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## THE ORIGINAL MAGAZINE FOR TRS-80™\* OWNERS

# H&E COMPUTRONICS INC.



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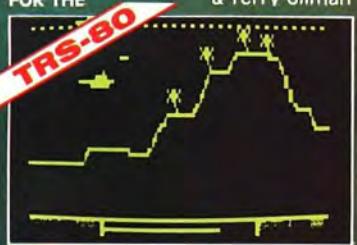
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**BUSINESS MANAGER**  
Steven M. Kahan

**EDITOR-IN-CHIEF**  
Hubert S. Howe, Jr.

**MANAGING EDITOR**  
Martin Leffler

**CONTRIBUTING EDITORS**

Leo M. Conrad  
Richard Kaplan  
Spencer Koenig  
Joseph Rosenman  
Gordon Speer  
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Steven M. Zimmerman, Ph.D.

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## BITS AND PIECES

Howard Y. Gosman

#### THE MODEL 12

In our last issue, we described some of the features of the new TRS-80 Model 12, which is essentially an upgrade and replacement of the Model II. Well, now we can say a few more things, because we have acquired a Model 12 here at H & E Computronics, Inc. In fact, this text you're reading was input on the new Model 12 running Lifeboat CP/M for Model II and our favorite word-processing program of all time, the ELECTRIC PENCIL. (A little side note: the Model 12 refused to boot our standard CP/M 2.25A for the Model II, but it did boot and run version 2.24 perfectly, and while running under 2.24, we were able to read all the files from a 2.25 disk. Rumor has it that Lifeboat will shortly release a new version of 2.25 that will run on the Model 12, and Radio Shack will soon market CP/M 3.0 for Models 12 and 16.)

After a couple of days using the Model 12, the most important observation I can make is this: the

Model 12 has, by far, the finest typist's keyboard ever put on a microcomputer. It has the standard layout that all typists expect from a machine, and a responsive feel that is better than the IBM PC's (the IBM has a nice feel but a terrible keyboard layout). This keyboard will allow the experienced typist to attain the fastest possible typing speed, much faster than the Model II, or even the new Model 16 (which, strangely, has a keyboard more similar to the Mod II than the Mod 12). This keyboard is what I would call a "racing" keyboard—the feel is every bit as good as with keyboards found on phototypesetters costing \$40,000 and more. It goes without saying that the Model 12 is the IDEAL machine for word processing.

#### POWERDRIVER FOR SUPERSCRIPSIT

Do you want to use SuperScrapsit (Radio Shack's word processor for *continued on page 8*

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The *H & E COMPUTRONICS MONTHLY NEWS MAGAZINE* encourages comments, questions, and suggestions. H & E COMPUTRONICS will pay contributors for articles and programs published in the magazine.

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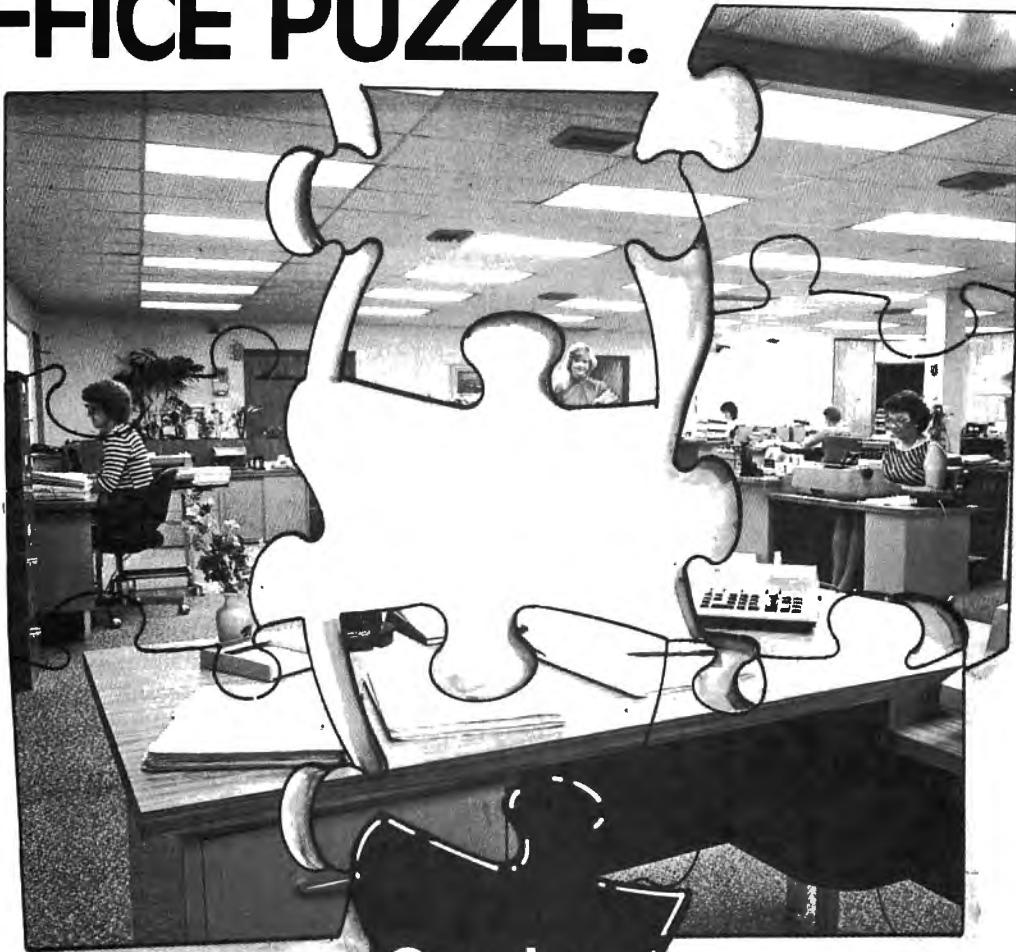
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- Editing is simple and fast...automatic search. Batch transfer of edited entries to backup disks.
- Provides for duplicate labels.
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- Load and "scroll" through entries.
- Optional "ATTN:" line.
- Plenty of user defined fields with various options for **simultaneously** purging and selecting the printout.
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- Each disk entry automatically "remembers" how many mailings have been made.
- Primarily written in BASIC for **easy modification**...embedded machine code for those speed sensitive areas.
- **Hardware requirements:** 32K, printer, and 1 or 2 drives.

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## THE CRYSTAL BALL

### News and Rumors of Interest to TRS-80 Owners

#### FLAT PANEL DISPLAY

IBM will be introducing a number of new products soon, including a display which uses a new technology: the gas-panel flat display. This new display uses a screen filled with neon and argon gas which glows when an electrical charge passes through it. The display creates high resolution characters and graphics, and the screen is much flatter than any cathode-ray tube presently in use. The new screen, which will be used one of IBM's new display terminals, can be divided into as many as four separate screens (or "windows") to display data from several different sources.

IBM is also releasing an upgraded IBM Personal Computer, to be called the "XT". The major feature of the new PC is the addition of IBM's own internal hard disk drive, which will raise on-line storage to between 10 and 20 megabytes. The basic XT computer will cost \$4,995, with an optional second hard disk for \$2,695. Hard disks are also to be made available for the regular IBM PC, \$3,390 for the first and \$1,695 for the second.

#### INSIDE RADIO SHACK

Steve Leininger, the designer of the TRS-80 Model I, will return to Radio Shack as their new director of advanced product development. We hope that he will be a source of many exciting new products for Radio Shack.

This comes at a time when Radio Shack is already preparing several new computers for the market, and we can expect to see Radio Shack offering more diverse products and becoming more aggressive in marketing them. In case you haven't seen them yet, a few television commercials have started to appear, advertising the Model III and the Model 12. These are high-gloss, big-bucks commercials, not at all like the late night "computer crazy" spots. This is probably only the beginning. Radio Shack seems to be realizing how large a role mass advertising can play in selling their computers. After all, look at the TRS-80's chief rival, the Apple. Apple computer has been doing

mass media advertising for years now, making themselves more visible than Radio Shack. As a result, the Apple—a mediocre computer by any standards—is the industry's best selling personal computer. This is because of advertising, and if Radio Shack could only create an image the way Apple has done, no one, not even IBM, could touch them.

Speaking of new Radio Shack computers . . . the new "notebook" size Radio Shack portable computer will probably appear in Radio Shack stores and computer centers by the time you read this column. This computer is Radio Shack's answer to Epson's HX-20, the first really well designed computer of this size range. We are anxiously waiting to see a picture or read a detailed description of this machine, and we hope that it is as good as the Epson. This new type of computer, the battery powered notebook size machine, will be seen in ever increasing numbers, used by businessmen on the go and by students in colleges and high schools. It's likely that within the next 5 years or so, a computer will not only be a necessity at every desk (which is practically true now), but also it will become a constant companion wherever you go. Expect to see nearly *all* students at all levels carrying computers around with them soon.

It looks like the new portable version of the Model III (the Osborne-sized portable) will be introduced even sooner than the Epson-sized notebook portable. The portable Model III will be a battery-powered portable desktop machine with some enhancements over the Model III, but exactly what enhancements, we can't say. We hope that both portables are out by the time you read this, so that we'll be able to say a lot more about them in our next issue.

Other notes: More sources are saying that the new Model IV will be equipped with 128K of RAM and a standard built-in hard disk drive interface. Radio Shack may introduce a replacement for the Color Computer, manufactured by a South Korean company. ■

# BOOK REVIEW

## The Word Processing Book by Peter A. McWilliams

Andrew Hofer

Here is a new book that I just can't say enough good things about. In fact, a lot of people are saying good things about *The Word Processing Book* by Peter A. McWilliams. For example: "This is a marvelous book—the first lucid account of what word processing is all about" (William F. Buckley, Jr.); "Brilliant! Mr. McWilliams has led me out of the darkness" (John Chancellor); "A pleasure as well as a primer: thorough, amusing, witty, and highly recommendable" (*The Los Angeles Times*). And that's just a few of the enthusiastic comments being received by this book. I agree wholeheartedly—this is the best introduction to word processing ever published. It will introduce a total novice not only to word processing, but to small computers in general, with clear and interesting coverage of everything from diskettes to printers and computers.

How interesting can a book on word processing be? Well, I've been using word processors and computer typesetting equipment for a number of years, and everything in the book is related to knowledge I use every day. Yet, once I started to skim through the introduction, I couldn't put the book down! This guy has a great writing style, and before I knew it I was deeply into the book, reading every word. I read the entire book from cover to cover in less than 2 days—nearly 300 pages on a subject I am quite familiar with already, and I couldn't stop reading. This is especially surprising since this is an introductory book, intended for people who have never used a word processor, or even a computer. The book is very complete and clearly written, and the writing style is designed to keep you reading—every page or so, the author will suddenly make some comment or observation that will cause you to break down laughing. In addition, the book is illustrated with dozens of beautiful old woodcuts and etchings with very humorous captions, most of which depict some aspect of writing, typing or printing as it was done in the "good old days." Other illustrations of com-

puters and printers are also provided.

The introductory first chapter, entitled "A Brief and No Doubt Inaccurate History of Word Processing," gives the reader some background on how computers have eased their way into our lives over the last thirty years, finally becoming a familiar appliance in many households. The author points out that it took many years of data processing before someone had the bright idea of using computers to manipulate words. Remember the first appearance of "personalized" junk mail arriving at your house? Letters that repeatedly refer to your name and home town while telling you that "you may already have won!" This was one of the earliest applications of word processing. The appearance of small pocket calculators, and finally desktop computers, ushered in the age of the modern word processor, and the office will never be the same. With the advent of word processing, the very concept of "retyping" a document has ceased to exist.

Chapter 2, "The Personal Computer," gives a quick introduction to the features of small computers and some of the procedures involved in operating one, including diskette handling, explanations of what software is and how it works (including operating systems and applications programs), the parts of a system (CPU, printer, keyboard, monitor), and so on. Here and throughout the book, the author gradually introduces new terms, gently teaching the reader the language known as "computerese."

In chapter 3, "The Wonders of Word Processing," the author first describes the plight of the secretary in years past, and goes on to show why a user of a word processor would never go back to an ordinary typewriter. This chapter introduces many standard features of word processors, such as automatic "word wrap" at the end of each line (no more pressing RETURN), text storage in disk files, text insertion and deletion, centering, automatic pagination, justification, proportional spacing, block move/copy/delete, global search, search and

replace, special print options, etc.

Chapter 4, "The Curse of Noah Webster," describes the use of those wonderful new spelling dictionary programs. The author seems to have some experience with a number of these programs, and he maintains that the absolute best dictionary program available is THE WORD (or THE WORD PLUS) from Oasis Systems in San Diego. Judging by his description of it, we'd have to agree.

Chapters 4, 5, 6, and 7 each describe the uses of word processors for people with different needs. In "Word Processing in the Office," the author describes a typical problem of the non-electronic office. The hard working secretary types a very important letter for the boss. After several crumpled sheets, a perfect copy is finally produced. The boss sees the letter, and (since words always seem different when you see them in print), wants to make several changes. So the letter must be retyped from scratch, and it will probably take several more tries to get another perfect copy. The production-editing-correction cycle that might take an hour in the non-electronic office will only take about ten or fifteen minutes on a word processor. Another great office use: form letters on which you need only insert an address, and print out a copy. The author also points out that word processing is the ideal way for a small business to get into computing, and that a small computer first used as a word processor can eventually perform far more complex duties as well.

In "Word Processing and the Student," students will find plenty of ammunition for use in persuading parents to invest in a small computer. The author points out that a student who uses a word processor to compile and edit their notes throughout a semester can then use much of what is already stored on disk when assembling a paper. And the paper will be cleanly typed, with few or no errors. If a student wants to make a really good impression on a professor, here's one way to do it: after handing in a paper, the student receives it back, marked



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with corrections and suggestions for improvement and expansion. Then, two days later, the student voluntarily resubmits the paper, freshly typed and with all the suggested changes made! This might not improve the grade for that particular paper, but the professor will remember which students really take learning seriously.

"Word Processing for Writers" briefly describes what should be obvious to everyone by now. A professional writer, whether of books or of articles, needs a word processor. The amount of writing, editing, correcting, re-editing and re-correcting needed to prepare a manuscript adds up to a monumental task. This is why it often takes several years to prepare a book for publication. With a word processor, the amount of work is reduced at every step along the way, and there are many other benefits, such as being able to provide a freshly-typed copy for each manuscript submission, rather than xerox copies.

Chapters 8 and 9 give a few more good examples of the uses of word processors. Their titles: "Word Processing and the Self-Employed," and "Poetry from a Computer?"

Chapter 10, "The Drawbacks of Word Processing Computers," warns that you have to follow very careful procedures with a computer to avoid disasters. For instance, the loss of a single diskette (when there's no backup) can be equivalent to having the only copy of your several-hundred-page manuscript burn up in a fire.

Chapters 11 and 12 help you evaluate your needs: "Is Word Processing for You?" and "Selecting a Word Processing Computer." Chapter 11 is simple—if your daily routine involves any kind of writing, the answer is yes, you'll never regret your decision to buy a computer. In selecting a word processing computer, the author discusses everything from disk storage space to printer speed and quality. The keyboard feel and video display clarity are also stressed as very important factors. Also in this chapter, the prospective buyer is warned against considering a "dedicated" word processor. This is a machine that was designed only as a word processor, and functions only as a word processor. These machines are

going the way of the dinosaurs, mainly because they combine high price (usually from \$10,000 to \$20,000) with limited abilities (you can't run your accounts receivable program on a dedicated word processor). These machines are usually sold only to large corporations who can afford to spend lots of money for a brand name (like Lanier, Wang) and a well-dressed salesperson. On this subject, the author makes a good observation: "Dedicated word processors are dedicated to the proposition that big businesses don't know the meaning of value when it comes to word processing computers."

The 13th chapter is devoted to a very detailed "Brand Name Buying Guide." Here the reader will find concise descriptions of 14 word processing and spelling dictionary programs, 8 of the best printers available, and 28 different brands of small computers. In this chapter, we generally are in agreement with most of the author's opinions. We agree that the Atari and Apple computers would make the worst conceivable word processors. But (horror of horrors!) he doesn't like the TRS-80 either! Here we disagree. You see, he hasn't tried the TRS-80 with the right software. When describing programs for word processing, he explains that some are hard to learn but easy to operate once you're familiar with them, and others are easy to learn but clumsy to operate. Well, he thinks that SCRIPSIT is both hard to learn and hard to use! This is true. But he does not mention that there are other, better programs available, that are easy to learn and easy to use. This entire column and many of the articles in this magazine are typed into a TRS-80. In the case of this column, I'm using a new TRS-80 Model 12 running CP/M and ELECTRIC PENCIL. After looking at many programs for word processing, there is still not one that equals the ELECTRIC PENCIL. The author has evidently never heard of it.

The final chapter, "Purchasing a Word Processing Computer," warns of the pitfalls found when dealing with computer salespeople, and urges the buyer to make a careful, informed decision when purchasing a computer.

continued on page 8

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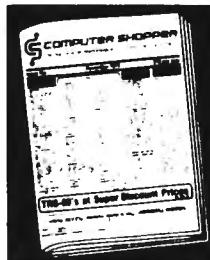
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## BOOK REVIEW continued from page 6

The author recognizes that the state-of-the-art in word processing and small computers changes very rapidly. Almost overnight, new innovations can make older equipment and software obsolete. Thus, this book, which was first printed in May of 1982, is already in its fifth edition. Also, the author urges any reader who is looking through the book later than May 1983 to write to him and ask for his "Update #4," which will contain much new information. He plans to continue these updates regularly.

This book deserves a wide audience. Every business which is planning or even considering getting into word processing should definitely get this book. It will not only help people in management to make an informed decision, it will also be useful again and again as an introduction for employees new to word processing. And you won't have to push people to keep reading this book.

*The Word Processing Book*, by Peter A. McWilliams, is published by Prelude Press of Los Angeles, California; has 297 pages and costs \$9.95 (paperbound). The book should be readily available in most computer and book stores, and is distributed by Ballantine Books (New York City). If this book really starts taking off, you may be able to order it through H & E Computronics. ■

### BITS AND PIECES

continued from page 2

TRS-80's) but you don't have a Radio Shack printer? The POWER-DRIVER series of printer drivers from Powersoft allow the user of SuperScripsit to take full advantage of the capabilities of the Epson MX80/100, C.Itoh 8510 Prowriter, or F-10 Starwriter printers.

POWERDRIVER/P, for the Prowriter 8510 dot matrix printer (from Leading Edge Products) supports 8 pitch sizes, including two sizes of proportionally spaced print. For word processing, POWERDRIVER/P supports underlining, boldface, superscripts, subscripts, overstrike, top of form return, and pause printing. The Greek character set is also fully supported.

POWERDRIVER/E is for the popular Epson MX-80/100 series of

printers. Grafrax™ or Grafrax+™ is required. Two drivers are included that each support 4 pitch sizes. Provisions for underlining, italics, double-strike, over-strike, emphasized, subscript, superscript, and pause are included.

POWERDRIVER/F, for the Starwriter F-10 Daisy Wheel printer, supports 10 pitch, 12 pitch, and proportional print modes. It allows full use of the printer, including superscripts, subscripts, underlining and double-underlining.

Each version comes on a disk that boots on either a TRS-80 Model I or III. The software is not protected. The disk also contains patches for running SuperScripsit under the LDOS operating system. All versions cost \$29.95, and are available from PowerSOFT Products, 11500 Stemmons Expressway, Suite 125, Dallas, Texas 75229; (214) 484-2976. (Printer type MUST be specified.)

### COLOR COMPUTER MATERIAL NEEDED

H & E Computronics is always eager to receive material on the TRS-80 color computer, but very little of it has been submitted recently. We know that a sizable percentage of our readers have color computers, but very few of you have been writing programs and articles for us to publish. We would like to let our color computer readers know that we are just as interested in their materials as we are in things for the Models I and III.

### GIGANTIC ON-LINE BUSINESS INFORMATION LIBRARY

Data Resources Inc., a McGraw-Hill company, has joined forces with VisiCorp (owners of VISICALC and other VISI- software) to bring small computer owners the largest library of on-line business information ever made available to the mass market.

A new software package from VisiCorp, called VISILINK, allows you to tap into DRI's mainframe computer over phone lines. From the VISILINK electronic catalog, you can then order DATAKITS, which are preformatted packages of historical and forecast data that you can receive on your computer and then manipulate in VISICALC worksheets. In their impressive full-page ad in the February 23 Wall Street Journal, they list forty-one different

DATAKITS available, and imply that there are many more as well.

What can you do with your DATAKITS? Here are the examples mentioned in the ad: Compare your business to U.S. economic trends; analyze DRI's forecast of inflation and unemployment; analyze DRI's forecast for housing starts; forecast various energy prices; project next quarter's costs for your business; evaluate DRI's forecast of state and local government spending; monitor Dodge construction activity by region; examine monthly changes in paper prices by grades; track weekly rail shipments by traffic category; examine the impact of inflation on your business; track monthly pattern in oil wells drilled; access Platt's Oilgram data; evaluate the cost performance of your health care facility; analyze price indexes for key insurance costs; calculate historical market share for your product line; conduct sensitivity analysis of your financial model; compare the cost of living in 25 U.S. cities; develop market share estimates by automobile engine size; monitor activity for eight agricultural commodities; track changes in capacity utilization for the steel industry; narrow plant location choices with state economic data; calculate year-to-date portfolio activity; compare yields of various money market instruments; examine the pattern of money market yields through time; compare historical financial reports of any FDIC bank; evaluate arbitrage possibilities across foreign currencies; forecast sales in the automotive industry; analyze DRI's forecasts for the trade balance in Hong Kong; analyze trends in money markets; evaluate yield spreads in credit markets; compare performance of over 5000 companies; compare performance of 180 industry aggregates; forecast sales in the steel industry; monitor changes in disposable income in Brazil; forecast sales in the furniture industry; measure daily portfolio performance; access Standard & Poor's COMPUSTAT data; examine banking activity for each Federal Reserve District; analyze inflation rates in Mexico; compare hourly wages in Germany, Chile and Malaysia; and forecast sales in 21 basic industries. (That's a lot of possibilities!)

This new system will undoubtedly have a great impact on the information-services industry, because it

appears to go way beyond the other popular on-line services, providing a service to businesses that is really practical. For more information about VISILINK and DATAKITS, write to Room 369, McGraw-Hill, Inc., 1221 Avenue of the Americas, New York, NY 10020.

#### ASSEMBLY LANGUAGE SERIES WILL CONTINUE

Joseph Rosenman, whose series "Assembly Language for Beginners" was published continuously for several months, would like his readers to know that he is still interested in continuing it, but he has been working hard at a new job and hasn't had the time to devote to his writing as in the past. Nevertheless, he does intend to continue the series when he has time.

#### DAISY WHEEL PRINTER WITH BUILT-IN BUFFER

Data Terminals and Communications has produced a new daisy wheel printer with all of the features expected of a good daisy wheel machine, plus one very important new feature: an internal 48,000 character printer buffer. For those of you who don't already know, this means that you can "dump" about 24 pages of text into the printer in just a few seconds, and then use your computer for other purposes while the printer proceeds to print out all of the text. External buffers have been around for a while, but this is the first sign we've seen of a manufacturer realizing that this should be a built-in feature for printers—all printers. With RAM memory getting cheaper and cheaper, there's really no reason for printer manufacturers not to include a buffer as a standard feature, or at least a built-in option.

The DTC 380Z printer is a good, versatile machine, and although it has a somewhat slow print speed (roughly 32 characters per second) this is quite acceptable due to the presence of the printer buffer and the low overall price tag of \$1199. The printer has a bidirectional print head, automatic proportional spacing, serial and parallel interfaces, graphic plotting, is software-compatible with the Diablo 1640/1650/630 printers, accepts text transmission between 50 and 19.2K baud, uses standard ribbons, has a selection of 12 different printwheels, and has a built-in diagnostic test for its four

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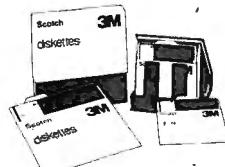
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## INSURANCE FOR PERSONAL COMPUTERS

Personal computer owners who use their systems for business, either in their homes or at the office, may not realize they could be leaving thousands of dollars of equipment uninsured.

"Most standard homeowner's policies don't cover computers used in business," said Sherry Scott, vice president of Columbia National General Agency (CNGA). "Yet many people who've purchased microcomputers for fun are now using them for business as well. They usually don't realize this could leave their \$4,000 or \$5,000 system completely unprotected."

CNGA has just developed the first comprehensive policy for personal computers regardless of use. The policy, one of several to be developed in the SAFEWARE™ program, covers a wide range of mishaps, from fire and theft to accidental damage.

A CNGA insurance representative who has developed his own home computer system first saw the need for filling the gap in insurance coverage. The policy is, as a result, written for computers users in language familiar to them and it covers a wide range of threats to hardware and software, including power surges.

The annual premium for a typical system consisting of a \$3,500 microcomputer, a \$1,600 printer and \$900 worth of programs would run approximately \$75, with a \$50 deductible. The cost of insurance for personal computers used for business is tax deductible.

Insurance companies have traditionally found it difficult to offer home computer coverage even on an individually written basis. They have had to scale down larger policies or modify existing policies of a similar type, such as floaters written on expensive jewelry and antiques. These policies base rates on the value of the individual items

covered; for example, each diamond necklace, ruby ring and emerald brooch.

This "scheduling" method of rating has obvious drawbacks for computer owners who continually change their systems. They very often trade peripherals and programs among themselves outside of the normal retail market. With scheduled rating, the owner would have to update his or her policy every time a piece was added to or removed from the system. This would create a flood of paperwork, unnecessarily complicating the transaction for both agent and insured.

CNGA's SAFEWARE instead bases the policy on the total value of the system. The annual premium covers all the hardware, media and purchased software up to an amount stated by its owner when the policy is issued. Individual pieces are not itemized, so no coverage limits are placed on specific items prior to the claim. SAFEWARE's blanket coverage reimburses the insured for the full replacement cost of the equipment at the time of loss. Policies can be quoted over the phone and issued immediately. If insureds are not satisfied, they can receive a full refund within 10 days of receiving the policy. For more information, contact Sherry Scott, Columbia National General Agency, 88 East Broad Street, Suite 1800, Columbus, OH 43215 or call (800) 848-0598. In Ohio, call (614) 224-7235. (SAFEWARE is a trademark of CNGA.) ■

## LETTERS TO THE EDITOR

### Corrections

Listed below are some corrections for my article "Graphics and the Dot Matrix Printer" as it appeared in the March 1983 issue:

#### PROGRAM 1:

```
2000 D$(1)="0": D$(2)="1"  
2120 A=A+INT(C*2>(D-1)+.5)
```

#### PROGRAM 2:

```
2120 A=A+INT(C*2>(D-1)+.5)
```

```
3420 K2=K-1: R=R+INT(K2*16>(J-1)+.5):  
E$=LEFT$(E$,LEN(E$)-1): NEXT J
```

continued on page 14

# PROGRAM PREVIEWS

A. A. Wicks

## This Month: INFOSCAN

Sometimes a full-featured data base information program is just too much for one's needs. Mostly, because even though the information to be filed may be minimal, it is still necessary to go through a fairly elaborate procedure with most programs in order to enter and file data. On the other hand, if a program providing ease of entry of minimum data will also permit bulk input, then this will be of great value to the user.

Such a program is INFOSCAN, and as the producers state, it is not a "full-blown data base manager." The restriction here is not in the amount of information it is possible to maintain, but rather that elaborate functions like detailed sorting are not present in this program. For example, it is not possible to search through a data file and extract the names of all females of ages 21 through 25, who have blue eyes. Full-capability data base manager programs can indeed do this, and if this is what you are seeking there are many good programs of this type available (some have been reviewed in past issues).

However, INFOSCAN will organize, store on disk, and locate (and either print or display), any information desired—even lengthy material such as book reviews or product descriptions, if you wish. The program may better be described as an "information storage, retrieval, and display utility;" and let us not even think of it as a database manager.

Also, let's emphasize that word "display," above. Extraordinary screen clarity and formatting are just two of the benefits you get from INFOSCAN. Actually, the display definitely gave me the impression that I was sitting in front of an \$8000 computer terminal. There'll be more about this striking display in a moment. Operating in machine language, all actions occurring during the operation of INFOSCAN do so with extreme speed, reflecting that mode of operation.

### START UP

Getting started with INFOSCAN

is easy. The INFOSCAN disk is not protected, and an immediate backup is recommended. Single-drive users may have to split the operating programs over two disks that have a reduced-size DOS on them, and they will have to do some disk switching when operating, as well as copying the INFOSCAN programs to these disks. The Smallsystem Center offers to place INFOSCAN on customer-supplied minimum-DOS disks at no charge, for one-drive owners. Multiple-drive users need only make a backup, and work with their DOS in Drive 0, if they choose.

From DOS Ready, typing "INFOSCAN" clears the screen and presents an attractive logo panel and copyright notice for about 10 seconds, while the program is loading. The next display is the Main Menu Panel, containing many other items in addition to the latter. From this point on, the user can be oblivious to the functional operation of the program, such as disk operations in-and-out, and need know absolutely nothing about the mechanics of what is occurring. This, to me, is a demonstration of a real user-oriented program.

### DISPLAY

The panel now on the screen, and which intrigued me so, has four defined and boxed windows. Although the window functions are Status, Main Menu, Small Screen Text, and INFOSCAN Logo, they are not identified as such, but during operation present those functions. It is a transitional screen panel that you view, changing the contents of the various areas as different commands are given, either from keyboard or disk input. This four-panel screen is always present, with one exception. One of the functions, which will be described presently, removes this display, and substitutes a Full Screen Text window, which covers the entire video screen.

The Status Window displays information regarding the file being processed at the time, including the name of the file, but also displays

other information when required, and as will be mentioned. The Small Screen Text window presents questions to the user relative to identification and processing of the files. When information records are formatted for this window, they too, are shown here. The Main Menu window lists all of the functions of INFOSCAN, and these are selected by moving the cursor that is present on the left side of the list, from one item to another, using the up-down arrow keys. When the cursor is beside the selected item, <ENTER> initiates the processing.

There are other visual enhancements at various times. One, for example, is that when a file is loading there is a flashing star in the small window, and the word "loading" appears.

### FILES

Operation of INFOSCAN is around two files that are created by the user. These may be on the same or separate disks, as you choose. The first, which will be a name selected by you, followed by /DAT. No need for you to append that suffix—this is done automatically by the program. This will be the file that contains the specific information for the file that you wish to use; perhaps a Product List. The second file, appended similarly, but as /KWF, is the Keyword file. The Keyword file is a list of keywords unique to the data, and which are used to search for and display the information that has been inserted by you. Each information file, incidentally, may contain up to 350 records; however, the practical limits are up to the extent of the disk drive capacity.

If you have never operated an information base program before, the words "record," "file," and "keyword" may concern you. However, all of this is adequately and clearly explained in the documentation. It is sufficient to say in this review that, (using an address list as an example), each name and address group may be considered as an information record—and the keyword will be a symbolic alpha or

numeric (or both), group that will identify all of the designated name-address records. The entire file, with this program, could be the name-address records only, or it could conceivably also include, an appointment calendar, recipes, ad infinitum—the choice is yours. However, it would normally be proper to give each different topic a different keyword. In the following paragraphs, I will review the Command functions, and you will see how these keywords are used for searching and sorting.

## COMMANDS

It follows then, as with all file information programs that the information must be entered, and to do this with INFOSCAN, the word "Add" is selected, after designating a file name with the previously mentioned file identification function ("File"). Add is used initially for a new file being entered, or to add information to an existing file. A Password may be used, optionally. Add requests a keyword via the Text window, and you can enter any word from one to 17 characters long. You may at this time also specify a Sort Group, as it is called, for each new information record. This is the only type of sort within INFOSCAN, and I must admit it took some comprehending on my part to determine what was going on here. I suppose it was because I was expecting the type of sort whereby the names in an address list could be input randomly and sorted alphabetically. Not so—the sort occurs by keywords. If your keywords were 200, 800, 100, then the sort would come out as 100, 200, 800—and these groups might be all names and addresses zoned by keywords, or mixed with recipes—just the way you had initially set them up.

Although the explanation provided in the documentation for this function is fairly long, as I say, it was puzzling. The explanation itself is puzzling and I would have liked to have seen a more simplified discourse—considering that everything else in the manual is most clear. The author suggests you "experiment" with the Sort group feature. I feel this is an avoidance of a specific and a no-doubt difficult exposition.

Continuing with the input of information, you type in the data

that you wish to have on file. This operation is quite convenient, and has many of the capabilities of a small word processor. A blinking cursor appears where the next character will be displayed. The cursor may be moved, using the arrow keys, anywhere around the screen, and it will not erase any existing characters it may pass over (this is termed "non-destructive"). Hence, lines may have information added to them, deleted, or be overstruck. Careful with this cursor though—it moves with the speed of lightning! A little too fast, I would say, as it is easy to zoom past the point where you intended to stop. Text entry is continuous to the extent that you desire. That is, when an end-of-line is reached, word wrap-around will occur—if a complete word will not fit on the current line it is dropped in its entirety to the next line. As the last line in the Text Entry window is reached, the text will scroll up one line. There is no apparent limit to typing speed.

A great amount of data input lends itself to using the Small window entry. However, lengthy material may better be processed using the Full Screen window. In this mode, up to 56 screen lines of information may be entered. Obviously, if your text is more than a window can display, it will be lost to sight. But as typing continues, it will scroll, and when viewing it may be moved in and out of the window using the up-down arrow keys.

A unique feature that may be called up during text entry is FORMFLASH. Readers will probably be aware of what could be an involved procedure if the data you wish to enter is better presented by using a fill-in form. It means that ordinarily you must move from place to place on the form, insert the information, and then toggle over to the next location. An appointment list could be an example of this type of entry, where, on the display (or printout), you would like to show Name, Address, Telephone No., Appointment Time, Doctor to See, etc., presented on the form to utilize space to the utmost. Using FORMFLASH, you create the blank form once, store it on disk, and recall it when required. You then use the floating cursor to move from entry to entry on the form. But you say—this is as

difficult as moving from place to place by pressing the arrow key! Not with INFOSCAN—the whole operation may be accelerated by placing a colon after each item when creating the form (which you probably would do, anyway). Then, when entering data on the form, by pressing two keys simultaneously, the cursor will jump to the next item on the form immediately following the colon—ready for text entry. A great timesaver.

While still in the Add function, there are several Special Commands available, allowing you to print a record being entered, write to disk, not writing to disk but returning to menu, etc., and of course, the FORMFLASH mode as described. The command to Print results in printing the requested material, but correctly enough, linefeeds the printer to the end of the page, although you may only be printing an item several lines long. I would have liked to have seen some control over this.

When you have created records for your file using the Add function (or have added records to an existing file), you will wish to scan and possibly print these records from time to time. Using the movable cursor and menu choice you may go directly to Scan, as long as files have been previously prepared. In Scan, a set of graphic "brackets" nearly two inches high box the keyword list in the small window of the file you have requested. The first two lines identify the information file and shows the number of keywords in the list. You only need to scroll up and down to view the keywords. Flashing pointers within the brackets indicate the keyword that will be selected. Once chosen, pressing the Clear key instantly displays the associated information record. As you may see, all of the information is screen provided—you need not keep any separate written or printed guide to locate and display the information you seek. Keeping in mind that long keyword lists could present an annoyance by requiring much scanning, the program author has provided an "Automatic Keyword Locator" module in the program. By pressing two keys at the same time, the top of the keyword list appears. You then type, at the blinking cursor, as much of the keyword as you may recall (which may be as

few as three letters), and press <ENTER>. Within a fraction of a second (dependent upon the length of the list), the first matching keyword will appear between the brackets. Pressing Clear displays the record. One more keystroke will return you to the Menu. This is an extremely useful and time-saving feature of the Scan within INFO-SCAN.

Also within Scan are some special functions, using two keys. You may print the keyword list, or change the keyword list currently being displayed, using these keys.

The command Delete will permit the deletion of keywords from an information file keyword list. This "kills" the keyword and the information file on the associated disk, and should be used with that in mind, obviously. The space released is available for additional records. Operation is similar to Scan, and you may use the Automatic Keyword Locator here, too. Pressing two keys deletes the keyword shown in the window.

The Change function will recall an information record from disk, and permit changes, or additions to existing information—but should not to be confused with the Add function; however, the operation is almost identical. Once the information is displayed the quasi word processing procedures of Add may be used to make any changes or additions. This information is then rewritten to disk. You can essentially use Change to scan records too—especially useful if you are moving through a number of information records and making changes. Again, an example of this would be an appointment list, in which it is desired to have all date entries moved ahead three days.

The final menu function is End, and, as the producers strongly emphasize, this command should always be used to terminate program operations. A number of actions occur, and assurance is provided that records are not destroyed on the data disk. End rewrites the updated keyword list files, writes updated control information to the information record file, closes all open files, and returns the computer to the DOS.

## DEMONSTRATION PROGRAM

An excellent and impressive

demonstration program is available, which may be called from the INFO-SCAN disk just as if it was a file of yours. I never fully realized the potential that was available with INFO-SCAN until I ran this demonstration. It comprises several records all on a single file. One of these is an Appointment File for a number of days and another for a full day, hour-by-hour—apparently for a very busy person. The format of this record is impressive and shows exactly what you can do with this program. In addition, there is a blank form created by FORMFLASH that will provide you with plenty of ideas. A "To Do" list for one day with numbered items through to 13 is something that could be available at any time, or be printed out on a daily basis. An Address List indicates the remarkable possibilities of being able to keep not only the name and address, title, telephone number and company of your various business and personal contacts, but also a little key insertion, such as "likes two-martini's for lunch," and, "Assistant's name is Will Gamble." A recipe file shows how a nicely formatted input can be developed that looks exactly like a card file (some of the recipes sound good, too!). This Demonstration file places emphasis on the fine graphics capabilities of INFO-SCAN. For Model I owners who do not have a lower case modification installed, a special Demonstration file is on the INFO-SCAN program disk, all in upper case.

## ERROR TRAPPING

One of the most important qualities of a program that will classify it as good or bad, is how well it handles error trapping. Satisfactory operation in this area is mandatory with a program that will be used by computer operators unfamiliar with the inner machinations of programs and computer equipment. And programs that "lock-up" the computer and display "ERR-34 Line 12230" are probably more devastating to the user than having the computer simply quit.

INFO-SCAN is what I would call "first-class" in its error-handling techniques. In the first place, although I deliberately performed many erroneous actions, the worst that happened was that "nothing" happened. Pressing an incorrect key in some instances merely left



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everything as if I had never pressed the key. Some other errors permitted me to try again, by pressing the <ENTER> key. When this was done, I was back in the program flow at the point just before the error action. Errors such as invalid file names state this error in plain English, and <ENTER> lets you try again. Also, it was interesting to see that INFOSCAN will not let you go into lower case while entering a file name. I was pleased with the error-trapping facets of the program, and would like to see more programs developed along these lines. This is going to be essential as more and more neophytes acquire computers.

## OPERATING MANUAL

The Operating Manual for INFOSCAN comprises 28 single-sided 8 1/2 by 11 inch sheets, composed by a "letter-quality" dot matrix printer. This material lends itself well to being three-hole punched (which it isn't), and kept in a binder. (I maintain all of my "loose" manuals in this way, with dividers and index tabs.) The pages are delivered in a sturdy soft-cardstock pouch-type folder.

The manual is well organized, providing a large number of pages of Overview and discussion of just what the program does and is capable of doing, before it gets into the details of actual operations. The latter is well-written and easy to understand for anyone unfamiliar with computer operations, with the exception of the Sort function, which has already been mentioned. I especially liked the general format and paragraphing of this manual, and the "bite-size" exposition throughout. Although no mention is made of it in the manual, upper and lower case is supported for the Model III, and for the Model I in which a lower case modification been installed. There are three

Dr. Weldon J. Horton  
Midland College  
3600 N. Garfield  
Midland, TX 79705

### Another Correction

There was a minor typographical error in my article "Short-Type," which appeared in the March 1983 issue: paragraphs 11-14 were repeated! However, as far as content goes, the article was accurate. I hope your readers enjoy it and profit from it.

Frank Tymon  
4749 W. K12 Avenue  
Lancaster, CA 93534

### A Question of Record Lengths

HELP! The Radio Shack Bisync Communications (catalog #26-4716) states that record lengths can be up to 256 bytes. Has anyone been successful in actually doing this when communicating to an IBM System 34? Any information will be appreciated.

Marvin Lanahan  
24935 Roesner Road  
Katy, Texas 77450

### Don't Forget Cassette Users!

I would like to voice two minor complaints before the praise. Please don't forget the readers who haven't upgraded to disks. In your classified ads (for programs from any issue) and in other areas, you give coverage to disk systems. Please don't forget us who are still cassette bound. Secondly, when you include documentation with your free cassette, please don't reduce it so small. They are very hard on these 41-year old eyes.

I have been delighted with your publication since I first subscribed. I have especially enjoyed the three authors of the Beginner's Corner and the Model III Corner. You were the ones who told me about the Lemon Loader, and it has helped me with non-garbage loads. The loader helped me find the MEM test on the first copy of the free cassette. The documentation I received listed the programs as: Word Processor, Data Base, MEM, Clean-up, Advent. In actuality, the 1980 version I received had these programs in the following order: Word

Processor, Data Base, Cleanup, Advent, MEM, Super Word Processor, T.I. Calculator Simulator. The cassette I received with the last renewal has a four-program version: Word Processor, Data Base, Cleanup, and Fincalc.

I have modified the Data Base as per instructions for faster reading and writing of data cassettes. It improves the speed somewhat and works fine. A question on the Word Processor: when I clear the buffer with the CLEAR command, the buffer is cleared, but I receive an error message "?DD" Redimensioned Array. This occurs on both the 7 program word processor and the 4 program word processor.

As I have no printer yet, I cannot use either of the two word processors on the free cassettes to the fullest extent. The programs are excellent for the starting computerist. I also bought Dr. Lien's book on TRS-80 BASIC, on your recommendation, and it is excellent. I would recommend it to anybody who is getting their first taste of computers, as I am.

I hope you will consider making programs available on cassettes as well as diskettes. Please update your article index, which you first published in 1981, from time to time. Also, could you list clubs and user's groups for your readership?

Thank you for your kind attention and trouble. I have subscribed to others, but your publication has been the one to follow. Keep up the good work.

James P. Dixon  
#3, 592 High Point Terrace  
Memphis, TN 38122

To avoid the errors with the Word Processor, when you want to clear the buffer, simply hit the BREAK key and then type RUN.

We'd like to make the programs available to cassette users, but not all of them will run on cassette systems, and the labor involved is much more costly than with disk copies. We will consider requests for copies of the programs on cassette, but because of these problems we are not going to advertise them.

We will also consider publishing an annual directory of TRS-80 clubs and user's groups. Readers are asked to let us know about groups which they may belong to. ■

## LETTERS TO THE EDITOR

continued from page 10

The left bracket sign ([ ]) is formed on the TRS-80 Model III by the up arrow and performs the same exponentiation function as the up arrow on the Model I.

You have an excellent magazine.

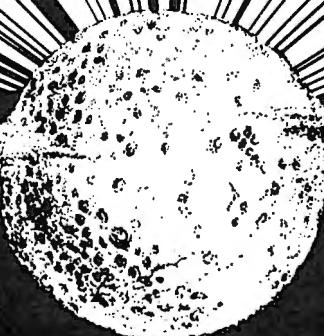
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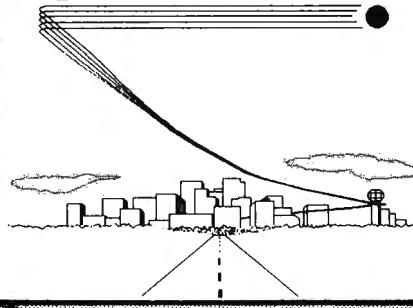
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# BEGINNER'S CORNER

Spencer Koenig

## This Month: Potpourri, Left-Overs, and Misconceptions

Hi. It's that time again. Well, what shall we talk about this time? Let's start with the mail. Every now and then the letter(s) come rolling in with some comments (just like "60 Minutes") about an article I wrote way back when. Usually they're about some book I've reviewed, wanting to know where to get it or who is and where do you find the publisher. I try to make sure that information is in the article, but sometimes these things happen.

Well, just for information's sake, I usually come across the texts in the usual way, in a book store. I usually stumble across it, look through it, and if it seems like a good deal, I buy it. If it's really good, then I can recoup my purchase by writing a review. I usually don't write reviews on books that are not worthwhile (there have been a few, believe me), because you may not have the time to read a "bad" review when you could just as well get more out of a "good or better" review. If you want to see reviews on some books that I think are not so worthwhile, drop me a line and we'll make it personal (besides, the EDITOR doesn't like to take up magazine space with "bad" news).

OK. Suppose you've read my review and now you want to find the book. Maybe I slipped up or you can't find the article with the information. What do you do? Where do you go? The answer is really very simple: you can go to any book store and ask for help on locating a specific title. As it turns out, there is a rather large book that all book stores should have which contains a listing of "ALL" titles still in print. This book also has the publisher as well as information on where to send for more information (and sometimes a toll free number to call).

As it turns out, there really aren't that many publishers for books that deal with the TRS-80 or related materials. Those that should be noted are ADDISON WESLEY, TAB books, OSBORNE/MCGRAW HILL, SAMS BOOKS, WILEY, PRENTICE-HALL, RADIO SHACK (who else?), and HAYDEN BOOKS. These few publishers put out most of the current texts that are good for beginners and up. As you get into the subject, you'll find you'll be going into more serious books (and prices) that deal with systems and techniques on programming (Yourdon Press and the famous subject "Structured programming" for example).

These publishers are a good bet for some of the best that's out there, and if I were you I'd keep an eye out for their products. They are generally of good quality and usually well written (not to mention, well priced). Again, for specific information on who wrote what and who's the publisher, check with the BIG BOOK at your local favorite store. If they can't help, then by all means drop me a line and I'll do what I can to help.

Enough about books for now. Let's change the subject. A while back I wrote about the benefits of joining a club (misery loves company, etc.), and I gave a few suggestions on how to go about getting together with others with similar interests as your own. One of those suggestions was that, if you were forming a club

or wanted to, you could write to me and tell me about it and I would make some mention (if possible).

Well, as it happens, I'm happy to say, a Mr. Jim Dixon wrote to me saying, (and I quote):

Dear Spencer,

Although I have been a subscriber to *Computronics* since mid 1980, hands on has been since October of last year. I read the January Beginner's Corner with much interest. Would you mention to like minded computerists in my area that there is one (person) much interested in forming a users' group in Memphis and/or Blytheville, AR. Thank you and keep those corners coming. Before closing, I have a TRS-80 MODEL III with CCR-81.

Sincerely

Jim Dixon  
630 N. Hwy 181  
Blytheville, AR 72315

or

#3, 592 High Point  
Memphis, TN 38122

I'm sorry Jim but I'm afraid I'm not allowed to pass personal messages through the magazine. You'll just have to find some other way to get your message across. What do you think this is, a public bulletin board or something (but seriously folks)! So, if there's anyone out there who knows of any clubs or wants to form a club, then get together with Jim and by all means party.

NOW FOR ANOTHER NEW SUBJECT (how do you like my segues? Smooth, huh!)

I have some interesting news (at least for me), that might interest you who might be involved with teaching. As most of you know, if you've been reading my column, I teach in a N.Y.C. Junior High in Ocean Hill-Brownsville (sometimes called a ghetto area), and under my urging (I like to think so, at least), my school has recently acquired eleven TRS-80 Model III's. What this means, of course, is that I have to practice what I preach. The biggest result, though, has been my own very interesting education (or should I say re-education?). Once again, I find that if something can go wrong, a Junior High student can do it bigger and better than I dreamed possible.

As you can tell by my tone, the experience hasn't been at all like those that you may have read about in various publications, fantastic successes, grades skyrocketing etc. I must say, it has been more exciting than anything I've done before, but it has also been more frustrating than I would have expected.

My overall goal is to get the kids reading in any way possible, but if they're like any other beginners, they run into the same road blocks of misconceptions and buzzwords. I was really amazed how T.V. has affected these impressionistic young minds.

continued on page 18

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## BEGINNER'S CORNER

continued from page 16

One of the first questions they asked me was "Can I ask it a question?" They believed that, by asking, you could just as easily get the answer. Simply tell the computer what you want to know (don't forget to plug it in first), and SHAZAM, the answer appears. One of the brighter students even asked me if she could get information about her family background from the computer (ROOTS inspired I'm sure). At the same time, I had to use a whip and a chair to keep them from mauling the machines to dust (they didn't know the keyboard at this time and on/off buttons seem to get a great deal of attention).

The second most popular question was "Can I play PAC-MAN on the computer?" I'm surprised it came in second. I imagine they were originally looking for help in doing their homework.

Well, to keep the enthusiasm going, I told them they could only play a game like PAC-MAN on the condition that they type it in (I have collected several versions from various magazines and books). My reason for this was two fold. The first was that I think they would get more out of the program by seeing the insides of the code and having it explained to them as they went along, and the second reason was that, if the Principal ever came in, I could always say that they were debugging a program that they had put into the computer themselves (whew!).

Misconceptions abound. I'm still trying to figure out what it is the kids are thinking when they say "The program is in the computer" I can't help but wonder how old these kids are when they say that phrase. I'm almost positive some of them are thinking a little on the dirty side (they have great senses of humor).

Trying to find decent texts for the classroom is a real problem too (that's a hint to any publishers of educational materials out there). I've learned that you have to be more careful about the little things in texts that can catch you by surprise. I'm using the Lien text as a model for my lesson plans. One of the things that tripped me up was an example of entering a basic command in the first chapter. See EXAMPLE 1.

---

### EXAMPLE 1

Run ENTER.

10 This is a line of code ENTER  
20 This is another line of code

---

In the beginning the text mentions that you should press the ENTER key at the end of the line. This is done almost subliminally by showing a picture of the key in a small rectangular box. Well, after the first few examples (like in line 20) the ENTER key picture was gone with no clear explanation.

If you have some experience at the machine, this kind of problem may seem trivial and at worst really "stupid," but you must take it from the viewpoint of the extreme beginner. Every example must include every, and I mean every, step that must be taken, and if you're going to change the situation (such as dropping the enter key picture), you can't just have a small notice on the side (or no mention at all in some cases). The

change must be FLAGGED WITH A BANNER, SO THAT THE STUDENT (if he's reasonably awake) TAKES NOTICE. By the way, there were a few teachers who were also interested in working on the machines, and on their first attempts they made the same mistake and had to ask "What do I do now"

As a teacher, it's my job to try and smooth over these rough spots, but, "it ain't that easy." The only way to manage through these problems is to go through them. After some time, you will have found most of the bugs.

I have found that some of the (tons of) material I get to go through has been pretty good, but I never rely on one source. My other source of material is the Radio Shack introduction to BASIC. This series is quite good. It includes overhead transparencies for classroom projection as well as accompanying texts for the students to go through. The limitation of this series is that it doesn't have "hands on" experience at a fast enough rate, but it is good on explanations of the TRS-80's innards. The Lien book, however, has lots of "hands on" but a great deal less on explanations of the internals (the kids are really curious and literally devour any information).

One concept I didn't expect to run into was the "I ran out of room" on the screen problem. I hadn't thought of it before, but how does a beginner (kid or adult) know where the rest of the program goes when he runs out of room on the screen? For me it was something I just took for granted. The only place I saw it explained, of all places, was in a database management package. Think about that for a moment! The users of DBMS's are usually very sophisticated people (usually business types), who you would expect could figure out that the screen can scroll up and the information still retrieved. Sometimes the world is really upside down.

The explanation I found was really quite good, and I'd like to pass it on to you. Think of the screen as a continuous piece of paper that scrolls up as you write on the bottom. It's really a very simple approach (the simple ones are usually the best and often the most overlooked). The analogy works quite well, and when combined with explaining that the CLEAR key only clears the screen, sighs of relief and sounds of wonder can be heard in all of my classes.

These kind of problems only scratch the surface. The authors of texts have to realize that there are hundreds of variations on these problems that they have to test for in their research when writing any text. I'm sure they and you are aware that there is only so much a text can contain. What is required is texts that look at the overall picture of a particular grade, and as the grade continues, the texts for the next grade adds more information, one that considers vocabulary as well as concepts.

I was surprised at how many students didn't know how to explain the definition for "DELETE" or "INSERT." A glossary with pictures with this kind of approach for beginners at all levels would make learning computer science much easier. How many of you could define clearly the difference between a "COMMAND" and a "STATEMENT?" I am sorry to say that Mr. Lien's book mentions it, but nowhere does he give a concise definition.

Even adults come across with gross misconceptions. I was told a story by a friend of mine about a woman who

continued on page 22



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# PRACTICAL BUSINESS PROGRAMS

S. M. Zimmerman and L. M. Conrad

## Month #5: Housekeeping Programs: UPDATE and YEAR

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These two programs are needed at the end of the tax year and whenever a change is made in the chart of accounts. When the tax year comes to an end is it necessary to zero out the year-to-date information maintained in the profit and loss statement. YEAR is the program that does this function. Be very careful not to use YEAR except at the end of the year.

The second program is UPDATE. This program is designed to change the chart of accounts when necessary.

The last of the housekeeping programs is MOVE. This program is designed to move files from disk to disk. If you are using a single disk system and then add a second or third disk this program will be useful. It is also useful in placing material on different disks for purposes of storage. This program will be published as per the following schedule:

No	Month	Program
1.	.....	GLMENU (Controls use of routines).
2.	.....	NAME & START (Initializes chart of accounts and firms name).
3.	.....	TRANSACTION (Inputs monthly transactions).
4.	.....	CPA (Produces Balance sheet & Income and Expense statements, Profit & Loss statement).
5.	.....	UPDATE & YEAR (Changes chart of accounts and performs year end closing tasks).
6.	.....	TRIAL (Produces trial balance).
7.	.....	BALANCE (Balances check book).
8.	.....	MILES & MOVE(Calculates gas mileage and moves files between disks).

Each of the programs in this set will be reviewed in turn.

### RUNNING YEAR

This program has a single objective which is to return to zero the year to date profit and loss values. It is expected that you will need this procedure at the start of each new year only.

The program starts by printing in bold letters

**THIS ROUTINE SHOULD BE USED TO START A NEW YEAR ONLY**

YOU WILL ZERO ALL YEAR TO DATE DATA

ARE YOU SURE YOU WANT TO DO THIS (Y/N)?

It is dangerous to play around with this program.

The next question is relative as to which disk the information is found on.

DISK?

NAME OF OLD BALANCE?

You have control of the disk upon which the information is to be put, as in each one of our programs. Be careful to place the old balance sheet on the same

disk it was on in the past. It is possible to end up with two versions of the same file. The computer will use the file it first encounters, the one in the lower numbered disk drive.

After the task is completed, the computer will print:

THE DEED IS DONE

It will then return you to GLMENU.

### RUNNING UPDATE

UPDATE is designed to be used to change the number of different types of accounts in the chart of accounts, to delete old unwanted accounts and to make adjustments for errors you may have made in setting up the chart of accounts in the first place.

We will use UPDATE to add two dummy accounts to the chart of accounts as created in START. Both accounts will be assets. They will be named Dummy#1 and #2.

UPDATE OF SYSTEM/REVISION OF CHART OF ACCOUNTS CORRECT  
DEBITS & CREDITS  
DISK?

After inputing the disk being used there will be a delay as the computer reads some information from a disk file. It will then proceed.

### NUMBER OF ACCOUNTS YOU WILL ADD?

We plan to add two accounts so we answer this question with a 2. If we decide to add a third account in this run we will not be able to. We are committed to adding a maximum of two accounts. We may add none or one if we wish.

1	NO. LIQUID ASSETS	1
2	NO. FIXED ASSETS	4
3	NO. INCOME FILES	2
4	NO. EXPENSE FILES	6
5	NO. LIABILITIES FILES	3
6	NO. STOCKHOLDER EQUITY	2

ENTER TO CONTINUE?

The above is the current number of different types of accounts in the chart of accounts. You will automatically add or delete accounts in the UPDATE program.

### FILE NAME OF OLD BALANCE?

In our example we have used AUGUST2 as the name of the old balance sheet. Again we will use this name, but we will make no changes, so as not to destroy the system we have created.

#### FILE NAMES

NO. LIQUID ASSETS

1 CASH 5845.22 0.00

NO TO CHANGE, -1 TO CONTINUE, -2 TO INSERT, -3 TO DELETE

-4 TO SUM DEBIT/CREDIT

?

Since there was only one liquid asset, only one item was printed out. If we wish we may delete this item or do any of the other activities noted above. Be careful only to make changes to the files printed out before you. If you ask the computer to delete number 12, it would do so at this point, but it would reduce the number of liquid assets to zero and make a mess of your files.

If you select the -4 option, you will obtain the total sum of all balance sheet accounts and separately the sum of all profit and loss accounts. This procedure has proven to be a useful error searching procedure in case of typing errors. The output would be as follows:

<b>BALANCE SHEET</b>			
SUM DEBITS	39,699.44	SUM CREDITS	39,699.44
<b>PROFIT AND LOSS</b>			
SUM DEBITS	9,000.00	SUM CREDITS	8,600.00
PROFIT FOR PERIOD		-400.00	

As shown above the sum of the debits should equal the sum of the credits on the balance sheet. This is not true on the profit and loss statement. The sum of the credits less the sum of the debits is equal to the profit for the period.

After you have printed out the above, you will be returned to the menu of activities choices shown above.

After inputting -1 to continue, the next set of accounts will be printed on the screen.

<b>NO. FIXED ASSETS</b>			
2 HOUSE#1	36261.22	0.00	
3...RES FOR DEP	0.00	2888.44	
4 TRS-B COMPUTER	3202.00	0.00	
5...RES FOR DEP	0.00	506.22	
NO TO CHANGE, -1 TO CONTINUE, -2 TO INSERT,			
-3 TO DELETE, -4 TO SUM DEBIT/CREDIT			
?			

Since we wish to insert a new line, -2 was typed.

**INPUT NUMBER TO BE INSERTED, NAME DEBIT & CREDIT?**

To insert a line 6 called DUMMY#1, the above question is answered with (6,DUMMY#1,0,0). The cycle then repeats itself and DUMMY#2 can be added.

When you have completed the file, you will be given the choice of a hard copy of what you have just changed.

#### HARD COPY CHART OF ACCOUNTS (Y/N)?

The next question will be relative to the name of the new old balance sheet data. If you wish to save last year's results, it is possible to change the name being used at this point. After answering this question, the files will be updated and you will be returned to GLMENU.

**FILE NAME OF NEW OLD BALANCE SHEET?**

### EXAMINING THE PROGRAM: UPDATE

UPDATE starts with a CLEAR 2000 in line 10 to make room for the string variables to be examined. Lines 20-50 define the headings to be used and the format of the output. Line 60 clears the screen and print the title of the program.

Line 70-190 inputs the file specification and the files to be updated, while lines 190-220 prints the current information in the files and gives the user the opportunity to update or change the information.

The summation routines are in lines 230 through 300. In line 310-340 there is an error trapping routine which does not allow you to input more new files than you said you would at the beginning of the program.

Lines 350-380 is a deletion routine which allows you to remove some accounts if you wish.

Lines 360-460 are a hardcopy option if wanted. We have built into line 390 the ability to control the top of page form routine if your system allows.

Lines 470-530 completes the program and saves the updated information as specified.

### EXAMINING THE PROGRAM YEAR

This is a very short program. All it does is to zero the year to date information in the profit and loss files so a new year may be started. Line 80 is where the 0,0 is printed. We recommend that you copy your year ending disks using BACKUP and then use these new disks to start a new year.

### PROGRAM LISTINGS: UPDATE

```

010 CLEAR 2000:REM "UPDATE"
20 AX$=" NEW NAME, DEBIT & CREDIT"
30 A$(1)="NO. LIQUID ASSETS":A$(2)="NO. FIXED ASSETS":
A$(3)="NO. INCOME FILES"
40 A$(4)="NO. EXPENSE FILES":A$(5)="NO. LIABILITIES FILES"
50 A$(6)="NO. STOCKHOLDER EQUITY":BB$="#,###,###.##":
CC$="# %           % #####.## #####.## #####.##"
60 CLS:PRINT "UPDATE OF SYSTEM/REVISION OF CHART OF ACCOUNTS
CORRECT DEBITS & CREDITS"
70 INPUT "DISK";DD$:NO$="NO":FF$="FILE":FJ$=FF$+"N:"+DD$:
INPUT "NUMBER OF ACCOUNTS YOU WILL ADD";NA
80 NO$=NO$+":":DD$:FF$=FF$+":":DD$:XZ=0:OPEN"I",1,NO$:
FOR I=1 TO 6: INPUT #1,K
90 J(I)=K:XZ=XZ+J(I): NEXT I: CLOSE 1: DD=XZ+ABS(NA):
DIM FI$(DD),X#(DD,2)
100 SU=0: FOR I=1 TO 6: SU=SU+J(I): PRINT I,A$(I),J(I):
NEXT I:SV=SU
110 AA$="NO TO CHANGE, -1 TO CONTINUE, -2 TO INSERT, -3 TO
DELETE, -4 SUM DEBIT/CREDIT":INPUT "ENTER TO CONTINUE":DU$ 
120 INPUT "FILE NAME OF OLD BALANCE";OP$:OB$=OP$+":":DD$:
OP$=OP$+"P":DD$: OPEN "I",1,OB$: OPEN "I",2,OP$: A=1:
B=J(1)+J(2): C=B
130 FOR I=A TO B: INPUT #1,X#(I,1),X#(I,2): NEXT I:IF B<>C
THEN 150
140 A=1+B:B=B+J(3)+J(4): FOR I=A TO B: INPUT #1,X#(I,1),
X#(I,2): INPUT #2,X#(I,1),X#(I,2): NEXT I: A=1+B:
B=B+J(5)+J(6): GOTO 130
150 CLOSE 1: CLOSE 2
160 OPEN "I",1,FF$: FOR I=1 TO SU: INPUT #1,F$: FI$(I)=F$:
NEXT I: CLOSE 1:TT=SU
170 PRINT " FILE NAMES": SUM=0: J(0)=1: XX=0
180 FOR P=1 TO 6:SUM=SUM+J(P):XX=XX+J(P-1)
190 G=0:PRINT A$(P): FOR I=XX TO SUM: G=G+1: PRINT USING CC$;
I,FI$(I),X#(I,1),X#(I,2): IF G=11 THEN G=0: INPUT "ENTER TO
PAGE":DU$
200 NEXT I
210 PRINT AA$: INPUT Y: IF Y=-1 THEN 390
220 IF Y<-4 THEN 290
230 PD#=0: PC#=0: SD#=0: SC#=0: FOR I=1 TO J(1)+J(2):
SD#=SD#+X#(I,1): SC#=SC#+X#(I,2): NEXT I
240 O=J(1)+J(2): Q=0+J(3)+J(4): FOR I=O+1 TO Q:
PC#=PC#+X#(I,2): PD#=PD#+X#(I,1): NEXT I

```

```

250 FOR I=Q+1 TO Q+J(5)+J(6): SD#=SD#+X#(I,1):
SC#=SC#+X#(I,2): NEXT I
260 PRINT "BALANCE SHEET "; PRINT "SUM DEBITS ";: PRINT
USING BB$;SD#: PRINT " SUM OF CREDITS ";:PRINT USING BB$;SC#
270 PRINT "PROFIT AND LOSS ": PRINT "SUM DEBITS ";: PRINT
USING BB$;PD#:
280 PRINT " SUM CREDITS ";:PRINT USING BB$;PC#: PRINT "PROFIT
FOR PERIOD";: PRINT USING BB$;PC#-PD#: GOTO 210
290 IF Y>0 THEN 380
300 IF Y<-2 THEN 350
310 SV=SV+1: IF SV>DD THEN PRINT "NUMBER OF FILES TO BE
INPUTTED": INPUT "ENTER TO CONTINUE";D$: GOTO 210
320 PRINT "INPUT NUMBER TO BE INSERTED, NAME, DEBIT &
CREDIT":: INPUT K,$$,D#,C#
330 TT=TT+1: SUM=SUM+1: J(P)=J(P)+1: FOR L=TT TO K STEP-1:
FI$(L)=FI$(L-1): X#(L,1)=X#(L-1,1): X#(L,2)=X#(L-1,2):
NEXT L: FI$(K)=S$: X#(K,1)=D#: X#(K,2)=C#
340 GOTO 190
350 IF Y<-3 THEN 210
360 PRINT "INPUT NUMBER TO BE DELETED";: INPUT K: SV=SV-1
370 SU=SU-1: J(P)=J(P)-1: FOR L=K TO SV: FI$(L)=FI$(L+1):
X#(L,1)=X#(L+1,1): X#(L,2)=X#(L+1,2): NEXT L: GOTO 190
380 PRINT AX$: INPUT FI$(Y),X#(Y,1),X#(Y,2): GOTO 190
390 NEXT P: INPUT "HARD COPY CHART OF ACCOUNTS (Y/N)";Y$:
INPUT "LINE COUNTER (Y/N)";LC$: IF LC$="Y" THEN CMD"FORMS(T)"
400 IF Y$="Y" LPRINT "CHART OF ACCOUNTS": SD#=0: SC#=0:
PC#=0: PD#=0: FOR I=1 TO SUM: LPRINT USING CC$;I,FI$(I),
X#(I,1),X#(I,2): NEXT I
410 FOR I=1 TO J(1)+J(2): SD#=SD#+X#(I,1): SC#=SC#+X#(I,2):
NEXT I
420 O=J(1)+J(2): P=O+J(3)+J(4): FOR I=0+1 TO P:
PD#=PD#+X#(I,1): PC#=PC#+X#(I,2): NEXT I
430 FOR I=P+1 TO P+J(5)+J(6): SD#=SD#+X#(I,1): SC#=SC#+
X#(I,2): NEXT I
440 LPRINT "BALANCE SHEET "; LPRINT "SUM OF DEBITS ";:
LPRINT USING BB$;SD#;
450 LPRINT " SUM OF CREDITS ";: LPRINT USING BB$;SC#:
LPRINT " PROFIT AND LOSS "
460 LPRINT " SUM OF DEBITS ";: LPRINT USING BB$;PD#;: LPRINT
" SUM OF CREDITS ";: LPRINT USING BB$;PC#: LPRINT " PROFIT
FOR PERIOD ";: LPRINT USING BB$;PC#-PD#
470 OPEN "0",1,FF$: FOR I=1 TO SUM: PRINT #1,CHR$(34);FI$(I);
CHR$(34): NEXT I: CLOSE 1
480 OPEN "0",1,NOS$: FOR I=1 TO 6: PRINT #1,J(I): NEXT I:
CLOSE 1
490 INPUT "FILE NAME OF NEW OLD BALANCE";OP$: OB$=OP$+":":+
DD$: OP$=OP$+"P":+DD$: OPEN "0",1,OB$: OPEN "0",2,OP$: A=1:
B=J(1)+J(2): C=B
500 FOR I=A TO B: PRINT #1,X#(I,1),X#(I,2): NEXT I: IF B<C
THEN 520
510 A=I+B: B=B+J(3)+J(4): FOR I=A TO B: PRINT #2,X#(I,1),
X#(I,2): PRINT #1,0,0: NEXT I: A=I+B: B=B+J(5)+J(6): GOTO 500
520 CLOSE 1: CLOSE 2
530 LOAD "GLMENU",R: REM PLACE AN INPUT"INPUT PROGRAM DISK
HERE";DU$ IF USING A SINGLE DISK SYSTEM WITH SEPARATE
DATA/PROGRAM DISKS

```

## YEAR

```

10 CLS: PRINT CHR$(23): PRINT "THIS ROUTINE SHOULD BE USED TO
      START A NEW YEAR ONLY": PRINT:REM "YEAR"
20 PRINT "YOU WILL ZERO ALL YEAR TO DATE          DATA"
30 INPUT "ARE YOU SURE YOU WANT TO DO THIS (Y/N)";Y$
40 IF Y$<"Y" THEN LOAD "GLMENU",R
50 CLS: INPUT "DISK";DD$: INPUT "NAME OF OLD BALANCE ";H$:
H$=H$+"P":+DD$#
60 OPEN "0",1,H$: OPEN "1",2,"NO"

```

```

70 FOR I=1 TO 6: INPUT #2,K: J(I)=K: NEXT I
80 A=J(1)+J(2)+1: B=A+J(3)+J(4): FOR I=A TO B: PRINT #1,0,0:
NEXT I
90 PRINT "THE DEED IS DONE": FOR I=1 TO 40: R=RND(3): NEXT I:
CLOSE 1: CLOSE 2
100 LOAD "GLMENU",R

```

## SUMMARY

With the addition of these two programs, you now have a complete operating general ledger system. The additional programs which will be published in the next three months add to the ability of your system. However, at this point, you can do all that is necessary to run your business.

Steven M. Zimmerman, Ph.D.

College of Business and Management Studies  
University of South Alabama  
Mobile, Alabama 36688

Leo M. Conrad

Imagineering Concepts  
P.O.Box 9843  
Mobile, Alabama 36691-0843 ■

## BEGINNER'S CORNER

*continued from page 18*

was learning to use one of those other more popular computers named after a fruit. Because she had no idea of the levels that computers work on, she was typing in something like EXAMPLE 2

### EXAMPLE 2

This is Spencer Koenig and I am controlling the computer - obey me.

My friend explained to her the several levels of BASIC language interpreter (High level language) working under an OPERATING system that handles all the little details the language requires, such as input and output functions, which further breaks down to a lower level language often called machine language that ultimately controls the operation of the computer.

Actually, this isn't completely true. If you've followed Joseph Rosenman's articles, you'll see where he mentions a lower level language call MICROCODE which tells the central processor what to do when it encounters machine code. After a while, the student had a better understanding and was beginning to get the idea of how she can control the computer. Now, if only someone could just put it all together for teachers, students and hackers. You know, maybe then I'll have something to write about for next time.

Keep those card(s) and letter(s) coming, folks. Until next time.

P.S., The Heisermann book entitled *Intermediate Programming for the TRS-80 (Model I)* is published by Howard W. Sams & Co. Inc., 4300 W. 62nd Street, Indianapolis, Indiana 46268.

Spencer Koenig

153-27 73rd Avenue

Flushing, New York 11367 ■

# EVERLASTINGLY AT IT

## One "Small" Step for Personal Computery Mike Shadick

As we proceed into the computer age, some people seem to assume that life will somehow become—well, more automatic. That many of life's decisions will be left up to the rapidly-mushrooming talents of artificial intelligence (electronic brains), and that life will thus be rendered more cut-and-dried for us *homo sapiens* than ever before in our history.

The truth, however, is just the opposite! For the computer, by freeing us from life's "simpler" decisions, is actually *expanding* the possibilities for our personal creativity, by increasing the number and variety of creative choices and alternatives available to us!

As but one example, take an aspect of the computerized lifestyle which is already available to us: such as whole-house comfort control. Your TRS-80 can be programmed to not only monitor your home's comfort "systems," but to actually regulate and control those systems for your full and complete "creature" comfort. This ability on your computer's part, serves to free you for other, much more creative pursuits.

Computerized climate control is a relatively "small" thing, right? Indeed! And, by placing it under computer control, we thereby take one more step in liberating ourselves for bigger things!

And yet, digitized climate control is only one tiny example of what computery can do, not to take over the business of living from us, but rather, to free us for it.

The computer, then—now and to an infinitely greater degree in the future—can actually increase our personal responsibility for how we live our own lives. Not lessen it, as some computer critics would maintain. Indeed, the computer's growing role in our lives might actually make life more complicated, in that the avenues of creative expression opening up to us will grow in number, certainly not diminish.

This is to say that the computer can and will serve to enrichen our lives, giving us ever more varied lifestyle options and alternatives—and the "leisure" time to pursue them!

So no, my microfriend, life is not fated to become simpler, in the computer age. Rather, it will in many respects actually grow in complexity, in that computery—and especially personal computery—will make available to us more and more new ways to truly express our individual personalities. More ways than we even dare dream of today!

We can hope that life in the computer age will become less harried, but we can rest assured that it will certainly become more varied!

Mike Shadick  
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# ASK RICHARD

## Richard Kaplan

In February you mentioned "flippy diskettes," which are floppy diskettes that can be turned over to access the second side. I understand that particles picked up and held in the soft lining of the diskette envelope are brought up and act as an abrasive on the diskette surface. Is this indeed harmful? (R.M. Sanford, Largo, Florida)

I have heard this argument stated before; however, I do stand by my original statement, if it is applied in the correct context. (A *flippy diskette* is a standard floppy diskette which has had an extra write-protect notch cut out, allowing both sides of the diskette to be used to store information. The second side is not as well tested by the manufacturer as is the first side, but usually this does not cause any difficulties.)

My comments regarding flippy diskettes essentially were that this procedure is not recommended for critical data, since the second side of a standard floppy diskette is not subject to quality control. However, for data not utterly important flippy diskettes can be an economically appealing idea.

To answer the question, the risk taken in using an untested diskette (such as the second side of a flippy diskette) is analogous to the risk taken due to particles getting trapped in the diskette. In my experience, I have never known this procedure to lead to diskette failure. Of course, I would not depend on it for my company's financial information, but the risk of loose particles damaging a diskette is so minute that I would not even consider the danger for data of secondary importance.

I would like to add 40-track double-sided, double-density diskette drives to my system. Should I buy a PERCOM Doubler, and what diskette operating system should I purchase? — Elwood Cox Jr., Berkeley, California

For a detailed discussion of what a doubler is and why someone would consider buying one, see "Ask Richard" in the January issue. For now, suffice it to say that a doubler is a device which can greatly increase the amount of information which can be stored on a floppy diskette. I would suggest that you purchase a doubler only if you are reasonably familiar with the disk operating system. Most disk operating systems that work with the doubler boards have special commands for formatting diskettes and specifying disk drive parameters. These can be more complicated than the basic TRSDOS commands.

Assuming I have decided to purchase a doubler, what operating system should I purchase?

Certainly there is no universal answer to this question, as each operating system is suited for a different typical user. However, it is possible to generalize the features of each of the major operating systems available.

NEWDOS/80 (from Apparat, Inc.) is by far the most popular alternative operating system available. This is probably due to its early entrance into the operating system market (Look in back issues of computer magazines—Apparat will undoubtedly be there) and its versatility for an experienced BASIC programmer (NEWDOS/80 has many very advanced functions).

Unfortunately, NEWDOS/80 tends to be a bit

overbearing for a computing novice. Its manual tends to be excessively technical and may appear to be written for a nuclear engineer. I recommend NEWDOS/80 to an experienced programmer who is looking for an extremely powerful operating system.

### What is your assessment of DOSPLUS?

DOSPLUS (written by Micro Systems Software) is my personal favorite for two reasons: 1) It has many advanced features, yet it is still user-friendly and has a well-written manual; and 2) it is a fairly popular operating system, which means that most software designed for alternative operating systems will operate with DOSPLUS.

It is worth noting that DOSPLUS II is presently the only major alternative operating for the Model II other than CP/M. (TRSDOS programs will operate correctly under DOSPLUS II. They will not operate under CP/M. DOSPLUS II is also, in my opinion, the most outstanding operating system I have seen yet for any microcomputer.

### Would you recommend MULTIDOS?

MULTIDOS is an excellent operating system, certainly equal in capability to DOSPLUS or NEWDOS/80. In addition, MULTIDOS sells for approximately half the price of any of the other major operating systems. The only disadvantage I can see in using MULTIDOS is that it is presently less widely used than either DOSPLUS or NEWDOS/80. Hence, it may be difficult to obtain modifications to operate a commercial software package with MULTIDOS.

### What is the difference between "compiled BASIC" and "interpreted BASIC?"

A BASIC program which has been compiled has been converted into machine language. An interpreted program is stored in symbolic form within the computer's memory as you type the lines in and executed only when you type RUN.

Very often a program which is written in BASIC operates too slow. One solution is to convert the program into machine language—the computer's own language of 1's and 0's. Machine language programs run much faster than do BASIC programs, but it takes much more time to program in machine language. Hence, converting or "compiling" a program from BASIC to machine language in a sense affords the computer user the best of both worlds.

### Why does machine language operate faster than does BASIC?

Regardless of the language in which a program is written (BASIC, FORTRAN, COBOL, etc.), a computer can only recognize its individual machine language (see above). A program written in BASIC must be "converted" to machine language first, while a program already in machine language need not be converted, thus saving time. Hence, a BASIC "interpreter" is needed to interpret a BASIC program for the computer and translate it into machine language.

### Why not compile all BASIC programs into machine language if it is so much faster?

There are instances in which it is desirable to leave a

program in BASIC, and sometimes it is actually impossible to compile a program.

Very often purchasers of commercial programs, particularly complicated business packages, want to customize a program for their own needs. If a program is written in BASIC, this is easily accomplished. However, machine language programmers are relatively scarce, and it almost impossible for anyone other than the original program author to modify a machine language program. Hence, in this instance it would be desirable to keep the program in BASIC.

**You said that sometimes it is not possible to compile a BASIC program. When would this be?**

Most compilers sold cannot translate every command in a computer's dialect of BASIC. Relatively complex functions are usually omitted from the compiler. As a result, a program which uses these advanced commands cannot be compiled unless it is rewritten without the "illegal" commands.

**I've seen magazine ads for some inexpensive computers which boast "membrane keyboard." What does this mean?**

Membrane keyboards are usually found on very inexpensive computers, such as the Timex/Sinclair 1000 and the Atari 400. A membrane is not at advantage, but rather a cost-cutting inconvenience.

Membrane keyboards do not have any keys at all! Instead, the keyboard is one unbroken surface—a membrane—with locations marked off for each key. To "depress" a key, all you have to do is touch the appropriate location, and it will be automatically recognized by the computer.

In general, touch typists find that typing speed on a membrane keyboard is less than that on a conventional keyboard.

**Is there any median between a membrane keyboard and a conventional keyboard?**

Yes. The Radio Shack Color Computer is an example of such a compromise. This computer does, indeed, contain actual keys, but the keys are spaced closer than those on a typewriter and their shape and feel resembles that of a calculator keypad. Needless to say, the cost of and typing efficiency with this type of keyboard is between that of a membrane keyboard and that of a conventional keyboard.

**We've all heard the term "booting a computer." How did this phrase originate?**

Boot has its origins in the English word "bootstrap," as in "pulling one up by the bootstrap." What actually happens when you boot your computer is that the first location on the diskette—called the bootstrap—is read, which tells the computer how to read the next part of the diskette, etc. This function—being the first part of the diskette to be used—lead to the adoption of the term bootstrap, later shorted to "boot."

**Many software ads I've seen include mention of using an "ISAM" technique. What is an ISAM?**

ISAM stands for *Indexed Sequential Access Method*, and it essentially is a method used to quickly save and retrieve information from a diskette. Essentially, a program which uses an ISAM technique always

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*continued on page 27*

# POCKET COMPUTER CORNER

**Steven M. Zimmerman, Ph.D., Leo M. Conrad, and Bernard Moseby**

## This Month: The Distance, Rate, and Time Problem

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The basic Distance, Rate, Time formula is usually stated as: Distance = Rate \* Time. It can be manipulated to yield: Rate = Distance / Time and Time = Distance / Rate. All three versions will be used to allow us to solve for any one of the unknowns in the equation. If you are traveling from one city to a second and know the distance plus the approximate rate of speed you will be traveling, the program will tell you the approximate time needed to complete the trip. If you know time and speed rate, the distance traveled can be solved for, and if you know your rate of speed and the time you plan to spend traveling, the distance you will cover can be determined.

This program utilizes the DEG and DMS functions of the pocket computer for the conversion of Hours, Minutes, and Seconds into their decimal equivalents and the conversion of decimal time into its respective Hours, Minutes, and Seconds. For example, in the RUN mode type DEG (1.5.2) and press ENTER. You will see on the display 1.866666667. This says 1 degree, 5 minutes, and 2 seconds is equal to 1.866666667 degrees. Using the DMS in the RUN mode by typing DMS(1.5) ENTER, results in 1.3 appearing on the screen. This means one and half hours is one hour and thirty minutes as expected. The use of the DEG and DMS functions means you can input the information in the natural units of the variable and obtain your answers in the natural unit of the variable of interest.

This program works well for varied applications. For example: an individual finished the Mobile Marathon, which is 26 miles long, and his finishing time was 5 hours, 35 minutes, and 23 seconds. Running this data in our program gives us his rate as 4.65 miles per hour. If he ran the first mile in 4 minutes and 57 seconds, then his average time for the first mile was 12.12 miles per hour. (time will be entered in this case as 0 hours, 4 minutes, and 57 seconds).

### RUNNING THE PROGRAM

The program starts by printing a menu that asks you to assign the values: "0" for END, "1" for Rate, "2" for Distance, and "3" for Time. After typing R. in the RUN mode you will see:

OEND 1RATE 2DIST 3TIME

The numbers were placed directly against the words and the question mark left out, so all the information would be on the computer's display at the same time. The menu requests that you select the unknown you wish to solve for. For our example type 1 ENTER and you will see on the display:

DIST. AND TIME.?

Type 20 ENTER for a distance of 20 miles. The computer will respond with:

HOUR?

You must answer the time question one unit at a

time. Do so as follows:

HOURS ? 1 ENTER  
MINUTES ? 30 ENTER  
SECONDS ? 10 ENTER

and the following results will be obtained:

RATE 13.30  
DIST 20.00  
HOURS 1.  
MINUTES 30.  
SECONDS 10.

Between each result you must press ENTER if you are using the display for output. If you have your printer set up, the results will be printed and then the computer will return to the main menu.

The results say if you took 1 hour, 30 minutes, and 10 seconds to travel 20 miles the rate at which you were traveling was 13.33 miles per hour.

Selecting option 2 with the input shown below results in the following:

OEND 1RATE 2DIST 3TIME 2 ENTER

RATE ? 13.30 ENTER  
HOURS ? 1 ENTER  
MINUTES ? 30 ENTER  
SECONDS ? 10 ENTER

RATE 13.30  
DIST 19.98  
HOURS 1.  
MINUTES 30.  
SECONDS 10.

Returning to the main menu the third option is selected with the following results:

OEND 1RATE 2DIST 3TIME 3 ENTER

RATE ? 13.30 ENTER  
? 20.0 ENTER

RATE 13.30  
DIST 20.00  
HOURS 1.  
MINUTES 30.  
SECONDS 10.

Selecting the first option 0 in the main menu results in the following:

OEND 1RATE 2DIST 3TIME 0 ENTER

PROGRAM TERMINATED ENTER

>

### EXAMINING THE PROGRAM

The program uses seven variables. They are:

Variable	Use
A	Rate

B	Distance
C	Time
D	For routing from the main menu
E	HOURS
F	MINUTES
G	SECONDS

Because of the common use of variables, it was possible to use a single set of statements for printing the results, no matter what variable was being solved for. Lines 13-17 are these common printing statements.

The main menu for the program is found in line 1. The routing for the menu is performed in lines 2 through 5. There is no default procedure if a bad answer is given. The computer will send you to line 10 to solve for RATE if you type in a "bad" value.

Lines 10 and 12 solve for rate and then send the program to line 13 for printing. Lines 20-23 solve for TIME before sending the computer to line 13, and lines 30-33 solve for DISTANCE. Lines 40 and 41 are a short termination routine. Line numbers have been used to structure the program and make it easier for you to see how it works.

## PROGRAM LISTING

```

1:"F":INPUT "BEND 1RATE 2DIST 3TIME";D
2:IF D=0 GOTO 40
3:IF D=1 GOTO 10
4:IF D=2 GOTO 30
5:IF D=3 GOTO 20

10:INPUT "FOR DIST ?";B,"HOURS? ";E,"MINUTES? ";F,"SECONDS?
  ";G:C=E+F/100+G/1 000
12:A = B/DEG(C)
13:PRINT USING "#####.##";"RATE ";A
14:PRINT USING "#####.##";"DIST ";B
15:E=INT (C):F=INT ((C-E)*100):G=((C-E)-F/100.)*10000.
16:PRINT USING "#####.##";"HOURS ";E:PRINT USING "###.##
  "MINUTES ";F
17:PRINT USING "#####.##";"SECONDS";G
18:GOTO 1

20:INPUT " RATE AND DIST.?";A,B
22:C=B/A
23:C = DMS(C)
24:GOTO 13

30:INPUT "RATE ? ";A,"HOURS ?";E,"MINUTES ?";F,"SECONDS?
  ";G:C=E+F/100+G/10000
32:B = A * DEG (C)
33:GOTO 13

40:PRINT "PROGRAM TERMINATED"
41:END

```

## SUMMARY

The program is useful for runners, car rallies, or simply traveling from one place to another. It is simple to operate and has the advantage of presenting the input and output data in the natural way in which people are used to seeing such information.

Steven M. Zimmerman, Ph.D.  
 College of Business and Management Studies  
 University of South Alabama  
 Mobile, Alabama 36688

Leo M. Conrad  
 Imagineering Concepts  
 P.O. Box 9843  
 Mobile, Alabama 36691-0843

Bernard Moseby  
 College of Business and Management Studies  
 University of South Alabama  
 Mobile, Alabama 36688 ■

## ASK RICHARD

*continued from page 25*

maintains a "table of contents," or an *index*, of your data, so you can access any one piece of information very quickly.

### What is a keyboard debounce modification for the Model I, and why is it needed?

Early Model I computers had a tendency to repeat keys when entering information. Hitting one key on the keyboard might result in 3 characters appearing on the screen.

In order to resolve this difficulty, many manufacturers—and finally Radio Shack directly—offered what is known as a "keyboard debounce modification." Essentially, a computer with this modification installed delays looking at the keyboard after a key has been pressed for a long enough time to release the key.

Every computer science text I've seen starts with an explanation of the binary system, and magazines always seem to love hexadecimal. I don't know a thing about binary or hex, and I think I know how to program. How can this be?

The binary system, which is known as base 2, is composed of 1's and 0's. This is how all computers internally store numbers or programs. Hexadecimal is known as base 16, and it uses the numerals 0-9, as well as the letters A-F. Hexadecimal is sometimes used to enter "assembly language" (a kind of "shorthand" for machine language) into a computer.

A BASIC programmer usually need not understand either binary or hexadecimal arithmetic. The computer does use both systems in carrying out computations, but when programming in BASIC this is "transparent" (an invisible process) to the user. Knowledge of both base 2 and base 16 is required, however, when programming in machine language.

*Questions not attributed to a particular person represent a "typical" computer user, a composite character drawn from the author's personal experience speaking with Computronics customers.*

*Questions from readers on all aspects of personal computing are welcomed. Please enclose a self-addressed, stamped envelope with your request.*

Richard Kaplan  
 H & E Computronics  
 50 N. Pascack Road  
 Spring Valley, NY 10977 ■

# FAST CONVERSION BETWEEN HEX AND DECIMAL

Alan R. Lowe

## DECIMAL TO HEX CONVERSIONS

This article concerns Decimal to HEX and HEX to Decimal conversions in BASIC. I found in the August issue another program which uses a long, drawn-out method of HEX conversion. In fact, the author states that "... HEX conversion is very slow in BASIC . . .," and seems to have resigned himself to this "fact." A software toggle switch to bypass the conversion is proof enough of this. I wish to show that this extra work is not necessary.

My conversion methods will display several HEX and Binary representations of different numbers in the time it takes to print one HEX number using the "string method." I call it this because it almost invariably involves the extraction of HEX digits from a string ("0 1 2 3 4 5 6 7 8 9 A B C D E F"). The string does absolutely nothing else but consume memory and slow down program execution.

I will use a number which can be contained in 8 Binary digits, to illustrate my method. Suppose the value to be converted is 93 decimal. The binary equivalent of this number is 01011101.

The first step toward HEX conversion is to separate the upper and lower 4 bits (nibbles) of the number. For 93, this is 0101 and 1101. So, how is this done in BASIC?

Let's define the variable "H" for the upper nibble and the variable "L" for the lower nibble. The original value of 93 is stored under the variable name "A," which will remain constant throughout the conversion.

To isolate the upper nibble and assign its value to H, we may perform a logical AND between the value of A and the number 240 which is 11110000 in binary. This will mask out the lower nibble:

100 H = A AND 240

The result will be 01010000, or 80 decimal. We now need to get this value into the lower nibble of H before we can use it. This would normally involve shifting the value 4 places to the right or simply by dividing H by 16.

100 H = (A AND 240)/16

Alternatively:

100 H = INT(A/16)

Or, if H has been predefined as integer:

100 H = A/16

In each case, H will have a resultant value of 5 which is correct. At this point we will work on a value for L. To give L the value of the lower nibble of A, we will perform a logical AND between A and the binary number 00001111 or, in decimal, 15:

100 H = INT(A/16):L = (A AND 15)

The result will give L the value of 0001101 in binary or 13 in decimal, which is correct.

Ultimately, we will want to display these values as ASCII characters. This is done by adding 48 to each of

the values so far obtained. The decimal 48 is the equivalent of an ASCII "0":

100 H = INT(A/16):L = (A AND 15)+48

H now has the value 53, L has a value of 61. In this case, H may be printed as it is, however, L obviously needs some correction. At this point, L is the decimal equivalent of the "=" symbol. In other cases, H may require a similar correction.

The correction for the ASCII letters "A" to "F" requires the addition of the value 7 to the present value of H or L. This could be done using IF/THEN statements, but this also consumes time and memory (miserly, aren't I?).

Level 2 BASIC has a logical test built in. That is, an expression within parentheses will return a -1 if true and a 0 if false. For example, we want to test H and L for values greater than 57 (ASCII "9"). The expression (H>57) will be false in this case and will return a 0. The expression (L>57) will be true since L equals 61, so a -1 will be returned. If we multiply the results by 7 we will get (0) \* 7 or 0 for H and (-1) \* 7 or -7 for L.

We now subtract these values from the original values of H and L. H becomes 53 - 0 = 53. L becomes 61 - (-7) or 61 + 7 = 68:

100 H = INT(A/16)+48:L = (A AND 15)+48

110 H = H-(H>57)\*7:L = L-(L>57)\*7

We now have H equal to the ASCII value for "5" and L equal to the ASCII value for "D":

120 PRINT CHR\$(H);CHR\$(L);

The HEX number 5D, which is 93 in decimal, will be printed. To further reduce memory consumption, we may put all of this into a single program line and produce this subroutine:

100 H = INT(A/16)+48:L = (A AND 15)+48:  
PRINT CHR\$(H-(H>57)\*7);CHR\$(L-(L>57)\*7);:RETURN

To display the HEX equivalent of a 16-bit number such as an address, assume AD to be the address in question:

200 A = INT(AD/256):GOSUB 100:A = (AD-(AD\*256))AND 255:GOSUB 100

The entire 4-digit HEX value will be displayed much more quickly than many people though BASICALLY possible. The speed of execution would be increased further by assigning variable names to all of the constant numerical values used.

## HEX TO DECIMAL CONVERSIONS

I have examined Decimal to HEX conversion and produced the following subroutine:

100 A = INT(AD/256):GOSUB 120:A = AD-(A\*256)  
120 H = (A/16)+48:L = (A AND 15)+48:PRINT CHR\$(H-(H>57)\*7);  
CHR\$(L-(L>57)\*7);:RETURN

Where AD is a 16-bit number which is first broken down into two 8-bit values each of which are converted separately. Line 120 is the actual conversion routine.

We will now reverse this operation and produce the Decimal equivalent of a HEX number entered from the

keyboard. We will assume for now that the HEX number consists of 2 HEX digits, for example, 5D. Remember that this is an ASCII string entered from the keyboard and as such consists of 2 ASCII codes, 53 and 68. The Decimal equivalent, assumed to be unknown at this stage, is 93. We will now obtain this value from the values supplied. The first step is to convert the ASCII values to numerical values by subtracting the value 48 from each digit:

```
100 H$ = LEFT$(HX$,1):L$ = RIGHT$(HX$,1)
```

This separates the two digits. H\$ now equals "5" and L\$ equals "D".

```
110 H = ASC(H$)-48:L = ASC(L$)-48
```

This returns the values 5 for H and 20 for L. The operation may be reduced to this line:

```
100 H = ASC(LEFT$(HX$,1))-48:L = ASC(RIGHT$(HX$,1))-48
```

This will return the same values for H and L but without the formation of the intermediate strings H\$ and L\$. Since a HEX digit may only represent a value from 0 to 15, the value of L is obviously out of place. This may be corrected by subtracting 7 from any result which exceeds the value of 9. This may be done using IF/THEN statements, or by the following routine which will correct automatically:

```
110 H = H+(H>9)*7:L = L+(L>9)*7
```

If H is greater than 9 then the expression in parentheses will return -1, which, when multiplied by

7 will return -7. If this value is added to H the result will be the same as subtracting 7, and H will be corrected.

The same operation is applied to L. If H or L are not greater than 9, then the expression will return 0 and the values are not changed.

The final value then is (H\*16)+L. If the variable for the result is DA then the routine for this conversion is as follows:

```
100 H = ASC(LEFT$(HX$,1))-48:L = ASC(RIGHT$(HX$,1))-48:  
DA = (H+(H>9)*7)*16+(L+(L>9)*7):RETURN
```

A 16-bit number may be produced by converting a 4-digit HEX number AD\$ to its decimal equivalent AD as follows:

```
10 HX$ = LEFT$(AD$,2):GOSUB 100:AD = DA * 256:  
HX$ = RIGHT$(AD$,2):GOSUB 100:AD = AD + DA:RETURN
```

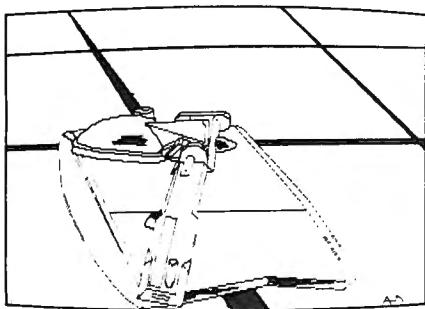
These two subroutines will convert a HEX ASCII string to its decimal equivalent very quickly, but the input string must be either 2 digits for line 100 or 4 digits for line 10. Therefore, the program must be able to distinguish one from the other by the length of the input string. For most applications this is not a problem and the routines are complete. They do limit the input string to FFFF HEX and a further routine would have to be added to get the decimal equivalent of 10000 HEX or 65536 Decimal.

Although conversion of higher numbers is rarely required, I have developed a single-line subroutine to convert any HEX number to its Decimal equivalent.

The key number in HEX/Decimal conversions is the

## Draw

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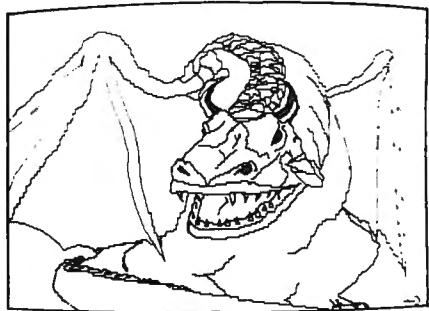
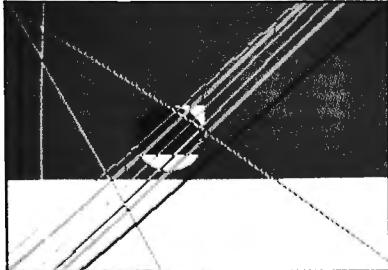


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HEX radix 16. Each digit in a HEX number has a Positional Value (PV) equal to 16 times the PV of the next least significant digit. Taking the number 36C, for example, the "3" has a positional value of 256 decimal, the "6" has a PV of 16 decimal and the "C" has a PV of 1. These multiples of 16 are continuous for a HEX number of any length.

A routine which utilizes this could, theoretically, convert an infinitely long HEX number to its Decimal equivalent.

Since we do not have infinite numerical range in our computers, we will rephrase the theory to say that we may convert any HEX number to decimal within the numeric range of the computer. The upper limit of TRS-80 Level 2 BASIC is approximately  $10E+38$ , which is an astronomical figure in anyone's language, the magnitude of which is difficult to comprehend. Yet this figure is the upper limit of the single-line subroutine which I will present. I will use the number 36C from the previous example to illustrate this method.

The most significant digit, 3, has a numeric value of 3. At this point, we have no previous result, so we will give it a value of 0. Before we add the current to the result, the previous result must first be multiplied by 16. For the first digit, this will be  $(0*16)+3=3$ . We now take the next MSD and repeat the operation. The numerical value of the next MSD in the example is 6. Result =  $(3*16)+6=54$ . The last digit, C, has a numeric value of 12. Result =  $(54*16)+12 = 876$ . The first digit, 3, has now gone through 2 stages of multiplication by 16 giving it a PV of  $16*16 = 256$ . A further stage of multiplication would increase its PV to 4096 and so on.

We will assume now, that the HEX number to be converted has been entered from the keyboard in the form of an ASCII string which we shall call HX\$. For clarity, I will present a routine using individual lines:

```

100 AD = 0           ' Zero result
110 FOR I = 1 TO LEN(HX$) ' Set loop equal to number of
                           ' significant digits
120 D = ASC(MID$(HX$,I,1)) ' Get ASCII value of digit
130 D = D-48          ' Get numeric value of digit
140 D = D+(D>9)*7      ' Correct for A to F
150 AD = (AD*16)+D     ' Multiply previous result by 16
                           ' and add current digit
160 NEXT I            ' Repeat for next digit
170 PRINT AD          ' Display final result

```

This routine may be compacted and placed in a single program line:

```

100 AD = 0:FOR I = 1 TO LEN(HX$):D = ASC(MID$(HX$,I,1)) - 48:
AD = (AD*16) + (D+(D>9)*7):NEXT:PRINT AD:RETURN

```

The RETURN statement completes the line as a subroutine. If D is defined as an integer variable, the execution speed will be increased. This subroutine may be used for any application requiring HEX to Decimal conversion, however, the accuracy begins to falter somewhere around 1 million. By defining AD as a double precision variable, the accuracy is extended to the numerical limit of the computer.

## ALL-PURPOSE DECIMAL TO HEX CONVERSION

The concept of repeated multiplication by 16 in the last example has prompted yet another method of Decimal to HEX conversion.

If a HEX number may be converted to its Decimal

equivalent by repeated multiplication of the HEX radix, there seems to be no reason why the reverse operation could not be done. A HEX number could be produced from a Decimal number of any magnitude by applying the following theory:

If a Decimal number is divided by 16, the remainder will be an integer value between 0 and 15. This remainder represents the least significant digit of the final HEX number. The quotient of the above operation then becomes the dividend for another division by 16, the remainder being the Second Least Significant digit and so on until the dividend is reduced to a value less than the divisor (16), which will then be the Most Significant Digit.

We will store the result as a string, HX\$, which will be created by determining each digit from right to left or LSD to MSD. If the Decimal number is stored as a double precision variable, we will have enormous numeric range but execution time will be increased. The remainder, R, may be defined as an integer variable.

```

100 AD = AD/16           ' Divide decimal by 16
110 R = (AD-INT(AD))*16   ' Extract remainder
120 AD = INT(AD)         ' Discard decimal remainder
130 HX$ = CHR$((R-(R>9)*7)+48)+HX$ ' Add in next MSD
140 IF AD >= 1 THEN 100    ' Loop back for next digit
150 PRINT HX$             ' Display result

```

To put it all on a single program line:

```

100 AD = AD/16:R = (AD-INT(AD))*16:AD = INT(AD):
HX$ = CHR$((R-(R>9)*7)+48)+HX$:
IF AD<1 THEN PRINT HX$:RETURN:ELSE 100

```

I have now presented a routine which will convert a HEX number of any length to its decimal equivalent and a routine to convert any Decimal number to HEX. If we use the identical routines but replace every occurrence of 16 with the number 8 we will have Decimal/Octal conversion routines. Change the radix from 8 to 2 and we have Decimal/Binary conversions which would be useful when examining a switch array from a port, for example. In fact, if the Decimal values handled by Level 2 BASIC are inconvenient, these routines may be used to convert from Decimal to any number system and back again just by using the appropriate radix.

To conclude this article, I will present a simple program to demonstrate these routines. I will use Decimal/Hex conversion, but, once again, any number system may be used by changing every occurrence of 16 with the desired radix. The statement "DEFDBL A" may be deleted from line 10 to increase execution speed but the accuracy will be affected.

```

10 CLEAR 100:DEFINT D,R:DEFDBL A:CLS
20 INPUT "1 = DEC TO HEX, 2 = HEX TO DEC";N
30 ON N GOSUB 100, 200:GOTO 20
100 INPUT "DEC"; AD:HX$ = ""
110 AD = AD/16:R = (AD-INT(AD))*16:AD = INT(AD):
HX$ = CHR$((R-(R>9)*7)+48) + HX$:IF AD>1 THEN 110:
ELSE PRINT HX$:RETURN
200 INPUT "HEX"; HX$:AD = 0
210 FOR I = 1 TO LEN(HX$):D = ASC(MID$(HX$,I,1))-48:
AD = (AD*16) + (D+(D>9)*7):NEXT:PRINT AD:RETURN

```

A. R. Lowe  
18 Bosworth St.  
Hammersley 6022  
Western Australia ■

# 3-ACROSS MAILING LABELS

## Fred Blechman

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This program, using just a "plain vanilla" TRS-80 16K Model I or III and a standard 80-column printer, will allow you to store up to 200 four-line name and address labels, and print them out in standard 3-across format. It is written entirely in Level II/Model III BASIC. Information for each label is held within the program in DATA statements, so no external cassette or disk data files are required. The program can be used with cassette or disk systems in exactly the same way. Also, a version is included for the TRS-80 Color Computer. If you have more memory than 16K, you can store more labels without any program modifications. For example, 48K will hold about 700 labels in memory! I'll also describe the changes to allow printing one-across or directly on envelopes one-at-a-time.

This is a "no-frills" program, without screen graphics, sorts, searches and other memory-gulping features not normally required. Non-essentials have been omitted so that the program can store lots of names and addresses. It does, however, use a unique pseudo-sorting entry technique based on program line numbers—so you can arrange your list by zip code, alphabetically, or any other way you wish. You can print all or any portion of the list, and additions, changes or deletions are simple to make.

This is one of six programs in my "Small Home-Home-Business Package." Two other programs in that package have already appeared in *80-U.S. Journal*: "12-Column Ledger" in January 1982 and "Simple Invoice" in May 1982. All the programs are available on a single cassette for the 16K Model I/III (see the end of this article for pricing).

I wrote this program because I needed a mailing list program for about 150 names and did not have disk drives. My OKIDATA Microline-80 printer does not have tractor feed, so I only use 8-1/2 inch wide paper. Most of the mailing list programs I found required disks, so I bought some 16K cassette-based programs and was disappointed. One had the capacity, but only listed names and addresses on a single line—not good for address labels. Another printed the labels only one-across, which was slow and wasted two-thirds of my roll paper. Another program only held about 50 labels in 16K. Yet another would literally take minutes to enter each label's information after about the first 25, since it sorted on entry and got all hung-up in string handling, garbage collecting and array manipulations. So I wrote this for simplicity and high label capacity.

Listing 1 shows the program for Model I/III, Listing 2 is for the Color Computer. The "core" or working part of this program is lines 200-420 and the DATA lines. The rest are introductory and instructional, and are not required for program operation, but can save you hunting around for documentation when using the program next time. They can be omitted for maximum label capacity. In any case, enter the entire program from the cassette, or at least the core program using the keyboard, with the DATA statements shown as samples. If you've entered the program from the keyboard, CSAVE a copy on cassette in case you've made a

catastrophic keyboard error that crashes the program. Also, you could have a power failure that would cause you to lose everything! (Actually, this happened to me while I was typing this article on my word processor. I was just about completed, after several hours of typing and correcting and refining, and was about to CSAVE the entire text when the power in the area suddenly failed. I instantly had no text—and no backup! I had no notes or rough copy. What you're reading had to be done over from scratch!) Now RUN the program, since it's easier to use than describe.

The program, after the introduction, clears the screen and reminds you to turn on your printer. This is not just a frill! If you don't have your printer ready-to-go, the first LPRINT in the program will make it "freeze"—stop cold—and you could lose the entire program. Escaping from this condition is easy if you have a printer connected—just turn it on. However, if you are just experimenting and don't have a printer connected, escape depends on which computer configuration you have. On a Model I WITHOUT an expansion interface, just press the RESET button at the left rear of the keyboard, under the flip-up cover, and the program is still left in memory. However, if you have an expansion interface, pressing the RESET button causes the program to be LOST—which is one reason I never expanded my Model I. On a Model III, just press the BREAK button and the program remains in memory.

Okay, your printer is on and ready, and now the screen asks you if you want to skip over any labels. If you just press ENTER the entire label list will be printed, using the sample DATA lines, with three labels at a time on the screen as they're being printed. To stop the printing, press BREAK and HOLD IT DOWN until the printer stops. If you want to skip some of the first labels for any reason, answer the "SKIP?" prompt with the number of three-label groups you wish to omit from the printout. By use of the skip prompt and the BREAK key you can print any portion of the list.

Now that you're familiar with program operation, you'll want to enter the information for your own name and address labels. The program reads the DATA lines in their sequence in the program, and each DATA line is one complete four-line label. Since each DATA line has a line number, and each line number is held in the program in order, the labels will be printed in line-number sequence. Therefore, when you enter the DATA lines, you control where they will be printed in the list by your line number assignment. Confused? Look at the DATA lines in the listing to see how they have been arranged by ZIP code sequence. Each line number is 10000 plus the first four digits of the ZIP code. For example, line 10061 contains the DATA for an address with ZIP code 00619. An easy way to do it is to add 1 to the front of the ZIP code and drop the last digit.

Fine, you say, but what happens if you have two addresses with the SAME ZIP code? Just change the last digit of the line number. Obviously, this won't be very satisfactory for a local mailing list, but it works fine for a nationwide list where few ZIP code numbers are the

same. To play it safe, if you're using this system, before entering new DATA, just LIST the proposed line number to see if there's already anything in memory for that line number.

For a local list, arrange your names in advance, alphabetically or any other way desired, and assign them line numbers with an interval of about ten between each. This will allow you to enter other DATA later, and it will be placed right where you want it in the list, almost instantly. In effect, each DATA line is sorted on entry, by line number—a handy technique you may find useful in other programs that use DATA statements.

Okay, are you ready to enter your own DATA? First, delete the DATA from the sample program. The easiest way to do this is to type: DELETE 10061-20010 and press ENTER. Do NOT delete lines 30000-30300! Now, enter your own DATA statements into the program. Look at the DATA in the listing to see the format. Each DATA line contains four "fields" separated by commas. The first field is normally the name. The second field can be the street address, the third field the city and state, and the last field could be the ZIP code. However, it's up to you what you enter in each field, which will each be one line of the printed label. The important thing is that each DATA line has FOUR fields, with three commas on each line—no more, no less. If you don't need any information in one field, use a blank space. Also, no field should exceed 24 characters, or it will affect the printout beyond that point. Now, enter your own DATA, using line numbers to determine the list sequence, as already explained, and you've got your own mailing list.

To add a new label at any time, just enter the new line number in the program, with the new DATA. It will fit in the DATA list right where your line number tells it to go. Changing DATA only involves editing or retyping that line number. And, of course, you can remove a label by simply deleting that line number. It's very handy to have a printout of all the DATA statements for quick line number reference during list updates. Remember to CSAVE what you have on cassette before a RUN—just in case some entry error causes a program hang-up and lost DATA. Most program errors will only result in an error message, without loss of DATA—but who knows what you might be capable of?

You may print the labels on three-across adhesive stock labels, if your printer can handle them. I find the labels tend to peel off as they come around the platen on my Microline-80 and jam the print head—so I stopped trying that! Perhaps labels with better adhesive would not pull away from the carrier, but rather than destroy my printer finding out, I use plain, inexpensive roll paper. After the labels are printed I use a paper cutter (scissors would do) to cut them apart, then apply them with rubber cement, spray adhesive or any of several "glue sticks." Actually, I've found it quicker and easier to apply the labels with clear plastic tape sold on 2-inch wide rolls. I make a second copy of the labels, uncut, for my files, so I know who I mailed to, and when.

For those interested in how the program works, it's embarrassingly simple. Line 200 reminds you to ready the printer. Lines 210-280 "dummy" READs the number of three-label groups specified, so they are not printed. Lines 300-320 READ the DATA and assign the name and address information to four string arrays, using a FOR-NEXT loop to read the information for three labels.

Lines 330-350 print the three labels on the screen, and lines 360-390 print the four-line labels, spaced for standard three-across label stock. Line 400 moves the printer paper up two lines for proper vertical spacing between labels. Line 410 looks to see if the list has been completed, and, if not, line 420 goes back to line 300 for another three labels.

The last program line, 50000, is used to save two copies of the program on a Model I cassette, with a two-second gap on the tape between the programs. For Model III, change OUT255,4 to OUT236,2. To use this feature, set your recorder to the record mode, type: RUN 50000 and press ENTER. (This may be used with any BASIC program, and is the last line of all programs I sell, so the customer can have program copies made on their own recorder, for easiest CLOADs.)

Now, suppose you have some rolls of 5000 one-across self-adhesive labels, and you don't want to throw them away. Just make some simple program changes. In listing 1, make these changes:

1) Line 220: Change "THREE LABEL GROUPS" to "LABELS"

2) Line 230: Change 300 to 310

3) Delete lines 250, 270, 300, 320, 330, 350

4) Change line 360 to "LPRINTTAB(1)A\$(X)"

5) Change line 370 to "LPRINTTAB(1)B\$(X)"

6) Change line 380 to "LPRINTTAB(1)C\$(X)"

7) Change line 390 to "LPRINTTAB(1)D\$(X)"

8) Line 410: change "A\$(3)" to "A\$(X)"

9) Line 420: change 300 to 310

10) If you want to be extra neat: delete "(X)" in all places in lines 260, 310, 340, 360, 370, 380, 390 and 410.

If you want to print directly on envelopes, one at a time, make the changes just described, change the TABs in lines 360-390 to "(35)" instead of "(1)" and add the following new line:

415 PRINT : INPUT "PRESS ENTER FOR NEXT LABEL"; Z

Similar changes can be made for the Color Computer (Listing 2) to accomplish the same purposes. Obviously, you can make any program changes you desire. One of my customers, A. Hudak of Canada, uses INPUT statements to print the title and date at the top of the list, and has added E\$(X) and F\$(X) with DATA statements that hold six fields, including company name and phone number. Notice that CLEAR and DIM statements are not required, so program expansion and enhancement are relatively straightforward. I use the program the way it stands, and find it does all I want—in only 16K, with no disks!

For the convenience of readers who wish to save time and debugging associated with keyboard entry, the author offers Listing 1 on cassette for \$10. You may also order the entire six-program "Small Home-Business Package" for a special price of \$29.95 by mentioning 80-U.S. Journal (regular price is now \$49.95). Information on programs: \$2, refundable with order for package. All programs are on 500-baud cassettes, compatible with TRS-80 16K Level II and Model III BASIC. Prices are postpaid USA and CANADA. Foreign add \$2. California residents must add 6% sales tax. For info only call (213) 346-7024. No phone, C.O.D. or credit card orders.

100 CLS:PRINTTAB(15)"3-ACROSS MAILING LABEL PROGRAM"

110 REM \* (C) COPYRIGHT FRED BLECHMAN 1980

VERSION 12/17/80 \*

```

120 PRINT : PRINT "PRINTS 4-LINE MAILING LABELS 3-ACROSS ON A
STANDARD SHEET."
130 PRINT "APPROXIMATELY 200 NAME, STREET, CITY/STATE, ZIP CODE
LABELS CAN"
140 PRINT "BE HELD IN DATA STATEMENTS IN A 16K MEMORY....."
150 PRINT : PRINT "TO INCREASE LABEL CAPACITY TO ABOUT 220
LABELS, PRINT OUT"
160 PRINT "THE INSTRUCTIONS (LINES 500-800) AND THEN DELETE
THEM....."
170 PRINT : PRINT : PRINT : INPUT "INSTRUCTIONS?
Y/N":QS
180 IF LEFT$(QS,1)="Y" GOTO 500
200 CLS : PRINT : PRINT ***** TURN ON
PRINTER ! ! *****
210 PRINT : PRINT "YOU MAY WISH TO PRINT ONLY A PARTIAL LIST.
IF SO, HOW MANY"
220 INPUT "THREE-LABEL GROUPS DO YOU WISH TO SKIP";S
230 IF S=0 GOTO 300
240 FOR Y=1 TO S
250 FOR X=1 TO 3
260 READ A$(X),B$(X),C$(X),D$(X)
270 NEXT X
280 NEXT Y
290 FOR X=1 TO 3
310 READ A$(X),B$(X),C$(X),D$(X)
320 NEXT X
330 FOR X=1 TO 3
340 PRINT A$(X): PRINT B$(X): PRINT C$(X): PRINT D$(X): PRINT
350 NEXT
360 LPRINT TAB(1)A$(1)TAB(28)A$(2)TAB(56)A$(3)
370 LPRINT TAB(1)B$(1)TAB(28)B$(2)TAB(56)B$(3)
380 LPRINT TAB(1)C$(1)TAB(28)C$(2)TAB(56)C$(3)
390 LPRINT TAB(1)D$(1)TAB(28)D$(2)TAB(56)D$(3)
400 LPRINT " " : LPRINT " "
410 IF A$(3)="END" THEN PRINT "END OF LIST....": END
420 CLS : GOTO 300
500 CLS : PRINT " 3-ACROSS MAILING LABEL PROGRAM"
510 PRINT : PRINT "NAME, ADDRESS, CITY/STATE, ZIP CODE FOR EACH
LABEL IS ENTERED"
520 PRINT "IN A DATA STATEMENT. THERE ARE AT LEAST TWO
APPROACHES:"
530 PRINT : PRINT "(1) LOCAL MAILING LIST:
540 PRINT : PRINT "ENTER DATA STARTING WITH LINE 1000, WITH
LINE INTERVALS"

```

```

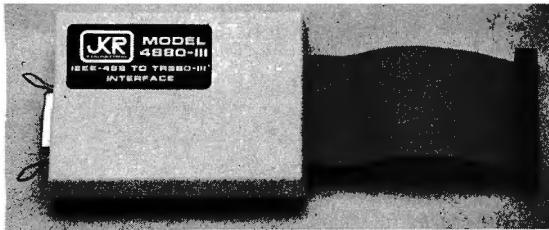
550 PRINT "OF 10 (1000,1010,1020,ETC.) TO ALLOW FOR FUTURE
ADDITIONS. YOU"
560 PRINT "SHOULD ENTER ALPHABETICALLY BY LAST NAME IF YOU
WANT THE LABELS"
570 PRINT "IN ALPHABETICAL ORDER. (THE LABELS WILL BE
PRINTED IN THE SAME"
580 PRINT "ORDER AS THE DATA STATEMENT LINE NUMBERS.....".
590 PRINT : INPUT "PRESS ENTER TO CONTINUE....";A
600 CLS : PRINT "(2) NATIONWIDE MAILING LIST:"
610 PRINT : PRINT "USE DATA STATEMENTS WITH LINE NUMBERS
EQUAL TO 10000 PLUS THE"
620 PRINT "FIRST 4 DIGITS OF THE ZIP CODE. FOR EXAMPLE, IF
THE ZIP CODE IS"
630 PRINT "19325 THEN THE LINE NUMBER FOR THIS ENTRY WOULD BE
11932....."
640 PRINT "...AND BEWARE OF DUPLICATE ZIP CODES! CHANGE LAST
DIGIT IN"
650 PRINT "LINE NUMBER IF NECESSARY TO AVOID
DUPLICATION....."
660 PRINT : PRINT "      THE FORMAT TO ENTER DATA IS AS
FOLLOWS:"
670 PRINT : PRINT " *** NAME, STREET ADDRESS, CITY STATE,
ZIP CODE ***"
680 PRINT : PRINT "DON'T FORGET THE COMMAS!! USE A BLANK
SPACE FOR ANY UNKNOWN"
690 PRINT "DATA ITEMS. SEE THE EXISTING SAMPLE DATA
STATEMENTS...."
700 PRINT : INPUT "PRESS ENTER TO CONTINUE....";A
710 CLS : PRINT : PRINT "IF YOU HAVE 'FOREIGN' ZIP CODES, USE
DATA LINES STARTING AT"
720 PRINT "LINE 20000...."
730 PRINT : PRINT "DO NOT DELETE OR INPUT DATA BEYOND THE
LINES STARTING"
740 PRINT "AT LINE 30000! THEY ARE USED TO END THE
PROGRAM...."
750 PRINT : PRINT "NOTE THAT YOU MAY ONLY USE FOUR LINES FOR
EACH LABEL AND THAT"
760 PRINT "NO DATA ITEM SHOULD EXCEED THE LABEL WIDTH OF 24
CHARACTERS!"
770 PRINT : PRINT "PRACTICE WITH THE SAMPLE DATA STATEMENTS
IN THIS PROGRAM"
780 PRINT "AND THEN REPLACE WITH YOUR OWN....."

```

*continued on page 36*

## IEEE-488 to TRS-80 Interface

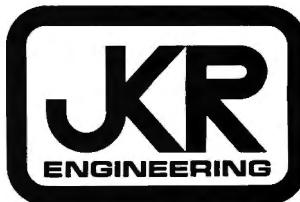
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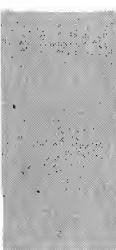


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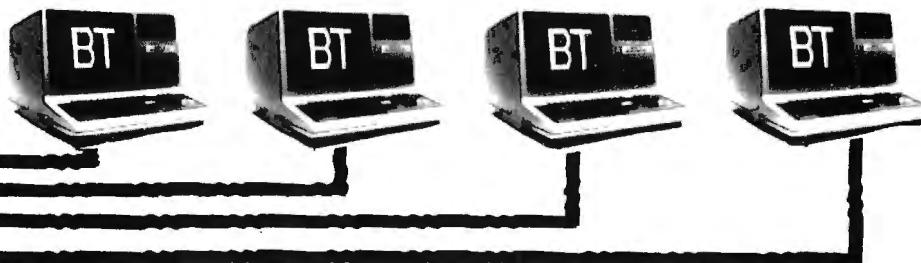
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# COLOR COMPUTER CORNER

## A NEW C.C. PUBLICATION

A newsletter just for Color Computer owners has recently started, and it's not a monthly, but rather a weekly publication. The *Color Computer Weekly* contains news of hardware and software products for the Color Computer, hints on programming technique, plus listings for games and other programs, written in such a way as to be educational (plenty of explanatory REM statements) as well as useful.

This is a small publication, but it seems to be growing. In its seventh week, there were four pages of information, and by the ninth week it had grown to six. The publishers hope, within a few months, to be publishing 60-plus pages of reviews, program listings, new product information and comments from subscribers (they are asking any interested C.C. owners to become writers for them).

One byproduct of the newsletter will be a manufacturer's directory, where you will be able to find listings for virtually all products available for the Color Computer in a single publication.

For more information, contact *Color Computer Weekly*, P.O. Box 1355, Boston, Massachusetts 02205.

## RUNNING OUT OF MEMORY?

A new product from "little bits computing services" is designed to allow C.C. users to run very long cassette-based programs, even if they would normally exceed the machine's memory. This system, called the "Memory Loader," is designed to function with either BASIC or machine language programs, but the programmer need only be familiar with Extended BASIC, and users of the program don't need any programming knowledge at all. The programmer simply divides the program into sections that will be loaded from tape as needed, as "overlays." When the program needs a set of instructions stored on the tape, the tape is automatically loaded while the program execution pauses. Once loaded, the program resumes operation.

An interesting feature of this system is the use of continuous-loop tapes (like those in telephone answering machines) which allow you to simply leave the cassette recorder turned on, without worrying about rewinding the tape to allow an overlay to be loaded. Instead, the system will just run the tape until it gets back around to the proper overlay. The Memory Loader is mostly machine language and partially BASIC, and only the program needs to have it. Once written, all of your "overlay" programs will run by themselves on any Color Computer.

The Memory Loader sells for \$12.95 and is available from little bits computing services, P.O. Box 396, Hibernia, NJ 07842.

## GREAT NEW PROGRAMMING AID

The "Worksaver" is a new utility package for the Color Computer that adds some really fantastic programming features to your machine. To start with, you get single-key entry of more than 90 BASIC keywords, with a labeled keyboard overlay that shows the positions of the command keys. The Worksaver also

allows chaining of programs and what is called "dynamic debugging" (locating errors while actually running a program). You can alter, delete, or join together program lines—all without erasing existing data in memory.

That's not all. You also get a full-screen editor for BASIC programs—the kind where you can move a cursor all around the screen making changes at will, and saving the corrected version to disk. Wait, there's more: you also get the ability to use the full screen editor on the contents of string and numeric arrays! The manufacturer explains that you can practically create your own version of VisiCalc with this feature. Other features include the creation of a numeric keypad on the right side of the keyboard and storing data for as many as 100 user-programmable function keys on diskette.

The Worksaver is available for \$30 from:

Platinum Software,  
P.O. Box 833,  
Plattsburg, NY 12901,  
(518) 643-2650. ■

## 3-ACROSS MAILING LABELS

continued from page 33

```
790 PRINT : PRINT : INPUT "PRESS ENTER FOR SAMPLE  
RUN....";A  
800 GOTO 200  
10061 DATA JOSE L. GONZALEZ,36BB-24 RIVER SIDE,BAYAMON,  
PUERTO RICO 00619  
10233 DATA GEORGE GRISHAM,64 BLANCO RD.,DUXBURY MA,02332  
10603 DATA FRANK E. LARONE,50 WOLCOTT RIDGE ROAD,FARMINGTON  
CT,06032  
10641 DATA HARRY HOWELL, HOWELL COMPANY,290 WEST HALL ST.,  
CHESHIRE CT 06410  
10807 DATA R.BLAUMAYER - GXB ENT.,6120 BEECHNUT LANE,  
CINNAMINSON NJ,08077  
19513 DATA KRISHNA KALLADALLI,4813 KINFIELD WAY,SAN JOSE  
CA,95135  
19633 DATA KENNETH W. MILER,AFSCF - DET8(301),APO SAN  
FRANCISCO CA,96334  
19747 DATA HARRISON JUNGER,465 N.W. HICKSON,ROSEBURG OR,97470  
19800 DATA JERRY TIRCH,71123 S.W.SIXTH ST.,BELLEVUE WA,98008  
20000 DATA NUNHAM G. KINFORD,P.O.BOX 1326,STIRLING  
ALBERTA,CANADA T0K 2E0  
20010 DATA RICK & JOSIE HARDEN,2021 QUALITY ST.,OTTAWA  
ONTARIO,CANADA K2H 7G8  
30000 DATA END,,0,0,0  
30100 DATA END,,0,0,0  
30200 DATA END,,0,0,0  
30300 DATA END,,0,0,0  
50000 CSAVE"1": OUT 255,4: FOR I=1 TO 2000 : NEXT : CSAVE"1"
```

Fred Blechman  
Blechman Enterprises  
7217 Bernadine Avenue  
Canoga Park, California 91307 ■

# STAMPS: SERVICE TERRITORY AND MANPOWER PLANNING SIMULATION

## A Computer Simulation Program for the Field Service Manager

Dennis P. Avola

### ABSTRACT

Field service managers across the country are demanding more technology: A technology of management tools calibrated to achieve the highest level of excellence; tools that will allow the field service manager to ask "what if" questions and receive immediate responses; and management exercises that will illustrate the economic trade-offs in optimizing service manpower. This technology of management tools is here today—the "Era of the Field Service Manager and the Personal Microcomputer."

The applications for a desk-top computer in the field service manager's office are boundless. Maintaining a personnel file on each technical representative, documenting technical training requirements, preparing maintenance price quotations, measuring service revenue and expense levels, and generating technical letters and mailing pamphlets are some typical applications.

This paper introduces a computer simulation program designed to assist the field service manager in determining the impact of different operating strategies on service manpower (see exhibits A and B).

**Impact of  
Technician's Utilization Rate & Mean Service Times  
on Field Service Manpower Levels**

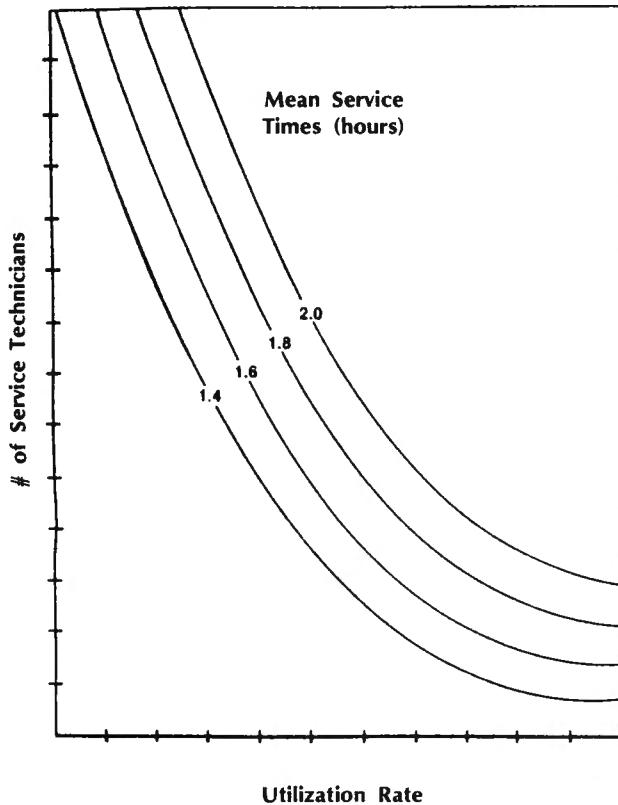


EXHIBIT A

### INTRODUCTION

"STAMPS" is a computer simulation program designed for the Field Service Engineering Manager in the development and construction of field service territories and manpower work load requirements. The following flow chart illustrates the mechanics of the program:

(See flow chart on next page.)

### FORMATTING

The program begins by prompting the user to define the number of territory locations. Each location is then assigned an identification label (name) by the user. If the technical skill level required to service a territory location varies from the standard mean service times, then the user may elect to use the skill factor option. This option prompts the user to enter a skill factor percentage to increase or decrease the mean service times.

The final formatting procedure is to enter the appropriate equipment product categories for two business divisions. The division labels can be pre-

**Impact of  
Service Productivity & Technician's Availability Rate  
On Field Service Manpower Levels**

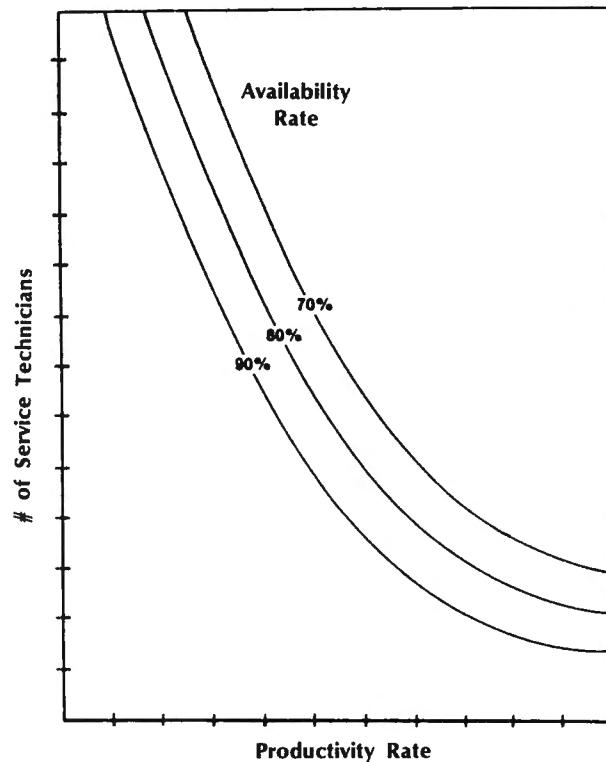
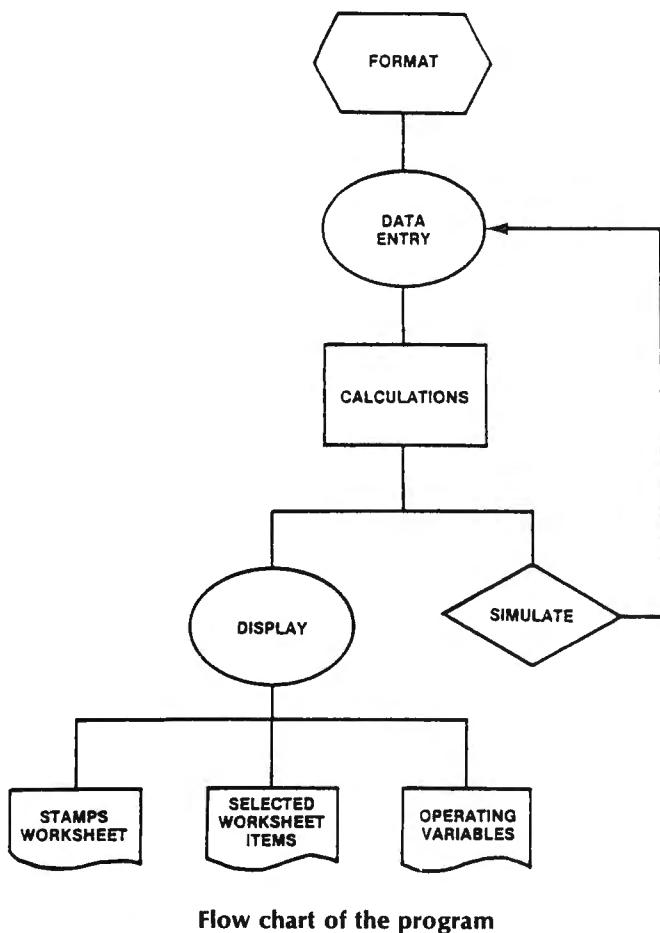


EXHIBIT B



information. The use of data statement lines helps minimize operator's keystrokes.

The first screen display reviews annual sales projections and service statistics. The following definitions explain the column headings in the screen display.

SERVICE TERRITORY AND PLANNING SIMULATION		
ANNUAL SALES PLAN		
DIVISION I		DIVISION II
EQUIPMENT UNITS	8,100	8,500
EQUIPMENT SALES DOLLARS	\$ 615,000	\$ 745,000
SERVICE STATISTICS		
SERVICE PARTS (OTC)	10 %	15 %
CONTRACT RETENTION	75 %	70 %
% INCOMPLETE CALLS	3 %	5 %
T.R. PRODUCTIVITY RATE	75 %	75 %
WORK DAYS PER T.R./YEAR	221 /YR	221 /YR
OVERTIME BUDGET	5 %	5 %
ANY CHANGES ?		

**Screen display #1**

#### ANNUAL SALES PLAN

- |                         |   |
|-------------------------|---|
| EQUIPMENT UNITS         | - FORECASTED UNIT VOLUME OF EQUIPMENT   |
| EQUIPMENT SALES DOLLARS | - FORECASTED DOLLAR VOLUME OF EQUIPMENT   |
| <br>SERVICE STATISTICS  |   |
| SERVICE PARTS (OTC)     | - SERVICE "SPARE" PARTS REVENUE SOLD OVER-THE-COUNTER AS A PERCENTAGE OF TOTAL BILLABLE SERVICE REVENUE.                |
| CONTRACT RETENTION      | - PERCENTAGE OF CUSTOMERS WHO RETAIN THEIR SERVICE MAINTENANCE CONTRACTS AFTER PURCHASING A REPLACEMENT EQUIPMENT UNIT. |
| % INCOMPLETE CALLS      | - INCOMPLETE SERVICE CALLS AS A PERCENTAGE OF TOTAL REPORTED SERVICE CALLS.   |
| * * *                   |   |
| T.R. PRODUCTIVITY RATE  | - DIRECT SERVICE LABOR (WORK AND TRAVEL HOURS) AS A PERCENTAGE OF TOTAL REPORTED TIME.                                  |
| WORK DAYS/T.R./YEAR     | - NUMBER OF WORK DAYS AVAILABLE PER T.R. PER YEAR.  |
| OVERTIME BUDGET         | - OVERTIME LABOR HOURS AS A PERCENTAGE OF TOTAL PAYROLL HOURS.  |

defined by the user and may represent different business groups, product-lines, or even companies.

"STAMPS" can simulate a maximum of seven product categories divided into two groups for fifteen territory locations. The program is menu-driven for easy operation.

SERVICE TERRITORY AND MANPOWER PLANNING SIMULATION PROGRAM FORMAT	
DIVISION I ?	DIVISION II ?
PRODUCT A ?	PRODUCT W ?
PRODUCT B ?	PRODUCT X ?
PRODUCT C ?	PRODUCT Y ?
	PRODUCT Z ?

#### DATA INPUT ROUTINE

This section of the program instructs the user to enter operating data and statistics pertinent to each pre-defined service territory location. A series of four screen displays prompt the user to enter the appropriate

The second display reviews operating variables relating to the equipment unit base. The following definitions explain the column headings in the screen display.

SERVICE TERRITORY AND HUMANPOWER PLANNING SIMULATION UNIT BASE ASSUMPTIONS								
CATEGORY	EQUIP % MIX	PERCENT UNITS REPLACED	PERCENT UNITS INSTALLED	INSTALL PRICE	CONTRACT CAPTURE PERCENTAGE	PERCENTAGE NEW REPLACED	EXISTING	
PRODUCT A	50	80	80	\$ 30	40	10	10	
PRODUCT B	30	50	70	\$ 25	50	10	10	
PRODUCT C	20	15	75	\$ 40	75	10	10	
PRODUCT D	25	10	100	\$ 125	25	10	5	
PRODUCT E	25	10	100	\$ 100	25	10	5	
PRODUCT F	20	10	100	\$ 150	50	25	5	
PRODUCT G	30	10	100	\$ 175	50	25	5	
ANY CHANGES ?								

Screen display #2

The third display reviews the mean service times (MTTS), repair and travel hours, by product category. The following definitions explain the column headings in the screen display.

SERVICE TERRITORY AND HUMANPOWER PLANNING SIMULATION MEAN SERVICE TIMES (Repair and travel hours)										
CATEGORY	INSPECTIONS (MTTS #/YR)	Maint (MTTS #/YR)	Repair (MTTS #/YR)	Installation (MTTS #/YR)	Warranty (MTTS #/YR)	Repair (MTTS #/YR)	Shop (MTTS #/YR)	Repair (MTTS #/YR)	Shop (MTTS #/YR)	Repair (MTTS #/YR)
PRODUCT A	.8	1	.75	.5	1.2	1	.75	.25	.75	2.5
PRODUCT B	.7	1	.75	.3	1.3	1	.75	.33	.75	2.3
PRODUCT C	.5	1	.85	.4	1.5	1	.85	.25	.85	2.5
PRODUCT D	1	2	1.5	.5	1.5	2	1.5	.33	1.5	2.2
PRODUCT E	1	2	1.5	.4	1.7	2	1.5	.25	1.5	0
PRODUCT F	2	2	1.8	.3	1.7	2	1.7	.33	1.7	0
PRODUCT G	2	2	1.6	.5	2.2	2	1.5	.33	1.5	0
ANY CHANGES ?										

Screen display #3

#### UNIT BASE ASSUMPTIONS

- EQUIPMENT UNIT % MIX - PERCENTAGE MIX OF ANNUAL EQUIPMENT UNITS SOLD.
- PERCENT UNITS REPLACED - PERCENTAGE OF ANNUAL EQUIPMENT UNITS SOLD AS REPLACEMENT EQUIPMENT.
- PERCENT UNITS INSTALLED - PERCENTAGE OF ANNUAL EQUIPMENT UNITS SOLD THAT WILL REQUIRE INSTALLATION SERVICES.
- AVERAGE INSTALL PRICE - AVERAGE SERVICE BILLING CHARGE FOR INSTALLATION SERVICES PER EQUIPMENT UNIT.

#### CONTRACT CAPTURE PERCENTAGE

- NEW CUSTOMER - PERCENTAGE OF ANNUAL EQUIPMENT UNITS SOLD TO NEW CUSTOMERS WHO PURCHASE A SERVICE MAINTENANCE CONTRACT.
- REPLACEMENT CUSTOMERS - PERCENTAGE OF ANNUAL EQUIPMENT UNITS SOLD TO CUSTOMERS AS REPLACEMENT EQUIPMENT (THAT WERE NOT PREVIOUSLY COVERED BY A SERVICE CONTRACT) WHO PURCHASE A SERVICE MAINTENANCE CONTRACT.
- EXISTING CUSTOMERS - CAPTURE OF ADDITIONAL SERVICE CONTRACTS FROM THE EXISTING UNIT INSTALLED BASE (NOT CURRENTLY COVERED BY A SERVICE CONTRACT) AS A PERCENT OF EXISTING CONTRACT UNIT BASE.

#### MEAN SERVICE TIMES (REPAIR AND TRAVEL HOURS)

- INSPECTIONS (MTTS #/YR) - MEAN TIME TO PERFORM A SERVICE INSPECTION PER UNIT; AND THE NUMBER OF SERVICE INSPECTIONS EXPECTED PER YEAR PER UNIT.
- MAINTENANCE REPAIR (MTTS #/YR) - MEAN TIME TO PERFORM A REPAIR SERVICE CALL ON A UNIT COVERED BY A MAINTENANCE CONTRACT; AND THE NUMBER OF REPAIR SERVICE CALLS EXPECTED ON CONTRACT UNITS PER YEAR/UNIT.
- INSTALLATION (MTTS #/YR) - MEAN TIME TO INSTALL AN EQUIPMENT UNIT; AND THE OF INSTALLATION SERVICE CALLS EXPECTED PER EQUIPMENT UNIT PER YEAR.
- WARRANTY (MTTS #/YR) - MEAN TIME TO PERFORM A REPAIR SERVICE CALL ON AN EQUIPMENT UNIT DURING ITS WARRANTY SERVICE PERIOD; AND THE NUMBER OF WARRANTY REPAIR CALLS EXPECTED PER EQUIPMENT UNIT PER YEAR.
- REPAIR (#/YR) - MEAN TIME TO PERFORM A REPAIR SERVICE CALL ON AN EQUIPMENT UNIT NOT COVERED BY A MAINTENANCE CONTRACT.
- SHOP (MTTS) - MEAN TIME TO PERFORM SHOP SERVICE WORK PER EQUIPMENT UNIT PER YEAR.

The fourth display requires the user to enter the appropriate service territory data. The following definitions explain the column headings on the screen display:

SERVICE TERRITORY AND MANPOWER PLANNING SIMULATION TERRITORY SERVICE RECORD							
CATEGORY	CONTRACT BASE		BILLABLE BASE			P M A	
	MAINTENANCE UNITS	AVERAGE PRICE	TOTAL DOLLARS	SHOP AVB/PRICE	% VOL	RENEWAL RATE	
PRODUCT A	583	\$3700	80	\$3600	150	10	85
PRODUCT B	759	\$4200	95	\$4200	123	10	90
PRODUCT C	893	\$4250	70	\$3620	200	5	80
PRODUCT D	923	\$4900	125	\$5400	250	10	90
PRODUCT E	823	\$1900	105	\$7250	0	0	85
PRODUCT F	423	\$1000	110	\$4920	0	0	85
PRODUCT G	673	\$7500	100	\$7500	0	0	80

ANY CHANGES ?

Screen display #4

#### SERVICE TERRITORY AND MANPOWER PLANNING SIMULATION

\*\*\*\*\* M E N U \*\*\*\*\*

- (1) DISPLAY "STAMPS" WORKSHEET
- (2) DISPLAY OPERATING VARIABLES
- (3) DISPLAY SELECTED WORKSHEET ITEMS
- (4) SIMULATE OPERATING VARIABLES

YOUR SELECTION ?

#### CONTRACT BASE

- |                     |  |
|---------------------|--|
| MAINTENANCE UNITS   | - NUMBER OF EQUIPMENT UNITS COVERED BY A SERVICE MAINTENANCE CONTRACT. |
| MAINTENANCE DOLLARS | - TOTAL DOLLAR VOLUME OF SERVICE MAINTENANCE CONTRACTS.                |

#### BILLABLE BASE

- |                    |  |
|--------------------|--|
| AVERAGE PRICE      | - THE AVERAGE BILLABLE SERVICE CHARGE FOR SERVICE CALLS ONLY.  |
| TOTAL DOLLARS      | - TOTAL EXPECTED BILLABLE SERVICE REVENUE INCLUDING PARTS (OTC) SALES AND ANY SERVICE SHOP BILLINGS. |
| SHOP AVERAGE PRICE | - THE AVERAGE BILLABLE SERVICE CHARGE FOR SERVICE SHOP WORK.   |
| SHOP % VOLUME      | - THE VOLUME OF SERVICE SHOP BILLINGS AS A PERCENT OF TOTAL BILLABLE SERVICE REVENUE.                |
| PMA RENEWAL RATE   | - PERCENTAGE OF CUSTOMERS WHO WILL RENEW THEIR SERVICE MAINTENANCE CONTRACT COVERAGE.                |

### PROGRAM CALCULATIONS

Once the appropriate service operating data and statistics are entered for a territory location, the program calculates the required manpower necessary to support the territory. An information worksheet documenting the manpower calculations is also available for each territory (see Program Menu).

Once all necessary calculations are complete, the program loops back to the data input routine for multiple territory locations. This feature minimizes the user's waiting time for program calculations.

### DISPLAY "STAMPS" WORKSHEET

The "STAMPS" worksheet documents the territory service unit base and manpower work load requirements. The following worksheet can be displayed on the line printer only:

(See top of next page)

### DISPLAY SELECTED WORKSHEET ITEMS

This menu option allows the user to review only selected items on the "STAMPS" worksheet (see above). Once selected, a list of worksheet items will appear on the CRT screen. The user is then prompted to enter the number of items to be displayed and the corresponding item code(s). The selected worksheet items may be displayed on the CRT or the line printer.

### DISPLAY OPERATING VARIABLES—FACT SHEET

This menu option allows the user to a create hard copy on a line printer of the series of four CRT screens which displayed the territory service data and statistics. The first three screens are printed according to the data statement lines. The final screen, the service territory record, is printed for each territory location.

### SIMULATE OPERATING VARIABLES

This menu option allows the user to change the service operating variables for any territory location. The program loops back to the four screen displays and prompts the user to edit the data entries. The first three screens appear on the CRT according to the data statement lines. Each service territory record is reviewed separately.

### PROGRAM SPECIFICATIONS

The "STAMPS" computer program is written in Microsoft Level II BASIC. The program requires 48K of random access memory (RAM) and may be loaded via a cassette tape or diskette. "STAMPS" is specially designed for your personal desktop microcomputer.

**STAMPS WORKSHEET**  
SAMPLE TERRITORY LOCATION

**WORK UNIT POPULATION**

	DIVISION I		DIVISION II	
	UNITS	DOLLARS	UNITS	DOLLARS
<b>CONTRACT BASE</b>				
EXISTING	2,439	156,210	2,850	281,300
CANCELLATIONS	363	23,031	415	41,025
ADDITIONS	629	40,204	294	28,247
TOTAL CONTRACT BASE	2,705	173,383	2,729	269,247
<b>BILLABLE BASE</b>				
PER CALL	1,758	141,757	2,304	251,685
SHOP	101	14,591	34	8,560
SVC PARTS		17,372		45,928
TOTAL BILLABLE BASE	1,859	173,720	2,338	306,171
<b>INSTALLATIONS</b>				
	1,290	50,925	500	69,375
<b>TL WORK UNITS</b>				
	5,854	398,028	5,568	644,793

**UNIT WORK LOAD**

	DIVISION I		DIVISION II	
	CALLS	HOURS	CALLS	HOURS
<b>CONTRACT BASE</b>				
INSPECT	2,706	1,758	5,458	7,556
REPAIR	1,253	980	1,244	1,949
TOTAL CONTRACT BASE	3,959	2,738	6,702	9,505
<b>BILLABLE BASE</b>				
REPAIR	1,758	1,388	2,304	3,022
SHOP	101	242	34	75
TOTAL CONTRACT BASE	1,859	1,628	2,338	3,097
<b>INSTALL BASE</b>				
INSTALLATIONS	1,290	1,755	1,000	1,800
WARRANTY	411	316	180	222
INCOMP/CALL-BACKS	371	291	508	813
TOTAL INSTALL BASE	2,072	2,362	1,688	2,835
<b>TL WORK LOAD</b>				
	7,890	6,728	10,708	15,437
	SHOP	FIELD	SHOP	FIELD
# OF TRS	0.2	4.5	0.1	10.7
CALLS PER DAY		8.0		4.5

## CONCLUSION

Today, field service and technical support managers are purchasing desktop microcomputers to improve their managerial skills. Computer simulation programs like "STAMPS" will soon become standard management tools for the field service professional.

### SERVICE TERRITORY AND MANPOWER PLANNING SIMULATION

	VARIABLES		TOTAL SERVICE \$\$\$ BASE	TOTAL CONTRACT \$\$\$ BASE	TOTAL CONTRACT INSPECTION CALLS	TOTAL CONTRACT INSPECTION HOURS	E(8,I)	E(41,I)
	DIVISION I	DIVISION II						
EXISTING CONTRACT UNIT BASE	E(1,I)	E(34,I)					E(9,I)	E(42,I)
EXISTING CONTRACT \$\$\$ BASE	E(2,I)	E(35,I)					E(10,I)	E(43,I)
NEW ADDITIONAL CONTRACT UNITS	E(3,I)	E(36,I)					E(11,I)	E(44,I)
NEW ADDITIONAL CONTRACT \$\$\$	E(4,I)	E(37,I)					E(12,I)	E(45,I)
CANCELLED CONTRACT UNITS	E(5,I)	E(38,I)					E(13,I)	E(46,I)
CANCELLED CONTRACT \$\$\$	E(6,I)	E(39,I)					E(14,I)	E(47,I)
SHOP REPAIR \$\$S	E(7,I)	E(40,I)					E(15,I)	E(48,I)

TOTAL SHOP REPAIR HOURS	E(28,I)	E(61,I)	SHOP UNITS - PRODUCT A	L4
TOTAL SERVICE WORK HOURS	E(29,I)	E(62,I)	SHOP UNITS - PRODUCT B	L5
TOTAL SERVICE CALLS	E(30,I)	E(63,I)	SHOP UNITS - PRODUCT C	L6
# OF OUTSIDE T.R.S.	E(31,I)	E(64,I)	SHOP UNITS - PRODUCT W	L7
# OF INSIDE T.R.S.	E(32,I)	E(65,I)	SHOP UNITS - PRODUCT X	L8
TOTAL # OF T.R.S.	E(33,I)	E(66,I)	SHOP UNITS - PRODUCT Y	L9
INCOMPLETE/CALL-BACK CALLS	E(67,I)	E(69,I)	SHOP UNITS - PRODUCT Z	L1
INCOMPLETE/CALL-BACK HOURS	E(68,I)	E(70,I)		

## PROGRAM LISTING

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AVERAGE CONTRACT PRICE - PRODUCT A      Y1          5 POKE 16419,252
AVERAGE CONTRACT PRICE - PRODUCT B      Y2          10 REM * SERVICE TERRITORY & MANPOWER PLANNING SIMULATION *
AVERAGE CONTRACT PRICE - PRODUCT C      Y3          12 REM * BY DENNIS P. AVOLA --'STAMPS'-- *
AVERAGE CONTRACT PRICE - PRODUCT W      Y4          13 REM *** COPYRIGHT FEBRUARY 25, 1982 ***
AVERAGE CONTRACT PRICE - PRODUCT X      Y5          30 CLEAR 2000
AVERAGE CONTRACT PRICE - PRODUCT Y      Y6          31 GOSUB 10000
AVERAGE CONTRACT PRICE - PRODUCT Z      Y7          32 CLS:PRINT TAB(7)"SERVICE TERRITORY AND MANPOWER PLANNING
SIMULATION":PRINT STRING$(63,"=")
35 PRINTTAB(10)"HOW MANY LOCATIONS";:INPUT S
36 DIM D(10,10,$),E(72,S),B(10,10),W$(72),H4(45),T$(S),T(S),N$(S)
37 FOR I=1 TO S:CLS:PRINT TAB(7)"SERVICE TERRITORY AND MANPOWER
PLANNING SIMULATION":PRINT STRING$(63,"=")
38 PRINT@134,"ENTER NAME FOR LOCATION #";I;:INPUT N$(I):PRINT
"SKILL FACTOR (Y/N)"::INPUT T$(I):IF T$(I)="Y" THEN PRINT@222,
"ENTER %"::INPUT T(I)
39 NEXT I:GOSUB 9000
40 FOR I=1 TO S: RESTORE
41 FOR M=1 TO 2:READ C(1,M):NEXT M
42 DATA 1500,500
45 FOR M=1 TO 2:READ C(2,M):NEXT M
46 DATA 615000,365000
47 FOR M=1 TO 2:READ C(3,M):NEXT M
48 DATA 10,15
50 FOR M=1 TO 2:READ C(4,M):NEXT M
52 DATA 75,90
53 FOR M=1 TO 2:READ C(5,M):NEXT M
54 DATA .05,.05
55 FOR M=1 TO 2:READ C(6,M):NEXT M:DATA 75,75
57 FOR M=1 TO 2:READ C(7,M):NEXT M:DATA 221,221
58 FOR M=1 TO 2: READ C(8,M):NEXT M:DATA 5,5
60 GOSUB 8000
62 FOR F=1 TO 7: READ A(1,F):NEXT F
63 DATA 50,80,80,30,40,10,10
65 FOR F=1 TO 7: READ A(2,F):NEXT F
66 DATA 30,50,90,25,50,10,10
70 FOR F=1 TO 7:READ A(3,F):NEXT F
80 DATA 20,15,95,80,75,10,10
85 FOR F=1 TO 7:READ A(4,F):NEXT F
90 DATA 25,10,100,125,25,10,5
95 FOR F=1 TO 7: READ A(5,F):NEXT F
97 DATA 25,10,100,100,25,10,5
105 FOR F=1 TO 7:READ A(6,F):NEXT F
106 DATA 20,10,100,150,50,35,5
107 FOR F=1 TO 7:READ A(7,F):NEXT F
108 DATA 30,10,100,175,30,25,5
109 GOSUB 5000
110 CLS:FOR V=1 TO 10:READ B(1,V):NEXT V
115 DATA .8,1,.75,.5,1.2,1,.75,.25,.75,2.5
120 FOR V=1 TO 10:READ B(2,V):NEXT V
125 DATA .7,1,.75,.5,1.5,1,.75,.33,.75,2.3
128 FOR V=1 TO 10:READ B(3,V):NEXT V
133 DATA .5,1,.85,.4,1.5,1,.85,.25,.85,2.5
135 FOR V=1 TO 10:READ B(4,V):NEXT V
140 DATA 1,2,1.5,.5,1.5,2,1.1,.35,1.1,2.2
145 FOR V=1 TO 10:READ B(5,V):NEXT V
150 DATA 1,2,1.3,.4,1.7,2,1.5,.25,1.3,0
152 FOR V=1 TO 10:READ B(6,V):NEXT V
155 DATA 2,2,1.8,.4,1.7,2,1.5,.25,1.3,0

CAPTURE OF ADDITIONAL CONTRACT UNITS ON
NEW EQUIPMENT SALES

PRODUCT A      Z1
PRODUCT B      Z2
PRODUCT C      Z3
PRODUCT W      X1
PRODUCT X      X2
PRODUCT Y      X3
PRODUCT Z      X4

CAPTURE OF ADDITIONAL CONTRACT UNITS ON
REPLACED UNITS NOT PREVIOUSLY COVERED
BY A SERVICE CONTRACT

PRODUCT A      Z4
PRODUCT B      Z5
PRODUCT C      Z6
PRODUCT W      X5
PRODUCT X      X6
PRODUCT Y      X7
PRODUCT Z      X8

CAPTURE OF ADDITIONAL CONTRACT UNITS ON
EXISTING EQUIPMENT NOT COVERED BY A SERVICE CONTRACT

PRODUCT A      Z9
PRODUCT B      V1
PRODUCT C      V2
PRODUCT W      X9
PRODUCT X      J1
PRODUCT Y      J2
PRODUCT Z      J3

TOTAL (NET) CONTRACT UNITS - PRODUCT A   K1
TOTAL (NET) CONTRACT UNITS - PRODUCT B   K2
TOTAL (NET) CONTRACT UNITS - PRODUCT C   K3
TOTAL (NET) CONTRACT UNITS - PRODUCT W   U1
TOTAL (NET) CONTRACT UNITS - PRODUCT X   U2
TOTAL (NET) CONTRACT UNITS - PRODUCT Y   U3
TOTAL (NET) CONTRACT UNITS - PRODUCT Z   U4

BILLABLE REPAIR UNITS - PRODUCT A        K4
BILLABLE REPAIR UNITS - PRODUCT B        K5
BILLABLE REPAIR UNITS - PRODUCT C        K6
BILLABLE REPAIR UNITS - PRODUCT W        U5
BILLABLE REPAIR UNITS - PRODUCT X        U6
BILLABLE REPAIR UNITS - PRODUCT Y        U7
BILLABLE REPAIR UNITS - PRODUCT Z        U8

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160 FOR V=1 TO 10:READ B(7,V):NEXT V
165 DATA 2,2,1.8,.5,2.2,2,1.5,.33,1.5,0
180 GOSUB 7000
185 GOSUB 6500
190 IF RT=44 THEN 580 ELSE 400
400 CLS:PRINT
500 PRINT TAB(7)"SERVICE TERRITORY AND MANPOWER PLANNING
SIMULATION"
510 PRINT STRING$(63,"=")
520 PRINT" CONTRACT BASE ---BILLABLE BASE-----
PMA"
528 PRINT" PMA PMA AVG TL SHOP
SHOP RENEW"
530 PRINT"PRODUCTS units $$$ price $$$ av/pr %
vol %"
535 PRINT STRING$(63,"-")
540 PRINT"PA$;PRINT@460,:INPUT D(1,1,I):PRINT@468,:INPUT
D(1,2,I):PRINT@476,:INPUT D(1,3,I):PRINT@483,:INPUT D(1,4,I):
PRINT@491,:INPUT D(1,5,I):PRINT@499,:INPUT D(1,6,I):PRINT@504,
:INPUT D(1,7,I)
545 PRINTPB$:PRINT@524,:INPUT D(2,1,I):PRINT@532,:INPUT
D(2,2,I):PRINT@540,:INPUT D(2,3,I):PRINT@547,:INPUT D(2,4,I):
PRINT@555,:INPUT D(2,5,I):PRINT@563,:INPUT D(2,6,I):PRINT@568,
:INPUT D(2,7,I)
550 PRINT"PC$;PRINT@588,:INPUT D(3,1,I):PRINT@596,:INPUT
D(3,2,I):PRINT@604,:INPUT D(3,3,I):PRINT@611,:INPUT D(3,4,I):
PRINT@619,:INPUT D(3,5,I):PRINT@627,:INPUT D(3,6,I):PRINT@632,
:INPUT D(3,7,I)
555 PRINTPW$:PRINT@652,:INPUT D(4,1,I):PRINT@660,:INPUT
D(4,2,I):PRINT@668,:INPUT D(4,3,I):PRINT@675,:INPUT D(4,4,I):
PRINT@683,:INPUT D(4,5,I):PRINT@691,:INPUT D(4,6,I):PRINT@696,:INPUT
D(4,7,I)
560 PRINTPX$:PRINT@716,:INPUT D(5,1,I):PRINT@724,:INPUT
D(5,2,I):PRINT@732,:INPUT D(5,3,I):PRINT@739,:INPUT D(5,4,I):
PRINT@747,:INPUT D(5,5,I):PRINT@755,:INPUT D(5,6,I):PRINT@760,
:INPUT D(5,7,I)
565 PRINTPY$:PRINT@780,:INPUT D(6,1,I):PRINT@788,:INPUT
D(6,2,I):PRINT@796,:INPUT D(6,3,I):PRINT@803,:INPUT D(6,4,I):
PRINT@811,:INPUT D(6,5,I):PRINT@819,:INPUT D(6,6,I):PRINT@824,:INPUT
D(6,7,I)
570 PRINTPZ$:PRINT@844,:INPUT D(7,1,I):PRINT@852,:INPUT
D(7,2,I):PRINT@860,:INPUT D(7,3,I):PRINT@867,:INPUT D(7,4,I):
PRINT@875,:INPUT D(7,5,I):PRINT@883,:INPUT D(7,6,I):PRINT@888,:INPUT
D(7,7,I)
580 CLS:PRINT" *** C H A N G E R O U T I N E ***"
585 PRINT STRING$(63,"=")
590 PRINT"LOC#";I;" CONTRACT BASE ---BILLABLE BASE
-----PMA"
595 PRINT" PMA PMA AVG TL SHOP
SHOP RENEW"
600 PRINT"PRODUCTS units $$$ price $$$ av/pr %
vol %"
605 PRINT" (1) (2) (3) (4) (5)
(6) (7)":PRINT STRING$(63,"-")
610 PRINT"(1) ";PA$;PRINT@462,D(1,1,I):PRINT@468,D(1,2,I):PRINT
@477,D(1,3,I):PRINT@482,D(1,4,I):PRINT@492,D(1,5,I):PRINT@499,
D(1,6,I):PRINT@505,D(1,7,I)
620 PRINT"(2) ";PB$;PRINT@526,D(2,1,I):PRINT@532,D(2,2,I):PRINT
@541,D(2,3,I):PRINT@546,D(2,4,I):PRINT@556,D(2,5,I):PRINT@563,
D(2,6,I):PRINT@569,D(2,7,I)
625 PRINT"(3) ";PC$;PRINT@590,D(3,1,I):PRINT@596,D(3,2,I):PRINT
@605,D(3,3,I):PRINT@610,D(3,4,I):PRINT@620,D(3,5,I):PRINT@627,
D(3,6,I):PRINT@633,D(3,7,I)
630 PRINT"(4) ";PW$;PRINT@654,D(4,1,I):PRINT@660,D(4,2,I):PRINT
@669,D(4,3,I):PRINT@674,D(4,4,I):PRINT@684,D(4,5,I):PRINT@691,
D(4,6,I):PRINT@697,D(5,7,I)
635 PRINT"(5) ";PX$;PRINT@718,D(5,1,I):PRINT@724,D(5,2,I):PRINT
@733,D(5,3,I):PRINT@738,D(5,4,I):PRINT@748,D(5,5,I):PRINT@755,
D(5,6,I):PRINT@761,D(5,7,I)

640 PRINT"(6) ";PY$;PRINT@782,D(6,1,I):PRINT@788,D(6,2,I):PRINT
@797,D(6,3,I):PRINT@802,D(6,4,I):PRINT@812,D(6,5,I):PRINT@819,
D(6,6,I):PRINT@825,D(6,7,I)
645 PRINT"(7) ";PZ$;PRINT@846,D(7,1,I):PRINT@852,D(7,2,I):PRINT
@861,D(7,3,I):PRINT@866,D(7,4,I):PRINT@876,D(7,5,I):PRINT@883,
D(7,6,I):PRINT@889,D(7,7,I)
650 PRINT@896,"ANY CHANGES (Y/N)";:INPUT B$;IF B$<>"Y"ANDB$<>"N"
THEN 650
651 IF B$="N" THEN 900
660 PRINT@896,"ENTER ROW (,) COLUMN #";:INPUT W,Q
661 IF W<1 OR W>7 THEN 660
662 IF Q<1 OR Q>7 THEN 660
665 PRINT@896,"CHANGE TO ";:INPUT D(W,Q,I)
670 GOTO 580
900 REM ** CALCULATIONS **
901 CLS:ON ERROR GOTO 2340
905 REM DIVISION I CALCULATIONS
910 E(1,I)=D(1,1,I)+D(2,1,I)+D(3,1,I):E(2,I)=D(1,2,I)+D(2,2,I)
+D(3,2,I)
912 Y1=D(1,2,I)/D(1,1,I): Y2=D(2,2,I)/D(2,1,I): Y3=D(3,2,I)/
D(3,1,I)
915 LET Z1=(C(1,1)*(A(1,1)/100))*(1-(A(1,2)/100))*(A(1,5)/100)
920 Z2=(C(1,1)*(A(2,1)/100))*(1-(A(2,2)/100))*(A(2,5)/100)
925 Z3=(C(1,1)*(A(3,1)/100))*(1-(A(3,2)/100))*(A(3,5)/100)
926 Z4=((C(1,1)*(A(1,1)/100))*(A(1,2)/100))*(1-(C(4,1)/100))*
(A(1,6)/100)
930 Z5=((C(1,1)*(A(2,1)/100))*(A(2,2)/100))*(1-(C(4,1)/100))*
(A(2,6)/100)
935 Z6=((C(1,1)*(A(3,1)/100))*(A(3,2)/100))*(1-(C(4,1)/100))*
(A(3,6)/100)
937 Z9=(D(1,1,I)*(A(1,7)/100)):V1=(D(2,1,I)*(A(2,7)/100))
938 V2=(D(3,1,I)*(A(3,7)/100))
940 E(3,I)=Z1+Z2+Z3+Z4+Z5+Z6+Z9+V1+V2
945 E(4,I)=((Z1+Z4+Z9)*(D(1,2,I)/D(1,1,I)))+(Z2+Z5+V1)*
(D(2,2,I)/D(2,1,I))+(Z3+Z6+V2)*(D(3,2,I)/D(3,1,I))
950 E(5,I)=((D(1,1,I)*(1-(D(1,7,I)/100)))+(D(2,1,I)*(1-(D(2,7,I)
/100)))+(D(3,1,I)*(1-(D(3,7,I)/100))))
955 E(6,I)=(((D(1,1,I)*(1-(D(1,7,I)/100)))*Y1)+((D(2,1,I)*(1-
(D(2,7,I)/100)))*Y2)+((D(3,1,I)*(1-(D(3,7,I)/100)))*Y3))
960 E(7,I)=(D(1,4,I)*(D(1,6,I)/100))+(D(2,4,I)*(D(2,6,I)/100))+
(D(3,4,I)*(D(3,6,I)/100))
975 E(9,I)=((D(1,4,I)+D(2,4,I)+D(3,4,I))*(1-(C(3,1)/100))-E(7,I)
985 E(11,I)=(D(1,4,I)+D(2,4,I)+D(3,4,I))*(C(3,1)/100)
987 Z7=((C(1,1)*(A(1,1)/100))*(A(1,2)/100))+((C(1,1)*(A(2,1)/
100))*(A(2,2)/100))+((C(1,1)*(A(3,1)/100))*(A(3,2)/100))
995 E(14,I)=((C(1,1)*(A(1,1)/100))*(A(1,3)/100))+((C(1,1)*
(A(2,1)/100))*(A(2,3)/100))+((C(1,1)*(A(3,1)/100))*(A(3,3)/100))
997 Z8=((Z7/2)+(Z1+Z2+Z3+Z4+Z5+Z6))/C(1,1)
1009 E(16,I)=(E(1,I)+E(3,I))-E(5,I)
1020 E(18,I)=(E(2,I)+E(4,I))-E(6,I)
1030 K1=(Z1+Z4+Z9)+D(1,1,I)-(D(1,1,I)*(1-(D(1,7,I)/100)))
1032 K2=(Z2+Z5+V1)+D(2,1,I)-(D(2,1,I)*(1-(D(2,7,I)/100)))
1033 K3=(Z3+Z6+V2)+D(3,1,I)-(D(3,1,I)*(1-(D(3,7,I)/100)))
1035 E(20,I)=(K1*B(1,2))+(K2*B(2,2))+(K3*B(3,2))
1040 E(21,I)=((K1*B(1,2))*B(1,1))+((K2*B(2,2))*B(2,1))+((K3*
B(3,2))*B(3,1))
1041 IF T$(I)="Y" THEN E(21,I)=E(21,I)*(1+(T(I)/100))
1045 E(22,I)=(K1*B(1,4))+(K2*B(2,4))+(K3*B(3,4))
1050 E(23,I)=((K1*B(1,4))*B(1,3))+((K2*B(2,4))*B(2,3))+((K3*
B(3,4))*B(3,3)):IF T$(I)="Y" THEN E(23,I)=E(23,I)*(1+(T(I)/100))
1051 K4=((1-(D(1,6,I)/100)+(C(3,1)/100)))*D(1,4,I)/D(1,3,I)
1052 K5=((1-(D(2,6,I)/100)+(C(3,1)/100)))*D(2,4,I)/D(2,3,I)
1053 K6=((1-(D(3,6,I)/100)+(C(3,1)/100)))*D(3,4,I)/D(3,3,I)
1054 E(10,I)=K4+K5+K6
1055 E(24,I)=E(10,I)
1060 E(25,I)=(K4*B(1,9))+(K5*B(2,9))+(K6*B(3,9)):IF T$(I)="Y"
THEN E(25,I)=E(25,I)*(1+(T(I)/100))
1061 K7=((C(1,1)*(A(1,1)/100))*(A(1,2)/100))*(1-(C(4,1)/100))
1062 K8=((C(1,1)*(A(2,1)/100))*(A(2,2)/100))*(1-(C(4,1)/100))

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1063 K9=((C(1,1)*(A(3,1)/100))*A(3,2)/100)*(1-(C(4,1)/100))
1065 L1=((C(1,1)*(A(1,1)/100))-K7)-(Z1+Z4)
1066 L2=((C(1,1)*(A(2,1)/100))-K8)-(Z2+Z5)
1068 L3=((C(1,1)*(A(3,1)/100))-K9)-(Z3+Z6)
1069 E(26,I)=((C(1,1)*(A(1,1)/100))*A(1,3)/100)*B(1,6)+((C(1,1)*(A(2,1)/100))*A(2,3)/100)*B(2,6)+((C(1,1)*(A(3,1)/100))*A(3,3)/100)*B(3,6))
1070 E(12,I)=((C(1,1)*(A(1,1)/100))*B(1,8))+((C(1,1)*(A(2,1)/100))*B(2,8))+((C(1,1)*(A(3,1)/100))*B(3,8))
1071 E(15,I)=((C(1,1)*(A(1,1)/100))*A(1,3)/100)*A(1,4)+((C(1,1)*(A(2,1)/100))*A(2,3)/100)*A(2,4)+((C(1,1)*(A(3,1)/100))*A(3,3)/100)*A(3,4))
1072 E(13,I)=((C(1,1)*(A(1,1)/100))*B(1,8)*B(1,7))+((C(1,1)*(A(2,1)/100))*B(2,8)*B(2,7))+((C(1,1)*(A(3,1)/100))*B(3,8)*B(3,7)):IF T$(I)="Y" THEN E(13,I)=E(13,I)*(1+(T(I)/100))
1073 E(19,I)=E(18,I)+E(7,I)+E(9,I)+E(15,I)+E(11,I)
1075 E(27,I)=((C(1,1)*(A(1,1)/100))*A(1,3)/100)*B(1,5)+((C(1,1)*(A(2,1)/100))*A(2,3)/100)*B(2,5))+((C(1,1)*(A(3,1)/100))*A(3,3)/100)*B(3,5)):IF T$(I)="Y" THEN E(27,I)=E(27,I)*(1+(T(I)/100))
1076 L4=((D(1,4,I)*(D(1,6,I)/100))/D(1,5,I))
1077 L5=((D(2,4,I)*(D(2,6,I)/100))/D(2,5,I))
1078 L6=((D(3,4,I)*(D(3,6,I)/100))/D(3,5,I))
1079 E(8,I)=L4+L5+L6
1080 E(28,I)=(L4*B(1,10))+L5*B(2,10)+(L6*B(3,10))
1081 IF T$(I)="Y" THEN E(28,I)=E(28,I)*(1+(T(I)/100))
1082 E(17,I)=E(16,I)+E(8,I)+E(10,I)+E(14,I)
1085 E(29,I)=E(21,I)+E(23,I)+E(25,I)+E(27,I)+E(28,I)+E(13,I)
1088 E(30,I)=(E(20,I)+E(22,I)+E(24,I)+E(26,I)+E(8,I)+E(12,I))
1089 E(67,I)=(E(30,I)-E(8,I))*C(5,1)/100
1090 E(68,I)=E(67,I)*((B(1,3)+B(2,3)+B(3,3))/3)
1091 E(31,I)=((E(29,I)-E(28,I))+E(68,I))/((C(6,1)/100)*(C(7,1)*8)+(2080*(C(8,1)/100)))
1095 E(32,I)=E(28,I)/((C(6,1)/100)*(C(7,1)*8)+(2080*(C(8,1)/100)))
1098 E(33,I)=(E(29,I)+E(68,I))/((C(6,1)/100)*(C(7,1)*8)+(2080*(C(8,1)/100)))
1099 REM DIVISION II CALCULATIONS
2000 E(34,I)=D(4,1,I)+D(5,1,I)+D(6,1,I)+D(7,1,I): E(35,I)=D(4,2,I)+D(5,2,I)+D(6,2,I)+D(7,2,I)
2005 Y4=D(4,2,I)/D(4,1,I):Y5=D(5,2,I)/D(5,1,I):Y6=D(6,2,I)/D(6,1,I):Y7=D(7,2,I)/D(7,1,I)
2010 X1=(C(1,2)*(A(4,1)/100))*(1-(A(4,2)/100))*(A(4,5)/100)
2015 X2=(C(1,2)*(A(5,1)/100))*(1-(A(5,2)/100))*(A(5,5)/100)
2020 X3=(C(1,2)*(A(6,1)/100))*(1-(A(6,2)/100))*(A(6,5)/100)
2025 X4=(C(1,2)*(A(7,1)/100))*(1-(A(7,2)/100))*(A(7,5)/100)
2030 X5=((C(1,2)*(A(4,1)/100))*(1-(C(4,2)/100)))*(A(4,6)/100)
2032 X6=((C(1,2)*(A(5,1)/100))*(1-(C(4,2)/100)))*(A(5,6)/100)
2035 X7=((C(1,2)*(A(6,1)/100))*(1-(C(4,2)/100)))*(A(6,6)/100)
2040 X8=((C(1,2)*(A(7,1)/100))*(1-(C(4,2)/100)))*(A(7,6)/100)
2042 X9=(D(4,1,I)*(A(4,7)/100)):J1=(D(5,1,I)*(A(5,7)/100))
2045 J2=(D(6,1,I)*(A(6,7)/100)):J3=(D(7,1,I)*(A(7,7)/100))
2050 E(36,I)=X1+X2+X3+X4+X5+X6+X7+X8+X9+J1+J2+J3
2055 E(37,I)=((X1+X5+X9)*(D(4,2,I)/D(4,1,I)))+((X2+X6+J1)*(D(5,2,I)/D(5,1,I)))+((X3+X7+J2)*(D(6,2,I)/D(6,1,I)))+((X4+X8+J3)*(D(7,2,I)/D(7,1,I)))
2057 E(38,I)=((D(4,1,I)*(1-(D(4,7,I)/100)))+(D(5,1,I)*(1-(D(5,7,I)/100)))+(D(6,1,I)*(1-(D(6,7,I)/100)))+(D(7,1,I)*(1-(D(7,7,I)/100))))
2060 E(39,I)=((D(4,1,I)*(1-(D(4,7,I)/100)))*Y4)+((D(5,1,I)*(1-(D(5,7,I)/100)))*Y5)+((D(6,1,I)*(1-(D(6,7,I)/100)))*Y6)+((D(7,1,I)*(1-(D(7,7,I)/100)))*Y7))
2064 L7=(D(4,4,I)*(D(4,6,I)/100))/D(4,5,I):L8=(D(5,4,I)*(D(5,6,I)/100))/D(4,5,I):L9=(D(6,4,I)*(D(6,6,I))/D(6,5,I)):M1=(D(7,4,I)*(D(7,6,I)/100))/D(7,5,I)
2065 E(40,I)=(D(4,4,I)*(D(4,6,I)/100))+(D(5,4,I)*(D(5,6,I)/100))+(D(6,4,I)*(D(6,6,I)/100))+(D(7,4,I)*(D(7,6,I)/100))
2066 E(41,I)=L7+L8+L9+M1
2067 E(41,I)=E(40,I)/D(4,5,I)

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2068 E(42,I)=((D(4,4,I)+D(5,4,I)+D(6,4,I)+D(7,4,I))*(1-(C(3,2)/100)))-E(40,I)
2075 E(44,I)=(D(4,4,I)+D(5,4,I)+D(6,4,I)+D(7,4,I))*(C(3,2)/100)
2076 E(45,I)=((C(1,2)*(A(4,1)/100))*B(4,8))+((C(1,2)*(A(5,1)/100))*B(5,8))+((C(1,2)*(A(6,1)/100))*B(6,8))+((C(1,2)*(A(7,1)/100))*B(7,8))
2077 E(46,I)=(((C(1,2)*(A(4,1)/100))*B(4,8))*B(4,7))+(((C(1,2)*(A(5,1)/100))*B(5,8))*B(5,7))+(((C(1,2)*(A(6,1)/100))*B(6,8))*B(6,7))+(((C(1,2)*(A(7,1)/100))*B(7,8))*B(7,7)):IF T$(I)="Y" THEN E(46,I)=E(46,I)*(1+(T(I)/100))
2085 Q1=((C(1,2)*(A(4,1)/100))*A(4,3)/100)
2086 Q2=((C(1,2)*(A(5,1)/100))*A(5,3)/100)
2087 Q3=((C(1,2)*(A(6,1)/100))*A(6,3)/100)
2088 Q4=((C(1,2)*(A(7,1)/100))*A(7,3)/100)
2090 E(47,I)=Q1+Q2+Q3+Q4
2095 E(48,I)=(Q1*A(4,4))+((Q2*A(5,4))+((Q3*A(6,4))+((Q4*A(7,4))))*
2100 E(49,I)=(E(34,I)+E(36,I))-E(38,I)
2120 E(51,I)=(E(35,I)+E(37,I))-E(39,I)
2125 E(52,I)=E(51,I)+E(40,I)+E(42,I)+E(44,I)+E(48,I)
2130 U1=((X1+X5+X9)+D(4,1,I))-(D(4,1,I)*(1-(D(4,7,I)/100)))
2135 U2=((X2+X6+J1)+D(5,1,I))-(D(5,1,I)*(1-(D(5,7,I)/100)))
2140 U3=((X3+X7+J2)+D(6,1,I))-(D(6,1,I)*(1-(D(6,7,I)/100)))
2145 U4=((X4+X8+J3)+D(7,1,I))-(D(7,1,I)*(1-(D(7,7,I)/100)))
2150 E(53,I)=(U1*B(4,2))+((U2*B(5,2))+((U3*B(6,2))+((U4*B(7,2))))*
2155 E(54,I)=((U1*B(4,2))*B(4,1))+((U2*B(5,2))*B(5,1))+((U3*B(6,2))*B(6,1))+((U4*B(7,2))*B(7,1))
2160 IF T$(I)="Y" THEN E(54,I)=E(54,I)*(1+(T(I)/100))
2165 E(55,I)=(U1*B(4,4))+((U2*B(5,4))+((U3*B(6,4))+((U4*B(7,4))))*
2170 E(56,I)=((U1*B(4,4))*B(4,3))+((U2*B(5,4))*B(5,3))+((U3*B(6,4))*B(6,3))+((U4*B(7,4))*B(7,3))
2175 IF T$(I)="Y" THEN E(56,I)=E(56,I)*(1+(T(I)/100))
2180 U5=((1-(D(4,6,I)/100)+(C(3,2)/100)))*D(4,4,I))/D(4,3,I)
2185 U6=((1-(D(5,6,I)/100)+(C(3,2)/100)))*D(5,4,I))/D(5,3,I)
2190 U7=((1-(D(6,6,I)/100)+(C(3,2)/100)))*D(6,4,I))/D(6,3,I)
2195 U8=((1-(D(7,6,I)/100)+(C(3,2)/100)))*D(7,4,I))/D(7,3,I)
2196 E(43,I)=U5+U6+U7+U8
2197 E(50,I)=E(49,I)+E(41,I)+E(43,I)+E(47,I)
2200 E(58,I)=(U5*B(4,9))+((U6*B(5,9))+((U7*B(6,9))+((U8*B(7,9))))*
2210 E(57,I)=U5+U6+U7+U8
2220 IF T$(I)="Y" THEN E(58,I)=E(58,I)*(1+(T(I)/100))
2230 E(59,I)=(Q1*B(4,6))+((Q2*B(5,6))+((Q3*B(6,6))+((Q4*B(7,6))))*
2240 E(60,I)=((Q1*B(4,6))*B(4,5))+((Q2*B(5,6))*B(5,5))+((Q3*B(6,6))*B(6,5))+((Q4*B(7,6))*B(7,5))
2245 IF T$(I)="Y" THEN E(60,I)=E(60,I)*(1+(T(I)/100))
2255 E(61,I)=(L7*B(4,10))+((L8*B(5,10))+((L9*B(6,10))+((M1*B(7,10))))*
2260 E(62,I)=E(54,I)+E(56,I)+E(58,I)+E(60,I)+E(61,I)+E(64,I)
2265 E(63,I)=(E(53,I)+E(55,I)+E(57,I)+E(59,I)+E(41,I)+E(45,I))
2266 E(69,I)=(E(63,I)-E(41,I))*(C(5,2)/100)
2267 E(70,I)=E(69,I)*((B(4,3)+B(5,3)+B(6,3)+B(7,3))/4)
2270 E(64,I)=((E(62,I)-E(61,I))+E(70,I))/((C(6,2)/100)*(C(7,2)*8)+(2080*(C(8,2)/100)))
2275 E(65,I)=E(61,I)/((C(6,2)/100)*(C(7,2)*8)+(2080*(C(8,2)/100)))
2280 E(66,I)=(E(62,I)+E(70,I))/((C(6,2)/100)*(C(7,2)*8)+(2080*(C(8,2)/100)))
2340 RESUME NEXT
2350 NEXT I
2400 CLS:PRINTTAB(7)"SERVICE TERRITORY AND MANPOWER PLANNING SIMULATION"
2405 PRINT STRING$(63,"-")
2410 RT=@:PRINT:PRINT:PRINTTAB(20)***** M E N U *****"
2420 PRINTTAB(15)"(1) DISPLAY STAMPS WORKSHEET"
2425 PRINTTAB(15)"(2) DISPLAY OPERATING VARIABLES"
2430 PRINT TAB(15)"(3) DISPLAY SELECTED WORKSHEET ITEMS"
2435 PRINT TAB(15)"(4) SIMULATE OPERATING VARIABLES"
2445 PRINT:PRINT
2450 PRINT TAB(15)"YOUR SELECTION":INPUT R
2460 ON R GOTO 3000,4000,6000,2910
2910 RT=44:GOTO 40

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3000 CLS:F$="###,###":C$="#,##,##":H$="#,##":I$="#,##":
F1$="#.#"
3005 LPRINTCHR$(14) STAMPS WORKSHEET"
3010 FOR I=1 TO S
3015 S1=LEN(N$(I)):S2=(40-(S1/2))
3020 LPRINT TAB(S2);N$(I)
3025 LPRINT:LPRINTCHR$(14)TAB(10)"WORK UNIT POPULATION":LPRINT
3030 LPRINT TAB(30)" ";D1$;TAB(50)" ";D2$;" "
3035 LPRINT TAB(30)" UNITS DOLLARS";TAB(50)" UNITS
DOLLARS"
3040 LPRINTTAB(30)STRING$(41,"-")
3045 LPRINT CHR$(14)"CONTRACT BASE"
3050 LPRINT TAB(13)"EXISTING":LPRINT TAB(32)USING F$;E(1,I);:
LPRINT TAB(40) USING G$;E(2,I);:LPRINT TAB(52)USING F$;E(34,I);:
LPRINT TAB(60)USING G$;E(35,I)
3055 LPRINT TAB(13)"CANCELLATIONS":LPRINT TAB(32)USING F$;E(5,I);:
LPRINT TAB(40)USING G$;E(6,I);:LPRINT TAB(52)USING F$;E(38,I);:
LPRINT TAB(60)USING G$;E(39,I)
3060 LPRINT TAB(13)"ADDITIONS":LPRINT TAB(32)USING F$;E(3,I);:
LPRINT TAB(40)USING G$;E(4,I);:LPRINT TAB(52)USING F$;E(36,I);:
LPRINT TAB(60)USING G$;E(37,I)
3065 LPRINT TAB(8)"TOTAL CONTRACT BASE":LPRINT TAB(32)USING F$;
E(16,I);:LPRINT TAB(40) USING G$;E(18,I);:LPRINT TAB(52)USING
F$;E(49,I);:LPRINT TAB(60)USING G$;E(51,I)
3070 LPRINT:LPRINT:LPRINT CHR$(14)"BILLABLE BASE"
3075 LPRINT TAB(13)"PER CALL":LPRINT TAB(32)USING F$;E(10,I);:
LPRINT TAB(40)USING G$;E(9,I);:LPRINT TAB(52)USING F$;E(43,I);:
LPRINT TAB(60)USING G$;E(42,I)
3080 LPRINT TAB(13)"SHOP":LPRINT TAB(32)USING F$;E(8,I);:LPRINT
TAB(40)USING G$;E(7,I);:LPRINT TAB(52)USING F$;E(41,I);:LPRINT
TAB(60)USING G$;E(40,I)
3085 LPRINT TAB(13)"SVC PARTS":LPRINT TAB(40)USING G$;E(11,I);:
LPRINT TAB(60) USING G$;E(44,I)
3090 LPRINTTAB(8)"TOTAL BILLABLE BASE":LPRINT TAB(32)USING F$;
E(17,I)-(E(16,I)+E(14,I));:LPRINT TAB(40)USING G$;E(19,I)-
(E(18,I)+E(15,I));:LPRINT TAB(52) USING F$;E(50,I)-(E(49,I)+
E(47,I));
3091 LPRINT TAB(60)USING G$;E(52,I)-(E(51,I)+E(48,I))
3095 LPRINT:LPRINT
3100 LPRINT CHR$(14)"INSTALLATIONS"
3110 LPRINT TAB(32)USING F$;E(14,I);:LPRINT TAB(40)USING G$;
E(15,I);:LPRINT TAB(52)USING F$;E(47,I);:LPRINT TAB(60)USING G$;
E(48,I);:LPRINT:LPRINT
3115 LPRINT CHR$(14)"TL WORK UNITS"
3120 LPRINT TAB(32)USING F$;E(17,I);:LPRINT TAB(40)USING G$;
E(19,I);:LPRINT TAB(52)USING F$;E(50,I);:LPRINT TAB(60)USING G$;
E(52,I)
3125 LPRINT TAB(30)STRING$(41,"="):LPRINT
3130 LPRINT TAB(22)CHR$(14)" UNIT WORK LOAD":LPRINT
3135 LPRINT TAB(30)" ";D1$;TAB(50);" ";D2$
3140 LPRINTTAB(31)" CALLS HOURS";TAB(51)" CALLS HOURS"
3145 LPRINT TAB(30)STRING$(41,"-")
3150 LPRINT CHR$(14)"CONTRACT BASE"
3155 LPRINT TAB(14)"INSPECT":LPRINT TAB(32)USING H$;E(20,I);:
LPRINT TAB(40)USING I$;E(21,I);:LPRINT TAB(52)USING H$;E(53,I);:
LPRINT TAB(60)USING I$;E(54,I)
3160 LPRINT TAB(14)"REPAIR":LPRINT TAB(32)USING H$;E(22,I);:
LPRINT TAB(40)USING I$;E(23,I);:LPRINT TAB(52)USING H$;E(55,I);:
LPRINT TAB(60)USING I$;E(56,I)
3165 LPRINT TAB(8)"TOTAL CONTRACT BASE":LPRINT TAB(32)USING H$;
(E(20,I)+E(22,I));:LPRINT TAB(40)USING I$;(E(21,I)+E(23,I));:
LPRINT TAB(52)USING H$;(E(53,I)+E(55,I));
3166 LPRINT TAB(60)USING I$;(E(54,I)+E(56,I))
3170 LPRINT:LPRINT
3175 LPRINT CHR$(14)"BILLABLE BASE"
3180 LPRINT TAB(14)"REPAIR":LPRINTTAB(32)USING H$;E(24,I);:
LPRINTTAB(40)USING I$;E(25,I);:LPRINTTAB(52)USING H$;E(57,I);:
LPRINT TAB(60)USING I$;E(58,I)
3185 LPRINT TAB(14)"SHOP":LPRINT TAB(32)USING H$;E(8,I);:LPRINT
TAB(40)USING I$;E(28,I);:LPRINTTAB(52)USING H$;E(41,I);:LPRINT
TAB(60)USING I$;E(61,I)
3190 LPRINT TAB(8)"TL BILLABLE BASE":LPRINT TAB(32)USING H$;
(E(24,I)+E(8,I));:LPRINT TAB(40)USING I$;(E(25,I)+E(28,I));:
LPRINT TAB(52)USING H$;(E(57,I)+E(41,I));
3191 LPRINT TAB(60)USING I$;(E(58,I)+E(61,I))
3195 LPRINT:LPRINT CHR$(14)"INSTALL BASE"
3200 LPRINT TAB(10)"INSTALLATIONS":LPRINT TAB(32)USING H$;
E(26,I);:LPRINT TAB(40)USING I$;E(27,I);:LPRINTTAB(52)USING H$;
E(59,I);:LPRINT TAB(60) USING I$;E(60,I)
3210 LPRINT TAB(10)"WARRANTY":LPRINT TAB(32)USING H$;E(12,I);:
LPRINT TAB(40)USING I$;E(13,I);:LPRINT TAB(52)USING H$;E(45,I);:
LPRINT TAB(60)USING I$;E(46,I)
3215 LPRINTTAB(10)"INCOMP/CALL-BACKS":LPRINT TAB(32)USING H$;
E(67,I);:LPRINT TAB(40)USING I$;E(68,I);:LPRINT TAB(52)USING H$;
E(69,I);:LPRINT TAB(60)USING I$;E(70,I)
3220 LPRINT TAB(8)"TOTAL INSTALL BASE":LPRINT TAB(32)USING H$;
(E(26,I)+E(12,I)+E(67,I));:LPRINT TAB(40)USING I$;(E(27,I)+
E(13,I)+E(68,I));:LPRINT TAB(52)USING H$;(E(59,I)+E(45,I)+
E(69,I));
3221 LPRINT TAB(60)USING I$;(E(60,I)+E(46,I)+E(70,I))
3225 LPRINT:LPRINT
3230 LPRINT CHR$(14)"TL WORK LOAD":LPRINT TAB(32)USING H$;
(E(30,I)+E(67,I));:LPRINT TAB(40)USING I$;(E(29,I)+E(68,I));:
LPRINT TAB(52)USING H$;(E(63,I)+E(69,I));:LPRINT TAB(60)USING I$;
(E(62,I)+E(70,I))
3232 LPRINT TAB(30)STRING$(41,"=")
3235 LPRINT:LPRINTTAB(31)" SHOP FIELD ";TAB(50);:LPRINT
TAB(52)" SHOP FIELD"
3240 LPRINT CHR$(14)"# OF TRs"
3245 LPRINT TAB(33) USING F1$;E(32,I);:LPRINTTAB(41)USING F1$;
E(31,I);:LPRINT TAB(53)USING F1$;E(65,I);:LPRINTTAB(61)USING
F1$;E(64,I)
3250 LPRINT CHR$(14)"CALLS PER DAY":LPRINT TAB(41)USING F1$;
((E(30,I)+E(67,I)+E(8,I))/C(7,1))/E(31,I);:LPRINT TAB(61)USING
F1$;((E(63,I)+E(69,I)+E(41,I))/C(7,2))/E(64,I)
3400 NEXT I
3500 GOTO 2400
4000 CLS:PRINT" SELECT ANY OF THE FOLLOWING CRT
SCREENS BY"
4005 PRINT" BY PRESSING THE FOLLOWING KEYS:"
4010 PRINT" SHIFT KEY "
4020 PRINT" DOWN ARROW KEY"
4030 PRINT" ASTERISK KEY"
4035 PRINT:PRINT" PRESS ALL THE ABOVE KEYS AT THE SAME
TIME"
4040 PRINT:FOR Z=1 TO 1000:NEXT Z
4050 RT=44:GOTO 40
5000 CLS:PRINTTAB(7)"SERVICE TERRITORY AND MANPOWER PLANNING
SIMULATION"
5003 PRINT"LOC#";I: TAB(22)" UNIT BASE ASSUMPTIONS"
5005 PRINTSTRING$(63,"="):PRINT TAB(15)" UNIT ";TAB(21)%"
UNITS";TAB(29)% UNITS AVG";TAB(41)"PMA CLOSURE PERCENTAGE"
5010 PRINTTAB(3)"CATEGORY";TAB(15)% MIX ";TAB(21)"REPLACE";
TAB(29)"INSTAL PRICE";TAB(43)"NEW";TAB(47)"REPLACE EXISTING"
5011 PRINT"row/column #";TAB(16)(1);TAB(23)(2);TAB(31)(3)
(4);TAB(44)(5);TAB(51)(6);TAB(59)(7)"
5013 PRINT STRING$(64,"-");
5015 PRINT"(1) ";PA$:PRINT@464,A(1,1);:PRINT@471,A(1,2);:PRINT
@478,A(1,3);:PRINT@484,"$";:PRINT@485,A(1,4);:PRINT@491,A(1,5);:
PRINT@498,A(1,6);:PRINT@506,A(1,7)
5020 PRINT"(2) ";PB$:PRINT@528,A(2,1);:PRINT@535,A(2,2);:PRINT
@542,A(2,3);:PRINT@548,"$";:PRINT@549,A(2,4);:PRINT@555,A(2,5);:
PRINT@562,A(2,6);:PRINT@570,A(2,7)
5025 PRINT"(3) ";PC$;:PRINT@592,A(3,1);:PRINT@599,A(3,2);:PRINT
@606,A(3,3);:PRINT@612,"$";:PRINT@613,A(3,4);:PRINT@619,A(3,5);:
PRINT@626,A(3,6);:PRINT@634,A(3,7)
5030 PRINT"(4) ";PW$;:PRINT@656,A(4,1);:PRINT@663,A(4,2);:PRINT
@670,A(4,3);:PRINT@676,"$";:PRINT@677,A(4,4);:PRINT@683,A(4,5);:

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PRINT@690,A(4,6)::PRINT@698,A(4,7)
5035 PRINT"(5) ";PX$::PRINT@720,A(5,1)::PRINT@727,A(5,2)::PRINT
@734,A(5,3)::PRINT@740,"$";::PRINT@741,A(5,4)::PRINT@747,A(5,5)::;
PRINT@754,A(5,6)::PRINT@762,A(5,7)
5040 PRINT"(6) ";PY$::PRINT@784,A(6,1)::PRINT@791,A(6,2)::PRINT
@798,A(6,3)::PRINT@804,"$";::PRINT@805,A(6,4)::PRINT@811,A(6,5)::;
PRINT@818,A(6,6)::PRINT@826,A(6,7)
5045 PRINT"(7) ";PZ$::PRINT@848,A(7,1)::PRINT@855,A(7,2)::PRINT
@862,A(7,3)::PRINT@868,"$";::PRINT@869,A(7,4)::PRINT@875,A(7,5)::;
PRINT@882,A(7,6)::PRINT@890,A(7,7)
5050 PRINT@896,"ANY CHANGES (Y/N)":;INPUT A$
5051 IF A$<>"Y" AND A$<>"N" THEN 5050
5055 IF A$="N" THEN 5075
5060 PRINT@896,"ENTER ROW (.) COLUMN #'S":;INPUT R,C
5065 PRINT@896,"CHANGE TO           ";;INPUT CH
5070 A(R,C)=CH:GOTO5000
5075 RETURN
6000 CLS:H$="#,###,###":H1$="###.#"
6020 PRINT"UNIT POPULATION";TAB(18)"UNITS $$$";TAB(32)"UNIT
WORK LOAD";TAB(50)"CALLS HRS"
6025 PRINT STRING$(63,"=")
6030 PRINT"EXISTING CONTRACT";TAB(19)"(1)    (2)":TAB(32)
"INSPECTION";TAB(51)"(20)   (21)"
6040 PRINT"CANCEL CONTRACT";TAB(19)"(3)    (4)":TAB(32)"CONTRACT
REPAIR";TAB(51)"(22)   (23)"
6050 PRINT"CONTRACT ADDITION";TAB(19)"(5)    (6)":TAB(32)"TL
CONTRACT BASE";TAB(51)"(36)   (37)"
6060 PRINT"TL CONTRACT BASE";TAB(19)"(16)   (18)":TAB(32)
"BILLABLE REPAIR";TAB(51)"(24)   (25)"
6070 PRINT"BILLABLE ";TAB(19)"(10)   (09)":TAB(32)"SHOP REPAIR";
TAB(51)"(08)   (28)"
6080 PRINT"SHOP REPAIR";TAB(19)"(08)   (07)":TAB(32)"TL BILLABLE
BASE";TAB(51)"(38)   (39)"
6090 PRINT"SERVICE PARTS";TAB(19)"           (11)":TAB(32)
"INSTALLATIONS";TAB(51)"(26)   (27)"
6100 PRINT"TL BILLABLE BASE";TAB(19)"(34)   (35)":TAB(32)
"WARRANTY";TAB(51)"(12)   (13)"
6110 PRINT"INSTALLATION";TAB(19)"(14)   (15)":TAB(32)"CALL-BACKS";
TAB(51)"(67)   (68)"
6115 PRINT"GRAND TOTAL";TAB(19)"(17)   (19)":TAB(32)"TL INSTALL
BASE";TAB(51)"(40)   (41)"
6120 PRINT"# OF TRs";TAB(19)"(33)":TAB(32)"GRAND TOTAL";
TAB(51)"(30)   (29)"
6125 PRINT"CALL/DAY/TR";TAB(19)"(42)":TAB(32)"SPACE";TAB(51)"
(71)"
6200 PRINT @896,"HOW MANY TO DISPLAY":;INPUT H3
6210 PRINT@896,"ENTER NUMBERS      ";;FOR I=1 TO H3
6220 PRINT@908+(I*4),:;INPUT H4(I):NEXT I
6225 CLS:PRINT TAB(7)"SERVICE TERRITORY AND MANPOWER PLANNING
SIMULATION":PRINT STRING$(63,"=")
6230 PRINT:PRINT"    DISPLAY SELECTED VARIABLE ON (C)RT OR
(L)INE PRINTER":;INPUT K$:IF K$<>"C" AND K$<>"L" THEN 6230
6240 IF K$="L" THEN 6405
6245 FOR I=1 TO S
6250 CLS:PRINTTAB(7)"SERVICE TERRITORY AND MANPOWER PLANNING
SIMULATION":PRINTTAB(20)N$(I):PRINT STRING$(63,"=")
6260 PRINT"    VARIABLE";TAB(28)D1$;TAB(47)D2$
6265 PRINT STRING$(63,"-")
6266 FOR X=1 TO H3
6270 IF H4(X)>=29 THEN 6288
6275 PRINT W$(H4(X)):;PRINT TAB(30)USING H$;E(H4(X),I);:PRINT
TAB(50)USING H$;E((H4(X)+33),I)
6280 NEXT X: FOR Z=1 TO 1000:NEXT Z:NEXT I
6285 GOTO 2400
6288 IF H4(X)=29 THEN 6289 ELSE 6290
6289 PRINT W$(29):;PRINT TAB(30)USING H$;(E(29,I)+E(68,I));:
PRINT TAB(50) USING H$;(E(62,I)+E(70,I)):GOTO 6280
6290 IF H4(X)=30 THEN 6295 ELSE 6300
6295 PRINT W$(30):;PRINT TAB(30)USING H$;(E(30,I)+E(67,I));:
PRINT TAB(50)USING H$;(E(43,I)+E(41,I)):GOTO 6280
6300 IF H4(X)=31 THEN 6315 ELSE 6320
6305 PRINT W$(31):;PRINT TAB(30)USING H$;(E(31,I)+E(29,I));
PRINT TAB(50)USING H$;(E(53,I)+E(55,I)):GOTO 6280
6310 IF H4(X)=32 THEN 6325 ELSE 6330
6315 PRINT W$(32):;PRINT TAB(30)USING H$;(E(32,I)+E(30,I));
PRINT TAB(50)USING H$;(E(54,I)+E(56,I)):GOTO 6280
6320 IF H4(X)=33 THEN 6335 ELSE 6340
6325 PRINT W$(33):;PRINT TAB(30)USING H$;(E(33,I)+E(31,I));
PRINT TAB(50)USING H$;(E(55,I)+E(57,I)):GOTO 6280
6330 IF H4(X)=34 THEN 6345 ELSE 6350
6335 PRINT W$(34):;PRINT TAB(30)USING H$;(E(34,I)+E(32,I));
PRINT TAB(50)USING H$;(E(56,I)+E(58,I)):GOTO 6280
6340 IF H4(X)=35 THEN 6355 ELSE 6360
6345 PRINT W$(35):;PRINT TAB(30)USING H$;E(24,I);:PRINT TAB(50)
USING H$;E(57,I):GOTO 6280
6350 IF H4(X)=36 THEN 6365 ELSE 6370
6355 PRINT W$(36):;PRINT TAB(30)USING H$;(E(25,I)+E(29,I));
PRINT TAB(50)USING H$;(E(58,I)+E(61,I)):GOTO 6280
6360 IF H4(X)=37 THEN 6365 ELSE 6370
6365 PRINT W$(37):;PRINT TAB(30) USING H$;(E(26,I)+E(12,I)+E(67,I));
PRINT TAB(50)USING H$;(E(59,I)+E(45,I)+E(69,I)):GOTO 6280
6370 IF H4(X)=38 THEN 6375 ELSE 6380
6375 PRINT W$(38):;PRINT TAB(30)USING H$;(E(27,I)+E(13,I)+E(68,I));
PRINT TAB(50)USING H$;(E(60,I)+E(46,I)+E(70,I)):GOTO 6280
6380 IF H4(X)=39 THEN 6385 ELSE 6386
6385 PRINT W$(39):;PRINT TAB(30)USING H1$;((E(30,I)+E(67,I)+E(8,I))/C(7,1))/E(31,I);:PRINT TAB(50)USING H1$;((E(63,I)+E(69,I)+E(41,I))/C(7,2))/E(64,I):GOTO 6280
6386 IF H4(X)=47 THEN 6387 ELSE 6388
6387 PRINT W$(67):;PRINT TAB(30)USING H1$;E(67,I);:PRINTTAB(50)
USING H1$;E(69,I):GOTO 6280
6388 IF H4(X)=68 THEN 6389 ELSE 6390
6389 PRINT W$(68):;PRINT TAB(30)USING H1$;E(68,I);:PRINT TAB(50)
USING H1$;E(70,I):GOTO 6280
6390 IF H4(X)=71 THEN 6395 ELSE 6280
6395 PRINT :GOTO 6280
6405 LPRINT:LPRINT STRING$(80,"*")
6410 LPRINT TAB(15)"SERVICE TERRITORY AND MANPOWER PLANNING
SIMULATION"
6411 FOR I=1 TO S
6415 LPRINT TAB(30)N$(I);: LOCATION":LPRINT STRING$(80,"*")
6416 LPRINT:LPRINTTAB(10)"VARIABLES";TAB(38)"TIME EQUIPMENT";
TAB(57)"BUILDING SYSTEMS"
6420 LPRINT:FOR X=1 TO H3
6425 IF H4(X)>=29 THEN 6430
6426 LPRINTTAB(5) W$(H4(X)):;LPRINT TAB(39)USING H$;E(H4(X),I);:
LPRINT TAB(58)USING H$;E((H4(X)+33),I)
6427 NEXT X:LPRINT:LPRINT:NEXT I
6429 GOTO 2400
6430 IF H4(X)=29 THEN 6431 ELSE 6432
6431 LPRINT TAB(5) W$(29):;LPRINT TAB(39)USING H$;(E(29,I)+E(68,I));:LPRINT TAB(58)USING H$;(E(62,I)+E(70,I)):GOTO 6427
6432 IF H4(X)=30 THEN 6434 ELSE 6435
6434 LPRINT TAB(5) W$(30):;LPRINT TAB(39)USING H$;(E(30,I)+E(67,I));:LPRINT TAB(58)USING H$;(E(63,I)+E(69,I)):GOTO 6427
6435 IF H4(X)=33 THEN 6437 ELSE 6438
6437 LPRINT TAB(5)W$(33):;LPRINT TAB(39)USING H1$;E(33,I);:
LPRINT TAB(58)USING H1$;E(66,I):GOTO 6427
6438 IF H4(X)=34 THEN 6440 ELSE 6441
6440 LPRINT TAB(5) W$(34):;LPRINT TAB(39)USING H$;(E(10,I)+E(8,I));:LPRINT TAB(58)USING H$;(E(43,I)+E(41,I)):GOTO 6427
6441 IF H4(X)=35 THEN 6442 ELSE 6443

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6442 LPRINT TAB(5)W$(35)::LPRINT TAB(39)USING H$;(E(7,I)+E(9,I)+E(11,I));:LPRINT TAB(58)USING H$;(E(40,I)+E(42,I)+E(44,I));:GOTO 6427
6443 IF H4(X)=36 THEN 6445 ELSE 6446
6445 LPRINTTAB(5) W$(36)::LPRINT TAB(39)USING H$;(E(20,I)+E(22,I));:LPRINT TAB(58)USING H$;(E(53,I)+E(55,I)):GOTO 6427
6446 IF H4(X)=37 THEN 6447 ELSE 6448
6447 LPRINT TAB(5) W$(37)::LPRINT TAB(39)USING H$;(E(21,I)+E(23,I));:LPRINT TAB(58)USING H$;(E(54,I)+E(56,I)):GOTO 6427
6448 IF H4(X)=38 THEN 6450 ELSE 6451
6450 LPRINT TAB(5)W$(38)::LPRINT TAB(39)USING H$;E(24,I);:LPRINT TAB(58)USING H$;E(57,I):GOTO 6427
6451 IF H4(X)=39 THEN 6455 ELSE 6457
6455 LPRINT TAB(5) W$(39)::LPRINT TAB(39)USING H$;(E(25,I)+E(29,I));:LPRINT TAB(58)USING H$;(E(58,I)+E(61,I)):GOTO 6427
6457 IF H4(X)=40 THEN 6460 ELSE 6465
6460 LPRINT TAB(5)W$(40)::LPRINT TAB(39)USING H$;(E(26,I)+E(12,I)+E(67,I));:LPRINT TAB(58)USING H$;(E(59,I)+E(45,I)+E(69,I)):GOTO 6427
6465 IF H4(X)=41 THEN 6470 ELSE 6472
6470 LPRINT TAB(5)W$(41)::LPRINT TAB(39)USING H$;(E(27,I)+E(13,I)+E(68,I));:LPRINT TAB(58)USING H$;(E(60,I)+E(46,I)+E(70,I)):GOTO 6427
6472 IF H4(X)=42 THEN 6475 ELSE 6476
6475 LPRINT TAB(5) W$(42)::LPRINT TAB(39)USING H1$;(E(30,I)+E(67,I)+E(8,I))/C(7,1)/E(31,I);:LPRINT TAB(58)USING H1$;(E(63,I)+E(69,I)+E(41,I))/C(7,2)/E(64,I):GOTO 6427
6476 IF H4(X)=67 THEN 6477 ELSE 6478
6477 LPRINT TAB(5) W$(67)::LPRINT TAB(39)USING H1$;E(67,I);:LPRINT TAB(58)USINGH1$;E(69,I):GOTO 6427
6478 IF H4(X)=68 THEN 6479 ELSE 6480
6479 LPRINT TAB(5)W$(68)::LPRINT TAB(39)USING H1$;E(68,I);:LPRINT TAB(58)USING H1$;E(70,I):GOTO 6427
6480 IF H4(X)=71 THEN 6485 ELSE 6490
6485 LPRINT: GOTO 6427
6490 IF H4(X)=90 THEN 6491 ELSE 6427
6491 LPRINT:GOTO 6427
6500 FOR G=1 TO 30:READ W$(G):NEXT G
6510 DATA"EXISTING CONTRACT UNITS","EXISTING CONTRACT $$$",
"CONTRACT ADDITIONAL UNITS","CONTRACT ADDITIONAL $$$","CANCELLED
CONTRACT UNITS","CANCELLED CONTRACT $$$","SHOP REPAIR $$$",
"SHOP REPAIR UNITS","PER CALL BILLABLE $$"
6520 DATA "PER CALL BILLABLE UNITS","SERVICE PARTS OTC $$",
"WARRANTY CALLS","WARRANTY HOURS","INSTALLATION UNITS",
"INSTALLATION $$$","TL CONTRACT BASE UNITS","GRAND TOTAL SERVICE
UNITS","TL CONTRACT BASE $$$","GRAND TOTAL SERVICE $$",
"INSPECTION CALLS"
6530 DATA "INSPECTION HOURS","CONTRACT REPAIR CALLS","CONTRACT
REPAIR HOURS","BILLABLE REPAIR CALLS","BILLABLE REPAIR HOURS",
"INSTALLATION CALLS","INSTALLATION HOURS","SHOP REPAIR HOURS",
"GRAND TOTAL HOURS","GRAND TOTAL CALLS"
6540 READ W$(33):DATA "TL # OF TRS"
6570 FOR G=34 TO 42:READ W$(G):NEXT G
6580 DATA"TL BILLABLE BASE UNITS","TL BILLABLE BASE $$$","TL
CONTRACT BASE CALLS","TL CONTRACT BASE HOURS","TL BILLABLE BASE
CALLS","TL BILLABLE BASE HOURS","TL INSTALL BASE CALLS","TL
INSTALL BASE HOURS","CALLS/TR/DAY"
6590 READ W$(67):DATA"# OF CALL-BACKS"
6600 READ W$(68):DATA"CALL-BACKS HOURS"
6620 RETURN
7000 CLS:PRINT TAB(7)"SERVICE TERRITORY AND MANPOWER PLANNING
SIMULATION"
7005 PRINT"LOC#";I; TAB(26)"MEAN SERVICE TIMES"
7010 PRINTTAB(10)"INSPECTIONS";TAB(22)"CTR REPAIR";TAB(34)
"INSTALL";TAB(43)"WARRANTY";TAB(52)"REPAIR";TAB(58)" SHOP"
7015 PRINT"PRODUCTS";TAB(11)"MTTS #/YR";TAB(22)"MTTS #/YR";
TAB(33)"MTTS #/YR";TAB(43)"MTTS #/YR";TAB(53)"MTTS";TAB(59)"MTTR"
7020 PRINT"row/columns";TAB(12)"(1) (2)";TAB(23)"(3) (4)";
TAB(33)"(5) (6)";TAB(43)"(7) (8)";TAB(54)"(9)";TAB(59)"(10)"

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7022 PRINT STRING$(63,"-")
7030 PRINT"1 ";PA$::PRINT@396,B(1,1)::PRINT@401,B(1,2)::PRINT
@406,B(1,3)::PRINT@411,B(1,4)::PRINT@416,B(1,5)::PRINT@421,
B(1,6)::PRINT@426,B(1,7)::PRINT@432,B(1,8)::PRINT@437,B(1,9):::
PRINT@442,B(1,10)
7040 PRINT"2 ";PB$::PRINT@460,B(2,1)::PRINT@465,B(2,2)::PRINT
@470,B(2,3)::PRINT@475,B(2,4)::PRINT@480,B(2,5)::PRINT@485,
B(2,6)::PRINT@490,B(2,7)::PRINT@496,B(2,8)::PRINT@501,B(2,9):::
PRINT@506,B(2,10)
7045 PRINT"3 ";PC$::PRINT@524,B(3,1)::PRINT@529,B(3,2)::PRINT
@534,B(3,3)::PRINT@539,B(3,4)::PRINT@544,B(3,5)::PRINT@549,
B(3,6)::PRINT@554,B(3,7)::PRINT@560,B(3,8)::PRINT@565,B(3,9):::
PRINT@570,B(3,10)
7050 PRINT"4 ";PW$::PRINT@588,B(4,1)::PRINT@593,B(4,2)::PRINT
@598,B(4,3)::PRINT@603,B(4,4)::PRINT@608,B(4,5)::PRINT@613,
B(4,6)::PRINT@618,B(4,7)::PRINT@624,B(4,8)::PRINT@629,B(4,9):::
PRINT@634,B(4,10)
7055 PRINT"5 ";PX$::PRINT@652,B(5,1)::PRINT@657,B(5,2)::PRINT
@662,B(5,3)::PRINT@667,B(5,4)::PRINT@672,B(5,5)::PRINT@677,
B(5,6)::PRINT@682,B(5,7)::PRINT@688,B(5,8)::PRINT@693,B(5,9)
7060 PRINT"6 ";PY$::PRINT@716,B(6,1)::PRINT@721,B(6,2)::PRINT
@726,B(6,3)::PRINT@731,B(6,4)::PRINT@736,B(6,5)::PRINT@741,
B(6,6)::PRINT@746,B(6,7)::PRINT@752,B(6,8)::PRINT@757,B(6,9)
7065 PRINT"7 ";PZ$::PRINT@780,B(7,1)::PRINT@785,B(7,2)::PRINT
@790,B(7,3)::PRINT@795,B(7,4)::PRINT@800,B(7,5)::PRINT@805,
B(7,6)::PRINT@810,B(7,7)::PRINT@816,B(7,8)::PRINT@821,B(7,9)
7070 PRINT@896,"ANY CHANGES (Y/N)":INPUT A$:IF A$<>"Y" AND A$<
"N" THEN 7070
7071 IF A$="N" THEN 7090
7075 PRINT@896,"ENTER ROW (,) COLUMN # ":INPUT R,C
7076 IF R<1 OR R>7 THEN 7075
7077 IF C<1 OR C>9 THEN 7075
7080 PRINT@896,"CHANGE TO
7085 B(R,C)=CH:GOTO 7000
7090 RETURN
8000 CLS:PRINTTAB(7)"SERVICE TERRITORY AND MANPOWER PLANNING
SIMULATION"
8005 PRINTSTRING$(63,"-")
8010 PRINT"LOC#";ITAB(22)(1) ";D1$;TAB(41)(2) ";D2$
8012 PRINT
8015 PRINT"(1) EQUIPMENT UNITS":PRINT@283,C(1,1)::PRINT@303,C(1,2)
8020 PRINT"(1) EQUIP UNITS/SYS":PRINT@283,C(1,1)::PRINT@303,C(1,2)
8030 PRINT"(2) EQUIP SALES DOLLARS ":PRINT@347,C(2,1)::PRINT
@367,C(2,2)
8035 PRINT
8040 PRINT"(3) SERVICE PARTS (OTC)":PRINT@475,C(3,1)::PRINT@495,
C(3,2)
8050 PRINT"(4) CONTRACT RETENTION ":PRINT@539,C(4,1)::PRINT@559,
C(4,2)
8058 PRINT"(5) % INCOMPLETE CALLS":PRINT@603,C(5,1)::PRINT@623,
C(5,2)
8059 PRINT
8060 PRINT"(6) TR PRODUCTIVITY RATE":PRINT@731,C(6,1)::PRINT@751,
C(6,2)
8065 PRINT"(7) WORK DAYS PER TR/YR":PRINT@795,C(7,1)::PRINT@815,
C(7,2)
8070 PRINT"(8) OVERTIME BUDGET":PRINT@859,C(8,1)::PRINT@879,C(8,2)
8100 PRINT@896,"ANY CHANGES (Y/N)":INPUT B$:IF B$<>"Y" AND B$<>"N"
THEN 8100
8109 IF B$="N" THEN 8140
8110 PRINT@896,"ENTER ROW (,) COLUMN #'S":INPUT R,C
8111 IF R<1 OR R>8 THEN 8110
8112 IF C<1 OR C>2 THEN 8110
8120 PRINT@896,"CHANGE TO
8130 C(R,C)=CH1:GOTO 8135
8135 GOTO 8000
8140 RETURN

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continued on page 61

# HOME RUN WITH BASE 2

James J. Conroy

Are you searching for the "perfect printer?" This entry into the field delivers high performance at low cost and may end your search.

Are you like me? Do you balk at paying more for a printer than you spent for your computer? Have you spent hours of catalog shopping and comparing the features and prices of various machines? Well, search no more. The BASE 2 dot-matrix printer may be your dream come true.

## THE NEED

Sooner or later a computerist wants hard copy. There are so many different printers on the market, using various modes of output, that it becomes difficult to decide which machine to buy. And then there is the cost . . . . What we need is a printer with qualities comparable to the TRS-80: low cost, versatile, compact and easy to use. The BASE 2 printer fits the bill.

## ENTER BASE 2

When I first read the advertisements for the BASE 2 printer, it seemed to good to be true. A plain paper, dot-matrix impact printer, it claimed to have as standard features: full upper/lower case ASCII character set, 64, 72, 80, 96, 120, or 132 characters per line at 60 lines per minute (with 16 baud rates up to 9600), immediate interface capability for RS232, 20ma, IEEE 488, and Centronics I/O, an auxiliary User-Defined Character Set, a self-test switch, and the list goes on. And all this fits into a 3 by 11 by 15-inch enclosure that weighs only 15 pounds! To make a long story short, my good friend and employer, Bob Gilman, bought one from Advanced Computer Products, Inc., and I have had the chance to put one of these fantastic machines through its paces.

## MODEL 800

After my initial experimentation with the BASE 2 printer, I was still amazed at all the features of the machine. And the darn thing is smaller than a bread box. Immediately, I wrote a letter to the company to ask a few semi-technical questions about the printer and to learn a little bit about the people responsible for this incredible machine. Later, I called BASE 2, Inc. to get more data. Here is what I learned:

Applications Engineer Joe Governale explained that the specifications on the Model 800 are a tribute to the engineering wizardry of designer Norm Campbell. The first printers were produced in November of 1979 and they are now manufacturing about 1000 per month. Originally, the machine was offered as a standard model (at \$499.00) which could be augmented with options that included a 2K Terminal Screen Buffer (1920 characters), High Speed Paper Advance/Graphics, and Tractor feed.

This brought the price up to \$649.00. This was the model my friend had purchased, but I soon learned that since 90 percent of the people have ordered the machine configured with all options, they are now standard. When I told the applications engineer that in its present state, the BASE 2 seems to have more features per dollar than any comparable printer, he agreed that (using the digital logic of the 8085

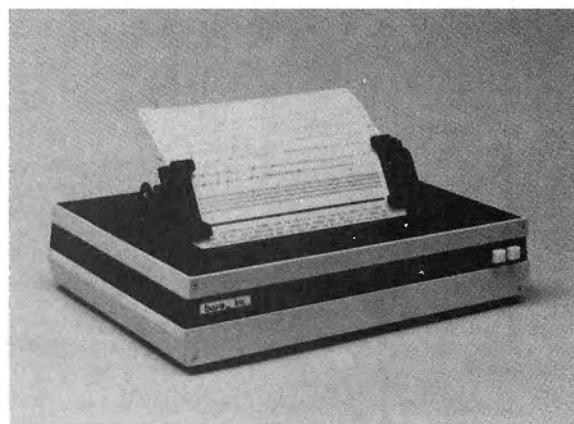
microcomputer I.C.) the BASE 2 has the most "software muscle" on the market. Let's take a look at the specs.

The 5 by 7 inch bi-directional dot matrix print mechanism covers a print area of 8 inches at 100 characters per second (all densities). The maximum paper width is 9-1/2 inches and throughput at 80 characters per line is 60 lines per minute. Paper can be loaded from the back, front, or bottom for either friction or tractor feed. While the printhead does not produce descending lowercase letters, the upper/lower case ASCII set is near letter quality at 80 characters per line. There is an elongated character font (embedded) for all six densities, that produces a very nice enhancement of the characters. Add to this the User-Defined Character feature that allows the programmer to store a full 96-character set of his own design (and this can be enhanced too!) in the printer's RAM and provisions for EPROM that can hold up to 8 additional character sets. BASE 2, Inc., currently offers Swedish, French, British, and Greek character fonts and has plans for more. The estimated life of the printhead is 100 million characters and the drive should last for 10 million lines.

When you first look at the BASE 2 Printer, you are immediately impressed by its size and simplicity. The heavy gauge aluminum chassis and enclosure is sleek and sports only 2 buttons (one of which is lighted) on the right front panel. This controls the unit-select and form feed/paper advance. As you examine the rear panel of the machine you'll be pleased by the methodology employed to live up to the interfacing promises.

The AC power is user selectable (with wiring references in the manual) for 115 VAC or 230 VAC at 50 or 60 Hz. Since the printhead and paper feed are driven by DC stepper motors, the AC frequency will not affect the constant print speed.

There is an 8-position dip switch which allows the user to select the mode of interfacing for RS232, 20ma, Centronics parallel and IEEE 488 at 64, 72, 80, 96, 120, and 130 character density. Although the configuration of this switch defines the "power-up" character density selection, this can be overridden by software commands (more on this later). In all, 20 different modes can be defined. A thumbwheel type switch affords easy selection of any of the 15 baud rates available (from 75 to 9600).



The Base 2 Model 800 Printer

Cable connecting couldn't be easier, since there are 3 connectors provided; 25 pin RS232/20ma current loop, a 24 pin IEEE 488 standard and a 36 pin Centronics type parallel. If you can't hook this up to your computer, you've got some non-standard equipment. I was told that BASE 2, Inc. has thoroughly worked out the interfacing considerations for TRS-80, Pet, Apple, Atari, Compucolor, and other popular microcomputers.

Also located on the back panel are the power on-off switch, fuse sockets, and the self-test switch. The tendency on this machine is to provide well thought out extra features, and the self-test switch is another such delight. The self-test capability is activated by pushing the toggle switch to the right. The printer then provides a test pattern line of whatever the mode select switch is set for. This same switch, if moved to the left, will reset all registers to the original setting. Again we have a pleasant interaction between software and hardware control of the unit.

THIS IS 64 CHARACTERS PER LINE  
THIS IS 72 CHARACTERS PER LINE  
THIS IS 90 CHARACTERS PER LINE  
THIS IS 96 CHARACTERS PER LINE  
THIS IS 120 CHARACTERS PER LINE  
THIS IS 132 CHARACTERS PER LINE

Figure 1

## "SOFTWARE MUSCLE"

If all the hardware features of the BASE 2 weren't enough to please the buyer, the software control power should be. As previously mentioned, the printer's line length (character density) is preselected by a mode switch, but by using proper command codes in BASIC, the programmer can alter this and almost 50 other parameters which govern the printer's performance. The LPRINT CHR\$(X) command is used to handle all of the standard printer controls, such as 10 vertical and 16 horizontal tabs, form length, auto form feed, paper eject, line feed & carriage return combinations, etc. Here also, the programmer can have a field day by enabling or disabling the printhead directionality, the User-Defined Character and Optional Character Sets, the 1920 character buffer, and the graphics mode.

Just about all aspects of the printer's behavior (particularly line spacing and print matrix configuration) are controllable from the graphics mode. Resolution is surprising, since the vertical paper advance can be set in half-dot increments and a proper data stream (transmitted line by line) will define any pattern which the 5 by 7

ANY CHARACTER CAN BE ELONGATED LIKE THIS!

Figure 2

matrix can produce. BASE 2, Inc. includes a sensible warning that extremely high density graphics, (i.e., a solid page of black print) may cause the printhead to exceed its temperature limits. At this point, visions of screen dumps of my TRS-80 graphics were filling my head. That's child's play. Apple fans will be thrilled to

the core because a follow-on letter from BASE 2, Inc. included a sample of high resolution graphics from the Apple II. This appealing capability was accomplished with their own Apple Interface Card which is now available. You should find this especially fruitful, because not only does it augment the overall

ANY CHARACTER FONT WILL PRINT IN LOWERCASE TOO!

Figure 3

performance capacity, but is less expensive than Apple's own parallel interface card.

## ALL THIS AND A MANUAL TOO

Obviously, your utilization of the printer will depend on the instructions and reference data available to you. Here again, the BASE 2 people shine. The 72 page operator's reference manual is clearly written, with few errors. Included are numerous sample programs, explaining software control, plus photos and line drawings of sub-assemblies and mechanical workings. The 25 page appendix also includes reference data along with schematics, board layout, parts lists and photo-keys.

! "#%&^()\*\*+, -./0123456789:;=>?@ABCDEFGHIJKLMNO

IJKLMNOPQRSTUVWXYZ~`\_`abcdefghijklmnopqrstuvwxyzijklmnop

Figure 4

## CONCLUSION

I wish I could say that I've covered it all, but I am sure that I have overlooked some things. Maybe that's a tribute to the preponderance of features which the BASE 2 possesses. By now it is no secret; I am in love with this little machine. Yes, it must have drawbacks or shortcomings—it's just that, for my purposes, I haven't found any. I hope I've provided some helpful information for all of you prospective printer buyers. It pays to check BASE 2. You can contact them at: BASE 2, Inc., 1835 A Dawns Way, Fullerton, CA 92631 (714) 586-6530.

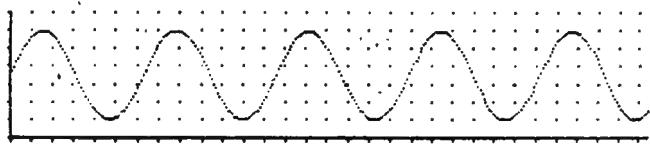


Figure 5

## ADDITIONAL SPECIFICATIONS

Character Height: .104 inches (2.6mm)  
Character Width: .083 inches (2.0mm) at 80 col.  
Paper Thickness: .013 inches (0.33mm) Max  
Paper Feed Rate: 1-1/2 inches/second  
Ribbon: 1/2 inch (13mm)  
Memory:  
(RAM, ROM, EPROM) - Aux. UDC  
- 1920 Char. Buffer

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# SWORD OF RASCHKIL

## Mac Vaughn

Several hundred years ago, the warrior Raschkil was slain in battle. It was rumored that he had had a magical sword, but when it was not found on him, many assumed that it had never existed.

Just a few months ago, you were digging in a garden near your small house when you unearthed a small, unlocked iron box. Within it was a map giving the approximate location of the sword of Raschkil! How did it get under the soil of your garden? No one will ever know.

You decided to find the sword, and had little difficulty finding the area on the map: an area surrounding a small castle. Now, using your wits, you must find the sword within the area named. Any further instructions are included in the program. Good luck—you'll need it!

```
10 ' THE SWORD OF RASCHKIL VERSION 1.32 WRITTEN 8/20/81
20 ' BY MAC VAUGHN 3123 QUEENS WALK ATLANTA, GA. 30084
30 ' SOPHOMORE AT HENDERSON HIGH SCHOOL AGE 16 CLASS OF '84
35 ' PHONE (404) 491-1613 PROGRAM USES ABOUT 11K RAM
40 DIMS(19),0(19),0$19:CLS:PRINT"QUEST # 1 'THE SWORD OF
RASCHKIL' BY MAC VAUGHN TUCKER, GA.":PRINT
50 PRINT"THIS QUEST IS THE FIRST OF A SERIES.YOUR
MISSION IS TO SEEK OUT THE FAMED SWORD OF RASCHKIL.TO DO SO
YOU MUST FIND THE PROPER ITEMS AND USE THE CORRECT
COMMANDS.YOU MUST NOT FAIL!":PRINT:FORI=1TO19:S(I)=-1:NEXTI
55 S(3)=-2:S(6)=-2:FORI=8TO12:S(I)=-2:NEXTI:S(16)=-2:S(17)=-2
60 PRINT"YOU WILL FIND THAT YOU ARE IN A WHOLE NEW WORLD.YOU
CAN PICK UP THINGS (AND PUT THEM DOWN).USE ONE- OR TWO-WORD
COMMANDS ( ) TO CONTROL ME (YOUR PUPPET) IN THIS QUEST (I.E.
CLIMB LADDER,SWIM).USE N,S,E OR W (OR D FOR DOWN) TO MOVE.
61 GOOD LUCK!!!"
65 PRINT$06,CHR$(92);
67 PRINT@640,"NOTE: TO TAKE INVENTORY TYPE 'I' , TO QUIT TYPE
'Q' "
70 PRINT@704,"PRESS ANY KEY TO CONTINUE";
80 IFINKEY$=""THEN80ELSE(1)=32:0(2)=7:0(3)=4:0(4)=9:0(5)=31
90 0(6)=8:0(7)=13:0(8)=14:0(9)=15:0(10)=13:0(11)=2:0(12)=18
100 CLS:0(13)=19:0(14)=23:0(15)=0:0(16)=25:0(17)=3:0(18)=4
110 0(19)=15:$0(1)="SWORD":$0(2)="WATER":$0(3)="TREE"
120 $0(4)="JAR":$0(5)="KEY":$0(6)="CASTLE":$0(7)="STAFF"
130 $0(8)="PIT":$0(9)="WIZARD":$0(10)="LADDER":$0(11)="HOLE"
140 $0(12)="HOUSE":$0(13)="RAT":$0(14)="PIE":$0(15)="DIAMOND"
150 $0(16)="GHOST":$0(17)="DOOR":$0(18)="LEAF":$0(19)="SIGN"
160 RO=1:GOT02000
190 GOT06000
200 ' ----- INPUT COMMANDS
210 INPUTX$:IFNH=1THENGG=1:NH=0:RO=10:PRINT"YOU RUN OUT OF
AIR AND SURFACE."
215 FORI=1TOLEN(X$):IFMID$(X$,I,1)=" "THEN300
220 NEXTI:IFX$="LOOK"THEN200ELSEIFLEN(X$)=1THEN1000
230 IFX$="SWIM"THEN280ELSEIFX$="DIVE"THEN250
240 IFX$="JUMP"THEN270ELSEIFX$="SURFACE"THEN290
245 C$=X$:GOT05020
250 IFRO<>10THEN5000
260 NH=1:RO=31:GOSUB5010:GOT02000
270 IFRO=130RRO=9THEN5030ELSE5000
280 IFRO<>7THEN285ELSERO=10:GOT02000
285 IFRO=10THENRO=7:GOT02000ELSE5000
290 IFRO=31THENRO=10:GOSUB5010:GOT02000ELSE5000
300 C$=LEFT$(X$,I-1):D$=RIGHT$(X$, (LEN(X$)-LEN(C$)-1))
310 RESTORE:FORI=1TO16:READX$:IFX$=C$THENV=N:I:GOT0330ELSENEXTI
320 GOT05020
```

```
330 FORI=1TO19:IFD$=0$(I)THEN340ELSENEXTI:GOT05080
340 ONVGOT0370,370,700,720,720,780,820,860,920,950,970
350 ONV-12GOT03500,3540,3560,3600
370 ONIGOT0390,440,5090,490,510,5090,550,5090,5090,5090
380 ONI-10GOT05090,5090,570,610,630,5090,5090,650,670
390 IFRO<>32THEN5000ELSEIFS(18)=1THEN410
400 PRINT"IT LEVITATES OUT OF YOUR REACH.":GOT0200
410 PRINT"AS YOU SEIZE THE HILT,THE SWORD BEGINS TO GLOW."
420 PRINT"YOUR QUEST IS AT AN END.YOU NOW POSSESS THE SWORD"
430 PRINT"OF RASCHKIL.":GOT06000
440 IFRO<>7ANDRO<>10ANDRO<>31THEN5000
450 IFS(4)=1THEN470
460 PRINT"FIRST I NEED A CONTAINER.":GOT0200
470 IFS(2)=1THEN5100
480 GOSUB5010:S(2)=1:GOT0200
490 IFRO<>9THEN5000ELSEIFS(4)=1THEN5100
500 GOSUB5010:S(4)=1:0(4)=-1:GOT0200
510 IFGG=1THENGG=0:GOT0530ELSEIFRO<>31THEN5000
520 IFS(5)=1THEN5100
530 GOSUB5010
540 RO=10:S(5)=1:0(5)=-1:GOT02000
550 IFRO<>13THEN5000ELSEIFS(7)=1THEN5100
560 S(7)=1:0(7)=-1:GOSUB5010:GOT0200
570 IFRO<>19THEN5000
580 PRINT"THE RAT BIT YOU.":KJ=RND(20):IFKJ<>1THEN200
590 PRINT"AS SOON AS HE BITES YOU A STRANGE PAIN ENVELOPS"
600 PRINT"YOUR BODY.YOU SLOWLY COLLAPSE AND DIE.":GOT06000
610 IFRO<>23THEN5000ELSEIFS(14)=1THEN5100
620 GOSUB5010:S(14)=1:0(14)=-1:GOT0200
630 IFS(15)=-2,5000ELSEIFRO<>0(15),5000
640 IFS(15)=1THEN5100ELSESES(15)=1:0(15)=-1:GOSUB5010:GOT0200
650 IFRO<>4THEN5000ELSEIFS(18)=1THEN5100
660 S(18)=1:0(18)=-1:GOSUB5010:GOT0200
670 IFRO<>15THEN5000
680 PRINT"THE WIZARD SAYS,'LEAVE MY SHINGLE ALONE.'"
690 GOT0200
700 IFS(I)<>1THEN5110
710 GOSUB5010:S(I)=-1:0(I)=RO:GOT02000
720 IFRO<>13ANDRO<>4THEN5000
730 IFD$="LADDER":ANDRO=13THEN750
740 IFD$="TREE":ANDRO=4THEN770ELSE5000
750 IFC$="SCALE":THENPRINT"TRY 'CLIMB)":GOT0200
760 GOSUB5010:RO=2:GOT02000
770 GOSUB5010:RO=9:GOT02000
780 IFRO<>7ANDRO<>10ANDRO<>31THEN5000
790 IFD$<>"JAR":THEN5000
800 IFS(2)=1THENPRINT"IT'S ALREADY FULL.":GOT0200
810 S(2)=1:GOSUB5010:GOT0200
820 IFD$<>"WATER":THEN5000ELSESES(2)=-1:IFRO=15THEN840
830 GOSUB5010:PRINT"BOY THAT REALLY HIT THE SPOT!!!":GOT0200
840 GOSUB5010:PRINT"EVERYTHING BEGINS TO SPIN AROUND AND..."
850 RO=17:GOT02000
860 IFD$<>"PIE":ORS(14)=-1THEN5000
870 IFRO=13THENPRINT"YOU HIT THE WIZARD WITH A PIE."
880 IFRO=13THENPRINT"HE STRIKES YOU DEAD WITH HIS TOUCH."
890 IFRO=13THEN6000
900 PRINT"YOU HIT THE GHOST WITH A PIE."
910 PRINT"HE GETS MAD AND PUNCHES YOU. THE FORCE OF THE BLOW"
915 PRINT"IS SO GREAT THAT IT KILLS YOU.":GOT06000
920 IFRO<>150RD$<>"SIGN":THEN5000
930 PRINT"IT SAYS,' I AM CLUTON. THROW A PIE AND YOU WILL
DIE.'"
940 GOT0200
950 IFS(2)=-10RD$<>"WATER":THEN5000ELSESES(2)=-1
```

```

960 GOSUB5010:PRINT"YOU MADE A PUDDLE ON THE GROUND.":GOTO2000
970 IFD$<"DOOR"ORS(5)<10RRO<>30THEN5000ELSEGOSUB5010
980 PRINT"THE DOOR SWINGS OPEN.":S(17)=-3:GOTO2000
1000 ' ----- MOVE,QUIT OR INVENTORY?
1010 IFX$="Q"THENPRINT"OH WELL...BYE...":GOT06000
1020 IFX$="I"THEN3700ELSEIFX$="E"ORX$="W"ORX$="N"THEN1030
1025 IFX$<>"D"ANDX$<>"S"THEN5120
1027 IFX$="D"ANDR0<>9THEN5000
1030 ON RO GOTO 1060,1080,1100,1120,1130,1150,1170,1180,
1200,1210
1040 ON RO-10 GOTO1220,1240,1250,1260,1280,1300,1310,
1330,1350
1050 ON RO-19 GOTO1360,1380,1390,1410,1430,1450,1470,
1490,1510
1055 ON RO-28 GOTO1530,1550,1570,1570
1060 IFX$="S"THENRO=2:GOTO2000ELSEIFX$="E"THENRO=6:GOT02000
1070 GOT05120
1080 IFX$="W"THEN5120ELSEIFX$="E"THENRO=5:GOT02000
1090 IFX$="N"THENRO=1:GOTO2000ELSEIFX$="S"THENRO=3:GOT02000
1100 IFX$="N"THENRO=2:GOTO2000ELSEIFX$="E"THENRO=4:GOT02000
1110 GOT05120
1120 IFX$<>"W"THEN5120ELSERO=3:GOT02000
1130 IFX$="S"THEN5120ELSEIFX$="N"THENRO=6:GOT02000
1140 IFX$="W"THENRO=2:GOTO2000ELSERO=8:GOT02000
1150 IFX$="N"THEN5120ELSEIFX$="S"THENRO=5:GOT02000
1160 IFX$="E"THENRO=7:GOTO2000ELSERO=1:GOT02000
1170 IFX$<>"W"THEN5120ELSERO=6:GOT02000
1180 IFX$="W"THENRO=5:GOTO2000ELSEIFX$="E"THENRO=11:GOT02000
1190 GOT02000
1200 IFX$<>"D"THEN5120ELSERO=4:GOT02000
1210 GOT05120
1220 IFX$="N"THENRO=12:GOTO2000ELSEIFX$="S"THENRO=16:GOT02000
1230 IFX$="E"THENRO=15:GOTO2000ELSERO=8:GOT02000
1240 IFX$="E"THENRO=14:GOTO2000ELSEIFX$="S"THENRO=11:GOT02000
1250 GOT05120
1260 IFX$="S"THENRO=15:GOTO2000ELSEIFX$="W"THENRO=12:GOT02000
1270 GOT05120
1280 IFX$="N"THENRO=14:GOTO2000ELSEIFX$="W"THENRO=11:GOT02000
1290 GOT05120
1300 IFX$<>"N"THEN5120ELSERO=11:GOT02000
1310 IFX$="W"THEN5120ELSEIFX$="E"THENRO=19:GOT02000
1320 IFX$="N"THENRO=18:GOT02000ELSERO=4:GOT02000
1330 IFX$="S"THENRO=17:GOTO2000ELSEIFX$="E"THENRO=20:GOT02000
1340 GOT05120
1350 IFX$="W"THENRO=17:GOT02000ELSE5120
1360 IFX$="S"THEN5120ELSEIFX$="N"THENRO=21:GOT02000
1370 IFX$="E"THENRO=22:GOT02000ELSERO=18:GOT02000
1380 IFX$="S"THENRO=20:GOT02000ELSE5120
1390 IFX$="S"THEN5120ELSEIFX$="N"THENRO=23:GOT02000
1400 IFX$="E"THENRO=24:GOT02000ELSERO=20:GOT02000
1410 IFX$="S"THENRO=22:GOT02000ELSEIFX$="E"THENRO=25:GOT02000
1420 GOT05120
1430 IFX$="N"THENRO=25:GOT02000ELSEIFX$<>"W"THEN5120
1440 RO=22:GOT02000
1450 IFX$="S"THENRO=24:GOT02000ELSEIFX$="W"THENRO=23:GOT02000
1455 IFX$="E"ANDS(16)=-3THENRO=26:GOT02000
1457 IFX$="E"THENPRINT"THE GHOST WON'T LET YOU BY.":GOT02000
1460 GOT05120
1470 IFX$="N"THENRO=27:GOT02000ELSEIFX$="S"THENRO=24:GOT02000
1480 GOT05120
1490 IFX$="E"THEN5120ELSEIFX$="W"THENRO=28:GOT02000
1500 IFX$="N"THENRO=29:GOT02000ELSERO=26:GOT02000
1510 IFX$="N"THENRO=30:GOT02000ELSEIFX$="E"THENRO=27:GOT02000
1520 GOT05120
1530 IFX$="S"THENRO=27:GOT02000ELSEIFX$="W"THENRO=30:GOT02000
1540 GOT05120
1550 IFX$="S"THENRO=28:GOT02000ELSEIFX$="E"THENRO=29:GOT02000
1560 IFX$="W"ANDS(17)=2THENRO=32:GOT01580
1570 GOT05120

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1580 PRINT"THE DOOR SLAMS BEHIND YOU AND...":GOT02000
2000 ' ----- PRINT PRESENT LOCATION
2010 ON RO GOTO 2040,2060,2080,2090,2110,2120,2140,2160,2170,
2180,2210
2020 ON RO-11 GOTO 2220,2240,2270,2290,2330,2340,2370,2380,
2400,2410,2420
2030 ON RO-22 GOTO 2430,2440,2450,2460,2480,2500,2520,2540,
2570,2580
2040 PRINT"YOU ARE AT THE EDGE OF A FOREST."
2050 PRINT"PATHS LEAD SOUTH AND EAST.":GOT03000
2060 PRINT"YOU ARE IN A GROVE OF OAK TREES."
2070 PRINT"A HOLE IS NEARBY.":GOT03000
2080 PRINT"YOU ARE IN THE MEADOW.":GOT03000
2090 PRINT"YOU ARE ON A SMALL PATH.A LARGE OAK IS NEARBY."
2100 IFO(18)=4THENPRINT"A GOLDEN LEAF IS ON THE GROUND"
2105 GOT03000
2110 PRINT"YOU ARE IN A BLEAK,GRASSY FIELD.":GOT03000
2120 PRINT"YOU ARE IN A LOVELY FOREST WITH THE CALLS OF MANY"
2130 PRINT"BIRDS SOUNDING ALL AROUND YOU.":GOT03000
2140 PRINT"YOU ARE IN AN ANCIENT ORCHARD."
2150 PRINT"A POOL OF MURKY WATER IS BEFORE YOU.":GOT03000
2160 PRINT"YOU ARE AT THE ENTRANCE TO A SMALL CASTLE.":GOT03000
2170 PRINT"YOU ARE AT THE TOP OF AN OAK.":GOT03000
2180 PRINT"YOU ARE SWIMMING IN A POOL OF WATER."
2190 IFO(5)=31THENPRINT"AT THE BOTTOM OF THE POOL IS A KEY."
2200 GOT03000
2210 PRINT"YOU ARE IN THE CASTLE ENTRY.":GOT03000
2220 PRINT"YOU ARE IN THE NORTH WING.A DRAFT ISSUES FROM THE"
2230 PRINT"EAST EXIT.":GOT03000
2240 PRINT"YOU ARE ON A LEDGE JUST INSIDE A BOTTOMLESS HOLE."
2250 PRINT"A LADDER LEADS UP.I ADVISE YOU NOT TO GO DOWN."
2260 GOT03000
2270 IFS(7)=-1THENPRINT"YIIIEEEEE...YOU FELL IN A PIT!":GOT0190
2280 PRINT"YOU ARE LEVITATING ABOVE A PIT.":GOT03000
2290 PRINT"YOU ARE IN THE WIZARD'S ROOM."
2310 PRINT"THE WIZARD IS IN THIS ROOM."
2320 PRINT"A SIGN IS NEARBY.":GOT03000
2330 PRINT"YOU ARE IN THE SOUTH WING.":GOT03000
2340 PRINT"YOU ARE ON THE HEATH OF ORIONE'S MANOR."
2350 PRINT"TO THE NORTH IS A HOUSE,TO THE EAST,A DUMP."
2360 GOTO 3000
2370 PRINT"YOU ARE AT THE ENTRANCE TO A HOUSE.":GOT03000
2380 PRINT"YOU ARE IN THE DUMP.A LARGE RAT IS WATCHING YOU."
2390 GOT03000
2400 PRINT"YOU ARE IN THE ENTRY HALL.":GOT03000
2410 PRINT"YOU ARE IN AN ANCIENT BEDCHAMBER.":GOT03000
2420 PRINT"YOU ARE IN THE BACK ROOM.":GOT03000
2430 PRINT"YOU ARE IN THE KITCHEN.":GOT03000
2440 PRINT"YOU ARE IN THE BACK PORCH.":GOT03000
2450 PRINT"YOU ARE IN THE PANTRY.A GHOST IS HERE.":GOT03000
2460 PRINT"YOU ARE IN THE GARDEN.A BARN IS TO THE NORTH."
2470 GOT03000
2480 PRINT"YOU ARE IN THE BARN.TO THE NORTH ARE STABLES."
2490 PRINT"AND A PASSAGE LEADING WEST.":GOT03000
2500 PRINT"YOU ARE IN THE DIM FEED STORAGE ROOM.TO THE NORTH"
2510 PRINT"IS ANOTHER DIMLY LIT ROOM.":GOT03000
2520 PRINT"YOU ARE IN THE STABLE.A PASSAGE LEADS WEST."
2530 GOT03000
2540 PRINT"YOU ARE IN THE LEATHERSHOP.A DOOR IS TO THE WEST."
2550 IFS(17)=2THENPRINT"IT IS UNLOCKED.":GOT03000
2560 PRINT"IT IS LOCKED.":GOT03000
2570 PRINT"YOU ARE AT THE BOTTOM OF A POOL.":GOT03000
2580 PRINT"YOU ARE IN A MISTY ROOM.A SWORD IS LEVITATING"
2590 PRINT"IN MIDAIR.":GOT03000

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*continued on page 59*

# FIVE BASIC PROGRAMS

## William H. Patrick

### ESCAPE

ESCAPE is a mini-adventure. You are in a ten story office building with 100 rooms per floor. A bomb has been hidden somewhere inside the building. You are told the location of and combination to the company's safe. That safe contains all the company funds and a meter for detecting how close you are to the bomb. You are also told the order in which the wires on the bomb must be clipped.

With 100 moves before the building blows up, your mission is to save the building, save the documents, or merely escape through one of the 10 subway exits on the ground floor. Oh, by the way, in the panic to get out of the building, some of the doors were locked. It could be impossible, but.... Good luck!

```
0 RANDOM:CLS
1 PRINT " AN ORIGINAL PROGRAM BY":PRINT:PRINT
2 PRINT TAB(1),"WILLIAM H. PATRICK"
3 PRINT TAB(1),"RT 7 PARADISE CAMP ROAD"
4 PRINT TAB(1),"HARRISBURG, KENTUCKY 40330"
5 PRINT@ 960,"";:INPUT"<ENTER>"; PG$
10 CLS:CLEAR(1000):DIM R(10,10,10):VL=0:FL=0
11 MN=0
15 PRINT @ 470,"STAND BY!"
20 GOSUB 1000: REM INITIALIZE
30 GOSUB 1000:REM INSTRUCTIONS
40 GOSUB 2000: REM METER READING
50 GOSUB 3000: REM DIALOGUE (I/O)
60 GOTO40
1000 REM INITIALIZE
1010 REM 1=BLOCKED ROOM, 2= EXIT, 3=VAULT, 4=YOU, 5=BOMB
1020 GOSUB 8000:S1=X1:S2=X2:S3=X3:R(X1,X2,X3)=4:REM YOUR
START
1030 FOR I=1 TO 100: REM SET BLOCKED ROOMS
1040 GOSUB 8000: IF R(X1,X2,X3)<>0 THEN 1040 ELSE
R(X1,X2,X3)=1
1050 NEXT I
1060 FOR I=1 TO 10 : REM SET EXITS
1070 GOSUB 8000: IF R(X1,X2,1)<>0 THEN 1040 ELSE R(X1,X2,1)=2
1080 NEXT I
1090 GOSUB 8000:IF R(X1,X2,X3)<>0 THEN 1090 ELSE VX=X3:
VY=10*X1+X2: R(X1,X2,X3)=3:REM VAULT
1100 GOSUB 8000:IF R(X1,X2,X3)<>0 THEN 1100 ELSE B1=X1:B2=X2:
B3=X3: R(X1,X2,X3)=5:REM BOMB
1110 MN=0
1111 RETURN
2000 REM METER READING
2010 MR=SQR((B1-S1)↑2+(B2-S2)↑2+(B3-S3)↑2)/SQR(3)
2222 RETURN
3000 REM I/O DIALOGUE
3001 FOR XX=1 TO 1000:NEXT:CLS
3005 FLAG=0
3010 MN=MN+1:PRINT "MOVE "MN:IF MN>100 THEN 9000
3012 FOR II=1 TO 700:NEXT
3015 GOSUB 12000:REM DRAW FLOOR MAP
3020 PRINT "YOU ARE LOCATED ON FLOOR "S3 "IN ROOM
"10*S1+S2".
3030 IF VL=1 THEN PRINT TAB(1), "METER READING "MR
3040 PRINT:PRINT "THE ADJOINING ROOMS ARE -"
3050 IF S1<>0 THEN PRINT 10*(S1+1)+S2,
3060 IF S1<>9 THEN PRINT 10*(S1+1)+S2,
3070 IF S2<>0 THEN PRINT 10*S1+S2-1,
3080 IF S2<>9 THEN PRINT 10*S1+S2+1
3085 PRINT
3090 PRINT"OR YOU CAN CHANGE FLOORS TO -"
3100 IF S3<>1 THEN PRINT S3-1,
3110 IF S3<>10 THEN PRINT S3+1,
3115 PRINT
3120 INPUT "ENTER ROOM NUMBER";RN
3121 IF RN>100 OR RN<0 THEN 3120
3130 INPUT "ENTER FLOOR NUMBER";FM
3131 IF FM>10 OR FM<1 THEN 3130
3140 GOSUB 4000:REM IS THAT MOVE POSSIBLE?
3150 IF FLAG=1 THEN 3000
3160 S1=D1:S2=D2:S3=D3:R(S1,S2,S3)=4
3333 RETURN
4000 REM CHECK POSSIBILITY OF THAT MOVE
4010 D1=INT((RN+.5)/10):D2=RN-D1*10:D3=FM
4015 IF D1>S1+1 OR D1<S1-1 OR D2>S2+1 OR D2<S2-1 OR D3>S3+1
OR D3<S3-1 THEN PRINT "INVALID MOVE":FOR XX=1 TO 1000: NEXT:
FLAG=1: GOTO 4444
4020 IF R(D1,D2,D3)=1 THEN PRINT "SORRY THAT ROOM IS
BLOCKED.": FLAG=1:GOTO4444
4030 IF D1>10 OR D2>10 OR D3>10 OR D1<0 OR D2<0 OR D3<1 THEN
PRINT "SORRY BUT THAT IS OUTSIDE THE BUILDING!": FLAG=1:
GOTO 4444
4040 IF R(D1,D2,D3)=3 THEN GOSUB 5000:REM VAULT
4050 IF R(D1,D2,D3)=2 THEN GOTO 6000:REM EXIT FOUND
4060 IF R(D1,D2,D3)=5 THEN GOTO 7000:REM BOMB FOUND
4444 RETURN
5000 REM VAULT FOUND
5010 PRINT "YOU HAVE FOUND THE VAULT!"
5020 PRINT "DO YOU WANT TO OPEN IT?":INPUT "Y/N";A$ 
5030 IF A$="N" THEN 5555
5040 INPUT "ENTER THE COMBINATION (FIRST#, SECOND#, THIRD#)": 
N1,N2,N3
5050 IF V1=N1 AND V2=N2 AND V3=N3 THEN 5100
5060 PRINT "THAT DIDN'T WORK!":PRINT" DO YOU WANT TO TRY
AGAIN? (IT WILL COST YOU A MOVE.)"
5070 INPUT "Y/N";A$ 
5080 IF A$="N" THEN 5555
5090 MN=MN+1:GOTO5040
5100 PRINT "ALL RIGHT! IT'S OPEN!"
5110 PRINT "IT CONTAINS $"RND(30000)+10000" IN CASH AND THE
COMPANY PAPERS."
5120 VL=1
5125 FOR XX=1 TO 1000:NEXT
5130 PRINT "NOW YOU NEED TO GET OUT OF THE BUILDING OR FIND
THE BOMB."
5555 RETURN
6000 REM EXIT FOUND
6010 PRINT "... AN EXIT!"
6020 INPUT "DO YOU WANT TO GET OUT (Y/N)":B$ 
6030 IF B$<>"Y" THEN 6666
6040 PRINT "YOU MADE IT TO SAFETY."
6050 IF VL=1 THEN PRINT "AND - BROUGHT THE MONEY AND COMPANY
DOCUMENTS WITH YOU! SUPER JOB!!!"
6060 PRINT " - COME BACK.":END
6666 GOTO 3000
7000 REM BOMB FOUND
7010 PRINT "THERE'S THE BOMB!"
7020 PRINT "DO YOU WANT TO TRY DISARMING IT?":INPUT "Y/N";C$ 
7030 IF C$="N" THEN 7777
7040 PRINT "THERE ARE THREE WIRES - RED, YELLOW AND ORANGE.
7050 INPUT" ENTER THE FIRST LETTER OF EACH OF THE THREE WIRES
IN THE ORDER THAT THEY MUST BE CUT",A$(1),A$(2),A$(3)
```

```

7060 IF A$(1)=B$(1) AND A$(2)=B$(2) AND A$(3)=B$(3) PRINT
"THAT DID IT!": GOTO 7100 ELSE CLS:PRINT CHR$(23):PRINT@ 480,
"BOOM!": END
7100 PRINT "CONGRATULATIONS, YOU HAVE BEEN A GREAT HELP
SAVING THE BUILDING!":PRINT "PLEASE COME BACK ANY TIME.":END
7777 GOTO 3000
8000 X1=RND(10)-1:X2=RND(10)-1:X3=RND(10):RETURN
9000 PRINT "TIME'S UP!":FOR X=1 TO 1200:NEXT:CLS:PRINT
CHR$(23): PRINT@ 480," BOOM!":END
10000 REM INTRO
10001 CLS
10002 PRINT "PRESS ANY KEY TO CONTINUE INSTRUCTIONS"
10003 GOSUB 11000
10010 CLS
10020 PRINT "YOU ARE IN A TEN STORY OFFICE BUILDING WITH 100
ROOMS ON EACH FLOOR."
10030 GOSUB 11000
10040 PRINT" THESE ROOMS ARE ARRANGED IN TEN ROWS OF TEN
ROOMS.
10050 GOSUB 11000
10060 PRINT "NORMALLY YOU CAN GO FROM YOUR ROOM TO ANY OF THE
ADJACENT ROOMS, OR TO THE ROOM ABOVE OR BELOW.
10070 GOSUB 11000
10080 PRINT"HOWEVER, THERE HAS BEEN A BOMB HIDDEN IN THE
BUILDING."
10090 GOSUB 11000
10100 PRINT "IN THE RUSH TO LEAVE, SOME DOORS WERE LOCKED.
10110 GOSUB 11000
10120 PRINT"WE DON'T KNOW WHICH, NOR DO WE HAVE A KEY."
10130 GOSUB 11000
10140 PRINT"ALSO, THE COMPANY DOCUMENTS AND FUNDS ARE IN A
VAULT IN ROOM "VV" ON FLOOR ";VX3
10150 GOSUB 11000
10160 PRINT"WHEN YOU FIND THE VAULT -"
10165 V1=RND(300):V2=RND(300):V3=RND(300)
10170 GOSUB 11000
10180 PRINT "THE COMBINATION IS -":PRINT TAB(1), V1,V2, V3
10190 GOSUB 11000
10200 PRINT"WE HAVE NO IDEA WHERE THE BOMB IS."
10210 GOSUB 11000
10220 PRINT"IF YOU FIND IT, IT CAN BE DISARMED BY CLIPPING 3
WIRES."
10230 GOSUB 11000
10240 PRINT"(R=RED, Y=YELLOW, O=ORANGE)"
10250 GOSUB 11000
10260 F1=RND(3)
10270 ON F1 GOTO 10275,10280,10285
10275 B$(1)="R":B$(2)="Y":B$(3)="O":GOTO 10290
10280 B$(1)="Y":B$(2)="O":B$(3)="R": GOTO 10290
10285 B$(1)="O":B$(2)="R":B$(3)="Y"
10290 PRINT"THEY MUST BE CUT IN THIS ORDER -"
10300 PRINT TAB(1),B$(1),B$(2),B$(3)
10305 GOSUB 11000
10310 PRINT "IN THE VAULT IS A METER WHICH CAN DETECT THE
BOMB"
10320 PRINT"AND INDICATE TO YOU ON A SCALE OF 1-10 YOUR
CLOSENESS TO IT"
10321 PRINT "IF YOU FIND AND OPEN THE VAULT YOU CAN USE THIS
METER."
10330 PRINT "( 0 IS CLOSEST )"
10340 GOSUB 11000
10350 PRINT"YOUR HELP IN SAVING THE BUILDING AND/OR COMPANY "
10360 PRINT "DOCUMENTS AND FUNDS WOULD BE GREATLY
APPRECIATED."
10370 GOSUB 11000
10380 PRINT"BUT, IF YOU ARE ABLE, YOU CAN CHOOSE SIMPLY TO
ESCAPE."
10381 PRINT "THERE ARE 10 SUBWAY EXITS FROM VARIOUS FIRST
FLOOR ROOMS."

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10390 GOSUB 11000
10400 PRINT "YOU HAVE 100 MOVES. GOOD LUCK!"
10410 GOSUB 11000
10420 RETURN
11000 PRINT:REM CONTINUE
11001 X$=INKEY$:IF X$=""THEN 11001 ELSE PRINT" * ";:RETURN
12000 RX=10*S1+S2
12001 CLS
12002 FOR RI=1 TO 10
12003 FOR CI=0 TO 9
12004 RM=(RI-1)*10+CI
12005 IF RM=RX THEN PRINT "YOU "; ELSE PRINT STR$(RM)+
STRING$(6-LEN(STR$(RM)),32);
12006 NEXT CI
12007 PRINT
12008 NEXT RI
12009 PRINT@ 800,"";:INPUT"<ENTER>";PG$:CLS:RETURN

```

## SKETCHIT

SKETCHIT is a graphics utility program for the TRS-80 Models 1 and 3. Its primary function is to allow arrow key drawing on the screen and the saving of the data for that drawing as either a cassette or disk file.

The basic commands are as follows:

- S to save a program (drawing) on disk or tape
- L to load a drawing from disk or tape
- C to erase the screen
- Q to quit and return to BASIC.

Drawing is done with the arrow keys. The blinking cursor can be moved without or used for erasing by using the "shift" with the appropriate arrow key. (New ROM Model I and Model III users will have to use the "A" for the "shift" down arrow.)

The basic commands listed above may be used at any time. More than one drawing may be loaded onto the screen without erasing, so that individual pictures may be combined into one composite drawing, edited, and saved as one picture.

The speed of the drawing is controlled by pressing any digit from 1-9. The key should be held down until the rate of flash of the cursor is noted. Pressing a "1" allows you to draw or erase exactly one block at a time. The @ key can be used to stop the cursor at its present location without affecting the drawing speed.

When a drawing is saved (by pressing "S"), a dialogue is initiated at the bottom of the screen. The user is asked if he wants the entire screen scanned. If the question is answered with a "no," the user may select any part of the screen to be saved as a file, by moving the blinking cursor to the upper left hand corner of what he wishes to save and pressing a "B." He then moves the cursor to the lower right hand corner of the portion of the screen he wishes to save and presses an "F."

The user can select to shift the drawing horizontally or vertically or to change the size of the drawing. All of these options are prompted by questions at the bottom of the screen. Care must be taken so that the shifted or enlarged drawing does not produce an off-screen data point. Because of integer graphics, the reduced or enlarged drawing may need some editing after it is saved.

SKETCHIT may also be used to copy graphics from another program. To do this, simply load the program with the desired graphics, locate the line immediately following the drawing of the graphics in the original

program, and add the following line:

```
PRINT @ 800,"";: LOAD "SKETCHIT/BAS"
```

Next, run the program. When SKETCHIT loads, type RUN 101. When the blinking cursor appears, all you need to do is to type "S" and the saving process will begin.

Data files can easily be listed if you want to add the graphics to another BASIC program. In DOS, the file is simply listed. On a cassette system, you might want to make an addition like "PRINT D\$" immediately following the "INPUT #-1,D\$."

```
1 HZ=0:VZ=0
10 CLS:PRINT"SKETCHIT":PRINT:PRINT TAB(1),"BY WILLIAM H.
PATRICK":PRINT TAB(1),"PARADISE CAMP ROAD":PRINT
TAB(1),"HARRODSBURG, KY. 40330":FOR XX=1 TO 1000:NEXT
20 CLS
30 PRINT"PRESS 'C' TO CLEAR AND RESTART"
40 PRINT"PRESS 'L' TO LOAD A PREVIOUSLY SAVED DRAWING"
50 PRINT"PRESS 'S' TO SAVE CURRENT DRAWING"
55 PRINT "PRESS 'Q' TO QUIT"
60 PRINT:PRINT"DRAWING CONTROLS - "
70 PRINT " PRESS ANY ARROW KEY TO DRAW. ":PRINT "PRESS
<SHIFT> AND ARROW KEYS TO MOVE WITHOUT DRAWING OR ERASE."
71 PRINT"(NEW ROM TRS-80 USE SHIFT 'A' FOR SHIFT DOWN ARROW)"
80 PRINT " PRESS '@' TO PAUSE."
85 PRINT "PRESS ANY DIGIT 1-9 TO CONTROL SPEED OF DRAWING (9
SLOW,           1 ONE BLOCK ONLY)"
86 PRINT"    ALWAYS MAKE YOUR MOVE EXACTLY ONE GRAPHICS BLOCK
AHEAD ":PRINT "OF THE DESIRED MOVE."
90 PRINT:INPUT"<ENTER> TO BEGIN":PG$
```

100 CLS

101 CLEAR (4000):DIM D\$(100)

102 X=0:Y=0:X\$="@":SP=5

108 ER\$=STRING\$(50,32)

109 DEFINT A-Y

110 GOSUB 600:IF C\$="D" THEN CLOSE 1

112 IF X\$="C"THEN 100

113 IF X\$="L" THEN GOTO 6000

114 IF X\$="S" THEN GOTO 5000

115 IF X\$="@" THEN 110

116 IF VAL(X\$)>0 AND VAL(X\$)<10 THEN SP=VAL(X\$)

117 IF X\$="Q" THEN END

119 REM MOVE

120 IF ASC(X\$)=27 THEN Y=Y-1:GOSUB 500:GOTO110

130 IF ASC(X\$)=26 OR ASC(X\$)=97 THEN Y=Y+1:GOSUB500:GOTO110

140 IF ASC(X\$)=24 THEN X=X-1:GOSUB 500:GOTO110

150 IF ASC(X\$)=25 THEN X=X+1:GOSUB500:GOTO110

160 IF ASC(X\$)=91 THEN Y=Y-1:GOT0300

170 IF ASC(X\$)=10 THEN Y=Y+1 :GOT0300

180 IF ASC(X\$)=9 THEN X=X+1: GOT0300

190 IF ASC(X\$)=8 THEN X=X-1 :GOT0300

300 GOSUB 500

320 GOTO110

500 REM OFF SCREEN

510 IF X<0 THEN X=0

520 IF X>127 THEN X=127

530 IF Y<0 THEN Y=0

540 IF Y>47 THEN Y=47

550 RETURN

600 REM INKEY ROUTINE

601 XX\$=INKEY\$

603 SET(X,Y): FOR Z=1TO2\*SP13: NEXT: RESET(X,Y): FOR Z=1 TO
2\*SP2: NEXT

605 IF XX\$="" AND X\$="@" THEN 601

```
606 IF XX$="" AND SP=1 THEN 601
607 IF XX$<>" " THEN X$=XX$
609 IF ASC(X$)<97 AND (ASC(X$)>30OR ASC(X$)<23 )THEN SET
(X,Y)
611 RETURN
4999 REM SAVE DRAWING
5000 GOSUB 7000
5001 PRINT@900,"";:INPUT"    TAPE OR DISK (T/D)":C$:PRINT@900,ER$;:IF C$="T" THEN 5100 ELSE PRINT@ 900,ER$ ;:PRINT@900,"";:INPUT"    ENTER FILE NAME":FM$
5002 OPEN "O",1,FM$
5003 FORX=BX TO EX:FORY=BY TO EY:PRINT @940,"X=X:PRINT@ 950
,"Y=Y
5004 GOSUB 11000:IF POINT(X,Y)=-1 THEN PRINT #1,ZMF*(X+HZ)
", " ZMF*(Y+VZ)", ";
5005 NEXT Y, X
5006 CLOSE 1
5007 GOTO20
5100 PRINT @900,"READY CASSETTE FOR RECORDING, PRESS ENTER":;
INPUT PG$:PRINT@ 900,ER$;:KK=1
5101 D$(KK)=""
5102 FOR X=BX TO EX:FOR Y=BY TO EY
5104 IF POINT(X,Y)=-1 THEN D$(KK)=D$(KK)+ STR$(X)+"+"+STR$(Y)+"/"
5105 IF LEN(D$(KK)) >230 THEN KK=KK+1:D$(KK)=""
5106 NEXT Y,X
5107 D$(KK)=D$(KK)+"999/999/"
5108 PRINT#-1, KK:FOR W=1 TO KK:PRINT#-1,D$( W):NEXT
5109 X=0:Y=0:XX$="@":X$="@":PRINT@ 900,"TAPE FINISHED":; GOTO
110
6000 REM LOADDRAWING
6001 PRINT@ 900,"";:INPUT"TAPE OR DISK (T/D)":C$:PRINT@ 900,
ER$;:IF C$="T" THEN 6100 ELSE PRINT@ 900, " "; :INPUT
"ENTER FILE NAME":FM$:PRINT@ 900, ER$;
6002 OPEN "I",1,FM$
6003 INPUT #1,X,Y:SET(X,Y):IF EOF(1) THEN 6006 ELSE 6003
6006 CLOSE1:X$="@"
6007 GOTO110
6100 REM TAPE INPUT
6101 INPUT#-1,KK:FORZZ=1 TO KK:INPUT#-1,D$(ZZ):NEXT:ZZ=0
6102 ZZ=ZZ+1
6103 FOR K=1 TO 2 :C=1
6104 IF MID$(D$(ZZ),C,1)<"/" THEN C=C+1: GOTO 6104
6105 X(K)= VAL(LEFT$(D$(ZZ),C-1))
6106 D$(ZZ)=RIGHT$(D$(ZZ),LEN(D$(ZZ))-C)
6107 PRINT @ 900,X(1), X(2),LEN(D$(ZZ)) ;:NEXT K
6108 IF X(1)=999 THEN XX$="":X$="@":X=0:Y=0:GOT0110
6109 SET (X(1), X(2))
6110 IF LEN(D$(ZZ))<=1 THEN 6102 ELSE 6103
7000 REM MARK BOUNDARIES OF DRAWING SCAN
7001 PRINT@ 900,"";:INPUT"SCAN ENTIRE SCREEN      (Y/N)":PG$:
PRINT @ 900, ER$;;
7002 IF PG$="Y" THEN BX=0:EX=127:BY=0:EY=47:GOTO 7100
7003 PRINT @ 900,"PRESS 'B' AT THE UPPER LEFT CORNER OF WHAT
YOU WANT SAVED":FOR Z=1 TO 1500:NEXT : PRINT @ 900,"USE THE
ARROWS TO MOVE TO THE LOWER RIGHT OF WHAT YOU WANT"
7004 X=0:Y=0:BX=0:BY=0:EX=0:EY=0
7005 IF POINT(X,Y)=-1 THEN MARK=99 ELSE MARK =0
7006 SET(X,Y):FOR Z=1 TO 3:NEXT:RESET(X,Y):FOR Z=1 TO 3:
NEXT: IF MARK=99 THEN SET(X,Y)
7007 M$=INKEY$:IF M$="" THEN 7005
7008 IF ASC(M$)=91 THEN Y=Y-1:GOT07020
7009 IF ASC(M$)=10 THEN Y=Y+1:GOT07020
7010 IF ASC(M$)=9 THEN X=X+1:GOT07020
7011 IF ASC(M$)=8 THEN X=X-1
7012 IF M$="" THEN PRINT@ 900,STRING$(50,32):GOTO 7100
7013 IF M$="B" THEN BX=X:BY=Y
7020 GOSUB 500
7030 IF X>EX THEN EX=X
```

```

7040 IF Y>EY THEN EY=Y
7050 PRINT@ 900,"PRESS 'F' WHEN YOU ARE FINISHED ";:PRINT
STRING$(27,32);
7060 GOTO 7005
7090 HZ=0:VZ=0:ZMF=1
7100 PRINT@ 900,"";:INPUT" HORIZONTAL SHIFT ";HZ:PRINT@ 900,
ER$;
7110 PRINT@ 900,"";:INPUT" VERTICAL SHIFT ";VZ:PRINT@ 900,
ER$;
7115 PRINT@ 900,"";:INPUT "SIZE FACTOR      ";ZMF:PRINT@ 900, ER$;
7120 RETURN
11000 IF ZMF*(X+HZ)<0 OR ZMF*(X+HZ)>127 THEN PRINT@ 900,ER$:
    PRINT@ 900, "HORIZONTAL ERROR":GOTO110
11001 IF ZMF*(Y+VZ)<0 OR ZMF*(Y+VZ)>47 THEN PRINT@ 900,ER$:
    PRINT@ 900, "VERTICAL ERROR":GOTO110
11002 RETURN

```

## CONCENTRATION

Concentration is a game for two or more players, and it should be initialized by a third person. First, any drawing previously saved by the SKETCHIT program is loaded into the computer. The computer will prompt you when to do this and will ask if the drawing is to be loaded from tape or disk. The drawing is quickly drawn on the screen and erased, so that the initializing person will know that it has loaded properly. The computer will then ask for a word or phrase that is to be guessed from the drawing.

Once this initialization is completed, players enter their names and the game begins. The screen is covered with 56 numbered squares. The player selects two, and the squares are erased one at a time, displaying two letters. If the letters match, a portion of the drawing is revealed, and the player gets a chance to guess the word or phrase. Blanks indicate the number of letters and words. If the letters do not match, the squares are redrawn.

A player continues to play his turn as long as his move produces a match. The game ends when one player guesses the phrase. A winning message is displayed.

```

0 CLS:PRINT "CONCENTRATION":PRINT TAB(1),"BY WILLIAM H.
PATRICK"
2 PRINT TAB(1),"HARRODSBURG, KENTUCKY 40330"
4 INPUT "INSTRUCTIONS (Y/N)";A$:IF A$="Y" THEN GOSUB 15000
5 CLS
10 CLS:REM CONCENTRATION
20 REM BY WILLIAM H. PATRICK RT7 PARADISE CAMP ROAD,
HARRODSBURG,          KENTUCKY 40330
30 CLEAR(5000):DIM X( 500), Y( 500), SQ( 56):REM MAXIMUM DATA
POINTS
31 FOR I=1 TO 56:SQ(I)=64+RND(13):NEXT
32 DIM D$(100)
35 INPUT "DO YOU WANT TO LOAD AN EXTERNAL DRAWING FILE
(Y/N)";A2$:IF A2$="N" THEN 20000
40 INPUT "WILL DRAWING BE LOADED FROM TAPE OR DISK (T/D)";A1$
50 IF LEFT$(A1$,1)="D" THEN GOSUB 5000 ELSE GOSUB 6000
54 PRINT
55 INPUT "NAME OF PICTURE";P$
56 REM CHECK DRAWING
57 FOR I=1 TO ND:SET(X(I),Y(I)):NEXT
88 CLS
89 INPUT " ENTER NAME 1";N$(1):INPUT " ENTER NAME 2";N$(2)
90 FOR I=0 TO 894:PRINT@ I,CHR$(191);:NEXT I

```

```

100 FOR X=0 TO 127 STEP 16
110 FOR Y=0 TO 41
120 RESET (X,Y)
130 NEXT Y,X
150 FOR Y=0 TO 47 STEP 6
160 FOR X=0 TO 127
170 RESET (X,Y)
180 NEXT X,Y
200 REM PUT IN NUMBERS
210 FOR P=1 TO 14 STEP 2
220 FOR P2=0 TO 7
230 PRINT@ P*64+P2*8,P2+1+INT((P-1)/2)*8;
240 NEXT P2,P
300 II=1
310 PRINT@ 960, "IT'S YOUR TURN "N$(II);
320 FOR KI=1 TO 200:NEXT KI
330 FOR S=1 TO 2:PRINT@ 896, STRING$(50,32);:PRINT@ 896,S;:
INPUT "WHAT SQUARE ";S(S):IF S(S)=99 THEN 88 ELSE PRINT@ 995,"";:GOSUB 410:NEXT S
331 IF S(1)>56 OR S(2)>56 OR S(1)<1 OR S(2)<1 OR S(1)=S(2)
THEN 330
400 PRINT@ 896,STRING$(50,32);
405 GOTO 437
410 REM ERASE SQUARE AND DISPLAY LETTER
420 Y=((INT(S(S)/8))*6:X=(S(S)-INT(S(S)/8)*8-1)*16
421 IF ABS(S(S)/8-INT(S(S)/8))<.001 THEN Y=Y-6:X=112
422 XS(S)=X:YS(S)=Y:PL(S)=INT(Y/3)*64+X/2+64:REM PRINT
LOCATION
430 FOR EX=X TO X+15:FOR EY=Y TO Y+5:RESET(EX,EY):NEXT EY,EX
432 PRINT@ PL(S)+2 ,CHR$( SQ(S(S)));
435 RETURN
437 IF SQ(S(1))<>SQ(S(2)) THEN FOR S=1 TO 2:FOR X=XS(S)+1
TO XS(S)+15 :FOR Y=YS(S)+1 TO YS(S)+5: SET(X,Y): NEXTY,X:
PRINT@ PL(S),S(S);: NEXT S: GOTO 470
440 PRINT@ 896,"ONE MINUTE PLEASE!";
444 IF XS(S)=-1 THEN XS(S)=0
445 FOR S=1 TO 2:FOR EX=XS(S) TO XS(S)+15:FOR EY=YS(S) TO
YS(S)+5:RESET(EX,EY):NEXT EY,EX,S
447 FOR I=1 TO ND
450 IF (X(I)>=XS(1) AND X(I)<=XS(1)+16 AND Y(I)>=YS(1) AND
Y(I)<=YS(1)+5) OR (X(I)>=XS(2) AND X(I)<=XS(2)+16 AND
Y(I)>=YS(2) AND Y(I)<=YS(2)+5) THEN SET(X(I),Y(I))
460 NEXT I
461 PRINT@ 896,"ENTER YOUR GUESS      ";
462 FOR ZI=1 TO LEN(P$):IF MID$(P$,ZI,1)=CHR$(32) THEN PRINT
CHR$(32); ELSE PRINT "-";
463 NEXT ZI:INPUT DN$:IF DN$=P$ THEN 12000
465 GOTO 480
470 IF II=1 THEN II=2 ELSE II=1
480 GOTO 310
5000 REM LOAD FROM DISK
5010 INPUT "ENTER FILE NAME";FM$
5020 OPEN"I",1,FM$
5030 I=1
5040 INPUT #1,X(I),Y(I)
5050 IF EOF(1) THEN 5500
5060 I=I+1
5070 GOTO 5040
5500 ND=I:REM ND=NUMBER OF DATA POINTS
5510 RETURN
6000 REM
6005 NI=1
6101 INPUT#-1,KK:FOR Z=1 TO KK:INPUT#-1,D$(ZZ):NEXT:ZZ=0
6102 ZZ=ZZ+1
6103 FOR K=1 TO 2 :C=1
6104 IF MID$(D$(ZZ),C,1)<>"/" THEN C=C+1: GOTO 6104
6105 XX(K)= VAL(LEFT$(D$(ZZ),C-1))
6106 D$(ZZ)=RIGHT$(D$(ZZ),LEN(D$(ZZ))-C)
6107 PRINT @ 900,X(1), X(2),LEN(D$(ZZ));:NEXT K

```

```

6108 IF XX(1)=999 THEN ND=NI:GOTO 54
6109 X(NI)=XX(1):Y(NI)=XX(2):NI=NI+1
6110 IF LEN(D$(ZZ))<=1 THEN 6102 ELSE 6103
12000 CLS:FOR KI=1 TO 100:PRINT "THAT'S RIGHT!!":NEXT
12100 PRINT" ... A ";PS
12110 FOR KI = 1 TO 500:NEXT
12120 FOR I=1 TO ND:SET (X(I),Y(I)):NEXT
12170 GOTO 12170
15000 CLS:PRINT " A BOARD OF 56 SQUARES WILL BE DRAWN ON THE
SCREEN":PRINT
15002 PRINT"YOU WILL SELECT TWO SQUARES, ONE AT A TIME":
PRINT
15004 PRINT"THESE TWO SQUARES WILL BE ERASED AND A LETTER
WILL BE DISPLAYED IN THEIR PLACES.":PRINT
15006 PRINT "IF THE LETTERS DO NOT MATCH, THE SQUARES WILL BE
REDRAWN AND RENUMBERED.":PRINT
15008 PRINT "IF THE LETTERS DO MATCH, THEY WILL BE ERASED AND
A PORTION OF A DRAWING WILL BE MADE.":PRINT
15009 INPUT "<ENTER>";PG$ 
15010 CLS:PRINT "YOU WILL THEN BE GIVEN A CHANCE TO GUESS THE
NAME OR PHRASE THAT FITS THE DRAWING.":PRINT
15012 PRINT "IF YOU ARE INCORRECT, YOU WILL BE GIVEN ANOTHER
TURN FOR HAVING CORRECTLY MATCHED THE LETTERS.":PRINT
15014 PRINT "IF YOUR NAME OR PHRASE IS CORRECT, A WINNING
MESSAGE IS PRINTED."
15016 PRINT:INPUT "<ENTER>";PG$ 
15018 CLS:PRINT "BEFORE BEGINNING PLAY, YOU WILL BE ASKED IF
THE DRAWING IS TO BE LOADED FROM TAPE OR DISK.":PRINT
15020 PRINT"BEFORE ANSWERING THIS QUESTION, A DRAWING
SAVED WITH THE 'SKETCHIT' PROGRAM SHOULD BE IN THE RECORDER
OR DRIVE READY TO LOAD."
15022 PRINT:PRINT"YOU WILL THEN BE ASKED FOR THE NAME OR
PHRASE THAT FITS THIS PICTURE THAT THE PLAYERS WILL BE TRYING
TO GUESS."
15024 PRINT:PRINT"(IDEALLY THIS PROGRAM IS INITIALIZED BY A
NON PLAYER.)":PRINT
15026 INPUT "<ENTER> TO BEGIN";PG$:RETURN
20000 PS="BUTTERFLY":I=1:FOR Z = 1 TO 24
20001 READ X1, X2, Y
20002 FOR X = X1 TO X2
20003 X(I)=X:Y(I)=Y:I=I+1
20004 NEXT X
20005 NEXT Z
20006 DATA 11,27,3,98,114,3,28,31,4,94,97,4,32,36,5,89,93,5,
37,40,6,85,8,8,6,41,44,7,81,84,7,45,47,8,78,80,8,48,50,9,75,
77,9,51,52,10,73,74,10,53,54,11,71,72,11,30,37,26,88,95,26,
44,53,42,72,81,4,2,54,57,41,68,71,41
20007 II=I
20008 FOR I=II TO II+188
20009 READ X(I),Y(I):NEXT I
20010 DATA 10,4,115,4,9,5,116,5,8,6,117,6,9,7,116,7,10,8,70,
8,56,8,115,8,11,9,69,9,57,9,113,9,12,9,114,9,13,10,68,10,58,
10,112,10,14,11,67,11,15,11,59,11,110,11,111,11,16,12,55,12,
60,12,66,12,70,12,109,12,17,13,18,13,56,13,61,13,65,13,69,1
20011 DATA 107,13,108,13,19,14,57,14,62,14,64,14,68,14,106,
14,20,15,58,15,63,15,67,15,105,15,20,16,59,16,63,16,66,16,
105,16,21,17,60,17,61,17,64,17,65,17,104,17,22,18,60,18,65,
18,103,18,22,19,59,19,66,19,103,19,23,20,58,20,67,20,102,20,
24,2
20012 DATA 59,21,66,21,101,21,24,22,58,22,67,22,101,22,25,23,
59,23,66,23,100,23,26,24,27,24,58,24,67,24,98,24,99,24,28,25,
29,25,59,25,66,25,96,25,97,25,58,26,67,26,38,27,39,27,58,27,
66,27,86,27,87,27,34,28,35,38,59,28,67,28,58,29,66,29,30
20013 DATA 30,31,30,58,30,67,30,94,30,95,30,30,31,31,31,59,
31,66,31,94,31,95,31,30,32,31,32,58,32,67,32,94,32,95,32,30,
33,31,33,59,33,66,33,94,33,95,33,31,34,58,34,67,34,94,34,32,
35,33,35,59,35,66,35,92,35,93,35,34,36,35,36,60,36,65,36
20014 DATA 90,36,91,36,34,37,35,37,61,37,64,37,90,37,91,37,

```

```

36,38,37,38,60,38,61,38,62,38,63,38,64,38,65,38,88,38,89,38,
38,39,39,39,58,39,59,39,66,39,67,39,86,39,87,39,40,40,41,40,
56,40,57,40,68,40,69,40,84,40,85,40,42,41,43,41,82,41,83,41
20015 ND=I-1:GOTO 88

```

## TMULT

TMULT is a program to multiply any two numbers with up to 250 digits each and give an exact answer. The program is based on a method of mental multiplication developed by Jakow Trachtenberg while a prisoner in Hitler's concentration camps, and is a most interesting, non-conventional method of multiplication.

Incidentally, if 250 digits isn't enough, you can modify the program to use INKEY\$ to put the digits into the arrays directly, rather than putting them in as strings and having the program separate them into digits. There is no limit, other than the maximum subscript, to the number of digits you can use.

The TRACH/BAS program, published along with TMULT, shows step-by-step how the algorithm works.

## TMULT

```

0 REM WILLIAM H. PATRICK, APRIL 1981, BASED ON TRACHTENBERG
      MULTIPLICATION
5 CLEAR(5000)
10 DEFINT A-Z:CLS:DEFINT A(250),B(500),C(500)
20 PRINT "MULTIPLICATION OF ANY TWO NUMBERS WITH UP TO 250
DIGITS EACH"
21 PRINT"(WHOLE OR DECIMAL)"
25 DP=0
30 INPUT "FIRST NUMBER";A$:D$=A$:GOSUB 500:A$=D$
40 FOR I=1 TO LEN(A$):A(I)=VAL(MID$(A$,LEN(A$)+1-I,1)):NEXT:
      REM SEPARATE INTO DIGITS
50 INPUT "SECOND NUMBER";B$:D$=B$:GOSUB 500:B$=D$
60 FOR I=1 TO LEN(B$):B(I)=VAL(MID$(B$,LEN(B$)+1-I,1)):NEXT:
      REM SEPARATE INTO DIGITS
70 ND=LEN(A$)+LEN(B$) ' NUMBER OF DIGITS IN PRODUCT
80 FOR I=LEN(B$)+1 TO ND:B(I)=0:NEXT: REM ADD LEADING ZEROES
85 REM FOR I=1 TO ND:PRINT B(ND+1-I);:NEXT:PRINT" * ";:FOR
I=1 TO LEN(A$):PRINT A(LEN(A$)+1-I);:NEXT:PRINT
90 REM TRACHTENBERG MULTIPLICATION
100 C=0 ' INITIALIZE CARRY
110 FOR K=1 TO ND
120 P=0 ' INITIALIZE PARTIAL PRODUCT
129 IF K<LEN(A$) THEN S=1 ELSE S=K+1-LEN(A$)
130 FOR J=K TO S STEP -1
140 JR=K+1-J
145 REM PRINT B(J)*"A(JR)
150 P=B(J)*A(JR)+P ' FIND PRODUCT
160 NEXT J
170 P=P+C ' ADD CARRY
171 REM PRINT "THIS PRODUCT="P
180 C(K)=P-INT(P/10)*10 ' GET ONES DIGIT
181 REM PRINT"THIS ANSWER DIGIT"C(K)
190 C=(P-C(K))/10 ' GET CARRY
191 REM PRINT "THIS CARRY DIGIT"C
200 NEXT K
210 PRINT"PRODUCT ";:FOR I=ND TO 1 STEP -1:REM ANSWER
211 IF I=DP THEN PRINT ".";
212 PRINT RIGHT$(STR$(C(I)),1);
213 NEXT I
219 PRINT
220 INPUT "<ENTER>";PG$:CLS:GOTO 25
500 REM GET DECIMAL PLACES
501 FOR I=1 TO LEN(D$)
502 IF MID$(D$,I,1)<>". " THEN 510

```

```

503 DP=DP+LEN(D$)-I
504 D$=LEFT$(D$,I-1)+RIGHT$(D$,LEN(D$)-I)
505 GOTO 512
510 NEXT I
512 RETURN

```

## TRACH

```

0 REM WILLIAM H. PATRICK, APRIL 1981, BASED ON TRACHTENBERG
MULTIPLICATION
1 CLS
2 PRINT "FOR DRILL IN TRACHTENBERG MENTEL MULTIPLICATION"
5 CLEAR(5000)
10 DEFINT A-Z:DIM A(250),B(500),C(500)
20 PRINT "MULTIPLICATION OF ANY TWO NUMBERS WITH UP TO 250
DIGITS EACH"
30 INPUT "FIRST NUMBER";A$
40 FOR I=1 TO LEN(A$):A(I)=VAL(MID$(A$,LEN(A$)+1-I,1)):NEXT:
REM SEPARATE INTO DIGITS
50 INPUT "SECOND NUMBER";B$
51 CLS
52 PRINT@ 0,"PRESS ANY KEY TO CONTINUE";
60 FOR I=1 TO LEN(B$):B(I)=VAL(MID$(B$,LEN(B$)+1-I,1)):NEXT:
REM SEPARATE INTO DIGITS
70 ND=LEN(A$)+LEN(B$) ' NUMBER OF DIGITS IN PRODUCT
80 FOR I=LEN(B$)+1 TO ND:B(I)=0:NEXT: REM ADD LEADING ZEROES
84 PRINT@ 200,"";
85 FOR I=1 TO ND:PRINT RIGHT$(STR$(B(ND+1-I)),1);:NEXT:PRINT"
*:FOR I=1 TO LEN(A$):PRINT RIGHT$(STR$(A(LEN(A$)+1-I)),1);
:NEXT:PRINT
90 REM TRACHTENBERG MULTIPLICATION
100 C=0 ' INITIALIZE CARRY
110 FOR K=1 TO ND
120 P=0 ' INITIALIZE PARTIAL PRODUCT
129 IF K<LEN(A$) THEN S=1 ELSE S=K+1-LEN(A$)
130 FOR J=K TO S STEP -1
135 PRINT@ 419,STRING$(50,32);
140 JR=K+1-J
144 PRINT@ 263+LEN(B$)+LEN(A$)-J, B(J);
145 PRINT@ 263+LEN(B$)+3 +2*LEN(A$)-JR,A(JR);
147 PRINT@ 295,B(J)*A(JR); " ;P+B(J)*A(JR)
148 PRINT@ 355,"PARTIAL PRODUCT      SUM";
149 IF INKEY$=""THEN 149:ELSE PRINT STRING$(62,32);
150 P=B(J)*A(JR)+P 'FIND PRODUCT
160 NEXT J
165 PRINT@ 419," + CARRIED      "C
170 P=P+C 'ADD CARRY
171 PRINT@ 610, "THIS PRODUCT="P
180 C(K)=P-INT(P/10)*10 'GET ONES DIGIT
181 PRINT@ 673,"THIS ANSWER DIGIT"C(K)
182 PRINT@ 840,"ANSWER";:PRINT@ 880-K, RIGHT$(STR$(C(K)),1);
190 C=((P-C(K)))/10 'GET CARRY
191 PRINT@ 738, "THIS CARRY DIGIT"C
195 IF INKEY$="" THEN 195
196 PRINT@ 262,STRING$(60,32);
197 PRINT@ 610, STRING$(200,32);
200 NEXT K
205 PRINT@ 900, "FINISHED";:IF INKEY$=""THEN 205 ELSE END
210 REM PRINT"PRODUCT ";:FOR I=ND TO 1 STEP -1: PRINT
RIGHT$(STR$(C(I)),1);:NEXT:REM ANSWER

```

## MAGIC SQUARES

MAGIC SQUARES is a program to produce any odd row/column magic square. All rows, columns, and diagonals add to the same total. The only reason for the size limitations in the program is so that the completed square will fit on the screen. The procedure works for any odd number of rows and columns. Take out the

input restrictions and fill your 132 column printer if you want.

```

10 CLS:PRINT "ODD MAGIC SQUARES":DEFINT A-Z:REM BY WILLIAM H.
PARTICK - JANUARY 1981
20 INPUT "ENTER ANY ODD INTEGER GREATER THAN 1 AND LESS THAN
15":X:IF (X>15) OR (X<1) OR (X/2=INT(X/2)) THEN 20
30 DIM SQ(X,X)
40 INPUT "ENTER STARTING NUMBER (MAX 500)";COUNT:IF COUNT>500
THEN 40
45 AD=COUNT-1:COUNT=
50 RP=1:CP=(X+1)/2:REM INITIALIZE ROW AND COLUMN POINTERS
60 SQ(RP,CP)=COUNT+AD
70 FOR CT= COUNT+1 TO X12
80 RP=RP-1:CP=CP+1
90 IF (RP=0) AND (CP=X+1) THEN RP=RP+2:CP=CP-1:REM OUT TOP
RIGHT
100 IF RP=0 THEN RP=X:REM OUT TOP
110 IF CP=X+1 THEN CP=1:REM OUT RIGHT
120 IF SQ(RP,CP)<0 THEN RP=RP+2:CP=CP-1:REM POSITION ALREADY
FILLED
130 SQ(RP,CP)=CT+AD
140 NEXT CT
150 CLS:S=0
160 FOR I=1 TO X:S=S+SQ(I,X):NEXT I
170 PRINT "THE MAGIC SQUARE SUM IS "S"."
180 INPUT "<ENTER> FOR THE MAGIC SQUARE";PG$ 
190 FOR I=1 TO X
200 FOR J=1 TO X
210 PRINT STRING$(4-LEN(STR$(SQ(I,J))),32);
220 PRINT STR$(SQ(I,J));
221 IF X<10 PRINT" ";
230 NEXT J
240 PRINT
250 NEXT I
260 END
William H. Patrick
Route 7, Paradise Camp Road
Harrodsburg, KY 40330 ■

```

## HOME RUN WITH BASE 2

continued from page 49

## UPDATE

Since this article was written, thousands of BASE 2 printers have been sold and user-tested. Many articles have appeared featuring the Hi-Res graphic capabilities of the BASE 2. A few complaints have surfaced indicating the possibility of a printhead burnout under adverse conditions. Owners of BASE 2 printers experiencing any problems or requiring supplies or maintenance should contact Computer Peripheral Repair, 1483 E. Warner Ave., Santa Ana, CA 92708, Attn: Tom Torrence. My latest communication with BASE 2, Inc. informs me that they now have available a Model 850 printer which is substantially the same as the Model 800 but is rated as a higher performance machine. Soon to be available will be the Model 900, their first heavy duty letter-quality printer. This is to be followed by the Model 950 which is featured as a 132 column equivalent of the Model 900. Contact BASE 2, Inc. for prices and availability

James J. Conroy
57 E. Garrison St.
Bethlehem, PA 18018 ■

# WORD CHASE

Jack S. Willett

"Word Chase" is a program that takes a message and flashes it all over the screen. There are two versions of the program that are included below. One uses a predefined message, whereas the other allows you to input the message.

The first program picks up the first word in the data, flashes it all over the screen, and stops at position 448. The second word is then picked up, and it flashes around, finally stopping next to the first word. This process continues until the entire message is completed.

The second program begins by asking you to enter ten words, one at a time. Then the words are flashed over the screen as the first program.

## PROGRAM 1

```
100 CLS: PRINT" WATCH YOUR WORDS TRYING TO FIND OUT
WHERE TO GO."
110 FOR W=1 TO 1000: NEXT W
120 CLS: CLEAR 5000: DIM V(200)
130 V(1)=128: V(2)=180: V(3)=350: V(4)=360: V(5)=704: V(6)=370
140 V(7)=586: V(8)=600: V(9)=838: V(10)=880
150 FOR J=1 TO 10
160 FOR S=1 TO 10
170 I=RND(10)
180 A$(1)="H & E": A$(2)="COMPUTRONICS": A$(3)="MAGAZINE":
A$(4)="IS": A$(5)="STILL": A$(6)="THE": A$(7)="BEST":
A$(8)="FOR": A$(9)="TRS 80": A$(10)="MODEL I"
190 PRINT @ V(I), A$(J);
200 FOR W=1TO 100: NEXT W
210 PRINT @ V(I), STRING$(15,32);
220 NEXT S
230 IF J=1 PRINT @ 448, A$(J);
240 IF J=2 PRINT @ 448 + LEN(A$(J-1))+1, A$(J)
250 IF J=3 PRINT @ 448 + LEN(A$(1))+1 + LEN(A$(2))+1, A$(J)
260 IF J=4 PRINT @ 448+LEN(A$(1))+1 + LEN(A$(2))+1 +
LEN(A$(3))+1, A$(J)
270 IF J=5 PRINT @ 448+LEN(A$(1))+1 + LEN(A$(2))+1 +
LEN(A$(3))+1 + LEN(A$(4))+1, A$(J)
280 IF J=6 PRINT@ 448+LEN(A$(1))+1 + LEN(A$(2))+1 +
LEN(A$(3))+1 + LEN(A$(4))+1 + LEN(A$(5))+1, A$(J)
290 IF J=7 PRINT @ 448+LEN(A$(1))+1 + LEN(A$(2))+1 +
LEN(A$(3))+1 + LEN(A$(4))+1 + LEN(A$(5))+1 + LEN(A$(6))+1,
A$(J)
300 IF J=8 PRINT @ 448+LEN(A$(1))+1 + LEN(A$(2))+1 +
LEN(A$(3))+1 + LEN(A$(4))+1 + LEN(A$(5))+1 + LEN(A$(6))+1 +
LEN(A$(7))+1, A$(J)
310 IF J=9 PRINT @ 448+LEN(A$(1))+1 + LEN(A$(2))+1 +
LEN(A$(3))+1 + LEN(A$(4))+1 + LEN(A$(5))+1 + LEN(A$(6))+1 +
LEN(A$(7))+1 + LEN(A$(8))+1, A$(J)
320 IF J=10 PRINT @ 448+LEN(A$(1))+1 + LEN(A$(2))+1 +
LEN(A$(3))+1 + LEN(A$(4))+1 + LEN(A$(5))+1 + LEN(A$(6))+1 +
LEN(A$(7))+1 + LEN(A$(8))+1 + LEN(A$(9))+1, A$(J)
330 NEXT J
340 PRINT:PRINT
350 GOTO 350
```

## PROGRAM 2

```
100 CLS: PRINT,STRING$(6,32)"W O R D C H A S E"
110 PRINT STRING$(8,32)"WATCH YOUR WORDS TRYING TO FIND OUT
```

WHERE TO GO"

```
120 PRINT,STRING$(8,32)"BY JACK WILLETT
130 FOR D=1 TO 1000: NEXT D
140 CLS: CLEAR 1000: DIM V(200), X$(100)
150 GOSUB 440
160 CLS
170 V(1)=128: V(2)=175: V(3)=350: V(4)=360: V(5)=704: V(6)=240
180 V(7)=586: V(8)=600: V(9)=838: V(10)=880
190 FOR J=1 TO 10
200 FOR S=1 TO 10
210 I=RND(10)
220 PRINT @ V(I), A$(J)
230 FOR W=1TO 100: NEXT W
240 PRINT @ V(I), STRING$(15,32)
250 NEXT S
260 IF J=1 B=$(A$(1)+" ")
270 IF J=2 B=$(A$(1)+" ")+(A$(2)+" ")
280 IF J=3 B=$(A$(1)+" ")+(A$(2)+" ")+(A$(3)+" ")
290 IF J=4 B=$(A$(1)+" ")+(A$(2)+" ")+(A$(3)+" ")+(A$(4)+" ")
300 IF J=5 B=$(A$(1)+" ")+(A$(2)+" ")+(A$(3)+" ")+
(A$(4)+" ")+(A$(5)+" ")
310 IF J=6 B=$(A$(1)+" ")+(A$(2)+" ")+(A$(3)+" ")+
(A$(4)+" ")+(A$(5)+" ")+(A$(6)+" ")
320 IF J=7 B=$(A$(1)+" ")+(A$(2)+" ")+(A$(3)+" ")+
(A$(4)+" ")+(A$(5)+" ")+(A$(6)+" ")+(A$(7)+" ")
330 IF J=8 B=$(A$(1)+" ")+(A$(2)+" ")+(A$(3)+" ")+
(A$(4)+" ")+(A$(5)+" ")+(A$(6)+" ")+(A$(7)+" ")+
(A$(8)+" ")+(A$(9)+" ")
340 IF J=9 B=$(A$(1)+" ")+(A$(2)+" ")+(A$(3)+" ")+
(A$(4)+" ")+(A$(5)+" ")+(A$(6)+" ")+(A$(7)+" ")+
(A$(8)+" ")+(A$(9)+" ")+(A$(10))
350 IF J=10 B=$(A$(1)+" ")+(A$(2)+" ")+(A$(3)+" ")+
(A$(4)+" ")+(A$(5)+" ")+(A$(6)+" ")+(A$(7)+" ")+
(A$(8)+" ")+(A$(9)+" ")+(A$(10))
360 PRINT @ 448, B$
370 NEXT J
380 PRINT:PRINT
390 PRINT @ 905,"DO YOU WISH TO SEE YOUR MESSAGE AGAIN
(Y/N)": INPUT X$
400 IF X$="Y" THEN 160 ELSE 410
410 IF X$="N" THEN PRINT CHR$(27),CHR$(30)
420 PRINT @ 908,"DO YOU WISH TO TRY ANOTHER ONE (Y/N)": :
INPUT X$
430 IF X$="Y" THEN CLS: GOTO 150 ELSE 550
440 PRINT"TYPE IN YOUR MESSAGE NOW (10 WORDS OR 64 CHARACTERS
MAXIMUM)"
450 PRINT"IF YOU HAVE LESS THAN 10 WORDS, PRESS <ENTER> TO
THE TENTH WORD"
460 FOR W=1 TO 1500: NEXT W
470 CLS: D=0: L=128
480 PRINT @ 20,"CHARACTERS LEFT"
490 FOR J=1 TO 10
500 PRINT @ 35, 64-D
505 A$(J)=""
510 PRINT @ L+J*64, J: INPUT A$(J)
520 C=LEN(A$(J))+1: D=C+D
530 NEXT J
540 RETURN
550 CLS: END
```

Jack S. Willett  
14089 Buckner Drive  
San Jose, CA 95127 ■

## PROGRAM PREVIEWS

*continued from page 14*

Appendices— one on how to maximize disk space, one on "Do's and Don'ts" (mostly about making backup disks), and one on Error Recovery (mostly "what to do" when a "Disk File Full" message is received). There is no Index and no Table of Contents, and although an Index is hardly necessary in a manual of this size, a full Contents would speed up looking for each function. There are a number of spelling errors throughout the manual, several of them repetitious and careless ("maneuver" is consistently misspelled many times), but otherwise, as stated, the writing and construction cannot be faulted. The manual rates an "8" on my 1 to 10 scale—that's given for the better manuals.

## OVERALL EVALUATION

Overall, this was a pleasant, interesting, and "different" program to review. No problems, and operation as advertised. I cannot restrain my enthusiasm for the excellent graphics and fast operation of INFOSCAN. The Smallsystem Center appears to specialize in graphics techniques (in the near future I will be reviewing another of their programs called "Screen Artist.") The demonstration files are probably the best I have seen, and are most helpful to the program user. The ability to keep "large screen" records, such as lengthy bibliographical information wherein considerable text is necessary is of inestimable value.

Nearly everyone has a need for an information storage and retrieval program of this type. I can recommend INFOSCAN as the one to meet your requirements.

The program will operate with a Model I or Model III, using TRSDOS, Newdos80, LDOS, DOSPLUS and possibly others. (Certain commands may be different from one DOS to another, but this is pointed out in the documentation.) The Smallsystem Center will provide a full refund within 30 days if you are dissatisfied for any reason—no questions asked (they are being honest with the purchaser, I can only hope this will be reciprocated). Damaged INFOSCAN distribution disks will be replaced for a period of up to five years from the date of purchase. All of this must be one of the best warranties that I have heard of in the industry.

**INFOSCAN**—The Smallsystem Center, P. O. Box 268, New Hartford, CT 06057. Model I, III, 48K, disk—\$49.95

A. A. Wicks  
30646 Rigger Road  
Agoura, CA 91301 ■

## SWORD OF RASCHKIL

*continued from page 51*

```
3000' ----- PRINT VISIBLE ITEMS
3010 PRINT"VISIBLE ITEMS":FORI=1TO19:IFO(I)=ROTHENI1=1:
PRINTO$(I)
3020 NEXTI:IFI1=1THENI1=0ELSEPRINT"NOTHING"
3030 GOTO200
3500 IFD$<>"DOOR"THEN5120
3510 IFR0<>30THEN5120
3520 IFS(5)=-1THENPRINT"YOU NEED A KEY.":GOTO 200
3530 S(17)=2:GOSUB5010:GOTO200
3540 IFD$<>"DIAMOND"THEN5120ELSEIFR0<>25THEN5120
```

*continued on page 61*

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# BOOK REVIEW

## Robot Intelligence with Experiments

### by David L. Heiserman

### Reviewed by Louis Zeppa

David L. Heiserman, *Robot Intelligence with Experiments*, TAB Books, 1981. 322 pages, \$9.95.

This is a most important popular microcomputer book. Mass entertainment, business, and academic educational uses of the microcomputer dominate the content of most computer magazines. Heiserman presents a different idea that may revolutionize the common man's use of this marvelous "toy."

He shows us how to share the experimentation and research toward creating artificial intelligence. His method requires neither technical skills nor scientific training because he provides an alternative to the first and an introduction to the second.

You need access to a computer. Though Heiserman used a TRS-80, his programs can be adapted for any microcomputer. As a whole, the book is a practical introduction to the scientific method and the design of experiments.

Heiserman's book is what John Krutch's *Experiments in Artificial Intelligence for Small Computers* pretends to be. It's a carefully thought out sequence that teaches a great deal about intelligence for machines. And along the way it shows good programming and documentation technique.

The first experiment, called ALPHA-1, introduces the problem and provides the statistical basis for evaluating future results. It randomly moves a SET/RESET graphics dot within a rectangle on the screen, counts bumps against the border, and successful moves away from the border.

Of course, random movement does not show intelligence. But for us who waited for the appliance computer (because we were better at burning fingers than soldering wires), here is an inspired perception: the video is an input/output device that is every bit as external to the CPU (central processing unit) as the relays and gears of any mechanical man.

Think about it. Blips and bleeps on the screen can signal the program to affect motion. Generalized from the screen to the floor of a room, Heiserman has created a robot on the TRS-80's video screen. While this robot is neither a mechanical bracero nor the puppy surrogate of futuristic movie fantasies, you can use it to learn about robotics and artificial intelligence.

The criterion of intelligence for Heiserman's moving dot is a high ratio of successful moves away from the border or other obstructions after an initial contact. Does it seem overly simplistic? Simple, yes! But, this is not a heavyweight statistical tome full of academic blarney. It focuses on the experiment. The strategy and tactics of mighty clever graphics routines do not confuse the issue by getting in the way of describing the experiments.

The ALPHA-1 robot provides the statistics of random

behavior. BETA and GAMMA robots add learning with more complex decision-making and memory routines. Comparing their statistics with random figures from ALPHA-1 clearly shows a modification of behavior patterns. The little buggers do learn from and respond to the screen environment.

Though the approach is good, the book has some deficiencies. First, the publisher: isn't it about time that TAB's books ceased to look like a basement operation? A group of amateurs using a small Kelsey letterpress would do a better job.

Boy do they need a proofreader! The ratio of errors per page is over two to one. The text and programs have too many typos. For example: an open parenthesis where a close parenthesis should be; a branching variable that is set to the same value for both of its flagging conditions; and GOTOS to nonexistent lines. The text or context may clear up the problem, but not always.

Such errors must result from sloppy typesetting without correcting proofs. While any author's manuscript will have some typos, I cannot believe Heiserman himself submitted a manuscript replete with so many errors of that kind. The natural audience for this book is not the typical hacker used to ferreting through slop for the germ of the idea. The errors in the programs could send a saint up the wall.

Second, the experiment feels incomplete. By going no further than perimeter responses he left the beginner to wonder at further practical applications. The early mention of mazes should have been followed up by programming the robot to solve one. Or perhaps, it could determine the size and shape of various patterns of its two-dimensional world. One such addition would have set the beginner's researches more firmly on the right path.

None of my criticism tames my recommendation. Remaining narrowly focused on such a minor aspect of intelligence allowed Heiserman to describe his programs in rich detail. His flow charts actually enhance the explanations; one of few computer books using them to advantage. His manner of using subroutines demonstrates the potential of structured programming without beating us over the head about it.

Because of the typos, I would hesitate to give the book to a young child who might find them too frustrating. Otherwise, if you are interested in artificial intelligence but lack experience and training, this book is the place to begin.

Louis Zeppa  
Box 19358  
Sacramento, California 95819 ■

## STAMPS

continued from page 47

```

9000 CLS
9005 PRINT TAB(7)"SERVICE TERRIORY AND MANPOWER PLANNING
SIMULATION"
9020 PRINT TAB(17)"P R O G R A M F O R M A T"
9030 PRINT STRING$(63,"-")
9035 PRINT
9040 PRINT TAB(5)"DIVISION I":;INPUT D1$:PRINT @291,"DIVISION
II":;INPUT D2$
9045 PRINT
9050 PRINT TAB(5)"PRODUCT A":;INPUT PA$:PRINT@419,"PRODUCT W":;
INPUT PW$
9055 PRINT TAB(5)"PRODUCT B":;INPUT PB$:PRINT@483,"PRODUCT X":;
INPUT PX$
9060 PRINT TAB(5)"PRODUCT C":;INPUT PC$:PRINT@547,"PRODUCT Y":;
INPUT PY$
9065 PRINT@611,"PRODUCT Z":;INPUT PZ$
9090 RETURN
10000 CLS:PRINTCHR$(23):FOR X=0 TO 127:SET(X,16):NEXT X
10010 PRINT@384," SERVICE TERRITORY AND MANPOWER"
10020 PRINT@448," PLANNING SIMULATION"
10030 FOR X=0 TO 127:SET(X,25):NEXT X
10040 PRINT@640," PRESS ENTER TO START":;INPUT X:RETURN

```

Additional information on "STAMPS" may be obtained by writing to:

Dennis Avola  
20 Prescott Street  
Rutland, Massachusetts 01543 ■

## SWORD OF RASCHKIL

continued from page 59

```

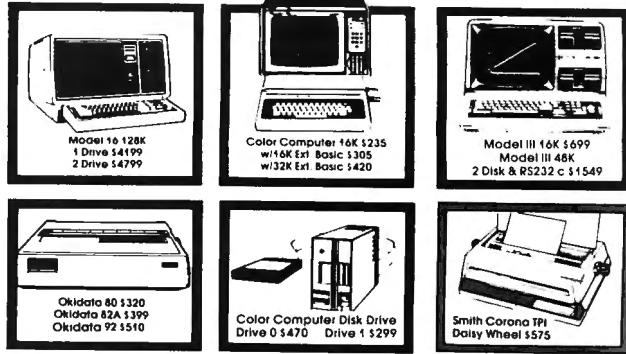
3550 PRINT"THE GHOST ACCEPTS THE DIAMOND.":S(16)=-3:GOTO200
3560 IFD$="RAT"THEN570ELSEIFD$<>"PIE"THEN5120
3570 PRINT"YOU ENJOY A DELICIOUS SARA LEE PIE."
3580 PRINT"HIDDEN INSIDE IT IS A DIAMOND.":O(15)=R0:S(15)=-1
3590 O(14)=-1:S(14)=-1:GOTO200
3600 IFD$="POOL"THENPRINT"TRY 'SWIM'.":GOTO200
3610 IFD$<>"HOLE"ORRO<>2THEN5120
3620 R0=13:GOTO200
3700 PRINT"YOU ARE CARRYING THE FOLLOWING.":FORI=1TO19
3710 IFS(I)=1THENI1=1:PRINTO$(I)
3720 NEXTI:IFI1=0THENPRINT"NOTHING"ELSEI1=0
3730 GOTO200
5000 PRINT"I CAN'T DO THAT AT THIS TIME.":GOTO200
5010 PRINT"O.K.":RETURN
5020 PRINT"I DON'T KNOW HOW TO "C$" SOMETHING!!!!":GOTO200
5030 PRINT"YOU FELL AND BROKE EVERY BONE IN YOUR BODY!!!!"
5040 PRINT"YOU'RE DEAD!!!!":PRINT:GOTO6000
5050 DATA "GET","TAKE","DROP","CLIMB","SCALE","FILL","DRINK"
5060 DATA "THROW","HURL","READ","POUR","LOCK","UNLOCK","GIVE"
5070 DATA "EAT","ENTER"
5080 PRINT"I DON'T KNOW WHAT A "D$" IS!!!!!!":GOTO200
5090 PRINT"DON'T BE RIDICULOUS!!!!":GOTO200
5100 PRINT"I'VE GOT IT ALREADY!!!!":GOTO200
5110 PRINT"I DON'T HAVE IT!!!!":GOTO200
5120 PRINT"WHAT???:GOTO200
6000 INPUT "PLAY AGAIN";X$X$=LEFT$(X$,1):IF X$>"N" THEN RUN
ELSE END

```

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NAME	DESCRIPTION
1 RULE78	Interest Apportionment by Rule of the 78's
2 ANNU1	Annuity computation program
3 DATE	Time between dates
4 DAYYEAR	Day of year a particular date falls on
5 LEASEINT	Interest rate on lease
6 BREAKEVN	Break-even analysis
7 DEPRSL	Straightline depreciation
8 DEPRSY	Sum of the digits depreciation
9 DEPRDB	Declining balance depreciation
10 DEPRDDB	Double declining balance depreciation
11 TAXDEP	Cash flow vs. depreciation tables
12 CHECK2	Prints NEBS checks along with daily register
13 CHECKBK1	Checkbook maintenance program
14 MORTGAGE/A	Mortgage amortization table
15 MULTMON	Computes time needed for money to double, triple, etc.
16 SALVAGE	Determines salvage value of an investment
17 RRVARIN	Rate of return on investment with variable inflows
18 RRCNST	Rate of return on investment with constant inflows
19 EFFECT	Effective interest rate of a loan
20 FVAL	Future value of an investment (compound interest)
21 PVAL	Present value of a future amount
22 LOANPAY	Amount of payment on a loan
23 REGWITH	Equal withdrawals from investment to leave 0 over
24 SIMPDFSK	Simple discount analysis
25 DATEVAL	Equivalent & nonequivalent dated values for oblig.
26 ANNUDEF	Present value of deferred annuities
27 MARKUP	% Markup analysis for items
28 SINKFUND	Sinking fund amortization program
29 BONDVAL	Value of a bond
30 DEPLETE	Depletion analysis
31 BLACKSH	Black Scholes options analysis
32 STOCVAL1	Expected return on stock via discounts dividends
33 WARVAL	Value of a warrant
34 BONDVAL2	Value of a bond
35 EPSEST	Estimate of future earnings per share for company
36 BETAALPH	Computes alpha and beta variables for stock
37 SHARPE1	Portfolio selection model-i.e. what stocks to hold
38 OPTWRITE	Option writing computations
39 RTVAL	Value of a right
40 EXPVAL	Expected value analysis
41 BAYES	Bayesian decisions
42 VALPRINF	Value of perfect information
43 VALADINF	Value of additional information
44 UTILITY	Derives utility function
45 SIMPLEX	Linear programming solution by simplex method
46 TRANS	Transportation method for linear programming
47 EOQ	Economic order quantity inventory model
48 QUEUE1	Single server queueing (waiting line) model
49 CVP	Cost-volume-profit analysis
50 CONDPROF	Conditional profit tables
51 OPTLOSS	Opportunity loss tables
52 FQEOQ	Fixed quantity economic order quantity model
53 FQEOWSH	As above but with shortages permitted
54 FQEOPB	As above but with quantity price breaks
55 QUEUECB	Cost-benefit waiting line analysis
56 NCFANAL	Net cash-flow analysis for simple investment
57 PROFIND	Profitability index of a project
58 CAP1	Cap. Asset Pr. Model analysis of project
59 WACC	Weighted average cost of capital
60 COMPBAL	True rate on loan with compensating bal. required
61 DISCBAL	True rate on discounted loan
62 MERGANAL	Merger analysis computations
63 FINRAT	Financial ratios for a firm
64 NPV	Net present value of project
65 PRINDLAS	Laspayres price index
66 PRINDPA	Paasche price index
67 SEASIND	Constructs seasonal quantity indices for company
68 TIMETR	Time series analysis linear trend
69 TIMEMOV	Time series analysis moving average trend
70 FUPRINF	Future price estimation with inflation
71 MAILPAC	Mailing list system
72 LETWRIT	Letter writing system-links with MAILPAC
73 SORT3	Sorts list of names
74 LABEL1	Shipping label maker
75 LABEL2	Name label maker
76 BUSBUD	DOME business bookkeeping system
77 TIMECLK	Computes weeks total hours from timeclock info.
78 ACCTPAY	In memory accounts payable system-storage permitted
79 INVOICE	Generate invoice on screen and print on printer
80 INVENT2	In memory inventory control system
81 TELDIR	Computerized telephone directory
82 TIMUSAN	Time use analysis
83 ASSIGN	Use of assignment algorithm for optimal job assign.
84 ACCTREC	In memory accounts receivable system-storage ok
85 TERMSPAY	Compares 3 methods of repayment of loans
86 PAYNET	Computes gross pay required for given net
87 SELLPR	Computes selling price for given after tax amount
88 ARBCOMP	Arbitrage computations
89 DEPRSF	Sinking fund depreciation
90 UPSZONE	Finds UPS zones from zip code
91 ENVELOPE	Types envelope including return address
92 AUTOEXP	Automobile expense analysis
93 INSFILE	Insurance policy file
94 PAYROLL2	In memory payroll system
95 DILANAL	Dilution analysis
96 LOANAFFD	Loan amount a borrower can afford
97 RENTPRCH	Purchase price for rental property
98 SALELEAS	Sale-leaseback analysis
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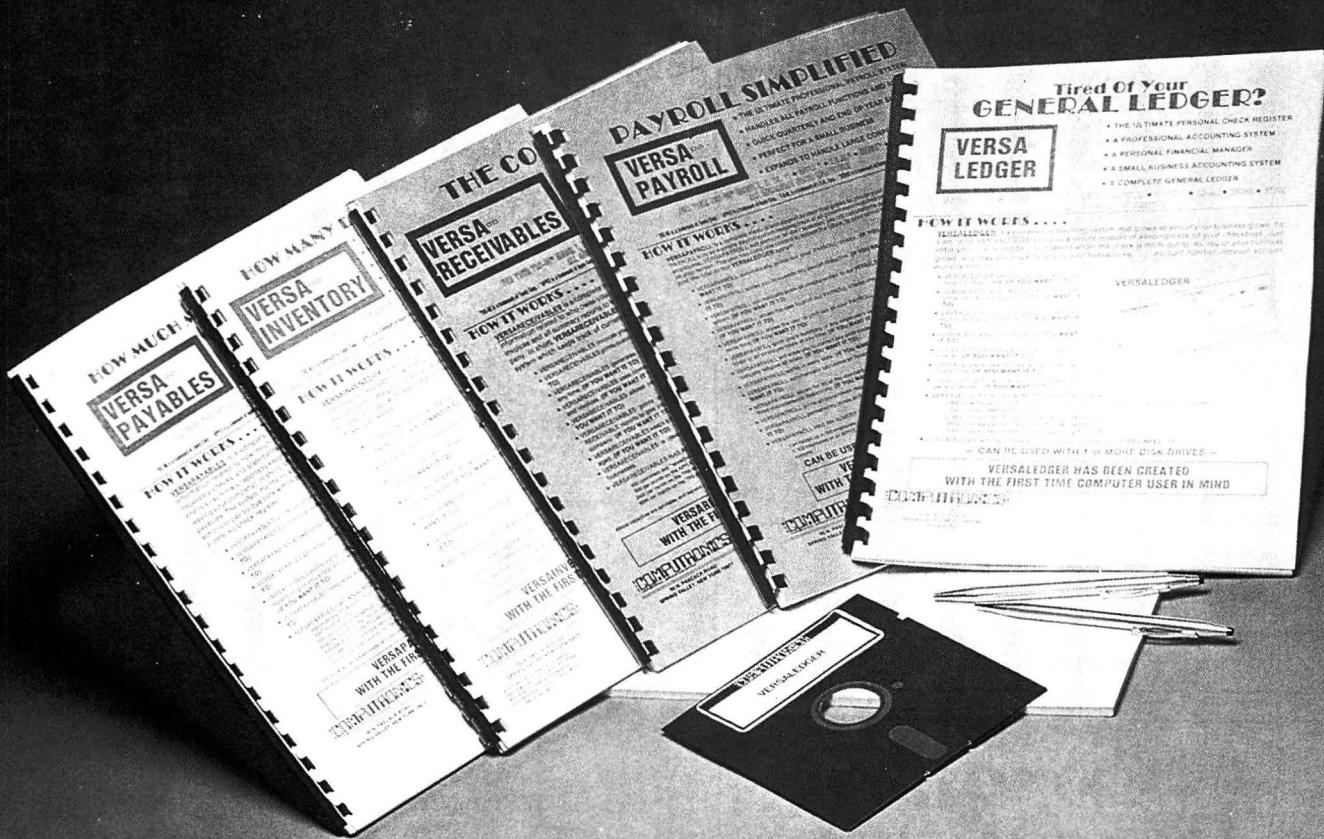
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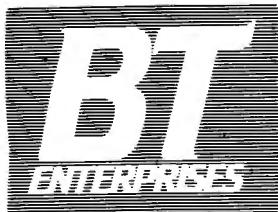
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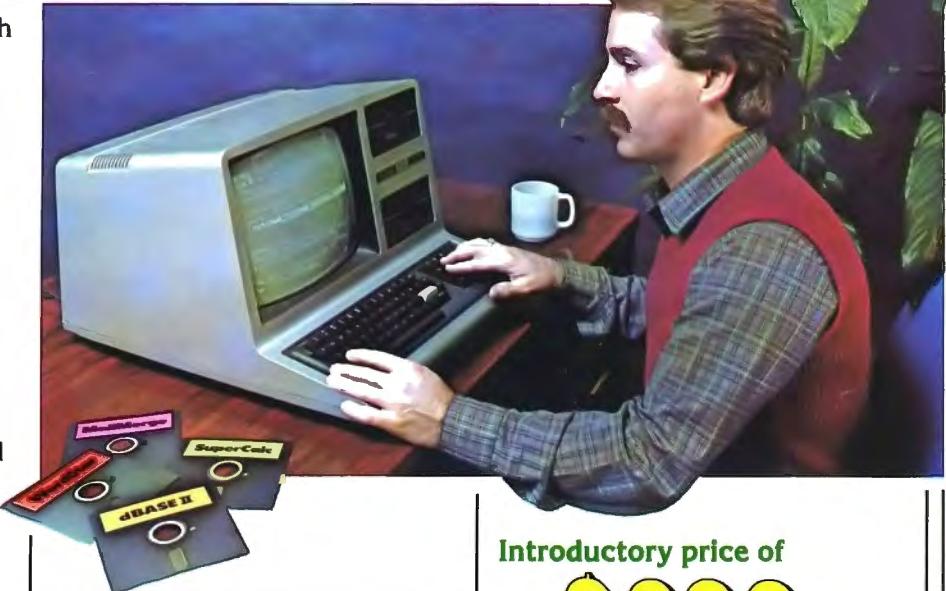
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