the testing environment for the real exam.

<b>Equations Microcomputer Workshop</b>		<b>\$24.95 Disk \$20.00 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	* Age group	- Levels of difficulty
C Price vs performance	J/S Grade level	- Levels of help
B Ease of use	+ Tutorial	+ Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	- Graphics
A Error handling	- Game	- Sound
	+ User friendly	- Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
C Tutorial design & implementation		
B Interaction		
C Interest level		
C Versatility		

### DESCRIPTION

This program presents equations in the form  $Ax + B = C$  where A, B, and C are integers. The solutions are also integers. The student must choose from a list of axioms to solve the problem. Axioms like: add the same term to both sides, subtract the same term from both sides, multiply both sides by the same number, or simplify. When the student makes his selection, he is prompted for particular values. If correct, the program then performs the particular operation with the particular value to display the new result. The student is then given the set of axioms to choose from again and so on until the final solution is obtained.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program presumes that the student is already familiar with the axioms presented. However, if an error is made, an explanation concerning the error is also displayed.

### INTERACTION

The student selects the particular axiom as part of a multiple choice question. Once the axiom is selected, the student enters a particular value such as the value to multiply on both sides to reduce the problem.

### INTEREST LEVEL

The program is strictly drill. The interest level is rather low.

### **VERSATILITY**

The program produces random equations, all of which can be reduced using integers. This tends to limit its versatility.

### **SUMMARY**

This program could serve as a remedial lesson for students having difficulty in solving equations. With a multiple choice question, it is very structured but offers a student having trouble a place to start in solving equations.

<b>Factoring Trinomials</b>		<b>\$9.95 Diskette</b>
<b>J M H Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	* Age group	- Levels of difficulty
C Price vs performance	J/S Grade level	+ Levels of help
A Ease of use	- Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	- Graphics
A Error handling	- Game	- Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
C Tutorial design & implementation		
C Interaction		
C Interest level		
C Versatility		

### DESCRIPTION

The program is designed for junior high and senior high students, and adults. It is a drill on factoring trinomials.

### TUTORIAL DESIGN AND IMPLEMENTATION

Three options are available in the program. Each is designed in a drill and practice format. The first option asks the student to choose between four possible factors of a trinomial. The second asks the student to fill in the terms missing from the factors on the screen. The third requires the student to develop factors of a trinomial presented on the screen. Hints are available if the student answers incorrectly.

### INTERACTION

The student is asked to fill in the blanks or choose between the choices given.

### INTEREST LEVEL

Positive reinforcement is offered for correct answers in the form of encouraging comments.

### VERSATILITY

Program chooses the examples randomly.

**Happy Tutor**  
**Pacific Coast Software**

**\$19.95 Diskette**

**GENERAL CRITERIA**

- C Overall rating
- C Price vs performance
- B Ease of use
- A Vendor support
- C Documentation
- A Error handling

**SPECIFIC CRITERIA**

- C Tutorial design & implementation
- B Interaction
- B Interest level
- B Versatility

**FEATURES**

- A Age group
- \* Grade level
- Tutorial
- + Drill/Practice
- + Simulation
- Game
- User friendly
- Lesson summary

**FEATURES**

- + Levels of difficulty
- Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- + Sound
- + Color
- Voice generation

**DESCRIPTION**

Happy Tutor is a typing tutorial program.

**TUTORIAL DESIGN AND IMPLEMENTATION**

The program is designed in a drill format. The student is given letters, words, or sentences to type, and the program evaluates the performance on the basis of both speed and accuracy.

**INTERACTION**

The student is required to type in the correct letter or word. For incorrect entries, the program waits until the student types in the correct entry.

**INTEREST LEVEL**

The program simulates a typewriter by drawing the typewriter keyboard on the screen. A happy face times the student's response and another face maintains a score of the student's performance.

**VERSATILITY**

The program offers up to 17 levels of difficulty in keyboard practice. During sentence practice, the student is allowed to add new sentences to the example pool (thereby increasing versatility) and to choose from any set of sentences during a practice session.



**Figure 1. Hey Diddle Diddle**

**Hey Diddle Diddle  
Spinnaker****\$39.95 Diskette****GENERAL CRITERIA**

- B Overall rating
- B Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- B Interaction
- A Interest level
- \* Versatility

**FEATURES**

- 3-10 Age group
- P/S Grade level
- + Tutorial
- + Drill/Practice
- Simulation
- + Game
- + User friendly
- Lesson summary

**FEATURES**

- + Levels of difficulty
- Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- + Sound
- + Color
- Voice generation

**DESCRIPTION**

Hey Diddle Diddle is a learning program that strengthens the reasoning skills of young children through rhyming exercises.

**TUTORIAL DESIGN & IMPLEMENTATION**

The program is organized in three parts: the Storytime, the Storybook, and the Rhyme game. The Storytime displays nursery rhymes with colorful graphics and music. The Storybook displays the first four lines of the verse, draws the picture on the screen slowly, and then the child can either progress to the remaining verse or to the next rhyme. The Rhyming game presents the child with one of the nursery rhymes except that the order of the lines is scrambled. The object of the game is to unscramble the order of the lines as quickly as possible to score the maximum points. More than one player can play this game and a joystick may be used to move the lines.

**INTERACTION**

The program is very interactive and requires frequent input from the student either through the keyboard or the joystick.

**INTEREST LEVEL**

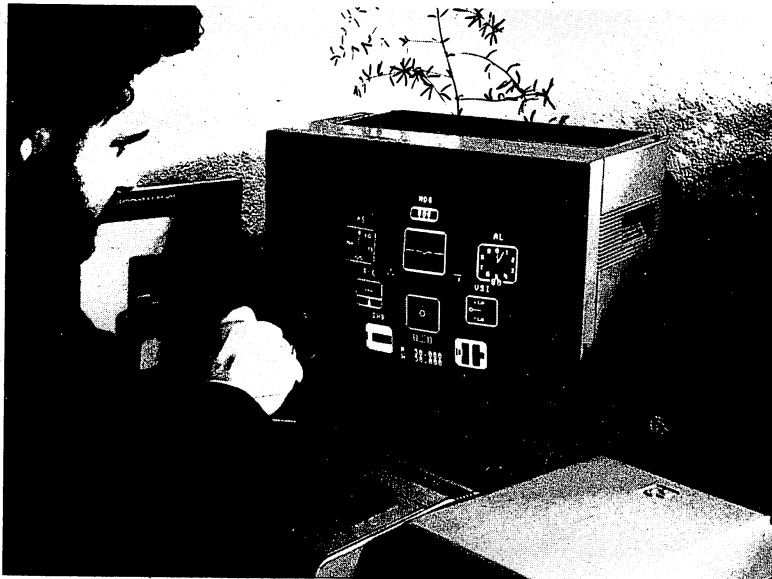
The various scenes accompanying the rhymes are very captivating, especially for young children. Each rhyme is also accompanied by some music. Children will especially enjoy playing the rhyming game.

## VERSATILITY

The program is limited to a few rhymes and cannot be expanded beyond the selection provided.

## SUMMARY

Hey Diddle Diddle is a fun program for children who will get hours of enjoyment out of it. Its scope is, however, limited to a few rhymes and, therefore, lacks versatility. It maintains good interaction with children through the use of the keyboard or joystick.



**Figure 2. Flight Simulator**

<b>IFR (Flight Simulator) Academy Software</b>		<b>\$40.00 Cartridge</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	A Age group	+ Levels of difficulty
B Price vs performance	* Grade level	- Levels of help
A Ease of use	- Tutorial	- Wrong answers explained
B Vendor support	+ Drill/Practice	- Positive reinforcement
B Documentation	+ Simulation	+ Graphics
A Error handling	+ Game	+ Sound
	- User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
A Interaction		
A Interest level		
B Versatility		

### DESCRIPTION

IFR is a realistic flight simulation program. Instruments used in flight control are displayed on your screen. You use your joystick and keyboard to direct your flight to any of four airports. You must navigate around terrain and respond to weather conditions.

### TUTORIAL DESIGN & IMPLEMENTATION

The program is designed to provide realistic responses to your control. Speed, altitude, fuel, turbulence, and aircraft specifications are taken into account as you maneuver your craft.

### INTERACTION

The joystick is the primary method of directing flight. Responses to your movement of the joystick are based on speed and aircraft specifications. If your speed is not appropriate for the wind conditions and throttle movement, a stall will result. You must direct movement to compensate for cross winds and turbulence.

### INTEREST LEVEL

The realism of this program intensifies the challenge. The skills mastered while using this program can stimulate an interest in flying. Your reactions are monitored and a score actually rates your ability to fly. There are four separate airports each presenting their own hazards. Conditions can vary with each flight. And of course, the programs response to your actions varies with your response.

### **VERSATILITY**

An edit option allows you to place the aircraft anywhere on the course. This allows you practice on weaknesses that you may have.

### **SUMMARY**

IFR is a new breed of game. It applies the appeal of arcade games with a serious application. The only real shortcoming of the program is with the sound. The steady drone of the engine is the only sound affect throughout the game.

<b>Kentucky Derby Sim Computer Products</b>		<b>\$24.95 Diskette \$19.95 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	A Age group	- Levels of difficulty
B Price vs performance	* Grade level	- Levels of help
A Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	+ Game	+ Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
N/A Interaction		
A Interest level		
N/A Versatility		

### DESCRIPTION

Kentucky Derby is one of the Inside Basic Series programs that are designed to help you develop programming skills in Basic.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is designed in the form of a game. The object of the game is to win the most money by betting on the right horse. Through the game design, the accompanying documentation gives you some insight into how a BASIC program is developed. The documentation provides the program overview, program listing, listing of variables and subroutines, and a line-by-line description of the programming steps involved in the development of that game.

### INTERACTION

Even though the program is designed as a game, the actual program development tutorial is not interactive since it is in the form of a manual.

### INTEREST LEVEL

The program presents a very sophisticated and delightful game using sprites, sound, and color graphics—all the features that will generate a lot of interest for those who wish to improve their programming skills.

### VERSATILITY

Not applicable.

**Kids on Keys  
Spinnaker****\$39.95 Diskette****GENERAL CRITERIA**

- B Overall rating
- B Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- A Interaction
- A Interest level
- \* Versatility

**FEATURES**

- 3-9 Age group
- P Grade level
- Tutorial
- + Drill/Practice
- Simulation
- + Game
- + User friendly
- Lesson summary

**FEATURES**

- + Levels of difficulty
- Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- + Sound
- + Color
- Voice generation

**DESCRIPTION**

Kids on Keys is a program that familiarizes children with the computer keyboard while they learn to identify the letters of the alphabet and numbers.

**TUTORIAL DESIGN & IMPLEMENTATION**

The program is a drill/practice game that presents the child with letters, numbers, and pictures in three different games. The child identifies the letters and numbers by typing in the appropriate key as they float down the screen. Similarly, pictures are identified by choosing the appropriate word from the list displayed on the screen.

**INTERACTION**

The program is interactive as it requires constant input from the child (student) through the keyboard.

**INTEREST LEVEL**

The game format of the program as well as the color graphics will generate considerable interest in children.

**VERSATILITY**

The scope of the program is limited to presenting children with letters and numbers at random, as well as selected pictures. The program does have increasing levels of difficulty.

### **SUMMARY**

Kids on Keys is an interesting and stimulating game that is designed to teach children to recognize letters and numbers while familiarizing them with the computer keyboard. It is well designed and has many interesting features.

<b>Letter Games</b>		<b>\$25.00 Diskette</b>
<b>Island Software</b>		<b>\$20.00 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	* Age group	+ Levels of difficulty
B Price vs performance	P Grade level	- Levels of help
A Ease of use	- Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
A Documentation	- Simulation	+ Graphics
A Error handling	- Game	- Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
B Interaction		
B Interest level		
B Versatility		

### DESCRIPTION

Letter Games is an alphabet drill designed for preschoolers

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is designed as a practice in discriminating letters of the alphabet. These letters are presented to the student in a game format and the student is asked to select the right letter from the choices presented on the screen.

### INTERACTION

The program is interactive and requires considerable input from the student in the form of selecting the appropriate choices.

### INTEREST LEVEL

The game format of the program is designed to create interest in the student while he practices recognizing the letters of the alphabet.

### VERSATILITY

The program offers limited levels of difficulty in the second and third games. It is specifically designed for the preschool age group.

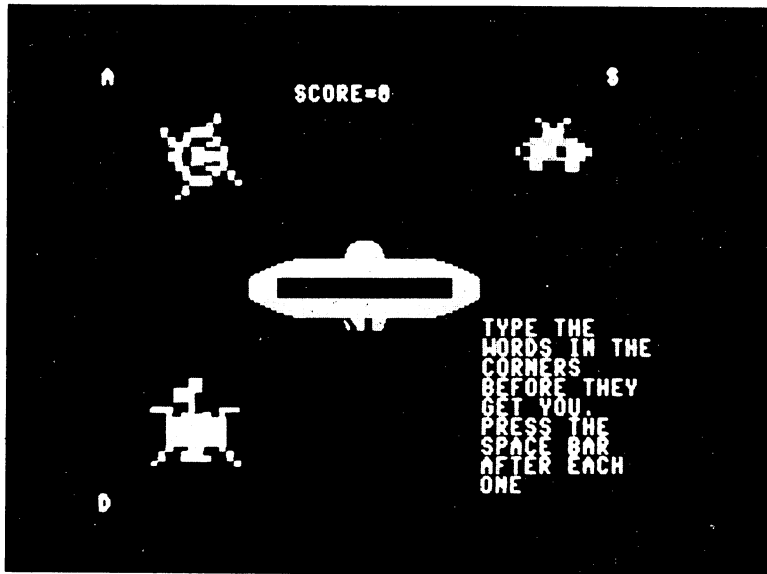


Figure 3. Master Type

<b>Master Type Lightning Software</b>		<b>\$39.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	A Age group	+ Levels of difficulty
A Price vs performance	* Grade level	- Levels of help
A Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
A Documentation	- Simulation	+ Graphics
A Error handling	+ Game	+ Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
A Interaction		
A Interest level		
A Versatility		

### DESCRIPTION

Master Type is a delightful typing tutorial game designed after the video arcade-style games.

### TUTORIAL DESIGN AND IMPLEMENTATION

The format of the program is very similar to an arcade game, although it presents a tutorial on typing with drills and exercises at each level.

### INTERACTION

The program is very interactive and prompts a constant response from the student during the typing sessions.

### INTEREST LEVEL

The outstanding feature of this program is the arcade-style format which makes it very interesting, entertaining, and unique. The letters and words appear at the four corners of the screen and the student must type them before they fire missiles and destroy the home base. There are plenty of sound and visual effects to keep the beginner typist entertained.

### VERSATILITY

There are many levels of difficulty in the program and a score is maintained for each session. The performance evaluation based on the score is used to suggest the next level. To increase the versatility of the program, a facility is provided for the student to create new lessons and save them on a disk.

<b>Najdorf Sicilian Enlightenment Inc</b>		<b>\$39.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	A Age group	- Levels of difficulty
B Price vs performance	* Grade level	- Levels of help
B Ease of use	+ Tutorial	+ Wrong answers explained
A Vendor support	+ Drill/Practice	- Positive reinforcement
B Documentation	+ Simulation	+ Graphics
B Error handling	+ Game	- Sound
	+ User friendly	+ Color
	+ Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
B Interaction		
B Interest level		
B Versatility		

### DESCRIPTION

A chess tutorial describing the Najdorf Sicilian defense. A chess board is displayed and the opening moves automatically played. The player is then prompted for his choice of moves in multiple choice format. Each move is countered and the player is then prompted with another set of logical moves.

### TUTORIAL DESIGN AND IMPLEMENTATION

This program is essentially tutorial, giving the advantages of one move or another. Each move is displayed on the chess board and accompanied with text at the bottom.

### INTERACTION

The player is given a group of possible moves and is capable of making his own selection from the list. The player can take back a move after he has played it through and proceed in a different direction.

### INTEREST LEVEL

This program provides an excellent approach to learning, affording the student of chess an opportunity to see the best response to each move. The impact of viewing each move on the screen is much more effective than trying to interpret each move by reading about it in a book. The ability to take moves back accelerates the learning process.

### VERSATILITY

The program is set up to demonstrate only the Najdorf Sicilian defense; however, it is the first in a series of books from the Living Chess Library.

### **SUMMARY**

This program is for the serious chess player. The moves and responses are from Grandmaster's analysis and will certainly improve any chess player's performance.

<b>Number Jotto</b>		<b>\$19.95 Diskette</b>
<b>Sim Computer Products</b>		<b>\$14.95 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	A Age group	- Levels of difficulty
B Price vs performance	* Grade level	- Levels of help
A Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	- Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	- Graphics
A Error handling	+ Game	- Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
N/A Interaction		
A Interest level		
N/A Versatility		

### DESCRIPTION

The Number Jotto is one of the Inside Basic Series programs designed to help you develop your skills in programming in BASIC language.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is designed in the form of a game. The object of the game is to guess the four-digit number that the computer has chosen. Through the game design, the accompanying documentation gives you insight into how a BASIC program is developed. The documentation provides the program overview, program listing, listing of variables and subroutines, and a line-by-line description of the programming steps involved in the development of that game.

### INTERACTION

Even though the program is designed as a game, the actual program development tutorial is not interactive since it is in the form of a manual.

### INTEREST LEVEL

The program presents a very challenging, interactive, and stimulating game that will generate a lot of interest for those who wish to improve their programming skills.

### VERSATILITY

Not applicable.

**Pinball Math**  
**Taylor-made Software**

**\$24.95 Diskette**  
**\$19.95 Tape**

**GENERAL CRITERIA**

- B Overall rating
- B Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- B Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- B Interaction
- B Interest level
- B Versatility

**FEATURES**

- \* Age group
- 1-6 Grade level
- Tutorial
- + Drill/Practice
- Simulation
- + Game
- + User friendly
- Lesson summary

**FEATURES**

- + Levels of difficulty
- Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- + Sound
- + Color
- Voice generation

### DESCRIPTION

Primarily designed for children in grades 1 through 6, this is a math drill that offers exercises in addition, subtraction, multiplication, and division.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is primarily designed as a drill. It offers four options (add, subtract, multiply, and divide); there are three levels of difficulty within each. The student is presented a problem, and the program maintains the score for each session. The exercises are presented through a pinball machine.

### INTERACTION

The student is prompted for answers to a math problem each time it is presented. If an incorrect answer is given then the student is prompted to enter again.

### INTEREST LEVEL

Positive reinforcement is offered via the pinball machine's colorful graphics and sound display. Negative reinforcement is displayed by a creature that appears from the machine to eat up the incorrect entry.

### VERSATILITY

The examples are offered at the level of difficulty chosen. The numbers for the problems are chosen randomly. There is no facility to alter or add to the example pool.

<b>Potato Factory</b>		<b>\$24.95 Diskette</b>
<b>Microcomputer Workshop</b>		<b>\$20.00 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	* Age group	- Levels of difficulty
C Price vs performance	P/I Grade level	- Levels of help
B Ease of use	+ Tutorial	+ Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	+ Simulation	+ Graphics
A Error handling	- Game	- Sound
	+ User friendly	- Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
C Interaction		
B Interest level		
C Versatility		

### DESCRIPTION

This program is an introduction converting base 10 numbers into other bases. The analogy of a potato factory is used for instruction. In Base 2 there are two potatoes per bag, two bags per box, two boxes per stack, and two stacks per truck. The student picks an arbitrary number of potatoes and proceeds to place them in bags, place the bags in boxes, and the boxes in stacks, etc. The number representing the potatoes, bags, boxes, stacks etc., is the new base number representing the original base 10 number of potatoes.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program carefully instructs the student on the procedure used and gives an example to work with in explaining each step.

### INTERACTION

The student selects the base system to work with originally, either base 2,3,4, or 5. The student is then prompted at each step for the number of potatoes, bags, or boxes, etc.

### INTEREST LEVEL

The graphics are very simple, using PET graphics to represent bags, boxes, etc. There is a little movement as trucks drive on and off the screen.

### VERSATILITY

The student can select the number of potatoes to work with but the program only allows base 2,3,4, or 5.

### **SUMMARY**

This is an ingenious approach to teaching a very difficult concept. The graphics are weak, but the program is menu-driven, and when the student makes an error, the error is explained and the student prompted for the correct entry.

<b>Programming Kit 1 Timeworks</b>		<b>\$24.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	A Age group	+ Levels of difficulty
B Price vs performance	* Grade level	- Levels of help
A Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	+ Game	+ Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
N/A Interaction		
B Interest level		
B Versatility		

### DESCRIPTION

Programming Kit 1 is a tutorial in BASIC program development. It uses a popular game called the Lunar Lander as an example to demonstrate the various steps required to build a program.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is designed in a game format. The game is arcade style and utilizes the limited graphics and sound capabilities of the Commodore 64. The accompanying documentation describes the general concepts of the program design through the flow charts and algorithms. It builds the program in blocks, while at the same time explaining how the various features and functions are being implemented. A listing of the program is also included to help the user understand the program design.

### INTERACTION

Even though the program is designed as a game, the actual program development tutorial is not interactive since it is in the form of a manual.

### INTEREST LEVEL

The program presents a challenging and interactive game that will generate a lot of interest for those who wish to improve their programming skills.

### VERSATILITY

The system diskette comes with three programs: the BASIC program, the modified BASIC program, and the enhanced program. These programs present varying levels of difficulty with respect to the programming design.

<b>Programming Kit 2 Timeworks</b>		<b>\$24.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	A Age group	+ Levels of difficulty
B Price vs performance	* Grade level	- Levels of help
A Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	+ Game	+ Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
N/A Interaction		
A Interest level		
B Versatility		

### DESCRIPTION

The Programming Kit 2 is a tutorial on BASIC language program development. The program makes use of a game called the Slot machine to demonstrate the steps required to build a program.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is designed in a game format. The game is arcade style and utilizes the limited graphics and sound capabilities of the Commodore 64. The accompanying documentation describes the general concepts of the program design through the flow charts and algorithms. It builds the program in blocks, while at the same time explaining how the various features and functions are being implemented. A listing of the program is also included to help the user understand the program design.

### INTERACTION

Even though the program is designed as a game, the actual program development tutorial is not interactive since it is in the form of a manual.

### INTEREST LEVEL

The program presents an interactive game that will generate a lot of interest for those who wish to improve their programming skills.

### VERSATILITY

The system diskette comes with two programs: the BASIC program and the enhanced program. These programs vary in the level of difficulty with respect to programming design.

<b>Puss In Boot Island Software</b>		<b>\$25.00 Diskette \$20.00 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	* Age group	- Levels of difficulty
B Price vs performance	P Grade level	- Levels of help
A Ease of use	- Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
A Documentation	- Simulation	+ Graphics
A Error handling	- Game	- Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
A Interaction		
B Interest level		
B Versatility		

### DESCRIPTION

Puss in Boot is a drill and practice program designed to provide young children with practice on positional concepts, such as: of, on, above, beside, etc.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program displays a puss and the boots in many different positions relative to each other. With each position, the student is given two sentences referring to that position and he must choose the correct one.

### INTERACTION

The program is interactive and requires constant input from the student. It also keeps track of the student's performance throughout a session.

### INTEREST LEVEL

The graphics display creates considerable interest for the student. The program does make much use of the sound and music capabilities of the Commodore 64.

### VERSATILITY

The program does not appear to offer any levels of difficulty.

<b>Quadratic Equations Microcomputer Workshop</b>		<b>\$24.95 Diskette \$20.00 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	* Age group	+ Levels of difficulty
B Price vs performance	J/S Grade level	- Levels of help
B Ease of use	+ Tutorial	+ Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	- Graphics
A Error handling	- Game	- Sound
	+ User friendly	- Color
	+ Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
C Tutorial design & implementation		
B Interaction		
C Interest level		
C Versatility		

### DESCRIPTION

This program randomly generates quadratic equations. The student can choose his own level of difficulty. The student is then given a multiple choice question on how to reduce the equation. After choosing the correct method, the student is prompted for particular values.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is essentially menu-driven. If the student makes any incorrect selection, a short tutorial explains why the choice was wrong. If the student makes two consecutive errors, the program proceeds to demonstrate how quadratics are solved in general.

### INTERACTION

The student is prompted for general methods of simplification such as divide both sides by a number, or factor left side. Once the student picks the correct method, the student is prompted for a particular value which he then enters from the keyboard. The program then proceeds to perform the selected method of simplification showing the next logical result of simplification. The student proceeds in this way until the quadratic equation is completely simplified.

### **INTEREST LEVEL**

Using a menu-driven format, the student has a logical means of solving the problem. If nothing else, the student can initially start on a trial and error basis. By showing why certain selections are not effective in solving a problem, the student can begin avoiding incorrect approaches. There is a final summary that calculates errors as either computational or procedural that further guides a student into studying the right area.

### **VERSATILITY**

The program generates quadratic equations at random. Each are solvable, but since the solution is menu-driven, there is little room for versatility in the solution.

### **SUMMARY**

This is overall a very effective teaching unit for students learning quadratic equations. Some introductory understanding of quadratic equations is presumed, and the program is structured to prevent getting off the track.

**Race Car Facts**  
**J M H Software**
**\$9.95 Tape/Diskette****GENERAL CRITERIA**

- B Overall rating
- B Price vs performance
- B Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- C Interaction
- B Interest level
- C Versatility

**FEATURES**

- \* Age group
- P/I Grade level
- Tutorial
- + Drill/Practice
- Simulation
- + Game
- + User friendly
- Lesson summary

**FEATURES**

- + Levels of difficulty
- Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- Sound
- + Color
- Voice generation

**DESCRIPTION**

This program offers up to six levels of difficulty for each of four arithmetic operations (addition, subtraction, multiplication, and division). The student may choose these operations individually or may choose mixed operations. Two to four players may compete to move their cars to the finish line by giving correct answers.

**TUTORIAL DESIGN AND IMPLEMENTATION**

The program is designed as a math drill. Students are given a problem, and if the answer is correct, they get to move their car a step closer to the finish line.

**INTERACTION**

The only interaction available in the program is the exercises that are presented to the student. There are no help levels or wrong answers explained.

**INTEREST LEVEL**

The program's game concept is designed to induce a sense of competition in the players. Interest is created because the game is a race to the finish, and two (or four) players must compete to win.

**VERSATILITY**

Players cannot add to the problem set available in the program; however, it does offer six levels of difficulty, with the added option of using mixed operations. This makes this drill very effective and versatile.

**Rhyming Fish  
Micro Ed**
**\$7.95 Diskette**
**GENERAL CRITERIA**

- A Overall rating
- A Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- B Interaction
- A Interest level
- C Versatility

**FEATURES**

- 4-7 Age group
- P Grade level
- + Tutorial
- + Drill/Practice
- Simulation
- Game
- + User friendly
- Lesson summary

**FEATURES**

- Levels of difficulty
- Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- + Sound
- + Color
- Voice generation

### DESCRIPTION

In this program a word is displayed at the top of the screen. Three more words are displayed towards the bottom of the screen behind colored fish. One of the words rhymes with the word at the top. The student lowers a fishing hook using function keys to the level of the fish with the rhyming word. The student is told whether he is correct and a total score is kept.

### TUTORIAL DESIGN AND IMPLEMENTATION

The graphic displays are very colorful with enough animation to attract interest from the student but not so much as to detract from the purpose of the program. There are some sound affects and music to enhance interest.

### INTERACTION

The student lowers a fishing line using two function keys on the right of the keyboard. It is simple enough and allows the student to interact with the program rather than being a straightforward tutorial type program.

### INTEREST LEVEL

The program is interesting and for the correct age group quite challenging. Scores are kept to let the student know how he is doing.

### VERSATILITY

The rhyming words cannot be altered, and although the list of words is quite extensive, the usefulness of the program ends when the student has learned all the words.

**SUMMARY**

Micro Ed is producing consistently good educational software at affordable prices. They place just the right emphasis on graphic and sound appeal as well as providing useful up-to-date learning material.

**Rocket Spell****J M H Software****\$9.95 Tape/Diskette****GENERAL CRITERIA**

- C Overall rating
- B Price vs performance
- B Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- C Interaction
- C Interest level
- C Versatility

**FEATURES**

- \* Age group
- P/S Grade level
- Tutorial
- + Drill/Practice
- Simulation
- Game
- + User friendly
- Lesson summary

**FEATURES**

- + Levels of difficulty
- Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- Sound
- + Color
- Voice generation

**DESCRIPTION**

Rocket Spell provides spelling and problem-solving practice using the 100 words most commonly misspelled by elementary students.

**TUTORIAL DESIGN AND IMPLEMENTATION**

There are ten groups of words. The student chooses one of the groups and the program presents blanks representing the letters of the words to be spelled. The words to be spelled are chosen randomly from the group. The student is given eight wrong choices. Every letter correctly chosen is placed on one of the blanks at the position at which it would belong in the word. Each correct answer therefore provides a hint.

**INTERACTION**

The program provides interaction only when the student enters the letters of the hidden word. All wrong choices are placed in a wrong choices box.

**INTEREST LEVEL**

The program offers positive reinforcement. For each correct answer the student gives, the program builds a rocket ship; if the whole word has been spelled correctly, then the student is offered a reward: the space ship blasts-off.

**VERSATILITY**

The program has a pool of 100 words, divided into ten groups. The degree of difficulty progressively increases with each group starting with the first level. There is no facility available for adding new words to the pool.

**Ruler Fractions 1**  
**J M H Software**
**\$9.95 Diskette**
**GENERAL CRITERIA**

- C Overall rating
- B Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- B Interaction
- B Interest level
- C Versatility

**FEATURES**

- \* Age group
- P/I Grade level
- Tutorial
- + Drill/Practice
- Simulation
- Game
- + User friendly
- Lesson summary

**FEATURES**

- Levels of difficulty
- + Levels of help
- Wrong answers explained
- + Positive reinforcement
- + Graphics
- Sound
- + Color
- Voice generation

**DESCRIPTION**

The program is designed for primary-intermediate students. It is a drill on the ruler fractions (inches and halves and inches and fourths).

**TUTORIAL DESIGN AND IMPLEMENTATION**

Two options (levels) are available: inches and halves or inches and fourths. An example at the beginning explains how to enter the appropriate response. Help is available for incorrect answers by lowering the space ship to the ruler and progressively making the correct answer more obvious.

**INTERACTION**

The student responds to the drill exercises by inputting an answer each time.

**INTEREST LEVEL**

Positive reinforcement is available by beaming the stick person (standing on the ruler) onto the spaceship.

**VERSATILITY**

Exercises are chosen at random.

**Touch Typing Tutor**  
**Taylor-made Software**
**\$24.95/19.95 Diskette**
**GENERAL CRITERIA**

- B Overall rating
- B Price vs performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Tutorial design & implementation
- A Interaction
- B Interest level
- B Versatility

**FEATURES**

- A Age group
- \* Grade level
- + Tutorial
- + Drill/Practice
- + Simulation
- Game
- + User friendly
- Lesson summary

**FEATURES**

- + Levels of difficulty
- Levels of help
- Wrong answers explained
- Positive reinforcement
- + Graphics
- Sound
- Color
- Voice generation

### DESCRIPTION

This program is a tutorial with drill to learn touch typing. From a screen menu the student can choose from three different options in learning typing. In lesson mode a graphic representation of the keyboard is displayed on the screen. One of the keys will flash to prompt the student to press that key on the keyboard. If the student presses the correct key another key will flash. If the incorrect key is pressed, the error is indicated and the error remains until the student finds the correct key. There are 19 different lessons in this mode with each lesson concentrating on a different group of keys. When the student is ready for more advanced study, there is a practice mode. Groups of random letters appear on the screen. The student must enter the same characters from the computer keyboard. Any mistakes are recorded as well as the student's time. The third mode of operation, the text mode, presents complete sentences on the screen. The student copies the sentences. A graphic clock keeps track of the student's time.

### TUTORIAL DESIGN AND IMPLEMENTATION

This program is intended to serve as a home drill. Keys are color coded on the screen to reveal the appropriate finger to use in typing.

### INTERACTION

This is a true interactive program where the student is constantly interacting with the program.

### **INTEREST LEVEL**

This program is an excellent approach to learning touch typing. A student can direct in the lesson mode particular lessons to assist him in weak areas of his typing. In the practice mode he can actually see how fast he is typing and how many errors he is making.

### **VERSATILITY**

The program is very versatile. It can be used by the beginner as an introduction to typing, or by those who have mastered the fundamentals and wish to improve their speed and accuracy.

### **SUMMARY**

This program is much more convenient and enjoyable than trying to use a book to learn typing. It also makes it very easy to monitor success in learning to type. An excellent program for beginning and intermediate typists.

<b>Typing Tutor Academy Software</b>		<b>\$21.95 Tape \$24.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	* Age group	+ Levels of difficulty
B Price vs performance	* Grade level	- Levels of help
B Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	- Game	+ Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
B Interaction		
B Interest level		
B Versatility		

### DESCRIPTION

Typing Tutor is a typing tutorial program.

### TUTORIAL DESIGN AND IMPLEMENTATION

The tutorial presents pages of practice lessons on the screen. The lessons vary in degree of difficulty. The student is required to enter text below the groups of letters on the screen. At the end of the session, the program displays the score in words per minute (wpm) and recommends the next set of exercises based on the score.

### INTERACTION

The student is required to type in the letters in each exercise. The score is displayed to keep the student informed of his performance.

### INTEREST LEVEL

Interest in the program is maintained by the use of scores, which are displayed at the end of each session. No other positive reinforcements are offered in the program.

### VERSATILITY

The program offers many levels of difficulty and up to ten pages within each level.

The Word Invaders program is available on the same diskette as the Typing Tutor; it offers more exercises on typing.

<b>U.S. Road Signs</b>		<b>\$9.95 Tape/Disk</b>
<b>J M H Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	A Age group	- Levels of difficulty
C Price vs performance	* Grade level	+ Levels of help
A Ease of use	- Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	- Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	- Game	- Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
C Interaction		
C Interest level		
C Versatility		

### DESCRIPTION

The program is an exercise in learning the patterns (related to their colors and shapes) of traffic signs. It is intended for a wide audience (interested in driver training).

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is designed as a drill. The student is given a choice of four traffic signs and a situation where one of them may be used. The program deletes every incorrect entry, thereby leading to the correct one. The signs are presented in their actual shape and color to help the student in remembering them.

### INTERACTION

The student must choose between four possible signs by entering the number of the block the sign is displayed in.

### INTEREST LEVEL

No reinforcements are offered in the program. The program does, however, maintain the score for each session, which is displayed at the end of the session.

### VERSATILITY

There is no facility available to add to or alter the example pool.

<b>Word Factory</b>		<b>\$25.00 Diskette</b>
<b>Island Software</b>		<b>\$20.00 Tape</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	* Age group	+ Levels of difficulty
B Price vs performance	P Grade level	- Levels of help
A Ease of use	+ Tutorial	- Wrong answers explained
A Vendor support	- Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	- Game	- Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
A Interaction		
B Interest level		
B Versatility		

### DESCRIPTION

The Word Factory is a drill program that is designed to aid students having difficulty with letter and word reversals (such as was and saw).

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is a practice in recognizing the differences between "look-alike" words that are either reversed in order or contain similar, but not identical, characters. The program displays a factory on the screen which churns out words in any combination of the characters that they consist of. The student is given a word and is asked to recognize all the words that the factory churns out that exactly match the word given by the program or the instructor.

### INTERACTION

The program is a practice and requires constant feedback from the student.

### INTEREST LEVEL

The game format of the program and the positive reinforcement available in the form of a good score provide considerable interest for the student.

### VERSATILITY

The program has limited versatility in that it offers two levels of difficulty as well as allowing the student to input any word of his choice for the drill.

<b>Word Invaders</b>		<b>\$21.95 Tape</b>
<b>Academy Software</b>		<b>\$24.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	A Age group	+ Levels of difficulty
B Price vs performance	* Grade level	- Levels of help
A Ease of use	- Tutorial	- Wrong answers explained
A Vendor support	+ Drill/Practice	+ Positive reinforcement
B Documentation	- Simulation	+ Graphics
A Error handling	+ Game	+ Sound
	+ User friendly	+ Color
	- Lesson summary	- Voice generation
<b>SPECIFIC CRITERIA</b>		
B Tutorial design & implementation		
B Interaction		
A Interest level		
C Versatility		

### DESCRIPTION

A follow-up program to Typing Tutor (Academy Software). It is a drill designed after arcade-type games.

### TUTORIAL DESIGN AND IMPLEMENTATION

The program is game-like. It drills the student on typing skills (speed and accuracy). Words are printed across the sky, and the object of the game is to blast them by typing each word as fast as the student can—before the words destroy the home base.

### INTERACTION

The program requires constant input from the student. For every correct answer, a cannon fires the word above. For every incorrect answer, the spaceship is further energized.

### INTEREST LEVEL

The game format of the drill keeps it entertaining.

### VERSATILITY

There is no facility to add to the pool of vocabulary preexistent in the program. There are, however, many levels of difficulty as well as four speeds available via the main menu.

This program is available on the same diskette along with Typing Tutor from Academy Software.

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**Worksheet for Computer-Assisted Learning**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

- Overall rating
- Price vs performance
- Ease of use
- Vendor support
- Documentation
- Error handling

**SPECIFIC CRITERIA**

- Tutorial design & implementation
- Interaction
- Interest level
- Versatility

**FEATURES**

- Age group
- Grade level
- Tutorial
- Drill/Practice
- Simulation
- Game
- User friendly
- Lesson summary

**FEATURES**

- Levels of difficulty
- Levels of help
- Wrong answers explained
- Positive reinforcement
- Graphics
- Sound
- Color
- Voice generation

*Description*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Tutorial Design and Implementation*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Interaction*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Interest Level*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Versatility*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

PROGRAM NAME	COMPARISON CHART									
	RATINGS FOR CRITERIA									
	OVERALL RATING	PRICE/PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	DESIGN/IMPLEMENTATION	INTERACTION	INTEREST LEVEL	VERSATILITY
ABC'S	B	B	A	A	B	A	B	B	B	C
ADDITION CONCEPTS	B	C	B	A	B	A	B	C	B	C
ARITH-MAGIC	C	C	B	B	B	A	B	B	C	C
BASIC CONCEPTS OF ELECTRICITY	B	B	A	A	B	A	B	A	C	C
BASIC TUTOR	B	B	A	A	B	A	B	B	C	C
BIORHYTHM	B	B	B	A	B	B	B	B	B	B
DECIMAL CONCEPTS	C	B	A	A	B	A	B	C	C	C
DUNGEONS OF THE ALGEBRA DRAGONS	B	B	A	A	B	A	B	A	A	B
ENGLISH ACHIEVEMENT	A	C	B	A	B	A	C	B	B	B
EQUATIONS	C	C	B	A	B	A	C	B	C	C
FACTORING TRINOMIALS	C	C	A	A	B	A	C	C	C	C
FLIGHT SIMULATOR	A	B	A	B	B	A	B	A	B	B
HAPPY TUTOR	C	C	B	A	C	A	C	B	A	B
HEY DIDDLE DIDDLE	B	B	A	A	B	A	B	B	A	*
KENTUCKY DERBY	B	B	A	A	B	A	B	*	A	*
KIDS ON KEYS	B	B	A	A	B	A	B	A	A	*
LETTER GAMES	B	B	A	A	A	A	B	B	B	*
MASTER TYPE	A	A	A	A	A	A	B	A	A	A
NAJDORF SICILIAN	B	B	B	A	B	B	B	B	B	B
NUMBER JOTTO	B	B	A	A	B	A	B	*	A	*
PINBALL MATH	B	B	A	A	B	B	B	B	B	B
POTATO FACTORY	B	C	B	A	B	A	B	C	B	C
PROGRAMMING KIT 1	B	B	A	A	B	A	B	*	B	B
PROGRAMMING KIT 2	B	B	A	A	B	A	B	*	A	B
PUSS IN BOOT	B	B	A	A	A	A	B	A	B	B
QUADRATIC EQUATIONS	B	B	B	A	B	A	C	B	C	C
RACE CAR FACTS	B	B	B	A	B	A	B	C	B	C
RHYMING FISH	A	A	A	A	B	A	B	B	A	C
RULER FRACTIONS	C	B	A	A	B	A	B	B	B	C
ROCKET SPELL	C	B	B	A	B	A	B	C	C	C
TOUGH TYPING TUTOR	B	B	A	A	B	A	B	A	B	B
TYPING TUTOR	B	B	B	A	B	A	B	B	B	B
U.S. ROAD SIGNS	C	C	A	A	B	A	B	C	C	C
WORD FACTORY	B	B	A	A	B	A	B	A	B	C
WORD INVADERS	B	B	A	A	B	A	B	B	A	C

\* = NOT APPLICABLE





## 2.2     EDUCATIONAL LANGUAGES

### Introduction

Every computer language is designed to handle certain tasks better than others. For instance, FORTRAN is widely used for scientific and numeric (i.e., desk calculators) computing. To accomplish this, the language design places emphasis on execution efficiency while compromising on design elegance and ease of programming. COBOL, with its strong orientation towards business data processing, has been one of the most widely implemented languages in business, while its relatively simple algorithms find little use outside the business world. BASIC, on the other hand, is a general all-purpose language for beginning programmers. It is easy to learn and is the most widely used language for microcomputers.

These languages require considerable programming skill on the part of the programmer in order for him to write efficient programs. While this issue may not be of concern to most experienced programmers and software developers, many of us, teachers and parents interested in implementing computer curricula in our schools are experiencing considerable pain in having to educate ourselves in this relatively new subject—computers, and this relatively new language—“computer-ese.”

The task of setting up computer systems in schools is overwhelming and complex by virtue of the many different approaches that are suggested for accomplishing it. The difficulties are compounded by the lack of adequate training and expertise in the field of computers and programming.

The questions that often come to mind are: How much do we have to know about the inner workings of a computer in order for us to use it for educating our children; and What kind of programming skills do we need in order to develop effective tutorials for classroom instruction?

Fortunately for the Commodore 64 (and a few other home computers), there are a few languages, for example, PILOT and LOGO, that have been designed specifically for teachers and programmers interested in developing educational software. These languages are sometimes referred to as authoring languages. They allow teachers to develop effective educational coursework for students without having to learn a lot about computers or programming.

PILOT is designed for sophisticated text manipulation. It is useful for developing tutorials, dialogues, and drills. PILOT takes a handful of simple statements and constructs highly interactive dialogue programs. With PILOT, teachers can create their own computer-assisted instruction (CAI) specifically related to their instructional strategies and coursework. PILOT programs provide flexibility in dialogue response so that the students can freely input their response, and the program will match that response (even if it is incorrectly spelled) to its own response in the instruction set, thereby allowing “free

response dialogue” between the computer and the student. BASIC, in comparison, would require awkward input processing routines for comparing words and phrases that the student might enter. PILOT allows the student to respond in a conversational manner.

In addition to these features, many versions of PILOT incorporate sprites and bit-mapped graphic displays as well as sound and music synthesis. These features are well-suited to educational games and simulations where the program requires an animation effect.

Similarly, LOGO is useful for symbol manipulation. Primarily developed for children, it has found a wide range of teaching applications in all age groups. It emphasizes learning through problem solving (much like PILOT). It is full of simple commands and provides the programmer with a very structured-oriented approach, which also makes it useful for teaching computer programming skills to students. It incorporates a feature referred to as turtle graphics. The concept of turtle graphics is simple. It allows children and beginning programmers to instruct an imaginary “turtle” to draw all kinds of graphics on the screen. The turtle lets the child experiment with his ideas and get immediate feedback from the computer on those ideas, thereby learning in the process.

LOGO is simple to learn. Besides its use as a learning tool for children, it has such features as the ability to explore complex mathematical relationships and ideas. This feature allows its use in many subjects including mathematics, music, the language arts, and the sciences.

### **Specific Criteria**

Although the two languages discussed above, PILOT and LOGO, appear to have some differences in design and implementation, many recent versions of these and other languages (such as COMAL) incorporate some if not all the features mentioned, specifically graphics, sound generation capability, and text string processing capability.

An evaluation of each language therefore takes into account the general criteria that are common to these languages in both design and implementation.

The following criteria were deemed suitable for our evaluation purposes.

**PROGRAM DEVELOPMENT**—Many factors are involved in program development. As we emphasized in the discussion earlier, the primary consideration is the ease with which teachers are able to understand the underlying command structure and syntax of the language so that they may design tutorials and other computer-assisted instructional software to fit their needs. It is also important to consider how the commands are implemented in a program, and how easy it is to develop a program using a string of simple commands. Other factors considered here are whether a language has a built-in interpreter and if a program written in that language requires compilation before it may be executed.

**PROGRAM DEBUGGING**—This is an important feature of a language, because it provides the programmer with the facility to debug programs through features such as program listing, trace command (which executes the program one step at a time), dump command (which lists the values of the variables and the student's responses in the buffer), etc.

**INFORMATIVE ERROR MESSAGES**—Success in developing a program that works depends a great deal on the help that you get from the language editor and the interpreter. The help is given in the form of informative error messages. These error messages will tell you the location (line) in the program where an error occurred and the type of error that occurred. How specifically a program's interpreter relays these error messages to the programmer is a feature evaluated in this category.

**TURTLE GRAPHICS**—Most CAL languages now incorporate graphics commands through the use of an imaginary turtle which is instructed by the student to move around the screen and draw various shapes and images. Turtle graphics has become an important part of learning for children, and its incorporation in many educational languages enhances their effectiveness and applicability.

**VERSATILITY**—This refers to the flexibility and provisions that a program provides to extend the realm of its applications. For example, Commodore's PILOT for the C-64 has provisions for integrating a programmer's own machine language subroutines. It also has a record keeping capability to aid the teacher in maintaining records of students' performances. Versatility also reflects other special features such as the ability to control joysticks and paddles, access disk drive, and other peripherals.

**LOGO  
Commodore****\$49.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Program development	+ Interpreter
A Price vs performance	A Program debugger	- Compiler
A Ease of use	A Informative error messages	- Step execution
B Vendor support	A Turtle graphics	+ Immediate mode
B Documentation	A Versatility	- Auto line numbering
A Error handling		+ Numeric computation
		+ Color graphics
		+ Sprites
		+ Sound generation
		+ Game controllers
		+ Access to DOS - error messages

**DESCRIPTION**

LOGO by Commodore is a programming language used most often in the field of artificial intelligence and for teaching programming to young children.

**PROGRAM DEVELOPMENT**

LOGO is a procedural language. A LOGO program is a collection of procedures (instructions) designed to perform specific tasks. Certain instructions are built into the language and they are referred to as LOGO commands (primitives). Other instructions may be defined in a procedure by the programmer. These instructions need not be redefined every time and they may be recalled in other procedures. A facility is also available for saving user-defined procedures on files which may be recalled later. The Commodore's version of LOGO has an extensive set of primitives, including commands for graphics, arithmetic and logical operations, and list processing.

**PROGRAM DEBUGGER**

LOGO programs are relatively easy to debug because they consist of simple procedures or tasks. The language allows you to test each procedure as it is developed before it is used in other procedures throughout the program. You may use the PAUSE and CONTINUE commands to halt a procedure during execution and observe the position of the turtle, or print values of specific variables to help you debug the program. The TRACE command is also available to trace portions of a procedure by executing it line by line.

## **INFORMATIVE ERROR MESSAGES**

Error messages displayed by LOGO are mostly directed at misspellings and wrong usage of commands and procedure names. An error message is displayed in two parts: the first part consisting of messages that start with different words at different times; and the second part consisting of a message that always starts out the same way. The messages are generally easy to understand, although the appendix describes all the error messages with examples of conditions in which they may occur for easy reference.

## **TURTLE GRAPHICS**

LOGO offers excellent graphics and sprite capabilities. It makes full use of the graphics and sprite features offered with the C-64. It incorporates turtle graphics that may be used for creating graphics on the screen by instructing an imaginary "turtle" to move in desired directions. Children can easily develop complex shapes and patterns using these simple procedures.

## **VERSATILITY**

Although LOGO is primarily used for teaching programming to young children, this version by Commodore includes word-list manipulation capabilities which are useful for writing conversational programs and tutorials. It has the built-in capability to do recursions which aids in complex mathematical computations. It also makes full use of the sound features of the C-64 by allowing the programmer to control the pitch, duration and the envelope of the sound to create melodies and other special effects.

## **SUMMARY**

Much more can be said concerning the versatility and powerful programming features of Commodore's LOGO. This version includes most standard features of the original LOGO as well as special features that allow the programmer to use the graphics and sound capabilities of the C-64 with considerable ease. The documentation is well written and comprehensive, and includes an appendix that is a quick reference guide for error messages, edit commands, and has examples of many useful procedures that may be typed in for special graphics and text processing programs.

<b>Pilot Commodore</b>		<b>\$59.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	A Program development	+ Interpreter
A Price vs performance	B Program debugger	- Compiler
A Ease of use	B Informative error messages	+ Step execution
C Vendor support	N/A Turtle graphics	+ Immediate mode
A Documentation	A Versatility	* Auto line numbering
A Error handling		+ Numeric computation
		+ Color graphics
		+ Sprites
		+ Sound generation
		* Game controllers
		+ Access to DOS - error messages

## DESCRIPTION

Commodore's PILOT is an educational language that facilitates development of tutorials and other learning aids without any prior knowledge or expertise in computer programming.

## PROGRAM DEVELOPMENT

The program operates in four modes: the Edit mode for program editing, the Run mode for program execution, the Immediate mode for execution of individual instructions (lets you experiment with various commands), and the Command mode for file handling (loading, storing, and printing programs). You use only one or two keystrokes to access these modes. The text may be any combination of upper and lower case, which makes it easier to read. Program development in PILOT is considerably easier than in other versions because of the special features that it incorporates. Besides the standard PILOT commands, Commodore's PILOT has the facility to provide conversational hints to the students to help them with the tutorials. It can accept string and numeric input from the student. (The numeric answers are accepted using relational operators since a match will yield a negative result for an input of 89 if the correct answer is 91.) The standard MATCH command is still used to match the input string with the correct answer.

Besides string and numeric processing, PILOT also has high resolution graphics (319 × 192 pixels) and sound capabilities. Graphics features are implemented using simple one-character commands. The screen is divided along the x and y axes, and drawings are generated by plotting points on the screen. You can also define sprites on the screen and create animation effects

in your programs. Implementing sound features in your program, however, is not an easy task and will require some experimentation with the different sound effects. Sound effects are strictly an enhancement (it is suggested in the documentation) and are not required to develop effective tutorials.

### **PROGRAM DEBUGGER**

The program may be edited in the Edit mode. PILOT provides alternate keys to shifted, cursor-control keys to make it easier to edit. (For example, the <RETURN> key is used for cursor up and F7 for cursor left; F1 is used for inserting a line at the location of the cursor.)

### **INFORMATIVE ERROR MESSAGES**

The interpreter and the editor have a significant list of self-explanatory error messages.

### **TURTLE GRAPHICS**

Not available.

### **VERSATILITY**

Commodore's PILOT is very versatile and flexible. It incorporates many outstanding features which enable you to use it for many applications. One of the special features incorporated in this version is the CALL instruction which calls a preloaded machine language subroutine into the program. With this feature, you can integrate your own subroutines with PILOT programs and create a myriad of special effects by accessing external devices through these subroutines.

The LINK instruction lets you execute a series of programs on disk by passing control from the program in memory to the program on disk. In this way, you can create programs in modules and execute them without the memory limitation.

PILOT also allows you to maintain records of students' progress by designing specific programs. Its VOICE instruction enables you to POKE any value at any specified location in memory.

**Vanilla Pilot**  
**Tamarack Software**

**\$29.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Program development	+ Interpreter
A Price vs performance	B Program debugger	- Compiler
A Ease of use	A Informative error messages	+ Step execution
A Vendor support	B Turtle graphics	+ Immediate mode
A Documentation	B Versatility	+ Auto line numbering
A Error handling		+ Numeric computation
		+ Color graphics
		- Sprites
		+ Sound generation
		- Game controllers
		+ Access to DOS - error messages

### DESCRIPTION

Vanilla Pilot is an educational language designed for teachers and students to help them develop tutorials and other instructional material as well as programming skills.

### PROGRAM DEVELOPMENT

Vanilla Pilot offers many features that will make programming enjoyable, interesting, and easy. The PILOT editor has commands such as AUTO—for automatic line numbering—and NEW/UNNEW—for erasing/recovering programs in memory. The Program mode accepts one or two-letter abbreviations for PILOT's instruction set. Students, responses are inputted using the A: (ACCEPT) command. Using the complex pattern of matching searches to the responses, the program may be instructed to make decisions and print the response, thereby creating a dialogue with the student. The Vanilla Pilot implements this decision-making function with the use of the MATCH (M:) command which matches the text string that was inputted by the student (via the ACCEPT command) with the various strings in the list of the MATCH command. Based upon the result of the match operation, the program may be instructed to perform conditional operations by using the conditional commands. Branching is available in the program through the use of simple labels attached to those statements to which the program must branch. The JUMP (J:) command instructs the program to go to the specified label.

A list of screen and sound commands is also available in the Program mode that may be used for setting up screen displays and sound (music) in the program.

The limitations of Vanilla Pilot (typical of educational languages) is in handling numeric constants and variables. There can only be a maximum of 26 variables in the program and the range of integer constants that these variables may handle is between -999 to +999. This allows you to perform limited calculations in your program.

Many of the editing features of Vanilla Pilot are very similar to BASIC. In fact, it also uses Commodore 64's editing keys (INST/DEL, CLR/HOME, and cursor-control keys). Program lines may be deleted, inserted, or replaced by specifying the line number and the modified contents of that line (similar to BASIC).

The Vanilla Pilot allows you to save your program on disk or tape. A useful facility is included to let you append a program from disk to a program in memory at the specified line number. Using the ERROR command, you can check for any DOS errors.

### **PROGRAM DEBUGGER**

There are a number of commands designed to assist the programmer with debugging. The TRACE command displays program lines as the program is being executed. The DUMP command displays a formatted listing of the contents of the answer field, name field, numeric variables, and the yes/no flag value. Programs may also be listed on the screen or the printer (device #4) using the LLIST and PLIST commands, respectively.

### **INFORMATIVE ERROR MESSAGES**

Both the interpreter and the editor have a significant list of self-explanatory error messages. There is also a set of error messages pertaining to the turtle graphics commands.

### **TURTLE GRAPHICS**

The enjoyable part of Vanilla Pilot, especially for children, is the turtle graphics feature. Using the DIRECTION command, the turtle may be moved to any location on the screen, and using the DRAW command, it may be instructed to draw a line to its original location. Other commands used in this mode are LEFT, RIGHT, COLOR, UP, DOWN, LOCATE, etc.

### **VERSATILITY**

The Vanilla Pilot has the facility to read the joysticks and paddles through the program (the joystick command—Y: and the fire button command—I:).

### **REMARKS**

Vanilla Pilot by Tamarack Software is an excellent PILOT interpreter at a very reasonable cost. It has many simple commands that may be used for developing effective tutorials. It is simple to use and does not require extensive programming experience on the part of the teacher.

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**Worksheet for Educational Languages**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

- Overall rating
- Price vs performance
- Ease of use
- Vendor support
- Documentation
- Error handling

**SPECIFIC CRITERIA**

- Program development
- Program debugger
- Informative error messages
- Turtle graphics
- Versatility

**FEATURES**

- Interpreter
- Compiler
- Step execution
- Immediate mode
- Auto line numbering
- Numeric computation
- Color graphics
- Sprites
- Sound generation
- Game controllers
- Access to DOS - error messages

*Description*— \_\_\_\_\_

\_\_\_\_\_

*Program development*— \_\_\_\_\_

\_\_\_\_\_

*Informative error messages*— \_\_\_\_\_

\_\_\_\_\_

*Turtle graphics*— \_\_\_\_\_

\_\_\_\_\_

*Versatility*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



# 3 GAMES

## Introduction

Perhaps nothing has done as much for introducing computers into the home as Pac-Man and Space Invaders. Almost reluctantly these games made their way out of the video arcade and into the home, reintroducing countless children to their living rooms. Recently there has been a shift in interest away from game machines in favor of the “down to business” personal computers. But the transition has not been easy. Many personal computers find themselves in the midst of an identity crisis.

The Commodore people have made a sincere effort to bridge the gap with the introduction of the Commodore 64. Although it is designed with sufficient memory to support home and business applications, it has remained faithful to its predecessor, the game machine. The Commodore 64 can output 16 different colors to a high resolution screen (320 × 250 pixels). It has what is probably the most advanced sound synthesizing chip available on a personal computer, capable of producing three voices and eight octaves. Additionally, it has a special sprite feature that facilitates animation and graphics. It also has special ports for attaching cartridges and joysticks. The Commodore 64 may be the best of both worlds for some.

Anyone who works with computers too long (like the authors of computer books) has a tendency to categorize everything into discrete units. Regardless of the infinite possible variations, people will invariably try to squeeze everything into a handful of classifications. You are apt to find their diskettes filed by application, their books by subject, and the socks in their dresser sorted by size and color. In this passion for compartmentalization, we have happily concluded that there are three types of computer games: adventure games, arcade games, and strategy games.

## Adventure Games

Adventure games create settings with messages that appear on the screen. You may find yourself in a medieval fantasy where dragons and mythical beasts may appear at any time, or on a planet in another galaxy. The object of the game may be to find a treasure or defeat a monster. Or you may acquire points by overcoming obstacles as the game progresses. In a typical game, the computer might initially display some text on the screen to describe your location or predicament: “A swollen river—and beyond, a winding road.” You

enter into the keyboard your response: "I swim the river." The computer will come back with the result of your action: "A shark just took a bite from your leg, Gimpy. Try again." Usually the computer is very rude. You must rely on logic, deductive reasoning, and previous experience playing these games. Everyone knows you should have made a raft with the lumber you encountered three statements earlier. Usually you will encounter clues along the way.

In some of the games the player actually assumes an identity. You may be given a list of virtues and abilities such as strength and wisdom, or you may receive some magical powers. (Think how much easier it would have been just to fly over that river.) Documentation is very important in these games. Not only does it give you your objective and some idea of the vocabulary you must enter, but it often gives you hints about how to overcome the various demons and difficulties. Occasionally, there is a map to reveal the locations of various treasures. It may be helpful for you to construct your own map on scrap paper as you progress through a game. There are generally some restrictions on the words you can enter into the computer, but you may be surprised how much the computer will recognize. If it does not understand a word, it will ask you to restate it. The computer will even keep track of your score.

Some adventure games for the Commodore 64 enhance the challenge with graphics and sound. You may see a high resolution sprite in the form of a dragon moving across your screen or hear the creak of a door as a pirate liberates you from your gold and silver. Some of the newer games have incorporated arcade-type action, such as the use of a joystick or game paddle to control your alter ego on the screen and to interact with your adversaries.

Adventure games may take hours or longer to complete. A very useful feature is their ability to store the events of the game on tape or diskette. You are then free to turn your computer off and return at another time to pick up where you left off.

Adventure games are always lengthy and seem to appeal more to people interested in the challenge of puzzles rather than the challenge of Pac-Man. They attract a distinctly different type of aficionado but have a following just as faithful as those dedicated to the arcade games.

## **Arcade Games**

These are the action games in which you may find yourself shooting aliens or maneuvering a lunar landing craft. You interact with the screen by using a joystick, or paddle, or in some cases the keyboard of your Commodore 64. These games can take full advantage of the Commodore's high resolution screen as well as the sound synthesizing chip.

There can be no logical orderly criteria for evaluating arcade games. We are convinced they appeal to some primal passion that no one has been able to identify, but the qualities of graphics appeal, interest level, sophistication, and challenge can be discussed. We're sure the controversy over their effect on children will last longer than the games themselves. Some will argue that they are a meaningless waste of time, that they distract children and adolescents

from more useful pursuits. But as one arcade fanatic put it, glancing up from an intense game of Zaxxon, "They build terrific eye-hand coordination and prepare me for interplanetary travel." We find them to be just plain old fun.

## Strategy Games

These are the chess, blackjack, poker type of games. They are often computer versions of more traditional games. Playing against computers can have distinct advantages over playing against people. Often you can program the level of difficulty. You can find the perfect challenge for your level of expertise. Playing against a computer affords you a much better learning opportunity. You can play at your own pace and avoid those snide remarks like, "Are you going to make that move today, or should I come back tomorrow?" You can play strictly instructive games, quitting anytime you want—generally when you are losing. When learning a new game, a computer provides you with an understanding teacher during the stupid-move stage.

## Specific Criteria

**GRAPHICS APPEAL**—This is where we can discuss the visual presentation of the game. Does the program make use of the Commodore's high resolution screen? Does it make effective use of color? What type of animation does it contain? Do the little men simply move across the screen or does the program use refined animation techniques so the men seem to walk across the screen? Remember, some adventure games are strictly text messages and don't intend to display graphics. A newer type of graphics, making use of 3-D, is nearing the completion state. You will be able to wear special 3-D glasses and view the game in three-dimensional perspective.

**INTEREST LEVEL**—This is pretty much a subjective evaluation. We attempt to take into consideration how creative the game is. Does it use the same theme used by a thousand other games? (We are getting pretty tired of alien invasions.) In playing the game are there a variety of alternatives? In adventure games, this might mean the number of rooms that we could enter or the number of different adversaries we might encounter. In arcade games it might refer to the number of different screens that appear. Are there any novel approaches that have not been used in countless other games? How difficult is the game? Is it so easy that the game quickly becomes boring, or so difficult that you lose interest through frustration? Can you change the level of difficulty? Some games allow you to set the level of difficulty in the beginning. Some games become increasingly more difficult as you play. Does the level of difficulty change with the score that you achieve?

**USE OF SOUND**—Sound in a game may range from a little beep to a Baroque fugue. Is it possible to generate an infinite number of sound effects, including creaking doors, wind, and of course laser bursts? How effective are the sound effects? Are they realistic? Do they vary throughout the game? A

pretty minuet of two bars is not so pretty after about an hour or so. The Commodore 64 is now capable of synthesizing speech. Soon some of the games available will be including this feature. Any remarks regarding the use of sound will be found in this section.

## **Glossary**

**ABBREVIATE COMMANDS**—In adventure games you must input various commands through the keyboard. The ability to abbreviate these commands, rather than having to type out the entire command may be an advantage.

**ARCADE INTERACTION**—This indicates that an adventure game includes some opportunity for arcade-type interaction with the program.

**MULTIPLE LEVELS**—In some games the level of difficulty can either be changed or changes automatically. Multiple Levels refers to this changing level of difficulty.

**MULTIPLE SCENARIOS**—In adventure games and in some strategy games, the events of the game may change depending on your previous actions. While playing an adventure game you may find yourself in the same room on two different occasions and have two entirely different experiences.

**MULTIPLE SCREENS**—Many arcade games display a screen that remains fixed as various objects move about. Some games will have a number of these screens in a single game and the screens may change at random or as certain scores are achieved. They serve to heighten the graphics appeal of a game.

**RESPONSIVENESS**—When you are interacting with a game (either by using a joystick or by entering text onto the screen), you of course expect a response from the computer. How quickly that response occurs determines a game's responsiveness.

**SAVE GAME**—In many adventure games, which may take many hours to play, the program allows you to save your current game on diskette or cassette. You are then free to turn off your computer and return at another time to pick up again where you left off.

**VOCABULARY SIZE**—Adventure games require you to enter text through the keyboard in response to scenarios created by the computer. The computer can recognize a limited number of words. This feature is an indication of the size of vocabulary it can recognize compared to other adventure games.

**VOICE**—This refers to the program's ability to use speech synthesis.

**3-D**—Some games allow you to view the screen in three dimensions using special glasses.

<b>Adventure Pack Victory Software</b>		<b>\$27.95 Diskette \$24.95 Tape</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	C Graphics appeal	+ Multiple screens
B Price/ Performance	C Use of sound	+ Multiple levels
C Ease of use	C Interest level	+ Adventure
B Vendor support		- Arcade
C Documentation		- Strategy
B Error handling		

### DESCRIPTION

This is a series of three beginning adventure games, including Moon Base Alpha in which you attempt to destroy an approaching meteor, Jack and the Beanstalk in which you attempt to outwit the Giant, and Computer Adventure where you attempt to get your computer up and running.

### GRAPHICS APPEAL

There are no graphics, only text.

### INTEREST LEVEL

There is a single scenerio with a limited vocabulary available and limited options.

### USE OF SOUND

No sound.

### SUMMARY

There are three adventure games in this series. There is a different goal in each game: destroy the meteor, get the goose with the golden egg, get the computer up and running. The vocabulary is frustratingly limited. However, the price is right, and for the beginning adventure player, this is a reasonable buy.

<b>Annihilator</b>		<b>\$19.95 Cassette</b>
<b>Victory Software</b>		(Joystick required)
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

An arcade game where you defend a spaceship against aliens and asteroids. You start with three ships and gain a bonus ship every 10,000 points. Similar to Defender.

### GRAPHICS APPEAL

Contains high resolution, multicolor graphics.

### INTEREST LEVEL

Very challenging, and the game gets increasingly more difficult. A fast-moving game similar to Defender.

### USE OF SOUND

Minimal use of sound.

### SUMMARY

Annihilator is a fun, fast-action game. A handy pause feature allows you to walk away from the game for a while and pick it up later.

**Ape Craze  
Comm\*Data****\$27.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
C Documentation		- Strategy
B Error handling		

**DESCRIPTION**

Arcade-style game. You control the ability of a little man to jump and climb a platform while dodging bombs thrown down by a giant ape. When you reach the passage at the top you pass into another, more difficult screen.

**GRAPHICS APPEAL**

High resolution sprite movement.

**INTEREST LEVEL**

A number of factors keep this game interesting. The structure of the platform changes with each new play. The pattern of bombs is constantly changing to keep you on your toes, and there are two separate screens.

**USE OF SOUND**

A cute little melody plays along with the game.

**SUMMARY**

Although the response of the little man is a little sluggish, once you master the timing, this is a challenging little game. The random nature of the platform makes each game different from the one before it.

<b>Arcade Pak Computermat</b>		<b>\$24.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
D Overall rating	D Graphics appeal	+ Multiple screens
D Price/ Performance	C Use of sound	+ Multiple levels
B Ease of use	C Interest level	- Adventure
B Vendor support		+ Arcade
C Documentation		- Strategy
B Error handling		

### DESCRIPTION

This package contains three separate arcade games: Target Command, Head On, and Alien Invasion. In Target Command, as bombs slowly descend from the top of the screen, you direct the firing of a nuclear blast before it reaches the homes at the bottom of the screen. In Head On you direct a small car as it travels counterclockwise in a circular maze. You attempt to travel the entire maze without hitting another car that is running clockwise. Alien Invasion is a slower version of Space Invaders, with invaders slowly descending upon you while you attempt to fire missiles up at the invaders.

### GRAPHICS APPEAL

The graphics are low resolution, very vague, and slow to respond to joystick commands.

### INTEREST LEVEL

Although you can alter the difficulty level, the Alien Invasion and Target Command games are simply poor copies of arcade games that are already very old. Head On is mildly interesting.

### USE OF SOUND

Some sound effects.

### SUMMARY

Even three games are not enough to make this a good selection. The graphics are poor and very sluggish to respond to joystick commands.

**Attack of the Mutant Camels**  
HesWare

**\$44.95 Diskette**  
(Joystick Required)

**GENERAL CRITERIA**

A Overall rating  
C Price/  
Performance  
A Ease of use  
A Vendor support  
B Documentation  
B Error handling

**SPECIFIC CRITERIA**

A Graphics appeal  
C Use of sound  
B Interest level

**FEATURES**

- Multiple screens  
+ Multiple levels  
- Adventure  
+ Arcade  
- Strategy

**DESCRIPTION**

Arcade-style game. You maneuver a small cannon firing rockets across a grid. Small droids gradually descend from the top of the screen on you. You must shoot them down before they make contact with you.

**GRAPHICS APPEAL**

High resolution, very colorful graphics.

**INTEREST LEVEL**

There are twenty levels of skill. The game gets progressively more difficult and complex. Regardless of your skill the game remains challenging.

**USE OF SOUND**

Only minimal use of sound affects.

**SUMMARY**

This is an advanced form of Gridrunner with a greater variety of movement and challenge. If you have not purchased Gridrunner, this one is better. And even if you have, they are very similar in nature.

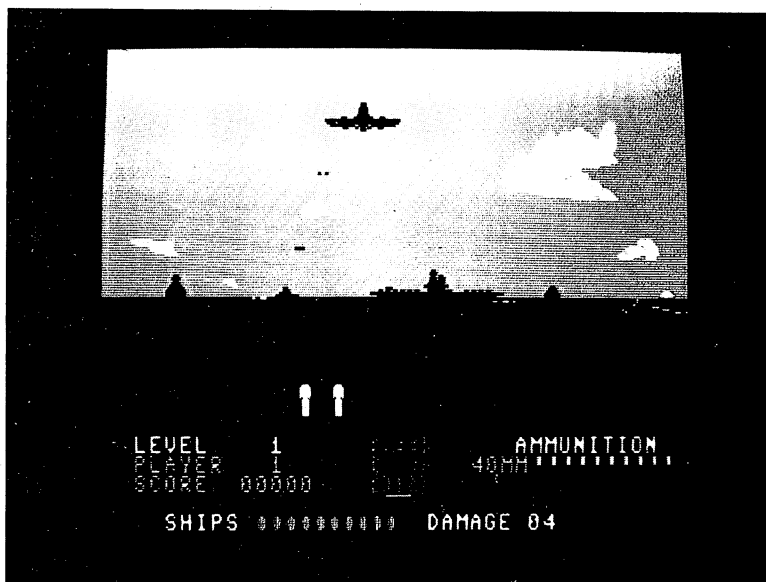


Figure 4. Beach Head

**Beach Head  
Access****\$34.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	+ Multiple screens
A Price/ Performance	B Use of sound	+ Multiple levels
A Ease of use	A Interest level	- Adventure
B Vendor support		+ Arcade
A Documentation		- Strategy
B Error handling		

**DESCRIPTION**

An arcade game. You direct anti-aircraft guns at oncoming planes. If you down all the aircraft, you direct cannons against ships, and if successful at that you direct tanks against gun emplacements. You collect points for each downed plane, ship, or gun emplacement.

**GRAPHICS APPEAL**

Excellent high resolution graphics. Oncoming planes are animated to appear as if they are actually approaching you from a distance and then pass overhead.

**INTEREST LEVEL**

One or two can play this game. There are four levels of difficulty. Excellent three-dimensional perspective on planes. Excellent color and resolution.

**USE OF SOUND**

Sound effects of planes and machine gun fire.

**SUMMARY**

Excellent. One of the best arcade programs around. Give it to an arcade lover and you will still be hearing machine gun fire at two in the morning.

<b>Black Jack</b>		<b>\$15.95 Diskette</b>
<b>Pacific Coast Software</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
B Price/Performance	C Use of sound	- Multiple levels
A Ease of use	B Interest level	- Adventure
B Vendor support		- Arcade
B Documentation		+ Strategy
B Error handling		

### DESCRIPTION

A strategy game. Just like casino blackjack, you can double down, split the first pair, and insure a blackjack. The computer keeps track of your winnings, shuffles the cards, and deals them out.

### GRAPHICS APPEAL

Low resolution PET graphics, but the graphics are adequate for this application.

### INTEREST LEVEL

If you enjoy blackjack, you will enjoy this game. The computer responds quickly, and all of the options normally found with blackjack are available.

### USE OF SOUND

Very minimal use of sound.

### SUMMARY

Great for trying your system before you lose your money. The computer shuffles occasionally, but you can still count cards. The only drawback: you can only play one hand at a time.

**Blade of Blackpoole  
Sirius**
**\$39.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	- Multiple levels
B Ease of use	B Interest level	+ Adventure
A Vendor support		- Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

An adventure game with graphics. You travel in search of the magical sword. You will encounter physical difficulties as well as an assortment of puzzles to solve.

### GRAPHICS APPEAL

Low resolution screens depicting your present location and situation.

### INTEREST LEVEL

The graphics work well with this adventure game. The story line is interesting with lots of alternative actions and a good vocabulary.

### USE OF SOUND

Minimal but interesting sound effects.

### SUMMARY

First-time adventure players may find this one particularly interesting and challenging. The graphics enhance the play, and the vocabulary seems comprehensive.

<b>B-1 Bomber</b>		<b>\$21.00 Diskette</b>
<b>Avalon Hill</b>		<b>\$16.00 Tape</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	n/a Graphics appeal	- Multiple screens
B Price/Performance	n/a Use of sound	- Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		- Arcade
B Documentation		+ Strategy
B Error handling		

### DESCRIPTION

A strategy game. In this game you interact with the computer, giving it short commands similar to an adventure game. You direct your bomber to a given city. You are armed with defensive weapons and direct your plane around Soviet defensive installations, MIG interceptors, and SAM missiles. You are warned when a Soviet weapon is closing in on you, and you must take appropriate action.

### GRAPHICS APPEAL

You are given printed messages on the screen and prompted for appropriate entries.

### INTEREST LEVEL

The game seems to have infinite scenarios which change as you change your actions. Each time you react differently, the computer reacts differently.

### USE OF SOUND

No sound involved.

### SUMMARY

A little scary considering the scenario, but extremely exciting and challenging.

**Castle Wolfenstein**  
**Muse Software**

**\$29.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	B Graphics appeal	+ Multiple screens
A Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	A Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

An arcade game. You direct a POW in an effort to escape a Gestapo prison. You direct movement, the aiming and firing of a gun, the throwing of a hand grenade, and the location and removal of various items from chests hidden throughout the prison. The game requires more than arcade skills in making good your escape.

### **GRAPHICS APPEAL**

High resolution sprite graphics. Lots of different rooms to explore, each with its own screen. Semi-animated movement.

### **INTEREST LEVEL**

Finally something new. The game is fascinating, involving arcade and adventure interaction. Even some strategy in this one. If you manage to escape, you get promoted and the next game is more difficult.

### **USE OF SOUND**

Sound effects and synthesized speech. That's right—it talks.

### **SUMMARY**

A new class of games, including the use of synthesized speech. There are long delays between games as sections of the game are reloaded, but you can save the game to disk and reenter it later.

<b>Chomperman</b>		<b>\$19.95 Tape</b>
<b>Victory Software</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/Performance	B Use of sound	+ Multiple levels
A Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. You direct Chomperman, alias Pac-Man, through different mazes. Chased by an increasing number of villains, you can get charged at different stations to turn on your adversaries. You gain extra points passing treasures along the way.

### GRAPHICS APPEAL

High resolution graphics with smooth scrolling sprites.

### INTEREST LEVEL

There are eight different screens and nine different levels of play to keep even the most advanced player on his toes. You can speed up Chomperman and send him off the screen to reappear on the other side.

### USE OF SOUND

Minimal use of sound effects and music, with traditional Pac-Man sound effects.

### SUMMARY

Actually one of the better Pac-Man clones. The graphics are good and the difficulty level can be increased to maintain the challenge. We like the speed-up feature.

**Choplifter**  
**Broderbund Software**

**\$44.95 Cartridge**  
 (Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	+ Multiple screens
B Price/Performance	C Use of sound	+ Multiple levels
A Ease of use	A Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

An arcade game. You direct a helicopter to pick up very animated little men as they escape from a POW camp. You fire against oncoming tanks and jets that try to shoot you down. Score is kept on how many men you are able to rescue and bring back to the safety of your base.

### **GRAPHICS APPEAL**

High resolution sprite graphics. Excellent animation.

### **INTEREST LEVEL**

The game gets progressively more difficult with additional tanks and jets intruding on your rescue attempt.

### **USE OF SOUND**

Sound effects only.

### **SUMMARY**

One of the best arcade games available. Excellent graphics, challenging.

<b>Collision</b>		<b>\$15.95 Diskette</b> <b>\$12.95 Tape</b> (Joystick Required)
<b>Topologic</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
B Price/Performance	C Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. A one or two-player game which directs an expanding column within a closed rectangle. You direct the column's growth left, right, up, or down—avoiding the walls and the other column while a timer counts down. You gain points for going the whole time limit.

### GRAPHICS APPEAL

Low resolution graphics.

### INTEREST LEVEL

This game is simple but different from most arcade games and manages to provide some challenge. You can program for 10 different levels of difficulty.

### USE OF SOUND

Minimal use of sound effects.

### SUMMARY

A single screen with variations on speed and obstructions, this game rates just slightly above average for uniqueness.

<b>CRIBBAGE</b>		<b>\$24.95 Diskette</b>
Softsmith		keyboard control
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	C Graphics appeal	- Multiple screens
B Price/	C Use of sound	- Multiple levels
Performance	A Interest level	- Adventure
A Ease of use		- Arcade
D Vendor support		+ Strategy
C Documentation		
A Error handling		

### DESCRIPTION

This program assumes that you already know how to play the game. It doesn't appear to make errors or foolish moves, but outside of that and the lack of the sound of cards being shuffled, it's a real Cribbage partner!

### GRAPHICS APPEAL

Screen contains computer's cards (face down), your cards (face up), and the crib and cribbage board. Graphics is not its high point.

### INTEREST LEVEL

Depends strictly on your interest in Cribbage.

### USE OF SOUND

A little melody before and after the game and the movement of the pegs on the board are about the only sounds available.

### SUMMARY

An excellent program for the Cribbage fanatic. Not difficult at all to learn the operating instructions. An excellent way to sharpen your playing ability as the game is so like cribbage, you'll never need another partner.

<b>CROSSFIRE</b>		<b>\$34.95 Diskette</b>
<b>Sierra Vision</b>		Joystick or Keyboard Control
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	- Multiple screens
B Price/Performance	A Use of sound	- Multiple levels
B Ease of use	A Interest level	- Adventure
C Vendor support		+ Arcade
A Documentation		- Strategy
A Error handling		

### DESCRIPTION

Arcade-style game where you are free to move along a horizontal or vertical axis and fire missiles at an intruder. Object is to clear the grid of all aliens to complete each round.

### GRAPHICS APPEAL

Good clarity, even on a TV screen. Along the edge of the screen a scoreboard keeps track of score and status.

### INTEREST LEVEL

Each round gives you five less shots before replenishing your supply, which simply means maneuvering to a randomly placed stockpile.

### USE OF SOUND

A modified version of Peter Gunn along with background sound to bring out a true arcade-style game.

### SUMMARY

A little tough to get the hang of. Ages 7 and up. Does not seem to be in many arcade centers, but nonetheless quite an exciting game.

**Cyberworld**  
**Progressive Peripherals & Software**

**\$39.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	+ Multiple screens
B Price/	B Use of sound	- Multiple levels
Performance	A Interest level	+ Adventure
A Ease of use		+ Arcade
A Vendor support		- Strategy
A Documentation		
A Error handling		

### **DESCRIPTION**

This game is actually three games in one combining the best of both arcade and adventure games. The year is 2814 and your assignment is to capture a Drokon warship, defend against waves of alien warships, and then track and destroy all remaining enemy vessels. In the first phase, you use text commands to move from room to room within a Drokon vessel. You collect various objects which ultimately help you take over the ship. In the second phase, you direct a mobile laser cannon against alien warships. In the third phase, you maneuver through the galaxy using text commands to scan for aliens and monitor damage to your own ship and attack the enemy.

### **GRAPHICS APPEAL**

In the first phase, you view each room with a map showing your location within the ship. In the second phase, you view the enemy vessels on your screen. The third phase, displays a map of the galaxy revealing your location as well as the location of your enemies. Separate screens reveal the status of your weapons and damage. There are over 100 different sprites, 3-D type graphics, and a variety of text displays.

### **INTEREST LEVEL**

There is an abundance of screens and sprites to keep the interest level high. Each game requires separate skills and the variety of activities makes this game extremely challenging.

### **USE OF SOUND**

There are some interesting sound effects.

### **SUMMARY**

This game, by the same people who make Gothmog's Lair, will keep you engrossed for weeks. It requires the strategy of an adventure game and the reflexes of an arcade game. If you are not typically a "game player" but are looking for a little diversion, this has it all.

**Cyclons 64**  
**Softsmith****\$27.95 Tape**  
(Joystick Required)**GENERAL CRITERIA**

- C Overall rating
- C Price/  
Performance
- B Ease of use
- A Vendor support
- B Documentation
- B Error handling

**SPECIFIC CRITERIA**

- C Graphics appeal
- C Use of sound
- C Interest level

**FEATURES**

- + Multiple screens
- + Multiple levels
- Adventure
- + Arcade
- Strategy

**DESCRIPTION**

Arcade-style game. You can maneuver your space-craft or fire your laser cannons but not both at the same time. You are chased by alien spacecraft and gain points as you shoot them down. This is the same game as Enniaxx from Pacific Coast Software.

**GRAPHICS APPEAL**

There is a very realistic exploding cluster display that is repeated each time a ship is destroyed, but very little variety in graphic displays.

**INTEREST LEVEL**

In this game there are two slightly different screens, four levels of difficulty, and the ability to have bullets ricochet to make the game more interesting.

**USE OF SOUND**

Perhaps the best part of the game is the theme from *Star Wars* that is played in the beginning, but after that the sound effects are repetitive.

**SUMMARY**

Extremely repetitive, this game lacks the stimulation most avid arcade players are looking for.

**Enniaxx**  
**Pacific Coast Software**

**\$27.95 Diskette**  
 (Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	C Graphics appeal	+ Multiple screens
C Price/ Performance	C Use of sound	+ Multiple levels
B Ease of use	C Interest level	- Adventure
A Vendor support		+ Arcade
C Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade-style game. You can maneuver your spacecraft or fire your laser cannons, but not both at the same time. You are chased by the same alien spacecraft and gain points as you shoot them down.

### **GRAPHICS APPEAL**

A very realistic exploding cluster display is repeated each time a ship is destroyed, but there's very little variety in the other graphic displays.

### **INTEREST LEVEL**

There are two background settings—both very simple. There are four levels of difficulty and an option of having your laser rounds bounce off the side of the screen. The action is extremely repetitive.

### **USE OF SOUND**

Perhaps the best part of the game is the theme from *Star Wars* that is played in the beginning, but after that the sound effects are repetitive.

### **SUMMARY**

Extremely repetitive, this game lacks any stimulation beyond a terrific exploding cluster routine.

**Escape MCP  
Comm\*Data**

**\$27.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	B Graphics appeal	+ Multiple screens
C Price/ Performance	C Use of sound	- Multiple levels
B Ease of use	C Interest level	- Adventure
A Vendor support		+ Arcade
C Documentation		- Strategy
B Error handling		

**DESCRIPTION**

Arcade-style game. You maneuver a little figure through a maze, avoiding the MCP that passes through walls to attack you. At the end of one maze you move through into another.

**GRAPHICS APPEAL**

High resolution sprite movement with a maze as a background.

**INTEREST LEVEL**

There are nine different mazes, each progressively harder, but the action remains the same.

**USE OF SOUND**

Minimal use of sound effects.

**SUMMARY**

This game lacks the stimulation most players look for in an arcade game. You simply move through the maze, avoiding the MCP. However, children will probably enjoy the game and find it easy to master its control.

**Frantic Freddie**  
**Commercial Data Systems**

**\$34.95 Diskette**  
 (Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	A Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade-style game. You direct Frantic Freddie through subterranean levels to collect pots of gold and avoid the underground monsters. You direct Freddie to move horizontally in the chambers and vertically up and down ladders.

### **GRAPHICS APPEAL**

High resolution sprite graphics.

### **INTEREST LEVEL**

The game is surprisingly difficult and gets progressively more difficult.

### **USE OF SOUND**

The musical quality is excellent. A number of different melodies accompany this game—each of them excellent.

### **SUMMARY**

An entertaining game with excellent graphics and musical qualities.

<b>Frogger</b>		<b>\$34.95 Diskette</b>
<b>Sierra Vision</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	A Graphics appeal	- Multiple screens
B Price/Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. Attempt to get your frog across a busy highway and log-filled river to the safety of a lily pad. Use either a joystick or keyboard commands.

### GRAPHICS APPEAL

Excellent high resolution graphics with true animation.

### INTEREST LEVEL

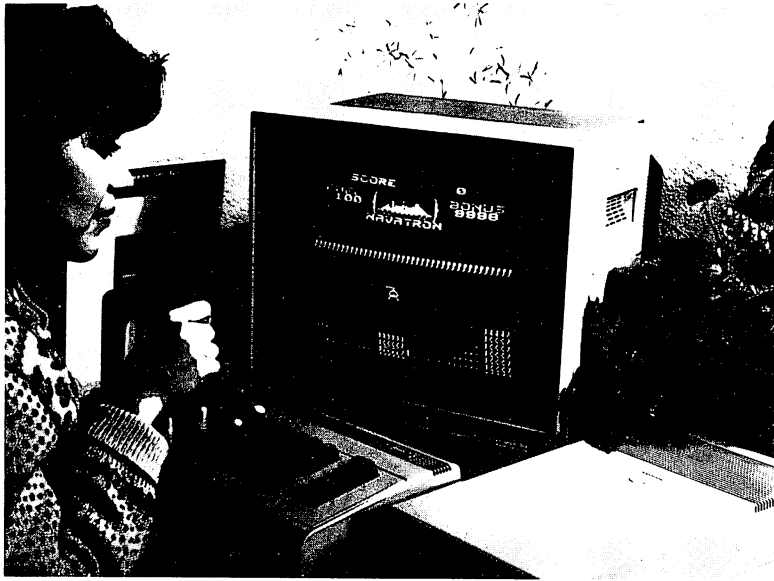
Game gets progressively harder as your score mounts. There are more cars and predators to avoid.

### USE OF SOUND

High-quality background music that can be turned off after you have heard enough.

### SUMMARY

This version retains all of the qualities that have made it so popular in the arcade parlors. Excellent quality graphics and sound seems to be a trademark of Sierra.



**Figure 5. Ft. Apocalypse**

**Ft Apocalypse  
Synapse**

**\$34.95 Tape**  
(Joystick Required)

**GENERAL CRITERIA**

- A Overall rating
- B Price/  
Performance
- A Ease of use
- B Vendor support
- B Documentation
- B Error handling

**SPECIFIC CRITERIA**

- A Graphics appeal
- C Use of sound
- A Interest level

**FEATURES**

- + Multiple screens
- Multiple levels
- Adventure
- + Arcade
- Strategy

**DESCRIPTION**

An arcade game. You direct a helicopter to rescue men trapped in various levels of an underground cavern. You maneuver the craft to avoid the walls of the cavern and fire cannons and plasma bombs to destroy attacking tanks, helicopters, and an assortment of booby traps. You attempt to destroy the underground fortress, rescue your forces, and try not to run out of fuel.

**GRAPHICS APPEAL**

High resolution sprite graphics. Four different screens.

**INTEREST LEVEL**

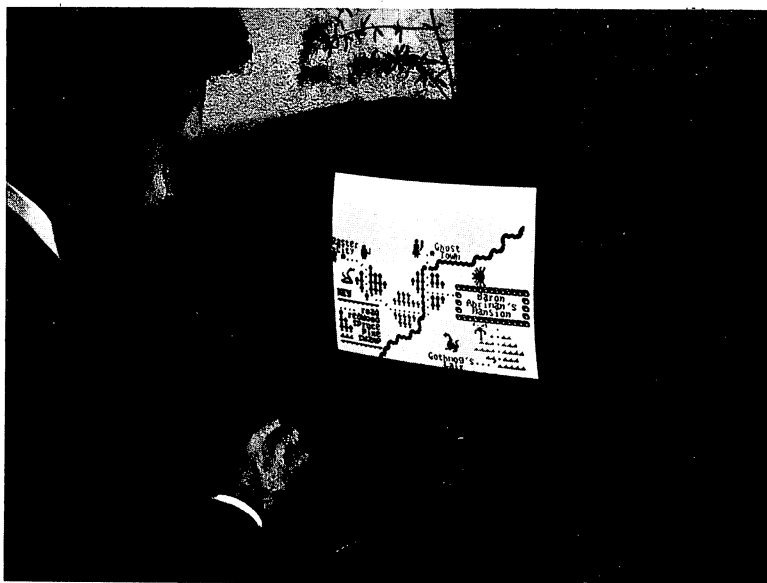
The game gets progressively more difficult the deeper you penetrate the cavern. Lot of action, lots of different screens, and lots of skill required to finish a game.

**USE OF SOUND**

Sound effects only.

**SUMMARY**

Another excellent arcade game. Enjoyed by all ages, it will get lots of use in a family.



**Figure 6. Gothmog's Lair**

**Gothmog's Lair  
Progressive Peripherals & Software**
**\$39.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
A Ease of use	B Interest level	+ Adventure
A Vendor support		- Arcade
A Documentation		- Strategy
A Error handling		

### DESCRIPTION

This is a more traditional adventure game. It includes eleven treasures with assorted point values and 50 objects to help obtain the treasures. Some graphics and sound enhance the game. You can enter up to nine-word sentences and abbreviate key words. The time required for your decision is considered.

### GRAPHICS APPEAL

Minimal but interesting use of graphics.

### INTEREST LEVEL

This is for the seasoned adventure lover who is prepared to spend weeks finishing a game. Lot of variety and challenge.

### USE OF SOUND

Minimal but interesting sound effects.

### SUMMARY

Lot of maps and magic, and helpful little gnomes to guide you on your way. If you're an adventure fanatic, you will love it. If you have not tried adventure games before, you will find out if you like this type of game with Gothmog's Lair.

**Grandmaster  
United Microware**

**\$32.95 Cassette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
B Price/ Performance	C Use of sound	+ Multiple levels
A Ease of use	B Interest level	- Adventure
B Vendor support		- Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

A strategy game of traditional chess. Grandmaster keeps track of the moves each side has taken and allows you to determine how many moves ahead the computer is thinking. You can change options during the middle of the game. The game allows you to take back a move even after the computer has played its move.

### **GRAPHICS APPEAL**

Standard chess board and pieces. You can change background and border colors.

### **INTEREST LEVEL**

Ten levels of difficulty. On more advanced levels of play it takes the computer a long time to make its move. There is, however, a special feature that allows you to force the computer into making an immediate move.

### **USE OF SOUND**

Minimal use of sound.

### **SUMMARY**

Excellent for beginning to intermediate chess players. It is designed to facilitate learning, allowing you to program the difficulty, and to take back moves after you see how the computer will respond.

<b>Grave Robbers</b>		<b>\$14.95 Diskette</b>
<b>Victory Software</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
B Price/Performance	C Use of sound	+ Multiple levels
A Ease of use	B Interest level	- Adventure
B Vendor support		- Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

This is a beginning adventure game. There are a dozen verbs that can be abbreviated and an assortment of nouns. There is a simple graphic display that accompanies each level. The object is to retrieve a diamond. There is a single method and conclusion to the game.

### GRAPHICS APPEAL

Uses PET graphics. Very simple displays.

### INTEREST LEVEL

There is a single scenerio to this game with a limited vocabulary available and limited options. The graphics do seem to enhance the game.

### USE OF SOUND

Some background thunder only.

### SUMMARY

This might be entertaining for the beginning adventure player, but it lacks the sophistication that most are looking for in a game. The graphics are a nice touch, but about the only way to solve the problem is to look on the hint list which tells you exactly how to solve the problem.

**Gridrunner**  
**Human Engineered Software**

**\$39.95 Cartridge**  
 (Joystick required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
B Price/ Performance	C Use of sound	+ Multiple levels
A Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade game similar to Centipede. You command a missile-firing spaceship against aliens. Setting is a gridlike array (space station) where waves of aliens appear at the top and gradually descend to destroy your ship.

### **GRAPHICS APPEAL**

Contains high resolution, multicolor graphics.

### **INTEREST LEVEL**

The game gets progressively more challenging as the waves of aliens increase.

### **USE OF SOUND**

Some repetitive sound effects.

### **SUMMARY**

A very popular game that increases in difficulty as you rack up the points. You can enter the game on any level to keep up the stimulation.

**Head On  
Softsmith**

**\$19.95 Diskette  
\$12.95 Tape**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	C Graphics appeal	- Multiple screens
B Price/ Performance	C Use of sound	+ Multiple levels
A Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade-style game. You direct a tiny car through a circular maze, gaining points as you go and avoiding another tiny car headed in the opposite direction.

### **GRAPHICS APPEAL**

A single screen with two mobile sprites.

### **INTEREST LEVEL**

The game is extremely simple yet challenging. There are nine levels of play with the opposing little car getting faster as you progress.

### **USE OF SOUND**

Minimal use of sound effects.

### **SUMMARY**

We think younger children will find this game especially enjoyable. It is simple enough for anyone to play right away and yet gets progressively more difficult to provide continual challenge.

**Jawbreaker II**  
**SierraVision**
**\$29.95 Diskette**  
**\$34.95 Cartridge**
**GENERAL CRITERIA**

- B Overall rating
- B Price/Performance
- A Ease of use
- B Vendor support
- B Documentation
- B Error handling

**SPECIFIC CRITERIA**

- B Graphics appeal
- B Use of sound
- B Interest level

**FEATURES**

- Multiple screens
- + Multiple levels
- Adventure
- + Arcade
- Strategy

### DESCRIPTION

An arcade game. There are some similarities to Pac-Man. You direct a set of dentures through 5 rows of dots gaining points as you devour the dots. You must avoid happy faces that jump in from the side of the screen.

### GRAPHICS APPEAL

High resolution sprite graphics.

### INTEREST LEVEL

There are ten different levels of difficulty that you can set. Each level speeds the game up. Within a level, the game gets progressively more difficult as you clear a screen.

### USE OF SOUND

A pleasant little tune accompanies play, and occasional sound effects occur.

### SUMMARY

Children will enjoy this game. It is easy to learn and master, with the ability to change the difficulty level to maintain the challenge.

<b>Jumpman</b>		<b>\$39.95 Diskette</b> (Joystick required)
<b>Epyx</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	+ Multiple screens
B Price/Performance	A Use of sound	+ Multiple levels
A Ease of use	A Interest level	- Adventure
B Vendor support		+ Arcade
A Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade game. You move and jump a small animated man up ladders and across girders, avoiding an assortment of flying obstacles as you collect bombs for points.

### GRAPHICS APPEAL

High resolution graphics with sprite animation.

### INTEREST LEVEL

Thirty game levels with lots of different screens, a variety of obstacles, and various levels of difficulty. One to four players with top scores recorded.

### USE OF SOUND

Pleasant little tunes between games and sound effects enhance play.

### SUMMARY

One of the best arcade games available. Levels of difficulty can be altered so the whole family can play together. The type of game where adults find themselves as enthusiastic as a four-year-old child.

**Jumpman Jr.**  
Epyx

**\$39.95 Cartridge**  
(Joystick required)

**GENERAL CRITERIA**

- A Overall rating
- B Price/Performance
- A Ease of use
- B Vendor support
- A Documentation
- B Error handling

**SPECIFIC CRITERIA**

- A Graphics appeal
- A Use of sound
- A Interest level

**FEATURES**

- + Multiple screens
- + Multiple levels
- Adventure
- + Arcade
- Strategy

**DESCRIPTION**

Arcade game. You move and jump a small animated man up ladders and across girders, avoiding an assortment of flying obstacles as you collect bombs for points. Essentially the same game as Jumpman with only slight variations.

**GRAPHICS APPEAL**

High resolution graphics with sprite animation.

**INTEREST LEVEL**

Twelve game levels with lots of different screens, a variety of obstacles, and various levels of difficulty. The speed of the little man can be increased to increase the challenge, with top scores recorded.

**USE OF SOUND**

Pleasant little tunes between games as well as sound effects enhance play.

**SUMMARY**

One of the best arcade games available. Levels of difficulty can be altered so the whole family can play together. The type of game where adults find themselves as enthusiastic as a four-year-old child. No noticeable difference with Jumpman.

**Kickman  
Commodore****\$29.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

**DESCRIPTION**

An arcade game. You move a clown on his unicycle to pop or catch falling balloons. If you miss, you have an opportunity to kick the balloons up before they reach the ground. If you miss, you trip and fall.

**GRAPHICS APPEAL**

High resolution sprite graphics. Lots of color.

**INTEREST LEVEL**

A unique game that children will love. You can adjust the amount and speed of the falling balloons to keep the game challenging.

**USE OF SOUND**

A nice little introductory tune and sound effects.

**SUMMARY**

Simple but surprisingly enjoyable. The type of game you can play with your five-year-old and enjoy it as much as he does.

**Kongo Kong  
Victory Software**

**\$19.95 Diskette**  
(Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
A Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
C Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade-style game. You move and jump a fireman up ladders and girders to save a woman from the clutches of a giant ape. The ape rolls obstacles down on you from above.

### **GRAPHICS APPEAL**

High resolution sprite graphics.

### **INTEREST LEVEL**

There are three different screens and nine levels of difficulty. Each screen has its own obstacles and objects. Advanced levels can be quite challenging.

### **USE OF SOUND**

An effective use of sound including sound effects and short tunes when you save the woman or are eliminated.

### **SUMMARY**

An excellent buy if you are looking for the arcade game involving jumping and climbing skills. The sprite graphics are colorful, and the music is an enhancement rather than a nuisance. The price is excellent for the quality of arcade game presented.

<b>Laser Strike</b>		<b>\$29.95 Diskette</b> (Joystick Required)
<b>Isis Hathor Digital Productions</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/Performance	B Use of sound	- Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

**DESCRIPTION**

Arcade-style game. You guide an attack fighter over passing terrain and through clusters of asteroids, solar pods, and asteroid cities. You gain points shooting solar pods with a laser cannon or bombing cities with a plasma bomb. At the end of one display you enter an ice cavern, avoiding contact with the walls and bombing reactor stations.

**GRAPHICS APPEAL**

High resolution sprite graphics.

**INTEREST LEVEL**

The challenge of the game shifts slightly from maneuvering between asteroids to guiding your way through the ice cavern. Each shift speeds up the game and makes it more challenging.

**USE OF SOUND**

There is a modest use of sound effects as you speed your craft or shoot solar pods.

**SUMMARY**

An entertaining game. Make sure you have a good joystick as the game requires very quick reactions. A good buy for long-term entertainment.

**Lode Runner**  
**Broderbund**
**\$34.95 Diskette**  
**\$39.95 Cartridge**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	B Graphics appeal	+ Multiple screens
A Price/Performance	B Use of sound	+ Multiple levels
B Ease of use	A Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

An arcade game. In this game you move your lode runner horizontally across brick walkways and up and down ladders collecting pots of gold. You are pursued by guards. You can blast a hole in the brick walkways to trip up the guards—but don't fall into it yourself. An added feature: you can alter the program and actually create your own arcade game.

### GRAPHICS APPEAL

Excellent high resolution graphics.

### INTEREST LEVEL

This is a fast-moving game with 150 variations of the screen; and if you get tired of those you can design your own.

### USE OF SOUND

High-quality sound effects.

### SUMMARY

Excellent. The game itself would be worth the price, but programming your own alterations can also be as much fun.

**Lunar Leeper**  
**Sierra Vision****\$34.95 Diskette**  
(Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	B Graphics appeal	+ Multiple screens
C Price/Performance	C Use of sound	+ Multiple levels
B Ease of use	C Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

**DESCRIPTION**

Arcade-style game. Maneuver a rescue craft to pick up small animated life forms without getting eaten by lunar leepers. Fly your ship to the safety of the cliffs. In addition to the action on the screen, you can see the amount of fuel you have left and your location over the valley floor.

**GRAPHICS APPEAL**

Small but very animated graphics.

**INTEREST LEVEL**

The difficulty of the game can be set from 1 to 7. When you have rescued or lost all the little men, a second scene appears where you are located deep within a cavern. Now you attempt to destroy a giant eyeball before running out of fuel.

**USE OF SOUND**

Minimal use of sound.

**SUMMARY**

A rather routine scenario of rescue and fuel limits, but still somewhat challenging at the more advanced levels. Hate to give a mediocre review to Sierra Vision, but maybe you can borrow Lunar Leeper from a friend.

**Maelstrom  
Comm\*Data**

**\$27.95 Tape and Disk**  
(Joystick Required)

**GENERAL CRITERIA**

C Overall rating  
C Price/  
Performance  
B Ease of use  
B Vendor support  
B Documentation  
B Error handling

**SPECIFIC CRITERIA**

B Graphics appeal  
B Use of sound  
C Interest level

**FEATURES**

- Multiple screens  
+ Multiple levels  
- Adventure  
+ Arcade  
- Strategy

**DESCRIPTION**

An arcade game. A Space Invaders-type game where small sprites descend gradually from above. You attempt to shoot them down before they reach the bottom row and destroy you.

**GRAPHICS APPEAL**

High resolution sprite graphics. Movement is a little shaky.

**INTEREST LEVEL**

Little challenge. The game tries to include Space Invaders action with Centipede action, but just lacks anything interesting to make it more than routine.

**USE OF SOUND**

Sound effects only.

**SUMMARY**

Mediocre. The game gets very repetitious very quickly.

**Matchmaker 64  
Softsmith**

**\$19.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		- Arcade
B Documentation		- Strategy
B Error handling		

**DESCRIPTION**

A memory game, where 52 or 90 cards (your choice) are viewed face down on the screen. You try to pick two that match. The two are temporarily flipped over to display the letters of the alphabet underneath. You try to remember the letters for later matches. You gain points by making a match.

**GRAPHICS APPEAL**

Low resolution but colorful graphics.

**INTEREST LEVEL**

You can vary a number of parameters to make the game more difficult or easy (such as tagging guessed cards or increasing the number of cards).

**USE OF SOUND**

Minimal use of sound effects for correct or incorrect answers.

**SUMMARY**

If you enjoy the game show Concentration, you will love this game. It can be extremely frustrating, for someone with a poor memory, but it is a game that children and adults can play together.

**Metamorphosis  
Victory Software**

**\$27.95 Diskette  
24.95 Tape**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	- Multiple levels
B Ease of use	C Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

An arcade game. Four separate screens in which you maneuver around a constantly expanding maze, maneuver and fire at tiny mobile robots that are also firing at you, and maneuver around indestructible mobile robots to destroy the power source.

### **GRAPHICS APPEAL**

High resolution sprite graphics.

### **INTEREST LEVEL**

There are four separate screens to enhance the interest level, but there is no way to increase the difficulty. Once the skills are mastered the game becomes quite routine.

### **USE OF SOUND**

Minimal use of sound effects.

### **SUMMARY**

Initially an interesting game that grows routine after you develop the skills of maneuvering around the obstacles.

**Midway  
Microcomputer Games**
**\$16.00 Tape**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	C Graphics appeal	- Multiple screens
B Price/ Performance	n/a Use of sound B Interest level	- Multiple levels + Adventure
B Ease of use		- Arcade
B Vendor support		+ Strategy
B Documentation		
B Error handling		

### DESCRIPTION

A cross between a strategy game and an adventure game. This game simulates the encounter between the Japanese naval forces and the US naval forces near Midway in 1942. You maneuver the US forces and direct naval air attacks; the computer maneuvers the Japanese force. You must prepare aircraft launch attacks, etc. Changes are made by typing in characters through the keyboard, as you would in an adventure game.

### GRAPHICS APPEAL

Low resolution graphics. A crude map is displayed with naval forces represented by numbers and Midway represented by a star.

### INTEREST LEVEL

This will attract those who are into war games. There are endless scenerios, depending on location of forces, chance encounters, etc.

### USE OF SOUND

No sound

### SUMMARY

This game seems to have the right blend of skill and chance that makes a war game enjoyable.

<b>Motor Mania</b>		<b>\$29.95 Cartridge</b>
<b>UMI</b>		(Joystick Required)
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	A Use of sound	- Multiple levels
A Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. You direct by aerial view a race car through an increasingly difficult course. Each service station you are able to pass adds points to your score. There are hazards such as glass, oil, rocks, and other cars to avoid.

### GRAPHICS APPEAL

High resolution graphics.

### INTEREST LEVEL

There are no time clocks to beat, but narrowing sections of road and obstacles get progressively more difficult to avoid.

### USE OF SOUND

Lots of sound effects, including the shifting of gears, flat tires, sirens, and the sound of crashing cars.

### SUMMARY

The variety of obstacles makes this a challenging game worth adding to your collection.

**MR. COOL**  
**Sierra Vision****\$34.95 Diskette**  
(Joystick Required)**GENERAL CRITERIA**

- A Overall rating
- A Price/Performance
- B Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- A Graphics appeal
- A Use of sound
- A Interest level

**FEATURES**

- Multiple screens
- + Multiple levels
- Adventure
- + Arcade
- Strategy

**DESCRIPTION**

Arcade game where you, a cube of ice, jump from one pad to another (diagonally) changing the color to match the border. When all pads are changed, you move to the next round. An extra life is put in your reserve every 20,000 points and also at various points in the game.

**GRAPHICS APPEAL**

True arcade-style high resolution graphics; should be used with a monitor, but a TV will do.

**INTEREST LEVEL**

Very active and addicting with multiple levels of play.

**USE OF SOUND**

Not as widespread as its arcade cousin, but still very good.

**SUMMARY**

A medium-skill level game for ages 5 and up. Total concentration is needed but easily obtained as the movement on the screen seems to block out all outside stimuli.

**Mr. TNT**  
HesWare

**\$39.95 Cartridge**  
(Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	A Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade-style game. You maneuver a small figure through a complex grid, eliminating the grid as you move and avoiding tiny adversaries until they destroy you or burn themselves out.

### **GRAPHICS APPEAL**

High resolution, high quality graphics.

### **INTEREST LEVEL**

There are eight different levels of difficulty with variations of the same screen as you progress. Time as well as skill is a factor.

### **USE OF SOUND**

There is a modest use of sound effects and a little melody at the end of each round.

### **SUMMARY**

If you are tired of the Pac-Man and Space Invader clones, this may be what you are looking for. Simple yet challenging and—most importantly—different.

<b>M.U.L.E</b>		<b>\$40.00 Disk</b>
<b>Parker Brothers</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	- Multiple levels
C Ease of use	A Interest level	- Adventure
B Vendor support		- Arcade
B Documentation		+ Strategy
B Error handling		

### DESCRIPTION

This is a Monopoly-type game. From one to four players can play the game or you can watch the computer play the game by itself. The object of the game is to attempt to build an empire taking into account such factors as food, energy, and natural resources.

### GRAPHICS APPEAL

There are a variety of screens which display your current situation in the game.

### INTEREST LEVEL

This game has all of the challenges of a traditional board game. You play against the other players, negotiating deals, making investments, and relying on a little luck.

### USE OF SOUND

This game has some sound effects and an excellent melody that occasionally accompanies the play of the game.

### SUMMARY

Computers provide some amazing possibilities to enhance the more traditional board games that were so popular some years back. This game is an example of some of those possibilities. Music and graphics enhance this game. Having the computer as an objective scorekeeper takes some of the work out of playing a game.

**Neutral Zone  
Access****\$34.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	+ Multiple screens
A Price/ Performance	B Use of sound	+ Multiple levels
A Ease of use	A Interest level	- Adventure
A Vendor support		+ Arcade
A Documentation		- Strategy
A Error handling		

**DESCRIPTION**

An arcade game. You direct the aim of a laser cannon at spaceships and incoming rounds from the spaceship. You attempt to protect a nearby space station, gaining points for each craft you destroy within a time-frame.

**GRAPHICS APPEAL**

High resolution graphics. Excellent detail in graphics with cannon fire appearing to be three-dimensional as it moves from or toward an alien vessel.

**INTEREST LEVEL**

Although the scenario is pretty old, the detail and three-dimensional appearance of the graphics is miles ahead of most games of this type.

**USE OF SOUND**

Some sound effects of cannon fire and explosions.

**SUMMARY**

Access is producing consistently high-quality arcade games, and this is no exception. An excellent buy.

<b>Pegasus</b>		<b>\$27.95 Diskette</b>
<b>Commercial Data Systems</b>		(Joystick Required)
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	B Graphics appeal	- Multiple screens
B Price/Performance	C Use of sound	+ Multiple levels
B Ease of use	C Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. You fly the half-man/half-horse Pegasus above the landscape, attempting to drop onto similar creatures that hover around you. If you drop on them, you score; if they drop on you, you lose.

### GRAPHICS APPEAL

High resolution sprite graphics.

### INTEREST LEVEL

A single screen seems to get monotonous after a while, but the number and speed of the opposing villains increase with your score, and the game continues to be challenging.

### USE OF SOUND

Routine sound effects.

### SUMMARY

An average game—not the quality and response you would expect if you have played the arcade versions of Pegasus.

**Pegasus Odyssey**  
**Comm\*Data**
**\$27.95 Diskette**  
 (Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
B Price/ Performance	C Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
C Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. You direct the flight of a flying horse against killer bats. Each bat you kill lays an egg and you must land and destroy it. The joystick controls the flapping of the wings and the direction of movement.

### GRAPHICS APPEAL

High resolution sprite movement.

### INTEREST LEVEL

One or two can play this game, and the difficulty can be set from 0 to 9. The skills required are quite different from most other games and the speed of the bats continues to provide constant challenge.

### USE OF SOUND

Minimal use of sound effects.

### SUMMARY

Not quite the quality found in arcade Pegasus games but close enough to be enjoyable. We would like to see multiple screens and obstacles to heighten the interest level, but Pegasus players will want this one for sure.

<b>Perplexian Challenger</b>		<b>\$39.95 Diskette</b>
<b>Progressive Peripherals &amp; Software</b>		(Joystick Required)
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	+ Multiple screens
B Price/	B Use of sound	+ Multiple levels
Performance	A Interest level	- Adventure
A Ease of use		+ Arcade
A Vendor support		- Strategy
C Documentation		
B Error handling		

### DESCRIPTION

Arcade-style game. You direct your ship through space firing your laser bolts, attacking alien vessels, and avoiding their lethal photon bombs. You extend your flight by maneuvering your vessel to recover energy pods along the way.

### GRAPHICS APPEAL

This game contains excellent high resolution graphics including some impressive 3-D effects. Part of your screen reveals gauges and readouts for your ship.

### INTEREST LEVEL

There are four difficulty levels. In addition to the typical arcade skills required to fire your laser, you must take into consideration your fuel level, your protective shields, and your laser power.

### USE OF SOUND

There are some very realistic sound effects.

### SUMMARY

The graphics quality of this game puts it slightly ahead of most other arcade games in its class. One to four players can play this game and top scores are saved.

**Polyps from Pluto**  
**Pacific Coast Software**

**\$29.95 Diskette**  
 (Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
C Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade-style game. You aim the crosshairs on your missile launcher and shoot down alien craft that are trying to shoot down your space station. You must occasionally stop firing long enough to reload your weapon and refuel your ship. The aliens keep coming.

### **GRAPHICS APPEAL**

High resolution sprite movement. Background is mostly open space and stars.

### **INTEREST LEVEL**

Although it is mainly a game of shooting those poor alien ships again, you must find time to reload your weapon and refuel your ship. The more points you get, the faster they come—maintaining the challenge even when you start to get good at it.

### **USE OF SOUND**

Ten seconds of Bach and then some minor sound effects.

### **SUMMARY**

You can guide the missiles you fire at distant targets. You must keep track of fuel and ammunition as well as the aliens. All these factors make for a very challenging and interesting game.

<b>Pool</b>		<b>\$17.95 Diskette</b>
<b>Abacus</b>		<b>\$14.95 Tape</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	C Graphics appeal	- Multiple screens
B Price/ Performance	C Use of sound	- Multiple levels
B Ease of use	C Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. You view a pool table from above and indicate the direction in which the cue ball is to be hit. You then control the impact with which it will be hit. The balls on the table respond according to the angle with which they are struck and the momentum. You play the game as you would a real pool game.

### GRAPHICS APPEAL

High resolution sprite graphics.

### INTEREST LEVEL

Mildly interesting. Calculating angles of shots on a screen against balls that are not round to begin with seems to detract from the game. There is no way to alter levels of difficulty.

### USE OF SOUND

Sound effects of balls bouncing off each other.

### SUMMARY

If you are fascinated by pool, you may enjoy this game.

**Protector II  
Synapse**
**\$34.95 Diskette**  
(Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. Maneuver a rescue craft to pick up small animated life forms without running into a Fraxullan mothership, being chomped by a Chomper, or struck by meteoroids. There are lasers and rockets to avoid, a volcano that can erupt at any time, and if that's not enough, you are constantly running out of fuel.

### GRAPHICS APPEAL

Excellent high resolution color graphics.

### INTEREST LEVEL

A fairly common scenerio but enhanced with a large variety of obstacles, changing scenery, and excellent graphics and sound effects. In addition to the variety of obstacles, the optional difficulty level makes the game very challenging.

### USE OF SOUND

Nice little ballad in the beginning and plenty of sound effects.

### SUMMARY

Lots of action in this game. Moving across the landscape, there are four or five different settings with a variety of obstacles. If you are looking for a "rescue those little men before you run out of fuel game," this is better than most.

**Purple Turtles  
Quicksilva****\$29.95 Tape**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	A Graphics appeal	- Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
A Ease of use	C Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

**DESCRIPTION**

Arcade-style game. You jump a man across the shells of four turtles that bob up and down in a small pond. Using the turtles, you cross to pick up various fruit on the other side of the pond and return for extra score.

**GRAPHICS APPEAL**

Excellent graphics, very colorful, lots of sprite activity.

**INTEREST LEVEL**

There is a single screen but ten different difficulty levels and ten different speeds to vary the challenge from extremely easy to impossible. The theme is rather simple: jumping the man either forward or backward.

**USE OF SOUND**

A pleasant little melody in preparation for the game and minimal sound effects through the game.

**SUMMARY**

This game has terrific graphics, and children in particular will love this game. You can enter the name of the high scorer during a session and view the name anytime. There is a time limit that can be altered.

**Q\*Bert**  
**Parker Brothers**

**\$44.95 Cartridge**  
 (Joystick)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	- Multiple screens
B Price/Performance	A Use of sound	+ Multiple levels
A Ease of use	A Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

This is destined to become another classic along with Pac-man and Space Invaders. You direct Q\*Bert around a pyramid of steps avoiding a collection of adversaries that bounce in from all directions.

### **GRAPHICS APPEAL**

Although a basically simple display, an excellent use of color and form makes the game visually appealing.

### **INTEREST LEVEL**

The game is extremely simple to play. You merely control the direction of movement for Q\*Bert. The number of adversaries and their ferocity increase as you continue the game.

### **USE OF SOUND**

A variety of interesting and unusual sound effects occur as you play the game.

### **SUMMARY**

Occasionally a game comes along that is simple in theme yet exciting to play. It is difficult to analyze a game to determine what it is that makes the game so appealing, but whatever it is Q\*Bert has it.

**Repton  
Sirius**

**\$39.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	+ Multiple screens
B Price/ Performance	C Use of sound	- Multiple levels
A Ease of use	A Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

An arcade game. You fly your missile-firing spaceship over a passing landscape. You take on half a dozen different types of alien spacecraft. In the middle of all this, the aliens are constructing a base of operations which you attempt to foil. Three-fourths of the screen displays the action; the rest displays a radar screen of enemy craft and a record of your score.

### **GRAPHICS**

High resolution sprite graphics. Lots of color and action.

### **INTEREST LEVEL**

This is an action game with progressively more aliens who grow more deadly as you rack up the score. Extremely interesting.

### **USE OF SOUND**

Limited to some sound effects.

### **SUMMARY**

This is a fast game that nearly all arcade fanatics will love. Good graphics, lots of action and variety, and a nice training mode in the beginning that lets you practice before the big game.

**Road Toad**  
**Commercial Data Systems**

**\$19.95 Tape**  
 (Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	C Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade-style game. Attempt to get your frog across a busy highway and log-filled river to the safety of a lily pad. You direct the frog and his jump.

### **GRAPHICS**

High resolution graphics with true animation.

### **INTEREST LEVEL**

Game gets progressively harder as your score mounts. There are more cars and predators to avoid.

### **USE OF SOUND**

Some minor sound effects.

### **SUMMARY**

This is essentially a copy of Frogger from Sierra Vision. Both the graphics and the sound are better in Frogger.

**Robbers of the Lost Tomb  
Timeworks****\$24.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	C Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	C Interest level	- Adventure
A Vendor support		+ Arcade
A Documentation		- Strategy
A Error handling		

**DESCRIPTION**

An arcade game. You direct an archeologist through a maze of rooms within the lost tomb. There are 20 rooms per level with five levels. You attempt to go in to find the lost tablets and get out alive. There are bottomless pits, ghosts, and snakes. You can defend yourself by throwing knives or finding a magic ruby.

**GRAPHICS APPEAL**

The game uses PET graphics and sprites to produce some animation. The quality of graphics is average to weak.

**INTEREST LEVEL**

You can choose your level of difficulty from 1 to 10. In each game you will encounter the villains in different locations. Although there are a lot of rooms, they appear pretty much the same. You can save the game to return later.

**USE OF SOUND**

A little tune accompanies the archeologist as he moves.

**SUMMARY**

This game involves keeping track of where the villains are waiting for you and some arcade interaction in throwing a knife. The game, while a little different from most, lacks quality graphics and stimulation.

**Rootin Tootin  
HesWare**

**\$39.95 Cartridge**  
(Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	+ Multiple screens
B Price/ Performance	A Use of sound	- Multiple levels
A Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade-style game. You maneuver through a maze of notes and troublesome little pests to gain points as you devour the notes. When you have cleared a screen of notes, new ones appear.

### **GRAPHICS APPEAL**

High resolution, very colorful graphics.

### **INTEREST LEVEL**

Each new screen presents a more difficult maze and the little pests get more difficult to avoid.

### **USE OF SOUND**

Perhaps one of the most imaginative games with music. A little tune accompanies the play, with random instruments intruding intermittently. The music greatly enhances the game rather than detracting from it.

### **SUMMARY**

This is an enjoyable game that manages both graphics and music effectively and still is capable of presenting a challenging arcade-style game. Kids and adults can enjoy this game.

<b>Save New York Creative Software</b>		<b>\$34.95 Cartridge</b> (Joystick Required)
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Graphics appeal	- Multiple screens
B Price/ Performance	C Use of sound	+ Multiple levels
A Ease of use	A Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

An arcade game. Spider-like aliens descend from the skies to devour the city of New York. You guide a cannon-firing jet against the intruders, trying not to destroy your own city, and occasionally refueling from air drops. You land your fighter and slip below the streets into the subways to skirmish with subterranean aliens.

### GRAPHICS APPEAL

High resolution sprite graphics.

### INTEREST LEVEL

The game gets progressively more difficult with additional flying spiders and eggs as well as a limited fuel supply which occasionally requires intercepting a parachuting refueling tank.

### USE OF SOUND

Limited to minor sound effects.

### SUMMARY

The game combines elements of two or three games and promises to remain challenging for some time after you have it. One of the better arcade games available.

<b>Seawolf Commodore</b>		<b>\$29.95 Cartridge</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	B Graphics appeal	- Multiple screens
C Price/ Performance	C Use of sound	+ Multiple levels
B Ease of use	C Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

An arcade game. You fire torpedos at ships passing horizontally above your ships. You gain points for hitting enemy ships which vary according to size and speed.

### GRAPHICS APPEAL

High resolution sprite graphics.

### INTEREST LEVEL

You can change the difficulty level (1 through 9) and time limitations, but otherwise the game lacks challenge and is rather routine.

### USE OF SOUND

Limited to some sound effects.

### SUMMARY

A rather mediocre game. Children may enjoy it. It seems to be a rather popular game in spite of itself.

**Shamus  
Synapse**

**\$34.95 Diskette**  
(Joystick Required)

**GENERAL CRITERIA**

- A Overall rating
- A Price/  
Performance
- B Ease of use
- A Vendor support
- B Documentation
- B Error handling

**SPECIFIC CRITERIA**

- A Graphics appeal
- B Use of sound
- A Interest level

**FEATURES**

- + Multiple screens
- + Multiple levels
- Adventure
- + Arcade
- Strategy

**DESCRIPTION**

Arcade-style game. You move Shamus through a maze of 32 rooms, shooting an assortment of villains as they attempt to destroy you. You locate a colored key that opens the next level of rooms. You collect points as you destroy the enemy.

**GRAPHICS APPEAL**

High resolution sprite graphics.

**INTEREST LEVEL**

This game gets progressively more difficult. The game is extremely challenging, and although becoming familiar with the maze simplifies the game, it can be programmed for four levels of difficulty.

**USE OF SOUND**

A short little theme from Alfred Hitchcock and then some minor sound effects.

**SUMMARY**

This game is put out by a couple of vendors. It combines arcade action with a little maze travel and even a little strategy. The game has become quite popular among advanced arcade players.

**Snake Byte  
Sirius**
**\$34.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	A Use of sound	+ Multiple levels
A Ease of use	A Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade game. You guide a snake through 28 different mazes, attempting to eat apples that appear randomly within the maze. Each apple that you consume makes your snake a little faster and a little longer, and it gets progressively more difficult to move your snake within the confines of the maze.

### GRAPHICS APPEAL

Contains high resolution multicolor graphics.

### INTEREST LEVEL

As the snake lengthens, it gets increasingly difficult to maneuver around without crossing the tail of the snake. You can increase the difficulty by introducing from 0 to 4 plums, which the snake must avoid.

### USE OF SOUND

Even the little tune of drums and flute is new and interesting on this game.

### SUMMARY

Finally something new. The screen is actually very simple, but the concept interesting and challenging. When you are tired of Pac-Man and Space Invader clones, there is Snake Byte as an alternative.

<b>Space Raider</b>		<b>\$24.00 Diskette</b>
<b>Virginia Micro Systems</b>		(Joystick Required)
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	C Graphics appeal	- Multiple screens
B Price/Performance	C Use of sound	- Multiple levels
B Ease of use	C Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. You aim the crosshairs of your gunsight against oncoming space ships. You must fire before they reach your vessel.

### GRAPHICS APPEAL

Low resolution with minimal color or movement.

### INTEREST LEVEL

This game gets repetitive very quickly. Seven frames of an oncoming vessel are repeated in different areas to give the impression of an approaching ship. There is no way to increase the difficulty.

### USE OF SOUND

Minimal use of sound to warn of an oncoming vessel.

### SUMMARY

A routine game. The gunsight is slow to respond to joystick movement.

**Star Battle  
Timeworks**
**\$24.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	C Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	C Interest level	- Adventure
A Vendor support		+ Arcade
A Documentation		- Strategy
A Error handling		

### DESCRIPTION

An arcade game. You command the starship Columbia. You have a choice of viewing a long-range scan of the area (viewing any enemy or allies vessels) or a short-range scan as you approach the enemy. You then view the enemy through a front window, directing phasar or photon attacks. You must balance your fuel supply with the energy needed to warp into new areas and the energy needed to hold shields against enemy fire. The object of the game is to destroy all enemy ships and return to your star base.

### GRAPHICS APPEAL

The graphics are low resolution with some sprites. Movement is choppy, rather than a smooth scrolling of displays.

### INTEREST LEVEL

There are four levels to choose from and a number of screens to display status and locations of enemy vessels. There is little challenge in destroying the enemy once you reach them.

### USE OF SOUND

Some sound effects.

### SUMMARY

This game concept has a lot of potential, but the poor graphics and the lack of challenge in the arcade interaction weaken the game.

**Supercuda**  
**Comm\*Data**

**\$27.95 Diskette**  
 (Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	B Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
A Vendor support		+ Arcade
C Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

Arcade-style game. Pac-Man with fish. You move your Supercuda through a maze, avoiding an assortment of Supercuda-eating fish. If you encounter an eel, you become supercharged for a few moments during which time you can turn on your attackers.

### **GRAPHICS APPEAL**

High resolution sprite movement with a maze as a background.

### **INTEREST LEVEL**

There are two screens, passages to move from one to the other at any time, and plenty of pursuing attackers.

### **USE OF SOUND**

Some sound effects and a short routine from *Jaws* to enhance the sound.

### **SUMMARY**

If you are still playing Pac-Man or hate to see your skills go to waste, this game is for you. As with the original Pac-Man, you can develop patterns to outsmart the attacking fish every time.

**Telengard  
Avalon Hill**

**\$24.00 Cassette  
or Disk**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	C Use of sound	+ Multiple levels
B Ease of use	B Interest level	+ Adventure
A Vendor support		- Arcade
B Documentation		- Strategy
B Error handling		

### **DESCRIPTION**

An adventure game with arcade-type interaction, complete with dungeons, dragons, hobbits, and ghouls. You acquire points locating treasures while fighting off over 20 different villains. You interact through the keyboard with a list of single-character commands.

### **GRAPHICS APPEAL**

Contains high resolution multicolor graphics.

### **INTEREST LEVEL**

The monsters can gain strength, making them more difficult to overcome. You can also gain strength to compensate for the increasing difficulty. A good mixture of adventure and arcade.

### **USE OF SOUND**

Minimal use of sound.

### **SUMMARY**

An exciting combination of adventure and graphics. Move your character through a maze with single letter entries from the keyboard. Your character as well as your adversary's can achieve different levels of skill to make the game continually challenging.

<b>Temple of Apshai</b>		<b>\$39.95 Diskette</b>
<b>Automated Simulations</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/	B Use of sound	+ Multiple levels
Performance	B Interest level	+ Adventure
B Ease of use		+ Arcade
A Vendor support		- Strategy
B Documentation		
B Error handling		

**DESCRIPTION**

An adventure and arcade-type game. Initially you obtain various weapons and defenses and then proceed to a maze where you find treasures and fight off giant swamp rats, skeleton warriors, antmen, giant amoeba, etc.

**GRAPHICS APPEAL**

Contains high resolution, multicolor sprite graphics.

**INTEREST LEVEL**

There are various rooms and monsters with various attack options such as thrust, parry, etc. However, once the locations of all the treasures and the weakness of all the monsters are known, the challenge subsides.

**USE OF SOUND**

Some fascinating sound effects.

**SUMMARY**

Initially a very challenging game because so many factors affect each move, such as fatigue level, weight, location, etc. Although experience lessens the challenge, the company makes a series of games so you can continue the enjoyment.

**T.G.I.F**  
**Microcomputer Games**
**\$25.00 Tape**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	B Graphics appeal	- Multiple screens
C Price/Performance	B Use of sound	- Multiple levels
B Ease of use	C Interest level	- Adventure
B Vendor support		- Arcade
B Documentation		+ Strategy
B Error handling		

### DESCRIPTION

This game doesn't fit into standard categories. It is similar to board games for children. One to four players are given a starting amount of money and then presented with opportunities, such as investments in gold or lottery tickets. Occasionally there is a treasure hunt and sometimes an unexpected bill. The object: to be the first to make \$10,000.

### GRAPHICS APPEAL

Low resolutions graphics with some semi-animation.

### INTEREST LEVEL

This game might be interesting for children. It is based on luck, with no strategy or arcade skills required. Lots of events add variety to the game.

### USE OF SOUND

A small tune at the beginning and end of the game and some intermittent sound effects.

### SUMMARY

If you have children who enjoy board games, they may enjoy this game as an alternative.

<b>Towering Inferno</b>		<b>\$34.95 Disk</b>
<b>Pioneer Software</b>		Requires Joystick
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/Performance	B Use of sound	+ Multiple levels
A Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

In this arcade game you move firemen beneath a burning building to catch victims as they leap for safety. You gain points for each victim you catch.

### GRAPHICS APPEAL

The graphics are rather simple, combining both sprites and PET graphic symbols. Your score and level is displayed as you play.

### INTEREST LEVEL

This game increases in difficulty with each level and as your score increases. Occasionally objects are thrown from windows to distract you.

### USE OF SOUND

There are some sound effects to enhance the play.

### SUMMARY

This game falls under the category of "cute." Easy to play, with amusing displays, you will enjoy this game despite its theme.

**Trek  
Victory****\$14.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
B Price/ Performance	C Use of sound	+ Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		- Arcade
B Documentation		+ Strategy
B Error handling		

**DESCRIPTION**

A strategy game. You view a grid representation of the galaxy with a separate grid to show the location of your starship in a particular section of the galaxy. You attempt to destroy the Klingon ships in your sector. Each confrontation uses up some power and ammunition with only two stations in the galaxy to refuel. Each movement through the galaxy uses up time. Destroy all the Klingons before the clock runs out to win the game.

**GRAPHICS APPEAL**

Low resolution PET graphics. Your ship is represented by the letter E, the Klingons by numbers. A text indicator reveals your ammunition, fuel level, etc.

**INTEREST LEVEL**

Although the graphics are not that interesting, the concept is different and quite interesting. You must calculate angles of attack and travel and balance the loss of time with ammunition.

**USE OF SOUND**

Minimal use of sound effects.

**SUMMARY**

Different and interesting.

<b>Wall Street Timeworks</b>		<b>\$24.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	+ Multiple screens
B Price/ Performance	C Use of sound	- Multiple levels
B Ease of use	B Interest level	- Arcade
B Vendor support		- Adventure
B Documentation		+ Strategy
B Error handling		

### DESCRIPTION

A strategy game. This game simulates investments in the stockmarket. From one to four can play. You decide how many game years you want to play. You buy and sell stocks, minerals, precious metals, real estate, and even IRA accounts. You can view bar charts and statistics on stocks, you pay taxes and commissions, you borrow and loan at prevailing interest rates, and then wait for the ticker to reveal how much you have made or lost. Strategy and luck play a part in this game—just as in real life investments.

### GRAPHICS APPEAL

Mostly text. Some bar charts and ticker reports.

### INTEREST LEVEL

This is a Monopoly-type game. Close enough to real life to make it a learning tool for prospective investors. You can use trends and earning reports to assist you in your investments.

### USE OF SOUND

Minimal use of sound.

### SUMMARY

If you have even a passing interest in the stock market, you will love this game.

<b>Zork I</b>		<b>\$44.95 Disk</b>
<b>Commodore</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	- Graphics appeal	- Multiple screens
B Price/	- Use of sound	- Multiple levels
Performance	A Interest level	+ Adventure
C Ease of use		- Arcade
A Vendor support		- Strategy
B Documentation		
B Error handling		

### DESCRIPTION

This is one of a three-part series of adventure games. In each game you respond to situations described by entering complete sentences such as "Open the door or climb the tree or pick up the sword". You gain points as you make your way through a subterranean passage defeating trolls and other creatures. The object is to retrieve 20 pieces of treasure without getting killed.

### GRAPHICS APPEAL

This game has no graphics. It is played by exchanging textual messages with the computer.

### INTEREST LEVEL

This game keeps track of each object you pick up and each troll you defeat. There are countless approaches to playing the game and a point system allows you to monitor your improvement as you play.

### USE OF SOUND

Again, this game does not make use of sound.

### SUMMARY

This is one of the better adventure games available for the Commodore 64. Zork II and Zork III provide follow-up games with a similar theme but an entirely different series of events.

<b>Zwark Software Consultants</b>		<b>\$24.95 Diskette \$19.95 Tape</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Graphics appeal	- Multiple screens
C Price/ Performance	C Use of sound	- Multiple levels
B Ease of use	B Interest level	- Adventure
B Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. You control the left and right movement of a gun as Zwarks descend from the top of the screen, moving randomly left and right. You must shoot down the Zwarks before they collide and destroy you.

### GRAPHICS APPEAL

High resolution graphics.

### INTEREST LEVEL

There is no time clock to beat, but the pace picks up as more Zwarks appear on the screen. The more you shoot, the faster they appear. Also they become darker and less visible.

### USE OF SOUND

There is a modest use of sound effects.

### SUMMARY

Similar to but simpler than Space Invaders.

**3D-64 Man**  
Softsmith

**\$29.95 Diskette**  
**24.95 Tape**  
(Joystick Required)

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
D Overall rating	D Graphics appeal	- Multiple screens
C Price/ Performance	D Use of sound	- Multiple levels
C Ease of use	D Interest level	- Adventure
A Vendor support		+ Arcade
B Documentation		- Strategy
B Error handling		

### DESCRIPTION

Arcade-style game. You move through corridors of a maze looking for the way out while avoiding colored monsters. A small radar image of the entire maze orients you to your position in the maze.

### GRAPHICS APPEAL

Extremely simple graphics without true animation.

### INTEREST LEVEL

There is no way to change levels of difficulty, and the game gets immediately repetitive.

### USE OF SOUND

The bare bones of sound effects.

### SUMMARY

Written in BASIC, the game is slow with no use of animation or sprite activity. The setting is plain, there is no action to speak of, and you have to use considerable imagination to view it as three-dimensional.

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**Worksheet for Games**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

Overall rating  
Price/Performance  
Ease of use  
Vendor support  
Documentation  
Error handling

**SPECIFIC CRITERIA**

Graphics appeal  
Use of sound  
Interest level

**FEATURES**

Multiple screens  
Multiple levels  
Adventure  
Arcade  
Strategy

*Description*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Graphics*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Interest Level*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Use of Sound*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Summary*— \_\_\_\_\_

## COMPARISON CHART

PROGRAM NAME	RATINGS FOR CRITERIA AND FEATURES													PRICE		
	OVERALL RATING	PRICE/PERF.	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	GRAPHICS APPEAL	INTEREST LEVEL	USE OF SOUND	MULTIPLE SCREENS	MULTIPLE LEVEL	ADVENTURE	ARCADE			STRATEGY
ADVENTURE PACK	C	B	C	B	C	B	C	C	C	+	+	+	-	-	\$27.95	
ANNIHILATOR	B	B	B	B	B	B	B	B	B	+	+	-	+	-	\$19.95	
APE CRAZE	B	B	B	A	C	B	B	B	B	+	+	-	+	-	\$27.95	
ARCADE PAK	D	D	B	B	C	B	D	C	C	+	+	-	+	-	\$24.95	
ATTACK OF THE MUTANT CAMELS	A	B	A	A	B	B	A	C	B	-	+	-	+	-	\$44.95	
B-1 BOMBER	B	B	B	B	B	B	*	*	B	-	-	-	-	+	\$21.00	Disk
															\$16.00	Tape
BEACH HEAD	A	A	A	B	A	B	A	B	A	+	+	-	+	-	\$34.95	
BLACK JACK	B	B	A	B	B	B	B	C	B	-	-	-	-	-	\$15.95	
BLADE OF BLACKPOOLE CASTLE	B	B	B	A	B	B	B	B	B	+	-	+	-	-	\$19.95	
WOLFENSTEIN	A	A	B	B	B	B	B	B	A	+	+	-	+	-	\$29.95	
CHOMPERMAN	B	B	A	B	B	B	B	B	B	+	+	-	+	-	\$19.95	
CHOPLIFTER	A	B	A	B	B	B	A	C	A	+	+	-	+	-	\$44.95	
COLLISION	B	B	B	B	B	B	B	C	B	-	+	-	+	-	\$15.95	
CRIBBAGE	A	B	A	D	C	A	C	A	C	-	-	-	-	+	\$24.95	
CROSSFIRE	A	B	B	C	A	A	A	A	A	-	-	-	-	+	\$34.95	
CYBERWORLD	A	B	A	A	A	A	A	A	B	+	-	+	+	-	\$39.95	
CYCLONS 64	C	C	B	A	B	B	C	C	C	+	+	-	+	-	\$27.95	
ENNIAXX	C	C	B	A	B	B	C	C	C	+	+	-	+	-	\$29.95	
ESCAPE MCP	C	C	B	A	C	B	B	C	C	+	-	-	+	-	\$27.95	
FRANTIC FREDDIE	B	B	B	A	B	B	B	A	B	+	+	-	+	-	\$34.95	
FROGGER	B	B	B	B	B	B	A	B	B	-	+	-	+	-	\$34.95	
FT APOCALYPSE	A	B	A	B	B	B	A	C	A	+	-	-	+	-	\$34.95	
GOTHMOG'S LAIR	B	B	A	A	A	A	B	B	B	+	+	+	-	-	\$39.95	
GRANDDMASTER	B	B	A	B	B	B	B	C	B	-	+	-	-	+	\$32.95	
GRAVE ROBBERS	C	C	B	B	C	B	B	C	C	+	+	+	-	-	\$14.95	
GRIDRUNNER	B	B	A	A	B	B	B	C	B	-	+	-	+	-	\$39.95	
HEAD ON	C	B	A	B	B	B	C	C	B	-	+	-	+	-	\$19.95	Disk
															\$12.95	Tape
JAWBREAKER II	B	B	A	B	B	B	B	B	B	-	+	-	+	-	\$29.95	Disk
															\$34.95	Cartridge
JUMPMAN	A	B	A	B	A	B	A	A	A	+	+	-	+	-	\$39.00	
JUMPMAN JR.	A	B	A	B	A	B	A	A	A	+	+	-	+	-	\$39.95	
KICKMAN	B	B	B	B	B	B	B	B	B	-	+	-	+	-	\$29.95	
KONGO KONG	B	A	B	A	C	B	B	B	B	+	+	-	+	-	\$19.95	
LASER STRIKE	B	B	B	B	B	B	B	B	B	+	-	-	+	-	\$29.95	
LODE RUNNER	A	A	B	B	B	B	B	B	A	+	+	-	+	-	\$34.95	
LUNAR LEEPER	C	C	B	A	B	B	B	C	C	+	+	-	+	-	\$34.95	



# 4 HOME MANAGEMENT AND ACCOUNTING

## Introduction

The computer has become an ally of the family in these times of inflation and high prices. Home management and accounting software can help us hold our own as we establish livable budgets, pinch pennies while monitoring expenses, and verify bank statements. Just think how satisfying it would be to send your own computer printout to the electric company notifying them of a 12 cent error in your favor.

As titillating as this sounds, in general home management and accounting programs are not meant to find errors in billing. They can, however, greatly simplify the process of balancing checking accounts and monitoring expenses within the home. Most programs of this type require an initial investment of time in setting up the program by entering pertinent data such as names, addresses, and initial balances. Then you must periodically update balances and enter in values from checkbooks, cash receipts, monthly charge card payments, etc. The real advantage of home accounting programs is they allow you to see your immediate financial situation at a glance. They also allow you to see specifically where income is going. From this information, in pie charts or tabular form, you are able to draw realistic conclusions about financial conditions. When records of expenses and savings are kept over a period of time, it is possible to project future savings and expenses. For example, when considering the purchase of a new car, a computer printout of current and projected auto expenses may help you make a financially sound decision.

## *Specific Criteria*

**CONFIGURABILITY**—There are a number of checkbook programs that can monitor your checking account. They all generate a formatted printout of some type. Before purchasing, be absolutely sure that the program will work with your printer. You are safe with the Commodore 1525 printer since all software vendors make sure that their software is compatible with it. The Commodore 1525 printer is certainly not the best printer available, however, and most programs are compatible with other printers as well. A number of programs offer printed graphs. Generally, a Commodore 1525 printer is required to obtain graphs.

Something you should ask when shopping around is how flexible is a program for the initial setup of an accounting system. If you have more than one savings or checking account, consider whether or not the program will accommodate separate account entries. Maybe you have a dozen credit cards and are making partial payments on each. Can a program include all of your cards? Any limitations in a program concerning size and flexibility will be listed under configurability.

**USEFULNESS**—Fifteen years ago we were all getting along fine without computers. With computers and with each new application, we must now consider how useful the application really is. Does it save us time or does it take more effort to enter the data than is justified by the result? In this section of our reviews, we will elaborate on just what the program can do for you. We will try to compare the time required to enter the information as opposed to the time saved using a computer program.

Generally, menu-driven programs are desirable. They simplify entries and make the program more time-effective. You want a program that is versatile and one that may be changed as your financial affairs change. Perhaps you need to close out a checking account, or you may decide to return one of your charge cards. Can your system be changed or do you have to start all over again? Ideally, you want a forgiving program that allows you to make mistakes. Before purchasing a program, make sure you can go in and edit incorrect values without having to reenter all subsequent entries. It would also be nice to be able to insert little memos along with value entries for unforeseeable expenses. Memos like "plumbing repairs" aren't necessary for keeping track of expenses, but may be handy at the end of the year when figuring out tax deductions.

Some home finance programs go beyond the checkbook stage and into the world of credit, interest, and depreciation. Even a home computer is hard pressed to keep up with fluctuating interest rates and straight line versus accelerated depreciation. You will definitely want to know how a computer program handles those problems. How are transactions handled? If you make a payment on an established bill, will the amount in the checking account be automatically deducted? If you pay exactly \$600 a month rent, must you reenter the amount each month or is it handled automatically? Can you split a transaction? Sometimes a check is made out for a single amount but is intended to cover three or four items. Can your software split the transaction? Any special features of your software will be discussed in the Usefulness section.

**REPORT GENERATION**—In the report generation section we will list the reports that can be generated with a particular package. We will also specify to what extent the format of the reports can be modified. Can you modify the printing of a check or must you order special checks? Can you obtain a printout of a report for a particular month or must you print everything from the beginning?

## Glossary

**ACTIVITY REPORT**—A list of all transactions in a specified timeframe. An activity report includes dates, who is involved in the transactions, and amounts.

**ASSETS**—Anything of value that you own is considered an asset. This includes the money in a checking account, the equity in a house, and any notes that you hold.

**AUTOMATIC TRANSACTIONS**—This feature is designed to periodically and automatically make an entry. If you make a monthly car payment, the deduction from a checking account occurs automatically.

**BALANCE SHEET**—This is a list of all assets, liabilities, and capital as of a certain date. It is a reflection of the financial condition of an individual or household.

**LIABILITIES**—These are long-term debts usually paid at regular intervals. The amount owed on a house is a liability.

**MENU-DRIVEN**—A menu-driven program allows you to view a screen with a list of alternative selections. Generally, you can enter a single letter or relocate the cursor to make a selection from the list. This simplifies and speeds up the selection of operations performed by the computer.

**RECONCILE BANK**—This feature allows you to designate whether a check has cleared or not. The balance of all cleared checks is totaled and compared against the bank's statement.

**SEARCH**—This feature allows you to look through a list of items to select a specified entry.

**SPLIT TRANSACTIONS**—This allows you to designate portions of a single check to two or more different categories. For example, with a check sent to cover a mortgage payment, you may wish to differentiate between the portion of the check going toward interest and the portion going toward the principal.

<b>Account Pac Pacific Coast</b>		<b>\$29.95 Diskette or Tape</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Configurability	- Checking
B Price/ Performance	B Usefulness	+ General purpose
A Ease of use	A Report generation	- Specific expenses
A Vendor support		- Budget guide
B Documentation		- Time management
A Error handling		

### DESCRIPTION

This program seems to cover every possible type of checkbook transaction. It uses the double entry form of accounting, which is explained in the documentation for anyone not familiar with this procedure. It is menu-driven for ease and speed in making entries. You don't have to remember to type in a SAVE command because it's all done for you to eliminate the danger of lost transactions. Any errors in entering data are handled by stating the problem or asking the question again. Prompts are used throughout.

### CONFIGURABILITY

It will handle up to 99 accounts. If more are needed, the documentation suggests moving to a 24-month cycle (twice a month) instead of a 12-month cycle. Transactions are made to the appropriate account (your selection); the bank checking account is updated automatically. Incomes from different individuals or from accounts such as interest, stocks, rentals, etc., are allowed. Facilities are provided for account adjustments or, more correctly, relocating expenses (as in one check written to cover a multitude of separate items). An error in a transaction can simply be voided. For ease in making these adjustments, a running account of all activity in each account may be printed to the screen. Account Pac is written in BASIC and is mainly a checking account, although much more elaborate than the average checking account program.

In a few accounts now earning interest on unused funds, the income must be added in. Also, automatic withdrawals are not so automatic; you must take care of these yourself. Features such as these may be upgraded later if the program registration is filled in and sent back to Pacific Coast. You will be informed of all improvements made to this program, and they will be mailed to you for the cost of shipping and handling.

### USEFULNESS

Video or printer display allows you to easily reconcile your records with the bank's statement. Checks and their remarks are displayed, which includes the check date, number, amount, and two areas for remarks. When all is correct, a new up-to-date account is written to a backup disk for review at a later time.

## **REPORT GENERATION**

Works on most popular printers. It will print out your end-of-month or end-of-year statement, which will include all transactions. Accounts are printed to the screen; a hard copy is not available.

### **SUMMARY**

This program is easy to use and provides the essential format for saving information concerning savings and expenses. It can actually be tailored to provide a simple general purpose business accounting system.

<b>Car Cost</b>		<b>\$19.95 Diskette</b>
<b>Creative Software</b>		<b>\$14.95 Tape</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	C Configurability	- Checking
B Price/ Performance	C Usefulness	- General purpose
B Ease of use	B Report generation	+ Specific expenses
B Vendor support		- Budget guide
B Documentation		- Time management
B Error handling		

### DESCRIPTION

This program records fuel, insurance costs, financing, maintenance, and repair expenses for your auto.

### CONFIGURABILITY

You enter the category of expense, the amount, the date, the mileage, and the fuel consumed.

### USEFULNESS

This program merely records expenses. If you are using your auto in your business where such records are necessary for tax deductions, this program may be useful.

### REPORT GENERATION

The program will print a chart displaying amounts spent, fuel economy, and estimated cost.

### SUMMARY

Most of the information entered into this program will have to be jotted down on paper when you are at the pumps and then entered into the program at a later time. The reports generated are not really going to save you much time, but they are a little more organized and presentable if you are keeping such information for the IRS.

**Checkbook Manager 64**  
**Abacus**
**\$22.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Configurability	+ Checking
B Price/ Performance	B Usefulness	- General purpose
A Ease of use	B Report generation	- Specific expenses
B Vendor support		- Budget guide
B Documentation		- Time management
B Error handling		

### DESCRIPTION

This program maintains information on a checking account to facilitate balancing the account. It is menu-driven and requires an initial setup of initial balance and subsequent checks written. Each check entry includes the check number, a date written, and the payee's name. The balance after a check has been deducted from the account is included with the check information.

### CONFIGURABILITY

The program retains all records on a data diskette. As checks are returned by the bank, they are dropped from the file until an outstanding check is encountered or until there are 50 transactions on record. An outstanding check will result in all subsequent checks being retained on record until 250 transactions have occurred and at which time a "capacity exceeded" error message will appear. Records may be examined, changed, or deleted. Any subsequent records are automatically changed. Initial menu includes normal run, first time run, disk recovery run, and tape recovery run. Backups of data are automatically made.

### USEFULNESS

This program is strictly a checkbook manager. If you are interested only in recording checks, this will meet your needs.

### REPORT GENERATION

You enter each transaction, including checks written, deposits, and service charges. When you receive a statement, you designate which checks have cleared and any service charges. The Manager gives you the balance you should have on your final statement. If there is a discrepancy, you use time-honored checkbook balancing procedures for finding the error. Check numbers up to 5 digits, dates up to 6 digits, payee up to 35 characters, and amount up to 4 digits plus 2 decimals are allowable.

### SUMMARY

Essentially this program does what it says to by recording and organizing check entries. You cannot escape much of the drudgery of reconciling errors in your checkbook.

**Electronic Checkbook, The Timeworks****\$25.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	B Configurability	- Checking
A Price/Performance	A Usefulness	+ General purpose
A Ease of use	B Report generation	+ Specific expenses
B Vendor Support		+ Budget guide
B Documentation		- Time management
B Error handling		

**DESCRIPTION**

This program allows you to make entries and organize a checking account. You enter checking transactions including the payee, check or deposit number, date whether a check has cleared, the category of expense (this category matches Money Manager and allows you to interface the two programs), and the amount. The program allows you to compare the balance calculated from the total number of checks and deposits with the balance on your bank statement. If they do not match, and a single deposit or check can account for the difference, the program will indicate the error. The program also allows you to analyze any particular group of expenses. You can pick a group based on a category, a transaction description, amounts over a certain figure, or dates. You can also obtain a listing of the sum and average of those groups.

**CONFIGURABILITY**

There are 16 categories of checks that can be altered to any more suitable for specific applications. You can record up to 2500 transactions per disk. When searching, you can search through a maximum of 500 records at a time. You may enter values up to \$99999.99.

**USEFULNESS**

This is one of the more useful checkbook managers available. It is not merely a method of storing and retrieving pertinent information concerning a checking account, but allows you to sort through that information as well. This program will, for instance, sort through all your checks and produce a list of those spent on entertainment. You can then sort through that list to obtain all checks over \$25.00. You could obtain a list of all medical expenses and obtain a total and an average. If you have the Money Manager, the data entered from the Electronic Checkbook can be automatically transferred.

**REPORT GENERATION**

You can print all transactions or just those sorted by category, date, description, or amount.

## **SUMMARY**

Perhaps one of the best checkbook managers available. It is easy to use, comprehensive, and versatile given the inherent limit of 16 categories.

**Home Accountant**  
**Continental Software**
**\$74.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Configurability	+ Checking
A Price/Performance	A Usefulness	+ General purpose
B Ease of use	B Report generation	+ Specific expenses
B Vendor support		- Budget guide
A Documentation		- Time management
B Error handling		

### DESCRIPTION

A comprehensive program that creates a clear, accurate picture of your financial situation. May be used with any household account, regardless of the number of transactions taking place. Should also be able to handle a small business.

### CONFIGURABILITY

This program is menu-driven with guides to help you select the proper category. It has default values to add to the ease (friendliness) of the system. There is full documentation in book format, along with reminders or mini-instructions as you run the program. However, this book must be read. As the program is running, a banner screen is displayed to assure you it has not crashed. It will handle up to five checkbooks, and will also automatically assign a number to each account. Transactions involved may be either checkbook, credit cards, or cash.

### USEFULNESS

A search feature allows you to recall and display all transactions. The program also has the ability to review any previous transaction periods. There is a reconciling account for your outstanding checks. Automatic transactions are included (both plus and minus accounts) as well as add and replace categories. There is however no delete function. For split checks, separate categories may be used or one category may be used with memos stating the subcategories within it. (No graph printout with these sub accounts.) As for printing, there are three different graphs available: bar, line, and trend analysis graphs. These will display on the screen only, unless you have graphics capability on your printer, and they will not save. Another feature of the Print mode is the ability to print your own checks which must be specially ordered (order form available with program).

## SUMMARY

An outstanding program covering virtually all areas necessary in home book-keeping. With your registration of \$20.00, you receive a one-year guarantee which also includes your upgrades should they become available from the programmers at Continental. One minor inconvenience is the programs inability to handle commas.

<b>Home Finance Manager</b>	<b>\$39.95 Diskette</b>
<b>Center For Advanced Sciences and Computers</b>	

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	A Configurability	+ Checking
B Price/ Performance	C Usefulness	+ General purpose
B Ease of use	B Report generation	+ Specific expenses
C Vendor support		- Budget guide
C Documentation		- Time management
C Error handling		

### DESCRIPTION

This is a general purpose home expense manager. You enter your expenses within coded categories. You enter your initial checking and saving account balances. At the beginning of each month you manually enter the total account balances from the previous month. You can edit or review any entry or group of entries.

### CONFIGURABILITY

You are presented with 60 different categories, each with a code number. You can also create a few of your own, and the vendor offers to modify the program (for a fee) to accommodate any specific categories you have in mind. The program will accommodate a minimum of 200 transactions. The program accommodates one checking account, one savings account, and one credit account.

### USEFULNESS

This program will make available a list of expenses either by month or total to date. Essentially, all the program does is categorize expenses. There is no attempt made to create budget outlines or flag taxable items. Any income must be recorded and entered manually.

### REPORT GENERATION

The program will print total expenses or expenses for any category. A balance summary can also be printed. The printer is apparently configured for a 1525 printer only.

### SUMMARY

This program is written in BASIC and is very sluggish at receiving keyed-in data. There is very little done for error handling, and an error is likely to force you to rerun the program. One nice feature is a security system which requires a password of your own designation to enter a particular month of entries.

<b>Home Inventory Creative Software</b>		<b>\$19.95 Diskette \$14.95 Tape</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	C Configurability	- Checking
C Price/ Performance	C Usefulness	- General purpose
B Ease of use	B Report generation	+ Specific expenses
B Vendor support		- Budget guide
B Documentation		- Time management
B Error handling		

### DESCRIPTION

This program records the possessions in your home.

### CONFIGURABILITY

You enter the possessions and their value into 40 different categories.

### USEFULNESS

This program does nought but record the possessions in your home and their value.

### REPORT GENERATION

The program will print a list of all the items in your home and their value.

### SUMMARY

If you happen to have a great number of possessions, this program helps categorize and produce an organized listing; otherwise, you could pretty much accomplish the same thing with most word processing programs or data base managers.

<b>Household Finance Creative Software</b>		<b>\$39.95 Diskette \$29.95 Tape</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Configurability	- Checking
A Price/ Performance	B Usefulness	+ General purpose
A Ease of use	B Report generation	- Specific expenses
A Vendor support		+ Budget guide
B Documentation		- Time management
B Error handling		

### DESCRIPTION

This is a general purpose home finance package. You enter your monthly income and expenses into 16 categories. You can include a budget quantity for each expense. The program will produce a spending profile, an Actual versus Amount Budgeted comparison, and an overall balance listing.

### CONFIGURABILITY

You are limited to 16 categories of expenses. You can flag any tax deductible items for a total listing at the end of the year.

Categories include auto expense, entertainment, clothing, and taxes, among others. For each entry you include the date, the amount, the category of payment made, and whether or not the expense is tax deductible. You can store up to 200 transactions.

### USEFULNESS

This program requires every expense paid out to be entered into the proper category. You can produce at any time an overall listing of your financial status. You can get a picture of what percentage of your income is going into each category and whether you are actually staying within a prescribed budget. In the course of writing 50 or 60 checks a month, it is often difficult to see just where it is all going. This program allows you to see just which category of expense is consuming the largest chunk of income.

### REPORT GENERATION

The program will print for any one month or for all months of your spending profile an Actual vs Amount Budgeted spending report, a list of tax deductions, and a total account balance sheet. The program supports the Commodore 1525 printer.

### SUMMARY

This program is easy to use, fairly comprehensive, and retails at a reasonable price. If you are looking for a moderately-priced general purpose home accounting program, this is the one for you.

**Money Manager, The Timeworks****\$25.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Configurability	- Checking
B Price/Performance	B Usefulness	+ General purpose
A Ease of use	B Report generation	+ Specific expenses
B Vendor support		+ Budget guide
B Documentation		- Time management
B Error handling		

**DESCRIPTION**

This is a general purpose home expense and budget program. There are 16 categories of expense and income. You can rename any of the 16 categories to fit your needs. You can then enter within the various categories an income or expense incurred in the course of a month. You can include a comment as well as a total budgeted amount for any category. This program will interface with the Electronic Checkbook from Timeworks to automatically retrieve pertinent data from entries in the Timeworks program. You can modify an entry at any time, so frustration is kept to a minimum.

**CONFIGURABILITY**

Sixteen categories can be altered to fit any category more suitable for specific applications. You can store data for each category for a period of 12 months. The program interfaces with The Electronic Checkbook from Timeworks.

**USEFULNESS**

This program will allow you to enter expenses, income, and budgets for 16 categories. You can then obtain screen displays of total expenses for a month. You can also receive monthly expenses for each category for a year. Additionally, you can view a bar chart showing monthly expenses for a particular category. In each case you can also view the budgeted amount and see the difference between the actual expense and the budgeted expense.

**REPORT GENERATION**

You can print a monthly expense and budget for each category. You can produce a printout of total expenses for all categories for an individual month.

**SUMMARY**

This program is very easy to use, and if 16 categories is enough for you, it does as much as any other budget program does. If you are attempting to keep close track of your checking account, the Electronic Checkbook can be used to automatically enter data into the Money Manager.

<b>Time Management TOTL</b>	<b>\$39.00 Diskette</b>
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<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Configurability	- Checking
B Price/ Performance	A Usefulness	- General purpose
B Ease of use	B Report generation	- Specific expenses
A Vendor support		- Budget guide
C Documentation		+ Time management
B Error handling		

### **DESCRIPTION**

This program allows you to keep track of your personal and business activities by creating schedules, calendars of events, and checklists of activities.

### **CONFIGURABILITY**

For each activity you are prompted for a description, comment, person responsible, project code, and duration. The program comes on either diskette or tape, and most properly configured printers can be used to print reports.

### **USEFULNESS**

The program can be used to generate lists of activities based on the person responsible, the project, or the date. You can enter a person's name and obtain a listing of all projects that person is responsible for. You can enter a start and stop date and obtain a listing of all activities in that period.

### **REPORT GENERATION**

There are 6 report formats: four years, one year, six months, seven weeks, six days, and two days. You can obtain listings of activities in those periods sorted by activity number or beginning and ending dates. You can group activities by person or project.

### **SUMMARY**

This program is excellent for someone responsible for overseeing the activities of others. If you are an executive keeping track of work done by your subordinates or the chairman of an activity group, you will find this program both beneficial and useful.

<b>Time Money Manager Hes</b>		<b>\$69.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	A Configurability	- Checking
B Price/Performance	B Usefulness	- General purpose
B Ease of use	B Report generation	- Specific expenses
A Vendor support		- Budget guide
B Documentation		+ Time management
B Error handling		

### DESCRIPTION

This package contains two programs. The first, Finance 64, compares buying versus leasing an item, loan analysis, payback analysis, and profit margin. The second, Schedule 64, allows you to create a category of events record and to review a schedule of those events.

### CONFIGURABILITY

For Finance 64 you are prompted for specific data concerning a lease, sale, or loan. You can choose from three types of depreciation: straight line, declining balance, or accelerated cost recovery. You can include data concerning tax credits or income tax rates. With loan analysis, you are prompted for pertinent data including whether a loan is compounded annually, semiannually, or monthly. With Schedule 64 you create your own categories of events by name and code number. You then enter events and appointments by date, time, and category.

### USEFULNESS

The financial part of the package enables you to compare the overall cost of leasing an item versus buying it. It enables you to calculate how much interest and how much principal will be paid over a certain period of time. You can calculate the future value of assets and at what price you must sell an asset to realize a profit. Schedule 64 can be used by a business such as a doctor's office to keep track of appointments and so prevent double booking. You can scan over a day's or a week's scheduled events. You can scan for free time as well. You can scan a week, month, or year and then zoom in on any individual day. You can obtain a listing of the number of events or appointments that occurred each month over the last five years. When entering appointments or events, you have the option of including two types of descriptions. Perhaps "doctor" or "racquetball" might be entered for such activities. The program has the capability of searching a description field. That is, you could search through to find out how many doctor appointments you've had or how many times you have played racquetball in the past year. If you are a receptionist keeping a

schedule for a doctor's office, you can conveniently go through and find out how often a particular patient has made appointments.

### **REPORT GENERATION**

For the Finance 64, nearly all entries can be printed to most properly configured printers. You are given a menu-driven option: the Commodore 1525 printer or non-Commodore printer. With Schedule 64 you can obtain printouts of scheduled appointments for a day, week, month, or year.

### **SUMMARY**

This can be a very useful program for both a small business and home applications. You will find with a time management program that you will actually get more done in less time with fewer headaches. When time is budgeted in the workplace, it is generally made more productive. The financial utilities can also be very useful at home in these days of fluctuating interest and volatile inflation rates.

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**Worksheet for Home Management and Accounting**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

- Overall rating
- Price/Performance
- Ease of use
- Vendor support
- Documentation
- Error Handling

**SPECIFIC CRITERIA**

- Configurability
- Usefulness
- Report generation

**FEATURES**

- Checking
- General purpose
- Specific expenses
- Budget guide
- Time management

*Description*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Configurability*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Usefulness*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Report Generation*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Summary*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**COMPARISON CHART****PRODUCT NAME****RATINGS FOR CRITERIA AND FEATURES**

	OVERALL RATING	PRICE/PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	CONFIGURABILITY	USEFULNESS	REPORT GENERATION	CHECKING	GENERAL PURPOSE	SPECIFIC EXPENCES	BUDGET GUIDE	TIME MANAGEMENT	PRICE
ACCOUNT PAC	B	B	A	A	B	A	B	B	B	+	+	-	-	-	\$29.95
CAR COST	C	B	B	B	B	B	C	C	B	-	-	+	-	-	\$19.95
CHECKBOOK															
MANAGER 64	B	B	A	B	B	B	B	B	B	+	-	-	-	-	\$22.95
ELECTRONIC															
CHECKBOOK	A	A	A	B	B	B	B	A	B	-	+	+	+	-	\$25.95
HOME ACCOUNTANT	A	A	B	B	A	B	A	A	B	+	+	+	-	-	\$74.95
HOME FINANCE															
MANAGER	C	B	B	C	C	C	A	C	B	+	+	+	-	-	\$39.95
HOME INVENTORY	C	C	B	B	B	B	C	C	B	-	-	+	-	-	\$19.95
HOUSEHOLD FINANCE	B	A	A	A	B	B	B	B	B	-	+	-	+	-	\$39.95
MONEY MANAGER, THE	B	B	A	B	B	B	B	B	B	-	+	+	+	-	\$25.95
TIME MANAGEMENT	B	B	B	A	C	B	B	A	B	-	-	-	-	+	\$39.95
TIME MONEY MANAGER	B	B	B	A	B	B	A	B	B	-	-	-	-	+	\$69.95

## 5

# BUSINESS APPLICATIONS

The real difference between a personal computer and a business computer is in the application, not the computer itself. There are a number of programs for the Commodore 64 written with business applications in mind. We have grouped these programs into four categories: word processing, file management, spreadsheets, and accounting.

These programs are not designed exclusively for business. Indeed, many of the programs are suited for applications that could be classified with Home Management and Accounting or Education. The same word processor that documents the minutes of a lengthy staff meeting can create the invitations to a house warming party. Spreadsheets that organize sales statistics can also be used to create home budgets. And a database management program that creates a customer mailing list can create a Christmas card mailing list as well. We have grouped these programs under Business only because these types of programs have been used extensively in business for years and are traditionally thought of as business applications.

A great deal of emphasis is now being placed on "computer literacy" in the marketplace. Persons looking for jobs will find many employers expecting a certain level of understanding of computers in business. Those holding jobs will be facing others who do have an understanding of computers in business. The types of business applications discussed in this book for the Commodore 64 are often the same applications found on larger more sophisticated machines in business, and an understanding of business applications for the Commodore 64 provides a basis for understanding all business-oriented software.

Business applications have been a driving force in the development of computers and computer software. It is difficult to find a business that is not using a computer somewhere in its operation. Even if you are not using a computer for business purposes, you can probably use many of the programs described in this chapter for home and personal purposes. We have attempted to describe each type of program in understandable terms. We have discussed specific criteria for evaluation not only to assist you in selecting software but to shed further light on just what these groups of programs can do. The reviews themselves elaborate on what a specific program will do.

## 5.1     SPREADSHEETS

### Introduction

Imagine sitting down to calculate a household budget for the coming month. You know exactly how much is needed for rent, the car payment, and insurance, but food, auto expenses, and entertainment are all weekly expenditures that you wish to limit to fixed amounts. The only restriction is that the sum of all expenses must fall within your monthly salary. So you list the different items on a piece of paper and make a guess as to what you will spend for each item. You add up the weekly expenses for each item and then add the monthly totals to find you are planning to spend \$75 more than you make.

It then occurs to you that you have been meaning to start that diet for some time now, and the current movies have received the worst reviews you've seen in years. So you change the entries for food and entertainment, reducing the amounts on each just a little, and recalculate. Now you are only \$10 over your salary. You toy with the idea of taking the bus to work whereby you could save \$10 a week in parking alone and think of the exercise. Not a chance! You have to draw a line somewhere. And you are totally committed to your savings plan. You trim just a bit more off entertainment. You recalculate and finally you are living within your means. The process of setting up a budget is very similar to many of the applications in business. Businesses spend a great deal of time adding lists of numbers, making changes in initial values, and recalculating totals. They can project profits or losses on a "what if" basis. "What if" we buy that new computer for \$50,000 and avoid making monthly payments to that accounting firm? For a short home budget, it's not all that difficult to erase and recalculate a few times. But when you are working with several pages of numbers, the idea of changing an initial value and recalculating the whole thing can unnerve the soundest of junior executives. It was probably out of compassion for junior executives that the spreadsheet was developed.

Spreadsheets initially display a screen made up of a grid of columns and rows. The entire grid is sometimes referred to as a spreadsheet since this is where you enter and view all your entries. Columns and rows intersect in small rectangular boxes called cells. Each cell can therefore be identified by a row number and a column number. A cursor appears in one of the cells, and you can move the cursor from cell to cell using the cursor controls. You can place the cursor in any cell and enter into that cell words like rent, food, and entertainment, or you can enter values like \$57.25 or 681.

You can also enter into cells formulas that can reference other cells. You could have a formula that adds cells A1 to M1. The entry would probably appear as Sum(A1-M1). The spreadsheet would automatically add the values in all of the cells from A1 to M1 and place the total in the cell where you have entered the formula. Don't worry about losing the formula. Each spreadsheet

allows you to see the formula again, if you wish, but all you care about is the result anyway. What if you decide to change just the entry in A1? Here is where the power of the spreadsheet appears. You simply change the entry in A1 and instantly the formula recalculates the totals of A1 through M1.

On some spreadsheets it may take one extra step for recalculating all formulas; but in either case, the junior executives (and home managers with complex budgets) are smiling again. The Commodore 64 displays a screen of 25 rows of 40 characters each. A spreadsheet may have more than 200 rows and columns whose combined width may extend far beyond 100 characters. Don't panic! The same spreadsheet will allow you to move the data on the screen to view beyond your 25 rows and 40 characters. Usually with the use of the cursor controls your screen becomes a kind of "window" that can move up and down or left and right, to view a larger "page." You can only see one area at a time, but you can simply move your window several times to eventually view the entire spreadsheet.

The same dilemma develops when you want to make a copy of your work on a printer. You cannot print beyond the maximum width of your printer, often only 80 columns wide. The only way around that problem is to print sections of your work. The best plan is to simply design your spreadsheet with your printer in mind.

Many of the programs available for the Commodore 64 that perform specific operations, particularly accounting functions, are essentially spreadsheets. They may be menu-driven with formulas already entered, and they may meet a specific need of your home or office. A good general spreadsheet can be a very versatile tool with many applications. If you are in sales, you may use a spreadsheet to record weekly sales statistics. Then you can let the spreadsheet compute the monthly sales figures, calculate deductions for taxes, and figure discounts for bulk sales. If you are in management, enter the names of your staff and the hours worked, and let the spreadsheet calculate each of their wages and deductions.

## **Specific Criteria**

**CONFIGURABILITY**—As with all software, it is a very tricky business to select the right program for your needs. It is even more of a problem with a general spreadsheet since you may have more than one application in mind. Configurability is one of those buzz words that you would prefer to skip over but which keeps popping up in everything you read about computer software. It has something to do with flexibility. Will your software print to more than one printer? Can you use two disk drives? Can you change the color of the screen? What about the screen itself? Can you alter the design to be more functional or visually appealing? Just what are the limitations on this software package? The answers to these questions all fall under the heading of configurability.

The first consideration in a spreadsheet should be its size. Each name, number, and formula that you enter into a spreadsheet requires additional memory within your computer. Your Commodore 64 has a finite amount of

memory available. Your computer memory size limits the number of entries you can make. It also specifies the maximum number of cells available as well as the maximum number of rows and columns available. It may be necessary to keep all three factors in mind at the same time. If there are a maximum of 1000 cells (200 rows and 50 columns), it does not mean you can have a spreadsheet with entries in 200 rows and 50 columns at the same time. That would require 10,000 cells (200 x 50). You could have 200 rows and 5 columns of entries, or maybe 100 rows with 10 columns, just as long you did not try to have more than 1000 cells on your spreadsheet.

There are other considerations in designing your spreadsheet. How wide is a column? Many spreadsheets appear originally with columns eight characters wide. But what if a number you want to enter into the column is nine digits long? Actually you can still enter in the complete number; you just won't be able to see the whole thing. Your computer will remember the complete value, and you can add and subtract and do anything your spreadsheet is capable of doing—but up on your screen you will see only eight of the nine digits. As long as you remember it's really \$10000000 and not \$100000, there shouldn't be a problem. Fortunately, most programs allow you to set up your spreadsheet with column widths different from the ones originally displayed. Again there will be a limit to how wide you can make the columns. In some programs you must decide in advance how wide your columns will be. Some let you alter column widths after you have already made entries in the columns. In some programs you can make a global change of column widths, changing all column widths simultaneously, while in others you will have to change the columns one by one.

Regardless of your application, chances are you will need a printed copy of your work. You want to be absolutely certain your spreadsheet will work with your printer. Common sense tells you that if you have been using your computer with your printer until now that it will continue to work when you purchase your spreadsheet. Unfortunately no one has been able to program common sense into a computer. Any spreadsheet developed for the Commodore 64 will work with a 1525 Printer by Commodore. There are much better printers available for the Commodore 64 and many of the spreadsheets available try to take that into consideration. They allow you to change certain values in the program to "reconfigure" it for a different type of printer.

**DATA ENTRY AND EDITING**—Once you have configured your printer and designed your screen you are ready to start entering data onto the page. Some programs go to great lengths to simplify data entry. They have built-in editing functions that will save you time and aggravation. What if you find yourself entering a list of 30 identical numbers? How nice to have a spreadsheet that will copy a cell into a range of cells. Even nicer, how about a feature that will allow you to copy an entire row or column? Maybe you don't want to copy a column - you just want to move it to a different location. Is there a single command that can accomplish this feat? On some spreadsheets yes, on others no. A slightly more advanced feature to grasp is a relative move of a column or row. You may have a column or row with formulas that

reference other cells. When you move that column or row, you may want the formulas referencing it to be changed to account for the new location. Some programs allow for relative changes of formulas following a move.

When you enter a name or a number, it will automatically be aligned to the right or left of the column. It is sometimes helpful to be able to change the alignment—to align or justify it to the opposite side.

Normally one moves from cell to cell using cursor controls. But when a spreadsheet becomes extremely large, it is handy to be able to jump directly to a specified cell by row and column number.

If you have a list of names along the first row and you start listing numbers below the names, at some point the names move off the screen. Remember you can only view 25 rows at a time, and to view row 26 you will lose sight of row 1. A very useful feature for those of us with a short memory is to be able to fix a row or column so it will not move. With this feature the other rows will scroll under the fixed row and you can make entries in row 190 and view row 1. Some programs carry this one step further by “splitting the screen.” The program fixes one section of the screen so that the other can scroll under it. And if you wish, you can reverse the operation fixing the second section of the screen and scrolling through the first. At least one spreadsheet on the market allows you to create “windows” on your spreadsheet. You can view a small rectangular section of the spreadsheet and view it beside any other section.

If you are certain of nothing else when working with computers, be certain that you are going to make mistakes and will need to make corrections. How helpful the program is in this process is going to be important to you. Some programs provide you with a little help screen that gives you a brief outline of the various commands and saves you the time of thumbing through the manual. Some programs require that you reenter an entire name, or number, or formula. Others let you go in and make minor changes to existing values. Can you delete an entire row or column?

When you are finally through entering and editing the data on a page, you are going to want to save it to a floppy diskette. Even the most Mickey Mouse of spreadsheets will allow you to name and save each of your pages. Some programs even allow you to view portions of two different pages simultaneously. You can hold up last year's budget against this year's budget on the same screen. Anyone who has had to copy a list of figures from one spreadsheet to another will appreciate being able to place them side by side on the screen.

**CALCULATIONS**—The power of the spreadsheet is in its ability to perform mathematical operations on numbers. The Volkswagen of spreadsheets will allow you to add, subtract, multiply, and divide. A Volkswagen is fine until you see a Mercedes. The Mercedes of spreadsheets will find a minimum value from a column or row, find a maximum value, and find a mean value. It will automatically calculate percentages, absolute values, and exponents. The Mercedes is going to let you enter logical operators into the formulas. You can AND and OR different cells to your heart's content or NOT. You can make use of inequalities. If cell A1 is greater than cell A3 then enter 100—otherwise

enter 0. Perhaps you are listing sales figures and you offer a discount of 10% when a customer purchases more than \$500 worth of merchandise. Inequalities help you set up for this situation. Some spreadsheets will alphabetize lists of names and sort columns of numbers.

All of the mathematical and logical operations take some time, depending on the quantities involved. Some programs allow you to make all the changes to your entries before recalculating formulas. In others, the recalculations are made after each new entry. Some programs are much faster than others. Those written in BASIC are generally very slow, and a long column of formulas may take a couple of minutes to recalculate values. The same column processed on a spreadsheet written in machine language may take only ten seconds.

**REPORT GENERATION**—When you are setting out to convince someone of a trend, there is nothing like a computer printout to make it obvious. The printout from a spreadsheet can be very convincing - long lists of names and numbers all perfectly aligned. One of the prime considerations in choosing a spreadsheet is its ability to generate these convincing lists. Can you modify the format of the printout? A column eight characters wide may be effective on a 40-column screen, but you may want it to print out as a 10-character column. Remember, your printer is most likely 80-columns wide. You are not going to get it to print 100 characters if it is an 80-column printer. Some spreadsheets allow you to copy what you see on your screen directly to your printer as a sort of snapshot of your screen. Others allow you to name the first and last cell that you want printed. Some allow both. There are programs that create graphs from lists of numbers in your spreadsheet. Will the program actually copy the graph to a printer? It's possible if you have a Commodore 1525 printer; unlikely if you have anything else.

In some business applications it is nice to have a page of a spreadsheet located within the body of a report or letter. This is not as easy as it sounds. You must have a word processing program that works with your spreadsheet.

## Glossary

**ADJUSTABLE COLUMN**—This indicates that you can alter the displayed width of a single column with a single command.

**ADJUSTABLE JUSTIFICATION**—Entries of names, values, and formulas are automatically either left or right justified within a cell. Adjustable justification indicates that you can alter that justification. If the contents are aligned to the right of the cell, you can align it to the left, and vice versa.

**BLOCK COPY**—This feature allows you to copy the contents of an area within a spreadsheet to another area within the spreadsheet. The contents of the original area are unaffected.

**BLOCK MOVE**—This feature allows you to specify an area within a spreadsheet and move the contents to another specified area. The contents of the original area are removed.

**CELL**—The screen of each spreadsheet is composed of rectangular boxes arranged in rows and columns. Each box is referred to as a cell and has a particular row and column number to identify it. If rows are referenced by letters of the alphabet and columns by numbers, then A1 would be the first cell in the spreadsheet and would be located in the upper left corner of the screen.

**CELL COPY**—A cell copy feature allows you to copy the value or formula from one cell to another with a simple command rather than having to reenter all of the data.

**CELL JUMP**—The cursor can be moved from any cell to an adjacent cell with cursor controls. Cell jump indicates that you can move the cursor from any cell to non-adjacent cells with a simple command using the cell's row and column numbers.

**CELL MOVE**—A cell move feature allows you to move the contents of a cell to another location. The contents of the original cell are removed.

**COLUMN COPY**—This feature allows you to copy all the names, values, or formulas in one column into another column. The original column is unaffected.

**COLUMN DELETE**—This feature allows you to delete all the contents of a column in a single command.

**COLUMN INSERT**—Initially a program presents a spreadsheet with a fixed amount of rows and columns. Generally you can alter the number of columns and rows prior to making any entries. Column insert indicates that you can insert a blank column after you have already made entries into your spreadsheet.

**COLUMN MOVE**—This feature allows you to remove all the names, values, or formulas from one column and place them into another column with a single command.

**COLUMNS**—The screen of each spreadsheet is composed of rectangular boxes called cells. They are arranged in columns and rows. The columns and rows are usually identified by alphabetic characters and numbers.

**FIXED TITLES**—Normally you can move a cursor from cell to cell within a page and view any section not exceeding the size of the screen (25 rows by 40 columns). A fixed title feature allows you to hold a section of a row or column stationary and view it simultaneously with any other part of the page. The rest of the page will scroll under the fixed section.

**FORMULA EDITOR**—This term refers to the ability to modify existing formulas in a spreadsheet. If a program lacks a formula editor and you wish to modify a formula that you have already entered, you will have to reenter the entire formula.

**GLOBAL CHANGE**—A global change is one that occurs throughout the page of a spreadsheet. A global change of column width will change all the columns. A global change of format values will change them throughout the page.

**GRAPHS**—Some spreadsheets will convert a list of numbers into a graph. Generally the graph is presented as a histogram where the length of bars displayed reflects the relative values of the list. Presume that the graph can only

be displayed on the screen unless the review specifies that it can be copied to a printer.

**HELP DISPLAY** (or **HELP SCREEN**)—A spreadsheet initially displays a grid of cells into which you can enter data. Some programs allow you to view a list of commands - such as print, move, etc. - along the top or bottom of the screen. Some programs actually allow you to view a separate screen where commands are listed and explained. This alternative screen is called a help screen.

**IF . . . THEN COMMAND**—This feature indicates that a formula entered into a cell can include an IF . . . THEN BASIC command. This feature allows the user to enter conditional formulas. An example would be a cell with the entry IF (A3)>100 THEN 20 ELSE 30. If cell A3 has a value greater than 100 then the cell with this formula will contain the value 20. If cell A3 contains a value less than or equal to 100, the current cell will contain the value 30.

**LOGIC OPERATORS**—This indicates that the formulas that you enter into a spreadsheet contain the logical operators AND, OR, and NOT.

**MENU-DRIVEN**—There is often an initial stage in developing a spreadsheet where the program will ask the user a number of questions such as the type of printer the user has, the number of columns and rows desired, etc. Menu-driven indicates that these questions will be presented in a separate screen, usually requiring the user to answer only yes and no questions.

**PAGE**—The word page is used to describe a particular set of entries. A page has a set limit of rows and columns defined by the user when the spreadsheet program is first run. The word spreadsheet is often used synonymously with the word page.

**REJUSTIFY**—When a label or value is entered into a cell it will automatically be aligned either to the right or left of the cell on the display. A rejustify feature allows you to realign the entry to the opposite side of that which is automatic for the program.

**RELATIVE COPY**—When a row or column is copied, it will have a new letter or number to identify it. If the row or column copied contains formulas that reference cells within the old row or column number, there may be a problem. A relative copy feature will automatically change any formulas to reference the new row or column identification.

**RELATIVE MOVE**—When a row or column is moved, it will have a new letter or number to identify it. If the row or column moved contains formulas that reference cells within the old row or column number, there may be a problem. A relative move feature will automatically change any formulas to reference the new row or column identification.

**ROW INSERT**—This feature, found on some spreadsheets, allows you to insert a blank row on a spreadsheet that has already been configured. If you have already designed a spreadsheet and made entries and then find it would be useful to include an additional row between two others that already exist, this feature will allow you to make the change.

**SEARCH**—This feature, found on some spreadsheets, indicates that the program can go through an entire spreadsheet automatically to locate a

particular entry. If you have entered an incorrect value several times in a long spreadsheet, this feature will conveniently locate the incorrect entry.

**SORT**—A sort feature will allow you to alphabetize a list of names or reorder a list of numbers so that they are in sequence.

**SPLIT SCREEN**—The Commodore 64 can display 25 rows of 40 characters each. Most spreadsheets will extend far beyond those limiting values. A split screen feature allows you to place two separate sections of the spreadsheet on the screen simultaneously. You are then free to scroll through either section independently of the other.

**SPREADSHEET**—A program that enables you to enter names, values, and formulas in tabular fashion. The formulas can reference any other value or formula in the spreadsheet and will automatically compute a resulting value. The term spreadsheet is also used in referencing the entries made. You can make entries into a spreadsheet and then save it under a specific name for later use. Your general spreadsheet program will recall that particular spreadsheet at your request.

**VALUE FORMAT**—Most spreadsheets distinguish numerical values as either an integer or a decimal and, in some cases, as a dollar value. A value format feature allows you to conveniently change the format designation after the value has been entered without having to reenter the value. For example, the number 47 could be changed to \$47.00 quickly and conveniently.

**WINDOWS**—The Commodore 64 can display 25 rows of 40 characters each. Many spreadsheets will extend far beyond those limiting values. A window capability allows you to view two separate sections of a spreadsheet simultaneously. A small rectangular section is placed on the screen over a larger section. You can then view two separate sections simultaneously although they may be far apart on the spreadsheet itself.

<b>BCalc</b>		<b>\$44.95 Diskette</b>
<b>Microtechnic Solutions</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
D Overall rating	3500 Max cells	- Sorts
D Price/Performance	35 Max rows	+ Help display
B Ease of use	99 Max columns	+ Menu-driven
B Vendor support	- Windows	- Graphs
B Documentation	- R/C copy	- Row insert
C Error handling	- R/C move	- Column insert
	- Logic operators	- Relative copy
<b>SPECIFIC CRITERIA</b>	- Split screen	- Rejustify
D Configurability	- Relative move	- Adjustable column
D Data Entry/Flexibility	+ Cell jump	- Fix titles
C Calculations	- Formula editor	- IF . . . THEN commands
C Report generation	- Search	

## DESCRIPTION

General spreadsheet.

## CONFIGURABILITY

This spreadsheet is directed toward ease of use and away from flexibility. Column width is fixed at seven characters, limiting the maximum dollar value to 9999.99. Labels can exist only on the top and side of the page and are a maximum of four characters for rows and five characters for columns.

## DATA ENTRY AND FLEXIBILITY

Formulas are not placed into individual cells. Instead, a menu-driven format allows you to perform various calculations from the menu and place the result in an individual cell. This approach simplifies the operation but only allows one operation at a time to be performed. You are not able to review the operation performed on a particular cell once it has been entered. Editing must be performed by replacing an entire value. Labels can be placed only along the left edge and top of the page. There is no facility for copying or moving rows or columns. There is a facility for jumping to a particular cell.

## CALCULATIONS

Addition, subtraction, division, and multiplication, percent, percent change, average, high, and low. Recalculations are performed automatically or delayed

in manual mode until you are ready. Calculations are menu driven and performed on a cell, a row, or a column.

### **REPORT GENERATION**

The print dump will print six columns at a time and as many rows as you have entered on the sheet. The print feature is configured for the 1525 or 1515 printer and unpredictable results occur with some other printers.

### **SUMMARY**

This program is designed to be extremely easy to use. Even the calculations performed are menu-driven. If your applications are strictly operations on short lists of short numbers, you may find some use for this program. However, flexibility has been sacrificed for ease of use. You cannot extend the width of a column to take in larger numbers or introduce labels in the middle of the page. You are limited to 35 rows, and you must perform operations on entire rows or columns - and then only one operation at a time. The program is extremely sluggish and slow to perform recalculations. Unless the price drops considerably, this is a poor choice for a spreadsheet.

<b>Busicalc</b>		<b>\$69.00 Diskette</b>
<b>Skyles Electric Works</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	1100 Max cells	- Sorts
C Price/Performance	99 Max rows	+ Help display
B Ease of use	99 Max columns	+ Menu-driven
B Vendor support	- Windows	- Graphs
C Documentation	+ R/C copy	+ Row insert
B Error handling	- R/C move	+ Column insert
	- Logic operators	+ Relative copy
<b>SPECIFIC CRITERIA</b>		+ Rejustify
B Configurability	- Split screen	+ Adjustable column
B Data Entry/Flexibility	+ Relative move	- Fix titles
C Calculations	+ Cell jump	- IF . . . THEN commands
B Report generation	+ Formula editor	
	- Search	

### DESCRIPTION

General spreadsheet.

### CONFIGURABILITY

From 20 to 99 rows and from 25 to 99 columns limited by an 1100 cell maximum. Visible cells can be configured from five to 18 characters. It seems to work with most properly interfaced printers.

### DATA ENTRY AND FLEXIBILITY

New rows and columns can be inserted after you have already made entries into a sheet. There are row, column, and cell copy commands. There are also cell, row, and column delete commands. The program will make relative changes during a move of a section of the sheet when requested. A walk feature allows you to program the cursor to move in different directions when you press the return key. For a long column of numbers, you can enter return and have the cursor move to an adjacent cell below rather than to the right of the current location. You can jump directly to any cell with a jump command. You can change the justification of an individual cell by command. It is possible to go into a cell and edit rather than to completely reenter a value or formula.

### CALCULATIONS

Addition, subtraction, division, and multiplication. Recalculations of formulas are performed on command.

## REPORT GENERATION

The print format can be altered from that of the screen just before printing. You can alter the linefeed command and specify the width of your printer. You can print any section of a sheet as long as it does not exceed the width of your printer.

### SUMMARY

This program is limited in two respects. The number of options available for a formula is rather limited. You cannot use any IF . . . THEN statements or logical operators. In addition to that shortcoming, the program is written in BASIC which makes recalculations painfully slow. The documentation warns of a possible ten-minute delay prior to printing out a copy of a sheet. Recalculating a list of 50 formulas takes two or three minutes, and even when entering data from the keyboard, there is a sluggishness to the response on the screen. On the other hand Basicalc, being in BASIC, can be modified in a number of ways. You can conveniently save segments of a sheet and then patch them together to create a composite. The documentation that comes with Basicalc is adequate.

<b>Calc Result Advanced Computer Marketing Services</b>		<b>\$149.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	1500 Max cells	- Sorts
B Price/ Performance	254 Max rows	+ Help display
B Ease of use	63 Max columns	+ Menu-driven
C Vendor support	+ Windows	+ Graphs
B Documentation	+ R/C copy	+ Row insert
B Error handling	+ R/C move	+ Column insert
	+ Logic operators	+ Relative copy
<b>SPECIFIC CRITERIA</b>	+ Split screen	+ Rejustify
B Configurability	+ Relative move	+ Adjustable column
A Data Entry/ Flexibility	+ Cell jump	+ Fix titles
A Calculations	+ Formula editor	+ IF . . . THEN commands
B Report generation	+ Search	

### DESCRIPTION

General spreadsheet.

### CONFIGURABILITY

Up to 1500 cells per page. Calc Result allows you to keep 5000 cells in a disk work area where pages can be quickly accessed and temporarily saved. Column widths can vary from five to 18 characters wide and be changed at any time with a global command. Initially you can configure the program to provide help in one of eight languages. You can use one or two 1541 disk drives and alter the colors of the display.

### DATA ENTRY AND FLEXIBILITY

New rows and columns can be inserted after you have already made entries into a sheet. There are row, column, and cell copy commands. There are also cell, row, and column delete commands. The program will make relative changes during the move of a section of the sheet when requested. Label entries are preceded by space values, and formulas are automatically differentiated. Values are formatted as floating point, integers, or dollars, and global changes allow you to change the format for the whole sheet. The screen can be split into two halves of a screen. You can then scroll through either half independent of the other. You can create a window of one section of a page and scroll the window independent of the background page. You can split the window to display three separate sections simultaneously. You can also display

split screen and windows so you can display three sections of three different sheets at the same time. You can also add the contents of multiple pages to create a sum page. The justification in cells can be individually changed. Titles can be fixed as a row, column, or both.

### **CALCULATIONS**

Addition, subtraction, division, multiplication, sum, maximum, minimum, average, exponential, absolute value, integer, count, sign, square, random number, sine, cosine, tangent, arctangent, >, <, =, =>, =<, NOT, AND, OR, THEN, ELSE, IF, Standard Dev, Arccos, arcsin, frac, log, and Rnd.

### **REPORT GENERATION**

You can choose a screen dump, a copy of any section as it is formatted on the screen, or the option of changing the format for the printout. A bar chart can be created automatically from any row or column. You can insert titles in the chart and print to a 1525 or 1520 printer.

### **SUMMARY**

This is professional quality software. If you have a business application, you will not find a better spreadsheet for the Commodore 64. If you have less than a business application, you will receive perhaps more than you actually need. The only drawback we can see is configuring the spreadsheet for a printer other than the Commodore 1525. The results can be unpredictable for anything other than Commodore printers.

<b>Calc Result Easy</b>		<b>\$79.95/Diskette</b>
<b>Computer Marketing Services</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	1000 Max cells	- Sorts
A Price/Performance	254 Max rows	+ Help display
B Ease of use	63 Max columns	- Menu-driven
B Vendor support	- Windows	+ Graphs
B Documentation	+ R/C copy	+ Row insert
B Error handling	+ R/C move	+ Column insert
	+ Logic operators	+ Relative copy
<b>SPECIFIC CRITERIA</b>	- Split screen	+ Rejustify
B Configurability	+ Relative move	+ Adjustable column
A Data Entry/Flexibility	+ Cell jump	+ Fix titles
A Calculations	+ Formula editor	+ IF . . . THEN commands
B Report generation	- Search	

**DESCRIPTION**

General spreadsheet.

**CONFIGURABILITY**

With up to 1000 cells per page, this is a less powerful and less expensive version of Calc Result. Column widths can vary from five to 18 characters wide and can be changed at any time with a global command. This program comes on a cartridge that inserts in the expansion port. Formatting and editing is performed using function keys followed by character keys. A small help display is presented at the top during editing.

**DATA ENTRY AND FLEXIBILITY**

New rows and columns can be inserted after you have already made entries into a sheet. There are row, column, and cell copy commands. There are also cell, row, and column delete commands. The program will make relative changes during a move of a section of the sheet when requested. Label entries are preceded by space values, and formulas are automatically differentiated. Values are formatted as floating point, integers, or dollars, and global changes allow you to change the format for the whole sheet. The justification in cells can be individually changed. Titles can be fixed as a row, column, or both.

## CALCULATIONS

Addition, subtraction, division, multiplication, sum, maximum, minimum, average, exponential, absolute value, integer, count, square root, random number, >, <, =, =>, =<, NOT, AND, OR, THEN . . . ELSE, IF, Standard Dev, Arccos, frac, log, and Ln.

## REPORT GENERATION

You can choose a screen dump, a copy of any section as it is formatted on the screen, or the option of changing the format for the printout. A bar chart can be created automatically from any row or column. You can insert titles in the chart and print to a 1525 or 1520 printer.

## SUMMARY

This is similar to the more advanced version that sells for much more. The only pertinent features lacking in Easy Calcs, is its inability to split screens, create windows, or process multiple screens simultaneously. The documentation is good, with speedy data entry and calculations. The cartridge means that you can turn your computer on and begin data entry almost immediately, and you can avoid switching between program disk and data disk. If you can get along without split screens and multiple page processing, then this version is just as good as the advanced version of Calc Result.

<b>ESP &gt; Calc</b>		<b>\$47.50/Diskette</b>
<b>New Leaf Inc.</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	2000 Max cells	- Sorts
C Price/Performance	645 Max rows	+ Help display
B Ease of use	645 Max columns	+ Menu-driven
B Vendor support	- Windows	- Graphs
B Documentation	- R/C copy	+ Row insert
C Error handling	- R/C move	+ Column insert
	- Logic operators	- Relative copy
<b>SPECIFIC CRITERIA</b>	- Split screen	- Rejustify
D Configurability	- Relative move	- Adjustable column
D Data Entry/Flexibility	+ Cell jump	- Fix titles
C Calculations	+ Formula editor	- IF . . . THEN commands
C Report generation	- Search	

**DESCRIPTION**

General spreadsheet.

**CONFIGURABILITY**

This spreadsheet is directed toward ease of use and away from flexibility. You determine the number of rows and columns when you initially set up the program, which is limited by the memory available. You can also label rows and columns at the same time. The number of operations available with the remaining memory is shown at the time of the initial setup. Ten characters can be included in the titles, but only eight characters per column and five characters per row will be visible on the screen. Values beyond nine significant figures are converted to scientific notation.

**DATA ENTRY AND FLEXIBILITY**

Rows and columns can be inserted into a page by creating a new page from a previous one and configuring additional rows or columns. Any titles to rows or columns are checked against all others to prevent duplication. Values, titles, and formulas can be edited any time. The program is menu-driven with help screens to facilitate operations. An auto advance feature allows you to program the cell bar so that the cursor will automatically move in the direction of your choice after an entry. Formulas can be viewed using a display option. Columns and rows can be deleted at any time. The values viewed on the screen are

truncated to six places, but the real values are saved and can be viewed with a special option.

### **CALCULATIONS**

Addition, subtraction, division, multiplication, percent, percent added, percent difference, sum of, average, minimum, and maximum.

### **REPORT GENERATION**

The printer is configured for a 1525 printer, and other printers give unpredictable results. You have a choice of two printing options. You can print the entire sheet or print the formulas.

### **SUMMARY**

This program is designed to be extremely easy to use. There are help screens available to display the options including the operations available. The screen is displayed with horizontal and vertical lines that give the screen a nice appearance. The program runs slowly. Calculations are slow and even cursor movement is sluggish. When you enter titles, they are crosschecked against all other titles to avoid duplication. This seems to waste a lot of time. You cannot enter labels within the spreadsheet. There are no features to facilitate copying rows, columns, or cells. This spreadsheet is adequate only for simple home applications.

<b>Multiplan</b>		<b>\$99.95/Diskette</b>
<b>HesWare</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	memory. Max cells	+ Sorts
A Price/Performance	255 Max rows	+ Help display
C Ease of use	63 Max columns	+ Menu-driven
A Vendor support	+ Windows	- Graphs
A Documentation	+ R/C copy	+ Row insert
A Error handling	+ R/C move	+ Column insert
	+ Logic operators	+ Relative copy
<b>SPECIFIC CRITERIA</b>	+ Split screen	+ Rejustify
A Configurability	+ Relative move	+ Adjustable column
A Data Entry/Flexibility	+ Cell jump	+ Fix titles
A Calculations	+ Formula editor	+ IF . . . THEN commands
A Report generation	+ Search	

**DESCRIPTION**

General spreadsheet.

**CONFIGURABILITY**

There is 10K of memory set up for a workspace. You can vary column widths individually or globally. You can format cells for integers, dollars, percent, fixed point, scientific notation, or leave it as a general format. You can use multiple drives.

**DATA ENTRY AND FLEXIBILITY**

Remarkable sums it up. You can name individual cells, columns, and rows and reference those names in formulas as well as by row and column numbers. There are row, column, cell copy, move, and delete commands. When requested the program will make relative changes during a move of a section of the sheet. You can reference other sheets on diskette, and the program will load values from those sheets onto the current one. You can change the format of any column, cell, or row. The screen can be split into two halves of a screen. You can then scroll through either half independent of the other. You can create a window of one section of a page and scroll the window independent of the background page. You can also add the contents of multiple pages to create a sum page.

## CALCULATIONS

Addition, subtraction, division, multiplication, sum, maximum, minimum, average, exponential, absolute value, integer, count, sign, square, random number, sine, cosine, tangent, >, <, =, =>, =<, NOT, AND, OR, IF . . . THEN . . . ELSE, Standard Deviation, log, Rnd, INDEX, Natural log, LEN, MID, Net present value, PI, Arctan, dollars, etc.

## REPORT GENERATION

You can print any part of or all of a sheet. You can set margin widths in advance. You can save a program on diskette in a format to be printed later. You can interrupt printing. You can choose between a formula and the value from the formula to be printed. The documentation states that you can print to a 1525 printer or a compatible printer.

## SUMMARY

This is professional-quality software. The ability to use names in formulas allows you to develop English formulas to clarify operations. Perhaps the strongest feature is the ability to link different pages together. Formulas in your current sheet can "look" to other pages for values. There are so many different logical and mathematical operations that it is impossible to explain them all here. The only drawback is the natural complexity of having a program that does so much. The documentation is excellent and there are plenty of help screens and menus, but this is an advanced program for professional applications.



**Figure 7. OmniCalc**

<b>OmniCalc</b>		<b>\$49.94/Diskette</b>
<b>HesWare</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	* Max cells	- Sorts
A Price/	255 Max rows	+ Help display
Performance	65 Max	+ Menu-driven
C Ease of use	columns	+ Graphs
A Vendor support	- Windows	+ Row insert
A Documentation	+ R/C copy	+ Column insert
A Error handling	+ R/C move	+ Relative copy
	+ Logic	+ Rejustify
<b>SPECIFIC CRITERIA</b>	operators	+ Adjustable column
A Configurability	- Split	+ Fix titles
A Data Entry/	screen	+ IF . . . THEN
Flexibility	+ Relative	commands
A Calculations	move	
A Report	+ Cell jump	
generation	+ Formula	
	editor	
	- Search	

## DESCRIPTION

General spreadsheet.

## CONFIGURABILITY

OmniCalc has the ability to link spreadsheets, which essentially gives you an unlimited size for documents. Column widths can be set from four to 20 character display widths, and entries can be formatted as dollars, floating point, or integers and changed at any time.

## DATA ENTRY AND FLEXIBILITY

Rows are given names and can be referenced in formulas. Rows, columns, and cells can be inserted, deleted, moved, copied, and edited. Column widths can be changed at any time. Editing is partially menu-driven, with the user entering two-letter codes for each operation. When requested the program will make relative changes during a move of a section of the sheet. You can reference other sheets on diskette, and the program will load values from those sheets onto the current one. You can change the format of any column, cell, or row.

There are a number of predefined formulas that can be performed on a specified row, cell, or column simply by entering the correct two-number code. There is a trend calculation that will take a previous value and, using the method of least square curve fitting, estimate the next value. You can predefine your own formula and then reference it with a simple two-number code. There

is a coded formula for amortizing a value monthly, semiannually, or annually as for interest or principal. There is a predefined formula for aging a value.

### **CALCULATIONS**

Addition, subtraction, division, multiplication, sum, average, exponential, absolute value, integer, sign, random number, sine, cosine, tangent, >, <, =, not equal to, IF . . . THEN . . . ELSE, log, Rnd, Arctan, dollars, trend, percentage, and amortize.

### **REPORT GENERATION**

You can print any part or all of a sheet. You can specify the number of spaces between lines. If the sheet is too wide for the printer after all the rows for the first section are printed, the printer will go back and print the remaining columns. You can also get a listing of all formulas and values for each cell. OmniCalc comes with a fantastic graphing program - Plot 64 (See Graphing Tools). The program is configured for the 1525 printer or Gemini Epson compatibles.

### **SUMMARY**

This is professional-quality software. The ability to link to other pages on diskette allows you to create interdependent reports. The program goes to great lengths to simplify operations. Many of the formulas are predefined and simply require a code and a reference. You can create your own predefined formulas which you may use often. The program is as easy to use as possible given the quantity of features. Excellent.

<b>Practicalc Computer Software Associates</b>		<b>\$35.00 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	2000 Max cells	+ Sorts
A Price/ Performance	250 Max rows	+ Help display
B Ease of use	100 Max columns	+ Menu-driven
B Vendor support	- Windows	+ Graphs
A Documentation	+ R/C copy	+ Row insert
B Error handling	+ R/C move	+ Column insert
	- Logic operators	+ Relative copy
<b>SPECIFIC CRITERIA</b>	- Split screen	+ Rejustify
B Configurability	+ Relative move	+ Adjustable column
B Data Entry/ Flexibility	+ Cell jump	+ Fix titles
B Calculations	+ Formula editor	- IF . . . THEN commands
B Report generation	+ Search	

## DESCRIPTION

General spreadsheet.

## CONFIGURABILITY

Up to 2000 per cell. From one to 100 columns and up to 250 rows limited by maximum number of cells. Displayed columns can be set from three to 38 characters with a global change. Seems to work with most properly configured printers. Graphics only with Commodore graphics printers.

## DATA ENTRY AND FLEXIBILITY

New rows and columns can be inserted after you have already made entries into a sheet. There are row, column, and cell copy commands as well as cell, row, and column delete commands. The program will make relative changes during a move of a section of the sheet when requested. The program automatically recognizes the difference between values and labels. Formulas must be declared in advance. Values are formatted as floating point, integers, or dollars; and global changes allow you to change the format for the whole sheet. If you narrow a column below the actual width of a number, the full number is saved and used for calculations. You can view the whole number with a special key function.

The justification in cells can be individually changed. Titles can be fixed as a row, column, or both. The program can sort any column alphabetically or

numerically. A particular value label or formula can be found automatically with a search feature that can scan a row, column, or the whole sheet.

### **CALCULATIONS**

Addition, subtraction, division, multiplication, sum, count, maximum, minimum, average, logarithm, exponential, absolute value, integer, sign, square, random number, sine, cosine, tangent, arctangent, >, <, and =. Recalculations of formulas are performed on command.

### **REPORT GENERATION**

The print format is the same as that which appears on the screen. Any section up to 80 characters wide can be printed. It is also possible to print only the formulas. There is a high and low-resolution graphical display showing bar graphs corresponding to the values of a column. The low-resolution graph can be sent to a printer which uses asterisks to display the graph. The high-resolution graph can only be sent to a printer with Commodore compatible graphics.

### **SUMMARY**

This is an excellent program. Its cost to performance value is extremely good. It lacks the ability to use logical operators and to use the IF THEN commands as formula operators. Although it is not possible to change the color scheme, it still ranks high on our value list.

<b>Spreadsheet Assistant</b>		<b>\$125.00/Diskette</b>
<b>Rainbow Computer Corp.</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	* Max cells	- Sorts
C Price/	200 Max rows	- Help display
Performance	52 Max	- Menu-driven
B Ease of use	columns	- Graphs
B Vendor support	- Windows	+ Row insert
A Documentation	+ R/C copy	+ Column insert
B Error handling	- R/C move	+ Relative copy
	- Logic	+ Rejustify
	operators	+ Adjustable column
<b>SPECIFIC CRITERIA</b>	- Split	- Fix titles
C Configurability	screen	- IF . . . THEN
C Data Entry/	- Relative	commands
Flexibility	move	
C Calculations	+ Cell jump	
B Report	+ Formula	
generation	editor	
	- Search	

## DESCRIPTION

General spreadsheet.

## CONFIGURABILITY

Up to 200 rows and 52 columns with an indicator to let you know how much memory you have left for a sheet. Column widths can be set from one to 20 characters wide. Screen colors can be changed at any time.

## DATA ENTRY AND FLEXIBILITY

New rows and columns can be inserted after you have already made entries into a sheet. You can copy a cell or group of cells to another part of the page with the option of making it a relative move. There are also cell, row, and column delete commands. You can jump directly to any cell with a jump command; you can change the justification of an individual cell by command. It is possible to go into a cell and edit rather than completely reenter a value or formula. Individual cells can be formatted as left justified, right justified, two place decimal, or integer. A global change can reformat the entire page.

## CALCULATIONS

Addition, subtraction, division, and multiplication. Recalculations of formulas are performed after the entry of a value or formula, but an optional manual mode will delay recalculations until you are ready.

## **REPORT GENERATION**

You can print any section of a page on an appropriate printer. Configurability for printers is flexible and should be able to accommodate any compatible serial or parallel printer. Data from the spreadsheet assistant can be stored in a format usable by the Writers Assistant (word processor).

## **SUMMARY**

This program is limited in scope. The applications are limited to work requiring addition, subtraction, division, and multiplication. The documentation, on the other hand, is excellent. In addition, the Rainbow people have made certain this spreadsheet will work with any properly configured printer. There is also the advantage of being able to integrate spreadsheets with word processing. The overall performance for price, however, is poor.

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**Worksheet for Spreadsheet Programs**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

- Overall rating
- Price/Performance
- Ease of use
- Vendor support
- Documentation
- Error handling

**SPECIFIC CRITERIA**

- Configurability
- Data Entry/Flexibility
- Calculations
- Report generation

**FEATURES**

- Max cells
- Max rows
- Max columns
- Windows
- R/C copy
- R/C move
- Logic operators
- Split screen
- Relative move
- Cell jump
- Formula editor
- Search

**FEATURES**

- Sorts
- Help display
- Menu-driven
- Graphs
- Row insert
- Column insert
- Relative copy
- Rejustify
- Adjustable column
- Fix titles
- IF . . . THEN commands

*Description*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Configurability*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Data Entry and Flexibility*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Calculations*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Report Generation*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Summary*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**COMPARISON CHART**

**PROGRAM NAME RATINGS FOR CRITERIA AND FEATURES**

	OVERALL RATING	PRICE/PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	CONFIGURABILITY	DATA ENTRY/FLEXIBILITY	CALCULATIONS	REPORT GENERATION
BCALC	D	D	B	B	B	C	B	B	C	C
BUSICALC	C	C	B	B	C	B	B	B	C	B
CALC RESULT ADVANCED	A	B	B	C	B	B	B	A	A	B
CALC RESULT EASY	B	A	B	B	B	B	B	A	A	B
ESP>CALC	C	C	B	B	B	C	D	D	C	C
MULTIPLAN	A	A	C	A	A	A	A	A	A	A
OMNICALC	A	A	C	A	A	A	A	A	A	A
PRACTICALC	B	A	B	B	A	B	B	B	B	B
SPREADSHEET ASSISTANT	C	C	B	B	A	B	C	C	C	B

**PROGRAM NAME CRITERIA AND FEATURES**

	WINDOWS	R/C COPY	R/C MOVE	LOGIC OPERATORS	SPLIT SCREEN	RELATIVE MOVE	CELL JUMP	FORMULA EDITOR	SEARCH	SORTS	HELP DISPLAY	MENU-DRIVEN	GRAPHS	ROW INSERT	COLUMN INSERT	RELATIVE COPY	REJUSTIFY	ADJUSTABLE COLUMN	FIX TITLES	IF . . . THEN COMMANDS
BCALC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BUSICALC	-	+	-	-	-	+	+	+	-	-	+	+	-	+	+	+	+	+	-	-
CALC RESULT ADVANCED	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+
CALC RESULT EASY	-	+	+	+	-	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+
ESP>CALC	-	-	-	-	-	-	+	+	-	-	+	+	-	+	+	+	+	+	-	-
MULTIPLAN	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+
OMNICALC	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRACTICALC	-	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
SPREADSHEET ASSISTANT	-	+	-	-	-	-	+	+	-	-	-	-	-	+	+	+	+	-	-	-

<b>PROGRAM NAME</b>	<b>FEATURES</b>			<b>PRICE</b>
	<b>MAX CELLS</b>	<b>MAX ROWS</b>	<b>MAX COLUMNS</b>	
BCALC	3500	35	99	\$44.95
BUSICALC	1100	99	99	\$69.00
CALC RESULT				
ADVANCED	1500	254	63	\$149.95
CALC RESULT				
EASY	1000	254	63	\$79.95
ESP>CALC	2000	645	645	\$47.50
MULTIPLAN	limited by memory	255	63	\$99.95
OMNICALC	*	255	65	\$49.95
PRACTICALC	2000	250	100	\$35.00
SPREADSHEET				
ASSISTANT	*	200	52	\$125.00

## 5.2 FINANCE AND ACCOUNTING

### INTRODUCTION

Today's businesses require an accurate record of all financial transactions. This record is useful in verifying the financial condition of a business and is usually required for bank loans, tax audits, and numerous other routine business activities. Such records can also be useful in identifying weaknesses in a business before they become fatal. Originally these transactions were first entered into a journal and then transferred to a ledger. The ledger was subdivided into three main categories: accounts receivable, accounts payable, and general ledger. The categories were further broken down into such items as cash, office expenses, etc. The result of every transaction would affect the ledger and the true economic condition of a company could easily be assessed by reading the ledger. There was a great deal of repetitive action involved in updating the journal, transferring transactions to the correct ledger, and verifying that all balances were correct. Repetitive action is exactly what a computer does best, and some of the first business applications were in the field of accounting.

**ACCOUNTS RECEIVABLE**—Few transactions in the marketplace today involve cash on delivery. Whether it is a coat from Macy's or the replacement of a filling in the dentist's office, payment for the product or service is usually made after the fact. A receivable account is set up by a business on every customer that qualifies for credit. Each time a customer makes a purchase, an entry is made showing the date of the purchase, the amount due, and the terms of the sale (to be paid in thirty days, etc.). When payment is received, another entry is made in the account along with the date of payment and the amount credited to the account. In this way, it is possible at any time to look at a receivable account and determine how much is owed your business and when the balance is due. By adding the totals from all of the receivable accounts you can get an overall view of expected revenues. These items are quite important from a business point of view. This kind of information can help you decide on whether it is wise to spend money at this time. It can also help you decide whether it is a good idea to continue to extend credit to a customer or perhaps hold off until he has made good on what he owes you. Banks view accounts receivable as a type of asset, and such records may be necessary when applying for a loan. A good **ACCOUNTS RECEIVABLE** program makes accessing this kind of information quick and convenient. An accounts receivable program is initially set up to include all existing customers to whom you extend credit. Each time a new customer qualifies for credit, he is added to the list. You will then be prompted to furnish information on the new customer, including the name of the firm, the address, and phone number. Depending on the particular program, you may be asked to furnish any credit

limitations and the acceptable terms for payment. Periodically someone in your firm will post all payments received into the appropriate accounts. The advantage of using a computer to handle receivable accounts becomes apparent as the list grows. Accessing information as to who is late on payments and who is approaching his credit limitation remains a convenient process.

**ACCOUNTS PAYABLE**—A business keeps track of the amount it owes each of its vendors in ACCOUNTS PAYABLE. Any purchase made on credit, whether it be office equipment for its own use or merchandise for resale, is kept track of by the business in payable accounts. Each time a business makes a payment to one of its vendors, it is recorded in the appropriate account. Essentially, the same type of information that is kept in a receivable account is kept in a payable account, including the name of the vendor, address, phone number, the initial amount, and the terms of the sale. Again, new vendors can be added at any time to the list. Remember, this is a record of money owed by your business.

It is often necessary to access information from payable accounts to resolve any discrepancies between your records and the vendor's records. When the list of payable accounts becomes long and the number of time payments becomes unmanageable, it is extremely helpful to have a program that can sort through the list, picking out those accounts where a payment is due immediately. This kind of information is vital when management attempts to structure budgets and plan expansion.

**GENERAL LEDGER**—A GENERAL LEDGER keeps track of all assets, liabilities, and capital. The amounts owed in payable accounts is totaled and entered as a single entry in the general ledger. Amounts owed to your business in receivable accounts is totaled and entered as a single entry in the general ledger. In addition to those entries, there are separate entries for cash, checking accounts, office equipment and supplies, merchandise, and repairs. Any record of anything of value is kept in the general ledger. The general ledger allows a business to get an overview of its economic health—whether it is making money or losing money, and what the major sources of gains and losses are. Total assets and liabilities should balance out in the general ledger. Any discrepancies indicate an error in calculations or misuse of funds.

A general ledger is set up when a business begins operating and is updated periodically when transactions are posted. A general ledger software program will allow you to view and to copy individual accounts in the ledger and to summarize all accounts to get an overall picture. A general ledger program must be able to interact with an accounts payable and accounts receivable system. If those two kinds of entries are few in number, they may be kept in a book and entered into the general ledger periodically. If your business has accounts receivable and accounts payable software, you will want a general ledger package that can interact with the two.

**INVENTORY**—An INVENTORY software package keeps track of a business's saleable items. There is generally a delay between the time products are ordered and the time they arrive. This, coupled with the fact that some products sell faster than others, may result in a surplus of some items and a

shortage of others. Inventory software can help a firm keep track of available inventory and thus avoid a surplus or shortage of products. Generally when an inventory program is implemented, you are prompted for specifics on each item. There will be questions regarding the description and initial quantity of products.

The program will request or furnish a specific product number for each item. New items can be added to the list at another time. Each time an item is sold or ordered, an entry is made. When a product arrives, a similar entry is made. An inventory package allows a business to have immediate access to information pertaining to quantities on hand and volume of sales on particular items. Some packages use various statistical methods to determine the optimal numbers of an item to keep on hand and will alert a business as to when it should reorder a product.

**PAYROLL**—Another accounting responsibility involves issuing correct salaries to employees. Deductions can be an accountant's nightmare. Generally these deductions include state and federal withholding taxes that vary depending on the amount of wages and percentage of state withholding. There are social security deductions and often local taxes, and benefit deductions. Of course wages and deductions can change at any time. It is important to have a software package that is flexible enough to allow for these changes. It is useful to have a package that will print the individual employee's check and maintain an active record of all wages paid. At the end of the year you will want a package that can produce information for W-2 forms. Generally PAYROLL software will prompt you for all the information necessary for setting up a payroll schedule for an individual employee. You will be asked for the employee's name, address, and wage, as well as percentages for federal, state, local, and miscellaneous withholding. Once the payroll software is initialized, you simply enter hours worked and dates. The software will do the rest.

**FINANCIAL UTILITIES**—In addition to the accounting programs mentioned, there are a number of utilities that aid in specific financial calculations and planning. There are often repetitive calculations specific to a particular type of office. You may require amortization of interest rates on various loans or depreciation curves for assets. Essentially, FINANCIAL UTILITIES are miscellaneous financial application programs.

### ***Specific Criteria***

**CONFIGURABILITY**—Although there are accepted accounting practices used in most businesses, each business has its own specific needs. It is desirable to be able to alter an accounting package to meet those specific needs. Will the software accommodate the number of accounts or the amount of inventory in your business? Can you alter the reports generated to meet your needs? Will the format of the invoices and checks that are generated on accounting software comply with the invoices and checks you already have? Can you change the format to meet future needs? Many payable and receivable accounts must keep track of amounts that are due in 30 or 90 days. This

type of accounting practice is referred to as aging, and an accounting package should be able to handle your aging requirements. Periodically a business must sort through all the payments received as well as the payments made and make entries into the payable and receivable sections. This process of posting may be done daily, weekly, or monthly depending on the volume of your business. Is the posting procedure flexible enough for your business?

There is also the matter of hardware configurability to take into consideration. Will the software purchased work with your printer? That \$40.00 accounting package is going to be very expensive if you have to buy another printer to work with it. The standard disk drive for the Commodore 64 is the 1541 disk drive. Can you use two of the drives to avoid having to repeatedly change diskettes? Can you use any of the other Commodore disk drives which are much faster than the 1541 drive?

Accurate accounting records are vital to a business. A business can become very vulnerable when more than one person has access to the accounting records. Some software packages establish a degree of security by providing password protection for the records. When you set up the account you establish your own password. From that point on you must enter that password to gain access to the accounting records. In each review configurability refers to the flexibility of the software, and we will attempt to answer as many of the above questions as possible.

**INTEGRABILITY**—There are five major types of accounting software: Accounts Payable, Accounts Receivable, General Ledger, Inventory, and Payroll. On some accounting packages three or more of these applications may come on the same diskette. They may interact so that an entry made into, say, a receivable account would update an entry in the general ledger account. The issue of how well each individual program relates to the others, is defined by the integrability factor. If you only need an accounting system to keep track of your accounts receivable, will an accounting package allow you to ignore the payable and general ledger sections? If you buy a single application and later find you need to expand to include other applications, will your program be able to work with others? In this section of a review we will make sure you are aware of other software packages that can be integrated with this package.

**REPORT GENERATION**—All pertinent information in an accounting package is saved on diskette. Individual entries and accounts can be viewed on a monitor. Most applications require various printed reports on accounts. In this section of the review we will try to specify the types of reports that can be printed. We will try to elaborate on your ability to alter the format of printed reports. When listing out the balance of each account, can we simply print out the final balance or must we view every transaction in the account? Can we view the activity for a specific month or group of months? In payroll programs can we print out checks? What about W-2 forms? In inventory can we get a printout of only those items that must be reordered immediately? In accounts receivable, can we get a listing of delinquent accounts? In the section on

Report Generation we will try to list the various printed reports and elaborate on the flexibility of each.

## GLOSSARY

**ACCOUNT PAYABLE**—A record for a particular business or party to whom you owe money. The record includes the name, address, and amount as well as any transactions involving the debt to that party. The transactions could be payments made later on the original debt.

**ACCOUNT RECEIVABLE**—A record for a particular business or party which owes your business money. The record includes the name, address, and amount as well as any transactions involving their debt. The transactions could include payments made toward that debt.

**ACTIVITY REPORT**—This feature indicates that it is possible to produce a listing of all transactions that have occurred in a particular account.

**AGING**—The process of monitoring the date a payment is due on an account. Traditionally payments are due on a 30, 60, or 90-day basis. A program that takes aging into consideration allows you to distinguish between different due dates.

**AUDIT TRAIL**—Each time a product changes hands, some sort of entry is required in an accounting system. If a product is purchased on credit from a vendor, an entry is made in a payable account. If the same product is then sold on a 30-day basis, an entry is made in a receivable account. At some point a payment is going to be made to the vendor, and at another point a payment is going to be received from the customer. An entry is going to be made for each of these. An audit trail is simply a list of these entries resulting from the purchase or sale of an item.

**AUTOMATIC REORDER**—Some inventory packages will advise when a particular product should be reordered. Automatic reorder may be based on the time it takes to receive products and the volume of those items sold, or it may be specified by you at a certain inventory level for the product.

**BALANCE SHEET**—This is a list of all assets, liabilities, and capital as of a certain date. It is a reflection of the financial condition of a business.

**CASH EVALUATION**—This feature indicates that an inventory program will calculate the dollar value of a purchase of a quantity of items.

**DEPRECIATION**—This refers to the decrease in value of an asset due to wear and tear and technological obsolescence.

**DISCOUNTS**—Some businesses discount the cost of an item purchased in quantity or in cash. A software package that takes that into consideration would automatically calculate the discount.

**DOUBLE ENTRY BOOKKEEPING**—This is a system of bookkeeping where each gain in one account results in a loss in another account. The purchase of an office chair will result in a loss in the cash account and a gain in the office equipment account.

**GENERAL LEDGER**—This is a combined listing of all accounts which includes all the financial transactions of a business. Accounts receivable and payable are each totaled to provide a single entry for each in the general ledger.

**HOURLY WAGES**—This feature found in some payroll software indicates that the software can be used to calculate wages on an hourly basis.

**INVENTORY PROJECTION**—Some inventory programs take into consideration the time it takes to order and receive a product as well as the volume of recent sales in order to predict inventory surplus or deficits.

**INVOICE**—A document stating the quantity, price, and other terms involved in the sale or purchase of a product or service.

**JOURNAL**—This is a record of the initial transaction that occurs when any product or service exchanges hands.

**MAX QUANTITY**—This is a value indicating the maximum number of items that can be monitored by a particular inventory package.

**MAX \$ LIMIT**—This is a value and indicates the maximum value in dollars that can be entered into the program.

**MAX # OF EMPLOYEES**—This is an indication of the maximum number of employees that can be entered into a payroll accounting system.

**MAX # OF ITEMS**—In an inventory package this value indicates the maximum number of items that can be monitored by the system. In an accounts receivable or accounts payable package, this indicates the maximum number of transactions that can occur in a particular account.

**MAX # OF RECORDS**—This is a number representing the maximum number of accounts that can be entered into an A/P program or A/R system, the number of employees in a payroll program, and the number of products in an inventory system.

**MODIFIABLE LOCAL TAX**—This feature found in some payroll software indicates that the software will calculate deductions required by a particular city or county and that the rate of deductions can be altered by you for a particular city or county.

**MODIFIABLE STATE TAX**—This feature is found in some payroll software and indicates that the software will calculate deductions required by a particular state and that the rate of deductions can be altered by you for a particular state.

**MODIFIABLE US TAX**—This feature found in some payroll software indicates that the software will calculate deductions for federal withholding and that the rate of deduction can be altered by you to accommodate changes in U.S. law.

**PASSWORD**—Some software establishes security for information entered into a program with a password. The password is usually an eight to ten-character entry assigned by you when an account is first created. From then on, the same password is required to access or change data in the account.

**PAY/INVOICE MATCHING**—This feature is found in some accounts receivable software and indicates that the program will automatically match a

payment received from a customer with the particular invoice that recorded the original transaction.

**POSTING**—This is the process of making entries into an account. When payments are received or sent, a record of the transaction is made in the appropriate account during posting.

**PRINTS CHECKS**—This feature indicates that a payroll program will print a wage or salary check for a particular employee.

**PRINTS W-2**—This feature indicates that a payroll package will calculate the total withholding for a particular employee for a given year and print the results on a standard W-2 form.

**RESPONSIVENESS**—This term refers to the speed with which a particular program responds. It can refer to how quickly a character pressed on the keyboard actually appears on the screen. It can also refer to how long it takes to access specific information.

**SALARIED**—This feature found on some payroll software indicates that the program will calculate an individual's salary on a periodic basis.

**SEARCH**—This refers to the ability to look through a list of accounts or inventory and find a specific entry.

**SORT**—This refers to the ability to organize a list in alphabetical or numerical order.

**TRACKING**—This indicates that a listing can be produced showing the entrance, movement, and disposition of a product.

**TRIAL BALANCE**—This is a list taken of the account balances in the general ledger to verify the accuracy of the postings to the ledger.

<b>Accounts Payable/Checkwriting Info Designs</b>		<b>\$79.95/Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	- General accounting	100 Max records
C Price/Performance	- Acct receivable	9999. Max values
C Ease of use	+ Acct payable	+ Password
A Vendor support	- Gen ledger	+ Aging
C Documentation	- Inventory	+ Print invoice
B Error handling	- Payroll	- Flag low inventory
	- Financial	+ Print checks
		+ Audit trail
<b>SPECIFIC CRITERIA</b>		
B Configurability		
A Integratability		
A Report generation		

**DESCRIPTION**

This program produces aged vendor payables reports for all vendors or for any one vendor. It will produce invoices, calculate payments, and write the checks. There is on-line status inquiry to determine a vendor's current account balance, total year-to-date volume, and the previous year's volume.

**CONFIGURABILITY**

Maximum vendors—100; maximum invoices—375; maximum transactions—40. Automatic aging of vendor invoices and discount calculation. Option to apply credit memos to balance due. Automatic posting of transactions to vendor file and invoice file. Hardware configurability can be changed for two drives or a 4040, and can be used with any properly interfaced printer.

**INTEGRATABILITY**

This program can be used alone or integrated with the other Info Designs accounting software.

**REPORT GENERATION**

Aged open item report for all vendors or selected group. Automatic checkwriting capability. List of vendors, Vendor Activity Report, A/P transaction file listing, A/P summary, A/P file update, A/P update, G/L transaction, A/P file update summary, A/P open invoice listing, A/P open invoice summary, A/P closed invoice listing and summary, single vendor report, A/P check register, manual check register, computerized checks, general information file.

## SUMMARY

The accounting functions are compiled BASIC programs. Loading the programs through a 1541 is a slow process because most are 50-90 blocks long. Moving around the menu selection is also slow. On a 4040 drive this problem is removed. This is another excellent accounting program from Info Designs. Info Designs offers a full-service telephone consulting capability for customers.

<b>Accounts Receivable/Billing Info Designs</b>		<b>\$79.95/Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	- General accounting	150 Max records
C Price/Performance	+ Acct receivable	9999. Max values
C Ease of use	- Acct payable	+ Password
A Vendor support	- Gen ledger	+ Aging
B Documentation	- Inventory	+ Print invoice
B Error handling	- Payroll	- Flag low inventory
	- Financial	+ Print checks
		+ Audit trail
<b>SPECIFIC CRITERIA</b>		
B Configurability		
A Integratability		
B Report generation		

### DESCRIPTION

With a standard configuration, this program can store information on 150 customers and 375 invoices, with up to 40 transactions. Larger data bases can be created segmenting customers onto different data disks. The program can generate invoices with options to apply payments by oldest invoice first. You can obtain on-line information as to a customer's current account balance, oldest invoice age, and credit limit.

### CONFIGURABILITY

The system has unlimited capacity because groups of customers and invoices are stored and processed at one time. Record storage capacity per disk: maximum customers—150, maximum invoices—375, maximum transactions—40. Hardware configurability can be changed for two 1541s, two 2031s, or one 4040 drive. Any properly interfaced printer can be used to generate reports. Tax codes can be introduced in initialization and used in generating invoices and payment calculations. You can update Account Receivable file weekly or more often if desired.

### INTEGRATABILITY

This program can be used alone or configured to work with the other business accounting packages from Info Designs.

### REPORT GENERATION

Among the reports that can be generated from this program are customer invoices, lists of customers, customer activity reports, accounts receivable transactions listing, accounts receivable updates, open items with aging, unbilled items, and closed item listings.

## SUMMARY

The menu selections are compiled BASIC programs. Loading the programs on a 1541 is slow because most are 50-90 blocks long. Moving around the menu is slow because loading the programs is slow. On a 4040 this problem is removed. Most of the information entered into the program must be coded, which tends to lower the ease of use. There are also limitations on the amount of deductions that can be automatically calculated on invoices.

<b>The Bill Collector</b>		<b>\$99.95/Diskette</b>
<b>Southern Solutions</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	- General accounting	400 Max records
B Price/Performance	+ Acct receivable	10Mil Max values
B Ease of use	- Acct payable	- Password
A Vendor support	- Gen ledger	+ Aging
A Documentation	- Inventory	+ Print invoice
B Error handling	- Payroll	- Flag low inventory
	- Financial	- Print checks
		+ Audit trail
<b>SPECIFIC CRITERIA</b>		
A Configurability		
A Integratability		
B Report generation		

**DESCRIPTION**

This is an accounts receivable program. You can record up to 100 customers and invoices on the same program diskette or 400 records on a separate data disk. For each customer you enter into the system you are prompted for name, address, phone number, and credit balance. The program will print billing invoices. Transactions are entered into the system and immediately update account balance, last purchase, and last payment total billed this year. The program automatically calculates finance charges and tax requirements.

**CONFIGURABILITY**

The program is completely menu-driven. You can initially designate aging periods as well as screen colors. Single 1541 or double, the 2031, 4040, 8050, 9050, 9060, and 8250 drive, and the Hardbox and Corvus Disk Drive with proper interface can be used. You can also alter printing parameters to allow the use of expanded print on most properly configured printers. You can set up the program to automatically calculate finance charges, as well as sales taxes. You can enter freight charges, salesperson codes, the FOB point, and any payment terms.

**INTEGRATABILITY**

The Bill Collector can integrate with the BusinessMan from Southern Solutions, a general ledger program. Any pertinent information obtained from entries in the Bill Collector will be automatically transferred to the BusinessMan.

## REPORT GENERATION

This program will print invoices for any accounts within your own specified range. You can also obtain summary listings of all unpaid accounts, overdue invoice listings, and all closed invoice listings. You can specify special messages depending on the lateness of an invoice. You can obtain a customer list, an activity report, and listing of all customers exceeding their credit rating.

### SUMMARY

This is an advanced accounts receivable program that could find applications in most small businesses. The program is relatively simple to operate considering many of the advanced features. The package is actually comprised of nine separate programs: transaction entry, billing, invoice print, invoice ledger, finance charge update, print statements, tax code file, general information file, and master information file. With the 1541 drive, there is some waiting if you must move from one program to another. Overall, a very professional package.

<b>The BillPayer</b>		<b>\$99.95/Diskette</b>
<b>Southern Solutions</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	- General accounting	600 Max records
B Price/Performance	- Acct receivable	10Mil Max values
B Ease of use	+ Acct payable	- Password
A Vendor support	- Gen ledger	+ Aging
A Documentation	- Inventory	+ Print invoice
B Error handling	- Payroll	- Flag low inventory
	- Financial	+ Print checks
		+ Audit trail
<b>SPECIFIC CRITERIA</b>		
A Configurability		
A Integratability		
A Report generation		

### DESCRIPTION

This is an accounts payable program. You can record up to 200 vendors and invoices on the same program diskette or 600 records on a separate data disk. For each vendor you enter into the system, you are prompted for vendor number, name, address, phone number, and debit account code. Transactions are entered into the system and immediately update the account balance and the amount spent in that account during the current year and the previous year. The program automatically calculates any discounts for early payments. Any taxes or freight paid out can be tracked for monitoring and reporting. The program will create payment invoices and print checks for all desired invoices.

### CONFIGURABILITY

The program is completely menu-driven. You can initially designate aging periods and screen colors. Single 1541 or double, the 2031, 4040, 8050, 9050, 9060, and 8250 drive, and the Hardbox and Corvus Disk Drive with proper interface can be used. You can also alter printing parameters to allow the use of expanded print on most properly configured printers. You can set up the program to automatically calculate finance charges as well as sales taxes. You can enter freight charges, salesperson codes, the FOB point, and any payment terms.

### INTEGRATABILITY

The Bill Collector can integrate with the BusinessMan from Southern Solutions (a general ledger program). Any pertinent information obtained from entries in the Bill Collector will be automatically transferred to the BusinessMan.

## REPORT GENERATION

This program will print invoices for any accounts within your own specified range. You can also obtain summary listings of open invoices, closed invoices, vendor lists, vendor activity lists, cash requirement analysis, general ledger reports, and payment checks.

### SUMMARY

This is an advanced accounts payable program that could find applications in most small businesses. The program is relatively simple to operate, considering many of the advanced features. The package is actually comprised of six separate programs: Invoice Entry, Invoice Payment, Invoice Ledger, Check Writer/Register, Master File Maintenance, and Information File.

<b>Business Accounting</b>		<b>\$95.00/Diskette</b>
<b>Totl Software, Inc.</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	+ General	400 Max records
B Price/	accounting	10 MIL Max values
Performance	+ Acct receivable	- Password
C Ease of use	+ Acct payable	- Aging
A Vendor support	- Gen ledger	+ Print invoice
B Documentation	- Inventory	- Flag low
C Error handling	- Payroll	inventory
	- Financial	- Print checks
		- Audit trail
<b>SPECIFIC CRITERIA</b>		
C Configurability		
C Integratability		
C Report		
generation		

### DESCRIPTION

This package includes an Accounts Receivable program that will produce invoices, statements, and inventory control records and an Accounts Payable program that will manage payables, expenses, and check registers.

### CONFIGURABILITY

The program can be configured for one to three drives and any properly configured printer. The program can be used in conjunction with 80-column expansion boards. The maximum number of customers varies with the number of transactions and the number of products recorded, ranging from 10 products, 100 customers, and 315 transactions to 500 products, 400 customers, and 60 transactions.

### INTEGRATABILITY

This program includes Accounts Receivable/Accounts Payable and allows for inventory mangement within those accounts.

### REPORT GENERATION

This program allows you to create invoices and account statements. You can include messages in invoices. Additional reports include purchase order registers, accounts transaction registers, check registers, expense summary reports, vendor file lists, accounts payable listing, accounts receivable listing, invoice registers.

### **SUMMARY**

This program is adequate for a small business. It is very configurable for printers and multiple drives. You can create aged accounts, include tax deductions, and credit charges.

<b>The BusinessMan Southern Solutions</b>		<b>\$99.95/Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	- General accounting	400 Max records
B Price/Performance	- Acct receivable	10Mil Max values
B Ease of use	+ Acct payable	- Password
A Vendor support	- Gen ledger	+ Aging
A Documentation	- Inventory	+ Print invoice
B Error handling	- Payroll	- Flag low inventory
	- Financial	- Print checks
		+ Audit trail
<b>SPECIFIC CRITERIA</b>		
A Configurability		
A Integratability		
A Report generation		

### DESCRIPTION

This is a program that allows you to enter transactions into a journal file and then automatically post those entries into a general ledger. You create your own accounts by number, name, and type. You can have regular accounts with monthly, quarterly, and annual balances or create a chart of accounts with designations for assets, liabilities, income, and expenses. You can use the program to create a trial balance, a balance sheet, an income statement, or a budget analysis.

### CONFIGURABILITY

This program can be used with a single or double 1541, or any Commodore disk drive model. You can also alter printing parameters to allow the use of any properly configured printer, and you can also alter screen colors.

### INTEGRATABILITY

The BusinessMan can be used alone or it can be integrated with the BillCollector (accounts receivable), The BillPayer (accounts payable), and the Paymaster (payroll) from Southern Solutions.

### REPORT GENERATION

This program will configure with any properly configured printer. Configuration is menu-driven from a program option. You can print trial balances, balance sheets, update reports, general information files, account file descriptions, statements of income and expenses, and budget analysis reports. You can obtain a listing of general journal entries or cash journal entries. All listings are in accepted format with debit entries on the left and credit entries on the right.

## SUMMARY

This is an advanced general ledger program that could find applications in most small businesses. The program is relatively simple to operate considering many of the advanced features. The package is actually comprised of seven separate programs: Cash Journal, General Journal, Financial Report, Posting Update, End-of-Month, Account File Maintenance, and General Information File.

**Easy Finance I  
Commodore****\$20.00/Diskette****GENERAL CRITERIA**

C Overall rating

C Price/  
Performance

B Ease of use

B Vendor support

B Documentation

B Error handling

**SPECIFIC CRITERIA**

B Configurability

B Integratability

B Report  
generation**FEATURES**

- General accounting
- Acct receivable
- Acct payable
- Gen ledger
- Inventory
- Payroll
- + Financial

**FEATURES**

- Max records
- Max values
- Password
- Aging
- Print invoice
- Flag low inventory
- Print checks
- Audit trail

**DESCRIPTION**

Easy Finance I is one of a five part series from Commodore designed to facilitate calculations involving loans, investments, and financial analysis. Easy Finance I will allow you to calculate monthly payments and interest paid at various loan rates. You enter the number of years for the loan, the annual interest rate, and the amount of the loan. Easy Finance will calculate the amount you may pay each month and how much you will end up paying in interest over the years.

**CONFIGURABILITY**

There is no real limit to amounts and interest rates that can be entered. The program specifies the 1525 printer as the printer output device but any properly configured printer should work.

**INTEGRATABILITY**

Each of the Easy Finance Series contains different programs to accomplish different tasks.

**REPORT GENERATIONS**

Easy Finance I will print out a listing that will include the interest rate, the amount of the loans, the amount to be paid each month, and the total interest that will have been paid when the loan has been paid off.

**SUMMARY**

Each of the Easy Finance Series is a very simple program. Most of the applications performed can be created more effectively using a good general spreadsheet. Be sure and look on the back of the box of each program to find out exactly what calculations are actually performed by the program.

**General Ledger  
Info Designs**
**\$79.95/Diskette**
**GENERAL CRITERIA**

- B Overall rating
- C Price/Performance
- C Ease of use
- A Vendor support
- B Documentation
- B Error handling

**SPECIFIC CRITERIA**

- B Configurability
- A Integratability
- B Report generation

**FEATURES**

- General accounting
- Acct receivable
- Acct payable
- + Gen ledger
- Inventory
- Payroll
- Financial

**FEATURES**

- 300 Max records
- 1MIL Max values
- + Password
- + Aging
- + Print invoice
- Flag low inventory
- Print checks
- + Audit trail

### DESCRIPTION

This program allows you to create a chart of accounts using the Osborne convention numbering scheme. Customized financial reports, income statements, balance sheets, and trial balances can be produced. Maintains account balances for present month, quarters-to-date, year-to-date, previous quarters, and previous years.

### CONFIGURABILITY

The programs reside on one disk, and the chart of accounts and transaction files reside on the other. Because the chart of accounts for any one company should not be allocated to several disks, there is a finite capacity in the system (maximum chart of accounts—300, maximum transactions—1,500). However, a separate chart of accounts disk may be established for each business entity. Hardware configurability can be changed for two 1541s, a 4040, or a 2031. Any properly interfaced printer can be used.

### INTEGRATABILITY

Automated interface with Accounts Payable, Accounts Receivable, and Payroll.

### REPORT GENERATION

This program can produce a general ledger listing, general ledger balances, a general journal, a transaction file, a cash receipts journal, a cash disbursement journal, a general ledger update, a posting update error report, a trial balance and balance sheet, a monthly or quarterly balance sheet, general information files, and an assortment of special reports.

## **SUMMARY**

The accounting functions are compiled BASIC programs. Loading these programs through a 1541 drive is a slow process because most programs are 50-90 blocks long. Moving around the menu selection is also slow. On a 4040 this problem is removed. This package in conjunction with the other Info Designs programs provides a comprehensive accounting system for most businesses. The documentation is good but presumes understanding of a general ledger system before initialization.

<b>Inventory Info Designs</b>		<b>\$79.95/Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	- General	1800 Max records
C Price/Performance	accounting	9999. Max values
C Ease of use	- Acct receivable	+ Password
A Vendor support	- Acct payable	- Aging
B Documentation	- Gen ledger	- Print invoice
B Error handling	+ Inventory	+ Flag low inventory
	- Payroll	- Print checks
	- Financial	+ Audit trail
<b>SPECIFIC CRITERIA</b>		
A Configurability		
A Integratability		
A Report generation		

### DESCRIPTION

Maintains perpetual inventory records for all stock items. Utilizes scientific inventory management principles to automatically calculate daily usage, re-order levels, and economic order quantities. Provides real-time updating of inventory file balances for current management information. Processes stock receipts, stock issues, stock orders, and stock adjustments will full audit trail.

### CONFIGURABILITY

Hardware configurability can be changed for two 1541 drives, a 2031, or a 4040 drive and any properly interfaced ASCII printer, printers by Commodore. Information can be included in an inventory file and used to generate a number of reports: part number, stock number, description, unit of measure, vendor code, lead time, bin location description codes, price standard, price discount 1, and price discount 2. Values that are automatically calculated are average unit cost, daily average usage, stock on hand, stock on order, reservations, reorder level, economic order quantity, monthly issues, and yearly issues.

### INTEGRATABILITY

Part of a total management accounting system which includes accounts receivable, accounts payable, payroll, and general ledger.

### REPORT GENERATION

Provides reporting of inventory summary, reorder report, shortage report, stock status report, physical inventory report, price, catalog, and sales analysis report, as well as stock receipts, stock issues, stock orders, stock adjustments,

inventory balances, inventory list, part numbers, a general information file, and a file maintenance coding sheet.

### **SUMMARY**

The menu selections are compiled BASIC programs. Loading the programs through a 1541 is a slow process because most programs are 50-90 blocks long. Moving around the menu is also slow. On a 4040 drive this problem is removed. The documentation is excellent—easy to read, with every entry fully explained. Reorder quantities are automatically calculated using lead-time, daily usage quantities, and the Wilson Lot Size formula to calculate optimum order quantities. An abundance of possible reports are generated, including an inventory catalog.

<b>Inventory Management Timeworks</b>		<b>\$79.00/Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	- General	950 Max records
B Price/ Performance	- accounting	10Mil Max values
A Ease of use	- Acct receivable	+ Password
A Vendor support	- Acct payable	- Aging
A Documentation	- Gen ledger	- Print invoice
B Error handling	+ Inventory	+ Flag low inventory
	- Payroll	- Print checks
	- Financial	+ Audit trail
<b>SPECIFIC CRITERIA</b>		
C Configurability		
A Integratability		
C Report generation		

### DESCRIPTION

This is an inventory management program that allows you to enter up to 950 products on a diskette. The program is menu-driven and prompts you for statistical information for each product added to the file. Information you may enter includes part number, unit of measure, product group, description, supplier, minimum stock, maximum stock, the reorder amount, the oldest open purchase order, and the oldest open presold (backorder). You may at any time add to the products list, record a sale, record a shipment received, record an order that can't presently be filled, record a purchase order, or change any of the entries previously entered. The program automatically produces the last activity date, the current inventory level, the current value of each item, and the total value of inventory on hand. If the inventory level drops below a preset level, that fact is indicated when accessing that record.

### CONFIGURABILITY

The program is completely menu-driven. You are limited to the information prompted for and mentioned above. You can elect to record a minimal amount of data in a short form with only the part number, the unit of measure, a product group, a description, and a supplier. Less information can be generated for reports from this short form.

### INTEGRATABILITY

Timeworks has, or is in the process of, developing other accounting programs that are integratable with the Inventory Management program.

## **REPORT GENERATION**

A separate report generation program must be loaded to display or print reports. Reports are printed in upper case only for the Commodore 1525. Other properly configured printers should work but may print in lower case only. Designing a report is menu-driven and allows you to print or display any of the types of information entered on the products as long as the entries do not exceed the width of the screen or printer. You can print descriptions, part number, quantity on hand, etc., in any order as long as it does not exceed the width of the printer. You can also specify parameters of the first and last part number or product group or date.

## **SUMMARY**

This program lacks some of the frills of more advanced inventory packages but is so simple to use it may be desirable in many cases. Files are stored using relative filing and are therefore accessed quickly. Everything is menu-driven and in plain English to simplify use. One drawback: If you exceed the character limits for any entry, you begin entering data into the next field. Overall we found this to be a fairly good program for a small business.

<b>The Paymaster</b>		<b>\$99.95/Diskette</b>
<b>Southern Solutions</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	- General accounting	130 Max records
B Price/Performance	- Acct receivable	10Mil Max values
B Ease of use	- Acct payable	- Password
A Vendor support	- Gen ledger	- Aging
A Documentation	- Inventory	- Print invoice
B Error handling	+ Payroll	- Flag low inventory
	- Financial	+ Print checks
		+ Audit trail
<b>SPECIFIC CRITERIA</b>		
A Configurability		
A Integratability		
A Report generation		

### DESCRIPTION

This program allows you to keep a record of 15 to 20 employees on the program disk or up to 130 employees on a separate data disk. You can print payroll checks and automatically compute withholding and end of the year W-2 forms. On each employee you are prompted in menu format for name, address, marital status, social security number, salary type or wages, date employed, pay rate, vacation hours accrued per period, sick hours per pay period, federal exemptions, state exemptions, and miscellaneous exemptions. When payroll calculations are actually made the federal tax table is automatically figured in. You have two options for calculating state tax: manually, where you are prompted for the amount for each check, or automatically, where you must load state tax information from another diskette provided by Southern Solutions.

### CONFIGURABILITY

This program can be used with a single 1541 or double, or any Commodore disk drive model. You can also alter printing parameters to allow the use of any properly configured printer. You can alter screen colors.

### INTEGRATABILITY

The Paymaster can be used alone or be integrated with the BusinessMan from Southern Solutions to automatically forward payroll expenditures to the general ledger program. Federal, state, and local taxes can be forwarded automatically into separate accounts in the general ledger.

## **REPORT GENERATION**

This program will configure with any properly configured printer. Configuration is menu-driven from a program option. You can print payroll transaction summary reports, deduction reports, payroll journals, sample checks, payroll check registers, sample W-2 forms, payroll information files, miscellaneous deduction registers, and general ledger update reports.

### **SUMMARY**

This is an advanced payroll program that could find applications in most small businesses. The program is relatively simple to operate considering many of the advanced features. The package is acutally comprised of 12 separate programs: Employee Master File, Transaction Record, Payment and Deduction Record, Calculate Payroll, Payroll Journal, Check Writer/Register, Payment Register, Payroll Posting, Quarterly Reports, Print W-2 Forms, File Maintenance, and Information File.

**Payroll  
Info Designs****\$79.95/Diskette****GENERAL CRITERIA**

- B Overall rating
- C Price/Performance
- C Ease of use
- A Vendor support
- B Documentation
- B Error handling

**SPECIFIC CRITERIA**

- A Configurability
- A Integratability
- A Report generation

**FEATURES**

- General accounting
- Acct receivable
- Acct payable
- Gen ledger
- Inventory
- + Payroll
- Financial

**FEATURES**

- 75 Max records
- 9999. Max values
- Password
- Aging
- Print invoice
- Flag low inventory
- + Print checks
- + Audit trail

**DESCRIPTION**

This program can be used to generate wages for both hourly and salaried employees. In setting up the program, you are prompted for cutoff points for federal and state withholding information found in IRS and state literature. The program will then automatically calculate federal and state withholding taxes. Special payments such as travel expenses and bonuses special deductions such as union dues and insurance premiums can be included in the initialization. Unemployment payments, FICA, and state disability insurance rates and cutoffs can be included.

**CONFIGURABILITY**

Hardware configurability can be changed to use two 1541s, a 4040, one or two 2031s, and any properly configured printer. The program can be used to automatically calculate federal, state, local, and miscellaneous deductions, and to print payroll checks as well as records of all checks printed.

**INTEGRABILITY**

This program can be used by itself or as part of a total accounting system which includes inventory management, accounts payable, accounts receivable/billing, and general ledger. Any payroll deduction is automatically totaled and transferred to the proper accounts in the General Ledger.

**REPORT GENERATION**

Reports include general information file, P/R transactions report, P/R summary report, miscellaneous, pay/deduction report, payroll journal, payroll checks, payroll check register, absentee report, insurance report, payroll 941 report, and W-2 forms.

## SUMMARY

The accounting functions are compiled BASIC programs. Loading the programs through a 1541 drive is a slow process because most programs are 50-90 blocks long. Moving around the menu is also slow. On a 4040 drive this problem is removed. The program is menu-driven but requires a lot of initialization. You will have to enter a lot of information pertinent to state, federal, FICA, and local deductions. Although the documentation is good, a thorough prior understanding of the payroll deduction system is required.

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**Worksheet for Finance and Accounting**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

- Overall rating
- Price/Performance
- Ease of use
- Vendor support
- Documentation
- Error handling

**FEATURES**

- General accounting
- Acct receivable
- Acct payable
- Gen ledger
- Inventory
- Payroll
- Financial

**FEATURES**

- Max records
- Max values
- Password
- Aging
- Print invoice
- Flag low inventory
- Print checks
- Audit trail

**SPECIFIC CRITERIA**

- Configurability
- Integratability
- Report generation

*Description*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Configurability*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Integratability*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Report Generation*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Summary—

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**COMPARISON CHART**

**PROGRAM NAME RATINGS FOR CRITERIA AND FEATURES**

	OVERALL RATING	PRICE/PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	CONFIGURABILITY	INTEGRABILITY	REPORT GENERATION	GENERAL ACCOUNTING	ACCT RECEIVABLE	ACCT PAYABLE	GENERAL LEDGER	INVENTORY	PAYROLL	FINANCIAL	PASSWORD	AGING	PRINT INVOICE	FLAG LOW INVENTORY	PRINT CHECKS	AUDIT TRAIL
ACCOUNTS PAYABLE/ CHECK-WRITING	B	C	C	A	C	B	B	A	A	-	-	+	-	-	-	-	+	+	+	-	+	+
ACCOUNTS RE- CEIVABLE/BILL- ING	B	C	C	A	B	B	B	A	B	-	+	-	-	-	-	-	+	+	+	-	+	+
THE BILL COLLECTOR	A	B	B	A	A	B	A	A	A	-	+	-	-	-	-	-	-	+	+	-	-	+
THE BILLPAYER BUSINESS ACCOUNTING	A	B	B	A	A	B	A	A	A	-	-	+	-	-	-	-	-	+	+	-	-	+
THE BUSINESSMAN EASY FINANCE I	C	B	C	A	B	C	C	C	C	+	+	+	-	-	-	-	-	-	+	+	-	-
GENERAL LEDGER	A	B	B	A	A	B	A	A	A	-	-	-	+	-	-	-	+	+	+	-	-	+
INVENTORY MANAGEMENT (Info Designs)	B	C	C	A	B	B	B	A	B	-	-	-	+	-	-	-	+	+	+	-	-	+
INVENTORY MANAGEMENT (Timeworks)	B	C	B	A	B	B	B	A	B	-	-	-	-	+	-	-	+	-	-	+	-	+
THE PAYMAS- TER	C	B	A	A	A	B	C	A	C	-	-	-	-	+	-	-	+	-	-	+	-	+
PAYROLL	A	B	B	A	A	B	A	A	A	-	-	-	-	-	+	-	-	-	-	-	+	+
	B	C	C	A	B	B	B	A	B	-	-	-	-	-	+	-	-	-	-	-	+	+

<b>PROGRAM NAME</b>	<b>FEATURES</b>		
	<b>MAX RECORDS</b>	<b>MAX VALUES</b>	<b>PRICE</b>
ACCOUNTS PAYABLE/ CHECKWRITING ACCOUNTS	100	9999	\$79.95
RECEIVABLE/BILLING THE BILL COLLECTOR	150 400	9999 10 MIL	\$79.95 \$99.95
THE BILLPAYER BUSINESS ACCOUNTING	600 670	10 MIL 10 MIL	\$99.95 \$95.00
THE BUSINESSMAN EASY FINANCE I	400 N/A	10 MIL N/A	\$99.95 \$20.00
GENERAL LEDGER INVENTORY MANAGEMENT (Info Designs)	300 1800	9999 9999	\$79.95 \$79.95
INVENTORY MANAGEMENT (Timeworks)	950	10 MIL	\$79.00
THE PAYMASTER PAYROLL	130 75	10 MIL 9999	\$99.95 \$79.95

## 5.3 WRITING AND CORRESPONDENCE TOOLS (WORD PROCESSORS)

### INTRODUCTION

Word processing is one of the most popular applications of personal computers. A word processing program makes your computer function as a super typewriter. Rather than typing a letter on paper, you type it into your computer through the keyboard. The word processor simultaneously displays it on the monitor screen.

Why would you want to invest hundreds of dollars in setting up a word processing system?

The answer lies in the powerful editing capabilities of a full-featured word processor. Once the text is displayed on the monitor screen, you can move, insert, or delete any portion of the text by using simple commands. In this manner, you may edit pages of documents as many times as necessary without once having to retype a page. With a word processor, you may format your text in any way you would like to see it printed (i.e., left justified, right justified, or centered). A word processor automatically numbers the pages of your document. It can also create headers, footers, and line spaces according to your specifications. You can print your documents any number of times desired with the ease of typing one or two character commands. You can also store your documents on floppy diskettes and retrieve them whenever you wish. This eliminates accumulation of loose pages of text during the editing process.

### *Applications Of Word Processors*

Before computers became affordable for the general public, word processing was used mostly in businesses. The “dedicated” office word processing system was specifically designed for professional operators and cost many thousands of dollars. Few individuals could justify spending such large sums of money for word processing.

Now a word processing system can be set up on a personal computer (such as your Commodore 64) for less than one thousand dollars—and word processing software is available for almost all microcomputers. This has generated many cost effective applications of word processing. For example, a small business can use a low-cost word processing system to generate reports for investors or personalized letters for clients. In fact, all business correspondence may be handled by a word processor in a fraction of the time it would take if

conventional typewriters were being used. (One of the most welcome spots for low-cost word processors has to be among the script writers in Hollywood, who spend grueling hours constructing dialogue for television and movie stars. Not only does word processing speed up their production, but it also allows them more time to think and thereby, increases their creativity. At least we hope it does!)

It is not surprising, therefore, to imagine word processors as being one of the primary reasons why many people invest in personal computers.

Many home computer owners have also started using word processing for applications such as publishing newsletters for amateur or special interest groups (like the Commodore 64 Users Group in your neighborhood), writing term papers for a class, or just sending letters to friends. Some even wind up writing books like the one you are reading, which was edited on a home computer with a word processor.

As Commodore 64 owners, you are especially fortunate if you want to add word processing capabilities to your computer. Because of the low cost of the computer and its increasing popularity among software developers and computer users, Commodore 64 can be set up as a powerful word processing system at minimal cost. Many programs are available for this computer, and in order to choose the right kind to match your business or personal needs, you will first need to develop a good understanding of the concepts of word processing, and second you will need to know what features to look for in a particular word processor. (This will be discussed in detail under Specific Criteria for Evaluation of Word Processors.) A glossary is also included to help you understand the jargon often associated with word processing.

## **Definition**

Word processor was originally a term used for automated, computerized office systems (such as Wang) designed strictly for preparing, editing, and printing business correspondence, corporate reports, etc. These systems incorporated a typewriter keyboard, a video display unit (monitor), a letter-quality (daisy wheel) printer, and built-in software designed for word processing.

With reference to personal computers (and, specifically, your Commodore 64), the term word processor refers to a program or programs that allow you to create, edit, store, and print textual matter, thereby closely duplicating the functions of a professional word processing system. The obvious advantage is, of course, the low cost involved in setting up such a system for your personal computer. Also, a personal computer, unlike a dedicated word processor, can be used for many other business and home applications, such as spreadsheets, accounting, information management, mailing lists, educational programming, and games.

## Specific Criteria

There are currently about a dozen popular word processors available for the Commodore 64. These programs range in price from \$30 to \$150. Few are directed at novice users, and many offer sophisticated features that only those who spend a great deal of time writing will appreciate. In evaluating a particular word processor for your needs, consider the price versus performance of that product as well as its suitability for your needs.

For the purposes of this book, we found it useful to evaluate a program in comparison with other programs that are also available for the Commodore 64. Within each price range we have been able to single out a few word processors which are equipped with better features. Following is a brief discussion of the criteria that we used to evaluate these specific programs.

**START-UP OPTIONS**—These are the options presented to you by the program (via the master menu) when you first load and execute the word processor. Through these options you may configure the system peripherals from within the program. These options generally include printer setup, DOS commands, screen text/background color adjustment, etc.

Printer setup refers to initializing the particular printer that you may be using with the Commodore 64 (NEC, Diablo, Spinwriter, or Centronix parallel).

DOS commands refers to accessing disk functions such as formatting a diskette and obtaining a directory of disk files.

Color setup refers to adjusting the screen and background colors to get the most pleasing color combination. Of the possible 256 color combinations available on the Commodore 64 screen display, very few allow optimum readability.

**TEXT ENTERING**—Text entering simply involves typing text onto the monitor screen through the keyboard. Some programs offer special features that make it easier to enter and format text on the screen. For example, a number of programs offer an 80-column screen. Since the video display of the Commodore 64 is restricted to 40 columns (without hardware modification), the 80-column screen is either available by horizontal scrolling or as a special high resolution bit-mapped character set. Other features may include, for example, tab set—which allows you to move quickly to a preset position (horizontally or vertically) and capital lock—which lets you enter text in upper case without using the shift lock key.

**TEXT EDITING**—Text editing is one of the primary functions of a word processor. In the Text Editing mode, you can display a letter or a report on the screen page by page. By using the cursor keys, you can position the cursor on any part of the text. You can move the text around by scrolling it vertically or horizontally, depending upon the particular word processor. Once you have viewed the text, you can modify it by making the appropriate deletions and insertions. You can erase, rearrange, and copy a line or paragraph.

Some state-of-the-art word processing programs offer advanced functions, such as the ability to “search” throughout the text file for specified strings (words or phrases) and “replace” those strings with the corrected ones. You

can access all these functions of the text editor in most of the word processors. Each function, however, may require more or less manipulation on your part depending upon the sophistication of the particular program. For example, some word processors make full use of the function keys. You can enter most of the commands by simply striking the appropriate function key, while others require you to memorize the specific commands and type them each time you want to access a specific function.

**TEXT OUTPUT**—This is the part of the word processor that emulates the functions of a typewriter. It may be considered as the most important feature of a word processing program. In the Text Output mode, you can format your text in exactly the way that you would like to see it printed. In order for you to accomplish this, most word processing programs offer an array of features. For example, you can set page length (lines), page width (columns), and left and right margins. You can align your text left or right justified, and you can also center portions of the text between margins. Some word processors offer advanced features such as automatic page numbering, headers, footers, and forced pagination. You can also send control codes to the printer for accessing alternate character fonts and special printer functions like underlining, boldfacing, superscripts, subscripts, etc.

**FILE HANDLING**—Once you have typed your text into the word processor, you can save it on a disk or cassette in the form of files. These files may be recalled whenever you want to view, modify, or print them. In addition to storing and retrieving these files, some word processors include some useful file facilities, such as the ability to link a number of files to form one long document, insert information from one file (fill file or merge) into another, etc. These file facilities enhance the usefulness of the program and broaden its applicability.

**SPECIAL FEATURES**—In addition to the features mentioned above, a particular word processor may offer special features that make it outstanding when compared with others. For example, Wordpro3 Plus by Professional Software offers an alternate screen which can be used to list the disk directory or load a second file that you may want to simultaneously view or edit. Easy Script by Commodore offers from 40 to 260 columns of text screen that can be used to create data tables, etc.

## **GLOSSARY**

**AUTOSCROLL**—This refers to the automatic scrolling of your text file by the program. The scrolling may be horizontal or vertical. This is convenient if you want to quickly view a part of or the whole text or if you want to go to a specific part of the text.

**BLOCK OPERATIONS**—Some word processors allow you to perform certain editing operations on blocks of text instead of one word or line at a time. These operations are collectively referred to as block operations. You may specify the range of a block (a few words, lines or paragraphs) and then

the program will perform the desired operation in that specified range. Examples of block operations are block-delete, block-copy, block-move, etc.

**CAPITAL LOCK**—In this mode, all the alphabetic characters that you type on the screen will appear in upper case. It is the same as the Shift Lock mode except that in the mode all other function and numeric keys will also appear in upper case.

**DATABASE INTERFACE**—The facility which allows a word processor to read sequential files created by a database management program. These files may be edited in the word processing mode or merged with text files created on the word processor.

**DECIMAL TABULATION**—This feature lets you enter a series of numbers and align the decimals. It is also referred to as numeric mode.

**DOS COMMANDS**—Some word processors let you perform disk operations without having to exit the program. This feature is time-saving and very convenient. You can display the disk directory, load and save files from the directory, scratch unwanted files from the disk, and copy certain files for backups.

**FILE**—A file is a text or document that is stored under a unique name on disk or tape. For example, if you store a section of your manuscript under the title "Chapter 1," then Chapter 1 will be considered as a text file. This file may be merged with other files if your word processor program has merge capabilities.

**FORCED PAGING**—This command instructs the printer to go to the top of the next page and resume printing the text.

**FORMATTED OUTPUT TO SCREEN**—This feature lets you look at the text on the monitor screen exactly the way it would be printed on paper. In this way you can make final changes in the formatting of your text before you actually print it on paper.

**GLOBAL SEARCH & REPLACE**—The editor in some word processing programs is capable of searching for specific text strings (words or phrases) throughout the text file. The text string may be a misspelled word or a name that you would like to correct. Using the global search and replace feature, you can instruct the editor to replace the text string with the corrected version, and the editor will automatically go through the entire file and replace that string. This can save hours of editing time if you have a manuscript of 100 pages and you want to replace a name or correct a consistently misspelled word.

**HELP MENU**—The help menu often consists of helpful hints on possible responses that you may make, a list of system commands, and the operating mode that you are currently working in. It is displayed by the program when you forget the commands or subsequent steps that you need to go through to execute an operation.

**HORIZONTAL SCROLL**—The video display on the Commodore 64 is restricted to 40 columns (without hardware modification). Some programs overcome this slight disadvantage by allowing you to scroll the text horizontally. Although when you scroll at any time you will see only 40 columns of the text, you can still create the text in an 80-column format.

**LINE SPACING**—Similar to a typewriter, word processors are also capable of printing text with a specified number of blank lines between the text lines. For example, you may choose double line spacing and all the text will be printed with two blank lines between the text lines. Line spacing is especially useful for formatting text for editing purposes.

**LINKING FILES**—This refers to the process of printing a number of text files sequentially from disk to create larger printed documents. Since it is easier to work with smaller files while editing, with this feature you can create several small files and later print them consecutively to create a large document.

**MAIL MERGE**—This is a special feature available in some word processors that allows you to merge names and addresses of people on your mailing list with a standard form letter to create personalized letters. The most common application is creating personalized form letters by merging mailing address files (on your database) with a standard letter file on your word processor. (Available on most word processors.)

**MENU-DRIVEN**—A program may be considered menu-driven if the various options presented by the program may be selected from a menu. In many programs, the menus are developed in a branching fashion with the master menu (or main menu) branching off to a number of sub-menus, each of which branches off to more sub-menus, depending upon the complexity of the program and the array of options available.

**MERGE**—This facility, often associated with word processing, refers to merging text files on your diskette. One file may be placed at the beginning, end, or in the middle of another file.

**PAGE NUMBERING**—Some word processing programs will automatically print page numbers on your document at the top or bottom of the page at the specified margin or in the center.

**SELECTIVE PAGE PRINTING**—The ability of a word processor program to print specified portions of text instead of the whole text file. This is a very useful feature when one page in the middle of a long document is torn or lost.

**SPELLING CHECKER**—This refers to the utility programs that are available with some word processors. These programs, when executed, will check the spelling of words in a specified text file, compare them with those in the program dictionary, and suggest errors to you. Moreover, they can also correct the spelling once you have approved the suggestion.

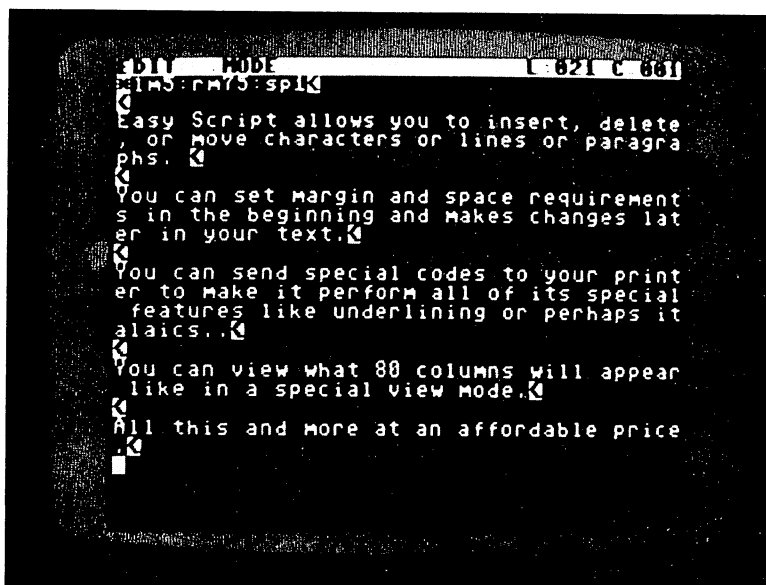
**SUPPORT PRINTER CODE**—Some word processors will let you send control codes (ASCII codes) to your printer through the program. This allows you to select alternate character fonts and other special printer functions such as boldface, underline, italics, etc. For example, in the Gemini 10x printer, sending the control codes 27 66 3 will cause your text to be printed in condensed print mode.

**TABS**—Tabs in a word processor are used in a manner similar to tabs on a typewriter. They refer to the vertical, and in some cases, horizontal positions where you want the cursor to move next or where you want to begin entering the text.

**TEXT**—Any information that you type into your computer, whether it is a letter or any other kind of manuscript, is referred to as text.

**WORD PROCESSOR**—A program or a collection of programs that allow you to use your microcomputer to enter, edit, store, and print text.

**80 COLUMNS**—This is a reference to the number of columns displayed on the monitor screen. The Commodore 64 has a 40-column video display. With some hardware or software modifications however, it can create an 80-column display. Some word processors offer an 80-column display in the text entering/editing mode.



**Figure 8. Easy Script**

**Easy Script  
Commodore****\$49.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	+ Menu-driven	+ Block move
A Price vs Performance	- Help menu	+ Block copy
A Ease of use	+ DOS commands	+ Block delete
C Vendor support	- Alternate screen	+ Link files
A Documentation	+ 80 Columns	- Spelling checker
A Error handling	+ Tabs	+ Database interface
	+ Headers & Footers	- Form fill
<b>SPECIFIC CRITERIA</b>	+ Autoscroll	+ Horizontal scroll
A Start-up options	+ Line spacing	+ Global search & replace
A Text entering	+ Selective page printing	+ Capital lock
B Text editing	+ Backup diskette	+ Decimal tab
A Text printing	+ Memory resident	+ Column & line indicator
B File handling	+ Function keys	

**DESCRIPTION**

Excellent low-cost word processing software from Commodore.

**START-UP OPTIONS**

The system prompts at the initial start-up allow you to choose between 40 to 240 columns across the screen for text entering and editing. You can configure the system for use with either disk or tape, and a variety of different printers (CBM, MX-80, Spinwriter, Qume, Diablo, and others). Once in the Text Editing mode, you can also alter screen colors for the most pleasant background/text contrast. DOS commands and functions are accessible in the program by entering into the Disk Drive Operations mode. You can enter this mode by using the appropriate function key and you can perform a series of disk operations without interfering with your text on the editor screen.

**TEXT ENTERING**

Once the system has prompted you for start-up options, it automatically shifts into the Text Entering/Editing mode. You enter text by typing directly from the keyboard onto the screen. The program can hold up to 799 lines of text in memory. If you choose a screen column size greater than 40, then the screen will automatically scroll horizontally as you type across the 40 column screen. Text may be typed in upper case using the conventional shift keys, but you can also lock into upper case by using a special function called "capital lock." Once in the Capital Lock mode, all text is automatically entered in upper case. Tabs may be set in the same way they are set on a typewriter. Easy Script also offers decimal tab set if you want to align decimals while entering numbers.

## **TEXT EDITING**

Edit commands are available via the function keys. There is a command line on top of the screen that lets you know what function or mode you are currently working in. This line is also used by the system to display any prompts for additional information and DOS error messages.

Easy Script supports the standard editing keys of the Commodore 64. You may perform edit functions such as insert, delete, erase, copy, and rearrange using one or two-character commands. Full use of the cursor control keys enables you to move around the text for editing. An automatic horizontal and vertical scrolling feature is also available if you want a quick view of the text. A GOTO command lets you "go to" a specified location. The search and replace functions let you make changes in specified words or phrases throughout the file without having to manually scan the text line by line. You can perform editing operations such as delete and copy, or move a block of text using the block operations commands.

## **FILE HANDLING**

The system supports most disk operations. You can save, load, replace, and scratch text files by using the function keys. You can also perform other drive operations by entering the DOS mode (i.e., listing of the disk directory, validating files, etc.). A merge facility is available to link a number of files to create longer documents. You may also perform other operations on merged or linked files, such as searching for specified text strings (words or phrases) and replacing them with the corrected ones. Linked files can also be printed sequentially. The system automatically loads each file and sends it to the printer. The mail merge facility is available through the fill files which may be merged at specified locations of your text for personalizing form letters, and so on.

## **TEXT PRINTING**

The text output may be directed to the screen or the printer. If you print to the screen, the system will display the formatted text. This allows you to look at the formatted output prior to printing it for any final changes. Text may be printed continuously or you can instruct the program to pause after each page if you want to change or readjust the paper. All standard format features are utilized by Easy Script. You can also send control codes to your printer if you want to use its special features, such as underline, boldface, double width, etc.

## **SPECIAL FEATURES**

The special feature of Easy Script is the facility to enter text on a 40- to 240-column screen. Since the video display of the Commodore 64 is only 40 columns across the screen, this is accomplished by scrolling the screen horizontally.

### SUMMARY

Easy Script is a comprehensive word processing program available at an exceptionally low cost. Its performance is comparable to that of professional word processing systems available for the CP/M or MS-DOS operating systems. At the low price of \$49.95, it is well worth the investment.

<b>Heswriter</b>		<b>\$44.95/Cartridge</b>
<b>HesWare</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	- Menu-driven	+ Block move
C Price vs Performance	- Help menu	+ Block copy
B Ease of use	- DOS commands	+ Block delete
A Vendor support	- Alternate screen	- Link files
B Documentation	- 80 Columns	- Spelling checker
A Error handling	- Tabs	- Database interface
	+ Headers & Footers	- Form fill
<b>SPECIFIC CRITERIA</b>	- Autoscroll	- Horizontal scroll
C Start-up options	+ Line spacing	- Global search & replace
C Text entering	+ Selective page printing	- Capital lock
B Text editing	- Backup diskette	- Decimal tab
B Text printing	+ Memory resident	- Column & line indicator
C File handling	+ Function keys	

## DESCRIPTION

A word processor for the Commodore 64.

## START-UP OPTIONS

The program is cartridge-based. As you turn the computer on with the cartridge plugged in, you are in the Text Entering mode. The program allows you to alter screen and text colors to maximize readability. No printer configuration facility is available with this program. DOS commands and functions cannot be accessed from within the program.

## TEXT ENTERING

The Text Entering mode allows you to enter text, and the program displays it on the screen. There is very limited use of the Commodore 64 editing keys in this mode (you can only edit the characters on the line on which the cursor is presently located). The majority of the editing is accomplished in the Editing mode. The program allows up to 27 screen lines of text on the screen (each line may have no more than 36 characters). There is no word wraparound feature, and the words that do not fit on one line are moved down to the beginning of the next.

## TEXT EDITING

In order to get into the Editing mode, you are required to type "e" on a blank line and press <RETURN>. Most of Heswriter's commands are implemented in this manner. The editor makes limited use of the Commodore 64's cursor control and INST/DEL keys. You may, however, make desired changes in your

text while in this mode. You cannot enter any new lines of text in the Editing mode. The DELETE command allows you to delete a specified line or a number of lines of text. Since the text editor identifies each line with a line number, the program provides a special NUMBER command that numbers the text lines. Text may be viewed without the numbers using the List mode. The editor provides a FIND command that may be used for searching a particular string of text. The copy function performs similarly to block operations in some of the sophisticated word processors. It can be used for either rearranging text by copying to a new location and deleting the old one, or it can be used for copying blocks of text at other points in the file. You can also insert new lines using the Insert mode. The program asks you for the line number to insert the text.

### **FILE HANDLING**

The WRITE command allows you to write a desired range of lines on disk or tape. The program provides the option of appending a file to the text in memory by reading a disk file at the end of the text file. You can also replace the text file (in memory) with the disk file read.

### **TEXT PRINTING**

The PRINT command is used to print the text on the printer. You can print from any line number and pause the print function after any line number. The Preview mode lets you display the formatted text on the screen. The print formatting is accomplished by placing control characters within the text. The Heswriter supports most of the major print format features.

### **SPECIAL FEATURES**

None.

### **SUMMARY**

Heswriter is a simple and easy-to-use word processor for the Commodore 64 and is directed at the novice user. It lacks many of the sophisticated features that some professional-quality word processors at comparable prices have. It is, therefore, not recommended for the serious user who will spend a great deal of time on word processing.

<b>Magic Desk Commodore</b>		<b>\$49.95 Cartridge</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	+ Menu-driven	- Block move
C Price vs Performance	+ Help menu	- Block copy
A Ease of use	+ DOS commands	- Block delete
C Vendor support	- Alternate screen	- Link files
C Documentation	- 80 Columns	- Spelling checker
A Error handling	+ Tabs	+ Database interface
<b>SPECIFIC CRITERIA</b>	- Headers & Footers	- Form fill
C Start-up options	- Autoscroll	- Horizontal scroll
C Text entering	- Line spacing	- Global search & replace
B Text editing	+ Selective page printing	- Capital lock
C Text printing	- Backup diskette	- Decimal tab
C File handling	+ Memory resident	+ Column & line indicator
	+ Function keys	

### DESCRIPTION

The Magic Desk I is one of a series of integrated programs from Commodore. It integrates word processing and database management (filing) into one package.

### START-UP OPTIONS

The program is cartridge-based. It is menu-driven except that the menu options are displayed on the screen in the form of pictures of objects. Each object represents a specific function that it is used for in our daily lives (i.e., a typewriter for writing letters and manuscripts, a clock for displaying time, a file cabinet for organizing records, etc.). A joystick is used to control the pointing hand on the screen. It may be moved to the desired object which corresponds with the specific function that you want (e.g., if you want to type a letter, you move the hand to the typewriter and the program will display a page on the screen, which will be ready for your text input). A help menu is available by simply typing the special Commodore key (C=). Error messages are displayed in the form of a special symbol accompanied by a diagnostic menu to help identify the problem.

### TEXT ENTERING

The text entering mode as suggested in the example above is selected by pointing the hand to the typewriter. The program displays a page on the screen and you can type the text at the position of the carriage. The carriage prints each letter that you type and moves across the columns and down the lines. You may select the right and left margins (the default value is  $lm = 10$ ,

rn = 70). Tabs may be set using the F3/F4 function keys in the text entering mode. Once a page is created, it may either be printed or saved on disk. Both the processes are automatically handled by the program when you point the hand to the appropriate object.

### **TEXT EDITING**

Only the page that is displayed on the screen may be edited. You may use the Commodore editing keys (INST/DEL, Cursor UP/DOWN, and RIGHT/LEFT) to perform the desired editing operation.

### **FILE HANDLING**

The file handling hierarchy consists of three drawers, each of which may have up to 10 file folders. Each file folder in turn can hold up to 10 page locations. Each disk can hold up to 30 pages. This type of structure is not very efficient, however, it is very simple to grasp and is designed for novices or recent enthusiasts. Each page is stored on disk in one of the drawers and its location is registered in one of the folders. You may have any form of text in each page (a letter or an address). This type of file structure also allows you to use the Magic Desk as a filing system for small mailing lists and recipes.

### **TEXT PRINTING**

The Print mode is selected by pointing the hand to the printer. You must exit the typewriter mode in order to select this option. You may print one page at a time either in memory or on disk (selecting from one of the files). There is no facility to configure the program for any printers other than the Commodore 1525E printer.

### **SPECIAL FEATURES**

The most outstanding feature of the Magic Desk is the simplicity with which it may be used (by selecting the desired options from the screen using a joystick). Its integrated structure is also unique and adds to the ease of use.

### **SUMMARY**

The Magic Desk is a delightful program that will provide hours of fun while you learn the basics of word processing and file management. It is, however, not for you if you are interested in serious applications (either word processing or DBMS). It is a simple program and may only be used for home applications.

<b>PaperClip</b>		<b>\$125.00/Diskette</b>
<b>Batteries Included</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	- Menu-driven	+ Block move
B Price vs Performance	- Help menu	+ Block copy
A Ease of use	+ DOS commands	+ Block delete
A Vendor support	- Alternate screen	+ Link files
A Documentation	- 80 Columns	- Spelling checker
A Error handling	+ Tabs	+ Database interface
	+ Headers & Footers	- Form fill
<b>SPECIFIC CRITERIA</b>	- Autoscroll	- Horizontal scroll
A Start-up options	+ Line spacing	+ Global search & replace
A Text entering	+ Selective page printing	+ Capital lock
A Text editing	+ Backup diskette	+ Decimal tab
A Text printing	+ Memory resident	+ Column & line indicator
A File handling	+ Function keys	

## DESCRIPTION

A comprehensive word processing package for the Commodore computers.

### START-UP OPTIONS

When you load PaperClip and run it, it enters the text entering and editing mode. Using control and function keys, you may set text and background colors, list the disk directory, verify the file in memory with the one saved on disk, and send appropriate commands to the disk drive for other DOS functions, such as format diskette, scratch files, etc.

The system diskette includes a series of printer files that serve to configure the program for the particular printer that you are using. In order to accomplish this, you are required to choose the file that closely identifies the printer set-up that you are using and load that file into the system. The program automatically configures your system from the data in that file.

### TEXT ENTERING

Text is entered in the Main Editor mode by typing from the keyboard. The program displays text on the screen as it is typed in and also wraps words to the next line if the line length exceeds 40 columns. You can enter text in upper case by using the Capital Lock feature. Tabs may also be set at specific points across the screen to facilitate text entry.

One of the outstanding features of PaperClip is its ability to manipulate columns of text. This is very useful for businesses preparing budgets and financial reports. Columns may be individually moved, deleted, inserted, shifted, and replicated. This is a very unique and useful feature since in most

word processors that lack this feature, working with columns is very tedious. You can also sort entries in a column by using simple control commands.

### **TEXT EDITING**

PaperClip supports standard text editing features. You can move around the screen using the cursor control keys. Text may be edited using the Commodore editor keys (INST/DEL, CLR/HOME), or you may use the control functions, such as insert, delete, erase, etc. The program also offers block functions that allow you to move, delete, and copy blocks of text using simple control commands.

### **FILE HANDLING**

PaperClip offers two ways of saving text files in memory to disk. One way is to store them in the screen format. The text is saved along with tabs and margin settings and when the file is loaded, it is displayed on the screen exactly as it was saved. Another way text files are saved is in the form of standard PET ASCII files. Since the PET ASCII format is universal for communication between programs, you may want to save your files in this manner. This mode allows you to interface your text files with other programs (databases, spreadsheets, etc).

You can also load sequential files from disk. This is useful if you want to edit files created by database programs, etc. The PaperClip editor allows you to move text from one file to another (often necessary due to insufficient space left in the main memory). The append feature lets you append a text file on disk to a text file in memory. This may be useful for modifying the contents of text files on disk by transferring blocks of text from one file to another. Search and replace functions may be implemented locally (on text in memory) or globally (throughout the chain of linked files on disk).

### **TEXT PRINTING**

PaperClip features all standard printer formats. You can specify left and right margins, set page and text lengths, center text, and justify left and right margins. The program also has advanced features such as automatic indentation, headers, footers, forced paging, page numbering, vertical position, and offset (this command lets you position text on paper without altering margins). You can send control characters to your printer through the program if you wish to access special printer functions such as condensed print, italics, boldface print, underline, etc. Multiple files may be output in sequence by linking them together. The text output function enables you to print the whole text file, selected pages, and even linked files. You can also print multiple copies of a document.

### **SPECIAL FEATURES**

PaperClip is loaded with special features. It has the facility to load alternate character sets. These character sets may be created by any of the standard character generators for the Commodore computers. The system diskette

comes with two character sets, standard Commodore and French. This is useful for those of you interested in using your word processor for multilingual applications.

The program is capable of sending disk files to the printer directly without processing them. This may be used to display graphics on the report if you have a file that contains bit image data.

Another unique feature is column manipulation. See the paragraph on Text Entering for more details on this feature.

The system diskette comes with several utility programs. These programs allow you to backup your diskettes and configure the word processor to your particular system. Alternate characters sets are also available on the system diskette.

### **SUMMARY**

PaperClip is definitely one of the best word processors for the Commodore 64. If price is no object, then this is the program to get. It has excellent documentation and is very easy to use. It presents some very advanced features that will make word processing a cinch for even the most serious and demanding users.

<b>Quick Brown Fox</b>		<b>\$65.00/Cartridge</b>
<b>Quick Brown Fox</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	+ Menu-driven	+ Block move
C Price vs Performance	- Help menu	- Block copy
B Ease of use	+ DOS commands	+ Block delete
A Vendor support	- Alternate screen	- Link files
B Documentation	- 80 Columns	- Spelling checker
B Error handling	+ Tabs	- Database interface
	+ Headers & Footers	- Form fill
<b>SPECIFIC CRITERIA</b>	- Autoscroll	+ Horizontal scroll
C Start-up options	+ Line spacing	+ Global search & replace
C Text entering	- Selective page printing	- Capital lock
C Text editing	- Backup diskette	- Decimal tab
C Text printing	+ Memory resident	- Column & line indicator
C File handling	- Function keys	

### DESCRIPTION

A cartridge-based word processor for the Commodore 64.

### START-UP OPTIONS

The program is menu-driven. You may choose to enter, edit, view, or print text through the main menu. You can also access disk functions such as list file directory; load, save, and erase files; etc. Printer setup is not required, and it is suggested that the program will work on most properly interfaced printers.

### TEXT ENTERING

Text is entered in the Type mode. The program has only a 40-column screen display, but it can function with the commercially available 80-column adapters (from Data 20, etc.). There is limited use of the cursor control keys in the program, so you cannot move around the text freely. Only one vertical movement is allowed, downward, which lets you scroll the text upward.

### TEXT EDITING

Text is edited in the Line Edit mode. You can edit the text only one line at a time. This makes the editing very slow. Instead of using the standard Commodore editing keys, for each edit you must use system commands. For example, you have to go to a particular line (in Line Edit mode) and position the cursor on a character and then press "d" to delete that character and "dw" to delete the word. If you want to replace that word then you have to get into the replace mode, type over that word, and exit the replace mode.

There are some advanced functions available in this program, but they are implemented in a primitive way. You can perform delete operations on a line, paragraph, or a block of text by specifying beginning and ending character strings. You can also transfer text in this manner. Global search and replace (on the whole text in memory) are also available. Limited use of headers is available by specifying the strings at the top of the first page. Headers are printed beginning with the second page.

### **FILE HANDLING**

You may perform some DOS functions through the program's clerk menu. You can save, retrieve, and erase disk files. A directory listing may also be obtained from this menu. The merge feature allows you to merge disk files by first loading them in the system's main memory. There is no facility to link files on disk if you want to perform edits throughout the files or if you want to print a number of files. You can only accomplish this by first merging all the files in main memory, provided that the file size does not exceed the memory available).

An advanced file handling feature of Quick Brown Fox (QBF) is the use of boilerplating. This is similar to merging contents of a text file at specific locations in another file (see Mail Merge in the Glossary).

### **TEXT PRINTING**

The Quick Brown Fox supports most ASCII printers. (We tried it on the Gemini 10x and it worked fine.) You can send the appropriate control codes to your printer through the program if you want to access a specific function or character font available on your printer. This is accomplished by the use of embedded commands in your text. The embedded commands are also used to format your text on the page. QBF supports most standard format features.

### **SUMMARY**

The Quick Brown Fox is a user-friendly and easy-to-use word processor. It was designed (it seems) for people who have little computer experience—people who know little about computers but would still like to incorporate some applications into their daily routines. As such, this word processor has usefulness for that audience. Because it lacks many advanced features available in comparably priced word processors like Easy Script and WordPro3 Plus, it is not recommended for the serious user.

<b>Script 64</b>		<b>\$99.95/Diskette</b>
<b>Richvale Telecommunications</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	+ Menu-driven	+ Block move
B Price vs Performance	+ Help menu	+ Block copy
B Ease of use	+ DOS commands	+ Block delete
A Vendor support	- Alternate screen	+ Link files
C Documentation	+ 80 Columns	+ Spelling checker
A Error handling	+ Tabs	+ Database interface
	+ Headers & Footers	- Form fill
<b>SPECIFIC CRITERIA</b>	- Autoscroll	- Horizontal scroll
B Start-up options	+ Line spacing	+ Global search & replace
C Text entering	+ Selective page printing	+ Capital lock
B Text editing	+ Backup diskette	+ Decimal tab
A Text printing	+ Memory resident	- Column & line indicator
B File handling	+ Function keys	

### DESCRIPTION

A word processor for the Commodore 64 featuring a 40/80-column display. The system diskette comes with two word processing programs. The Script 64 and the Script 64/80. The latter is identical to the Script 64 and differs only in that it offers an 80-column screen.

### START-UP OPTIONS

Through the start-up menu, you may configure the system to your particular printer. You can also format your diskettes before entering the Text Entering mode. The program offers limited access to DOS functions such as load, save, copy, format diskette.

### TEXT ENTERING

The program lets you enter text in a 40 or 80-column display. The 80-column display is software created and does not require any hardware modification or interfacing. Using the cursor control keys, you may enter text anywhere on the screen. The text may be entered one screen at a time; for continuing past a screen, you are required to use the function keys to access the next screen. This seems to be a primitive feature because in some comparable word processors, the program automatically scrolls the screen as you continue to add lines at the bottom of the screen. The program features automatic word wraparound. Numeric mode is available to facilitate aligning columns of numbers with decimals.

## **TEXT EDITING**

The program makes full use of the cursor control and editing keys on the Commodore 64's keyboard. You can also edit in special edit modes (Insert Text mode, Delete mode, etc.). The program also has the facility to move blocks of text from one screen to another.

## **FILE HANDLING**

The program saves text data in the form of screens. You may save up to 40 screens per file and as many as 999 screens on a disk. Similarly, when you load a file, the program loads 40 screens in the main memory. (In the 80-column mode, you have 20 screens per file; however, they contain the same amount of text as 40 screens in the 40-column mode).

The program offers global search and replace options that allow you to search the whole disk for a text string and replace it with a modified word or phrase.

## **TEXT PRINTING**

The print function is accessed from the command menu. You can print all or selected screens in any sequence that you specify. The program offers most standard print features such as margin setting, line spacing, paragraph indenting, right/left justification, automatic page numbering, etc. The default values for these features are available in print control maps. You can set the default value for each screen in the small control maps for each screen and for the whole file in the large control map. Control maps may also be saved on disk if you want to access the same map frequently. If you wish to print a section of a screen in a different format than specified in the small control map for that screen, then you have to use a special mode of text entry called "structured screens."

## **SPECIAL FEATURES**

One of the unique features of Script 64 is the dictionary provided on the system diskette. The program will automatically check your spelling in the text files. You can also expand the vocabulary of the dictionary by adding more words as you go through the text.

Another feature is the numeric mode which allows you to perform calculations (addition, subtraction, etc.) on the columns of numbers.

You can also redefine the keys on the keyboard and use special characters (the program provides the facility to load an alternate character set) if you wish to enter text in a language other than English.

## **SUMMARY**

Script 64 is a good word processor and incorporates many useful features such as the spelling dictionary, help menu, use of alternate character sets, etc. Its 80-column display is, however, disappointing due to the lack of adequate resolution. If you have a TV set, you will have a difficult time reading the text on the

screen in the 80-column mode. If you are using a monitor, then the resolution can be improved considerably by adjusting the screen colors and the resolution and contrast on the monitor. For this evaluation, we used the Taxan green monitor and found the display to be very poor in resolution and readability. Therefore, it is not recommended for those of you who are interested in its 80-column display. It is a great idea but poorly implemented.

**Smithwriter  
Softsmith Software**
**\$59.95/Diskette**
**GENERAL CRITERIA**

B Overall rating  
 B Price vs  
 Performance  
 A Ease of use  
 A Vendor support  
 A Documentation  
 A Error handling

**FEATURES**

+ Menu-driven  
 + Help menu  
 - DOS commands  
 - Alternate screen  
 - 80 Columns  
 + Tabs  
 - Headers &  
 Footers  
 - Autoscroll  
 + Line spacing  
 + Selective page  
 printing  
 - Backup diskette  
 + Memory resident  
 + Function keys

**FEATURES**

+ Block move  
 + Block copy  
 + Block delete  
 - Link files  
 - Spelling checker  
 - Database  
 interface  
 - Form fill  
 + Horizontal scroll  
 - Global search &  
 replace  
 - Capital lock  
 - Decimal tab  
 - Column & line  
 indicator

**SPECIFIC CRITERIA**

A Start-up options  
 C Text entering  
 C Text editing  
 B Text printing  
 C File handling

**DESCRIPTION**

Word processing program.

**START-UP OPTIONS**

The program does not support DOS commands and functions. If you have to format your data diskette, it is suggested that you perform that operation before you enter the word processing mode.

A separate configurator program is available on the system diskette that lets you configure the word processor to the particular printer that you are using. It also lets you set the text and screen colors and choose the option of accessing files from tape and/or disk. This program may be loaded the first time you use the Smithwriter or each time you wish to reset system configuration.

**TEXT ENTERING**

The Text Entering mode is rather unusual in this program. You enter text through a window that is created in the center of the screen. A window can hold up to 66 characters (the standard length of a single line on paper) and can hold one or many lines as long as the total length does not exceed 66 characters. After you enter 66 characters in the window, the program scrolls the text upwards, thereby creating a fresh new window for you to enter a new line. This type of text entering limits the number of lines that you can view on the screen at one time while you are creating text. (An option is available to change the 66-character limit of the window.) The program lacks a column number indicator. It has a line number indicator, but the line number corresponds to the line on the printout and not the line on the screen.

## TEXT EDITING

Like text entering, editing is limited to the line in the window. You may make full use of the cursor and INST/DEL keys while editing the line in the window. In order to edit lines above or below the line in the window, the line to be edited has to be brought to the window by means of the function keys to scroll the text file. This is a limitation for those who want to make full and efficient use of a word processing program since it severely limits the efficiency of the program. Many operations require multisteps. For example, in order to insert a blank line, you have to push the current line in the window down, insert the new characters, words, or phrases, and then pull up the characters of the succeeding line to fill in the remaining space on that line. The "push" and "pull" features in the program allow you to move words, phrases, or lines in the file (resembling block operations in some sophisticated word processors). You can also use the rearrange text option to perform block moves.

## FILE HANDLING

The program provides options to save the text on disk, tape, or the printer. You can also specify the range of text if you do not want all of it saved. A special facility is available to store more than one text file in the computer's memory at the time you are in the Editing mode. The program distinguishes one file from the other by the presence of three blank lines between two files.

## TEXT PRINTING

The printer set-up requires a separate program (the configurator). The program will send control codes to your printer if you want to access special functions/character fonts available with your printer. Standard print format features are available in the print text routine. The most unique feature of this word processor is its ability to print text in more than one column. This has special applications for printing newsletters and similar copy. Files may be created separately and then printed in multi-column format on a single sheet of paper.

## SPECIAL FEATURES

The facility to print text in more than one column on a page is a unique feature in this program.

## SUMMARY

Smithwriter, in our opinion, is a program directed at novice users. It is simple and easy to use. The documentation is well written, and the program offers the standard word processor features. We recommend it for those of you who do not have serious word processing applications in mind. Since it lacks some of the finer features available in comparably priced but more sophisticated word processors, we cannot recommend it for advanced users who have serious applications in mind.

<b>Totl. Text</b>		<b>\$44.00/Diskette</b>
<b>Totl Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	+ Menu-driven	+ Block move
B Price vs Performance	- Help menu	+ Block copy
B Ease of use	+ DOS commands	+ Block delete
A Vendor support	- Alternate screen	+ Link files
B Documentation	- 80 Columns	- Spelling checker
A Error handling	- Tabs	+ Database interface
	+ Headers & Footers	- Form fill
<b>SPECIFIC CRITERIA</b>	- Autoscroll	- Horizontal scroll
B Start-up options	+ Line spacing	+ Global search & replace
C Text entering	+ Selective page printing	- Capital lock
C Text editing	+ Backup diskette	- Decimal tab
B Text printing	+ Memory resident	- Column & line indicator
B File handling	+ Function keys	

## DESCRIPTION

A word processing software package.

## START-UP OPTIONS

The program is menu-driven and the initial prompts let you specify the printer type that you would like to use (the device number, secondary address, etc.) and the input and output devices (the program is capable of supporting both disk and cassette). The program supports most properly interfaced printers, and there are suggestions in the documentation on modifying the program for some specific printers.

The text and screen colors may be altered by making the appropriate modifications in the program. The disk utility option in the menu allows you to list the disk directory on the screen, scratch, rename, and validate text files on disk, and also format a diskette before use.

## TEXT ENTERING

The text is entered in blocks of 255 characters. You start at the top of the block, and as you continue entering text past the 255 character limit, the program shifts to the second block. Each block is treated like a screen. Using function keys, you may move up or down the blocks to edit or add text. Within a block, you may enter text anywhere by positioning the cursor at that point.

## TEXT EDITING

Text is edited in blocks. You may move to a specific block by using the function keys. You can also use commands in the edit/input menu that will position the

cursor at the block where you wish to start (previous block, next block, etc). A GOTO command is available to "go to" a specific block in the file. Once that block is in the center of the screen (highlighted), you can edit/modify the text. Blocks may be moved to another location or deleted from memory. Within a block, the program makes full use of the Commodore 64's editing and cursor control keys (<INST/DEL> <CLR/HOME>).

### **FILE HANDLING**

Files may be saved and loaded from disk or tape. The enhancement in the most recent version of Totl.Text includes the facility to use two disk drives (one for input and the other for output). There is also a short machine language program (Chickspeed) that is loaded into memory before you load Totl.Text. This program is designed to increase the processing speed of saving and loading files. Files may be appended to text in memory to create larger files. You can also concatenate files on disk and print them in a linked format.

### **TEXT PRINTING**

The print function is well developed. The documentation describes many text control symbols that may be embedded in the text to create special print effects and to format your output. The program supports most print features. You can print selected pages of a document by specifying the page numbers that you want to be printed.

### **SUMMARY**

The Totl.Text is an easy-to-use and very user-friendly word processor. It has many features that are comparable to professional-quality word processing programs. However, it is very slow in text entering, and editing processes take too long to accomplish. It is therefore not recommended for those interested in serious word processing applications.

<b>Word Processor</b>		<b>\$99.95/Diskette</b>
<b>Mirage Concepts</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	+ Menu-driven	+ Block move
B Price vs Performance	- Help menu	+ Block copy
A Ease of use	+ DOS commands	+ Block delete
A Vendor support	- Alternate screen	+ Link files
A Documentation	+ 80 Columns	- Spelling checker
A Error handling	+ Tabs	+ Database interface
	+ Headers & Footers	- Form fill
<b>SPECIFIC CRITERIA</b>	- Autoscroll	- Horizontal scroll
B Start-up options	+ Line spacing	+ Global search & replace
B Text entering	+ Selective page printing	- Capital lock
A Text editing	- Backup diskette	- Decimal tab
A Text printing	+ Memory resident	+ Column & line indicator
A File handling	+ Function keys	

## DESCRIPTION

A 40/80-column word processor.

## START-UP OPTIONS

At the initial start-up, you are prompted to set the screen background and text colors. Once the program is loaded, the main menu displays the various options, such as text entering/editing, displaying the disk directory, printing files, etc. The program is completely menu-driven.

## TEXT ENTERING

Text may be entered in a 40 or 80-column display mode (the 80 columns are created across the screen without any hardware interfacing or modification).

When you enter the Edit File mode for entering and editing text, you are asked to specify a number of parameters such as lines per page (1-255), characters per line (1-255) and indent spaces (000-005). These parameters stay the same until you load the program again.

The program features true word wraparound. Since the 80-column display takes up a considerable amount of computer memory, you only have 4-5 pages of text memory before you are required to save it on disk and begin another file. One of the unique features of this program is the audio feedback, which is in the form of a click each time you depress a key and a beep when you reach ten spaces from the end of the line (right margin). This is provided so that the word processor will closely emulate the typewriter. To further facilitate text entering, the program also allows tab setting in a number of ways.

## TEXT EDITING

Text is entered through the edit line (highlighted) at the center of the screen. Since the cursor never leaves this edit line, this is also where all of the edit operations are performed. All text is scrolled up or down using the cursor control keys. The Commodore key (C=) in conjunction with the E, S, X, and D keys may be used for controlling the cursor movements on the screen and scrolling the text vertically. The C= key may also be used with other keys to move the cursor across a word (left/right), space, sentence, and paragraph or to scroll the whole screen up and down and to the beginning and end of the text file. The rapid cursor movements are useful for editing text. The Control key is used for performing editing functions in conjunction with the other keys such as deleting a character, word, or sentence to the left or right of the cursor.

Replace and Insert modes are also available to facilitate editing.

Block function may be used for performing edit operations on predefined blocks of text. You can copy, insert, move, delete, save, indent, and print blocks of text by defining the beginning and the end of the block of text.

The program also offers a column function which lets you manipulate columns of text instead of a block or line. A column may be moved or erased. It can also be copied, saved, inserted, and printed if you first define it as a block.

Global search and replace commands allow you to search for specific character strings (words or phrases) through the document in memory and replace it with the modified string.

## FILE HANDLING

You can save and load text files by selecting the appropriate option from the main menu. Files may be appended with each other in memory by loading one after the other to create longer documents. By using the block function, it is also possible to save a block rather than the whole file. This gives you the ability to have standard blocks of text that may be merged to create a variety of form letters. Other DOS operations may also be performed in the program, such as deleting a file on disk, listing the directory, etc.

## TEXT PRINTING

The print format may be selected from the menu. Default parameters are available as well as the option to change any and all of them. A printer command file may also be loaded at the time of printing a document if you want to access special print functions and character fonts available with your printer. This file is created by listing all the possible printer command codes available with your printer. The file instructs the word processor on what commands to send to the printer. You can print the whole text file or only a section of it using the block function. Text is formatted by embedding printer commands in the document. The Word Processor supports all standard format functions and features. The advanced print program facilitates formatting of text by providing the features in the menu—and you can change the values of these features (such as left margin, line spacing, etc.) according to your format.

## **SUMMARY**

The most obvious feature unique to the Mirage Word Processor (and one other word processor) is the 80-column display. Our experience with this has not been very encouraging. The resolution is very poor and does not make it worth-while. The Word Processor, however, has many other very outstanding features that will prove useful to those interested in serious word processing. It is easy to learn, and the program comes with an easy-to-follow, well-documented manual (typical of Mirage Concepts) which will make word processing a lot of fun.

**Wordpro3 Plus  
Professional Software**
**\$89.95/Diskette**

<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	+ Menu-driven	+ Block move
B Price vs Performance	- Help menu + DOS commands	- Block copy - Block delete
A Ease of use	+ Alternate screen	+ Link files
A Vendor support	- 80 Columns	- Spelling checker
A Documentation	+ Tabs	+ Database interface
A Error handling	+ Headers & Footers	+ Form fill
<b>SPECIFIC CRITERIA</b>	- Autoscroll	- Horizontal scroll
A Start-up options	+ Line spacing	+ Global search & replace
B Text entering	- Selective page printing	+ Capital lock
A Text editing	- Backup diskette	+ Decimal tab
A Text printing	+ Memory resident	+ Column & line indicator
A File handling	+ Function keys	

### DESCRIPTION

Wordpro3 Plus is a professional quality word processing system for the Commodore 64. The program comes with excellent documentation and a system diskette. It is 100% machine language-driven.

### START-UP OPTIONS

The initial start-up menu allows you to configure the program for use with a variety of different types of printers (Spinwriter, Diablo, Qume, Tec, Commodore 8027, Commodore 1525E, and other ASCII printers). The program supports five DOS functions (of the 1541 drive) via the control and function keys. These are format, initialize, validate, rename, and scratch. Screen and text colors may also be changed by the use of the appropriate function keys.

### TEXT ENTERING

Text is entered by typing on the keyboard. The program allows up to 352 lines of text in the memory. There are two separate areas in the memory that can hold your text: the main text area and the extra text area. You can choose the number of lines you want to allocate to the Main Text mode (minimum 176), and the rest of the lines are allocated to the Extra Text mode. The concept of the alternate or extra text area is unique to this word processor, and it is useful if you want to work with two files simultaneously. You can switch from the Main Text mode to the Alternate Text mode by using the control key. You can also use the Alternate Text mode for listing the disk directory and performing other disk operations without interfering with the text in main memory. A tab set feature is available both for aligning text and for aligning decimals when

you want to enter a lot of numbers. The program also performs additions and subtractions on columns.

### **TEXT EDITING**

Edit commands are available via the control keys. A command line on top of the screen lets you know what function or mode you are currently working in. This line is also used by the system to display any prompts for additional information and DOS error messages if you are performing disk operations. WordPro supports the standard editing and cursor control keys of the Commodore 64. You may perform standard edit functions such as insert, delete, and erase, and move words or lines. There is no autoscrolling feature available with this program; however, you may scroll slowly using the cursor keys and fast by using the control/cursor keys. A GOTO command allows you to "go to" a specified character string. The search and replace features are available for text in memory.

### **FILE HANDLING**

The system supports the major DOS functions. You can list the disk directory, format and initialize diskettes, and recall other DOS operations by using the control keys. The program allows you to perform edit functions on disk files by the use of a global command. With this command you can also search and replace specified text strings and output disk files.

Files may be saved or replaced on disk and recalled into memory without exiting the Edit mode. You can save the text as a whole or in parts under various file names, and you can also merge files on the screen from the diskette.

### **TEXT PRINTING**

The text may be output to the printer only. No screen output is available. Text may be printed continuously or one page at a time. Special control characters can also be sent to the printer to access special printer functions. All standard format features are utilized by WordPro.

### **SPECIAL FEATURES**

The special feature that makes WordPro outstanding is the Extra Text mode. You can use this area as a scratchpad to write outlines, to list the disk directory, or to create variable blocks to be merged later with the text in main memory (i.e., creating personalized form letters). Another feature worth mentioning is the Numeric mode (or the decimal tabulation mode) in which you can enter numbers and the program aligns the decimals. The program will also perform additions and subtractions on columns of numbers.

### SUMMARY

WordPro 3 Plus from Professional Software is an excellent professional-quality word processor package. We have not experienced any drawbacks in the program, and although it does not have certain features such as an 80-column screen, selective page printing, and block copying, it still is one of the best word processors available for the Commodore 64.

**Writers' Assistant**  
**Rainbow Computer Corp.**
**\$125.00/Diskette**
**GENERAL CRITERIA**

- B Overall rating
- C Price vs Performance
- A Ease of use
- A Vendor support
- A Documentation
- B Error handling

**SPECIFIC CRITERIA**

- A Start-up options
- B Text entering
- B Text editing
- A Text printing
- B File handling

**FEATURES**

- + Menu-driven
- + Help menu
- + DOS commands
- Alternate screen
- 80 Columns
- + Tabs
- + Headers & Footers
- Autoscroll
- + Line spacing
- Selective page printing
- Backup diskette
- Memory resident
- + Function keys

**FEATURES**

- + Block move
- + Block copy
- + Block delete
- Link files
- Spelling checker
- + Database interface
- Form fill
- Horizontal scroll
- Global search & replace
- Capital lock
- Decimal tab
- + Column & line indicator

**DESCRIPTION**

A word processing program.

**START-UP OPTIONS**

The program is menu-driven. You may select your system configuration from the main menu, and the program prompts you for specifications of your printer (device number, secondary address, line feed, etc.), of your disk drive(s), and the screen colors (if you want a different combination of screen background/text colors). A disk utility option is also offered that allows you to access disk commands and functions from the program. You can format a diskette, display the disk directory, and scratch, validate, copy, and rename disk files.

**TEXT ENTERING**

Text is entered in free form on the screen in the Enter Text mode. You can make full use of the cursor control keys to enter text anywhere on the screen. The top line has a line and column indicator that keeps track of the position of the cursor at all times. You can enter a maximum of 356 lines of text in memory before you need to save it as a file. The text is printed on the screen in a wraparound fashion.

You can also enter text in preset columns by setting tabs at those columns. For information that you must enter often, the glossary feature is available to store that information and recall it at any point in the text, thus saving the effort of retyping that information.

## TEXT EDITING

The program makes use of the control and Commodore (C=) keys to implement the editing commands and functions. Text may be scrolled backwards by using CTRL/B and forward by using CTRL/F keys. Function keys may also be used to scroll the text one screen at a time in both directions. Block edit operations, such as block copy and block delete, may be performed by using the COPY command routine. Other edit operations such as INSERT, DELETE, and SEARCH are also available via the control key. While in the Edit mode, the program also offers a screen-justify routine which will justify the text on the screen so that it is easier to read and edit.

## FILE HANDLING

The program provides the facility to load and save text on disk files. Each file may hold a maximum of 356 screen lines in length. The program gives you the option to save a specified range of text in memory to disk. If the saved files are small, the append file feature allows you to concatenate a file on disk with the file in memory to create longer documents (this is useful if you want to append a number of standard paragraphs to create a document).

## TEXT PRINTING

The text is formatted for printing by using embedded commands. The Commodore (C=) key is used to embed commands in text. The program offers most standard print formats and features, such as left and right justification, text centering, headers and footers, forced paging, line spaces, top and bottom margins, and page numbering. The printer may be configured at the start of the word processing session and the program will support most properly interfaced printers.

## SUMMARY

The Writer's Assistant is an easy-to-use word processor that incorporates many standard features of word processors. It comes with excellent documentation. For fast typists (> 20 wpm), it may be too slow in its responsiveness and therefore is recommended for those who are novices at word processing and would like an easy-to-use-and-learn word processing system.

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**Worksheet for Writing and Correspondence Tools**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA FEATURES**

Overall rating	Menu-driven
Price vs Performance	Help menu
Ease of use	DOS commands
Vendor support	Alternate screen
Documentation	80 Columns
Error handling	Tabs
	Headers & Footers

**SPECIFIC CRITERIA**

Start-up options	Autoscroll
Text entering	Line spacing
Text editing	Selective page printing
Text printing	Backup diskette
File handling	Memory resident
	Function keys

**FEATURES**

Block move
Block copy
Block delete
Link files
Spelling checker
Database interface
Form fill
Horizontal scroll
Global search & replace
Capital lock
Decimal tab
Column & line indicator

*Description*—\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

*Start-up options*—\_\_\_\_\_

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\_\_\_\_\_

*Text entering*—\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

*Text editing*—

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*File handling*—

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*Text printing*—

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*Summary*—

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**COMPARISON CHART****PROGRAM NAME****RATINGS FOR CRITERIA**

	OVERALL RATING	PRICE VS PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	START-UP OPTIONS	TEXT ENTERING	TEXT EDITING	TEXT PRINTING	FILE HANDLING	PRICE
EASY SCRIPT	A	A	A	C	A	A	A	A	B	A	B	\$49.95
HESWRITER	C	C	B	A	B	A	C	C	B	B	C	\$44.95
MAGIC DESK	C	C	A	C	C	A	C	C	B	C	C	\$49.95
PAPERCLIP	B	B	A	A	A	A	A	A	A	A	A	\$125.00
QUICK BROWN FOX	C	C	B	A	B	B	C	C	C	C	C	\$65.00
SCRIPT 64	B	B	B	A	C	A	B	C	B	A	B	\$99.95
SMITHWRITER	B	B	A	A	B	A	A	C	C	B	C	\$59.95
TOTL.TEXT	C	B	B	A	B	A	B	C	C	B	B	\$44.00
WORD PROCESSOR	B	B	A	A	A	A	B	B	A	A	A	\$99.95
WORDPRO3 PLUS	A	B	A	A	A	A	A	B	A	A	A	\$89.95
WRITERS' ASSISTANT	B	C	A	A	A	B	A	B	B	A	B	\$125.00

**PROGRAM NAME**

**RATINGS FOR FEATURES**

	MENU-DRIVEN	HELP MENU	DOS COMMANDS	ALTERNATE SCREEN	80 COLUMNS	TABS	HEADERS AND FOOTERS	AUTOSCROLL	LINE SPACING	SELECTIVE PAGE PRINTING	BACKUP DISKETTE	MEMORY RESIDENT	FUNCTION KEYS	BLOCK MOVE	BLOCK COPY	BLOCK DELETE	LINK FILES	SPELLING CHECKER	DATABASE INTERFACE	FORM FILL	HORIZONTAL SCROLL	GLOBAL SEARCH AND REPLACE	CAPITAL LOCK	DECIMAL TAB	COLUMN AND LINE INDICATOR
EASY SCRIPT	+	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+
HES-WRITER	-	-	-	-	-	-	+	-	+	+	-	+	+	+	+	+	-	-	-	-	-	-	-	-	-
MAGIC DESK	+	+	+	-	-	+	-	-	+	+	-	+	+	-	-	-	-	-	+	-	-	-	-	-	-
PAPER-CLIP	-	-	+	-	-	+	+	-	+	+	+	+	+	+	+	+	+	-	+	-	-	+	+	+	+
QUICK BROWN																									
FOX SCRIPT	+	-	+	-	-	+	+	-	+	-	-	+	-	+	-	+	-	-	-	-	+	-	-	-	-
64 SMITH-WRITER	+	+	+	-	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	-
TOTL. TEXT WORD	+	-	+	-	-	-	+	-	+	+	+	+	+	+	+	+	+	-	+	-	-	+	-	-	-
PROCESSOR	+	-	+	-	+	+	+	-	+	+	-	+	+	+	+	+	+	-	+	-	-	-	-	+	+
WORD-PRO3																									
PLUS WRIT-ER'S AS-SISTANT	+	-	+	+	-	+	+	-	+	-	-	+	+	+	-	-	+	-	+	+	-	+	+	+	+

## 5.4 WRITING AND CORRESPONDENCE TOOLS (SPELLING CHECKERS)

### INTRODUCTION

After spending grueling hours writing a manuscript, the next step in putting in the finishing touches is editing. This means correcting spellings, grammar, syntax, sentence structure, etc. Then you may want to type or print the manuscript to make it visually presentable to the readers. This would normally involve setting the appropriate left and right margins, line spacing, paragraph indentations, etc. If you are using a full-featured word processor on your Commodore 64 to create your letters and manuscripts, then the task of formatting the manuscript for a presentable report can easily be handled by the word processor. The actual editing process, however, still has to be accomplished manually, i.e., you have to comb through the whole manuscript word by word to locate any spelling and grammatical errors. For many of us, this is perhaps the most tedious aspect of producing a manuscript and it involves frequent references to the dictionary and the thesaurus.

With the introduction of special programs, referred to as spelling checkers, a major part of the editing process has been considerably simplified. A spelling checker reads your manuscript (a word processor text file) many times faster than most of us are capable of reading. It also simultaneously checks each word in the manuscript against the dictionary that is provided with it. In this manner, you can correct spelling errors at a much faster rate and with considerably more ease than if you proofread the manuscript yourself.

The application of spelling checker programs is, however, limited to just that—proofreading for spelling errors. These programs (available for the Commodore 64) are not yet capable of identifying grammatical errors, errors in syntax or sentence structure. Moreover, they will not help you make anymore sense out of your text. They only correct misspelled words.

The real application of a spelling checker program is for those who are heavily involved in writing or editing manuscripts. If you use a word processor for writing letters to friends or a class term paper, perhaps a simple proofreading will suffice.

Functionally, a spelling checker program proofreads by attempting to match each word in your word processor text file (manuscript) with a word in its dictionary. If a match is found, then the word is assumed to be correct and the next word is searched. If no match is found, then, the word is “flagged” so that you may correct the misspelling if you wish. Since the size of the dictionary is limited, a “no-match” only suggests that the word does not exist in the dictionary. It does not suggest that the word is misspelled. The choice is left to you to either identify and correct the misspelling or pass it as a new word and add it to your dictionary. A limited dictionary of the most commonly used words in the English language is provided with most spelling checkers. Some also provide a supplementary dictionary to which you may add words that

relate to your particular needs. So whether your word processing applications relate to writing scientific papers or business correspondence for real-estate clients, you can easily create a supplementary dictionary to suit your specific needs.

### **Specific Criteria**

There are a few spelling checker programs available for the Commodore 64 computer. Many of these are marketed as a package with a particular word processing program (e.g., Spellright Plus/64 comes with WordPro3 Plus/64 both by Professional Software). Quite often, these spelling checkers will also read text files created by other word processors.

When purchasing one for yourself, make sure you buy the appropriate (compatible) spelling checker for interfacing with your word processor.

In evaluating spelling checker programs for the Commodore 64, we have considered the following criteria to be useful.

**Text Proofreading**—The primary function of a spelling checker is to proof-read the text for misspellings. Most spelling checkers will first load the word processor text file from disk into the main memory of the computer. Then, each word from that file is compared to the words in the dictionary. After the comparison is made, the programs will generally display the file with suspect words “flagged” or highlighted for subsequent editing steps. In this section, we evaluate the proofreading process that each program undergoes, and the speed and efficiency with which it is accomplished. We will also mention any helpful prompts displayed by the system to aid in efficiently proofreading and editing text files.

**Text Editing**—Once a given text file has been read by a spelling checker program, you are given the option of altering misspelled words or inserting new words into the dictionary. The editing process is the key to the efficiency derived from the use of these programs. A good spelling checker will display the “suspect” word or phrase. Many programs display full screens of text with highlighted “suspect” words. It will allow you to edit words in the vicinity of the “suspect” word and suggest potential corrections for each word highlighted. It will also support the standard edit keys of the Commodore 64 for ease of use. After all the words are edited, there should also be an option in the program to save the edited file on disk.

**Dictionary**—Here we will discuss the dictionary structure associated with each spelling checker program, the number of words that are in the dictionary, as well as the additional space available for users to add more words. Other utility commands and functions relating to the maintenance of the dictionary will also be mentioned in this section.

## GLOSSARY

**Flagging**—This is a process whereby the spelling checker program will highlight a new or “suspect” misspelled word by either displaying it in reverse video, blinking the word, or sounding an alarm each time such a word is encountered.

**Help Menu**—In any program, a help menu is the quick and easy way to refer to the various commands associated with the operations of the program without having to go to the manual. A help menu often displays the functions associated with each special “function” key as well as any other abbreviated keystrokes available in the program.

**One Disk Operation**—Most Commodore 64 owners use a single disk drive. The ability to have the dictionary files on the same disk as the text file makes it easier to proofread the file without having to change disks constantly.

**One Pass Operation**—For the sake of efficiency, a good spelling checker program will proofread the document, flag “suspect” words, and allow you to edit items in one pass.

**On Screen Prompts**—These are generally the messages displayed by the system (program) to the user. This is a way for a program to interact with the user by displaying the program execution mode, I/O status and many other important information. Frequently the “prompt” is displayed for a specific response (i.e., the user needs to make a selection from the given options or enter a filename).

**Shows Context**—In the editing mode, the ability of a Spelling Checker program to show the “suspect” word within the context of surrounding words is very important editing feature. Most spelling checker programs display the entire text with the “suspect” words in reverse video.

**Temporary Update Dictionary**—In many Spelling Checker programs, you may add a word to a temporary dictionary if it is only important in the context of the file you are editing. If your documents will use that word frequently, you may insert it into the permanent dictionary.

<b>SpellRight Plus/64 Professional Software</b>		<b>\$59.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	
B Overall rating	18k	Size of dictionary
B Price vs Performance	-	Recognizes suffix
A Ease of use	-	Temporary update dictionary
A Vendor support	+	Permanent update dictionary
B Documentation	-	Uses updated dictionary for rest of document
A Error handling	+	Shows context
<b>SPECIFIC CRITERIA</b>	-	One disk operation
B Text proofreading	-	One-pass operation
B Text editing	+	Help menu
B Dictionary	+	On screen prompts

### DESCRIPTION

SpellRight Plus/64 is a spelling checker program marketed by Professional Software with their popular WordPro3 Plus/64 word processor. This program is also available under a different brand name from its originators (Spellmaster from Systems Software).

### TEXT PROOFREADING

There does not seem to be a list included to show which word processor (other than WordPro3 Plus) SpellRight Plus is compatible with, however, we tested it with both WordPro3 Plus and Easy Script text files and found it to work only with WordPro3 Plus. The program is menu-driven, makes full use of the function keys, and has a help menu for quick reference to program commands and abbreviated key functions. It loads the text file from the disk and can perform either a fast or a normal proofreading operation (depending upon whether the whole or a major fraction of the dictionary was used for the review). Files may be chosen from the disk directory displayed by the program. SpellRight also displays the total number of words against "suspect" words in the file, as well as the dictionary module that it is accessing.

### TEXT EDITING

The text editing feature of SpellRight Plus is well-developed. The program displays full screen text with the "suspect" words highlighted in reverse video. Using the editing and cursor control keys you may edit, replace, or pass each "flagged" word. The only disadvantage appears to be the fact that only the highlighted words may be edited/modified. The rest of the text appears to be invisible to the text editor. The cursor skips from one "suspect" word to another. Correctly spelled words may also be added to the dictionary at this stage. Once the text has been modified, it may be saved on disk.

## **DICTIONARY**

The Spellright Plus comes with a normal and a fast-track dictionary. The normal dictionary consists of the all the words present in the dictionary including new additions. The fast-track dictionary is for routine correspondence where speed and efficiency are the main concern. The fast-track dictionary consists of the top 7,000 words from SpellWriter's dictionary as well as all the words from the user dictionary. Additional utilities are available for you to obtain a printout of all the words in the dictionary, update/delete/insert new words, as well as check the dictionary file occasionally to make sure it is not corrupted.

## **SUMMARY**

The SpellRight Plus is a well-developed spelling checker for the Commodore 64. It lacks many features found in many professional quality spelling checkers for business and personal computers. However, for the Commodore market, it appears to be suitable and works well with WordPro3 Plus and Easy Script.

**Totl.Speller**  
**Totl Software**

**\$35.00 Diskette**

**GENERAL CRITERIA**

- B Overall rating
- B Price vs Performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Text proofreading
- B Text editing
- A Dictionary

**FEATURES**

- 24k Size of dictionary
- Recognizes suffix
- + Temporary update dictionary
- + Permanent update dictionary
- + Uses updated dictionary for rest of document
- + Shows context
- + One disk operation
- One-pass operation
- Help menu
- + On screen prompts

**DESCRIPTION**

The Totl.Speller is a spelling checker program that is compatible with the Totl.Text word processor developed by the same company. The program is compiled for speed and efficiency and has many convenient features such as adaptability to 80-column boards, use of two disk drives, menu-driven format, and printer configurability (i.e., RS-232, VIC-1541, or Parallel printer may be used with this program).

**TEXT PROOFREADING**

The file to be proofread is loaded into memory. Text files are stored in special blocks created by the program. In the Proofreading mode, the program gives you options to begin and end the proofreading at specified blocks (default values are built into the program). Proofreading is a two-pass procedure. In the first pass, the program creates a sequential file of all "suspect" words and the "Totl.control" characters. In the second pass, you are given the options of editing each word or adding to the dictionary.

**TEXT EDITING**

During the second pass of the Proofreading mode, each "suspect" word is highlighted in reverse video. You may at this stage either correct the word if it is misspelled, bypass it, add it to the temporary dictionary, or choose the "help" function which will display suggested words from the Totl.dictionary. These words are picked from the dictionary by the program by matching its sub-sections. (A suitable example provided in the manual is the word "receive". The program divides this word into sub-sections RE-CEI-VE and matches other words in the dictionary to these sub-sections; i.e., RE-VI-VE.) The help function is very useful if you are troubled with the spelling of commonly used words. Function keys are used to select many of the options during the editing mode.

A Verify mode is also available for proofreading your text file. It is different from the Proofreading mode in that it checks every word in the file against the dictionary. The Proofreading mode only checks the "suspect" words in the dictionary.

### **DICTIONARY**

The Totl.Speller contains three different dictionaries. The permanent dictionary consisting of 10,000 words is expandable to more than twice that number depending upon the disk space available. The temporary dictionary has a capacity of 150 words and is used during proofreading. Any words from your text file that you wish to add to the main dictionary are first collected in this dictionary and added to the main dictionary at the end of the session. The third type of dictionary is the instant access dictionary. This dictionary consists of the 350 most commonly used words and resides with the main program.

### **SUMMARY**

Totl.Speller is a very versatile program that has many useful features. One not mentioned above is the utility file that allows you to configure screen colors, printer type, and access disk functions (such as formatting a diskette or listing the directory) without exiting the main program. The program has a relatively large dictionary size and the temporary dictionary is very helpful in updating the permanent or main dictionary. The documentation is easy to comprehend and the program is very easy to use.

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## Worksheet for Writing and Correspondence Tools (Spelling Checkers)

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

### GENERAL CRITERIA

Overall rating  
Price vs Performance  
Ease of use  
Vendor support  
Documentation  
Error handling

### SPECIFIC CRITERIA

Text proofreading  
Text editing  
Dictionary

### FEATURES

Size of dictionary  
Recognizes suffix  
Temporary update dictionary  
Permanent update dictionary  
Use updated dictionary for rest of document  
Shows content  
One disk operation  
One-pass operation  
Help menu  
On screen prompts

*Description*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Text proofreading*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Text editing*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Dictionary*— \_\_\_\_\_

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Summary—

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**COMPARISON CHART**


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<b>PROGRAM NAME</b>	<b>RATINGS FOR CRITERIA</b>									
	OVERALL RATING	PRICE VS PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	TEXT PROOFREADING	TEXT EDITING	DICTIONARY	PRICE
SPELLRIGHT PLUS/64	B	B	A	A	B	A	B	B	B	\$59.95
TOTL SPELLER	B	B	A	A	B	A	B	B	A	\$35.00

<b>PROGRAM NAME</b>	<b>RATINGS FOR FEATURES</b>									
	SIZE OF DICTIONARY	RECOGNIZES SUFFIX	TEMPORARY UPDATE DICTIONARY	PERMANENT UPDATE DICTIONARY	USES UPDATED DICTIONARY FOR REST OF DOCUMENT	SHOWS CONTENT	ONE DISK OPERATION	ONE-PASS OPERATION	HELP MENU	ON SCREEN PROMPTS
SPELLRIGHT PLUS/64	12K	-	-	+	-	+	-	-	+	+
TOTL SPELLER	24K	-	+	+	+	+	+	-	-	+

## 5.5 INFORMATION ORGANIZATION— DATABASE MANAGEMENT SYSTEMS

### INTRODUCTION

Whether you are a businessman operating a retail store, a hobbyist with hundreds of prized collectibles, or a student writing a term paper, you may find yourself in need of a filing system to help organize a wide variety of information (invoices, mailing lists, stamp prices, bibliographies, etc.). Frequently, you will want to update the information in the files (records) and also print a list of selected items in the file.

Before microcomputers became widely available, such a record-keeping system commonly consisted of a file of 3 X 5 index cards. Each card contained the desired information about one of a group of similar items (information about a magazine, perhaps, or about a customer with whom you correspond) and was filed in ascending numerical or alphabetical order.

There are several limitations to such a filing system. First, the retrieval of specific records from an index card file can be made at only one level; that is, if the cards containing a mailing list are arranged in alphabetic order by the client's last name, then they can only be accessed by last name. If you wish to access selected cards by a specific city or zip code, you will have to search the whole card file. This also makes record updating very tedious. Another disadvantage is obvious. You cannot, with such a filing system, print out a list of all, or selected, records.

The card index files are most popular in libraries which get around some of the above limitations by maintaining three index files for each publication, subject, author, and title, and using lots of cheap labor (students).

The availability of Database Management Systems (DBMS) on microcomputers has made it possible to enter and store a wide variety of information on disk files, thus eliminating the need for 3 X 5 card files, large filing cabinets, and hours of labor. Information in these files may be stored in a wide variety of classifications, all of them defined by you. Furthermore, any record or records that you select may be retrieved quickly from a file at any time. Facilities are also available for you to print records in a report format. The fact that these records are maintained on disk files also makes them much faster and easier to update than a card index file. Some sophisticated programs also allow merge capability (merging records with text files). This feature is especially useful in creating personalized form letters. A calculator function, available in a few programs, even allows you to perform arithmetic and logical operations on records containing numeric data.

## ***Applications Of Database Management Systems***

The applications of database management systems extend much further than the previous examples. You may store any type of information that you want by creating your own fields (see definition below). The program will let you search through that information, sort it in any order, and generate a list of any or all records in that database. For example, let us assume that you have created a database of your customer accounts in the United States. You can now generate a number of lists from the database. You can get a list of your most valued accounts in the U.S., or all your accounts in a specific area.

If you have a database consisting of customers' mailing addresses, then you can get a list of customers in the order of their last names or a list by a certain zip code. With the merge feature, you can merge each record in the mailing list (containing customer's name and address) with a standard form letter, that you may create on your word processor, to generate personalized letters.

Another DBMS special feature mentioned above is the calculator function. Using this feature, you may perform calculations on parts of your records. This is helpful when you wish to update balances owing in your customer accounts. The calculations may be performed on all or selected records.

In addition to maintaining customer accounts and mailing lists, DBMS are also used for other applications such as stock records, inventories, contract records, student records, sales ledgers, invoices, and personnel records.

Without a computer-based database management system, these tasks may take hours or even days to accomplish manually. Imagine sorting through a list of 1000 customers to extract a list of those who live in the area code 415, or manually updating invoices or cash balances of 100 accounts. The power of a computer-based database management system lies, therefore, in organizing your stored information in any way you want in a fraction of the time it would otherwise take you. How you use this to benefit your business depends a lot on your understanding of the concepts of database management and a knowledge of how to find the right system to match your specific needs.

Through this guide to available DBMS software for your Commodore 64, we will introduce you to some of the important concepts of DBMS and provide comprehensive reviews of specific programs to help you choose the right software to match your business or personal needs.

### ***Definition Of Database***

A database is a collection of information. It is typically a filing system in which the information is organized and stored in the form of user-defined structures called records. An example of this is a library card catalog. The catalog may be considered a database, with each card in the catalog representing a record. The content of each record is subdivided further into data types (author, title, index, etc.) referred to as fields. A database, therefore, consists of records and a record consists of fields. By definition, all records in a database must have identical data types or fields. Going back to our example of the

library card catalog, all cards have identical fields (author, title and subject), and a student can access a book via any of these three fields. A DBMS, also referred to as a file management system, is a collection of computer programs that allow you to create a database and store it in the form of files on a disk.

## **Specific Criteria**

In evaluating a particular database management system for the Commodore 64, the following criteria were considered to be most important:

**START-UP OPTIONS**—When you first load and execute a DBMS program, it offers (via the main menu) a variety of options. Using these options, you may configure the system peripherals from within the program. These options may involve printer set-up, DOS commands, screen background/text color changes, etc.

Printer set-up, for example, will let you set up the program for the particular printer that you have (NEC, Diablo, Spinwriter, or a Centronics parallel).

DOS commands refer to accessing the functions and commands of the disk operating system from within the program. This enables you to format a diskette or obtain the disk directory without exiting the program. Changing screen background/text colors is useful for getting the best contrast between the background screen and the text for improved readability. Although there are up to 256 color combinations available on the Commodore 64 (16 background and 16 text colors), only a few allow optimum readability.

**FILE STRUCTURE AND SPECIFICATIONS**—The efficiency of a particular DBMS in storing and retrieving data from a file depends primarily upon the file structure used. Relative files and random access files provide the fastest data storage and retrieval. Relative files have the added advantage that the record length may be altered. Records that are stored in sequential files, however, are only accessible in the order in which they are stored, so the last record entered into the file will be the last record accessed. In order to implement DBMS functions such as sorts and searches in sequential files, the data has to be loaded into memory completely. This restricts the size of the file (due to limited memory available in the computer) and makes it less versatile. Furthermore, updating sequential file records is very time-consuming and tedious. Most good quality DBMSs, therefore, use relative or random access files to handle record storage.

Specifications refers to the limitations a program imposes on the file and record structures you can create. For example, a program may allow a maximum of 25 fields per record and 30 characters per field in each record. If you wanted to use that program to record a mailing list of customers, these specifications may be sufficient. But if you want to store abstracts of magazine articles, you may not have enough space. If you have a specific application in mind, you will find it easier to choose a particular database management system. Otherwise, generally, the more versatile a particular program is, the more favorable it will be with respect to general applicability.

**ADVANCED DATA HANDLING**—This refers to sort and search features that are available in most programs. The sort feature allows you to arrange the records in your database in a number of ways. You can sort a file in either alphabetic or numeric order. You may use one or more fields to sort your data. For example, if your database consists of mailing addresses, you may, by using the advanced sort feature, arrange that list in alphabetical order by the customer's last name or by city. You may also want to rearrange the same list in numeric order by the zip code. The search feature lets you look into your database for specific records. You can define the criteria by using "conditional" statements (such as IF Last Name = Smith OR City = New York) and the program will automatically search for records that match the criteria defined in the conditional statements. Sorts and searches may be performed at one or multiple levels.

Another feature available in most advanced DBMSs is the ability to set up calculated fields in your database. This allows you to perform mathematical operations on specified fields of your database file (such as adding tax to the price of a stock item or averaging student grades). In many cases, you can use BASIC's mathematical operators for your formulas for the calculated fields.

**REPORT GENERATOR**—A useful function of a DBMS is its ability to generate user-defined reports. These reports may contain a few or all of the records in the file. The reports may be organized as a table or a listing and the fields may be positioned anywhere on the paper. This flexibility in defining the report format makes a program versatile in its applicability. You can print mailing labels or get a simple listing of a few names and addresses. You can also print selected fields from each record to form a comparison chart. A good database system will support many different types of printer configurations and print formats.

**SPECIAL FEATURES**—In this category, we have included the various features of a program that either add to its performance and applicability or make it outstanding in comparison with other similar programs. For example, a DBMS might feature an integrated word processor and a programmable calculator. This particular package may be of great value if you plan to use your DBMS for creating personalized form letters or keeping track of inventories. Another system may be designed for storing bibliographies. Its use is therefore limited to a specific application.

And finally, we may encounter some programs that offer exceptional sophistication, matching those of professional database management systems, while others that appear to have a serious drawback in design or performance that seriously affects their usefulness. In either case, we will reserve our comments on each program to the Summary section in each review.

## GLOSSARY

The following is a glossary of terms frequently encountered in the manuals of database programs:

**ADD FIELDS**—Suppose you have created a database of names and addresses of all your employees. Now you want to add another field (date of birth or starting date on the job) to this file. Some programs will not allow you to add a field to the preexisting file. In this case, you will have to start all over again and create a new file and enter all the records. The ability to add fields to a file is a useful feature that very few programs offer. With most DBMSs, you must design the file structure very carefully, since you may not be able to add more fields to your file.

**BROWSE**—This feature available in most database management systems allows you to look at the records in a file sequentially, starting with the first one. This “browsing” may also be performed in reverse order; i.e., if you are currently working with the 100th record and you want to view the preceding few records, then you may browse in a descending order.

**CALCULATOR**—This is a useful feature in a database management system. It lets you perform arithmetic calculations on the numeric data types in your records. The types of calculations that you can perform vary from program to program. The feature, however, adds to the versatility of the DBMS in its applications.

**CONDITIONAL STATEMENT**—This statement consists of logical operators (such as IF, THEN, GE, LE, EQ) that may be used to select specific records from a database. For example, you may use a statement like, “IF last name EQ Smith AND City EQ San Francisco,” to tell the computer to select only records which have “Smith” in the last name field and “San Francisco” in the city field.

**DATABASE**—A database is a collection of information organized in the form of records. It may be a list of customers' phones and addresses or an inventory of items in stock. The term database is also commonly used in relation to large information networks such as The Source or the Dow Jones News Retrieval Service.

**DATABASE MANAGEMENT SYSTEM**—Often abbreviated DBMS. Refers to a collection of computer programs that facilitate the creation and use of a database in the form of a file or files. It is an electronic filing system that offers efficiency in data storage and retrieval.

**EDITING**—Once you have entered your records in a file and want to update a specific record, or you want to correct information entered incorrectly, you will be working in the Editing mode of a DBMS. The manner in which this mode is implemented in each program and the efficiency with which you are able to update your records is considered here.

**FIELD**—A field is a specific data type. This may be the book title in a library card catalog or a zip code in a mailing list. A record consists of many interrelated fields. Information within a field may or may not be identical between records. For example, in a file containing a mailing list of clients, each record might contain five fields: name, street, city, state, and zip code. If two clients live in the same block, their zip code will be the same; therefore, the information in those fields will be identical in the respective records. Fields may be

used to perform sorts and searches within a file, although some DBMSs will search only key fields.

**FILE**—A collection of records on disk that are saved under a unique name. The records consist of identical data types (fields). For example, you may have a file containing a list of vendors that manufacture software for the Commodore 64. All records in this file will have identical field structure; i.e., all records will contain the name and address of the vendor and the product that they manufacture.

**FUNCTION KEYS**—The Commodore 64 has four undefined, programmable keys on the right side of the keyboard. These keys are often referred to as the function keys. By using these keys in conjunction with the shift key, you can actually perform up to 8 functions in your program. The function keys add to the ease and efficiency of using the features of a certain program. For example, you can use the function keys to select various menu options of a program. Without them, you would normally have to physically type in each option.

**HELP SCREEN**—Some programs display a list of commands and functions to help you select the right command for a specific function. In this way, you are not forced to memorize all the commands of the system and their specific functions. This is referred to as a help screen.

**KEY**—A key is an identifier consisting of one or more fields. It is used to sort, search, and format output of desired data elements. If you have a database of sales records, for example, then you may identify one or more fields (salesman, product name, etc.) in this database as key fields. This will enable you to sort or search the entire database for specific records by establishing criteria using these key fields. Some DBMSs will allow searches only on key fields, while others will search for non-key fields with a slower process.

**MENU-DRIVEN**—Many DBMS packages display the master menu when the program is first executed. Selection of a function or option from the master menu results in the display of another menu that contains more detailed features of that particular function. Such a system or program is called menu-driven.

**ON SCREEN PROMPTS**—These are the prompts that a program displays on the monitor screen everytime it requires you to perform a certain task such as inserting a new disk or changing printer paper. These prompts are very helpful because you are not required to memorize every step to execute a program. The program keeps you informed of the next step and any inputs that it needs from you.

**RANDOM ACCESS FILE**—A type of disk file that allows you to directly access records through the program by specifying the drive, track, and sector number. These files are not given names and do not appear in the disk directory.

**RECORD**—A record is a collection of data items (fields). In a personnel file, for example, the information on each employee is considered a record. The maximum number of records that a database may contain is limited by the size of each record and the available space on a diskette.

**RELATIVE FILES**—These are similar to random files, except that the files are given unique identifiers (file names) and the record length in the file is alterable. A relative file may contain up to 720 records.

**REPORT**—A report is a user-defined printout (or hard copy) of selected information in the database. Many different kinds of reports may be generated by a DBMS such as lists, forms, and tables.

**SEARCH**—This function allows you to search a file for specific records that you have defined with conditional statements.

**SECURITY**—A feature available in some DBMSs that allows you to restrict access to those with a password.

**SEQUENTIAL FILES**—A file that sequentially stores data on disk. Access to data is made in the same order each time (from the first element in the file to the last element in the file). This type of structure makes searches or record updating very time-consuming and tedious.

**SORT**—This is a function (available in some DBMSs) that allows you to rearrange the records in your database alphabetically or numerically. You may also be able to select (using conditional statements) the records to be sorted instead of sorting the entire file.

**SPREADSHEET FEATURES**—Some DBMSs have built-in features which allow you to build a spreadsheet from selected database records.

**START-UP OPTIONS**—These are the options available to you through the program when you first load and execute it. The options are displayed through the main menu. They may include printer set-up, disk initialization, and color adjustment.

**WORD PROCESSOR INTERFACING**—Some DBMSs allow you to create a file from the database which can be further processed by a word processor.

<b>Class Manager II</b>		<b>\$95.00 Diskette</b>
<b>Merlan Micro Series</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	* Records/	+ Menu-driven
B Price vs	File	+ On screen
Performance	* Chars/	prompts
A Ease of use	Record	- Help screen
A Vendor support	* Fields/	+ Browse
B Documentation	Record	+ Editing
B Error handling	* Chars/	+ Sorts
	Field	+ Search
		+ Add fields
		+ Print reports
		+ Calculator
		+ Use of Fcn. keys
		- Word processor
		interface
		- Security
<b>SPECIFIC CRITERIA</b>		
B Start-up options		
B File structure/		
specs		
B Advanced data		
handling		
B Report		
generator		

### DESCRIPTION

The Class Manager II is a filing system designed to assist teachers in maintaining student grades.

### START-UP OPTIONS

The program is menu-driven. You may select the screen and text colors using the function keys. You can also select the input and output devices at this time since the program works with cassette and disk. You can display the disk directory on the screen by selecting the appropriate option from the menu. No other DOS functions are available in the program. Printer setup is not necessary and the program will work with most properly interfaced printers.

### FILE STRUCTURE AND SPECIFICATIONS

The file and record structure of the program is predefined specifically to be used by teachers and school administrators for maintaining student records. Each file is designed to maintain records for one class. Sample files are also included to aid the teachers in understanding the functions of the Class Manager. The program uses sequential files for storing the student data. It is designed to keep track of student marks in classes with up to 36 students and 25 marks per student per term.

### **ADVANCED DATA HANDLING**

By selecting the appropriate option from the main menu, you can edit, delete, display, or view the records in a file. The program design facilitates editing and entering large amounts of data (such as student grades) with considerable ease. The program calculates the statistics on the grades as specified (class average, median, standard deviation, and the mark distribution). The sort feature will order student names by rank. There is also a facility available to scale the grades of students in one test if the teacher felt that that test had a higher degree of difficulty.

### **REPORT GENERATOR**

The print function allows you to print tables and reports of students with the desired grades to evaluate their performance. You can print a class report or an individual report. You can also print statistical summaries at the end of each report. Another print feature is the daily attendance record that may be printed without grades.

### **SUMMARY**

The Class Manager is designed for a unique application and is useful for teachers. It requires minimum input from the teacher and is very user-friendly.

<b>Data Manager MicroSpec</b>		<b>\$95.00 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	1200/600 Records/	+ Menu-driven
C Price vs Performance	125/255 Chars/	+ On screen prompts
B Ease of use	Record	- Help screen
A Vendor support	18 Fields/	+ Browse
B Documentation	Record	+ Editing
B Error handling	24 Chars/	- Sorts
	Field	+ Search
<b>SPECIFIC CRITERIA</b>		- Add fields
B Start-up options		+ Print reports
C File structure/ specs		- Calculator
C Advanced data handling		- Use of Fcn. keys
B Report generator		- Word processor interface
		- Security

## DESCRIPTION

Database management system.

## START-UP OPTIONS

The Data Manager supports the Commodore 1525/1526 or any properly interfaced Centronics parallel printer. A printer setup function available from the main menu allows you to send ASCII codes to your printer if you wish to access alternate character fonts or any other special function. You can specify printer delay time in seconds for printer synchronization purposes, and send linefeeds through the printer setup function. DOS commands and functions are not available through the program, however. Since one diskette is used for each database, the program will automatically format and initialize a diskette each time you create a new file (database). Screen background and text colors may be changed through the color selection option which is also available from the main menu.

## FILE STRUCTURE AND SPECIFICATIONS

The program uses a random access file for data storage. The maximum record size for each file may be 1200 for records < 127 characters, or 600 for records > 127 but < 255 characters. Each record allows a maximum of 18 fields (24 characters maximum in each field). The system stores the index or key file on the data diskette and therefore automatically recognizes each file as the diskette is inserted in the drive.

## **ADVANCED DATA HANDLING**

The search option lets you search your records based upon a predefined selection criteria. Comparison operators are Boolean (GT., EQ., LE., etc.). You may specify up to three levels of selection criteria and the system will display all records that match the criteria until the end of file has been reached. Records may also be changed during this option. No facility is available for performing calculations on numeric data fields.

## **REPORT GENERATOR**

Two print options are available in the main menu. You can dump all or some records in a specified range. This feature will print records in a sequence and does not require any selection criteria. This is helpful if you want to review the file as it exists in the database. Another report feature allows you to format your output any way you want by selecting specified fields and positioning them anywhere on the page or screen (the program will let you direct the output to the printer or the monitor screen if you do not want a hard copy). Selection of fields for the report is done using Boolean operators. You may also have your report sorted on one or two fields (it will sort on the first 10 characters for one field or the first five characters if two fields are specified for sorting).

## **DRAWBACKS**

The file structure limits the applicability of this program. Since you can only have a maximum of 24 characters per field, you cannot effectively use this system if you want to have a product description or a book title in your record. Another weak feature is the 10-character limit imposed by the program on field labels. If you want to define a field label greater than 10 characters, you have to abbreviate it. This makes it difficult for anyone who wishes to access your database but cannot understand your abbreviated field labels.

## **SUMMARY**

Data Manager has limited applications and may not be very appealing if you want a DBMS for more than maintaining mailing lists. It has some good features such as the report generator function which lets you design custom reports, and the option to direct output to screen if you do not need a hardcopy. Its price vs performance ratio is, however, low and thus does not rate highly according to our criteria.

<b>Data Manager Time Works</b>		<b>\$24.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	* Records/ File	+ Menu-driven
B Price vs Performance	240 Chars/ Record	+ On screen prompts
A Ease of use	* Fields/ Record	- Help screen
A Vendor support	* Chars/ Field	+ Browse
B Documentation		+ Editing
A Error handling		- Sorts
		+ Search
		- Add fields
		- Print reports
		+ Calculator
		- Use of Fcn. keys
		- Word processor interface
		- Security
<b>SPECIFIC CRITERIA</b>		
C Start-up options		
C File structure/ specs		
C Advanced data handling		
D Report generator		

### DESCRIPTION

General purpose database management system.

### START-UP OPTIONS

The program is menu-driven. You may select the options of formatting and initializing the data diskette. The program does not support any other DOS commands or functions. Printer setup is not required, and the print function will work with any properly interfaced printer.

### FILE STRUCTURE AND SPECIFICATIONS

The program uses relative files to store your data. The record structure is rather awkward. The length of a record is defined by screen lines. You can have up to 8 screen lines in a record and a line cannot be longer than 30 characters. Each line is a reference point for the Data Manager. You are prompted to enter your data in each line, and you may enter as many fields in a line as will fit (30 character limit). One of the disadvantages of the program is that you have to enter field identifiers (such as "Name" or "Street") in each record. Depending upon the record size (1 to 8 lines), you can store up to 1000 records on a diskette.

### ADVANCED DATA HANDLING

The program provides a search and cross search facility. You can search by item number or by the items in the records. Searched items may be edited or

listed. Each search list can be further searched to narrow down specific records in a long list. There is no sort feature available in the program.

The data analysis option lets you perform limited numeric calculations on the data fields. The program will calculate sums, averages, standard deviations, and frequency charts.

### **REPORT GENERATOR**

There is no report function included in the program. You can dump records on the printer in the format in which they appear on the screen. There is also an option available to print specific records that were selected in the search routine.

### **SUMMARY**

The Data Manager has an open design and is relatively easy to use. Its application range is limited, however, because of the lack of advanced features. Because of the low price, it is recommended for home use (for keeping mailing lists of friends, relatives, etc.).

<b>Database Manager Mirage Concepts</b>		<b>\$99.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	65535 Records/ File	+ Menu-driven
B Price vs Performance	2000 Chars/ Record	+ On screen prompts
A Ease of use	200 Fields/ Record	- Help screen
A Vendor support	250 Chars/ Field	+ Browse
A Documentation		+ Editing
A Error handling		+ Sorts
		+ Search
<b>SPECIFIC CRITERIA</b>		+ Add fields
B Start-up options		+ Print reports
A File structure/ specs		+ Calculator
A Advanced data handling		+ Use of Fcn. keys
C Report generator		+ Word processor interface
		- Security

## DESCRIPTION

Database management system.

## START-UP OPTIONS

The program supports the Commodore 1541 or 2031 disk drives (with interface), the Commodore 1525/1526 printer, or almost any properly interfaced parallel printer. Printer setup is not necessary, and if you want to use the alternate fonts available with your printer, it is suggested that you send the appropriate ASCII code to your printer before you load the program.

DOS commands are available through the main menu in the program. You can perform disk operations such as formatting diskettes and listing a disk directory.

## FILE STRUCTURE AND SPECIFICATIONS

The Database Manager uses relative and sequential files to store and manage data. The database is stored using relative files; other information pertaining to a database such as size of records, position of fields in a record, etc., is stored using sequential files.

The program can handle up to 65,535 records per file, although the actual number of records that you may have in a file will be limited to the available disk space. Each record may have a maximum of 2,000 characters and the program allows you to scroll your data form vertically if you have a large record. Maximum fields per record are 200 and each field may have no more than 250 characters. This type of file structure gives you a great deal of flexibility in designing a database.

## ADVANCED DATA HANDLING

The program features a search facility for specific entries in either of three formats: (1) exact field match; (2) beginning field match; and (3) match anywhere. Search speed is greatly increased if the particular field being searched has been previously sorted. Multiple level sorts are also available. In fact, you can sort your data on any field and at any level. The program creates a sort index of the files on diskette and automatically updates the most recent sort for the latest entries. BASIC's conditional statements may be used to select specific records while in the search or sort mode. Calculated fields may be defined while creating the database form so you can perform calculations on those fields. All BASIC mathematical operations are valid in the program. Once an operation is defined for a field, the program makes all the necessary calculations.

## REPORT GENERATOR

The program allows you to print your records in four different formats: form, list, report, and mailing labels. The form format prints all fields in a record exactly the way they appear on the screen. The list format tabulates specified fields across 80 columns, wrapping any carryovers to the next line. In the report format, you may adjust the page width and page length, print titles of each field, and select the fields that you would like to print. The mailing labels feature is specifically designed for printing mailing labels in a pre-defined format. The report generator feature is one of the weak points in the program. The four available print features may satisfy the needs of many; however, you cannot design your own reports (place fields in any position that you want). This severely restricts the applicability of the Database Manager. The manual provides helpful hints regarding the file structure for those who wish to design custom reports by accessing the records through their BASIC program. A separate report generator will soon be available from Mirage Concepts that will allow you to custom design reports in any format and perform a number of calculations on your files.

## SPECIAL FEATURES

The key features of this program that make it outstanding are: (1) the large file size; and (2) multiple sorts. The program also allows you to create sequential files of your data so you may merge them with text created on your word processor. Another special feature worth mentioning is the mailing label generator built-in to the program. This is useful for those of you who will need a DBMS for keeping mailing lists.

## SUMMARY

If you want a good DBMS, check out the features of the Database Manager. It is one of the most powerful and versatile DBMSs currently available for the Commodore 64. It comes with many outstanding features but lacks a good and versatile report generator program.

<b>Totl.Label</b>		<b>\$50.00 Diskette</b>
<b>Totl Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	* Records/	+ Menu-driven
C Price vs	File	+ On screen
Performance	254 Chars/	prompts
B Ease of use	Record	+ Help screen
A Vendor support	* Fields/	+ Browse
B Documentation	Record	+ Editing
B Error handling	* Chars/	+ Sorts
	Field	- Search
		- Add fields
		+ Print reports
		- Calculator
		- Use of Fcn. keys
		- Word processor
		interface
		- Security
<b>SPECIFIC CRITERIA</b>		
B Start-up options		
C File structure/		
specs		
C Advanced data		
handling		
C Report		
generator		

## DESCRIPTION

Mailing list.

## START-UP OPTIONS

This program supports any properly configured printer. You are free to define the number of lines per label and the format for each line. You are limited to 254 characters per label. The first line is used to sort or search, and can be suppressed when printing. You can vary the color of your screen when operating with the program. Once a label is configured you cannot change it in the same file.

## FILE STRUCTURE AND SPECIFICATIONS

This program uses sequential files to save label data.

## ADVANCED DATA HANDLING

The program is completely menu-driven. You can add, change, or delete a label entry at any time. You can browse through a file of labels sequentially as they are on the file, viewing the first line of the label with the option of viewing the entire label, or just browse through just the previous group viewed.

## REPORT GENERATOR

You can define a label to conform to just about any kind of label. You can print the entire list or you can select individual labels by entering the appropriate

numbers. You can also elect to print only those labels which have been altered during the current session. You cannot pattern match from the file, and if you wish only selected elements of a file printed, you must enter a separate number for each entry. You are given an opportunity to align labels prior to printing. The program can be configured to work with any properly configured printer.

### **SUMMARY**

This program is written in BASIC and using sequential files is very slow, so slow that you may find the printer waiting for the computer. The inability to automatically print labels matching a certain pattern weakens the program's versatility.

<b>Datalog</b>		<b>\$39.95 Diskette</b>
<b>Midwest Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	1000 Records/ File	+ Menu-driven
C Price vs Performance	250 Chars/ Record	+ On screen prompts
B Ease of use	12 Fields/ Record	- Help screen
B Vendor support	35 Chars/ Field	- Browse
C Documentation		+ Editing
D Error handling		+ Sorts
		+ Search
		- Add fields
		+ Print reports
		- Calculator
		+ Use of Fcn. keys
		+ Word processor interface
		- Security
<b>SPECIFIC CRITERIA</b>		
C Start-up options		
C File structure/ specs		
D Advanced data handling		
D Report generator		

## DESCRIPTION

DBMS

### START-UP OPTIONS

The program is menu-driven. Printer setup options are available in the print list mode. You may choose for a Commodore or an ASCII printer, and you can also send the proper secondary address through the setup options. The program does not support any DOS commands; however, it will automatically format the data disk at the time you create a new file.

### FILE STRUCTURE AND SPECIFICATIONS

The program uses relative files for storing your data. You may store up to 1,000 records per file. Since the number of records per file is inversely related to the number of characters per record, if you want 1,000 records per file, the program will allow you only 66 characters per record. So in order to have larger records, you will have to compromise by having fewer records in a file.

### ADVANCED DATA HANDLING

You may search records while in the Edit mode by specifying contents of a field. The program searches by matching the specified character or numeric string(s). Multiple searches can also be specified if you want to search by more than one field. A sort feature is available in the Prime mode. The program automatically sorts the first 16 characters of a field. No calculation function is offered by this program.

## **REPORT GENERATOR**

The print list feature lets you format your output, sort the records by a specified field, direct output to the screen or the printer, and calculate totals of specified fields at the end of the printout.

### **SUMMARY**

Datalog is a low-cost DBMS for the Commodore 64. The program design lacks sophistication and versatility, and it has limited applicability. It may be useful to you if you want a simple DBMS for limited use.

<b>Delphi's Oracle</b>		<b>\$150.00 Diskette</b>
<b>Batteries Included</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	* Records/	+ Menu-driven
A Price vs	File	+ On screen
Performance	7000 Chars/	prompts
B Ease of use	Record	- Help screen
A Vendor support	99 Fields/	+ Browse
B Documentation	Record	+ Editing
A Error handling	860 Chars/	+ Sorts
	Field	+ Search
		+ Add fields
		+ Print reports
		+ Calculator
		+ Use of Fcn. keys
		+ Word processor
		interface
		+ Security
<b>SPECIFIC CRITERIA</b>		
B Start-up options		
A File structure/		
specs		
A Advanced data		
handling		
A Report		
generator		

### DESCRIPTION

A versatile, professional-quality database management system.

### START-UP OPTIONS

The program is menu-driven. Disk utilities are available through the main menu (format diskette, scratch, rename, copy disk files, and change drive number). The program works with any properly interfaced printer as well as the Commodore 1525E printer. A useful feature in this program is the use of the function key F8 as the escape key. It allows you to return to the main menu at any time, even if you are in the middle of an operation and want to abort it.

### FILE STRUCTURE AND SPECIFICATIONS

The Oracle uses relative files to store the data. It creates separate files to keep track of the record structure and the order of the records.

The most outstanding feature of the Oracle is the record structure that can be created. You may pack as many records on a disk as the available space will allow. Each record may have up to 7,000 characters. There are a maximum of 99 fields allowed per record and up to 860 characters per field. Of all the DBMSs reviewed in this book, this one has the most flexible record structure. Additionally, you can change the record structure any number of times by adding new fields and deleting old ones. This is accomplished by first creating a sequential file of your data file. In addition to changing the record format, this sequential file may also be used to merge your data to text files in a word processor (Paper Clip).

## **ADVANCED DATA HANDLING**

The Oracle has some very sophisticated search routines. You may search records for specific text or numeric strings. You can also perform wildcard searches on any field. Unequal match search is used for locating records that contain ranges of values within a given field. A special search feature, the logical AND search, lets you specify any number of logical AND conditions between two fields. A browse feature is available through the "any match" search in which you do not specify any string and the program displays all records.

There is also a "search anywhere" feature incorporated in the later versions. This feature will match the search string anywhere in the field. You may sort any field at any time. The program does, however, maintain a constantly sorted list of all records (sorted by the keys selected). You can specify as many as nine subfields to sort your data and each sort may be up to 15 characters deep. Calculations may be performed in the design report mode. Oracle provides four arithmetic operations for performing calculations on numeric data: addition, subtraction, multiplication, and division. The sums of values contained in the report fields may be stored in banks accumulators (Oracle provides 36 accumulators for this purpose) for further manipulation. There is also a record count feature available that keeps track of the number of records that met a specified search criteria.

## **REPORT GENERATOR**

The program allows you to design custom reports by placing fields anywhere on the screen. You can label fields and columns by using variable field data. The concept of variable field data is unique to this DBMS. Variable fields allow you to input any data that does not belong in the records but would enhance the readability of a report. It also gives you a chance to input any comments in the report at the time it is being printed. You can also create special print effects such as a dotted line to separate entries within a report. A search function is also available in the print report mode so that you can select specific records for your report. The report can be directed to the screen if you do not want a hard copy. A label printing mode is available for simple applications such as printing mailing labels. One of the special (and unique) features of this DBMS is the facility to print pre-printed forms with data from your fields. Although this can be accomplished in some other DBMSs as well, Oracle contains nimble programming which makes the task a lot easier. Another special feature is the option of inserting breakfields at specified points in your report. Breakfields allow you to insert fixed text, perform calculations, and use printer commands at the specified points in the report. The Oracle works with most properly interfaced printers and therefore does not require much set-up from you.

## **SPECIAL FEATURES**

One of many special features of Delphi's Oracle is its record update mode. You recall a record for updating by using the search function. Once the record has

been displayed and you have made the desired changes, the program will replace the old fields with new fields and give you the option of making those changes in all the records. In other words, the program will locate all the records in the file that meet your search criteria and change the desired fields automatically once you have updated one of those records.

Oracle provides multilevel security options via a separate program "Oracle 64.sec." The multilevel security gives differential access to people with different level codes.

### **SUMMARY**

Delphi's Oracle is an outstanding DBMS. It is of professional quality, versatile, and a great value for the money. It is full of delightful little features that make the whole process of database management very efficient. The program is not easy to learn and requires considerable time and effort. If you want a DBMS for simple applications such as mailing lists, this may not be the right system for you; however, if your needs go beyond simple applications, go out and buy this program.

<b>Easy Mail Commodore</b>		<b>\$29.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	700 Records/ File	+ Menu-driven
B Price vs Performance	160 Chars/ Record	+ On screen prompts
A Ease of use	6 Fields/ Record	+ Help screen
B Vendor support	* Chars/ Field	+ Browse
C Documentation		+ Editing
B Error handling		+ Sorts
<b>SPECIFIC CRITERIA</b>		+ Search
B Start-up options		- Add fields
B File structure/ specs		+ Print reports
C Advanced data handling		- Calculator
B Report generator		+ Use of Fcn. keys
		+ Word processor interface
		- Security

### DESCRIPTION

Mailing list.

### START-UP OPTIONS

This program makes use of the Commodore 1541 disk drive and the Commodore 1525 printer. The program is configured to accept name, address, state, zip code, phone, and one extra category. You cannot alter that structure.

### FILE STRUCTURE AND SPECIFICATIONS

This mailing list uses relative files to store name, address, state, zip code, phone, and category. The program is completely menu-driven with an initial screen prompting for each of the above categories. Entries are made on the screen and are limited to thirty characters for the name, four lines of thirty characters each for the address, and suitable space for the abbreviation of any state, the zip code, the phone number including area code, and eight characters for a category entry (e.g., business). Opening a file automatically formats for 700 entries. But you, of course, can enter any number less than that value and add to the list at a later time. There are eight command modes including: New—to add a new name to a list; Dsp—for displaying an entry; Alt—for altering a name or entry; Del—for deleting a name from the list; Int—for initializing a new list; Prt—for printing labels; and Dsk—for displaying the status of the disk drive.

## ADVANCED DATA HANDLING

The program automatically gives each name an ID number. Any entry can be found in the Dsp mode by entering the correct ID number. If the ID number is unknown a record can be found by searching on any field. You simply move the cursor to the field you wish to search on and enter the entry you wish to find. The program will locate the first entry in the list whose leading characters match all of the characters on your search entry. If you entered the letters "Abs" in the name field, the first name beginning with the letters Abs will be located. You can continue to search the list for the next match or end the search.

## REPORT GENERATOR

The program allows you to print mailing labels with dimensions of 1 15/16" by 4". You can print on one or two labels across the page. Prior to printing you are prompted for pattern matching which allows you to selectively print those labels that match your entry into any single field. You are then prompted for sort. You can sort on any individual field independent of the pattern matching entry. You are then given an opportunity to align the labels and print a single label for alignment.

## SUMMARY

This program can be used to interact with Easy Script by Commodore. It is convenient and easy to use if the format described above meets your needs. You cannot modify the label size or the data that will be printed from the entries.

<b>File Organizer</b>		<b>\$29.95 Diskette</b>
<b>Virginia Micro Systems</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	* Records/	+ Menu-driven
B Price vs	File	+ On screen
Performance	* Chars/	prompts
B Ease of use	Record	- Help screen
A Vendor support	10 Fields/	+ Browse
C Documentation	Record	+ Editing
B Error handling	* Chars/	+ Sorts
	Field	+ Search
		- Add fields
		+ Print reports
		- Calculator
		+ Use of Fcn. keys
		- Word processor
		interface
		- Security
<b>SPECIFIC CRITERIA</b>		
B Start-up options		
B File structure/		
specs		
C Advanced data		
handling		
C Report		
generator		

### DESCRIPTION

Database management system.

### START-UP OPTIONS

The program is menu-driven. The initial start-up options allow you to change screen text and background colors. You may also specify disk or tape for input/output operations.

### FILE STRUCTURE AND SPECIFICATIONS

The program uses sequential files to store and retrieve data. The data files are completely memory-resident during the period they are being created and updated, therefore you will find the file handling process relatively fast and efficient. The limitation is that you cannot store a large number of records in files that are completely memory-resident.

### ADVANCED DATA HANDLING

The program has search and sort features available that are very efficient. For small data files, you will encounter lightning-fast sorts and searches. Both operations may be performed by specifying the field that you want to perform the operations on. No calculator function is available with this program.

## **REPORT GENERATOR**

The program has a built-in report generator that prints the whole file in the sequence that it is organized (via the sort feature). You cannot print selected records or custom print your reports. The documentation includes a separate program that you may type in to assist in custom designing your reports.

### **SUMMARY**

The File Manager is a low cost filing system that is adequate for home use. It lacks some advanced features of a DBMS and therefore has limited applications.

<b>File Pac / Inquire Pac</b>		<b>\$69.95 Diskette</b>
<b>Pacific Coast Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	200 Records/ File	+ Menu-driven
B Price vs Performance	256 Chars/ Record	+ On screen prompts
B Ease of use	15 Fields/ Record	- Help screen
A Vendor support	256 Chars/ Field	- Browse
B Documentation		+ Editing
B Error handling		+ Sorts
		+ Search
<b>SPECIFIC CRITERIA</b>		- Add fields
B Start-up options		+ Print reports
B File structure/ specs		- Calculator
B Advanced data handling		+ Use of Fcn. keys
B Report generator		+ Word processor interface
		- Security

### DESCRIPTION

Database management system.

### START-UP OPTIONS

The program does not support any DOS commands or functions. It does have a routine that displays the disk directory. Printer setup is not available, and it is assumed that it will work with most properly interfaced printers. (We tried it on our Gemini 10x and experienced no problems in printing reports).

### FILE STRUCTURE AND SPECIFICATIONS

The program's primary limitation is in the file structure. It can only handle up to 200 records per file. This limits the use of this DBMS for applications that do not require large data handling. Each record can only hold a maximum of 256 characters in a maximum of 15 fields. You can have as many characters in one field as there are left in the record.

### ADVANCED DATA HANDLING

Sort feature is available but the program can only sort at one level (specifically any field you specify that has no more than 30 characters). Searches are available in two modes. You can search the records for numeric data by specifying the upper and lower limits of that number. Conditional Search mode searches records by characters, words, or phrases. Both Search and Sort may be displayed on the screen or on the printer if you want to get a hardcopy.

## **REPORT GENERATOR**

The report generator program allows you to custom design your reports by specifying the row and column on the page where you want to have your field data printed. You can also specify field titles. There is an option available that allows you to print all the records in the file.

## **SPECIAL FEATURES**

The program has many special features. There is an option that lets you display the file directory, which consists of the first field of all records in the file. A separate program is available for creating a sequential file of your data file so that you may merge it with a word processor text file. It also allows you to direct output to the screen if you do not want to get a printout of your records.

## **SUMMARY**

The Inquire Pac is an easy to use DBMS. It does, however, present serious limitations to those who need to keep large files containing more than a few hundred records (they would have to create multiple files).

**Filing Assistant** **\$125.00 Diskette**  
**Rainbow Computer Corporation**

**GENERAL CRITERIA**

- C Overall rating
- C Price vs Performance
- B Ease of use
- A Vendor support
- C Documentation
- B Error handling

**FEATURES**

- \* Records/ File
- 254 Chars/ Record
- 25 Fields/ Record
- 40 Chars/ Field

**FEATURES**

- + Menu-driven
- + On screen prompts
- Help screen
- + Browse
- + Editing
- + Sorts
- + Search
- + Add fields
- + Print reports
- Calculator
- + Use of Fcn. keys
- + Word processor interface
- + Security

**SPECIFIC CRITERIA**

- B Start-up options
- B File structure/ specs
- B Advanced data handling
- C Report generator

**DESCRIPTION**

Database management system.

**START-UP OPTIONS**

The program is menu-driven. You can select for printer configuration from the main menu. You can specify the printer device number, the secondary address, line feed requirement, and whether or not you have an ASCII-type printer. The automatic printer setup option is also available for printers like the Commodore 1525/1526, Commodore 2022/4022, Spinwriter, Epson MX series, or any other RS-232 interfaced printer.

You can also alter screen colors to get the most pleasant contrast between background and text colors.

The program does not support any DOS commands/functions, and it is advised that you format and initialize a diskette before you load and execute the database program.

**FILE STRUCTURE AND SPECIFICATIONS**

The Filing Assistant uses random access files for data storage. You may enter as many records in a file as the disk space allows. Each record allows a maximum of 254 characters and 25 fields. The length of each field is limited to a maximum of 40 characters.

## ADVANCED DATA HANDLING

The program sorts records by the key field, as they are added. You are allowed to sort up to ten fields. The Change/Update selection allows you to copy, delete, add, and browse through records. A search facility is available through the FIND command. No calculation features are mentioned in the documentation.

## REPORT GENERATOR

In order to print a list or form of the records in the database, you have to load a program called the "Report Generator." The program lets you define the page length, page width, headers, footers, and title of each column. The limitation of the Report Generator program is that it allows you to print the fields of each record only in a columnar format. For mailing business correspondence, a separate program is provided so that you can print your records in the form of mailing labels.

## SUMMARY

The most annoying experience in using the program is its slowness and complexity. The Writer's Assistant is actually a collection of many BASIC programs. Each program performs a specific function, and it has to be automatically loaded every time you wish to access that specific function. This adds to the complexity of the program and makes the whole process very time consuming. Because most of us only have a single disk drive, and because the Commodore 1541 disk drives are notorious for lack of speed, the idea of loading and reloading programs while trying to perform a certain operation, like printing a few records or editing a file, almost makes the old card catalog more desirable.

<b>Infobase 64</b>		<b>\$59.95 Diskette</b>
<b>Cisco Technology</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	1000/500 Records/ File	+ Menu-driven
C Price vs Performance	256/128 Chars/ Record	+ On screen prompts
B Ease of use	40 Fields/ Record	- Help screen
A Vendor support	78 Chars/ Field	+ Browse
C Documentation		+ Editing
C Error handling		+ Sorts
		+ Search
		+ Add fields
		+ Print reports
		- Calculator
		+ Use of Fcn. keys
		Word processor interface
		- Security
<b>SPECIFIC CRITERIA</b>		
C Start-up options		
B File structure/ specs		
B Advanced data handling		
C Report generator		

## DESCRIPTION

Infobase is a database management system.

## START-UP OPTIONS

The program is menu-driven. You may create a file, print reports, mailing labels, etc., from the main menu. The program does not support any DOS commands and functions although the facility is provided for you to format your data diskette. There is no facility available to setup the program for any particular printer. We assume that the program works with any properly interfaced printer.

## FILE STRUCTURE AND SPECIFICATIONS

The program uses random access files for data storage. It allows you to store up to 1,000 records on a disk, provided each record is less than 128 characters. If the record size is between 128 and 256 characters, then you can only store a maximum of 500 records on a data disk. There are 40 fields allowed per record and 78 characters per field. The program offers a special routine that allows you to add up to five more fields to your records once you have created a file and have added records to it.

## ADVANCED DATA HANDLING

You may specify up to four key fields per file. These key fields are used by the program to sort your data for quick access and printing. The limitation of the sort feature of the program is that you can only have your data sorted

alphabetically. You cannot sort numbers such as dates, prices, inventory numbers, etc. The search feature of the program uses the predefined key fields to search your database. The limitation is that you have to specify each one of the keyfields in order to search the record. You cannot search by any field in the file. The remarkable feature of the search routine is that it overcomes misspelled words when you enter the key fields. Usually, it will find the record that you were looking even if you misspelled all the field entries.

No calculator functions are available in the program.

### **REPORT GENERATOR**

This is the weakest part of the program. You can print only columnar reports (fields placed across the page in columns) according to the documentation. A separate program is available for printing mailing labels and may be useful in creating some other types of reports. We evaluated this program using the Gemini 10x printer, and we were unable to get a satisfactory printout of the records. The report generator program failed to separate field entries in the columns. We did succeed in getting the mailing labels generator to function as described in the program. The format for creating mailing labels is relatively easy and seemed to work well.

### **SUMMARY**

The Infobase 64 has two serious drawbacks in design and implementation. The first has to do with poor error handling. Our experience with the program was contrary to the claim by the manufacturer that the program is "very resistant to crashes." The program either caused a system crash or it aborted when incorrect entries were made. The second drawback was the poor performance of the Report Generator program. We could not get a satisfactory printout of the report.

<b>Infomast Rabbit Software</b>		<b>\$149.00 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	669 Records/ File	- Menu-driven
C Price vs Performance	254 Chars/ Record	+ On screen prompts
B Ease of use	31 Fields/ Record	+ Help screen
B Vendor support	38 Chars/ Field	+ Browse
B Documentation		+ Editing
B Error handling		+ Sorts
		+ Search
<b>SPECIFIC CRITERIA</b>		- Add fields
C Start-up options		- Print reports
B File structure/ specs		+ Calculator
B Advanced data handling		- Use of Fcn. keys
D Report generator		+ Word processor interface
		+ Security

### DESCRIPTION

Database management system with an integral word processor and a programmable calculator.

### START-UP OPTIONS

The program lacks a main menu. It does have two help screens that let you review the symbols of the function commands that you need to type in on the command line. No printer setup is required, and we assume that it will work on any properly interfaced parallel printer (it worked on our Gemini 10x) as well as the Commodore 1525/1526 printers. DOS commands are not available in the program and the system automatically formats two diskettes everytime you create a new file (a data disk and a work disk).

### FILE STRUCTURE AND SPECIFICATIONS

The program uses random access files to store data. Two diskettes are used for this purpose. The work disk keeps track of record structure, where the records are stored on the data disk, the key field for each record, and all the relevant files created by the program. The data disk holds the actual information that you typed into your database. The program allows a maximum of 669 records per file. Each record may contain up to 254 characters (including field labels) and a maximum of 31 fields. Each field can hold a maximum of 38 characters. Fields may be specified as alphabetic, numeric, or date (which has a default value of 7 characters). The key field is defined at the time of creating the file

and only one key field is allowed per record. An option is available to change the key field.

### **ADVANCED DATA HANDLING**

The search option lets you search for a specific record by partial string, full string, or multiple fields. You can also print the records retrieved via this option. The sort feature will sort the key field either numerically or alphabetically. If you want to sort your records by an alternate field, then you have to change the key field to the alternate field. The program has an excellent calculator feature that will let you perform calculations on specified records. This feature is considered in detail in the Special Features section.

### **REPORT GENERATOR**

This is the weakest part of the program. Records can be printed only one at a time by using the screen copy function (which dumps the screen onto the printer). In order for you to get a printout of a few select records, you have to display these records one at a time on the screen by using the search option and then direct the output to the printer. The copy screen function will print any number of screen lines specified (1-19).

### **SPECIAL FEATURES**

The advanced programmable calculator that interfaces with the database is the most outstanding feature of this program. You can either use the calculator independently to perform some calculations or you can retrieve numeric data from your records and perform calculations on that data. The calculator has 26 memory locations to store variables. Its interface with your database file allows free flow of data between the calculator program and your database. The results of your calculations on specific data elements of your records can be transferred by the calculator to any field in the record. This way you can use the database like a spreadsheet. The programmable mode of the calculator lets you program up to 99 steps of calculations and save them for future use. Another feature worth mentioning is the password protection optionally available that allows you to restrict access to the database to selected people in your organization.

### **SUMMARY**

Infomast offers special features such as a built-in programmable calculator and word processor. However, it lacks many advanced functions found in other DBMS programs (such as a report generator program).

**Keyword Cross Reference  
Totl Software****\$39.00 Diskette****GENERAL CRITERIA**

- C Overall rating
- C Price vs Performance
- B Ease of use
- A Vendor support
- B Documentation
- C Error handling

**FEATURES**

- 9999 Records/  
File
- \* Chars/  
Record
- \* Fields/  
Record
- 255 Chars/  
Field

**FEATURES**

- + Menu-driven
- + On screen prompts
- Help screen
- + Browse
- + Editing
- Sorts
- + Search
- Add fields
- + Print reports
- Calculator
- Use of Fcn. keys
- Word processor interface
- Security

**SPECIFIC CRITERIA**

- C Start-up options
- C File structure/  
specs
- C Advanced data  
handling
- B Report  
generator

**DESCRIPTION**

Keyword Cross Reference (Research Assistant) is a filing system specifically designed to handle bibliography records. It consists of two programs: RA.Build, which builds your data file; and RA.Xref.Build, which builds the cross-reference.

**START-UP OPTIONS**

The program is menu-driven. It is configured for the Commodore 1525E printer but you may make modifications in the program to run it on any other printer (including RS-232 interfaced printers).

The program does not support any DOS commands and functions.

**FILE STRUCTURE AND SPECIFICATIONS**

The RA. Build uses sequential files to store your data. Data can only be accessed in the sequence that it was stored. This severely limits the time efficiency of the program, since all the operations are extremely slow and tedious when you are working with sequential files and Commodore disk drives.

The record structure is predefined in the program. Each record is identified by a number (source number) and you may have up to 9,999 records per file. A record can be thought of as a book or a journal article. Each record is further subdivided into fields: Author, Title, Bibliography, and References (you may have as many as 9,999 references per source). A reference can be an abstract or notes on the article. Each reference is subdivided into page number, comments (1,024 characters), keywords (10 keywords allowed), and dates

(From, To dates). Keywords and dates are used by the RA.Xref.Build program to search for specified records and build cross-reference files.

### **ADVANCED DATA HANDLING**

The RA.Xref.Build is the program that builds cross-reference files of your data. Keywords and dates are used for cross-referencing, sorting, and searching the data. (Sorting applies to keywords only.) You may set up to 20 date periods for building the cross-reference table. The cross-reference file is built in the memory so there is a limit to the number of files you can reference via this function. During the execution of the cross-reference function, the program asks you for date period and keywords. Once they are entered, a search is made through the file and the numbers of the matching source and references are displayed on the screen. It is up to you to go back to those sources to examine the contents of the records.

### **REPORT GENERATOR**

The format of the report generator is also predefined. The program prints the whole file in the sequence that it was entered every time you want to print a report. You cannot print sections of the file in the order that you would like. Unless you have just a few records in your file, the time it takes to print a file is too long. There is also a facility available to print the cross-reference file which will print each keyword that you specify during the search, the ID number of all of the sources and references associated with that keyword, and the date period specified for that keyword.

### **DRAWBACKS**

The serious drawback of this program is the file structure (use of sequential files) that it uses to store your data. Consider the idea of having a few hundred entries in a reference file, which is not uncommon for graduate students working on their thesis or professionals who have an extensive library of journals. Every time you wish to update the file (change or add an entry), you have to first create another file on disk, save all the preexisting records in that file, add the new entry, and save that entry. This could take hours of your time. The same is true each time you want to print a file. The program has no capability to print selected records. You have to find something else to do while the program loads each source (or record) from a disk and sends it to the printer. Even with a fast dot-matrix printer, this operation takes a lot of time.

### **SUMMARY**

The program is designed for a specific application (bibliography). It has special usefulness for students who spend a great deal of time building 3X5 card index files. However, since its design is primitive and implementation is very inefficient and time consuming compared to other sophisticated DBMSs, unless you want this program for writing term papers and articles that do not require an extensive bibliography, you should consider a good DBMS that has more sophisticated file handling features. For a little more money, you will be able to use a DBMS program for many more things than just bibliographies.

**Master Grades Program  
Midwest Software**
**\$39.50 Diskette**
**GENERAL CRITERIA**

- B Overall rating
- B Price vs Performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**SPECIFIC CRITERIA**

- B Start-up options
- B File structure/specs
- C Advanced data handling
- B Report generator

**FEATURES**

- \* Records/File
- \* Chars/Record
- \* Fields/Record
- \* Chars/Field

**FEATURES**

- + Menu-driven
- + On screen prompts
- Help screen
- + Browse
- + Editing
- + Sorts
- + Search
- Add fields
- + Print reports
- Calculator
- Use of Fcn. keys
- Word processor interface
- Security

## DESCRIPTION

The Master Grades Program is specifically designed for teachers to help them maintain records of students' attendance and grades.

## START-UP OPTIONS

The program is menu-driven. You may select options such as entering student names, grades, and attendance, and printouts of student reports from the main menu. A sample file is included on the system diskette to demonstrate the features of the Master Grades Program.

## FILE STRUCTURE AND SPECIFICATIONS

The structure of the file and the records is predefined to incorporate student grades and attendance records. The program prompts for the required information such as the class, subject, and student names, and the file is automatically created by the program as you input the data.

## ADVANCED DATA HANDLING

The student records may be edited by selecting the appropriate option from the main menu. The program will sort student records for a printout by last name or by percent score. A search feature is also available that will let you search the records of a particular student if you want to update that student's records.

## REPORT GENERATOR

There are a number of print options available in the program. You can print the class records on the screen or printer and the program will sort them by name or percent grade. The program will display on the screen the name of the student, attendance, total points, possible points, and average and letter grades. You can also custom print progress reports for each student or a report card of all students in a class.

## SUMMARY

The Master Grades Program is a filing system designed for a specific application. It is easy to use and very user-friendly, written for those who are inexperienced with computers.

<b>M'File</b>		<b>\$109.95 Diskette</b>	
<b>M'Soft Inc.</b>			
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>	
B Overall rating	1000/500 Records/	+ Menu-driven	
A Price vs Performance	250/125 Chars/	+ On screen prompts	
A Ease of use	Record	- Help screen	
A Vendor support	32 Fields/	+ Browse	
B Documentation	Record	+ Editing	
A Error handling	78 Chars/	+ Sorts	
	Field	+ Search	
<b>SPECIFIC CRITERIA</b>		+ Add fields	
B Start-up options		+ Print reports	
B File structure/specs		+ Calculator	
A Advanced data handling		+ Use of Fcn. keys	
B Report generator		+ Word processor interface	
		- Security	

## DESCRIPTION

Database management system

### START-UP OPTIONS

The program is menu-driven. Printer setup is not required and the program works well with the Commodore 1525/1526 printers as well as any of the parallel printers (properly interfaced). You may select screen text/background colors to get the most visually pleasant combination. DOS commands are not available in the program. It does however, format a disk every time you create a new file. M'File automatically recognizes its data files so you do not have to keep track of file names etc. The system will prompt you with the appropriate message (e.g, "Insert data disk") when it wants to read your file.

### FILE STRUCTURE AND SPECIFICATIONS

The program uses random access files to store your data. One disk is used for each database. If, however, you want to store more records than the available space allows on your diskette, then you can split your file onto two data disks. You can store a maximum of 500 records in a file if the record size is greater than 250 characters, or 1,000 records if each record holds less than 125 characters. The program will allow you to create as many fields as it will take to fill the record size (32 fields per record), and you can only store a maximum of 78 characters in each field. A special feature that is available in this DBMS is the ability to add fields to a preexisting file. You can add a field to a file as long as you do not exceed the block size (125 or 250 characters).

## ADVANCED DATA HANDLING

The Search mode will allow you to access records by field values, and you may use as many search parameters as there are fields. Fast searches are performed in the program by using the key field as the primary search field. You can also use non-key fields to perform searches, and the program will search a specified range of records at the rate of approximately 2 seconds per record. The sort function is accessed by loading another program from the system diskette. This program sorts your records by the key field, saves the sort index on the data disk, and resets the system. Once your file is sorted, you can reload the main program and execute it for other functions. A calculator function is also available in the program. M'File can accommodate up to 10 user-defined formulas. The formulas are only applicable to numeric fields. You can use BASIC's numeric operators in the formulas.

## REPORT GENERATOR

The report generator is an excellent feature of the program. You can custom design your report by printing selected or all fields in each record in any order. You can also print titles for each field either at the top of each page or with each record. Linefeeds may be placed between fields to create mailing labels. The program also allows you to send control characters (ASCII codes) to your printer for accessing alternate character fonts and other special print functions.

## SPECIAL FEATURES

The versatility of this DBMS is greatly enhanced by a "text merge" program available on the system diskette which allows you to merge your database records with a number of commercially available word processors like Easy-script, Wordpro, Quick Brown Fox, Script 64, Totl.Text, Busiwriter, Paperclip, and many others.

A screen dump feature is also available to let you print the screen at any time during file entering/editing. This feature is independent of the report generator program and is useful when you want a quick printout of the screen.

## SUMMARY

M'File is a good quality DBMS that offers most advanced features to allow efficient use. It is relatively easy to learn and a good choice if your application does not require complex data organization and management.

**Mini Jini**  
**Jini Micro Systems**
**\$89.95 Cartridge**
**GENERAL CRITERIA**

- B Overall rating
- B Price vs Performance
- B Ease of use
- A Vendor support
- B Documentation
- A Error handling

**FEATURES**

- \* Records/ File
- \* Chars/ Record
- 10 Fields/ Record
- 75 Chars/ Field

**FEATURES**

- + Menu-driven
- + On screen prompts
- Help screen
- + Browse
- + Editing
- + Sorts
- + Search
- Add fields
- + Print reports
- + Calculator
- + Use of Fcn. keys
- + Word processor interface
- Security

**SPECIFIC CRITERIA**

- B Start-up options
- C File structure/ specs
- B Advanced data handling
- B Report generator

## DESCRIPTION

A cartridge-based database management system.

## START-UP OPTIONS

The program is menu-driven. You can alter screen colors using the function keys. DOS commands are available from the main menu. You can format your new data diskette, list the disk directory, erase files from disk and initialize your data diskette using the DOS commands.

## FILE STRUCTURE AND SPECIFICATIONS

Mini Jini uses sequential files to store your data. This limits the size and number of records that you can have per file since all manipulations on sequential files, such as sorting and searching, are performed in the main memory (i.e., the whole file has to be loaded into main memory before you can perform any operations on it). You can have up to 750 characters per record, ten fields per record and a maximum of 78 characters per field.

## ADVANCED DATA HANDLING

You can browse through a file using the LOOK command. A Search facility is also available through the main menu. Search may be performed for character strings in a specific field or throughout the whole record. A sort feature is also available for any single field specified. Since the whole file is memory-resident, you may sort it as many times as you want by specifying the number of the

field you want to sort. You can also perform limited calculations on the numeric data fields in the file. Calculations may be performed on a field or between two fields.

### **REPORT GENERATOR**

There are a number of options available for printing the records in a file. You can print records individually as they appear on the screen (while searching) or all the records in a file in sequence. The records may be printed in a label format (mailing labels), in a report format (you specify the fields and the order of each field), or you can also write the whole file as it exists on the printer. Since you can only enter data in upper case, all the printouts are also in upper case.

You can send control codes to your printer through the program (F4 key) if you want to access special functions and character fonts available with your printer.

### **SUMMARY**

Mini Jini is an easy to use database management program with many commendable features. It lacks the sophistication of a professional-quality DBMS and is recommended for those who have relatively smaller lists and files to maintain.

<b>Powerfile City Software</b>		<b>\$130.00 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	* Records/ File	+ Menu-driven
C Price vs Performance	254 Chars/ Record	+ On screen prompts
C Ease of use	20 Fields/ Record	- Help screen
B Vendor support	79 Chars/ Field	+ Browse
B Documentation		+ Editing
C Error handling		+ Sorts
		+ Search
<b>SPECIFIC CRITERIA</b>		+ Add fields
B Start-up options		+ Print reports
C File structure/ specs		+ Calculator
C Advanced data handling		+ Use of Fcn. keys
C Report generator		+ Word processor interface
		- Security

### DESCRIPTION

Database management system.

### START-UP OPTIONS

The Powerfile is a collection of BASIC programs, each of which performs a specified function of the DBMS. The programs are selected via the main menu by functions. You can alter screen background/text colors, backup diskettes, create work disks (on which you will store your database), or run a tutorial program designed to help you through the use of examples to understand the functions and features of this DBMS.

### FILE STRUCTURE AND SPECIFICATIONS

The program uses random access files to store your data. Sequential files are created to keep track of record structure, field labels, field positions, etc. The number of records that you can create in a file depends primarily on the available space on your data disk. Other influencing factors are the size of each record and whether you are using one or two disk drives. Each record will hold up to 254 characters. There are up to 20 fields allowed per record and a maximum of 79 characters per field.

### ADVANCED DATA HANDLING

When creating a file, the program lets you set up keys for each file. A key here refers to the way you would like to see your file ordered. You may use more than one field for each key and the program will sort your file in a specific

order by the fields in the key. This is the only time that the option of defining keys is available to you in this program. You do not have the flexibility of deciding at a later date as to how you would like to order your file (to get a printout or just to view it on the screen). The search facility is available to you in the direct File Maintenance mode of the program. You can search for specific records by specifying field contents. You may also select specific records for the purpose of creating reports. The selection criteria may be defined by using numeric operators (LE., GE., EQ.) and pattern matching (? for wild character and \* for wild ending). The program also allows you to make changes in the numeric data fields by specifying a formula. The program performs calculations based upon the formulas and changes the specified fields in the file.

### **REPORT GENERATOR**

The report generator is a program that lets you create your own reports of the data in a specific file. The reports, however, can only be columnar; i.e., you can only place the fields horizontally. This may be useful if you want to create a database consisting of an inventory of stock items, but you will be handicapped if you want to create multiple databases for other purposes; e.g., bibliographies, patient records, personnel records, etc. There is help available in another program called "Mail Labels" which allows you to print your data fields (mailing addresses) on different lines to create mailing labels. Within the Report Writer program, you are allowed to specify headers, number of columns (for the fields), make descriptions of columns (in what order you would like your fields printed), and also select certain records by specifying your selection criteria. Calculations may also be performed while in the Report Writer mode. The program allows up to 20 calculation per record. In addition to the formulas that you specify, you can also instruct the program to calculate subtotals and totals of numeric data fields at the end of each column. No special features are available in the program to configure your printer. It is assumed that the program will work with any properly interfaced parallel printer as well as the Commodore 1525/1526 printers. You can send control codes to your printer if you want to access special print functions.

### **SPECIAL FEATURES**

The program allows you to restructure your database file by creating a sequential file of the database. You can add fields, change fields, or change the size of the records. This facility adds a great deal of flexibility to the use of this program. You can also merge the database to a word processor by creating sequential files. Another special feature of the program is batch entry. When your file gets large, any further additions of records are made by first creating a sequential file and adding all new records to that file. Once you are through adding records, the program will automatically merge the sequential file with the random access file that contains your database. This is designed to make data entry more time efficient. As previously mentioned, at the time of creating a new file you are asked to define keys for the file. The program constantly

updates all records in the order that is specified in the keys, and it maintains the order by all keys at all times. This eliminates the need to perform time-consuming operations every time you want the file sorted in a certain way.

### **SUMMARY**

The most annoying experience in using the program is its slowness and complexity. The Powerfile is actually a collection of many small BASIC programs. Each program performs a specific function, and it is automatically loaded every time you wish to access that specific function. This adds to the complexity of the program and makes the whole process very time consuming. Because most of us only have a single disk drive and because the Commodore 1541 disk drives are notorious for lack of speed, the idea of loading and reloading programs while trying to perform a certain operation (like printing a few records or editing a file) almost makes the old card catalog more desirable. The Powerfile no doubt has some very special and advanced features which have been discussed in some detail in the specific sections above. However, the program design is far too complex, the implementation too slow, and the price too high for us to recommend this database.

<b>Superbase 64</b>		<b>\$99.00 Diskette</b>
<b>Precision Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	* Records/	+ Menu-driven
A Price vs	File	+ On screen
Performance	1108 Chars/	prompts
B Ease of use	Record	+ Help-screen
A Vendor support	127 Fields/	+ Browse
B Documentation	Record	+ Editing
A Error handling	255 Chars/	+ Sorts
	Field	+ Search
<b>SPECIFIC CRITERIA</b>		+ Add fields
A Start-up options		+ Print reports
A File structure/ specs		+ Calculator
A Advanced data handling		+ Use of Fcn. keys
A Report generator		- Word processor interface
		- Security

## DESCRIPTION

Superbase is a true advanced database management system for the Commodore 64.

## START-UP OPTIONS

Superbase is user-friendly. It uses the main menu as a means of access to its most commonly used options. It also has prompts at various stages of DBMS operation that identify the particular mode that you are in (such as entry mode) as well as any actions that you are required to perform (such as insert master disk drive). A help screen is available through the main menu that describes the desired command. The special Commodore function keys are used throughout the program to facilitate entering of key words and commands for accessing its functions.

DOS system commands are also accessible in the program via the Maintain option. Through this option, you can format diskettes, create backups of data disks and files, scratch and rename files. Printer setup is performed in the Output mode.

## FILE STRUCTURE AND SPECIFICATIONS

One of the most outstanding features of Superbase is its ability to use up to 15 files for a database. Most other DBMSs reviewed in this book are only capable of one file per database. Superbase maintains a directory of files in current memory and although you can only work with one file at a time, having related (and easily accessible) files in memory is a very useful feature. You can switch from one file to another as well as load files from disk without destroying the

previous files in memory. Special commands allow you to move information from one file to another within a database.

Each file may have an unlimited number of records (i.e., limited only by the available disk space). Each record is limited to 1108 characters in size in a maximum of 127 fields. Text fields can hold up to 255 characters. Numeric fields may not be larger than 9 characters (up to 4 spaces allowed after decimal point). Date and constant fields are treated separately. The date field may be 7 or 11 characters and a constant field may be maximum 30 characters.

Superbase provides the facility to add more fields or alter the format of an existing file. In fact, it offers four screens that may be used for storing large record structures.

### **ADVANCED DATA HANDLING**

Superbase has excellent pattern matching capabilities. You can specify partial or full string data for any field or fields, and it will display all records that meet that criteria. You may specify text strings for pattern matching anywhere within a field as well as field-independent matches which will look for the string in all subsequent fields including the one in which the criterion is entered. AND/OR (& /) operators may also be used, when specifying pattern matching.

Numeric calculations are also available in Superbase. In the Calc mode you may use any of BASIC's normal arithmetic operators to perform numeric computations on specific fields. These computations may be performed on an individual record, multiple records, or all records in the file. Superbase will automatically perform the desired computation on all records specified via its batch processing function.

The sort feature can process a specified number of records in a file. Superbase keeps all records in a file sorted alphabetically according to the contents of the KEY field of each record. A sort on other fields within the record may be performed using the sort function.

### **REPORT GENERATOR**

Superbase comes with a well developed report generator program that will output data to the screen or the printer. You may output the records either across (laid out horizontally) or down (like in a crossword puzzle). You may also specify the row and column in which you want a specific field to be placed. Other cosmetic details for a more comprehensible printout include the facility to truncate trailing spaces, formatting numeric data to the desired decimal point, and adding extra text with the information from records. When creating reports, you may specify numeric computations on desired fields, report titles, and break points at which you are required to enter some information before the report generation resumes. Report generation may also be saved on disk for future use.

A screen dump utility is also available if you want to print the screen at any stage during data entry.

## SPECIAL FEATURES

Superbase is one of the most advanced information management systems for the Commodore 64. As such, it is filled with special features that enhance its usefulness in many applications. Independent of the files of records, Superbase allows you to create memo screens for each record that holds any notes that you would like to enter with that record. These notes may be about a client, if you are working with your mailing list file, or about an account you are managing. The memo screens consist of a whole screen of text and they may be recalled at any instant for quick access. In fact, the help screens available in the program are also memo screens which may be redesigned to fit your personal needs.

Although Superbase has two main menus from which you may select the various options and functions, it also allows you to bypass these menus by entering commands directly on the command line. The syntax of command line is described in the manual for advanced users who wish to enter complex commands.

For advanced users, the PROG option allows Superbase to be used as a powerful applications generator. Programs may be designed to automate complex sequences of Superbase operations which can then be executed with just one key (the Execute key). Programs also allow you to link files within a database and update a file using information from another.

## SUMMARY

Superbase is far more sophisticated than most DBMSs reviewed in this book. It is not for collecting recipes or mailing lists for sending Christmas cards. For any other sophisticated information organization such as maintaining bibliographies for your thesis, customer inventory/record files, personnel files, etc. it is the best DBMS we have encountered. It is well worth the price and the time it will take to master.

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**Worksheet for Information Organization—Database  
Management Systems**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

- Overall rating
- Price vs Performance
- Ease of use
- Vendor support
- Documentation
- Error handling

**FEATURES**

- Records/File
- Chars/Record
- Fields/Record
- Chars/ Field

**FEATURES**

- Menu-driven
- On screen prompts
- Help screen
- Browse
- Editing
- Sorts
- Search
- Add fields
- Print reports
- Calculator
- Use of Fcn. keys
- Word processor interface
- Security

**SPECIFIC CRITERIA**

- Start-up options
- File structure/specs
- Advanced data handling
- Report generator

*Description*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Start-up Options*—\_\_\_\_\_

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\_\_\_\_\_

*File Structure and Specifications*—\_\_\_\_\_

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*Advanced Data Handling*—

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*Report Generator*—

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*Special Features*—

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*Summary*—

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**COMPARISON CHART**


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**PROGRAM NAME****RATINGS FOR CRITERIA**

	OVERALL RATING	PRICE VS PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	START-UP OPTIONS	FILE STRUCTURE/SPECS	ADVANCED DATA HANDLING	REPORT GENERATOR
CLASS MANAGER II	B	B	A	A	B	A	B	B	B	B
DATA MANAGER	C	C	B	A	B	B	B	C	C	B
DATA MANAGER	C	B	A	A	B	A	C	C	C	D
DATABASE MANAGER	B	B	A	A	A	A	B	A	A	C
DATABASE MANAGER	C	C	B	A	B	B	B	C	C	C
DATALOG	C	C	B	B	C	D	C	C	D	D
DELPHI'S ORACLE	A	A	B	A	B	A	B	A	A	A
EASY MAIL	B	B	A	B	C	B	B	B	C	B
FILE ORGANIZER	C	B	B	A	C	B	B	B	C	C
FILE PAC/ INQUIRE PAC	B	B	B	A	B	B	B	B	B	B
FILING ASSISTANT	C	C	B	A	C	B	B	B	B	C
INFOBASE 64	C	C	B	A	C	C	C	B	B	C
INFOMAST	C	C	B	B	B	B	C	B	B	D
KEYWORD CROSSREFERENCE	C	C	B	A	B	C	C	C	C	B
MASTER GRADES PROGRAM	B	B	A	A	B	A	B	B	C	B
M'FILE	B	A	A	A	B	A	B	B	A	B
MINI JINI	B	B	B	A	B	A	B	C	B	B
POWERFILE	C	C	C	B	B	C	B	C	C	C
SUPERBASE 64	A	A	B	A	B	A	A	A	A	A



<b>PROGRAM NAME</b>	<b>RATINGS FOR FEATURES</b>				<b>PRICE</b>
	<b>RECORDS/ FILE</b>	<b>CHARS/ RECORD</b>	<b>FIELDS/ RECORD</b>	<b>CHARS/ FIELD</b>	
CLASS MANAGER II	*	*	*	*	\$95.00
DATA MANAGER	1200/600	125/255	18	24	\$95.00
DATA MANAGER	*	240	*	*	\$24.95
DATABASE MANAGER	65535	20000	200	250	\$99.95
DATABASE MANAGER	*	254	*	*	\$50.00
DATALOG	1000	250	12	35	\$39.95
DELPHI'S ORACLE	*	70000	99	860	\$150.00
EASY MAIL	700	160	6	*	\$29.95
FILE ORGANIZER	*	*	10	*	\$29.95
FILE PAC/INQUIRY PAC200		256	15	256	\$69.95
FILING ASSISTANT	*	254	25	40	\$125.00
INFOBASE 64	1000/500	256/128	40	78	\$59.95
INFOMOST	669	254	31	38	\$149.00
KEYWORD					
CROSSREFERENCE	9999	*	*	255	\$39.00
MASTER GRADES					
PROGRAM	*	*	*	*	\$39.50
M'FILE	100/500	250/125	32	78	\$109.95
MINI JINI	*	750	10	75	\$89.95
POWERFILE	*	254	20	79	\$130.00
SUPERBASE	*	1108	127	255	\$99.00

# 6

# COMMUNICATIONS

## INTRODUCTION

Telecomputing is simply the process of two or more computers communicating through telephone lines. The process is actually rather simple, requiring a special device called a modem that connects a computer with a telephone and some special software that usually accompanies the modem. There are a number of modems that will work with your Commodore 64 including the Vicmodem 1600 which retails for less than \$100. A modem will open up a whole new world of opportunities. There are commercial systems involving very sophisticated computers that allow you to connect to them to obtain specialized information. One service, the Dow Jones News Retrieval Service, allows you to obtain stock market information. You key in a stock symbol on your Commodore 64 and receive up-to-the-minute financial news on that stock, current financial disclosure on the company, and current trading prices. Another system, The Source, allows you to search through catalogs that appear on your screen and actually select and order products from the catalog. Dialog, a California-based system, offers over 7 million articles, reports, and books on virtually any technical topic. Of course you are going to have to pay for this information. Generally there is an initial fee when you set up an account with an information service. Then you will have to pay for the time that you are actually connected with the service. It can range from \$.05 cents a minute to \$5.00 a minute, depending on the type of information and the time of day you access the information.

There are over 2,000 commercially available information services or data banks in this country. These services have certain unique advantages over more traditional methods of researching information. First, they are extremely convenient, allowing you to access information from several sources from your own home. Second, they can save the expense of time and travel that are usually associated with obtaining information. And finally, the information provided is generally more current than that found in printed works.

Another application within the field of communications is electronic bulletin boards. Users of this service can connect as they would with a database. They can then enter their own messages, advertisements, or questions from their computer to be viewed by any other users of the system. Electronic bulletin boards are generally for a particular area and they are often centered around a particular interest. There are bulletin boards for Commodore 64 users where you can post questions about your computer. There are bulletin boards for

singles where you can find someone with interests similar to your own. Usually these bulletin boards are inexpensive or free to join.

One application in communications that is finding considerable use in business is electronic mail. Anyone who has tried to contact a busy executive or someone doing field work knows the frustration involved in transferring information. They are out when you call and when they return the call you are out. With an electronic mail service, you enter a message from your computer through the phone lines to someone else with a similar service. The other person can periodically check his electronic mail and return the call to your service leaving a similar message. It is possible to have one service which allows many people access to the same information. In this way information can be sent out to many people simultaneously.

All these applications require some specialized software. A program must be running in your Commodore 64 that will allow you to input information from your keyboard and send it through the modem to the receiving system. The same program must be able to receive information from a distant system and display it on your screen. The program must be compatible with the modem you are using and versatile enough to conform to standards of various data banks. For some applications you may want more from your software. If you want to be able to save information from another system for later viewing or printing, you are going to need some additional features. Electronic mail will require some additional software. Communications software will generally state specifically what modem and what applications it is intended for.

## ***Specific Criteria***

**CONFIGURABILITY**—If you have tried to purchase peripherals compatible with your computer, you have already learned that there are about as many different types of connections as there are devices. There are parallel and serial connections, and IEEE and RS-232 connectors. And devices used together must share the same handshaking protocol. Configurability refers to the flexibility of your software in making two systems or devices compatible. Your first concern is whether your software will actually work with your modem. We will identify which modems a package is compatible with.

When you attempt to access information from a database or bulletin board you must first make your computer compatible with another computer. Fortunately, some standards have been established, and any commercial system has gone to great efforts to make it easy for paying customers to connect their system. But there are some parameters that must be agreed upon between two computers before they can interact.

One parameter is the rate at which information is going to be sent. The baud rate refers to the number of bits per second that are transmitted to or from a system. A standard rate for personal computers connected to most data banks is 300 baud. But some modems and systems allow for a 1200 baud rate. You will need to be able to enter that information through your communications software prior to establishing contact with a system.

Some systems have an error detection system built into the computer and/or modem called "parity checking." The computer counts the first seven bits of a byte of information and determines if it is even or odd. If the system uses an even parity detection system, it will change the eighth bit to whatever is necessary to make the byte even. When a receiving system checks to make sure that the information sent was not accidentally changed in transmission, it checks to see if the byte is still even. If an error occurred, the receiving system will ask the sending system to repeat the transmission. Odd parity detection systems set the eighth bit to make the byte odd. Two systems must first agree on which, if any, error detection system is going to be used, and your communications software must be able to alter the parity.

Some systems insert an extra bit or two between bytes so that the receiving system knows where a word begins and ends. These start and stop bits must be agreed upon and entered through your software. Different computers may use a different number of bits to represent a word. Seven or eight bits are the most common. When you send information to a receiving computer, it will often return the same character to verify that it has received it. This mode of operation is called full duplex mode. In half duplex mode, the characters will not be echoed back. Again, you will want to set this information through your software in advance. Some software will also interact with your disk drive or printer. We will discuss the flexibility of configuration in this section as well.

**SPECIAL FEATURES**—With a bare bones communications package you can configure your computer to be compatible with another computer, you can send information from your keyboard to another computer, and you can receive across your screen information from another computer. There are a lot of other desirable features incorporated in some programs.

Information coming from another computer will fill your screen and then scroll out of sight along the top. It would be nice to be able to take that information as it comes in and save it to be viewed at a later time. This capability is referred to as downloading capability. Usually the information is saved in a buffer in the memory of the Commodore 64. The size of the buffer will limit the amount of information that can be saved at one time. It takes about a 4k buffer to save one page of print.

Once you have received the information you may want to save it to disk, send it to a printing device, or view it immediately. Normally you will send information to a receiving device by entering it from the keyboard. For your application you may be interested in sending an entire file of information previously entered. This uploading capability is found on some software.

Most databases require an initial sequence of entries to establish communications. In this logging-on phase you are prompted from the database with a question as to your account number. You enter your account number and then are prompted with a question requesting your Password. This entry is a secret entry known only to you and the other computer and prevents other people from using your account.

After entering your password you may be prompted with a question as to the specific information you are looking for. A handy feature in some programs

allows you to press a single key and have all of the log-on information sent automatically. In some programs you can save all the configuration information recorded automatically rather than having to reenter it each time you establish contact.

There are many other features that make communications more pleasant. Some programs allow you to change the colors on the screen to be visually more appealing. Some will scroll incoming text one pixel at a time rather than one line at a time. This smooth scrolling feature is easier to read. Any capability beyond the essential ones will be discussed in our review.

## **GLOSSARY**

**ACCESS DISK FUNCTION**—This feature allows you to temporarily leave the communications program that is running to interact with the disk drive. You may wish to temporarily quit receiving data from a database and get a listing of programs residing on the diskette. This feature would make that possible.

**ACOUSTIC COUPLER**—A device that allows a modem to physically connect with the hand set of a telephone and to transmit and receive information across telephone lines.

**AUTO ANSWER**—Modem answers phone when it rings and connects computer when carrier is detected.

**AUTO DIAL**—Modem generates signals to dial telephone.

**BAUD RATE**—This term refers to the rate at which information is transmitted between two devices serially. The rate is measured in bits per second. It is vital when communicating with another device that both devices agree on a baud rate. There is usually a maximum or set rate when using a modem. Standard baud rates are 300 and 1200.

**BBS**—Bulletin Board System.

**BELL 103**—This is a standard developed by Bell laboratories that sets fixed values for modems as they interact with telephone systems. The Commodore 64 can work with Bell 103 type modems. Bell 103 devices allow for full duplex transmissions up to 300 Baud.

**BUFFER**—A portion of the computer's memory set aside to store information until it can be processed.

**BUFFER SIZE**—If a program has a downloading capability, the amount of information that can be saved at one time is determined by the buffer size.

**CONVERTS PROGRAM FILE**—Some files for the Commodore 64 are stored on diskette as program files. In order to transmit these files through a modem they must first be converted to a sequential file. This feature indicates that capability.

**COMPUSERVE**—Subscription database providing financial services, electronic mail service, bulletin board, air travel, banking services, Commodore advice, and many other forms of information.

**DEFAULTS**—Preset values which work in most ordinary cases.

**DOWNLOADING**—This is the ability of a computer to take information as it is received through a modem and save it on disk for future use.

**DUPLEX**—When two devices are communicating with each other, the devices must agree as to duplex mode. In full duplex mode a transmitting device sends information to a receiving device which returns or “echos” the same characters back. In half duplex the receiving device does not echo the characters back.

**ECHO**—In full duplex mode a character sent from one device to another is returned to the sending device to be viewed across its screen.

**HANDSHAKING**—Regardless of how data is transferred between devices, a systematic process must be devised so that each device knows when to send and when to receive. A simple handshaking sequence might involve a transmitting device first warning the receiving device that it is about to send data by changing the voltage on a particular line connecting the two devices. When the receiving device senses the change in voltage and is ready to receive data, it may change the voltage on a second line to let the sending device know it is ready. The sending device could then send a character over a data line. The sending device might then let the receiving device know it is through sending the character by changing the voltage on still another line. This process that sets up and manages the transmission of data between two or more devices is known as handshaking.

**HARDWARE**—Physical equipment comprising a system.

**IMG-IMAGE**—Machine-specific file transmitted in hexadecimal. This type of file is used extensively on CompuServe.

**INTERFACE**—Connection between two systems.

**MACRO FILES**—Often a certain amount of dialogue occurs between a personal computer and a host computer before data can be obtained from a database. This initial dialogue called “logging on” may include a prompt from the database as to the type of computer logging on. The personal computer would then transmit a particular code. The host may then request an account code and a password. Some programs store all the initial response to log-on questions in a file. This macro file will automatically issue the correct responses and simplify logging on. Other frequently used sequences of commands are sometimes stored in other macro files.

**MENU-DRIVEN**—Many communications programs perform a number of operations such as the configuration of RS-232 parameters, or uploading and downloading of data. A menu-driven program presents the different operations of a program as a series of options on the screen. You simply select the option desired. Once an option has been selected there may be a second or third set of options to choose from. A menu-driven program greatly simplifies the use of the program.

**NETWORK**—A system consisting of the host and remote computers.

**PARITY**—When transmitting information between two devices there exists the possibility that some data may be unintentionally altered. This could be as a result of hardware malfunctions or interference in connecting lines or a number of other sources. If one bit was altered during the transmission of the

value \$6,000, it could be received as \$5,000. The use of parity is one method of confirming that the value sent is the one being received. If a system agrees on even parity, the eighth bit is changed to make the total number of one bits even. That is, if the sum of the first seven bits is even the eighth bit is 0, and if the sum of the first seven bits is odd the eighth bit is 1. The character is then sent after the appropriate changes have been made. At the receiving end, the one bits are counted. If the sum is an odd number, something was altered during transmission and the system will request that the character be sent again. Of course it is possible that two bits could be altered and the parity scheme would not catch the error. But the probability of such an event is extremely low. Parity can be even, odd, or ignored (none) and must be agreed upon between a sending and receiving device.

**PARALLEL CENTRONICS**—This is a standard for the parallel transmission of data between two devices. This standard is most often used in transmitting data to printing devices. It not only sets up the specific wiring and voltage requirements but also establishes a handshaking sequence to allow for the systematic transfer of data.

**PRINT DUMP**—This feature allows you to make a copy of whatever appears on the screen to the printer.

**PROTOCOL**—This is a computer communication convention for transferring data between a sender and receiver.

**PUNTER/CBM PROTOCOL**—A protocol developed to transfer BASIC program files without further conversion.

**RS-232**—One of the more popular standards for serial transmission of data between devices. The standard sets specific values for electrical signal characteristics, interface characteristics, and circuit configurations. Theoretically this means that, regardless of the vendor, any transmitting device conforming to RS-232 standards should work with any receiving device conforming to RS-232 standards. In actuality there are other parameters that must be agreed upon between the two devices for transmission to occur. These parameters include baud rate, stop bits, parity, duplex, word length, and type of coding. The Commodore 64 requires a special RS-232 interface to make the system RS-232 compatible.

**SAVE CONFIGURATION**—When using a communications program in conjunction with a modem certain parameters must be set before communication can take place. Parameters such as baud rate, parity, and duplex must be determined before communications can be made. A save configuration feature allows you to save all the vital configuration parameters in a file so that they can use the software immediately in the future.

**SMOOTH SCROLLING**—This feature moves the text received up on the screen one pixel at a time rather than one line at a time.

**SOFTWARE**—The programs that provide the instructions that make the system operate.

**STOP BITS**—In order to recognize the end of one byte and the beginning of the next, some computers require an additional bit called a start bit before the data bits, and/or a stop bit after the data bits. Again, these start or stop bits,

usually either one or two, must be agreed upon between transmitting and receiving devices.

**UPLOADING**—The ability of a computer to send an entire file of information through a modem to another computer.

**USER DEFINED KEYS**—In establishing contact with another computer it is often necessary to send the same information repetitively. A user-defined key allows you to program a special key to send the same information each time it is pressed.

**WORD LENGTH**—This refers to the number of bits used to represent a character. Some systems use seven rather than eight bits to represent a word, and there must be agreement between communicating devices.

<b>64 Term Commodore Business Machines</b>		<b>Included with VICModem</b>	
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>		<b>FEATURES</b>
D Overall rating	- Prints files		- Password
C Price/ Performance	- Commands menu		- Auto logon
A Ease of use	- Smooth scrolling	+	Options menu
B Vendor support	- User-defined keys	-	Uploading
D Documentation	- 80 column display	-	Downloading
B Error handling	- Clock and/or alarm	No	Buffer
	- Saves configuration		
	- Access disk functions		
<b>SPECIFIC CRITERIA</b>	- CompuServe "B" protocol		
C Configurability	- Seq. to Prg. conversion		
D Special Features			

## DESCRIPTION

This is the terminal software often provided with the Vicmodem. It supports only the most basic capabilities. An on-line accessible menu provides modification of parameters to allow communication with most bulletin board systems. You can choose the format mode, which moves words that cannot be completed on one line to the next line. This improves readability of the data on the screen.

## CONFIGURABILITY

Supports no peripherals other than the datasette used to load the program and the modem.

## SPECIAL FEATURES

This is a straightforward and easy-to-use software package, but it can be a bit confusing at first because documentation is not provided. The program is very similar to the one written for the Vic 20, but there are some differences. Color is changed by <CTRL> 1 for border color, <CTRL> 5 for character color, and <CTRL> 8 for screen color. Otherwise, function key assignments remain the same. It also has the ability to move words that break in the middle to the next line (format mode).

## SUMMARY

This is a functional, bare bones terminal software package that many purchasers of the Vicmodem will have access to. Its only notable features are that it is in machine language, that it has an on-line options menu, and that text can be automatically reformatted. Not allowing you to save or print information is a serious (fatal?) drawback.

<b>'64 Terminal Midwest Micro</b>		<b>\$29.95 Cassette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	- Prints files	- Password
C Price/ Performance	- Commands menu + Smooth scrolling	- Auto logon + Options menu
B Ease of use	- User-defined keys	- Uploading
B Vendor support	- 80 column display	+ Downloading
A Documentation	- Clock and/or alarm	24K Buffer
A Error handling	- Saves configuration	
	- Access disk functions	
<b>SPECIFIC CRITERIA</b>	- CompuServe "B" protocol	
C Configurability		
C Special Features	- Seq. to Prg. conversion	

**DESCRIPTION**

In addition to the basic terminal functions, '64 Terminal allows data to be captured in its 24K buffer and printed to either the screen or printer. The incoming data can also be formatted to remove extra spaces and lines.

**CONFIGURABILITY**

Limited to Commodore's printer configuration and datasette.

**SPECIAL FEATURES**

An easy program to operate. The inclusion of an overlay for the function keys is also helpful. Other features include a 24K buffer, ability to dump the buffer to the screen or printer, smooth scrolling, and a status line at the top of the screen.

**SUMMARY**

This is the next step up in sophistication from Commodore's 64 Term (which some consumers could confuse with Midwest Micro's '64 Terminal program due to the similarity in the names). It provides the capability of storing data in the buffer to be reviewed later either by printing it out on the printer or by displaying it on the screen. This saves time, and thus money, when connected to services like CompuServe or The Source. It does not allow saving the contents of the buffer to disk or tape, which is a serious drawback, especially considering its price.

**Smart 64 Terminal, The  
Microtechnic Solutions, Inc.**
**\$39.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	+ Prints files	+ Password
B Price/ Performance	- Commands menu	- Auto logon
B Ease of use	- Smooth scrolling	+ Options menu
? Vendor support	+ User-defined keys	+ Uploading
B Documentation	- 80 column display	+ Downloading
A Error handling	+ Clock and/or alarm	27K Buffer
	+ Saves configuration	
	+ Access disk functions	
<b>SPECIFIC CRITERIA</b>	- CompuServe "B" protocol	
B Configurability	+ Seq. to Prg. conversion	
A Special Features		

### DESCRIPTION

Most functions are accessible from within the program itself. Its approximately 27K buffer can be downloaded while still on-line, either automatically when the buffer is full or with a prompt (allowing the option of erasing the buffer). You can also download at any point without going off-line. Disk file type seq, pgm, and img are supported. An editor is provided to delete unwanted portions of files, such as separating text from img or prg files. The configuration that you select from the menus provided is saved on the user disk, speeding up future system start-ups.

### CONFIGURABILITY

Compatible with a wide variety of printers. The configuration for printer and screen are saved on the user disk. This requires a lot of shuffling between the program disk and user disk with a single disk drive.

### SPECIAL FEATURES

The menus provide adequate prompting, making this a fairly easy program to use (although some of the terminology used isn't as clear as it could be). Other features include prints of sequential files and/or screen to a printer, user-definable keys, uploading and downloading of files, converts sequential files to program files and vice versa, converts image files to program files and vice versa, disk functions accessible from within a program, 27K buffer, saves buffer to disk, screen and printer configuration saved on user disk, and file editor.

## SUMMARY

This is a full-featured terminal program that should fulfill the needs of most users. One limitation is that the menu does not prevent you from going off-line accidentally when using some of the support routines. No indication is given on the menu which routines are on-line and which are off-line functions. Also, there is no provision for creating sequential files for uploading text.

**Speedterm II  
Astral\*Image****\$29.95 Diskette****GENERAL CRITERIA**

- B Overall rating
- A Price/Performance
- B Ease of use
- B Vendor support
- B Documentation
- B Error handling

**SPECIFIC CRITERIA**

- B Configurability
- B Special Features

**FEATURES**

- + Prints files
- Commands menu
- Smooth scrolling
- User-defined keys
- 80 column display
- + Clock and/or alarm
- Saves configuration
- Access disk functions
- CompuServe "B" protocol
- + Seq. to Prg. conversion

**FEATURES**

- + Password
- Auto logon
- + Options menu
- + Uploading
- + Downloading
- 38K Buffer

**DESCRIPTION**

Speedterm II is a package of programs that provide a terminal emulator and support functions. The terminal program itself provides the necessary capabilities to communicate with most host computers. In addition, it can download data received to a 38K buffer, which can then be saved to disk after logging off. The disk files can then be converted to a program file or printed to the screen or printer. A text editing program is provided, allowing the creation and editing of sequential files for uploading. Programs can also be converted to image files, which may also be uploaded.

**CONFIGURABILITY**

Limited to standard Commodore configurations and addresses for peripherals.

**SPECIAL FEATURES**

Using the terminal is pretty straightforward, but using the support programs may take a little extra time to get used to. Other features include upload from and download to a 38K buffer, converts sequential files to program files and vice versa, converts image files to program files and vice versa, saves buffer to disk, prints sequential files to printer and/or screen, prints screen to printer, has assigned keys for ID/Password, clock for time on-line, off-line sequential file editor, and displays user-defined information at top of screen when program runs.

**SUMMARY**

This is a useful package of programs which supports the common requirements for communication with other computers. Its main limitation is that it is necessary to perform many of its more advanced functions off-line; e.g., saving the contents of the buffer to disk. This can prove inconvenient, especially during high-use times when it is difficult to get back on-line.

**SuPerTerm  
Midwest Micro**

**\$99.95 Diskette or Cassette**

**GENERAL CRITERIA**

- A Overall rating
- B Price/  
Performance
- C Ease of use
- A Vendor support
- B Documentation
- A Error handling

**FEATURES**

- + Prints files
- Commands menu
- + Smooth scrolling
- + User-defined keys
- + 80 column display
- + Clock and/or alarm
- + Saves configuration
- + Access disk functions
- CompuServe "B"  
protocol
- + Seq. to Prg.  
conversion

**FEATURES**

- Password
- Auto logon
- + Options menu
- + Uploading
- + Downloading

**SPECIFIC CRITERIA**

- A Configurability
- A Special Features

**DESCRIPTION**

SuPerTerm provides a buffer for uploading and downloading files. File transfers can be sent to the buffer or programs may be uploaded and downloaded directly to and from the disk using the Punter/CBM protocol. There are separate programs for converting image and sequential files into tokenized BASIC language programs and vice versa. Text can be edited or written on the text editor. In fact, the editor can function as a simple word processor. The screen width is definable as 40, 80, or 132 columns in both the terminal and editing modes. The screen is viewed by scrolling from side to side. A log-on buffer is provided which holds log-on routines that are created in the editing mode. This allows you to perform complete log-on routines by pressing a single key. Full printer capabilities are provided, allowing printing of the buffer and/or screen as well as a continuous display to the screen and printer at the same time. A parallel printer can be interfaced with a special piece of hardware (included) that plugs into the game port.

**CONFIGURABILITY**

Should be adaptable to a wide variety of printers, but if you want to use a parallel printer, Midwest Micro's Smart ASCII interface may be necessary for some of the models.

**SPECIAL FEATURES**

This is not a simple program to use, but with some practice it will become easier. Some of the other features are; full uploading and downloading capabilities, supports Punter/CBM protocol, user-defined x/off transmit protocol, converts sequence and image files to tokenized programs, a buffer, command line at bottom of the screen, screen up to 132 characters wide with side scrolling, prints out screen or buffer, provides hardcopy and displays text at

same time, supports both disk and tape, built-in telephone book, auto-logon buffer, and text editor.

### **SUMMARY**

This is the most comprehensive, as well as most expensive, terminal software package covered in these reviews. It has something for just about everybody. Its features allow you to utilize most systems, and the session's on-line flow is smooth since all the essential functions are contained within the program. This program isn't designed for the first-time user. For those already familiar with data communication, this software would be hard to beat.

**Vidtex  
CompuServe**

**\$39.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	+ Prints files	- Password
A Price/Performance	+ Commands menu	+ Auto logon
A Ease of use	- Smooth scrolling	+ Options menu
A Vendor support	+ User-defined keys	+ Uploading
B Documentation	- 80 column display	+ Downloading
A Error handling	- Clock and/or alarm	32K Buffer
	+ Saves configuration	
	+ Access disk functions	
<b>SPECIFIC CRITERIA</b>	- CompuServe "B" protocol	
A Configurability	+ Seq. to Prg. conversion	
A Special Features		

**DESCRIPTION**

Vidtex allows full access to CompuServe's features; e.g., error-free data transfer using CompuServe's B Protocol, color graphics, and uploading and downloading of programs in img and binary formats. Complex auto-logon routines can be programmed, utilizing auto answer/auto dial modems. Data can be captured in the buffer and/or directed to the printer. Data saved to disk can be in ASCII to be viewed later with Vidtex or translated in the equivalent Commodore code.

**CONFIGURABILITY**

This software should be able to accommodate most hardware configurations.

**SPECIAL FEATURES**

Considering the many features of the program, it is easy to use, particularly due to the on-line menus. Learning to use the system would be easier if a table of contents and/or index were provided in the documentation (which is fairly extensive). Some of the other features are: a buffer up to 32K, ten-user defined function keys, buffer can be viewed on the screen or printed, can handle sequence and binary files when on CompuServe, automatic log-on, supports color graphics on CompuServe, and data can be viewed on the screen and printed at the same time.

**SUMMARY**

When using CompuServe, this is the terminal software to have. It provides access to the system's specialized features and offers considerable flexibility in handling incoming data. It is also a fairly flexible general purpose terminal program, allowing downloading of data to the buffer, saving to disk, and printing text on the printer. It does not convert sequential or image program listings into tokenized programs when not on CompuServe. It also does not allow sequential files to be written off-line for uploading.

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**Worksheet for Communications**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

- Overall rating
- Price/Performance
- Ease of use
- Vendor support
- Documentation
- Error handling

**SPECIFIC CRITERIA**

- Configurability
- Special features

**FEATURES**

- Prints files
- Commands menu
- Smooth scrolling
- User-defined keys
- 80 column display
- Clock and/or alarm
- Saves configuration
- Access disk functions
- CompuServe "B" protocol
- Seq. to Prg. conversion

**FEATURES**

- Password
- Auto logon
- Options menu
- Uploading
- Downloading

*Description*—\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

*Configurability*—\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

*Special Features*—\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

*Summary*—\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**COMPARISON CHART**

<b>PROGRAM NAME</b>	<b>RATINGS FOR CRITERIA</b>								
	OVERALL RATING	PRICE/PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	CONFIGURABILITY	SPECIAL FEATURES	PRICE
64 TERM	D	B	A	B	D	B	C	D	\$FREE
64 TERMINAL	C	C	B	B	A	A	C	C	\$29.95
SMART 64 TERMINAL, THE	B	B	B	B	B	A	B	A	\$39.95
SPEEDTERM II	B	A	B	B	B	B	B	B	\$29.95
SUPERTERM	A	B	C	A	B	A	A	A	\$99.95
VIDTEX	A	A	A	A	B	A	A	A	\$39.95

<b>PROGRAM NAME</b>	<b>RATINGS FOR FEATURES</b>														
	PRINTS FILES	COMMANDS MENU	SMOOTH SCROLLING	USER-DEFINED FUNCTION KEYS	80 COLUMN DISPLAY	CLOCK AND/OR ALARM	SAVES CONFIGURATION	ACCESS DISK FUNCTIONS	COMPUERVE "B" PROTOCOL	SEQ. TO PRG. CONVERSION	PASSWORD	AUTO LOGON	OPTIONS	UPLOADING	DOWNLOADING
64 TERM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64 TERMINAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SMART 64 TERMINAL, THE	+	-	+	+	-	+	+	+	-	+	+	-	+	+	+
SPEEDTERM II	+	-	+	+	+	+	+	+	-	+	-	+	+	+	+
SPEEDTERM	+	-	+	+	+	+	+	+	-	+	-	+	+	+	+
VIDTEX	+	+	-	+	-	-	+	+	+	-	+	+	+	+	+



# 7

# PROGRAM DEVELOPMENT

## INTRODUCTION

A computer, any computer, only understands one language: its native language. This native language, often referred to as machine language, is actually a list of numbers. Each number will make the computer's brain or CPU (Central Processing Unit) perform a different function. For example, the machine language instruction hex 69, when executed, will result in the addition of two numbers. If you give the computer a string of numbers, it will execute each one at the rate of about 200,000 a second. The trick in getting a computer to do something useful is to come up with a proper sequence of numbers.

Nobody cares to sort through strings of numbers to program a computer. Computer experts have developed more advanced, "higher level," languages which contain somewhat more recognizable instructions. These instructions are listed together as a program and then converted to machine language before they are executed. There are several ways these higher level languages may be translated into machine language instructions. It isn't important that the programmer know the details of this translation process. The programmer only needs to know this higher language.

In the higher language BASIC there is a command PRINT that, when executed, will print on your screen the characters that follow the command. PRINT "HELLO" will print the word HELLO on the screen. Actually the command PRINT is converted into a string of machine language instructions. However, you are still faced with the decision of which language to learn.

The Commodore 64 comes with a BASIC interpreter built into it. That is, there exists a program inside the computer that will convert BASIC programs into machine language automatically for you. The User's Guide that comes with the Commodore 64 gives the BASIC instruction set. If you are still in doubt, let us assure you that BASIC is one of the easiest languages to learn. One more thing that you will be glad to hear: anything that can be programmed in any other language can be programmed in BASIC. The catch is that BASIC is not the fastest language and the programs written in BASIC are often more complicated than those of other languages. A program written in Assembly language can run 100 times faster than a BASIC program. Some languages are more convenient for specific applications. But unless you are absolutely certain of a specific application, BASIC is a good place to start.

We have broken Program Development down into two categories: Machine and Assembly Language Development, and Higher Language Development.

Assembly language instructions are such a close cousin to machine language we did not wish to separate them. Anything pertaining to the development of machine code or assembly code such as machine code monitors, assemblers, etc., will be found in this chapter. Any other language development system will fall under Higher Language Development. This will include Extended BASIC commands. These are programs that increase the number of BASIC commands recognized by the Commodore 64. Of course other languages such as Forth, Pascal, and Cobol will also be found in this chapter but there are a couple of exceptions. Languages that are teaching tools, such as Logo and Turtle Graphics, will be found in Chapter 2, Education.

## 7.1 MACHINE AND ASSEMBLY LANGUAGE DEVELOPMENT

The Commodore 64, like all personal computers, is essentially made up of a CPU (Central Processing Unit) and a memory. In the case of the Commodore 64, the CPU is a single integrated circuit identified as the 6510 microprocessor. If you opened up your keyboard you would see the 6510 resting there beside a number of other integrated circuits. But the 6510 is actually the brain of the system. It is the 6510 that adds, multiplies, and compares data. It is the 6510 that controls the other circuits to display graphics, play music, and do whatever a computer does. Understanding how the microprocessor works is understanding how your computer works.

The 6510 can be thought of as a small machine that can perform 56 different operations. An operation might be the process of comparing two numbers, or it might be the adding of two numbers. To get the CPU to perform an operation, a specific number must be sent to it. Actually the number is sent as a combination of voltages applied to certain pins on the 6510. If you can apply the right voltages at the right time, the CPU will add two numbers for you. You could sit down and theoretically start applying voltages to make your computer perform. But what if you could store a list of numbers as voltages and have them sent automatically? This is exactly what happens when you write and store a program in the memory of the computer.

The CPU, when first powered-on, begins reading those numbers from memory in a process called fetching. The number is first identified by the CPU and then the specific operation is executed. All you have to do is put the right numbers in the right sequence in memory. The CPU will do the rest.

The complete set of these numbers is called the machine language or machine code instructions for the microprocessor. Each of the machine code instructions has associated with it a three-letter mnemonic. ADC is the mnemonic for hex 69 which adds two numbers. It is much easier to develop a program using these mnemonics and then go back and convert them to numbers. Actually programs exist that can do the conversion for you—Assemblers.

Machine and Assembly languages are so closely related that the two terms are often used to mean the same thing. There are some distinct advantages to developing programs in machine or Assembly language. All programs, whether written in BASIC, Forth, or other languages must be converted into machine code before they can be executed. Any program can be written in many different ways. Some are faster than others; some require less memory. It is advantageous to write your program in Assembly language because then you will know exactly how it will appear as machine code. You can actually calculate how long it will take to execute and how much memory it will take. A program written in Assembly language can run up to 1000 times faster than a similar one written in BASIC. For graphics and animation this kind of speed is necessary, but it is apparent in almost any application.

## Specific Criteria

**APPLICATION**—The most important concern in selecting software is knowing just what the program can and can't do. In the section called applications we will try to describe what applications a program might have. Often this may be merely a more advanced description of the software or it may include limitations of the software.

**EASE OF USE**—A number of types of programs are involved in developing machine and Assembly code. Editors are programs that allow you to enter and edit Assembly instructions. Generally, the same edit and cursor control functions available when developing a BASIC program for the Commodore 64 are available when using an editor for Assembly language. You enter a line number and then the instruction. Each instruction must be formatted according to rules set down by the documentation for the particular editor you are using. You may go back and change any entry, and when you are through you can save the program—usually on diskette.

Once you are satisfied with your program you must convert it to machine code with another program called an Assembler. An Assembler and an editor must work together with the Assembler recognizing every command as well as the format from the editor. Assemblers will display the machine code equivalents of the Assembly code. It is nice to have the two displayed side by side with addresses for each of the instructions. Another very useful feature with some software is identification of any errors in syntax or format. When a program has been created and then assembled, it is ready to be loaded.

The Commodore 64 is set up to run BASIC commands. A special program called the interpreter is looking for BASIC entries as soon as you turn it on. A special program is needed to place the machine code in the computer and to leave the BASIC interpreter. This is the function of a Loader program, and most development packages will include their own loader.

You can be reasonably certain that a program will not work the first time you try to execute it. Finding the problem, a process known as debugging, can be very annoying. There are often a number of programs with various features to simplify the process. Debuggers and Monitors are programs that allow you to go into memory and change individual machine code instructions. They help avoid the alternative process of going back to the editor, making a change, assembling again, and then reloading the program. Some of these monitors have a trace or walk function that allows you to execute one instruction at a time to help find a problem. Some allow you to move sections of code from one place in memory to another. Some allow the insertion of a temporary breakpoint that will stop the program at a precise location. Some have a hunt feature that will search through the memory looking for a particular command or value.

A machine language program will have references to other locations in memory. Some instructions will reference another instruction by jumping to its particular location. If you move a section of memory or load it in another area, the program will jump to the wrong location. It is necessary to have a

relocating loader—one that will change any references to locations within the program to a new correct address. In the Applications section we will attempt to show just what the program or package of programs can and can't do.

**REPORT GENERATION**—It is almost mandatory to have a printout when developing software, and nearly all development programs contain some kind of printing facility. Some may simply copy the screen to a printer while others will allow the printing of a complete program or section of memory. Some will print error listings, some cross-reference files, and some will print the machine code next to the Assembly code. Some give you your choice of these. In report generation we will list the type of printout available as well as any configuration limitations. Generally, a printout of text can be printed to any properly configured printer, but we will include any limitations that we have found as well as any references from the documentation of the software.

## GLOSSARY

**ASSEMBLER**—This is a program that converts Assembly code instructions into machine code instructions. An Assembler must recognize not only the Assembly instruction set but the format of the instructions as well. Is there a space between instruction and operand? Can you separate a remark with a colon? An Assembler generally works with a specific editor for developing machine and Assembly language instructions.

**ASSEMBLY LANGUAGE**—A set of three-letter mnemonics that correspond to the machine language instruction set for a microprocessor. Rules are also provided governing data names, addressing conventions, etc.

**BREAKPOINTS**—It is often useful to run just a section of a machine language program. If a program is not running correctly, it is often impossible to see immediately where it is failing. Running one section at a time allows you to locate, by process of deduction, where the error is. A breakpoint allows you to stop the program at a designated location and thus run only a section of a program.

**BLOCK MOVE**—One feature found on some monitors is the ability to move a section of memory. If you have a machine language program and wish to insert another instruction, it will be necessary to move a section to make room for the new instructions. A block move feature will allow this.

**CROSS-REFERENCE LISTING**—This feature indicates that the program can produce a listing of all variables used in a program and the line number where they are found.

**COMPILER**—A compiler converts a higher language into a machine language program that can be run at a later time.

**DEBUG**—The process of locating and correcting errors in a program.

**DISASSEMBLER**—A program that converts machine language instructions into Assembly language instructions.

**EDITOR**—A program that allows you to create and edit a program. This is the program that actually allows you to enter line numbers, followed by

instructions, and to return to those instructions and make changes when necessary.

**ERROR LISTING**—This feature indicates that at least one program in a development package will list syntax and format errors.

**HUNT**—This feature indicates that the program will automatically search through a section of memory or a program file to locate a particular value or entry.

**INTERPRETER**—A program that translates and executes a higher language program into machine language one line at a time. Contrast this with a compiler that translates the entire program into machine language before execution.

**LOADER**—The Commodore 64 is set up for entering BASIC commands. In order to enter machine language programs, a special program is necessary. A loader will enable you to load a machine language program.

**MONITOR**—The term monitor, when referencing program development, is a program that allows you to read and write individual bytes to specific memory locations and registers. It can be used effectively to locate errors during program development.

**MACRO INSTRUCTIONS**—This feature, found in some editors, allows the programmer to create subroutines that may require input by name. The programmer can use these subroutines anywhere in a program simply by stating the name and listing the input.

**OBJECT/ASSEMBLY LISTING**—When you are creating an Assembly language program, this feature allows a listing of the object code alongside of the Assembly code.

**RELOCATABLE**—Many development tools allow the movement of blocks of memory. If a program contains an instruction that makes reference to another location within the program and the program is moved, it will not run correctly. If a loader or move feature is relocatable, any references to other locations in memory will be changed so that the program will work appropriately.

**STEP EXECUTION**—This feature allows you to execute one instruction at a time. This operation is very useful in locating trouble spots or “bugs” in a program.

**TRACE**—This feature, sometimes referred to as a step function or a walk feature, allows you to execute one instruction at a time. It is very helpful in debugging a program.

**Commodore 64 Macro Assembler  
Development System  
Commodore**

**\$15.95 Disk**

**GENERAL CRITERIA**

B Overall rating  
A Price/  
Performance  
C Ease of use  
C Vendor support  
C Documentation  
B Error handling

**FEATURES**

+ Monitor  
+ Assembler  
+ Loader  
+ Error listing  
+ Disassembler  
+ Breakpoints  
+ Hunt

**FEATURES**

+ Editor  
- Debugger  
+ Relocatable  
+ Step execution  
+ Block move  
+ Macro instruc

**SPECIFIC CRITERIA**

B Application  
C Ease of use  
B Report  
Generation

**DESCRIPTION**

The COMMODORE 64 MACRO ASSEMBLER package is a system of programs designed for the advanced or professional machine language programmer. The documentation is adequate for the professional user, but anyone else would have difficulty using the programs.

**APPLICATIONS**

Designed to be used with a disk drive and a printer, the MACRO 64 is used to develop machine language programs. The monitors provided load at \$8000 or \$C000. Thus you will always have a monitor that will not interfere with the program under development. The macro instruction feature distinguishes this package from other development systems and offers greater programming flexibility.

**EASE OF USE**

The development of help and menu screens in software has dated the older programs and spoiled the modern user. MACRO 64 has the mark of the older design concepts in that it lacks all user-friendly features we take for granted. From this perspective, MACRO 64 is not easy to use. You must remember what program module is in use, and mistakes tend to be rewarded with default to BASIC. To move from one module to another, you must save their work and load the new section. That means a lot of disk shuffling.

## **REPORT GENERATION**

MACRO 64 generates 24 error messages during assembly and loading operations. You also have the option of creating object files, cross-reference files, hard copy, and a source file. These various reports enable you to easily debug and document the program under development.

## **SUMMARY**

MACRO 64 is for use by the professional. The lack of tutorials, help screens, and menus would make this software package hard to use for the amateur. However, this package does offer the budget-minded user sophisticated features for a small price.

**DEVELOP-64**  
**French Silk****\$49.95 Disk Book****GENERAL CRITERIA**

B Overall rating

C Price/  
Performance

B Ease of use

B Vendor support

A Documentation

A Error handling

**FEATURES**

+ Monitor

+ Assembler

+ Loader

+ Error listing

+ Disassembler

- Breakpoints

+ Hunt

**FEATURES**

+ Editor

- Debugger

+ Relocatable

+ Step execution

- Block move

+ Macro instruc

**SPECIFIC CRITERIA**

B Application

B Ease of use

C Report

Generation

**DESCRIPTION**

DEVELOP-64 is a complete machine language development package that lives up to its advertising claim of being powerful enough for the professional yet friendly enough for everyone. The documentation is, in fact, an excellent machine language tutorial, rich in examples and step-by-step instruction. In addition, the author provides detailed memory maps of the 64 ROMs that are indispensable to the machine language programmer.

**APPLICATIONS**

DEVELOP-64 is used with a disk drive and printer to develop machine language programming or to study existing software. The monitor, called a debugger, is designed for single-step analysis of the program and thus does not have all the features of the stand-alone programs. However, it is more than adequate to work as a part of an integrated system to teach machine language programming and to develop the same.

**EASE OF USE**

The software is easier to use than most menu-driven screens that simplify loading sub-programs. Even a beginner can quickly learn to use the editor, assembler, disassembler, and debugger by following the clearly written sample program. One feature beginners like is the choice of hexadecimal or decimal number systems for Assembly instructions.

**REPORT GENERATION**

Two error messages are sent to the screen along with a beep to signal programmer errors while using the editor. The Assembler produces four other

error messages that are very helpful in debugging a program. The decoder (disassembler) can send output to the printer as a study aid.

### **SUMMARY**

DEVELOP-64 is an excellent development and tutorial package. The quality is seen in the documentation as well as the software. The only areas for improvement are the book provided lacks an index (it has a great contents), and the price may keep it out of the hands of the younger and less affluent computerists. French Silk should be watched for future software releases. If they keep up this quality, they will set the standard to be matched.

**HESMON  
HES****\$39.95 Cartridge****GENERAL CRITERIA**

B Overall rating  
 C Price/  
 Performance  
 B Ease of use  
 B Vendor support  
 C Documentation  
 C Error handling

**FEATURES**

+ Monitor  
 + Assembler  
 - Loader  
 - Error listing  
 + Disassembler  
 - Breakpoints  
 + Hunt

**FEATURES**

- Editor  
 + Debugger  
 - Relocatable  
 + Step execution  
 + Block move  
 - Macro instruc

**SPECIFIC CRITERIA**

B Application  
 B Ease of use  
 C Report  
 Generation

**DESCRIPTION**

HESMON is a ROM-based machine language monitor and not a true development package; it should be considered a general purpose programming utility. It has features that would be useful for the beginner or advanced computer user.

**APPLICATIONS**

HESMON is designed to be used with the 64, single disk drive Dataset, a properly interfaced printer, and a video monitor. It has 30 separate commands and functions which give you great power and convenience. While the breakpoint set, external relinker, block transfer, new locator, walk, and quick trace commands would be most useful to the advanced programmer, the more easily understood commands give the beginner all he needs to study the inner workings of his computer. Its only drawback is that it is non-relocatable. HESMON resides at \$8000 to \$9FFF and is incompatible with other programs that also use that space.

**EASE OF USE**

All single-letter or symbol commands and functions are easy to use. Simply enter the command, followed by the hexadecimal parameters, and hit return. If you made no mistakes, the operation is carried out at machine language speeds. Errors are flagged by a ? next to the command. The punctuation, spacing, and order are very important for the command to be executed properly.

## **REPORT GENERATION**

Although not a true report, HESMON can easily access a printer or disk drive to store memory displays for future study.

### **SUMMARY**

HESMON is a very good program that we would recommend to the person interested in learning to program BASIC or, especially, machine language. It will open the computer's secret workings for study, and it has features that will not quickly be outgrown. Unfortunately it is only a tool; the documentation is adequate for the person with at least a basic understanding of machine language, but the raw beginner is out in the cold. To be fair, HES states clearly that they do not intend to teach machine language, but they could produce a better instruction manual. If the beginner is willing to seek out other sources of information then HESMON could be one of the most used pieces of software in his library.

**PTD - 6502/6510 DEBUGGER**  
**Pterodactyl Software**
**\$29.95 Disk****GENERAL CRITERIA**

A Overall rating  
 A Price/  
 Performance  
 A Ease of use  
 A Vendor support  
 B Documentation  
 B Error handling

**FEATURES**

+ Monitor  
 - Assembler  
 - Loader  
 - Error listing  
 + Disassembler  
 + Breakpoints  
 - Hunt

**FEATURES**

- Editor  
 + Debugger  
 + Relocatable  
 + Step execution  
 - Block move  
 - Macro instruc

**SPECIFIC CRITERIA**

A Application  
 B Ease of use  
 B Report  
 Generation

**DESCRIPTION**

The PTD-6502/6510 Debugger is a multi-featured Assembly language monitor/debugger for the Commodore 64. (The manual also cover an Apple II version.) It provides commands for assembly of most machine language instruction types; disassembly of all instruction types to the screen, the printer, or memory; saving and loading between memory and disk files; and calculations (or conversions) in binary, decimal, and hexadecimal. It also provides tracing (or STEP-EXECUTION) of machine language programs with options including full-speed execution of subroutines; monitoring of ranges of memory, breakpoints and patches in RAM; a display of the instructions traced before reaching a breakpoint; SLOW BREAKPOINTS in ROM; and machine cycle counting. There is also a BASIC-style editor (i.e., one that uses line numbers) for construction programs of debugger commands or mini-assembler instructions. These programs can use numeric and string variables and IF-THEN-ELSE and GOTO statements. Finally, symbol tables from the MAE Assembler (sold by a different company) can be loaded and used by the debugger. An experienced assembly language programmer can customize this feature to use symbol tables from other assemblers.

**APPLICATIONS**

This debugger is suitable for debugging machine language programs up to about 22K bytes in object code length, or for assembling and debugging some simple programs up to about 1K bytes of source code. The debugger's output is kept separate from the screen of the program being debugged, so it is possible to debug programs that use graphics and/or call the KERNAL. How-

ever, no special provisions are made for programs that use interrupts. The debugger can easily be loaded into any contiguous 28K byte area (7000 hex bytes) within the region of addresses from 2K (decimal 2048, hex 800) to 52K (decimal 53248, hex D000), which makes it possible to debug programs almost anywhere in memory.

### **EASE OF USE**

For the beginner; you'll need to know 6502 Assembly language to use this program as the manual neither attempts to teach it nor to serve as a reference manual. However, this product could serve well as your first (and quite possibly your only) debugger. The manual is written in a fairly clear tutorial style, although there are a few types and example use commands that the manual doesn't discuss. The BASIC-style "deferred mode" and editor will be familiar and easy to understand.

For the experienced programmer; the BASIC-style "deferred mode" may annoy you if you're familiar with more advanced languages like FORTH, and the command summary is incomplete enough that you too should read most of the tutorial section. But it is hard to imagine that you will need any features not provided in the debugger, except for a block move command and a search for specified bytes both of which can be implemented as "deferred-mode" programs, or unless you're debugging the output of a high level language compiler.

### **REPORT GENERATION**

All output of the debugger can be sent to a printer on the serial port. Disassemblies can be listed into memory and then saved in a disk file. Variables, breakpoints, patches, and all other debugger status information can be displayed. The stack and several 8-byte ranges of memory can be continuously displayed during tracing.

### **SUMMARY**

This debugger has features that we've wished for but have never seen on any other we've used, including some for much more expensive computers. It should be fairly easy to learn for anyone who can edit BASIC programs and who has a moderate level of knowledge of 6502 machine and Assembly language. It will be very useful to programmers of any level of experience who want to debug or understand machine language programs up to 22K in size, or programs which can be divided into sections of that size or shorter. The authors avoided errors commonly made by the writers of other monitors, making it possible to trace the Commodore's KERNAL or programs that use the graphics chip extensively. The few bugs we discovered were minor inconveniences, but wouldn't result in incorrect tracing even if you were unaware of them. In short, this is an outstanding product for its price and should be useful to anyone developing machine language programs on the Commodore 64.

There is no search-for-specific-bytes-in-memory feature, nor a block move command. The mini-assembler can't assemble most zero-page instructions. No single command displays all the simulated registers. The deferred-mode programming has no GOSUB, nor can you RUN starting at a specific line number. Some commands aren't explained in complete detail. You shouldn't assign a string literal to a string variable in immediate mode, but it won't warn you if you do (the variable will be clobbered).

**6502 Professional Development System \$29.95 Tape  
HES**
**GENERAL CRITERIA**

- C Overall rating
- A Price/  
Performance
- C Ease of use
- A Vendor support
- C Documentation
- B Error handling

**FEATURES**

- Monitor
- + Assembler
- Loader
- + Error listing
- Disassembler
- Breakpoints
- Hunt

**FEATURES**

- + Editor
- Debugger
- Relocatable
- Step execution
- Block move
- Macro instruc

**SPECIFIC CRITERIA**

- C Application
- C Ease of use
- C Report  
Generation

### DESCRIPTION

The Professional Development System includes Hesedit, a general purpose text editing utility that allows you to write and save Assembly language programs, and Hesbal, a one pass assembler.

### APPLICATIONS

The Professional Development System is designed to enable you to write, edit, and save assembly programs. The saved programs can then be assembled into a machine language program. It is possible to assemble more than one source program to create one object file from a group of source programs. You cannot save the machine language programs unless you have a monitor (not supplied with the package). Any errors encountered during assembly will be located and listed.

### EASE OF USE

It is possible to locate errors during assembly and with a direct command change the erroneous entry. The direct command consists of a BASIC command that must be in the proper format. The Hesedit does not look for syntax errors so that any errors will not be found until assembly. If you want a listing to a printer, you must physically change some of the basic program lines of the development program. Likewise, since the default value for storing a program is a tape drive, you must physically change some of the program lines to use a disk drive.

### REPORT GENERATION

The program can produce a listing with some modifications.

## SUMMARY

This package lacks features desirable for program development. The editor does not produce a syntax or format error listing so that errors are not found until you attempt to assemble the program. Modifying a program that is being assembled is difficult. Using a disk or printer also requires changes in the program itself. A machine language program cannot be saved without the additional purchase of a monitor. The development programs reside in BASIC, and you must physically change the top of memory pointers if you wish to use the BASIC area for any programs you are developing.

<b>SUPERMON 64 (Bonus Pack) Commodore</b>		<b>Public Domain Disk</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	+ Monitor	- Editor
A Price/ Performance	+ Assembler	- Debugger
C Ease of use	- Loader	+ Relocatable
B Vendor support	- Error listing	- Step execution
C Documentation	+ Disassembler	+ Block move
C Error handling	- Breakpoints	- Macro instruc
	+ Hunt	
<b>SPECIFIC CRITERIA</b>		
B Application		
B Ease of use		
C Report Generation		

### DESCRIPTION

SUPERMON is a public domain program included on the Bonus Pack by Commodore that developed from early PET monitors. It is a simple program with few of the bells and whistles found on the commercial products; however it is more than adequate for the beginner's use. It is found in magazine listings and user's groups and generally will cost nothing but the time and medium to copy it. Its best features include self-relocatability, and coexistence with BASIC without upsetting pointers.

### APPLICATIONS

For use with 64, disk drive, dataset, printer, and video monitor. To use the printer, you must exit to BASIC and type: OPEN 4, 4: CMD4:RETURN. Go back to SUPERMON with SYS 8, and send the P command. That's a lot of work, but SUPERMON is for people with less money than time.

### EASE OF USE

Except for the print function, SUPERMON is as easy to use as commercial monitors that use single-letter commands. Unlike the ROM monitors, if the system crashes it takes a little longer to get up again as the monitor and program must be reloaded. Some other monitors have a super stop key that will, in many cases, bring a rampaging computer back under control—but SUPERMON crashes.

### REPORT GENERATION

By using the print function, a listing of memory can be produced for later study.

## SUMMARY

SUPERMON should be in everyone's software library because it is cheap, easy to use, and can be freely given to friends and beginning computerists. Although it lacks advanced features, it is an ideal starting point for the younger programmer. As learning takes place, the beginner will be able to add the more costly and fuller-featured software. This reviewer has a copy on each disk in his library; many times that convenience has helped to debug a program when the other monitors could not be found.

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**Worksheet for Machine and Assembly Language Development**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA FEATURES**

- C Overall rating + Monitor
- A Price/Performance + Assembler
- C Ease of use - Loader
- B Vendor support - Error listing
- C Documentation + Disassembler
- C Error handling - Breakpoints
- + Hunt

**FEATURES**

- Editor
- Debugger
- + Relocatable
- Step execution
- + Block move
- Macro Instruc

**SPECIFIC CRITERIA**

- B Application
- B Ease of use
- C Report generation

*Description*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Applications*— \_\_\_\_\_

\_\_\_\_\_

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*Ease of Use*— \_\_\_\_\_

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Report Generation—

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Summary—

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**COMPARISON CHART**


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**PROGRAM NAME    RATINGS FOR CRITERIA AND FEATURES**


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	OVERALL RATING	PRICE/PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	APPLICATION	EASE OF USE	REPORT GENERATION	MONITOR	ASSEMBLER	LOADER	ERROR LISTING	DISASSEMBLER	BREAKPOINTS	HUNT	EDITOR	DEBUGGER	RELOCATABLE	STEP EXECUTION	BLOCK MOVE	MACRO INSTRUC	PRICE
COMMO- DORE 64 MACRO AS- SEMBLER DEVELOP- MENT SYS- TEM	B	A	C	C	C	B	B	C	B	+	+	+	+	+	+	+	+	-	+	+	+	+	\$15.95
DEVELOP- 64	B	C	B	B	A	C	B	B	C	+	+	+	+	+	-	+	+	+	+	+	-	-	\$49.95
HESMON PTD-	B	C	B	B	C	C	B	B	C	+	+	-	+	-	+	-	+	+	+	+	+	-	\$39.95
6502/6510 DEBUGGER	A	A	A	A	B	B	A	B	B	+	-	-	+	+	-	-	+	+	+	+	-	-	\$29.95
6502 PRO- FESSIONAL DEVELOP- MENT SYS- TEM	C	A	C	A	C	B	C	C	C	-	+	-	+	-	-	+	-	-	-	-	-	-	\$29.95
SUPERMON 64	C	A	C	B	C	C	B	B	C	+	+	-	-	+	-	+	-	+	-	+	-	-	PD

## 7.2 HIGHER LEVEL LANGUAGE DEVELOPMENT

The Commodore 64 contains a BASIC interpreter. When you first turn your computer on, you can enter any of the BASIC commands listed in the *User's Guide* and the computer will execute the specific command. You can list a number of these commands with line numbers, enter RUN followed by a RETURN, and the commands will be executed one after another until the program is completed. BASIC is a fairly universal language among microcomputers. Different computers may alter a command or two, and some provide additional commands which would not be recognized by your computer, but essentially the rules and approach to BASIC programming are the same from computer to computer. A number of programs are available that expand the number of BASIC commands recognized by the Commodore 64. When these programs are loaded into your computer, you are free to create programs using these additional commands. These programs require some memory space so you find yourself with less space for entering BASIC programs, but they can greatly simplify the development of BASIC programs.

There are a number of languages other than BASIC available for use on the Commodore 64. Each language has its own set of commands and rules for implementing these commands; and each language has its own advantages and disadvantages. Some are better suited for developing business applications, some for engineering, and still others for graphics development. Each language will include a group of programs that are similar in nature. There will be some type of editor program that will allow you to enter commands into memory and to edit those commands. The editor will also, in effect, turn off the BASIC interpreter. These new commands would confuse the interpreter. The new language is going to need a program to translate the instructions into machine language. It will include an interpreter or compiler of its own to make the translation. A complete development system may also include some type of debugger program.

### **Specific Criteria**

**USEFULNESS**—Because these higher level languages are so different from one another, the specific criteria are not very specific. We will try to generalize on the particular language to give you an idea as to whether it will meet the needs for your planned applications. Learning a programming language requires a considerable amount of time and study. You will certainly want to do some additional reading before you undertake such a project. For those who have chosen a language, we will attempt to discuss specific advantages of one particular package as opposed to other packages for the same language.

Sometimes it is more enlightening to know the disadvantages of a language instead of the advantages. In this section, we will attempt to discuss a language's weaknesses as compared to other languages. We will also try to elaborate on specific weaknesses of a particular development system.

**I/O HANDLING**—Whatever language is used, it will have to work within the confines of the Commodore 64's input/output system. It will have to work in conjunction with the 1541 disk. This section will allow us to elaborate on how a particular language performs its input/output operations.

## Glossary

**ASSEMBLER SUBROUTINES**—This feature indicates that Assembly language subroutines can be incorporated in the language and called for efficient high-speed operations.

**BLOCK MOVE**—A feature found in some development systems is the ability to move sections of a program to another location in memory.

**BREAKPOINTS**—It is often desirable to run just a section of a program to locate trouble spots. A breakpoint is a feature that allows you to specify a specific location and run a program up to that point.

**COMPILER**—A compiler converts a higher language into a machine language program that can be run at a later time.

**ERROR LISTING**—This feature indicates that at least one program within a development package will list syntax and format errors.

**FLOATING POINT**—This indicates that this particular language can handle floating point numbers—numbers stored in scientific notation with a mantissa and an exponent.

**GRAPHICS CAPABILITY**—This feature is an indication of how suitable a language is for developing graphics.

**HUNT**—This feature allows you to automatically search through a program and locate a specific entry.

**INTERPRETER**—This feature converts one line of a program into machine code and then executes the line. The interpreter then converts another line and so on.

**LIB ROUTINES**—Library routines indicate that a program can make reference to a routine in another file. When the program or the linker encounters the reference, the file is called up and executed or incorporated into the program.

**MACRO INSTRUCTION**—This feature found in some editors allows the programmer to create subroutines that may require input. The programmer can use these subroutines anywhere in a program by simply entering the name of the subroutine and listing the input required.

**MEMORY INDICATOR**—This feature means that there is some sort of mechanism for determining just how much space is available in memory for a program.

**SPEED**—This is an indication of just how fast a language runs.

**STEP EXECUTION**—Sometimes referred to as the Trace function, this term indicates that it is possible to execute one line at a time to facilitate debugging.

<b>BASIC Aid</b>		<b>\$29.95 Diskette</b>
<b>Microtechnic Solutions</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	- Compiler	- Step execution
A Price/	- Interpreter	- Block move
Performance	- Extended BASIC	+ Hunt
B Ease of use	- Error listing	+ Screen/Editor
B Vendor support	- Monitor	- Breakpoints
B Documentation	+ Editing utilities	
B Error handling		
<b>SPECIFIC CRITERIA</b>		
A Usefulness		
A I/O handling		

### DESCRIPTION

This package is actually a set of five utility programs that facilitate the development of BASIC programs. A renumbering utility will prompt you for an increment value, a starting line number, and the name of the file to be renumbered. You can also renumber a section of a program. The utility automatically creates a backup of the original file. A search and replace utility will go through an entire file, replacing any string with the one you choose. A merge utility will actually merge two program files by numeric line number. If the two programs have an identical line number, the second program line is dropped. A cross-reference utility will send to a printer a program listing and then a list of all variables with the line numbers in which they are referenced. A subroutine extract file allows you to create a separate file from a section of a program. You specify the original file name, the range of line numbers you want extracted, and the utility will create a separate program file from those lines. You can then use a renumber utility and a merge utility to introduce the subroutine into another file.

### USEFULNESS

When creating BASIC programs, occasionally you will need to introduce additional lines between already existing lines. A problem occurs if the two line numbers are sequential such as line number 20 and then number 21. The renumbering utility will go through an entire program file and renumber to your specifications. Often you will want to combine two program files. The merge utility will merge the two by line number to create a third. Occasionally you will introduce an erroneous character string into a program and then have to change all of the values. The search and replace utility will perform this function automatically. You simply state the file, the erroneous string, and the correct string. The utility will do the rest. In a large BASIC program many variables may be introduced. It is easy to lose track of which variables have

been used and what values they represent. The cross-reference utility will print all the variables and the line numbers where they can be found in a program. Often in developing a program you will need a subroutine used in another program. The subroutine extract program allows you to conveniently go into a program, extract the subroutine as a separate program file, and then merge it into your program.

### **I/O HANDLING**

All the utilities except the cross-reference utility are loaded as a single program so you can use any of those utilities without having to reload them individually. The cross-reference listing is loaded separately and is configured to a 1525 printer or properly interfaced serial printer.

### **SUMMARY**

This is an excellent program for anyone involved in BASIC programming. It is easy to use, very useful, and very efficient at what it does.

**BASM  
Computer Alliance****\$99.95 Disk****GENERAL CRITERIA**

- B Overall rating
- B Price/  
Performance
- B Ease of use
- C Vendor support
- C Documentation
- B Error handling

**FEATURES**

- + Compiler
- Interpreter
- Extended BASIC
- + Error listing
- Monitor
- Editing utility

**FEATURES**

- Step execution
- Block move
- + Hunt
- Screen/Editor
- Breakpoints

**SPECIFIC CRITERIA**

- B Usefulness
- B I/O handling

**DESCRIPTION**

BASM is a BASIC-like compiler and assembler system that produces binary code that has a claimed execution up to 85 times faster than Commodore 64 BASIC. Although the speed increase was not tested, BASM does produce fast-running programs.

**USEFULNESS**

The main strengths of BASM include: efficient Assembly language addressing; easy enclosure of library routines, separate source, binary, and list files; and BASIC type commands intermixed with Assembly instructions. BASM is an intermediate language between BASIC and Assembly that should help you to learn Assembly language while writing BASM programs. To learn BASM, you would have to learn a new language. The BASIC user will need to learn the 6502 instruction set to become an efficient BASM programmer. This is not a program for the computer neophyte.

**I/O HANDLING**

Library routines may be called up from within a program with simple commands. The program can handle decimal, hexadecimal, octal, and binary inputs. I/O statements easily open and close files and direct I/O to various devices.

**SUMMARY**

BASM is a complete development system recommended for the advanced or professional user. While the documentation is good, the complexity and innovative quality of BASM deserves much more than 88 pages. As with any language, BASM will not be mastered quickly, but the rewards are enticing: faster program execution than BASIC, coupled with faster program development than Assembly.

**Editor Pack  
Pacific Coast Software****\$29.95 Diskette****GENERAL CRITERIA**

- B Overall rating
- B Price/  
Performance
- B Ease of use
- B Vendor support
- C Documentation
- C Error handling

**FEATURES**

- Compiler
- Interpreter
- Extended BASIC
- Error listing
- Monitor
- + Editing utilities

**FEATURES**

- Step execution
- Block move
- Hunt
- + Screen/Editor
- Breakpoints

**SPECIFIC CRITERIA**

- B Usefulness
- C I/O handling

**DESCRIPTION**

This package is actually a set of four utility programs that facilitate the development of BASIC programs. A renumbering utility will prompt you for an increment value, a starting line number, the name of the file to be renumbered, and the desired name of the new file created. A search and replace utility will go through an entire file replacing any value or variable with the one you choose. A merge utility will actually concatenate two program files. A variable and value display utility will send to a printer a list of all variables used and their values.

**USEFULNESS**

When creating BASIC programs, occasionally you will need to introduce additional lines between already existing lines. A problem occurs if the two line numbers are sequential such as line number 20 and then line number 21. The renumbering utility will go through an entire program file and renumber to your specifications. Often you will want to combine two program files. The merge utility will essentially add two program files to create a third. The line numbers are not altered; the second file is added to the end of the first regardless of line numbers. You can then renumber lines using the renumbering utility. You can play with this utility to extract subroutines from one file and introduce them into another by merging the two and deleting the line numbers you are not interested in. Occasionally you will introduce an erroneous variable or character string into a program and then have to change all the values. The search and replace utility will perform this function automatically. You simply state the file, the erroneous value, and the correct value. The utility will do the rest. In a large BASIC program many variables may be introduced. It is easy to lose track of which variables have been used and what values they represent. The variable display utility will print all the variables and the line numbers where they can be found in a program.

## I/O HANDLING

Each of the utilities are loaded separately from diskette. This means that you can only use one of them at a time and will have to shuffle diskettes if you do not have two drives.

## SUMMARY

This program is useful for the applications described above. There are some noticeable weaknesses. They are each loaded separately. If you need more than one utility, you will find yourself changing diskettes and waiting for each of the programs to load. The merge utility actually concatenates. The second program file is added to the end of the first rather than intermixing two program files by line number. If this is satisfactory to your needs, then the Editor Pack will be fine.

<b>Forth</b>		<b>\$37.95 Disk</b>
<b>Performance Micro Products</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	+ Compiler	- Step execution
A Price/	+ Interpreter	+ Block move
Performance	- Extended BASIC	- Hunt
A Ease of use	- Error listing	+ Screen/Editor
B Vendor support	- Monitor	- Breakpoints
B Documentation	- Editing utilities	
B Error handling		
<b>SPECIFIC CRITERIA</b>		
A Usefulness		
B I/O handling		

### DESCRIPTION

C-64 Forth is a Forth-79 standard compiler with several built-in additions to make life in Forth on the Commodore 64 much easier.

### USEFULNESS

The editor is screen-oriented. As is usual in Forth, source code is edited in 1K blocks called screens. Usually these are arranged as 16 lines of 64 characters. PMP Forth organizes these into 25 lines of 40 characters with a 26th line of 24 characters. This arrangement makes it possible to view the entire editing screen on the 64's display screen at one time (excepting that short 26th line). Editing commands include line insert/delete, block move within a screen or across screens, and clear to end of line. Although there is no search/replace command, this is not as necessary as might be expected since the editing is restricted to the current screen contents (as is usual in Forth). The package contains several extensions to Forth-79 including the following: 6502 assembler for in-line code, graphics package (hires and sprite), string package, and full interface to disk and tape.

### I/O HANDLING

The one weakness might be in the disk handling for source code. In order to make this Forth adaptable to any type of storage system (cassette, single/multiple 1541's, 4040, etc.), the author took a unique (for Forth) method of storing source code. Each editing screen is stored on the disk or tape as a sequential file with the name SCRxxx where xxx is the screen number. Although this makes it easy to copy screens from disk to disk or disk to tape, it does increase the disk access as you move from screen to screen since the disk drive must look up each individual screen in its directory. This is a minor nuisance as for the most part the whole system is easy to use. All in all, this is a very impressive package.

### **SUMMARY**

This is a relatively comprehensive version of Forth. At the price it is selling for, it is an excellent buy.

**Last One, The  
Blue Sky Software****\$100.00 Disk****GENERAL CRITERIA**

- A Overall rating
- B Price/  
Performance
- B Ease of use
- B Vendor support
- B Documentation
- B Error handling

**FEATURES**

- Compiler
- Interpreter
- Extended BASIC
- Error listing
- Monitor
- + Editing utilities

**FEATURES**

- Step execution
- Block move
- Hunt
- + Screen/Editor
- Breakpoints

**SPECIFIC CRITERIA**

- A Usefulness
- C I/O handling

**DESCRIPTION**

This program allows you to create BASIC programs without knowing BASIC. It is menu-driven and prompts you initially to define any files you will need, the number of fields, name of field, and field length. You are then prompted by menu to create a flow chart. Again, in a menu-driven format you create branches in your program, enter the questions and answers you want presented in your program and under what circumstances you wish to branch, and then proceed to define the format data which will be entered from the keyboard. You can define a screen that will appear in your program and allow you to enter data into the program from the screen. You can include sort options in your program and printer outputs. When you have finished, The Last One will turn your flowchart into a BASIC program that can be loaded into any Commodore 64 and run.

**USEFULNESS**

This program is for those with definite BASIC program applications in mind but without the background in programming to implement the idea. The documentation is good but the use of this program is not as straightforward as you may wish. You will have to gain an understanding of how files are used and how to use branch options to develop a usable program. However the process of learning to use The Last One usually requires days rather than the months required to learn BASIC.

**I/O HANDLING**

The Last One allows you to develop programs to prompt for information that will create sequential files. You can develop a program that will create a mailing list. Someone using the program you have created will be prompted for name, address, etc., in whatever format you desire. The data will be stored in a sequential file on diskette. You can further develop your program to compare

data input from the keyboard and place it in a different file under whatever circumstances you desire. Those living in another state may be entered into a different file. You can include printer options in your program to allow the printing of any material entered from keyboard or file to a printer.

### **SUMMARY**

This program allows you to develop a BASIC program file. If the BASIC program file you create needs to save information on diskette, it will save it as a sequential file. Sequential files are not as efficient as relative or random files for most database applications. The Last One is therefore not the best program if your application is merely creating a database. However, if you have a variety of applications which may require the creation of menus, or if your applications will include a variety of alternative operations based on what is input from the keyboard, this program may be what you are looking for. It may indeed save you the expense of having to customize a program for your application.

**Master 64  
Abacus****\$84.95 Disk****GENERAL CRITERIA**

- A Overall rating
- B Price/  
Performance
- B Ease of use
- B Vendor support
- B Documentation
- B Error handling

**FEATURES**

- Compiler
- Interpreter
- + Extended BASIC
- Error listing
- + Monitor
- + Editing utilities

**FEATURES**

- + Step execution
- Block move
- Hunt
- + Screen/Editor
- Breakpoints

**SPECIFIC CRITERIA**

- A Usefulness
- B I/O handling

**DESCRIPTION**

This program extends the recognizable BASIC commands by adding over 100 additional BASIC commands that facilitate the development of programs. Once this program is loaded you can create and load a program using the additional commands. The additional commands allow you to conveniently create a program which will input data from the screen inside predefined zones. The additional commands allow you to define printed formats and to print to various printers. A group of commands facilitate the creation and management of disk files. There are additional commands for multiprecision arithmetic, small to capital letter conversion, creation and use of buffers, hunting for particular characters in a string, and many more. Included in the list of commands are those that allow all the BASIC 4.0 commands.

**USEFULNESS**

This is excellent for advanced BASIC program development. These additional commands greatly simplify the development of complex programs. The documentation is very well done with an entire page of discussion and an example for each new command. It allows the development of files using random files with internal memory-resident key files. You can develop highly specialized formats to be printed to a printer or complicated graphical displays to be viewed on the screen. There are also additional commands found in BASIC 4.0 such as CATALOG, which displays the directory on a diskette, and RENAME, which will automatically rename a file. The package includes an easy-to-use monitor and step function that enables you to execute one instruction at a time.

### **I/O HANDLING**

This program allows you to create random files and maintain a sequential list of keywords. This sequential list of keywords is loaded into memory. Matching a word in this memory-resident list occurs in milliseconds rather than minutes as it might take on a disk-resident list.

### **SUMMARY**

Master 64 is probably one of the most comprehensive BASIC extensions. The BASIC 2.0 found on the Commodore 64 is very confining when attempting to develop advanced BASIC programs. Master 64 simplifies the development of advanced BASIC programs including file management. This program will have to be loaded prior to running any program that utilizes its commands.

<b>PETSPEED</b>		<b>\$150.00 Disk</b>
<b>Oxford Computer Systems</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	+ Compiler	- Step execution
C Price/Performance	- Interpreter	- Block move
D Ease of use	- Extended BASIC	- Hunt
B Vendor support	- Error listing	- Screen/Editor
D Documentation	- Monitor	- Breakpoints
C Error handling	- Editing utility	
<b>SPECIFIC CRITERIA</b>		
A Usefulness		
B I/O handling		

### DESCRIPTION

PETSPEED 64 is a true BASIC language compiler that converts a program written in BASIC to a special "P" code that will run ten times faster than the original program. With careful planning of the BASIC routines, even faster speeds are possible. The security module is only necessary for compilation; compiled programs will run like BASIC only faster.

### USEFULNESS

PETSPEED does work. It fills a niche between BASIC and machine code in terms of speed. Where speed of a BASIC program is important and/or where machine language programming is prohibitive in development time, etc., PETSPEED is a logical solution. Without knowledge of machine language, you can produce a faster program to meet your needs. Errors can be tracked down with the Error and Utilities programs which come with the master disk. Programming convenience features include easy enable and disable of the stop key, longer variable names, and reports on variables and arrays. The program is almost impossible to use unless a coach with PETSPEED experience is available. The documentation consists of only three pages of general information. The specific information given is confusing. You are told to make Utilities work and backup disks, but nothing is said about how to use the utilities programs. You must resort to a very frustrating time of trial and error to compile even a simple program. There is a provision for using two 1541 disk drives, but the program gives no instructions for their use. There are restrictions as to the BASIC statements permitted, and dynamic arrays are not allowed. Thus, many programs will need to be fixed before they will compile.

### I/O HANDLING

There are no special I/O difficulties observed.

### SUMMARY

PETSPEED 64 is a good program with very poor documentation. Fortunately, there have been articles written in various periodicals that will help you run the program, and help can be found at most users' groups. Even the machine language programmer would have a use for PETSPEED because it may not be worth the programmer's time to produce a new program when a basic version could be quickly compiled. Is it worth the money? Supply and demand set the price. PETSPEED is a unique program with no serious competitors at this time.

<b>Screen Editor Commodore</b>		<b>\$29.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	- Compiler	- Step execution
B Price/ Performance	- Interpreter	- Block move
C Ease of use	- Extended BASIC	- Hunt
C Vendor support	- Error listing	+ Screen/Editor
D Documentation	- Monitor	- Breakpoints
C Error handling	- Editing utilities	
<b>SPECIFIC CRITERIA</b>		
B Usefulness		
B I/O handling		

### DESCRIPTION

This program provides additional BASIC commands that will enable you to create screen displays in which you can input data. You can write a program that will create a screen that might prompt you for Name, Address, Telephone, and Zip code on the screen simultaneously. You could then move your cursor to the proper field, make your entry, and then press return to have the program process the data.

### USEFULNESS

Normally the BASIC command INPUT or GET can be used to input data from the keyboard to the program. The disadvantage to this is that the computer will display a single INPUT statement at a time. It is often desirable to have several questions displayed on the screen at the same time and to be able to move the cursor to each question and make an entry. When you are satisfied with the entry you would press a single key and have all the data entered into the program. Screen Editor provides additional machine language subroutines to extend the number of BASIC commands. These additional BASIC commands facilitate the development of the program discussed above. In addition there are commands that enable you to design a menu with horizontal lines across the screen and to display status information at the top or bottom of the screen. The documentation presumes a strong background in programming before you attempt to use this program. Even with a comprehensive understanding of BASIC, it is written poorly and is very difficult to understand. The only saving feature is a sample program that comes both on diskette and written in the documentation. Any program that will make use of these extended BASIC commands will also have to include a loader to load Screen Editor. In other words, anytime you have a diskette with a program using the additional BASIC commands you will have to have a copy of Screen Editor on the same diskette or else load it prior to using the program.

## **I/O HANDLING**

Fields are defined on the screen. Any characters placed in that field on the screen are stored in a string array. All other input/output operations are handled normally.

## **SUMMARY**

This is a handy program for the advanced programmer attempting to create user-friendly programs for other people. The features offered with this program will give your interactive program a look of professionalism.

**Screen-Graphics-64**  
**Abacus Software****\$24.95/27.95 Tape/Disk****GENERAL CRITERIA**

- B Overall rating
- A Price/Performance
- A Ease of use
- A Vendor support
- B Documentation
- A Error handling

**FEATURES**

- Compiler
- Interpreter
- + Extended BASIC
- Error listing
- Monitor
- Editing utilities

**FEATURES**

- Step execution
- Block move
- Hunt
- Screen/Editor
- Breakpoints

**SPECIFIC CRITERIA**

- B Usefulness
- C I/O handling

**DESCRIPTION**

Screen-Graphics-64 is a graphics program development aid for the Commodore 64.

**USEFULNESS**

It is a 6502 machine language interpreter that wedges itself into the BASIC programs area and adds 24 graphics commands to Commodore's BASIC to facilitate creation of good quality, high resolution graphics. These commands may be used in any BASIC program and they can be loaded and saved on a disk. In the graphics mode, the screen is laid out in an x- and y- axis format. You can plot points on the screen, or use special graphics commands such as circle, box, draw, etc., to draw the figures between text and graphics mode from within your program. In the graphics mode, there are two screens available—the high resolution screen (320 × 200 pixels) and the multicolor screen (160 × 100). The program also includes sprites design capability. The Screen-Graphics interpreter lets you use the graphics commands directly as well as through a BASIC program. The system diskette comes with a demo program that actually creates excellent graphics with the aid of this program. The special feature of this program is the added sprite design capability which enhances the graphics applications of this program.

**I/O HANDLING**

This program has no printer capability.

## SUMMARY

The Screen-Graphics-64 is a versatile program that allows you to create high-quality graphics with the use of simple BASIC commands. You can also design your own sprites, and the program is capable of storing screen graphics and sprites on disk for access later. The system diskette comes with an excellent tutorial program that takes you through the program and the extended BASIC commands, and gives examples on how to implement those commands to create graphic images.

<b>Simons' BASIC Commodore</b>		<b>\$29.95 Diskette</b>
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	- Compiler	+ Step execution
B Price/ Performance	- Interpreter	- Block move
B Ease of use	+ Extended BASIC	- Hunt
B Vendor support	- Error listing	- Screen/Editor
A Documentation	- Monitor	- Breakpoints
A Error handling	- Editing utilities	
<b>SPECIFIC CRITERIA</b>		
A Usefulness		
A I/O handling		

### DESCRIPTION

Simons' BASIC allows you to create programs using 114 new commands in addition to the 72 BASIC commands already recognized by the Commodore 64. The new commands are entered into programs in the same manner as the original BASIC commands.

### USEFULNESS

The additional commands are categorized into 11 groups. Programming aids include commands that automatically renumber the line numbers of a program or allow you to trace through a program executing one instruction at a time and then pausing to see the results. There is a command that allows you to assign a number or string of characters to each of 16 function keys. There are a number of commands that simplify the handling of text and string variables. There are commands that allow you to manipulate strings of characters. You can combine two strings into a single string or repeat characters within a string. There are 20 graphic commands that allow you to conveniently set the Commodore 64 for high resolution graphics. There are single commands that allow you to create lines, rectangles, circles, arcs, and solid blocks. There is another set of commands that simplifies the design and use of sprites. There is a group of commands that facilitates the process of locating errors that may occur in a program. Other commands simplify the development of music and the use of a lightpen.

### I/O HANDLING

There are two sets of commands specifically for simplifying input/output operations. There are individual commands that simplify the process of opening, closing, or transmitting data to the command channel. A single command allows you to view part or all of a disk directory without interfering with data

currently in memory. There are commands for saving and recalling high resolution screens that you have created. Hard copy printouts can be made on the Commodore 1525 printer.

### **SUMMARY**

In the past, one of the major limitations of the Commodore 64 was its limited set of BASIC commands. Simons' BASIC opens up a new world for the Commodore 64. Programs that would have required a long list of POKEs and PEEKs are executed with a few simple commands. The documentation is excellent with a sample of each command. The program consumes 8k of memory but still leaves over 30k available for BASIC programs.

**64 Forth  
HES****\$37.95 Disk/Tape****GENERAL CRITERIA**

- C Overall rating
- B Price/  
Performance
- A Ease of use
- B Vendor support
- B Documentation
- B Error handling

**FEATURES**

- + Compiler
- + Interpreter
- Extended BASIC
- Error listing
- + Monitor
- Editing utilities

**FEATURES**

- Step execution
- Block move
- + Hunt
- Screen/Editor
- Breakpoints

**SPECIFIC CRITERIA**

- C Usefulness
- C I/O handling

**DESCRIPTION**

A cartridge version of FIG Forth with several extensions for the Commodore 64. The editor is a combination line-oriented editor and screen editor. The Forth source screens are arranged in the traditional 64 × 16 Forth format. In order to accommodate these 64-character lines on the 64's 40-character display, the screen editor scrolls horizontally whenever the cursor moves past the mid-point on the screen. The only real disadvantage to this arrangement is that it is impossible to see the entire editing screen at one time. In practice, this turns out to be a minor nuisance. The line editor contains all the usual search and replace type functions one expects in this type of package.

**USEFULNESS**

Both editors are available at the same time with the screen editor at the top and the line editor at the bottom of the 64's display—a clever arrangement! A rather crude sprite editor is included. Sprites are edited on a screen grid and can be automatically saved to Forth screens for later use in a program. There are no high resolution graphics routines in the language at all. A standard Forth 6502 assembler is included for in-line assembly language coding.

**I/O HANDLING**

Source code may be saved either to a disk or a cassette. On disk, the screens are saved as relative files. This arrangement makes it rather fast (for a 1541) to retrieve any given screen. Since each source program can be saved in a separately named file, one of the major objections to Forth disk handling is overcome.

## SUMMARY

The one serious drawback to this version of Forth is that it is cartridge-based. This means that compiled programs can be run only by those who have the cartridge. We hope that HES will also distribute a developers' version to remedy this. The documentation is thorough even though it is rather uneven at points. Other books will definitely be needed by the Forth novice. Some points are down right confusing; e.g., references to the entry points on a KIM computer. As is usual in Forth packages, the meaning of every word in the language dictionary is defined.

<b>ULTRA BASIC</b>		<b>\$42.95 Disk</b>
<b>Abacus Software</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	- Compiler	- Step execution
B Price/Performance	- Interpreter	- Block move
B Ease of use	+ Extended BASIC	- Hunt
B Vendor support	- Error listing	- Screen/Editor
B Documentation	- Monitor	- Breakpoints
C Error handling	- Editing utilities	
<b>SPECIFIC CRITERIA</b>		
B Usefulness		
B I/O handling		

### DESCRIPTION

ULTRABASIC 64 is a language extension that adds turtle, hires, multicolor, and sprite graphics as well as sound commands to the 64. You can easily draw, plot, color areas, control sprites, and much more. Commands can be used in direct or programmed mode to create beautiful designs. Children will especially enjoy learning to program using the turtle to draw landscapes or mathematical designs.

### USEFULNESS

You no longer have to use tedious PEEKS and POKES to produce sights and sounds. Easy to understand commands produce startling and beautiful screen effects that add a new dimension to the 64. Tutorial screens help you to learn ULTRABASIC with the help of the documentation provided. The tutorial screens are complete enough to start you programming in your first hour at the keyboard. A final bonus is that the screen can be dumped to an Epson or Commodore printer. ULTRABASIC is a very strong program that does everything the ads claim.

### I/O HANDLING

I/O is handled like BASIC.

### SUMMARY

We recommend ULTRABASIC highly to anyone wanting easy graphic and sound commands. It is a fun program that has serious applications in mathematics, education, recreation, and computer science. Even simple programs can produce visuals and sound effects that will amaze anyone. It has great potential for teaching programming skills to children who can quickly master the commands. The instant program testing motivates you to try experiments and stimulates creative thinking.

<b>VICTREE</b>		<b>\$89.95 Cartridge</b>
<b>Skyles Electric</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	- Compiler	+ Step execution
C Price/	- Interpreter	- Block move
Performance	+ Extended BASIC	+ Hunt
B Ease of use	- Error listing	- Screen/Editor
C Vendor support	+ Monitor	+ Breakpoints
A Documentation	- Editing utilities	
C Error handling		
<b>SPECIFIC CRITERIA</b>		
B Usefulness		
B I/O handling		

### DESCRIPTION

VICTREE is a ROM-based program that upgrades Commodore 64's 2.0 BASIC to 4.0. Forty-two commands are added, giving expanded control of disk drive, printer, program editing, and debugging. The program may stay plugged into the 64 constantly; it is software controllable on or off.

### USEFULNESS

VICTREE permits easy command of peripherals, editing, and debugging. The commands are as natural to use as BASIC; they are fast responding and user transparent. Users experienced with the older Commodore computers that have 4.0 ROMs will enjoy the old trusted command sequences, and new users will soon feel comfortable and in charge. VICTREE has few faults. One irritation is the memory overhead of 8K when the program is not engaged. The trade-off between memory overhead and instant access to expanded controls must be weighed by the potential buyer. It also reduces space above \$C00 which is prime property for machine language programs.

### I/O HANDLING

VICTREE acts like BASIC (for which it is an extension) and handles I/O in the same manner.

### SUMMARY

VICTREE is an expensive BASIC language extension cartridge. The value of having 4.0 BASIC in the Commodore 64 is a decision to be made by the buyer. It works well but reduces BASIC programming space by 8K. In the 64 that may not be a drawback except for very large programs or for programs needing the same ROM space. It does simplify disk operations greatly, and the debugging commands offer true user convenience. If you are looking for a single package to expand BASIC, VICTREE should be considered.

<b>ZOOM PASCAL</b>		<b>\$39.95</b>
<b>Abacus</b>		
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	+ Compiler	- Step execution
A Price/	- Interpreter	- Block move
Performance	- Extended BASIC	+ Hunt
C Ease of use	+ Error listing	+ Screen/Editor
B Vendor support	+ Monitor	- Breakpoints
D Documentation	- Editing utilities	
D Error handling		
<b>SPECIFIC CRITERIA</b>		
C Usefulness		
C I/O handling		

### DESCRIPTION

Zoom Pascal is a subset of standard Pascal which compiles a source program into 6502 machine code, rather than the P-code used by many other versions of the language. The package comes with an editor, a P-code compiler, and a translator program which converts the P-code into the runtime package. The compiler program is the only one of these that is copy protected so that the editor and translator can be moved to your work disk.

### USEFULNESS

The editor has a rather strange assortment of single-letter commands which allow for its use as a traditional line editor. All files must be disk-based and are stored as sequential files. Any other editor that uses this format may be substituted. There is a "window" mode which does allow some screen editor functions. However, it can be frustrating to use at times. A carriage return always erases everything to the right of the cursor—a feature that is common on some terminals but unusual and unexpected on the Commodore 64. It is impossible to add to the end of the file in the "window" mode, though lines can be opened up within the body of the text to make room for more data. Compiling a program is a very simple procedure. The compiler just asks for the name of the file and whether or not to list to printer. After it is done, you are given the choice of running the interpreter. If you answer yes, the end result is a runtime program which can be SAVED or LOADED with the standard BASIC commands.

### I/O HANDLING

Access to all the file types on the Commodore disk, cassette, and printer is quite straightforward and easy to use. Unfortunately, no support is given directly in the language for the graphics and sound capabilities of the 64.

## SUMMARY

The documentation is terrible! If a person already knows Pascal, then it may not be too difficult to pick up this version. But a neophyte will have a hard time as very little information is given on most of the commands of Pascal. In the same vein, very little is mentioned about memory usage even though the compiler and translator give cryptic messages about the ratio of P-code to 6502. We bought the language with the idea of using it for some graphic projects. But we are not sure where we can safely put the matching language routines, bit maps, sprite maps, etc., so that Pascal will not interfere with them. Except for the documentation and the editor, we would rate this as a decent program if one does not need some of the fancier features of a full Pascal.

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**Worksheet for Higher Level Language Development**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

- Overall rating
- Price/Performance
- Ease of use
- Vendor support
- Documentation
- Error handling

**SPECIFIC CRITERIA**

- Usefulness
- I/O handling

**FEATURES**

- Compiler
- Interpreter
- Extended BASIC
- Error listing
- Monitor
- Editing utilities

**FEATURES**

- Step execution
- Block move
- Hunt
- Screen/Editor
- Breakpoints

*Description*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Usefulness*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*I/O Handling*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Summary*— \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

<b>COMPARISON CHART</b>	
<b>PRODUCT NAME</b>	<b>RATINGS FOR CRITERIA AND FEATURES</b>
	OVERALL RATING
	PRICE/PERFORMANCE
	EASE OF USE
	VENDOR SUPPORT
	DOCUMENTATION
	ERROR HANDLING
	USEFULNESS
	I/O HANDLING
	COMPILER
	INTERPRETOR
	EXTENDED BASIC
	ERROR LISTING
	MONITOR
	EDITING UTILITIES
	STEP EXECUTION
	BLOCK MOVE
	HUNT
	SCREEN/EDITOR
	BREAKPOINTS
	PRICE
BASIC AID	A A B B B B A A - - - - + - - - \$29.95
BASM	B B B C C B B B + - - - - - + - - - \$99.95
EDITOR PACK	B B B B C C B C C - - - - - - + - - - \$29.95
FORTH	B A A B B B A B B + + - - - - - - + - - - \$37.95
THE LAST ONE	A B B B B B A C C - - - - - - + + - - - \$100.00
MASTER 64	A B B B B B A B B - - - - - - + + - - - \$84.95
PETSPEED	B C D B D C A B B + - - - - - - - - - \$150.00
SCREEN EDITOR	B B C C D C B B - - - - - - - - - + - - - \$29.95
SCREEN- GRAPHICS-64	B A A A B A B C - - - + - - - - - - - - - \$24.95 T \$27.95 D
SIMONS' BASIC	A B B B A A A A - - - + - - - - - - + - - - \$29.95
64 FORTH	C B A B B B C C C + + - - - - - - + - - - \$37.95
ULTRA BASIC	A B B B B C B B B - - - + - - - - - - - - - \$42.95
VICTREE	B C B C A C B B B - - - + - - - - - - + - - - \$89.95
ZOOM PASCAL	C B C B D D C C + - - - - - - - - - + - - - \$39.95



# 8 MUSIC

## Introduction

The Commodore 64 contains a 6581 Sound Interface Device (SID), an advanced programmable sound synthesizer. It can produce music in a nine-octave range and alter various parameters of the music to provide a wide variety of sound effects.

Our perception of sound comes from a complicated auditory system of bones and nerves within the inner ear. The ringing of a bell or the blowing of a whistle generates vibrations that are transmitted through air to our ear. The eardrum and bones of the inner ear begin vibrating and generate the sensations that we perceive as hearing a sound. The 6581 Sound Interface Device, in conjunction with a speaker, can also generate vibrations that are transmitted through the air. The Sound Interface Device, unlike a bell or whistle, can vary many of the parameters that create the vibrations and thus change our perception of the sounds generated. The rate and volume of the vibrations can be controlled. The rate of frequency actually determines the tone or note that is generated.

Up to nine octaves of notes can be produced from the Commodore 64. As the speaker vibrates, it compresses the air in vibrating patterns that are transmitted to our ear. The shape of a sound wave also affects our perception of a sound. The Commodore 64 can produce four separate waveforms to alter the tone of a sound. The volume of a tone changes from the moment we first hear it until it dies away.

If we were to isolate a single tone, we could distinguish four separate parts. The part of the tone as it goes from zero volume to its maximum volume is referred to as the attack. The volume then drops off to a mid-range value. This initial decrease in volume is called the decay. The period of time the tone remains in this mid-range is called the sustain level. Finally, the period of time while the note falls to no volume is called the release. The SID can be programmed to alter all four of these parameters independently and thus generate countless variations of a single note. The SID can also be programmed to filter out frequencies above or below a certain limit. If this is more than you care to know about the SID, it only serves to emphasize the complexity of developing music on the Commodore 64 without music development software.

There are two types of software to simplify music development. One type adds BASIC commands, which alter a parameter or group of parameters with a single command. Rather than having to go in and POKE values into various

registers in the SID, an extended BASIC command will accomplish the same thing for you. Any program that offers extended BASIC commands for music development will be in the chapter on Program Development.

The second type of music development software allows you to create music without knowing programming at all. Some turn the keyboard of the Commodore 64 into a piano keyboard with different keys producing different notes. Some create music with straightforward English commands rather than through BASIC programming. Many of these programs enhance the sound with graphics. This type of software will be found in this chapter.

## ***Specific Criteria***

A set of specific criteria has also been established for music development programs so that they may be compared to and contrasted with each other to evaluate their usefulness and applicability. These specific criteria are as follows: **MUSIC DEVELOPMENT**—This refers to the way a program lets you create a composition or emulate a musical instrument, how you set the parameters for the SID, and the editing commands incorporated into the program that facilitate creation of good quality compositions.

**MUSIC QUALITY**—Although quality of music is very subjective and depends a great deal on how you implement the features of a program, there are still some limitations that a program may impose, by virtue of the lack of a specific feature(s). Conversely, a program might present you with many features that collectively add to the versatility of the program and enhance the quality of the music that is capable of generating.

**SPECIAL EFFECTS**—In a musical composition, you may create special effects to emulate a variety of musical instruments like the slide guitar, violin, piano, etc. Some programs will also use the Noise feature of the SID to create a rhythm effect that can be played along with three other voices (instruments) to sound like a synthesizer. Besides music, other special effects can be created, depending upon the versatility of the program.

## **Glossary**

**ATTACK**—A musical tone usually reaches a maximum volume, then fades to a middle volume, and then dies away. The rate at which it reaches its maximum volume is called the attack.

**DECAY**—A musical tone usually reaches a maximum volume, then fades to a middle volume range, and then dies away. The rate at which it falls from its maximum volume to its mid-volume is called the decay.

**FILTER**—Sound is usually made up of many frequencies. A filter will cut down the volume of a specified range of frequencies. A high-pass filter allows higher frequencies to pass unaltered. Lower frequencies are reduced in volume. A low-pass filter allows lower frequencies to pass unaltered while higher frequencies are reduced. A bandpass filter allows the frequencies close to a specified frequency to pass unaltered. The further away from that specific

frequency, the more the volume is reduced. A notch filter passes all frequencies, except a narrow band around some specified point.

**HARMONIC**—A harmonic of a frequency is another frequency that is an integer multiple of the original. The second harmonic of frequency 240 is a frequency at 480 cycles per second.

**MULTIPLE VOICES**—Sound on the Commodore 64 is produced using oscillators. The SID in the Commodore 64 contains three independently controlled oscillators, referred to as voices.

**PITCH CONTROL**—The pitch of an instrument or the musical output of the Commodore 64 may be altered to maintain harmony with another instrument if the two are being played together.

**RELEASE**—A musical tone usually reaches a maximum volume than fades to a middle volume and then dies away. The rate at which it dies away from its mid-volume level is called the release.

**RING MODULATION**—A process of logically ANDing two separate voices. This process alters the harmonic structure of a tone.

**SUSTAIN**—A musical tone usually reaches a maximum volume then fades to a middle volume range and then dies away. The duration of time during which it remains in a mid-range level is called the sustain level.

**TIMBRE**—A note is comprised of a frequency and its harmonics. Timbre refers to the difference in the tonal quality of sound which is brought about by varying the amount of each harmonic in a note.

**WHITE NOISE**—A sound produced by mixing random frequencies. The sound resembles the background interference of a distant radio station.

**MusicCalc I**  
**Waveform Corp****\$74.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Music	8 Octaves
A Price vs Performance	development	3 Voices
B Ease of use	A Music quality	4 Waveforms
A Vendor support	A Special effects	+ Rhythm + accompaniment
A Documentation		+ Disk Load/Save
A Error handling		+ Tempo select + Pitch select

**DESCRIPTION**

This is probably the best music development system available for the Commodore 64 at this time. For each of the three voices you can control the ADSR envelope, the waveform, the pulse width, and the ring modulation effects. You can synchronize each voice to another and create filtering effects on all three voices. You can create and save music by using the keyboard as you would use the keys on a piano. You can then play back what you have created and add a second and third set of notes.

**MUSIC DEVELOPMENT**

There are essentially two modes of operation with MushiCalc. In the first mode you set the controls that affect the type and quality of sound. Each of the three possible voices can have their own independent settings. A multimode filter affects all three voices. Some of the settings allow you to combine voices. For instance, you can have one voice ring modulate another or synchronize one voice from another. A graphical display on the left half of the screen allows you to view your settings at any time.

In the second mode of operation you can press keys on the keyboard and generate sounds. You designate the scale you wish to generate from the keyboard. Included are simple major and minor scales, blue's scale, whole tone scale, and an assortment of preprogrammed scales. You can also create your own scale. Once a scale has been selected you can play and save a pattern of notes. You can have a pattern repeated over and over again to create a tempo or bass line. Once you have saved a pattern you can play it back and make alterations as you play. While listening to one voice you can introduce a second pattern and save it as well. Then while playing both voices simultaneously you can introduce a third pattern from the keyboard.

**QUALITY**

This program gives you nearly full control of the SID chip. The ability to combine various settings and to change settings in the course of play allows you to take full advantage of the Commodore 64's musical potential.

## **SPECIAL EFFECTS**

In addition to playing and saving music from the keyboard it is possible to enter musical notes by letter and scale. You take a sheet of music and convert it note by note to play on MusiCalc and then set filters and ring modulators to produce your own music.

## **SUMMARY**

This is probably the most versatile music development system available for the Commodore 64, however there is a maximum length of 240 steps that can be created in a single score. Waveform Corp is also producing MusiCalc 2 that will run in conjunction with MusicCalc I and allow you to link up to 32 scores together. In addition MusiCalc 2 will allow you to print out the musical score on a dot matrix printer. Waveform is also in the process of developing a series of preprogrammed scores that will play in conjunction with MusiCalc I.

**Music Construction Set  
Electronic Arts****\$39.95 Diskette**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
A Overall rating	A Music	8 Octaves
A Price vs Performance	development	3 Voices
A Ease of use	A Music quality	4 Waveforms
A Vendor support	B Special effects	+ Rhythm accompaniment
A Documentation		+ Disk Load/Save
A Error handling		+ Tempo select
		+ Pitch select

**DESCRIPTION**

The Music Construction Set is a system designed to let you write your own music. Using a joystick, the Koala Pad or the cursor keys you move notes onto a blank line of music. You choose the type and duration of the note to be played and the adjust the volume, pitch, and tempo. When you are satisfied with the score you created, it can be played as each note is displayed on the screen.

**MUSIC DEVELOPMENT**

This is an excellent tool for writing music. You can create your own score using up to three voices simultaneously to produce chord-like tones. There are 13 preset types of sounds. Rather than changing ADSR and filter parameters you choose from the 13 preset sounds and you can introduce notes one at a time or replicate groups of notes in a special replicate mode. This replicate mode can be used to create a repeating base (or bass as in music bass line?) or tempo.

**MUSIC QUALITY**

There are 13 preset sounds which limits the range of sounds produced. However this greatly simplifies the process of developing music.

**SPECIAL EFFECTS**

When you are satisfied with the score you have produced the program can print a copy of the score on the 1541 printer.

## SUMMARY

This program is not designed to utilize the full extent of the SID chip, although there is wide range of types of sounds produced the program is really aimed at facilitating the writing of musical scores. Creating music is as easy as pointing to a note on the screen and then moving the cursor to a position on the staff. You can point to quarter notes or whole notes or eighth notes to produce various beats. You can have up to three notes played simultaneously. A background rhythm can be created and then replicated quickly and conveniently across the whole score. You can then write on top of the background music to create your own melody. At forty dollars this is one of the real bargains for musicians.

<b>Music Machine Commodore</b>		<b>\$19.95 Cartridge</b>
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
C Overall rating	B Music development	8 Octaves
C Price vs Performance	C Music quality	3 Voices
A Ease of use	B Special effects	4 Waveforms
B Vendor support		+ Rhythm accompaniment
B Documentation		- Disk Load/Save
A Error handling		+ Tempo select
		+ Pitch select

### DESCRIPTION

A cartridge-based music generator program.

### MUSIC DEVELOPMENT

Music Machine lets your computer emulate a piano. As you type or press the keys on the keyboard, the program plays the corresponding note and simultaneously displays it on the screen in the standard musical notation. You can select the octave, voice, and waveform of the note that you want to play by using special predefined keys. Music Machine does not provide any facility to save or load compositions.

### MUSIC QUALITY

The music created by this program is not exceptional in quality, although it is entertaining and easy to play.

### SPECIAL EFFECTS

Music Machine incorporates rhythm accompaniment via the F1 key. So while you are playing one to three voices simultaneously, the program will provide a soft rhythm, the tempo of which you can control by using the function keys.

### SUMMARY

Music Machine is a fun program that, unfortunately, does not incorporate many sophisticated features of the SID. It emulates a piano and has an exceptionally clear display of musical notes on the screen which may be helpful to someone interested in learning musical notation.

**Note Pro II**  
**Electronic Lab Industries**

**Price \$49.95/(Disk)**

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Music	8 Octaves
B Price vs Performance	development	3 Voices
B Ease of use	A Music quality	4 Waveforms
A Vendor support	B Special effects	+ Rhythm accompaniment
C Documentation		+ Disk Load/Save
A Error handling		+ Tempo select
		- Pitch select

**DESCRIPTION**

A music editor.

**MUSIC DEVELOPMENT**

The Note Pro II lets you create music in the create mode and edit prestored compositions in the display/edit mode. You can edit any eight-measure section of the music in memory. You may also choose one of three available voices. Once the program displays the notes, you can make the desired changes using the cursor keys, the pre-defined special character keys (<SHIFT> Q, etc.) and the space bar. You can also input your own notes by positioning the cursor to the desired row and column on the screen. Once the notes for a voice are entered, you may assign any one of the eight octaves available to that note.

Sections of music can also be played in any order, irrespective of their position in memory. Flags are placed at the beginning and end of each section to specify its order. Sections may also be saved on disk or tape by specifying which sections you want to save.

To set the SID parameters, a preset file is available that lets you alter the values of the ADSR envelope (Attack, Decay, Sustain, and Release), wave shape, ring modulation, and filter settings. The file contains a list of all input values and you can choose the function that you would like to set from the menu. Once the preset file has been completed, you can also save it on tape or disk by specifying the device number.

**MUSIC QUALITY**

The music quality of Note Pro II's generated compositions is greatly enhanced by its ability to support syncopated and polyrhythmic compositions. You can create notes of any duration. ADSR settings can also affect the rhythm of a composition (refer to the documentation for more details on this effect).

## **SPECIAL EFFECTS**

Using Note Pro II, you can create a variety of sound effects other than music, such as a ringing bell effect and white noise (gun shot, explosion, etc). The program features high speed plays (up to 450 notes per second), which is very useful in creating sound effects for games.

<b>Synthy 64</b>		<b>\$32.95/Diskette</b>
<b>Abacus</b>		
<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
B Overall rating	B Music	8 Octaves
B Price vs Performance	development	3 Voices
C Ease of use	A Music quality	4 Waveforms
B Vendor support	B Special effects	+ Rhythm accompaniment
B Documentation		+ Disk Load/Save
A Error handling		+ Tempo select
		+ Pitch select

**DESCRIPTION**

Synthy 64 is designed to make the control of the SID chip more convenient. Each of the parameters that control the chip can be altered with one or two letter commands. These commands can be entered sequentially into programs to create original musical compositions.

**MUSIC DEVELOPMENT**

Each note is identified by a letter and an octave number, for instance. A5 would produce note A on the 5th octave. The tempo is determined by the letter T followed by the number of quarter notes played per minute. Individual notes can be assigned their own duration and rests can be introduced as well. Three voices can be played simultaneously by using special prefixes in front of the notes played. You can alter the ADSR envelope, the waveform, the volume, the ring modulator, the filter type and frequency, and the resonance in a similar fashion by using two or three letter codes to initiate a particular setting.

**MUSIC QUALITY**

All of the parameters for the SID chip can be controlled with Synthy 64. Finding the parameters to generate the sound you desire is left to you.

**SPECIAL EFFECTS**

A special trace command allows you to view each instruction as it is played. A listing of your commands can be printed on a 1525 printer. This command allows you to locate errors and make appropriate changes.

**SUMMARY**

This program essentially expands the list of BASIC commands recognized by the Commodore 64. Commands used by Synthy 64 are written in the same format as BASIC with a line number preceding each command. You can run

and list a Synth 64 program just as you would a BASIC program. Unfortunately generating a Synth 64 program can be extremely complicated. Although there are replicating commands that allow you to repeat groups of notes, it becomes quite confusing attempting to produce a lengthy score. Some parameters interact with each other in peculiar ways and it is difficult to keep track of changes you may introduce into the program. Although Synth 64 allows you to make full use of the SID chip, be certain you are a dedicated programmer before you attempt to use it.

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**Worksheet for Music**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

<b>GENERAL CRITERIA</b>	<b>SPECIFIC CRITERIA</b>	<b>FEATURES</b>
Overall rating	Music development	Octaves
Price vs Performance	Music quality	Voices
Ease of use	Special effects	Waveforms
Vendor support		Rhythm accompaniment
Documentation		Disk Load/Save
Error handling		Tempo select
		Pitch select

*Description*— \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Music Development*— \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Music Quality*— \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*Special Effects*— \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**COMPARISON CHART**

**PROGRAM NAME RATINGS FOR CRITERIA AND FEATURES**

	OVERALL RATING	PRICE VS PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	MUSIC DEVELOPMENT	MUSIC QUALITY	SPECIAL EFFECTS	OCTAVES	VOICES	WAVEFORMS	RHYTHM ACCOMPANIMENT	DISK LOAD/SAVE	TEMPO SELECT	PITCH SELECT	PRICE
MUSICALC I	A	A	B	A	A	A	A	A	A	8	3	4	+	+	+	+	\$74.95
MUSIC CONSTRUCTION SET	A	A	A	A	A	A	A	A	B	8	3	4	+	+	+	+	\$39.95
MUSIC MACHINE	C	C	A	B	B	A	B	C	B	8	3	4	+	-	+	+	\$19.95
NOTE PRO II	B	B	B	A	C	A	B	A	B	8	3	4	+	+	+	-	\$49.95
SYNTHY 64	B	B	C	B	B	A	B	A	B	8	3	4	+	+	+	+	\$32.95

# 9

# GRAPHICS

## INTRODUCTION

The Commodore 64 has several features built into the computer to facilitate the design and display of pictures on the screen. Perhaps the most apparent feature is the 62 PET graphic symbols on the keyboard. When the computer is first turned on it is in the standard upper case/graphics mode. Pressing the shift key in conjunction with a character key will display the graphic symbol to the right of the key. For example, pressing the letter Q along with the shift key will result in the display of a small solid circle on the screen (identical to the one on the front right of the Q key). Pressing the special Commodore (C=) key located in the lower left corner of the keyboard in conjunction with a character key will display the picture to the front left of the key. Using standard BASIC programming techniques, these PET graphic symbols can be combined to create larger visual displays on the screen. With a little imagination you can create elaborate pictures, designs, geometrical shapes, etc.

There is also a second mode of operation available on the Commodore 64 to facilitate drawing of detailed graphics displays. Since the images are created in high resolution in this mode as compared to the standard mode, this is frequently referred to as the high resolution mode (or the bit map mode).

The video display on the screen of your TV or video monitor attached to the computer is composed of over 64,000 small dots of light called pixels. At a close glance, you can discern the individual pixels, but from a distance they appear to be continuous.

In the high resolution mode you can turn each of these pixels on or off individually. No longer are you confined to the shapes provided by the PET graphic symbols. Now you can create elaborate detailed graphics. You can still choose any of the 16 colors available on the Commodore 64, although the resolution of the screen drops when you begin multicolor displays.

Programming in high resolution can get a little tricky. It is possible to create high resolution graphics on your Commodore 64 with the limited number of BASIC commands that are available with the operating system of your Commodore 64, but this requires extensive use of the PEEK and POKE commands as well as numerous DATA statements. Furthermore, it is very slow and tedious.

A number of existing programs can simplify the process. They extend the number of BASIC commands available to you to create high resolution graphics without any PEEKs and POKEs. These programs are loaded into memory, and they generally reside in locations that do not interfere with BASIC programs. They alter the operating system of the Commodore 64

slightly so that the BASIC interpreter can understand the new commands. For example, a program may use a LINE command. When using the LINE command in a program, you specify the parameters of the line in the form of its position along the X and Y axes, and the BASIC Interpreter will know that you want to draw a line on the screen along those points. Similarly, many other commands can be added to the BASIC of the Commodore 64 that facilitate creation of graphic images for those with very little programming experience.

Since these programs are designed to help you in developing your own BASIC programs with added commands, they have been reviewed in section 7.2 High Level Languages.

We can also take high resolution one step further. Imagine turning on certain dots on the screen to form the shape of a cat. Imagine then changing the pattern of dots so that the cat's legs are slightly ahead of those in the previous picture. If you repeat this process in rapid succession, the cat will appear to walk forward on the screen. This is referred to as animation. It is a technique used for many years in the creation of cartoons. The computer, with its graphic capabilities and high speed operation, is an ideal tool for creating animation.

The Commodore people have gone to great lengths to facilitate animation. Ordinarily, to get that cat to walk across the screen would require the creation of hundreds of high resolution screens. Your Commodore 64, however, can handle the movements of these images through the use of moveable object blocks commonly known as sprites. Sprites can be moved horizontally or vertically on the screen without recreating multiple high resolution screens. The initial process of creating a sprite can also be a difficult exercise in programming, but the sprite generator programs are designed to simplify the operation.

Visual displays are a convincing tool in business and education. The creation of animated displays can be both useful as well as recreational. It is not necessary to learn BASIC programming to create graphic displays. There are many programs available that prompt you for information or provide convenient methods for developing displays without any knowledge of BASIC. Perhaps the most useful application is the development of graphs.

Graphs have long been an active part of business report presentations. They can convert rather boring statistical information into creative displays. These displays are much easier to remember than text and seem to have a greater impact on potential customers. With these programs, you can create pie charts and line and bar graphs by simply specifying the upper and lower limits of the axes and the parameters that you would like to plot. The program will automatically create the appropriate graph on the screen and, depending upon the program, enable you to print it. These programs are often referred to as graphing programs.

There are also a number of programs that incorporate special hardware, such as a lightpen or a special graphic tablet. These programs must have the specific hardware with which they are designed to work. Generally, graphics is only one of many applications for which the hardware may be used, and most

vendors include suggestions on how you could use that hardware in your own programs.

Based upon their primary application(s), there are four general categories of graphics programs available for the Commodore 64. The categories are as follows:

**1. GRAPHICS PROGRAM DEVELOPMENT AIDS**—These programs aid in the development of graphics programs, a feat accomplished in a number of ways. Generally these programs add extra commands to Commodore's BASIC interpreter—commands that can be directly implemented in a BASIC program to create graphics. These commands address small machine language subroutines that generate graphics images in the modified interpreter. They are usually simple commands, such as DRAW, CIRCLE, BOX, FILL, etc.

Reviews of these programs are included in Chapter 7 on Program Development Aids.

**2. GRAPHICS GENERATOR**—These programs are designed for creating high resolution graphics images through the keyboard, joysticks, lightpen, or a special graphics tablet interfaced with the computer. They simulate the process of drawing or painting. You can select color, paint brush, drawing mode, and many other options through the menu.

**3. SPRITE DESIGNER**—These programs aid in the development of sprites. Sprites (moveable object blocks) are small objects that the Commodore 64 handles in a very special way. They are created using special programming techniques and the computer is capable of directing their movements across the screen, thereby creating animation effects. Sprite designer programs help you create sprites by drawing them on grids. Depending upon the program, they will transfer these sprites to your BASIC programs in which you want to create animation (for example a game that you are writing), or they will provide you with numeric data (defining the sprite) that you can use in your program. You can also save sprites, load them from disk, view them, modify them, enlarge them—all depending upon the particular program that you are using.

**4. GRAPH GENERATOR**—These programs specifically generate line graphs, bar graphs, pie charts, etc. They require you to input the parameters and will display on the screen or printer the particular graph that you specify.

## ***Specific Criteria***

In evaluating the different types of graphics programs available for the Commodore 64, we considered the following criteria to be useful:

**GRAPHIC QUALITY**—When you buy a graphics program, you may be interested in creating graphs and pie charts for your business, sprite animation

for your games, engineering designs for school, or just plain doodling for fun. Whatever the interest, you will want the program to enable you to create high quality graphics. Some programs offer a number of features and functions more than others to facilitate this. For example, you can instruct a program to draw a geometric shape (a circle or a square) on the screen and fill it with a specified color using simple commands or function keys. In order to accomplish this by using a joystick or a lightpen might take you hours.

Similarly, some graph generator programs will offer higher resolution than others and will let you create many different types of graphs and charts using simple commands and data input statements. In this category, we attempt to evaluate the general effectiveness of a program with respect to the applications that it is designed for.

**PRINT FUNCTION**—The display of the graphics drawings on your TV or monitor screen is often not sufficient—especially if you want to create a report using computer-generated graphics. Surprisingly, many graphics programs do not offer any facility to allow you to print the graphics designs on paper. Programs that do offer this feature restrict the facility to a particular brand of printer. For that reason it is very important to know exactly which printers a particular graphics program is capable of using. Generally, a graphics package for the Commodore 64 is designed to work on the Commodore 1525E printer. If it is possible to configure the package to work on any other printer, we will specify that fact. If there are any limitations to the printed graphs, we will reveal them in this section.

## **GLOSSARY**

**BAR GRAPH**—A graph composed of rectangular sections. The relative lengths of the bars are a reflection of the relative values.

**EDITING CAPABILITY**—This is a feature that allows you to change information previously entered into a graphics package without having to reenter all the information.

**EXPANDED**—This feature indicates that a figure can be expanded in size with a single command.

**FILL IN**—This feature indicates that if a closed shape is created it can be filled with a particular color with a single command.

**FLIPS PAGES**—Some graphs have the capability of storing information for two or more graphs. The ability to flip pages allows you to conveniently view one and then the other without having to reenter information or load more information from diskette.

**GRAPHICS TABLET**—This indicates that the software works in conjunction with a graphics tablet. A graphics tablet is a flat rectangular board upon which you can draw lines and shapes. The line or shape drawn on the tablet appears on the screen of your computer.

**HIGH RESOLUTION**—The Commodore 64 generates a screen of over 64,000 dots of light or pixels. In the High Resolution mode, each dot of light

can be independently turned off or on to create detailed graphical displays and pictures.

**LIGHTPEN**—This small optical device, when placed near the screen of your monitor or TV, can be used to interact with your computer. Some graphical display packages will allow you to create drawings on the screen with a lightpen.

**LINE GRAPH**—A graph composed of dots reflecting relative values. The dots are connected with lines.

**MULTI COLOR MODE**—The Commodore 64 is capable of displaying up to four different colors at a time in the Multi Color mode. In this mode horizontal resolution is diminished. Instead of being able to program each pixel individually, you can program them in pairs. If a program has this capability it is presumed that they also have the standard High Resolution mode.

**NUMBER OF COLORS**—This number indicates how many colors can be presented at one time on a graph.

**NUMBER OF COMMANDS**—This is the number of additional commands that are added to the ones that already exist in the Commodore 64.

**NUMBER OF GRAPHS/SCREEN**—This feature allows you to present two graphs with the same scale simultaneously.

**NUMBER OF ITEMS**—This is the number of values that can be entered on a single graph.

**PIE CHART**—A circular display composed of wedges varying in size.

**PRESTORED IMAGES**—Some programs have pictures already stored in memory. Instead of having to create these pictures, you can simply place them on the screen in the location desired.

**ROTATIONAL**—This feature indicates that a figure can be rotated with a single command.

**SAVE GRAPH**—The ability to save data for a graph onto diskette or cassette to be recalled at a later time.

**SPLIT SCREEN**—This feature indicates that the program allows you to select conveniently between a high resolution display screen and the screen where your BASIC program is displayed.

**SUPERIMPOSED**—This feature indicates that two or more screens can be merged to create a composite screen.

**TRANSLATIONAL**—This feature indicates that a figure can be moved translationally with a single command.

**Banner Machine, The  
Virginia Micro Systems****\$19.95 Diskette**  
(Printer Required)**GENERAL CRITERIA**

B Overall rating

B Price/  
Performance

B Ease of use

A Vendor  
support

A Documentation

B Error handling

**SPECIFIC CRITERIA**N/A Graphics  
qualityA Graphics  
printing**FEATURES**

- Joystick

- Keyboard

- Multi color mode

- Sprites

+ High res graphics

- Multiple brush

+ Screen dump

- Color swap

- Copy image

- Fill color

- Character editor

- Animation

- Create graphs

**FEATURES**

- Help screen

- Lines

- Circle

- Box

- Arcs

- Zoom/Magnify

- Mirror

- Erase screen

- Change cursor  
speed

- Cursor on/off

+ Disk save/load

**DESCRIPTION**

The Banner Machine is a program specifically designed for printing signs (banners) on the Epson and Gemini printers.

**GRAPHICS QUALITY**

The program does not display any graphics on the TV or monitor screen and is strictly designed for printing banners.

**PRINT FUNCTION**

The program is able to generate good quality banners. You can select from a number of fonts available on the system diskette to print the specific characters. The program is simple to use and can print various character sizes, ranging from one inch to eight inches. You can select various options via the function keys. A screen dump command is also offered to print the screen while you are designing the banner so that you have a hard copy of the sign and the options that you chose to create that sign. You can select the width of the border, gap size between characters, and the line formats (right or left justified, etc.) to custom design your printout. You can also select the number of copies of a particular banner that you would like to print, and the program will automatically print that many copies.

**SUMMARY**

The Banner Machine is a very limited application program which only prints banners. However, it is fun to use and can be an asset for amateur organizations, clubs, or anyone who would like to produce a document with an eye-catching banner.

### Graphics Utility

**C-64 Character Editor**  
**Just Another Software Company**

**\$21.95/Diskette**

GENERAL CRITERIA	FEATURES	FEATURES
B Overall rating	- Joystick	- Help screen
B Price/Performance	+ Keyboard	- Lines
A Ease of use	+ Multi color mode	- Circle
A Vendor support	- Sprites	- Box
B Documentation	+ High res graphics	- Arcs
B Error handling	- Multiple brush	- Zoom/Magnify
	- Screen dump	- Mirror
	- Color swap	- Erase screen
	+ Copy image	- Change cursor speed
<b>SPECIFIC CRITERIA</b>	+ Character editor	- Cursor on/off
B Graphics quality	+ Animation	+ Disk save/load
N/A Graphics printing	+ Create graphs	

### DESCRIPTION

The C-64 Multi-color and High Resolution Character Editor is a program designed to create custom characters that may be used for a number of applications in graphics and text processing such as foreign language characters for word processing.

### GRAPHICS QUALITY

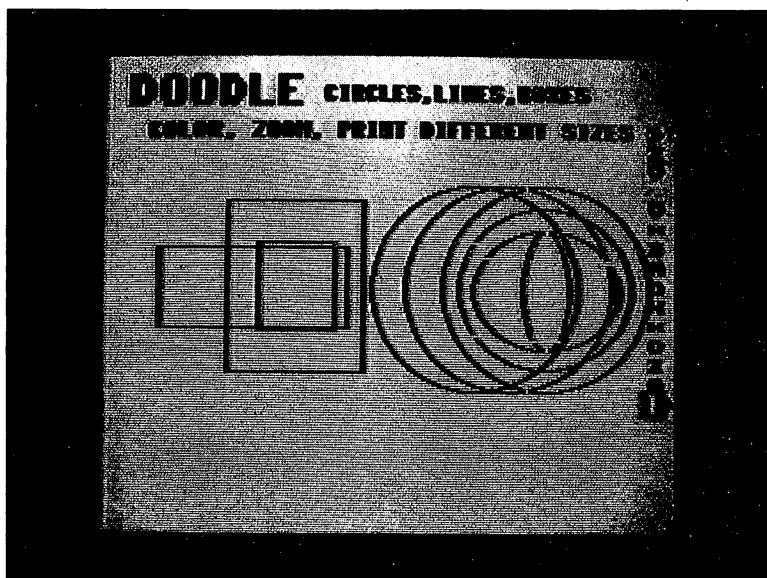
The program allows you to load the standard characters set or any other character set previously created from disk. You can edit each character in the set using the cursor keys and the space bar. Characters are created and edited on an 8×8 grid. Characters may be rotated and shifted within the grid. You can make multiple copies of a character, and a special facility is available in the program to display up to 20 characters in any sequence and frequency that you specify, thereby creating an animation effect. Characters may be saved on disk for use in other programs.

### PRINT FUNCTION

There is no print facility, however, the documentation includes a subroutine that may be used for printing the characters created in the program.

### SUMMARY

The program is designed specifically for creating and editing characters. It can be used for a wide variety of applications (wherever you need a special set of characters).



**Figure 9. Doodle**

<b>Doodle Omni Unlimited</b>		<b>\$39.95 Diskette</b> (Track ball/Joystick)
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	+ Joystick	+ Help screen
A Price/ Performance	- Keyboard	+ Lines
B Ease of use	- Multi color mode	+ Circle
A Vendor support	+ Sprites	+ Box
B Documentation	+ High res graphics	- Arcs
A Error handling	+ Multiple brush	+ Zoom/Magnify
	+ Screen dump	+ Mirror
	+ Color swap	+ Erase screen
	+ Copy image	- Change cursor speed
<b>SPECIFIC CRITERIA</b>	- Character editor	+ Cursor on/off
A Graphics quality	+ Animation	+ Disk save/load
N/A Graphics printing	+ Create graphs	

## DESCRIPTION

Doodle is a high resolution graphics generator program that also has the facility to dump the screen on the printer for a hard copy of your graphics.

## GRAPHICS QUALITY

Doodle is completely menu-driven and very easy to use. It is filled with outstanding features, many of which may be selected via the function keys. Even though you can use a joystick to draw with this program, the best results are obtained by using a trackball. The program allows you to mix text and graphics on the screen so that you can label your drawings. You can print a number of different sizes of characters on your graphics screen and place them in any position you want (upside down, facing right or left, etc.). There are nine paint brush sizes and as many drawing speeds available for drawing graphics on the screen. Once you create an image, you can rotate it in any position that you want, expand and contract it along the x and y axis in a number of sizes, and flip the drawing over the axis to the other side to create its mirror image. There is also a photonegative feature available that reverses the colors of the drawing and the background. This works like a toggle switch and you can flip the colors to observe contrast and clarity.

The program has special graphics routines to draw circles, boxes, ellipses, and lines on the screen. The erase mode is also available to let you erase a line or any other shape from the screen. The program creates a special box (16 × 16 pixels) that may be used for many functions such as draw, fill, and erase.

## **GRAPHICS PRINT**

This is one of the few graphics generator programs that offer a screen dump feature; i.e., it will print the screen graphics. The program is designed to support the Commodore 1525E printer; however, it may be configured for a number of other printers by using a special routine included with the system diskette. Some of the printers that it supports are NEC, Epsoms, Gemini 10x, C. Itoh, and Okidata.

## **SPECIAL FEATURE**

The program has many outstanding features as mentioned above. One that may be mentioned here is its ability to create a grid screen that enables you to draw by using the grids as reference points. The grids may be turned on or off without interfering with the graphics. For those of you who are using the program for business and professional applications such as electronic drafting, this is a very useful feature.

Another feature is the Rubber Stamp mode in which you can create an object and then stamp it anywhere on the screen. Sprites are manipulated in this mode. The program provides the facility to animate sprites on the screen.

## **SUMMARY**

Doodle is by far one of the best graphics generator programs that we have come across for the Commodore 64. It is however only high resolution and not multi color. In fact, it has the highest graphics resolution of all the programs reviewed in this section.

You cannot however get a printout of values or logarithms to show what you did.

<b>K-Paint</b>		<b>\$99.99 Diskette</b>
<b>Koala Technologies</b>		(Koala Pad)
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
A Overall rating	- Joystick	+ Help screen
B Price/Performance	- Keyboard	+ Lines
A Ease of use	+ Multi color mode	+ Circle
A Vendor support	- Sprites	+ Box
B Documentation	+ High res graphics	- Arcs
A Error handling	+ Multiple brush	+ Zoom/Magnify
	- Screen dump	+ Mirror
	+ Color swap	Erase screen
	+ Copy image	+ Change cursor speed
<b>SPECIFIC CRITERIA</b>	- Character editor	- Cursor on/off
B Graphics quality	- Animation	+ Disk save/load
N/A Graphics printing	- Create graphs	

**DESCRIPTION**

The K-Paint is a high resolution graphics generator program designed specifically for use with the Koala Pad—a special touch tablet.

**GRAPHICS QUALITY**

The program generates exceptional quality graphics with ease. The touch tablet is pressure sensitive and uses a small pencil (or a finger) to control the brush on the screen. The position of the pencil on the tablet corresponds to the position of the cursor on the screen. The special graphics features may be selected from the main menu. The program is designed to reduce any keyboard inputs, therefore all selections from the main menu are made by positioning the pencil on the corresponding position on the pad. You can choose the draw mode to draw (or doodle) on the screen. Many outstanding graphics features are also available in the program that facilitate the creation of high resolution graphics. These features may be chosen from the menu and each will draw the corresponding shape (box, circle, line, ray, disk) on the screen at the position that you specify. In the Mirror mode, the program divides the screen into four quadrants and anything that you draw in one quadrant is simultaneously copied by the program in the other three quadrants. In this manner, you have four mirror images of the object that you created. You can swap colors of the images, copy an image at other points on the screen, save the screen on disk, and also load previously saved screens.

**GRAPHICS PRINTING**

Not available.

### **SUMMARY**

The K-Paint program is very well developed and a lot of fun to use. It also lets you create exceptionally high quality graphics with ease. The lack of any graphics print facility is a serious drawback since most serious users will want to print the screen on their printer to keep a permanent copy.

### Graphics Generator

**Paint and Sketch**  
**Tech Sketch Inc.**

**\$39.95 Diskette**  
 (Light Pen)

<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	- Joystick	+ Help screen
C Price/ Performance	- Keyboard	- Lines
B Ease of use	+ Multi color mode	- Circle
A Vendor support	- Sprites	- Box
C Documentation	+ High res graphics	- Arcs
A Error handling	- Multiple brush	- Zoom/Magnify
	- Screen dump	- Mirror
	- Color swap	- Change cursor speed
<b>SPECIFIC CRITERIA</b>	- Copy image	+ Cursor on/off
B Graphics quality	- Character editor	+ Disk save/load
N/A Graphics printing	- Animation	
	- Create graphs	

### DESCRIPTION

The Paint and Sketch program is available free with the purchase of the Tech Sketch light pen. The program demonstrates the performance of the light pen.

### GRAPHICS QUALITY

The program is relatively simple and crude and is not very effective at generating high-quality graphics. It does, however, demonstrate the use of the lightpen available in the package. You can create high resolution graphics using the lightpen. The resolution of the graphics is relatively poor, probably because of the low sensitivity of the lightpen. The program offers only one special graphics command that draws a rectangle on the screen. All options are selected from the screen by using the lightpen. You can erase the screen, save it, and load it from the FILL command, which is also available to fill any enclosed area with one of three available colors.

### GRAPHICS PRINTING

Not available.

### SPECIAL FEATURES

The program demonstrates the use of a lightpen which may be used for a wide variety of applications, including graphics and education.

## **SUMMARY**

Paint and Sketch is a relatively poor-quality graphics program. However, since it is primarily designed to demonstrate the function of the Tech Sketch light-pen, it legitimately may not need to strive to be comparable to some of the commercially available graphics generator programs.

<b>Graphics Generator</b>		
<b>Paint Brush</b> <b>HesWare</b>		<b>\$19.95 Cartridge</b> (Joystick)
<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
C Overall rating	+ Joystick	- Help screen
C Price/Performance	- Keyboard	- Lines
B Ease of use	- Multi color mode	- Circle
A Vendor support	- Sprites	- Box
C Documentation	+ High res graphics	- Arcs
A Error handling	+ Multiple brush	- Zoom/Magnify
	Screen dump	- Mirror
	- Color swap	+ Change cursor speed
	+ Copy image	- Cursor on/off
<b>SPECIFIC CRITERIA</b>	+ Fill color	+ Disk save/load
B Graphics quality	- Character editor	
N/A Graphics printing	- Animation	
	- Create graphs	

## DESCRIPTION

Paint Brush is a high resolution graphics generator program.

## GRAPHICS QUALITY

The program is able to generate graphics of good quality. You can change the brush size and color using simple command keys. It is, however, limited in the graphics features that it offers to aid in the development of good pictures.

## PRINT FUNCTION

Not available.

## SUMMARY

Paint Brush incorporates a very limited selection of special graphics features; therefore, it is not recommended for someone who wants to create high-quality graphics. It suffers from many weaknesses related to the implementation of some of the features. For example, in order to lift the brush off the screen, you are required to press the fire button on the joystick while at the same time moving it away from the drawing. This actually is designed as an erase mode and works by changing the color of the brush to the background color. We found this feature to be very inconvenient when we used it to lift the brush since it quite often erased part of the drawing in the process of lifting the brush. It does seem to work well as the erase feature.

### Graphics Generator

**Picture Perfect  
Ranger Due**

**\$24.95 Diskette  
(Joystick)**

#### GENERAL CRITERIA

- C Overall rating
- C Price/  
Performance
- C Ease of use
- A Vendor  
support
- C Documentation
- A Error handling

#### FEATURES

- + Joystick
- + Keyboard
- + Multi color mode
- Sprites
- + High res graphics
- Multiple brush
- Screen dump
- Color swap
- Copy image
- Fill color
- Character editor
- Animation
- Create graphs

#### FEATURES

- Help screen
- + Lines
- + Circle
- + Box
- Arcs
- Zoom/Magnify
- Mirror
- + Erase screen
- Change cursor  
speed
- + Cursor on/off
- + Disk save/load

#### SPECIFIC CRITERIA

- C Graphics  
quality
- N/A Graphics  
printing

### DESCRIPTION

Picture Perfect is a graphics generator program that uses a joystick or the keyboard to create high resolution graphics on the TV or monitor screen.

### GRAPHICS QUALITY

The program is able to generate high resolution graphics. It allows you to use up to four different pens to draw pictures. Each pen can be redefined to use one of the 16 colors available on the Commodore 64. There is also an erase pen to erase dots or lines. Special graphics commands are available that allow you to create circles, boxes, and lines by using the appropriate command sequence. You can also display text with graphics (to label your drawing or graph). Only one brush size is available in the High Resolution mode.

### GRAPHICS PRINTING

Not available.

### SUMMARY

The program is able to create high resolution graphics; however, it has a few drawbacks. The special graphics commands that are used to draw circles, boxes, etc., are implemented in awkward sequences. For example, in order to use the circle routine, you first move the cursor to the location that is to be the center of the circle; then you press <SHIFT> T, followed by the fire button on

the joystick. You then move the cursor in any direction along the radius of the circle and press the fire button. The program then begins to create a circle.

Another weakness of the program stems from the lack of speed of the graphics generator routines such as circle, box, etc.

### Graphics Generator

**Sorcerer's Apprentice**  
**Event Horizon Software**

**\$49.95 Diskette**  
 (Joystick)

<b>GENERAL CRITERIA</b>	<b>FEATURES</b>	<b>FEATURES</b>
B Overall rating	+ Joystick	+ Help screen
B Price/	+ Keyboard	+ Lines
Performance	+ Multi color mode	+ Circle
B Ease of use	- Sprites	+ Box
A Vendor	+ High res graphics	- Arcs
support	- Multiple brush	+ Zoom/Magnify
C Documentation	- Screen dump	- Mirror
B Error handling	- Color swap	+ Erase screen
	+ Copy image	+ Change cursor
	+ Fill color	speed
<b>SPECIFIC CRITERIA</b>	+ Character editor	+ Cursor on/off
B Graphics	- Animation	+ Disk save/load
quality	- Create graphs	
N/A Graphics		
printing		

### DESCRIPTION

Sorcerer's Apprentice is a graphics generator program that allows you to draw high resolution graphics on the screen using a joystick or the keyboard.

### GRAPHICS QUALITY

The program is able to generate graphics of good quality. You can draw in the Draw mode (high resolution) or the Paint mode (low resolution). The program does not offer multiple brush sizes. It allows you to vary the cursor speed (for drawing slow or fast) and turn the cursor on or off, and you can access a number of graphics features and functions through the keyboard (the control and the function keys). The program has the ability to draw circles, lines, triangles, boxes, and ovals. You can fill any enclosed area with the specified color using the fill function. You can also move images on the screen and create multiple copies of an image or an area of the screen.

### PRINT FUNCTION

Not available. The documentation does provide some helpful hints on accessing the graphics screens (saved on disk) through your own BASIC program if you want to develop a screen dump routine for your printer.

### SPECIAL FEATURES

The program can load and edit character sets to let you define your own character fonts.

## SUMMARY

This is a good program for generating high resolution graphics on the Commodore 64. It has some good features that allow you to create good quality graphics with considerable ease. It, however, lacks the screen print feature which would have been very useful.

**Sprites Designer**

**Spritemaster  
Access Software**

**\$34.95 Diskette  
(Joystick)**

**GENERAL CRITERIA**

- A Overall rating
- A Price/Performance
- A Ease of use
- A Vendor support
- A Documentation
- A Error handling

**FEATURES**

- + Joystick
- + Keyboard
- + Multi color mode
- + Sprites
- High res graphics
- Multiple brush
- Screen dump
- Color swap
- Copy image
- Fill color
- Character editor
- + Animation
- Create graphs

**FEATURES**

- Help screen
- Lines
- Circle
- Box
- Arcs
- Zoom/Magnify
- Mirror
- Erase screen
- Change cursor speed
- Cursor on/off
- + Disk save/load

**SPECIFIC CRITERIA**

- A Graphics quality
- N/A Graphics printing

**DESCRIPTION**

Spritemaster is an excellent sprite generator program that allows you to build sprites using the keyboard or a joystick, animate them, and transfer them in your program.

**GRAPHICS QUALITY**

The program is completely menu-driven. You build sprites on a grid created by the program. You may use the keyboard or a joystick to accomplish that. You can also view a previously created sprite (stored on a disk), modify it, and save it by using the appropriate commands. The program is machine language-driven and very responsive to user commands and inputs. Both single and multi color sprites may be created. The outstanding feature of the program is its ability to animate sprites that you create on the screen. You can also adjust the animation speed for special effects. A programmer's reference section is included in the documentation to provide useful information on using these sprites in your program.

**PRINT FUNCTION**

Not available.

## **SPECIAL FEATURES**

The transfer feature lets you transfer sprite data directly to your program in the form of data statements. You can transfer as many sprites as you want to another program.

## **SUMMARY**

The Spritemaster is an excellent and easy-to-use sprite generator program with some very special built-in utilities for advanced programmers who wish to use sprites in their own programs.

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**Worksheet for Graphics**

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**Product Name** \_\_\_\_\_

**Price** \_\_\_\_\_ **Media** \_\_\_\_\_

**Vendor** \_\_\_\_\_

**GENERAL CRITERIA**

- Overall rating
- Price/Performance
- Ease of use
- Vendor support
- Documentation
- Error handling

**SPECIFIC CRITERIA**

- Graphics quality
- Graphics printing

**FEATURES**

- Joystick
- Keyboard
- Multi color
- Sprites
- High res graphics
- Multiple brush
- Screen dump
- Color swap
- Copy image
- Fill color
- Character editor
- Animation
- Create graphics

**FEATURES**

- Help screen
- Line
- Circle
- Box
- Arc
- Zoom/Magnify
- Mirror
- Erase screen
- Change cursor speed
- Cursor On/Off
- Disk save/load

*Description*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Graphics Quality*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Print function*—\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

*Special features*—

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*Summary*—

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**COMPARISON CHART**

**PROGRAM NAME**

**RATINGS FOR CRITERIA**

	OVERALL RATING	PRICE/PERFORMANCE	EASE OF USE	VENDOR SUPPORT	DOCUMENTATION	ERROR HANDLING	GRAPHICS QUALITY	GRAPHICS PRINTING	PRICE
BANNER MACHINE, THE	B	B	B	A	A	B	NA	A	\$19.95
C-64 CHARACTER EDITOR	B	B	A	A	B	A	B	NA	\$21.95
DOODLE	A	A	B	A	B	A	A	NA	\$39.95
K-PAINT	A	B	A	A	B	A	B	NA	\$99.95
PAINT AND SKETCH	C	C	B	A	C	A	B	NA	\$39.95
PAINT BRUSH	C	C	B	A	C	A	B	NA	\$19.95
PICTURE PERFECT	C	C	C	A	C	A	C	NA	\$24.95
SOURCERER'S									
APPRENTICE	B	B	B	A	C	B	B	NA	\$49.95
SPRITEMASTER	A	A	A	A	A	A	A	NA	\$34.95





## INTRODUCTION

CP/M, short for Control Programs/Microprocessor, is one of the most frequently encountered terms in the personal computer industry. It is an operating system that is available as a standard feature in many business microcomputer systems and as an option in others. The operating system of your Commodore 64 is present in the ROM (Read Only Memory) of the computer. CP/M is different. It resides on disk, commonly referred to as the system diskette, as a collection of programs. These programs may be loaded into any computer which has the appropriate hardware modifications to make it CP/M compatible. Adding CP/M capability to your personal computer can increase its versatility by making it compatible with the world's largest library of business and personal software. In fact, some of the most popular business application programs are written for CP/M-compatible systems.

How do you make your computer CP/M-compatible?

In most personal computers this is accomplished by installing a special microprocessor—the Z-80 chip. Depending upon the specific computer, this means either installing a special board or a plug-in cartridge containing the Z-80 chip. As we shall see, this facility was recently made available for the Commodore 64 computer.

When Commodore introduced its Commodore 64 computer in 1982, it promised CP/M as an option. The ability to run CP/M software was planned to enhance its versatility. For example, this would make languages like FORTRAN and Pascal available for programmers, and applications programs like WordStar, Multiplan, etc., available for businesses.

Now CP/M hardware is available (in cartridge form) from Commodore and third party vendors such as Data 20 Corp. Imagine running popular business programs such as WordStar and SuperCalc on your Commodore 64 or accessing the CP/M public domain library (which boasts a collection of over 80 volumes of programs) for free software that will greatly enhance the versatility of your Commodore 64 computer both in business and at home. All this and more is now possible, with the simple installation of the Z-80 microprocessor.

Before we explore the CP/M software for the Commodore 64, we would like to briefly discuss the concepts of CP/M as an operating system. CP/M is a disk-based operating system developed for the Z-80 and 8080 based microprocessors. It is a collection of programs available on a system diskette that is loaded into a computer at the initial start-up. It is functionally similar to the operating system of the Commodore 64 in that it coordinates the various

functions of the host computer. While the Commodore's operating system is built around BASIC, CP/M has a machine language monitor that adds to the processing speed and versatility of the host computer. It also takes up less memory and runs faster than BASIC.

The most exciting feature of CP/M, however, is its universal nature. Since it is disk-based, it may be loaded into a computer during initial start-up, and you can execute virtually any CP/M program on that computer with little or no modification. CP/M programs are, therefore, independent of the machines on which they have been developed. The only requirement that must be met to be able to run a CP/M program on your Commodore 64 is that it be formatted for the Commodore 1541 disk drive. Technically, a program must meet two general requirements in order for it to be executable on the Commodore 64 under the CP/M operating system: (1) It must meet the specific memory requirement of the particular CP/M version that is being implemented; and (2) it must make standard BIOS calls for I/O. Other modifications may have to do with whether you are using Commodore's CP/M cartridge which operates in the 40-column mode or a cartridge which operates in the 80-column mode such as the one from Data 20 Corp. Most programs will run with little or no modifications. However, many commercially available business application programs, such as Wordstar, do require considerable modification before they can be executed on the Commodore 64.

Structurally, CP/M consists of three functional modules. These are the Console Command Processor (CCP), which interprets the commands that you type in via the keyboard; the Basic Input Output System (BIOS), which handles communication with the various peripheral devices connected to the system such as the printer, disk drive, modem etc.; and the Basic Disk Operating System (BDOS), which manages disk files. These three components occupy the top of memory. A small area at the bottom of memory is reserved for the system parameter area which maintains information such as the current disk and user id, peripheral device assignments, etc. The rest of the memory is available for the program that you want to load and execute. This area is referred to as the Transient Program Area (TPA). Depending upon the cartridge that you use (Commodore's or Data 20's), you will have a TPA of 48 or 56 Kbytes for your CP/M applications programs. When you boot the system, the CCP, BIOS, and BDOS are loaded into the main memory of the computer from the CP/M system diskette. The BIOS takes over the further operations of the system and the CP/M prompt A is displayed on the monitor screen indicating that the system is ready for you to type in the console commands. At this point, any executable file may also be loaded into main memory.

## **CP/M On The Commodore 64**

For the purpose of our evaluation of CP/M software for the Commodore 64, we will use the Data 20 cartridge as the example. Its implementation on the Commodore 64 with the Disk Operating System (DOS) programs from Lifeboat Associates emulates CP/M very closely.

The implementation of CP/M on the Commodore 64 is performed by installing one of the available cartridges (by Commodore or Data 20) in the cartridge slot. As previously mentioned, these cartridges contain the Z-80 microprocessor which is required to emulate CP/M systems. Once the microprocessor is installed, you load CP/M into the computer from the system diskette. The diskette available with the Data-20 cartridge contains the SB-80 operating system (from Lifeboat Associates) which is compatible with CP/M 2.2. Once DOS is loaded, control is transferred to the Z-80 processor from the resident 6510 processor of the Commodore 64. (CP/M programs are generally loaded automatically in most computers via a bootstrap loader program. In the Commodore 64, however, a manual procedure is required.)

Once the system is booted, you are ready to load any applications program. Most CP/M programs available in the Commodore 1541 disk drive format may be directly loaded and executed on the Commodore 64 without modifications. Many of these programs are in the public domain. One of the major sources of public domain CP/M programs for the Commodore machines is the Commodore Information Network (CIN) database on Compuserve. For further information on downloading these programs on your disk or printer, log onto Commodore's bulletin board at the menu type XA for entering the database and select database 5 for CP/M.

Professional programs, such as WordStar or SuperCalc II require considerable modifications before they may be executed on the Commodore 64. Fortunately, some of these programs are available in a ready-to-run form for the Commodore 64 through Add-On Software. They are presently converting WordStar, SuperCalc, T/Maker, Spellbinder and many other professional application CP/M programs for use with the Commodore 64. Some programs are already available and many others will be available soon.

The CP/M programs have been reviewed in a format different from those in the rest of the book. The reason is two-fold. First, these programs are standard in the CP/M industry and are new only to Commodore users. Second, they differ considerably in class with the rest of the programs available for the Commodore 64 and, therefore, cannot be evaluated using the criteria established for evaluating the other programs. Our purpose in including this coverage of CP/M is primarily to make you aware of CP/M and its vast software library as a source of programs for your Commodore 64.

In addition to the programs offered by Add-On Software, another source for CP/M programs for the Commodore 64 is Lifeboat Associates. Lifeboat Associates will provide any program in their catalog for use on the Commodore 64 (i.e., formatted for the 1541 drive). For many programs, there are obviously three constraints: (1) the available disk space (disk storage may not exceed 170K); (2) available user memory (48-56K, depending upon the cartridge that you use); and (3) none of the CP/M systems available for the Commodore 64 can presently support more than one drive. (Lifeboat Associates is planning to enhance its SB-80 system for two drives in the near future.)

## GLOSSARY

**A:**—CP/M keeps an internal record of which disk drive is currently considered the “default disk” or “default drive.” When you start a CP/M session, the default disk is always A. To change the default disk to B, enter B:. To go back to A as default disk drive, look at the prompt (A> or B>) from CP/M. The CP/M prompt itself specifies the default drive (A> for drive A on the left, B for drive B on the right).

**A>**—A> is a prompt from the disk operating system indicating that drive A is the current default drive. This prompt is displayed on the screen when CP/M is ready to accept a command from the keyboard. This may occur either when CP/M is first started up, at the completion of any command when A is the default drive, or when you return to drive A with the command A:. The disk directory is read-only during the initial reference to the disk. Every time a disk is changed in the drive, a warm start should be performed on the system to enable CP/M to read the new disk directory.

**B:**—CP/M command to change the default or current disk drive to B. To determine which is the default disk drive, look at the prompt (A> or B>) from CP/M.

**B>**—CP/M prompt indicating that the drive B is the default drive. The prompt also indicates that the system is ready to accept a command from the keyboard.

**BDOS**—Basic Disk Operating System. One of three components of CP/M, it manages disk files, file storage, retrieval, and allocation.

**BIOS**—Basic Input Output System. One of three functional components of CP/M, it facilitates exchange of data and status information between the console command processor (CCP) and a peripheral device.

**CCP**—Console Command Processor. The intelligent component of CP/M. It is user-interactive (interprets commands at the keyboard) and performs internal processing using BIOS and BDOS as sources for status and data information.

**CP/M COMMANDS**—The following is a table of CP/M commands, each followed by its format and a brief description.

<b>COMMAND</b>	<b>FORMAT</b>	<b>DESCRIPTION</b>
ABORT	ABORT<program>	Halts the execution of a program specified in the argument.
DDT	DDT<filename>	A debugger program available in CP/M that allows you to load and alter and/or test the program specified in filename.
DIR	DIR<filename>	Obtains a list of all files that have the same filename or specified filetype.
DUMP	DUMP<filename>	Displays the contents of disk file (specified in the argument) in hexadecimal notation on the screen.
ERA	ERA<filename> or <filetype>	Erases file(s) on disk that have the same filename or filetype as the argument.
PIP	PIP<new filename> = <old filename>	Performs one or multiple copy operations.
REN	REN<newfilename> = <oldfilename>	Renames disk files.
SAVE	SAVEp<filename> p = page(256-byte segments).	Saves a file in TPA on disk. p(pages) to be saved are calculated via the DDT.
STAT	STAT<device> or <filename> or <filetype> or <disk>	Displays the status of device assignments or available disk space.
SYSGEN	SYSGEN	A program on system disk that loads the system into memory and makes a copy of the system disk for safekeeping.
TYPE	TYPE<filename>	Displays the contents of the file specified on the screen.

**CP/M CONTROL CHARACTERS**—Following is a table of the control character commands in CP/M and their functions.

<b>KEY</b>	<b>FUNCTION</b>	<b>REMARKS</b>
Control-C	Warm Start	Performed to abort program execution or replace disk in a drive.
Control-H	Delete Character	Cursor backup to previous character.
Control-U	Erase Line	To cancel current and begin a new line.
Control-E	Type a long command line	Move cursor to the next line without executing command.
Control-J	Execute Command	Executes current command moves to a new line.
Control-M	Terminates PIP	Control is returned to CCP (console command processor).
Control-X	Delete Line	Restart a new line.
Control-R	Retype Current Line	Used to reprint an edited/corrected line.
Control-P	On/Off Switch for printer	Toggle switch to turn the printer on/off
Control-S	Freeze Scrolling	Toggle switch to freeze the display.

**CP/M**—Acronym for Control Program for Microcomputers, CP/M is a single user, disk-based operating system designed for the Z-80, 8080 based microcomputers.

**DOS**—Acronym for Disk Operating System. It is a collection of programs that are available on disk and are loaded into the computer at the initial start-up. These programs are collectively referred to as the operating system.

**OPERATING SYSTEM**—A computer typically is comprised of a Central Processing Unit (CPU), memory chips, and peripheral devices such as the keyboard, disk drive, printer, etc. An operating system is a collection of programs in permanent memory (ROM) or on disk which facilitate communication between the CPU, the data in memory, and the peripheral devices. It is the operating system that lets you communicate with the computer through the keyboard by typing console commands or by loading programs.

The operating system is loaded each time the computer is turned on. The operating system of the Commodore 64 is present in ROM at location 40960 to 49151. The operating system for CP/M and other business systems is available on disk.

**SB-80**—A CP/M version 2.2 compatible operating system developed for a number of computers, including the Commodore 64, by Lifeboat Associates. Available on disk with the Data-20 CP/M cartridge, it allows you to run most CP/M software on the Commodore 64.

TPA Transient Program Area. This is the area of memory in CP/M allocated for loading user programs to be executed. A program often takes up more memory by occupying CCP and related areas used by various CP/M sub-routines. When it finishes execution, command is given back to the CCP.

## Descriptions Of "Ready-To-Run" CP/M Software For The Commodore 64

<b>CP/M Training Power</b> <b>American Training International</b>	<b>\$75.00</b>
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### DESCRIPTION

This program teaches you the commands and functions of CP/M in a simulated menu-driven training program. You will learn how to display a directory of files, protect files, rename files, copy files and disks, copy CP/M, edit or erase files, identify available space on disk, prepare disks, and adjust CP/M to your computer. A handbook is included for quick and easy access to help you use CP/M.

<b>LISP</b> <b>SuperSoft</b>	<b>\$150.00</b>
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### DESCRIPTION

LISP (LISt Processor) is the language for artificial intelligence applications. You may program your own robot, adventure game, or computer psychiatrist. LISP is also expandable and alterable; therefore, you can write your own programming language.

<b>Milestone</b> <b>Digital Marketing</b>	<b>\$295.00</b>
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### DESCRIPTION

Milestone is a project management program that will assist you in assessing the time and costs of planned projects. You enter the information about labor, materials, deadlines, and the program will display comprehensive, easy-to-read time schedules and project analyses. Schedules can be updated at any time, and Milestone will automatically display any changes in the project schedule that are affected by those updates. You can also obtain a printout of reports of the project schedule and cost assessment. You may also link several jobs together into one project schedule.

<b>Plan80</b> <b>Digital Marketing</b>	<b>\$295.00</b>
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### DESCRIPTION

Plan80 is a professional financial worksheet that may be integrated with any word processor to record information in your files, make calculations, and produce results in graphic worksheet format—on screen or in print. Since it works with any word processor, you can easily incorporate your spreadsheets and reports into larger written reports, business plans, etc.

Plan80 fully automates spreadsheet accounting. It can handle any size budget with any number of spreadsheets in any order. Any portion of a spreadsheet can be stored and read into subsequent spreadsheets for consolidation or other calculations. With simple and easy commands, you call each spreadsheet, make computations and consolidations automatically, and then quickly printout polished, custom formatted reports.

Plan80 lets you use English-like statements to name values. So instead of  $A5 = A3 - A4$ , you may say: "Margin = Sales - Cost." This type of descriptive name construction will considerably enhance the ease of understanding complex financial models. Other powerful features of Plan80 include automatic replication of formulas across columns and rows, unless you specify the limits; ability to reference values in any row or column in any sequence; 28 different built-in functions that allow you to create complex financial models and engineering analyses using functions to perform amortizations, depreciations, and internal rate of return with a single statement. You may also use the IF..THEN..ELSE logic for complex comparative expressions.

**Spellbinder**  
**Lexisoft****\$395.00**

## DESCRIPTION

Spellbinder is an office management system that writes documents, sorts mailing lists, prints in two-column format, creates blank forms, handles math functions, and writes checks. Originally developed for CP/M-based business systems, it has been modified to be used on the Commodore 64 by Add-On Software.

Spellbinder offers many advanced text entering and editing features such as full cursor movements, tabs & margin set, block movement, multi-line headers and footers, help menu, block indentation, output to screen, auto line numbering, and form fill. Most standard print functions are supported by Spellbinder, and there are also some special features offered such as print in two columns, true proportional spacing, numeric data alignment, and batch printing (printing several files in a row).

Spellbinder allows you to create, maintain and sort mailing lists and merge them with a standard form letter to create personalized letters. You may also sort and print records in any way you wish.

Macro commands are available for advanced users for creating custom help menus, performing elaborate formatting of multiple files with a single keystroke, defining function keys and performing arithmetic operations on columns and rows of numbers (up to 16 digits).

Spellbinder package also includes the Electronic Webster, a built-in spelling and grammar checking program. It has a dictionary of 50,000 words and you may add a few words and phrases that are common for your compositions. A grammatical checking feature is included that finds simple grammatical and compositional errors such as double negatives, wordy phrases, and common misuses of words. A simple correction is suggested each time an error is encountered.

**SuperCalc 2**  
**Sorcim****\$295.00**

### DESCRIPTION

This CP/M-based spreadsheet program is also available for the Commodore 64 (ready-to-run) from Add-On Software. It is used to create spreadsheets with up to 63 columns and 254 rows within the memory constraints of the Commodore 64. It has most of the advanced features of professional spreadsheets including commands for row and column copying, global and individual reformatting, and scrolling. The screen can be split to allow the simultaneous viewing of two separate sections of spreadsheets. A row or column can be "locked" (i.e., it can be held in view while scrolling through the rest of the spreadsheet). There is a protection command that allows you to save "protected" cells while erasing all others. This allows you to create a master form and to enter and remove values at your discretion. In SuperCalc, you can assign simple names such as "sales" or "debits" to cells and reference these cells in formulas by name rather than row and column number. Other advanced features include the ability to sort rows or columns on a key column. You name the column and SuperCalc will rearrange the columns to make the key alphabetical. You can also prevent specific cells from being printed by using the "hide" command. SuperCalc contains a long list of calculations that can be performed including finding maximum or minimum values of a list, calculating the trigonometric functions of angles, and determining the natural log of values. The logical operators as well as standard inequalities can be used in formulas. Formulas can include IF.THEN statements and include logical operators AND, NOT, OR as well as inequalities (greater than, less than, etc.). Look-up tables can be created with a column of names and an adjacent column of values corresponding to those names. The values can be called to cells using the assigned names from the table; for example, assign the value of 6.5% to the name "Tax." The formula  $\$100 * \text{"Tax"}$  will produce a result of \$6.50. Another handy feature is the execute command. You can list commands, names, and values on a separate disk file. Using the execute command will load and execute those commands, names and values. You can create a file consisting of a row of names and formulas that you use repetitively. Using the execute command will automatically call up that row and insert it in your present spreadsheet.

SuperCalc is certainly one of the more advanced spreadsheets available today. Its various features allow you to assign names to values and create formulas using English sentences. With the proper preliminary work, the formula "Sales" + "Tax" = "Total" could be used to calculate the resulting values and avoid the sometimes confusing aspect of numerical equations.

**SuperWriter  
Sorcim****\$295.00**

## DESCRIPTION

SuperWriter is a professional-quality word processing program developed originally for CP/M-compatible micromputer systems. It has been converted to run on the Commodore 64 by Add-On Software. It is easy to use and comes with a 150-page manual which also includes a quick reference index card. An answer key (help menu) is included as a feature in the program that may be referenced for obtaining more information on the various commands of SuperWriter and how they are implemented.

It has standard text editing and printing features and you can custom design your printouts through the use of the advanced features of your dot matrix or letter quality printer (such as proportional spacing, auto page numbering, select left and right margins, multiple copies, and draft printing). You can also send special control codes to your printer for accessing other special print functions (underline, boldface, super/subscript).

The SuperWriter package also includes a spelling checker (Spellguard) and a sophisticated merge-print function for creating personalized form letters.

The document history feature of SuperWriter lets you keep track of each file in detail: author, operator, date, date last modified, and comments.

**Tiny Pascal**  
**SuperSoft**

**\$85.00**

### DESCRIPTION

Tiny Pascal is a Pascal compiler that is suggested to execute programs approximately 25 times faster than with a normal BASIC interpreter. It also has the flexibility to be altered or enhanced to fit your programming needs.

Tiny Pascal is a two-stage compiler. First, it translates the high level program into an intermediate file called the P-code. Then the P-code is translated into machine-readable form. Tiny Pascal requires at least 36K of system memory to run.

**Turbo Pascal**  
**Borland International**

**\$89.95**

### DESCRIPTION

Turbo Pascal is an advanced, easy-to-use Pascal compiler that features a built-in editor and debugger. It takes 28K of disk space and has all the features of standard Pascal plus a few additional commands. It also features dynamic strings, full support of OS facilities, direct access to CPU memory and data ports, absolute address variables, and type conversion functions.

<b>T/Maker</b> <b>T/Maker</b>	<b>\$295.00</b>
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## DESCRIPTION

T/Maker integrates word processing, file management, spreadsheets and graphics into one program. This type of integration enables you to conveniently create reports that make use of all of these types of programs without having to switch software. You can generate a letter that includes a spreadsheet in the middle and produce a graph at the end. You can create a report that includes paragraphs extracted from other files.

The secret of T/Maker is a workspace that can be used to enter text or values. Commands can be introduced that will format the printing of text or perform various operations on numbers. The features associated with the spreadsheet are applied differently than most general spreadsheets. Formulas are not entered as single equations, and additions and subtractions are developed by including the appropriate signs with the values. The graphics capabilities are limited to producing bar graphs although the characters producing the graphs can be altered. The file management portion of the program allows you to arrange lists in alphabetical or numerical order and to take data from other files and place it in your current file.

The real advantage of this program is that it is only necessary to learn one program to become proficient at all four functions. There are certainly better spreadsheets and graphics programs available. But if your applications include the production of reports that include word processing, file management, spreadsheets, and graphics this may be what you are looking for.

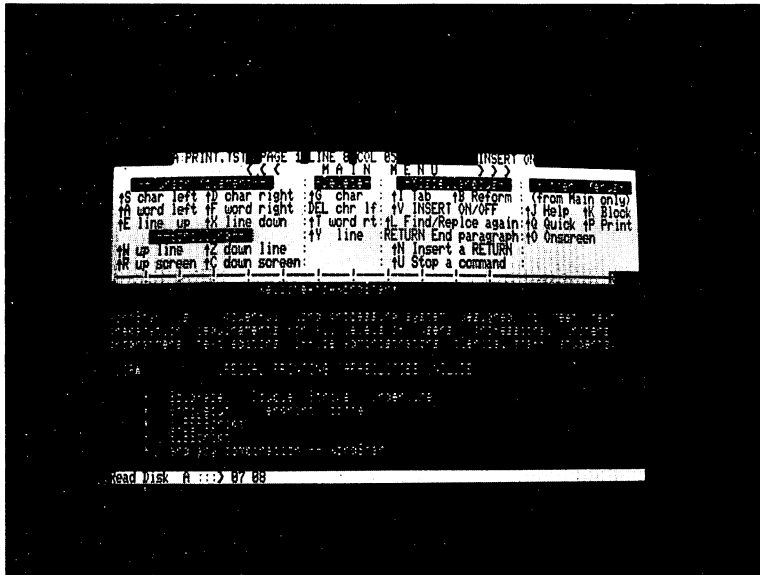


Figure 10. WordStar

<p><b>WordStar Micro Pro</b></p>	<p><b>\$295.00</b></p>
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### DESCRIPTION

Micro Pro's advanced word processing program, WordStar is the world's best selling word processor for personal and business computers. It features standard text entering and editing capabilities accessible with one or two key strokes. Full screen editing is available and the help menu may be displayed fully (i.e., display all commands in each mode), partially, or suppressed for advanced users. There is automatic word wraparound and the text on the screen is organized exactly as it would appear on print. You may select for the specific printer you are using, and WordStar supports most special print functions such as boldface, underline, super and subscript.

Additionally, for customizing standard letters, WordStar also provides a merge option via the Mail Merge program (also from Micro Pro). You can create two files using WordStar—the form letter and the names and address file, and the Merge program will automatically merge the names and addresses with the form letter(s). Mail Merge is available at an additional \$250.00 from Add-On Software (ready-to-run).

## APPENDIX

## VENDOR ADDRESSES

### **Aardvark**

2352 S. Commerce  
Walled Lake, MI 48088  
Phone: 313-669-3110

### **Abacus Software**

P.O. Box 7211  
Grand Rapids, MI 49510  
Phone: 616-241-5510

### **Access**

832 East Cameron Avenue  
West Covina, CA 91790

### **Adventures**

8718A Richmond Highway  
Alexandria, VA 22309

### **Briley Software**

P.O. Box 2913  
Livermore, CA 94550  
Phone: 415-455-9139

### **Broderbund Software**

1938 Fourth Street  
San Rafael, Ca 94901

### **Bytesize Micro Technology**

Box 21123 Dept A  
Seattle, WA 93111  
Phone: 206-236-2983

### **Cardco Inc.**

313 Mathewson  
Wichita, KS 67214  
Phone: 316-267-6525

### **Comm\*Data Computer House**

320 Summit Avenue  
Milford, Mi 48042  
Phone: 313-685-0113

### **Commander Magazine**

P.O. Box 98827  
Tacoma, WA 98498  
Phone: 206-565-6818

### **Commodore Business Machines Inc.**

487 Devon Drive  
Wayne, PA 19087

### **Commodore Business Machines Inc.**

3370 Pharmacy Avenue  
Agincourt, Ontario M1W 2K4  
Canada

### **Commodore 64 Texas Technical Services Inc.**

3115 West Loop Suite 26  
Houston, TX 77027  
Phone: 713-965-9977

### **Compuserve**

P.O. Box 20212  
5000 Arlington Centre Blvd.  
Columbus, OH 43220  
Phone: 800-848-8990

### **Compute!Books**

P.O. Box 5406  
Fulton Street  
Greensboro, NC 27403  
Phone: 919-275-9809

**Computer Camps Directory**

HES  
71 Park Lane  
Brisbane, CA 94005

**Computer Mail Order**

P. O. Box 6689 Dept 806A  
Stateline, NV 89449  
Phone: 800-648-3311

**Computer Mat**

Box 1664 Dept M  
Lake Havasu City, AZ 86403  
Phone: 602-855-3357

**Computer Outlet**

1095 E. Twain Park Place-  
Upper Level  
Las Vegas, NV 89109

**Computer Software Associates**

50 Teed Dr  
Randolph, MA 02368  
Phone: 617-961-5700

**Comquest**

E Camelback/Suite #1  
Phoenix, AZ 85012  
Phone: 602-264-0324

**Cursor Magazine**

P.O. Box 550  
Goleta, CA 93017  
Phone: 805-967-0905

**Cursor 64**

Box 6905  
Santa Barbara, CA 93110

**Cyberia Inc.**

2330 Lincoln Way  
Ames, IA 50010  
Phone: 515-292-7634

**Digital Interface System Co.**

P. O. Box 8715  
Portland, OR 97207

**Elcomp Publishing Inc.**

53 Redrock Lane  
Pomona, CA 91766  
Phone: 714-623-8314

**Electronic Arts**

San Mateo, CA  
Phone: 415-571-7171

**Electronic Protection Devices Inc.**

P. O. Box 673  
Waltham, MA 02254  
Phone: 800-343-1813

**Enlightenment Inc.**

1240 Sanchez  
San Francisco, CA  
Phone: 415-641-9089

**Event Horizon Software**

Box 1327  
New York, NY 10028  
Phone: 212-535-0687

**Exatron**

181 Commercial Street  
Sunnyvale, CA 94086  
Phone: 408-737-7111

**Foxsoft**

Box 507  
Deer Park, TX 77536  
Phone: 713-473-6723

**French Silk Smooth Ware**

Box 207  
Cannon Falls, MN 55009  
Phone: 507-263-4821

**Galactic**

Box 10516  
San Jose, CA 95157  
Phone: 408-247-4434

**Game Guide**

6648 N. Newgard Ave.  
Chicago, IL 60626

**Genesis Computer Corp.**

1444 Linden Stret  
Bethlehem, PA 18018

**Hayden Book Company**

50 Essex Street  
Rochelle Park, NY 07662  
Phone: 800-631-0856

**Hayes Microcomputer Products Inc.**

5835 Peachtree Corner E  
Norcross, GA 30092  
Phone: 404-449-8791

**HD Manufacturer**

91 Long Hill Rd.  
Leveritt, MA 01054

**Human Engineered Software**

71 Park Lane  
Brisbane, CA 94005  
Phone: 415-468-4110

**Info Designs**

6905 Telegraph Rd  
Birmingham, MI 48010  
Phone: 315-540-4010

**Jini Micro Systems Inc.**

P.O. Box 274  
Riverdale, NY 10463  
Phone: 212-796-6200

**Journal/20**

P.O. Box 1149  
Van Alstyne, TX 75095

**Just Another Software Co.**

Dept AB  
P. O. Box 873  
Palo Alto, CA 94301

**Lightning Software**

P. O. Box 11725  
Palo Alto, CA 904306  
Phone: 415-327-3280

**Luna Software**

Box 26922  
San Jose, CA 95159  
Phone: 408-378-7793

**Micro Software Systems**

P.O. Box #1442  
Woodbridge, VA 22193

**Micro Spec**

2905 Ports O'Call Court  
Plano, TX 75075  
Phone: 214-867-1333

**Micro Systems Development Inc.**

11105 Shady Trail Suite 104  
Dallas, Tx 75229

**Micro Ware Distributing Inc.**

1342 B Rt.23  
Butler, NJ 07405  
Phone: 201-838-9027

**Micro World Electronix Inc.**

3333 South Wadsworth Blvd #C105  
Lakewood, CO 80227  
Phone: 303-934-1973

**Micro-Ed Inc.**

P.O. Box 24156  
Minneapolis, MN 55424  
Phone: 612-926-2292

**Microcomputer Workshops**

225 Westchester Ave  
Port Chester, NY 10573  
Phone: 914-937-5440

**Microtech**

Box 102  
Langhorne, PA 19047  
Phone: 215-757-0284

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ISBN 0-89303-382-0