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Cover by Chris Demarest
I na way, I suppose you might say I sold out, but I plead guilty with an explanation. And by the way, if you're interested in joining a fast-rising firm, you could do worse than read on.

It all started this last spring when some chaps from one of the bigger banks called saying that they had a large foreign publisher who was looking to acquire something like my micro publishing empirote. I wasn't much interested because I enjoy what I'm doing more than anything else I can imagine. But what would it cost to listen, right?

So they came to visit and looked over our place. I showed them our growth in sales, which has run around 50 percent a year for the last eight years, limited only by all growth being 100 percent self-financed. They mumbled vaguely about $50 million, which I have to admit got my attention. I'd really never given much thought to what the whole mess might be worth.

The word that I was thinking of selling began to spread, and new suitors started calling every few days. The more I talked with these firms, the more I realized that this probably was a good time to merge with a larger firm, to give me the money to invest in some new projects. I never had much of a personal need for money, so selling out for a big bundle of cash had little attraction.

No, it would be worth merging if I could get the money to start magazines at a faster rate and thus be able to better keep up with the needs of the microcomputer industry. And I had an idea for a new type of magazine I wanted to try out. If it worked, I'd have a way to get perhaps 50 more like it going, each with expected sales on the order of $5 million a year or more.

Then there was my idea of a new type of school, a business/technical institute geared to the needs of the 80s. The more I thought about it, the more ideas for new divisions of Wayne Green Inc. came to mind. With some cash available for getting these new businesses and publications going, we could step up our growth enormously. I did some sales projections and I could see us growing to $1 billion in sales within 10 years, just on the plans already in mind.

As I talked with the firms interested in merging, I found several of them excited about my ideas and plans. I've got a good record of coming up with innovative ideas, so there wasn't much skepticism.

The final choice of merger partner was most difficult. Several large firms put it bluntly: They needed me and I could name my price. Now, I want to tell you, that is fantastic for the ego. I really wasn't into shopping around for the highest offer because the difference between $50 million and $100 million is a lot less than the compatibility of the merger. And numbers like that don't mean anything anyway—they're just very big numbers.

On May 22 I signed a preliminary agreement with Pat McGovern. He's the publisher of Computerworld, In-foWorld, and so on... several times the size of my firm in sales. The date was significant to me because it was eight years to the day from when I called the editor of a small micro newsletter to come up and discuss starting a magazine... and we agreed to give it a try. Five weeks later the first issue of Byte went to the printer.

The merger means that we'll be able to do more promotion of our current magazines. It means we'll be able to start more magazines—and I have a bunch of them all planned out. Each magazine is going to require a staff, so we'll be looking for programmers, people for advertising sales, typesetting,
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graphics arts, circulation, data processing, and so on.

Then there are a number of special projects, such as my planned technical/business college. We’re going to need management teams to get these projects going and to run them. Most of this is going to be done in New Hampshire, but eventually we’ll be growing in other areas of the country.

If you’re interested in getting involved with some exciting new ideas, you should get a letter off to me telling me what you think you might be able to do. I’m looking right now for non-smokers with a history of enthusiasm and the ability to make things happen with a minimum of supervision.

There won’t be any astronomical salaries as we start new projects, but we plan to make it well worth the while of those who are the most helpful in starting these new ventures.

For instance, I have a number of products that I’d like to have made in Asia and import for sale here. I’ve got the contacts in Asia to handle that end, but I need the people to handle the project from the New Hampshire end—setting up the advertising, importation, and distribution of the products. This should grow into a substantial business by itself.

Why New Hampshire? Well, mostly because this is one of the best places in the country to live. The quality of life is wonderful and the cost of living far less than New York or Silicon Valley. We still don’t have any state sales or personal income taxes in New Hampshire. We’re in a small town with all of the advantages of a small town. The people are friendly and the crime rate is low.

If you’re looking for the chance of a lifetime to get in on some new projects...and if you think you can hack it...let me know. You’re going to have to prove you can get things done. We have no free rides here, just a bunch of enthusiastic people all having the times of their lives working hard and turning out first-rate products. We’re working out of old houses, converted motels and barns, and so on. This is not IBM.

You can be old, young, black, white, red, brown, male, female, undecided, but if you smoke please don’t bother me, okay? The air up here is invisible and we want to keep it that way.

The merger means that we have a guarantee of the money we need to move ahead on as many projects as I can find teams to work on. And if we run out of projects to get started, I’ll have more. I come up with an idea for a good solid project every few days.

When you think about it, by the time you put my six magazines together with those Pat is already publishing, we’re a very strong combination. I think we’ll be able to parlay this group into a pilot model of the college of the future, into perhaps an educational satellite television network...things like that.

Pat is much like I am—full of ideas and enthusiasm. I think we’re going to really make things hum in the microcomputer field. Care to join us?

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The editors look at the issues

The first cliche about computer buffs is that they carry pens in plastic shirt-pocket liners. The second is that they don’t speak English.

Pocket-protector jokes belong to engineering, not computing; but the latter charge has some merit. Computer owners are famous for veering into jargon; indeed, anyone exposed to micros for any length of time begins speaking a kind of esoteric shorthand. Liberal arts graduates, taking entry-level positions at 80 Micro, are initially baffled. Within days, though, they’re striding through the office saying “Where’s the RS-232 cable for the 4?” and “Anybody got a TRS80 1.3 I can back up?”

The advent of the computer age is no excuse for bad or stupid language—even if you have a terminal package and modem, you do not “interface” with people. But, in a magazine like 80, the use of computer terms and abbreviations is not only appropriate but essential. To help readers who aren’t familiar with some micro-oriented acronyms, we’re introducing the glossary that appears below.

Fear of acronyms

It’s by no means a definitive dictionary. Some mass-market computer magazines pepper their articles with asterisks, referring novices to a comprehensive glossary; we’re more technically oriented than that, and decided to take “bit” and “disk” for granted. We may add some words as well as acronyms to the monthly list—“modem” was a strong contender in editorial meetings.

Tell us what you think of the idea. We don’t want to insult our readers’ intelligence, but we want 80 to be accessible to new TRS80 fans as well as old ones. If it weren’t an even worse cliche than the pocket protector, we’d say we want to be user-friendly.

—E.G.

Glossary

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<th>Acronym</th>
<th>Definition</th>
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<td>ASCII</td>
<td>American Standard Code for Information Interchange. Character code that refers to the computer’s internal recognition of letters, numbers, and symbols.</td>
</tr>
<tr>
<td>EPROM</td>
<td>Erasable Programmable Read Only Memory. Usually refers to a PROM that can be reused several times. It’s erased with ultraviolet light and then programmed with a special PROM programmer. Kilobytes. 1K = 1024 bytes. Used in referring to computer storage capacity.</td>
</tr>
<tr>
<td>CP/M</td>
<td>Control Program/Monitor or Control Program for Microcomputers. A disk operating system produced by Digital Research.</td>
</tr>
<tr>
<td>CPU</td>
<td>Central Processing Unit. Computer module that retrieves, decodes, and executes instructions.</td>
</tr>
<tr>
<td>CRT</td>
<td>Cathode Ray Tube. The television tube used to display pictures or characters.</td>
</tr>
<tr>
<td>DIP</td>
<td>Dual In-line Package. A standard integrated circuit package with two rows of pins at 1/10-inch intervals.</td>
</tr>
<tr>
<td>DOS</td>
<td>Disk Operating System, such as DOSPLUS, NEWDOS80, TRS80s, and LDOS.</td>
</tr>
<tr>
<td>RAM</td>
<td>Random Access Memory. This is the primary storage area of a computer. The information in RAM is lost when power is disconnected.</td>
</tr>
<tr>
<td>ROM</td>
<td>Read Only Memory. This information cannot be changed and is not lost when the power is off.</td>
</tr>
</tbody>
</table>

Editor:
Send all correspondence to 80 Micro, Pine St., Peterborough, NH 03458.

Subscriptions:
Problems with Subscriptions: Send a description of the problem and your current and/or most recent address to: 80 Micro, Subscription Department, P.O. Box 981, Farmington, NY 14065.
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See List of Advertisers on Page 322

80 Micro, September 1983 • 11
**Scarfman Lives**

When my copy of Scarfman died, I returned it to the manufacturer, Cornsoft Group, for a new copy. I didn’t make a copy for myself or my friends, but respected the manufacturer’s copyright.

When Cornsoft inadvertently sent me a replacement disk instead of a tape, I sent it back and quickly received the tape.

You see, software companies don’t mind replacing media, they just don’t want you to steal their programs. So use your copy as much as you want, but let’s not ruin the chain of software that took so long to build.

Patrick Kellogg
10030 Heron Ave. N.
White Bear Lake, MN 55110

**Author Turned Consumer**

Much has been written recently about software piracy, disk copy protection, obtaining version updates, and the like. As a software author and consumer, I have contrasting views on the subject. Today I must put my author hat aside and take the side of the consumer.

For over three years I have been trying to get Radio Shack to do something about a bug in their Model I VisiCalc program. The problem has to do with the @EXP( ) function, and working around it makes calculating engineering and interest data awkward. Letters and phone calls have had little effect; refraining from future Radio Shack software purchases could constitute a partial loss of my original investment.

Last year I purchased the UltraPX data-base manager from CIE. In January, I ordered the upgrade and was informed that I must return the original to get the upgrade. CIE has since left the software marketplace leaving me with only stripped-down, working copies of the software. That is partly my fault since I failed to make a back-up copy prior to returning the disk.

Now, if some company chooses to pick up the product and offer upgrades, I no longer have the original software as proof of purchase. If someone can put me in touch with retired Col. Charles D. House (U.S. Air Force), author of UltraPX, I’d appreciate it.

Charles E. Burton
1720 S. DeFrame Court
Denver, CO 80228

**Interfacing Computers**

I think you should print more articles on interfacing computers to outside sources, such as burglar alarms, timers, or computer-controlled switches.

Also, could you give me the address of a Model III user’s group or club in my area?

Paul Bukowski
217 Calkins Road
Palmer, MA 01069

You’ll find a home-control project in our upcoming November issue. While you’re waiting, you can get together with the folks at the Western Massachusetts Computer Club, 134 Breckwood Circle, Springfield, MA 01119.—Eds.

**MC68020 Update**


Mr. Hawkes was correct in stating that the 68020 will be a full implementation of the 32-bit architecture, and will indeed have 32 address lines and 32 data lines, not the 24 address lines Mr. Fishman claims.

The Model 16’s MC68000 has 24 address lines and a 16-bit data bus. Also, there is no such thing as an MC68032 currently in the works.

In addition to the full 32-bit architecture, the 68020 will have onboard cache, an enhanced instruction set, coprocessor operations, increased speed, and the virtual machine capabilities of the newly introduced 68010. The 68020 will be upward compatible with the 68000, 68008, and 68010.

Joe Jelensensk
MOS Microprocessor Design
Motorola Inc.
3501 Ed Bluestein Blvd.
Austin, TX 78721

**Enlarge “Barrier” Display**

I enjoyed “Barrier Level II” (Fun House, 80 Micro, May 1983, p. 362), but the invisible maze takes up only a third of the display screen. By enlarging the game screen to display size, I have made the game more difficult and more fun to play.

Try the changes in Program Listing 1 for more action.

Paul S. Marzovilla, Jr.
4602 Barnaby Court
Virginia Beach, VA 23455

**Penpals Wanted**

I’m a South African computer hobbyist looking for American penpals. I own a Spectrum (to you, a Timex-Sinclair 2000), and read 80 Micro regularly, trying to convert programs to run on my micro.

Werner Bredenhann
94 Gladstone St.
Parow, 7500
Cape Province, South Africa

**Penetrator Eased**

I bought Penetrator last year and found it to be a great game. My Model I Level II machine has the high-speed clock mod that turns on with an OUT
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MEM SIZE? <ENTER>
K/S L2 BASIC
READY
>SYSTEM <ENTER>

=? P <ENTER>

=? <BREAK>
OUT 254,1: DEFINTX: FOR X=17408
TO 32766: IF Peek(X)=211 AND Peek(X+1)=254 THEN POKE,0:POKE+1,0: NEXTX:
OUT254,0 ELSE NEXTX: OUT254,0<ENTER>

>SYSTEM <ENTER>

=?/ <ENTER>

Program Listing 2. Changes that make Penetrator a more difficult game to play.

254,1 command. Since Penetrator includes this instruction in its code, the high-speed mod is turned on when the program runs and the game becomes very difficult to play.

Now when I want to play Penetrator, I type in Program Listing 2. The line PEEKs at locations from 17408 (the start of the program) to 32767 (the end of the program), and looks for the instruction OUT (FE), A. This outputs byte 1 to the port 254 (FEH). When it finds that opcode, it replaces it with NOPs.

Javier Henderson
Av. Belgrano 2449 B5
Piso Dept. C
1096 Buenos Aires,
Argentina

LPRINT Hints

I want to thank Jerry Lindsys for his article, “Drivers and DCBs,” in your June 1983 issue. I recently purchased a 16K, cassette-based Model III. Until yesterday, I was unable to interface programs containing LPRINT statements to either my video screen or my printer at my one-key entry command. His identification of the DCB addresses for video and printer output were most helpful.

While that program lets you output programs containing LPRINT statements to the CRT, printer, or both, I prefer to use a five-line program at the beginning of my programs (which I update and print out daily).

This way, I can update my program, check it on my CRT for accuracy, and then print it. I do all of this without changing any LPRINT statements to Print commands. Program Listing 3 works on a 48K Model I with dual drives. Program Listing 4 is written for a 16K, cassette-based Model III.

Henry P. Amelung
1205 Juniper Drive
Alamogordo, NM 88310

Spool It

I find the Spool command very helpful in making electrical job estimates on my Model II. I save the printouts for future reference, or to ensure that accurate specifications go to my supply houses. This spool file is sequential, and the sorting operation is done only once.

From TRS-DOS, type SPOOL ON and press the enter key. Type SPOOL N,F=(file name), (drive number) and press the enter key. Then type and enter

BASIC — F:3, RUN(file name). All LPRINT statements go to the spool file.

Once the file is saved, get into Basic and type SYSTEM and press the enter key to return to TRS-DOS. To close the spool file until you want to print it, type SPOOL OFF and press the enter key.

To print the spool file from TRS-DOS, type and enter SPOOL ON, and then SPOOL P,F=(file name), K. The letter K saves the spool file for future use. Once the spool file is printed, close it again.

To see the file on screen before you print it, load TRS-DOS and enter FORMS D, then DUAL ON.

This routes the spool file from the printer to the CRT. Return from TRS-DOS to the printer by typing and entering DUAL OFF, and then FORMS.

While the spool file is printing, you can enter Basic and do other work. I use the library commands Forms D, Dual On, Dual Off, and Forms to check LPRINTs on the CRT.

Wright’s Electric
405 East Bates St.
Hebron, IN 46341

Safe Landing

I have made changes to my article “Jet Bomber” (80 Micro, May 1983, p. 298). One reader was frustrated because the plane crashes when it flies too close to the mountain top. The changes in

Program Listing 3. This lets you output programs with LPRINT statements to the CRT or printer for a 48K Model I.

Program Listing 4. This lets you output programs with LPRINT statements to the CRT or printer for a 48K Model I with dual drives.

10 INPUT DO YOU WISH TO OUTPUT TO VIDEO OR PRINTER (V OR P)";Q$ 20 IF Q$="P" THEN 50 30 POKE 16422,88:POKE 16423,4 40 GOTO 60 50 POKE 16422,0:POKE 16423,255 60 LPRINT

Program Listing 4. This lets you output programs with LPRINT statements to the CRT or printer for a 48K Model I with dual drives.

10 INPUT DO YOU WISH TO OUTPUT TO VIDEO OR PRINTER (V OR P)";Q$ 20 IF Q$="P" THEN 50 30 POKE 16421,7:POKE 16422,115:POKE 16423,4 40 GOTO 60 50 POKE 16421,6:POKE 16422,194:POKE 16423,3 60 LPRINT

Program Listing 4. This lets you output programs with LPRINT statements to the CRT or printer for a 48K Model I with dual drives.
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The Software: Newclock-80 is as easy to use as it is to install. "SET", a Basic program, is used only once to set the time and date and select 12 or 24 hour format. "TIMESTR", also in Basic, patches your computer "TIMES" function to read Newclock-80. It also adds "TIMES" to keyboard-only systems, a short routine is simply "poked" into low memory.

Newclock-80 uses 12 ports (176 to 188): 6 for the time, 6 for the date. The data is conveniently stored in decimal form, no conversion is needed. You can read or modify any digit using simple Basic "INP" and "OUT" statements.

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Program Listing 5 allows lower bombing runs for Jet Bomber.

over the direction your editorials have taken lately. You recently accepted ads from WittSoft for a product made to copy another company’s copyrighted software. This program is in the same class as burglar tools. They are even using a name that we have been using since last November for our ham radio program.

I could go along with accepting their ad, but writing a review of the product is going too far. In the review you sound like you are condoning the use of this product. Do you realize that sales of Model III programs have decreased measurably since last November? This is due to the number of downloads and clubs where people make illegal copies of software.

I went to a computer show in San Francisco and everyone that stopped by our booth told us how much they enjoy Cyborg. It’s interesting that you can sell 10 copies of a program in a city and 100 people tell you how much they like it.

Many firms have stopped making TRS-80 software, including Big Five, Med Systems, and Soft Sector Marketing. Others, like Adventure International, are slowing down production of TRS-80 software. Why? Because there isn’t a good return for the amount of work necessary to make a good program.

By promoting this product you are actually encouraging Kim Watt, probably the best software author writing for the TRS-80, to start writing for some other computer, like the IBM Personal Computer.

My two favorite authors have stopped writing software for the Model I/III. PowerSoft is writing SuperUtility for the IBM. You seem to be helping to ensure that only mediocre software is produced for the TRS-80.

Radio Shack has promoted good software at a fair price. What other system has its manufacturer selling a word processor or an excellent data base for around $100? TRS-80 owners have come to expect free software, and with this attitude they’re hurting themselves.

Computer Shack has some excellent products. At last count we had 20 different software packages—this could be the largest of any company publishing TRS-80 software. We take out three to five pages of advertising in every issue of 80 Micro, and so far you have reviewed one of our products.

Gordon Monnier
Computer Shack
Pontiac, MI 48054

Many people would like us to pass judgement in the name of our readers on various types of software. But that is not our role. We exist as an information source, and we will not censor any material because someone has a vested interest in seeing that material censored.

We deemed that WittSoft’s program, Super Duper, would interest a large number of our readers. Publishing a review of the program in no way implies that we endorse pirating Super Utility Plus, any more than publishing a liquor ad would mean that we condone drunk driving.

We remain strongly opposed to software piracy. But editorial censorship would be the easy way out. It would create a fantasy that piracy no longer existed, and would do nothing to stop it.

Finally, any software company that abandons the TRS-80 because of piracy is deluding itself if it thinks that life is easier anywhere else. Piracy is not restricted to the TRS-80, but is an industry-wide problem.—Eds.

Column Changes

I typed Program Listing 3 of the MiniCalc program by John Corbani, (80 Micro, May 1983, p. 140). His program is great, but I could only get five columns across a page. My changes eliminate the extra alpha column headings.

Line 470 contains the code to set an Epson printer to 132 characters per inch, and the reference to number of columns in line 110 is changed from 14 to 15. Line 475 sets unidirectional printing and checks for number of columns.

If there are eight or fewer columns, set Q to 1 and drop to line 480. If there are more than eight, set Q to 9 and go to line 476 to print the first eight columns. Then go to line 480 to print the rest. Line 490 keeps the underline length correct.

With these changes you can print the
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GREEN SCREEN WARNING

IBM and all the "baggies" are using green screen monitors. Its advantages are not widely advertised. The test that every TRS-80 user should enjoy the benefits it provides. But WARNING: all Green Screens are not created equal. Here is what we found:

- Several are just a flat piece of standard color Lucite. The green tint was not due to this filter, but added for the color the blemish is green. It gives the appearance of a poor appearance.
- One filter is a thin plastic film taped onto a cardboard frame. The color is satisfactory but the blemish is a faint green. It is not as satisfactory as the IBM filter.
- A few filters claim to reduce glare but in fact they are just another piece of plastic film and Lucite type film that are sold under the name of the other manufacturers. They are not as satisfactory as the IBM filter.
- The final product is a flat plastic film that is not as satisfactory as the IBM filter.

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full 16 columns by 26 rows on one sheet of standard-sized paper.

Howard Potvin
2527 Los Padres Drive
Rowland Heights, CA 91748

Design or Detail?

When I read the June cover, “Software Construction: How to Build a Better Program,” I expected to find articles dealing with overall program design and structure. Instead I found articles whose emphasis was on low-level detail. I think your readers need to learn more about proper program design, not tricks and shortcuts. I’m afraid that by stressing these tricks, our new generation of programmers will be no better off than the pioneers of the 1950s.

The solution lies in weaning these people from Basic and Assembly languages; if any languages encourage bad programming practices, it is these two. I feel that no one should stay with Basic for more than a month. Give them that month and then force them on to higher-level languages. Advanced Basic programming is a myth. You should encourage articles with well-designed and well-implemented programs written in C, Pascal, Fortran, or Modula-2.

Edward D. Pirroni
1619 Coach Drive
Grand Rapids, MI 49501

Micro-Design

Micro-Design offers a floppy disk system for the Model I. It is a plug-compatible, 40-track, 5½-inch drive. Its average access time (track-to-track and data-transfer rates) are the same as those listed by other manufacturers. These figures are derived by the manufacturer of the drive mechanism and change little from drive to drive.

Micro-Design offers three floppy disk systems: the MDX-6A, MDX-6B, and MDX-6C. All three include the MDX-6 floppy disk controller that handles both 5½- and 8-inch disk drives. They also include all hardware and cabling required for the internally mounted disk drives.

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The MDX-6C upgrade system lets you add four internal slim-line disk drives. These 40-track, 5½-inch, double-sided drives offer 500K of memory. Special added features ensure reliable, trouble-free operation. The first MDX-6C upgrade costs $495, additional drives cost $295. A total system offers the user 2 megabytes of unformatted, internally-mounted storage.

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(SOFTSIDE, Dec. 1982)
"... ongoing support second to none, with superb documentation." (80 U.S. Journal, Feb. 1982)
Is Archbold Missing?

I'm told that there was a speed-up kit offered by Exatron for the Model I that no longer is available, but that there's a similar kit called "Archbold Speed-up Kit" that does the same thing. The problem is that I've been unable to locate a source for the Archbold. Can someone help me?

M.S. Yellin
1877 Morgan Ave.
Claremont, CA 91711

Ad-Ware Anyone?

I'm looking for advertising software for my Model III. Does anyone know where I can buy such software?

Nick Lambesis
4531 North 16th St.
Phoenix, AZ 85016

I Need a Patch

Can anyone tell me where I can obtain a patch program for lowercase characters that works with the Model I Electric Pencil cassette version?

George Sanquenetti
1439 South 3rd St.
Clinton, IN 47842

Model III Utility Needed

I need a utility for my Model III that lists the variables used in a program in one column and the line numbers as they appear in another. Can someone help me?

Richard Compton
1635 Oramas Road
Santa Barbara, CA 93103

Program to Print

I'm looking for a Model III program to print graphics (lettering, sketches, designs, and so forth) on an IDS 440G printer. Can anyone advise me?

Jan Lanoue
125 Irving St.
P.O. Box 2154
Framingham, MA 01701

Looking for answers

Do You Know?

Does anyone know how to embed hexadecimal code in Color Scriptor? One of our customers wants to receive ASCII text files via modem and typeset them without using the keyboard.

So far we have been unable to find any information on this accomplishment for the Color Computer.

Harley L. Smith
Athol Daily News
225 Exchange St.
Athol, MA 01331

Stumped with Pascal

I'm a reasonably capable Basic programmer, but Pascal has me stumped. Is there a magazine, newsletter, or book for Alcor Pascal beginners?

Also, does anyone have source code programs that they would like to swap?

Robert Athanasiou, M.D.
13 Lawrnredge Ave.
Albany, NY 12208

Expecting Too Much?

Our library is looking for a printer that is compatible with both the Model III and the Apple II Plus, that can handle card stock for library catalog cards, that prints in condensed format with extended lowercase letters, that is able to cut stencils, and that is capable of reversing to make second columns. Can someone help us?

Diane D. Kester
Eastern Wayne Junior High
Route 10, Box 28
Goldsboro, NC 27530

How?

How is it possible to reduce both amplitude and frequency through the cassette port? Also, what happened to EDF, and how can I acquire a copy of this program? If anyone has a copy of EDF I'm willing to pay photocopying and mailing costs for it.

Rick Sayre
4922 Cozad Way
Stockton, CA 95212

Back to School

Can someone tell me where I can get information on classes on the west coast for the TRS-80? I'm looking for a course that's two weeks long and that has hands-on use of the TRS-80 with instruction involving compatible software packages.

Craig Horton
2352 Delta Waters Road
Medford, OR 97501

Lend a Hand!

I have a Model I with a version G board. The level II ROMs are on a separate board and recently became disconnected from the ribbon cable. I need a diagram that shows what line goes to what hole on the circuit board. Can someone lend a helping hand?

John Coleman
811 Piedmont Ave.
Atlanta, GA 30308
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Another Line

A line is missing in Program Listing 6 of Mare-Anne Jarvela's Model 100 article, "The Final Notice" (July 1983, p. 176). Insert the following line to make the program work: 60 H=0:F=0:C=0:T=0:RESTORE.—Eds.

Division Problems

Several lines need to be added to Adam Wells' program listing for "Math Countdown" (February 1983, p. 160). In order to divide, you need to add the following lines:

256 GOSUB 270:INPUT "Now, what would you like to practice";Q:Q N Q GOSUB 285,510,580,645,690
645 CLS
646 PRINT@10,64+30,SHS
647 FORI=1TO10
648 PRINT@64+12+15,11-I
690 PRINT CHR$(28):END

—Eds.

"...diode CR2"?

We inadvertently left out part of the text to Richard Esposito's "40K Color Basic" article (May 1983, p. 212). The first sentence on p. 214 should read "You could install a switch in line with diode CR2." Sorry about that.—Eds.

A Traveling Error

Beve Woodbury’s Model 100 article, "Traveling Expenses" (July 1983, p. 171), contained several errors. The program listing to set up the travel expense file was omitted. It should read as follows:

10 OPEN"RAM:EXPFILE.DO" FOROUTPUTAS1
20 PRINT#1,"0"
30 CLOSE:END

You also have to make several changes to Program Listing 3. First, add line 190:

190:F=0

Next, change line 420 to:

420 PRINT#2,Z",""""N",""""""""C",""""""""Y",""""X:
GOTO30

Finally, remove the semicolon after in-

Don't Be Teed-Off!

I had trouble getting Michael Parks' "Tee-Off" program to run correctly (April 1983, p. 108). The program listing gets in trouble in a few places where it should be using single-precision arithmetic instead of integer arithmetic. To fix this problem, remove the DEFINT A-Z from line 10. Also, in Victor Albino's "Bitty and the Electric Troll" (May 1983, p. 320), the second graphic in line 160 should be changed to read CHR$(177).

William Eccles
5939 East Quartz Mountain Road
Scottsdale, AZ 85253

A Debug on Debug

The weather forecast program written by Anthony Perri (Feedback Loop, January 1983, p. 400) is correct as originally published and should not be changed as per the May 1983 Debug letter from Rea Plowman (p. 26). For information from the author on how to correctly use this program, see this month's Feedback Loop.—Eds.

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80 Micro, September 1983 • 23
TRS-80s have three different kinds of random-access memory (RAM): 1K of keyboard memory, which I discussed last month; 1K of screen memory (between 3C00 and 3FFF hexadecimal) that holds the value of each screen position; and 4K, 16K, 32K, or 48K of user memory from 4000 hex to the highest accessible address of the system.

User RAM is further subdivided. One section of memory (4000-42E8 hex on the Model I, 4000-43E8 hex on the Model III) is set aside for system use. Filled with pointers, temporary variables, and buffers, this area of RAM is generally not available to Basic programmers. However, many specific values in this low memory are invaluable if you can include machine-language routines in your Basic programs.

The first 21 bytes in low memory, 4000-4014 hex, contain seven restart vectors. A restart (or RST) is a special Z80 machine-language instruction that uses 1 byte to force a call to one of eight addresses in page-zero memory. The Z80 RSTs save time and programming space by calling often-used subroutines at addresses 00, 08, 10, 18, 20, 28, 30, and 38 hex.

You can’t write too many useful subroutines in the 8 bytes allowed for each restart; therefore, each restart address contains a jump instruction (JP) to another part of memory. In the TRS-80, all RSTs except RST 00 hex force a jump to a unique, 3-byte instruction near the beginning of low memory. In low memory, each RST instruction meets another JP command to either an address in ROM or, when a DOS is active, to some address in the RAM used by DOS. (In tape-based systems, RST 28 hex and 30 hex encounter a return instruction; the code for RST 38 hex is different for the Models I and III).

The RST instructions jump from page-zero ROM to low memory RAM, and then back to ROM so the computer can modify or redefine each restart. Most disk operating systems redefine or modify at least some restarts, but some complex machine-language utilities completely redefine the restarts.

How can this information help you? Well, you can use some restarts to simplify your own machine-language routines, and you can modify one to add an extra command to Basic.

**Normal Restart Functions**

RST 00 hex, as explained above, forces a system reset in the same manner as a JP 0000 hex does. Other than as a short method to end a program, this RST has little use in machine-language programming.

RST 08 hex tests for a match between the byte pointed to by HL and the byte following the RST 08 hex instruction. If the test fails, the routine forces a JP to Basic’s Syntax Error routine. Otherwise, HL is incremented to point to the next non-space character, and control returns. RST 08 hex checks necessary syntax, such as closing parentheses, and has some limited value for mixed-language programmers.

RST 10 hex retrieves the next non-space character from the string pointed to by HL. The character is loaded into the A register and the carry flag is set or cleared to show the range of the character. This restart provides an interesting method of adding new commands to Basic (see below).

RST 18 hex compares the value in register pairs DE and HL, and sets the status flags accordingly. Though the routine is simple to write, using RST 18 hex considerably shortens many data-handling programs.

RST 20 hex tests the type (integer, single, double, or string) of the current variable. It sets the status flags and loads a value into the A register to indicate the variable type. The variable
MICRO-DESIGN
If you don't know the number, you should.

1-800-531-5002
must have been previously moved to a special buffer in low memory.

RST 28 hex and RST 30 hex are reserved for use by DOS. RST 28 hex is generally used as a DOS request call (for example, a request for a specific DOS overlay). RST 30 hex loads and executes Debug.

RST 38 hex is the system entry point for all maskable interrupts. For one method of changing interrupt processing, see the article I wrote with Jean Durbin, "Computer Security with a Credit Card," 80 Micro, March 1983, p. 74.

Using the Restarts

As an example of how to use restart vectors, this month’s demonstration program defines a new Basic command, Frame, which creates a border of CHR$(191) around the video screen. Though not complete (this routine only works in the 64-character display mode and doesn’t handle cursor placement), Frame demonstrates how you can write new command verbs.

The Frame routine is shown in Program Listing 1. The definition of Exit in line 200 is critical. The value shown is correct for Models I and III tape systems, for all versions of Model I TRSDOS and NEWDOS and for all Model III versions of TRSDOS. If you use a different DOS, go to Disk Basic and enter the following command:

? PEEK(&H4004); PEEK(&H4005)

If 120 and 29 appear, Exit is correct as it is. If different numbers appear, change the value of Exit in line 200 to match the current address in bytes 4004 and 4005 hex.

The key to defining a new Basic command verb is RST 10 hex. Basic starts execution of every statement at 1D5A hex with a RST 10 hex instruction. ROM address 10 hex is the instruction JP 4003 hex. Normally, 4003 hex contains the instruction JP 1D78 hex. Because 4003 hex is in RAM, you can change it to any value you like.

The Load portion of this month’s routine (lines 220–250) alters the normal address at 4003 hex so every RST 10 hex instruction results in a jump to Frame. Since Load is only used during initialization, you can place it anywhere in memory. You don’t need to protect it.

At line 350, a number of tests begin. First, the address on the top of the stack

<table>
<thead>
<tr>
<th>Restart</th>
<th>Jump Address</th>
<th>Normal Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>RST 00 hex</td>
<td>(none)</td>
<td>System reset (identical to power on).</td>
</tr>
<tr>
<td>RST 08 hex</td>
<td>4000 hex</td>
<td>Compare value pointed to by HL to that immediately following the RST instruction.</td>
</tr>
<tr>
<td>RST 10 hex</td>
<td>4003 hex</td>
<td>Examine the next symbol pointed to by HL.</td>
</tr>
<tr>
<td>RST 18 hex</td>
<td>4006 hex</td>
<td>Compare DE to HL and set the zero and carry flags accordingly.</td>
</tr>
<tr>
<td>RST 20 hex</td>
<td>4009 hex</td>
<td>Test the type of the current variable.</td>
</tr>
<tr>
<td>RST 28 hex</td>
<td>400C hex</td>
<td>Reserved for DOS use—normally a DOS function call.</td>
</tr>
<tr>
<td>RST 30 hex</td>
<td>400F hex</td>
<td>Reserved for DOS use—normally for invoking Debug.</td>
</tr>
<tr>
<td>RST 38 hex</td>
<td>(varies)</td>
<td>Entry point for all maskable interrupts.</td>
</tr>
</tbody>
</table>

Table 1. The Restart patch points.
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is examined to find the return address after RST 10 hex execution. Numerous ROM, DOS, and Disk Basic routines use RST 10 hex. Let the Frame routine interface only if RST 10 hex is called from 1D5A hex (if the return address is 1D5B hex). If the return address is anything else, all registers except AF are restored, and control is returned to the normal RST 10 hex routine (lines 350-420).

Line 460 calls the ROM routine at 1D78 hex to get the next character in the current Basic line into the A register. Another test checks to see if that character is an F. If it isn't, control returns to Basic to interpret the line normally.

If an F is found at the beginning of the Basic statement, it can either be the first letter of Frame or part of a variable definition (for example, F = 10). If it is a variable definition, or LET statement, the variable name is followed by =. Lines 540-630 perform a search for = occurring before the end of the statement. If it isn't found, control drops through to line 670.

The last series of tests starts at line 670. First, the pointer that Basic maintains to keep track of its location in the statement is incremented past the F of Frame. Then, four RST 08 hex instructions test for the correct spelling of Frame. If any test fails, a syntax error is reported and control returns to Basic's normal command level.

If all tests succeed, the HL registers are saved and control finally passes to line 810, where the actual frame around the screen is drawn. Finally, in line 890, the HL pointer is restored and corrected, and control returns to normal Basic operation.

You need to observe several precautions when defining new Basic commands:

- Until your program completes its preliminary tests, preserve all registers except AF. Several routines use RST 10 hex, some of which may expect certain values to be in certain registers.
- Error-trap the new command completely. Every possible syntax error should be accounted for and your program must be able to recover from program errors like syntax and type mismatch.

The value returned in HL is critical. The normal RST 10 hex routine increments HL before it picks up the next character. Therefore, you should be sure that, when your new command has finished executing, HL points to the last character of the new command. Basic can then determine if the following character is an end-of-line marker (00 hex), a multiple statement separator (,), or something that causes a syntax error. The easiest way to preserve HL is to Push it on the stack when it points past the last character in your command, then Pop and Decrement it before returning to Basic.

Using Frame

Program Listing 2 demonstrates Frame in action. From either DOS READY or by using the System command, execute Frame. Then protect it in high memory (with a disk system, protect it before going to Basic). Finally, enter and run Listing 2.

If you have modified your DOS to include the Restore patch I explained in my June column (p. 24) Frame will not operate. Both routines use the RST 10 hex vector to change Basic. You will have to load Basic, then load Frame into protected high memory, and use Debug to set the correct address in 4004 hex and 4005 hex. Better yet, try Frame with an unmodified version of your DOS.

One final warning: If you write a new verb, make sure it doesn't contain any of Basic's reserved words. If it does, your command is stored in memory partly tokenized. For example, Store would be kept in memory as 'ST D3H E', because the Basic word Or is tokenized as 0D3 hex. Your computer manual contains a list of reserved words.

Mixing Languages on the Model 4

As soon as I am familiar with the Model 4, I will devote at least a part of a column to discussing which Model III techniques will work with the Model 4, which won't, and why. If any of you have specific suggestions or questions, pass them along and I'll try to answer them as soon as I can. In the meantime, I am looking forward to the excitement of exploring the possibilities and limitations of a new machine.
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THE COLOR KEY

by Scott Norman

I'll never make it as a businessman. I don't do well when confronted with a page full of numbers because I'm slow to spot trends or unusual relationships in numerical data.

However, I readily understand graphs. I'm much more comfortable when I see data plotted; then I can start to make decisions based on the information at hand.

My contribution to this month’s business issue is a Color Computer graphics aid for comparing spending rates with budgetary limitations. The program incorporates ideas useful in other applications, makes good use of the CoCo’s graphics capabilities, and fulfills a real need.

Suppose you have a budget that has to last for a given length of time. It could be a monthly household budget, a bank account to see a student through a school year, or (my own application) an annual budget for a research and development project.

As you spend the money, you need to know whether or not your funds will last through the time you originally planned.

At the least, you'll want to compare your spending rate to a constant rate that would deplete your resources precisely at the end of the budgeted time period.

You probably want to do more, though. How about using the computer to extrapolate your spending pattern to the end of the budget period, so you can see where your present spending habits lead you? This lets you visualize the effects of changing your spending rate.

I had such a program in mind when I set out to write Expgraph. It proved to be a happy experience: I have a program that meets my needs, and I’ve used a few favorite routines along the way.

Features of Expgraph

I designed Expgraph (see Program Listing) to take as much of the load off the user as possible while retaining a fair amount of flexibility. The program prepares graphs using reports of dollars spent as of specified dates.

The data represents either period costs (how much you spent between April 1 and May 1) or cumulative costs (how much you spent between the first of the year and the end of January, February, and so on). I receive both kinds of reports in my own work.

In principle, you could graft Expgraph onto other programs; at the least, you could make it read other programs' data files. For this column's purposes, I've incorporated expense information as a cluster of data statements at the end of Expgraph.

As written, the program is equally at home with disk or cassette systems, but it does require Extended Color Basic.

Notice that I haven’t entered the data (month, day, year, expenditure) in
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THE COLOR KEY

chronological order. Exgraph contains a sorting routine that obviates this protocol.

Also, there is nothing magical about monthly data. The information could represent any interval; in fact, the intervals could vary for a single report. I did make one assumption, though: The budget period covers one year. This sets the scale for the graph’s horizontal (time) axis.

The vertical axis is another story. I’ve enjoyed the opportunity this project has given me to dust off a few favorite subroutines, including one that automatically scales graphs.

Remember the agony of trying to fit data onto graph paper? It always seems to be divided into the wrong number of sections.

This program incorporates a routine to guarantee that the graph’s major divisions represent usable numbers: multiples of two, five, or 10. Furthermore, the total budget figure (supplied by the user at run time) lands in the uppermost division. So whatever your data range, you always use the full video screen.

I formatted the graph using only those elements I find useful. The budget figure appears as a circle on the right side of the plot, and a straight line connects it to the origin. This represents the constant spending rate that consumes all funds at the year’s end. The program plots the user’s data as smaller circles connected by straight line segments.

Two methods of extrapolation are available. Exgraph could calculate the average spending rate for the entire period your data covers and plot a straight line at that rate from the origin to the year’s end.

You can also specify that the program continue the most recent rate (the rate you spent money in the last interval for which you have data). This alternative shows the effect of any recent changes in spending patterns.

The program does not restrict you to one of these methods. The keyboard polling routine lets you ask for both plots on the same graph, one after the other.

Dissecting the Code

The Program Listing contains a commented version of Exgraph. Stripped of the REMs, the program occupies a little less than 4K, so it’s feasible to renumber it and incorporate it into a more
LISTING CONTINUED

1340 PRINT: INPUT "YOUR CHOICE"; EX
1350 IF EX<1 OR EX>2 THEN 1300
1360 SCREEN 1,1
1370 ON EX GOTO 1400, 1500
1397 ' 
1398 '**** "AVERAGE RATE" **** 
1399 '**** EXTRAPOLATION ****
1400 B(0,0)=60: B(0,1)=166: SL=0
1410 FOR K=1 TO N
1420 SL=SL+(B(K,1)-B(K-1,1))/(B(K,0)-B(K-1,0))
1430 NEXT K
1440 SL=SL/N
1450 TI=166+SL*184
1460 IF TI<2 THEN 2000
1470 LINE(60,166)-(244,YI),PSET
1480 IS=INKEY$: IF IS="M" THEN 1300 ELSE 1400
1497 ' 
1498 '**** "LAST-2-POINTS" **** 
1499 '**** EXTRAPOLATION ****
1500 SL=(B(N-1,1)-B(N,1))/(B(N,0)-B(N-1,0))
1510 YI=B(N,1)-SL*(244-B(N,0))
1520 IF YI<2 THEN 2000
1530 LINE (XX,YK)-(244,YI),PSET
1540 IS=INKEY$: IF IS="M" THEN 1300 ELSE 1540
1597 ' 
1998 'unnecessary 
1999 ' 
2000 CLS: PRINT "", "*** WARNING *** 
2010 PRINT: PRINT" EXTRAPOLATED SPENDING RATE IS BADLY OFF-SCALE 
L. PLEASE CHECK YOUR FIGURES!" 
2020 PRINT" IF FIGURES ARE CORRECT, THE EXTRAPOLATION CAN BE 
BROUGHT BACK ON-SCALE BY SPECIFYING A FICTITIOUS ENLARGED BUDGET." 
2030 END
4999 ' 
5000 DATA 1,31,83,1000
5010 DATA 2,20,83,2000
5020 DATA 3,31,83,3000
5030 DATA 5,31,83,5000
5040 DATA 4,30,83,4000
5050 DATA 0

Comprehensive financial management package.

The REMs all have line numbers like 198 and 399, and are not referenced by GOTOs or other control transfers. Feel free to delete them.

Exgraph is written in a fairly linear fashion, except for one odd move at the beginning; the jump around the routine at line 120. This routine calculates the Julian equivalent for all dates of interest to the program (the program computes time intervals by subtracting Julian dates), so you might call it often. I wanted it near the beginning of the program to speed up execution, hence the jump.

The program uses the string variables in lines 200–250 to draw a dollar sign and to calibrate the scale for the final PMODE 4 graph. The techniques for drawing text on a high-resolution graphics screen are well known by now; these particular characters are from the set I defined in a previous article (80 Micro, Anniversary Issue 1983, p. 469).

Notice that the numerals (NR$(1), and so on) are elements of an array. Exgraph doesn’t need the other elements since it doesn’t label every division of the graph, but this is a handy way to organize data. It makes life simpler when you call up the graphical equivalents of each digit in a number.

As far as the user is concerned, the program begins at line 300. That queer spacing in the text of the menu is necessary for an attractive screen display.

The program calls for only two pieces of information: the starting date for the year and the total budget. Enter the date as:

Month, Day, Year

You need one or two digits for the month and day, and two for the year; the program adds the 1900. (Readers who expect to be concerned with the
THE COLOR KEY

21st century can modify line 120 when the need arises.)
Now the auto-scaling routine at line 370 takes over. This is a modification of a more general routine published in the December 15, 1981 issue of Electronics (p. 159).
I've simplified it by assuming that the graph shows only positive numbers. You start with zero expenditures and spend up toward your total budget.
The routine starts by trying to fit the budget figure onto a graph with 10 major divisions. If this requires the divisions to have unacceptable values (i.e., not one, two, or five times an integer power of 10), the program automatically adjusts.
The final graph might have an unusual number of divisions, but they will be a convenient size. The program plots the history of a $775,000 project on an eight segment display, with every segment corresponding to $100,000.
The variable C (line 420) is the dollar value associated with each major division of the graph; you need it later in the labeling routine. MX (line 460) is the maximum value you can show on the graph, and is equal to C times the number of major divisions.
I decided that the graph for Expgraph would be 184 positions wide and 150 high. The conversion between dollars and vertical coordinates on the screen is governed by a scale factor SF, equal to MX/150. The final variable in this routine is NI, the number of major vertical divisions.
The 184-position width provides a reasonable fit to a two days/position scale. If you want to use Expgraph for some other period of time, change this when you get to the plotting routine.
Once the program calculates the scaling factors, it moves to the second menu at line 500. This asks the user how to interpret the data.
To make a sensible graph, you have to know whether each piece of data represents the total money spent since the beginning of the year or since the end of the last reporting period. The selection variable MC is used in the plotting routine.
The user doesn't need to keep track of how many data points are to be plotted. The program checks in lines 560-600, and sets up a data array of the appropriate size. Note that a DATA 0 sets up a simple out-of-data test. If you use another technique, such as a disk file, to supply information to Expgraph, you must modify this.
The data array B(K,J) is N X 2 in size, where N is the number of data points. The first subscript ranges from 1 to N, while the second takes the values zero and 1. B(K,0) is the Kth Julian date, while B(K,1) is the corresponding expenditure figure.
Now the program reads the data statements a second time to add data to the array (lines 620–670). It calculates the Julian dates and puts the array in order using the Shell-Metzner sort in lines 700–810.
Ordinarily, financial data is available in chronological order, but you might not be able to enter a report in the proper sequence. Expgraph frees you from having to worry about this.
Lines 900–980 set up the outline of the graph, draw horizontal lines at the major divisions, and plot the budget figure and the straight line connecting it to the origin. Lines 1000–1070 plot the actual data points and connect them.
There isn't much to say about the plotting routine. It scales the Julian dates to the graph coordinate system in line 1010, and scales the financial figures in line 1030.
Variable names XK and YK are the same as B(K,0) and B(K,1), but I wanted to shorten the notation for some of the plotting instructions.
The graph is even more useful when the program calculates the dollar scale in lines 1100–1190. The program finds the vertical position of the first major division line and converts it to a string in line 1100. Expgraph uses the string in a Draw command (line 1120) to locate a fiducial mark: a horizontal line segment with a down-pointing arrow.
Line 1110 draws the complementary line, complete with an up arrow, aligned with the lower edge of the graph. This sets up a gap one major division high, into which you write the dollar value of that division—$1,000, $50,000, or whatever. Line 1130 even draws the dollar sign.
Lines 1140–1190 convert the variable C to a string, analyze it one digit at a time, and draw the NR$ variables corresponding to each digit. The Execute option of Extended Color Basic's Draw command comes into play here.
Line 1160 is necessary because Basic wants to lead off with a blank when converting a number to a string. Without it, the calibrations all start with a leading zero.
With the zero suppressed, and with the screen coordinates I've chosen for the graph, you have enough room for a six-digit number plus the dollar sign. Expgraph can properly label a major division of up to $500,000.
Now that the raw data is graphed, press the M key to get to the third menu for extrapolation options. The average-expenditure-rate method assumes that all reporting intervals are of equal length. At this level of accuracy, such an assumption isn't unreasonable if the reporting intervals are months of the year. You shouldn't use this method if you mix monthly and weekly data, though.
Should either extrapolation method indicate that you are headed for disaster, with anticipated expenses far in excess of your budget, the program gives you a warning message (lines 2000–2030) and throws you off.
Serves you right.

Final Thoughts

One word of warning: If you get into this type of graphics data presentation, be careful about the positive and negative signs of vertical distances on the screen.
The Color Computer uses an inverted coordinate system: The positive direction for vertical measurements is down. This causes me a few headaches whenever I start a new graphics project.
Expgraph has been a workhorse for me. I can't claim that the extrapolations are accurate to six significant figures, but they're good enough to tell me when a real budget problem is in the making—something I might not notice in columns of numbers.
Other users might want to spruce up the display a little. You might like to add a title, or vertical lines to indicate the end of each month or another reporting interval.
You might even want to add more labels to the dollar scale. Of course, if you do that you need a complete set of numerals for your draw statements.

Scott Norman welcomes reader response to The Color Key. Write c/o 80 Micro, 80 Pine St., Peterborough, NH 03458.
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Our reviewers use a five-star rating system. One star represents the low end of this spectrum, while five stars represent the spectacular and high end of the spectrum.

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**Model MC-10 Micro Color Computer**

Tandy/Radio Shack
One Tandy Center
Fort Worth, TX 76102
$119.95

by Beve Woodbury

Radio Shack's new MC-10 Micro Color Computer is a good computer on which neophyte users can learn Basic programming. It's reasonably priced, fairly versatile, and accepts Basic commands from a single keystroke. But its versatility is limited by a small (4K) memory capacity and a lack of software.

The MC-10 is aimed at the low-end market currently dominated by the Timex-Sinclair 1000 and the VIC-20. Each computer has advantages and disadvantages, but the MC-10 comes out last in my opinion.

**Physical Description**

The MC-10 has an ivory case. It's 2 inches high by 8½ inches long by 7 inches wide, and weighs a little under 2 pounds (see Photo 1). It generates eight colors on a 32-character by 16-line display. You can display text and graphics on the same screen.

This computer has a cassette recorder port (see Photo 2), an RS-232C port for a printer or telephone modem, and a port for inserting an optional 16K RAM module. It doesn't have a port for joysticks or EPROMs.

The MC-10 comes with an antenna switch that connects to a TV, the connecting cable, a manual, a quick reference card, and a bulky, heavy power supply you must use to connect the computer with a wall outlet.

According to Tandy, the keyboard is "standard typewriter style." The keyboard letter/number format is standard, but the keys are the small chiclet style that would horrify any touch typist.

The keys are well labelled. Regular and special characters are identified on each key, and Basic commands appear on the panel above the key. You access special characters, such as the 16 graphics characters, by simultaneously pressing the shift key and the character key.

You access Basic commands by simultaneously pressing the control key and the key associated with the desired command. The control key is in the lower left corner, and the shift key is in the lower right corner. The enter key
and the break key are also on the far right of the keyboard.

I was immediately ready to dislike the keyboard, but the more I used it in programming, the more I liked it. It is definitely a one-hand keyboard. All but the smallest of hands can span it to press the shift or control key and any other key.

This leaves one hand free to follow any text you're copying. The MC-10's size could be a great advantage to anyone handicapped by the use of only one hand.

Once I became familiar with the keyboard, I could type in a program much more quickly than usual. Each Basic command requires only one keystroke, thus eliminating typos in the command words.

You don't need to type CHR$(n) for graphics, although the command is available. The background color of the graphics character is determined by the color of the cursor when you press the shift and graphics keys.

Change the color of the cursor by pressing control and the zero key. The color changes each time you press the keys, cycling through the full range of colors. These three options greatly reduce programming and debugging time.

Several keys have special functions when you use them with the control key. The Q key deletes the current program line. The A key erases by backspacing. The W key produces exponentiation. The S and Z keys are "reserved for special purposes" that Tandy has yet to define.

The shift key with the @ key pauses a program. The shift key with the zero key switches the keyboard between upper- and lowercase modes.

Lowercase letters don't appear on the screen. The MC-10 prints lowercase letters in reverse video; green letters on black background. They should appear on a printout, but I couldn't test the printing capabilities as I didn't have access to a serial printer.

The reset button on the back of the computer clears the screen or gets you out of a hang up while retaining the program and variables in memory.

The MC-10 can also generate music, or noise, depending on the listener's perspective. The lowest musical note is approximately the E below middle C, moving up 255 tones to the very high tones. This sound capability could be useful in detecting early high-sound hearing disabilities.

Like the machine, the manual is compact and easy to understand. The information is presented in a factual, instructive manner without all the cartoon features of the CoCo manuals. The documentation has a good table of contents, but no alphabetical index to help locate specific information.

A novice can start at the beginning of the manual setting up the computer and its accessories, then progress smoothly to programming. The Basic commands appear in logical order, starting with Print commands and ending with mathematical functions. The explanations are detailed, and include sample program lines and simple programs.

Evaluation
The MC-10's portability is definitely an asset. You can use it wherever you have access to a television. My teenage users commented that it would easily fit into their book bags.

If you plan to connect your MC-10 to a motel television, be sure to check with management first. Many motels have silent alarms connected to their television cables.

The MC-10 is useful for learning Basic, but it does have many disadvantages.

The lack of automatic line numbering slows program entry, and no edit mode exists to aid debugging. This is frustrating when you make a typing error at the end of a long line. You have to retype the entire line, possibly creating more typing errors.

The MC-10 has no means of using files. This severely limits programming use. The closest you can get is to use an array as a file. You can set up an array in a program with string or numeric characters.

You can save an array of numeric characters on tape using the CSAVE* command, then load it back for future use with the CLOAD* command. This lets you simulate data files limited to numeric data.

Even if file input/output becomes available, it would be difficult to use the MC-10 for any application that requires keyboard input. One-handed data entry on a miniature keyboard is difficult and error-inducing.

The computer has no Else command, and program line length is limited to 127 characters.

Also, the MC-10 doesn't control the motor (start/stop) on the cassette recorder. You must manually turn the recorder on and off.

All these disadvantages are probably due to the limitations of MC-10 memory size. I expect Tandy to come out with an Extended Basic add-on that will include automatic line numbering, the Else command, cassette motor control, and expanded graphics commands such as Line, Print, and Paint.

It would be beneficial if you could use CoCo program tapes on the MC-10 and vice versa. However, the CoCo runs on a 6809 ROM chip and the MC-10 runs on a 6803 ROM chip. These two chips require different Basic command tokens.

(A Basic command is tokenized in memory so it fits in 1 byte of memory, regardless of the command's length. Of and Restore each occupy 1 byte.)

The MC-10 loads a tape written on the CoCo and vice versa, but the different command tokens produce strange programs. For example, Print on the MC-10 becomes Data on the CoCo, and Next becomes End.

All things considered, the MC-10 is up against some stiff competition. You can purchase the 1K Timex-Sinclair 1000 with a 16K RAM add-on for approximately the same price as the 4K MC-10. And the Timex-Sinclair accepts 63 one-keystroke commands and generates 20 graphics characters.

I prefer the real keys on the MC-10 to the membrane keys on the Timex-Sinclair 1000 and I think the MC-10 has a clearer manual. The Timex-Sinclair 1000 doesn't have color, but you can program it in Assembly language.

The larger memory (at the same price) and the ability to use Assembly language give the Timex-Sinclair 1000 a decided advantage if you're willing to
sacrifice color and real keys. Both are primarily learning computers and have limited expansion capability.

The 5K Commodore VIC-20 is close to the MC-10. I’ve seen it for $159.95, but know it’s been on sale for under $100. The VIC-20 isn’t as portable; it’s about three times the size of the MC-10 and has a heavy power supply unit.

The added size provides room for expansion. In addition to cassette and serial ports, the VIC-20 has a joystick port, a cartridge port, and a port for special accessories. You can use the serial port for a printer or a disk drive. You can also expand memory to 32K.

The VIC-20 has a true typewriter-style keyboard with access to 60 graphics characters and eight colors. Upper- and lowercase letters appear on the screen.

You can also choose from 16 screen colors, eight border colors, and eight graphics colors. Even letters can appear in one of eight colors. The VIC-20 has high-resolution graphics and each pixel is separately programmable.

One-keystroke Basic commands are not available on the VIC-20. This makes program typing more difficult and time consuming, but the real keys make data entry much easier. File input/output is available, so the VIC-20 is a more practical computer for data handling or business use than the MC-10.

The screen display is 22 characters wide by 23 lines long. This causes the characters to appear spread out and distorted. I found text displays quite unpleasant and difficult to read on the screen.

Rumor has it that the Timex-Sinclair 2000, the U.S. version of the English Spectrum, will be released in October. If it’s really like the Spectrum and sells for under $200, it might be worth considering.

The Spectrum is a color computer with high-resolution graphics and 16K RAM. The screen display is 32 characters wide by 24 lines long. The keyboard is almost standard-size with chiclet-style keys.

You can enter Basic commands and graphics with one key. The Spectrum is expandable to 48K RAM, and disk drives and printers are available for it.

Perhaps some of Tandy’s products for the MC-10 will help make it more competitive with the other low-end computers. As I write this review, Tandy is advertising games and personal time saver programs from a library of ready-to-run MC-10 cassette software. They are also touting a $49.95 16K RAM add-on.

Unfortunately, advertising has preceded availability, and Radio Shack Computer Centers aren’t sure when they’ll have the software or expansion RAM. These products might be available by the time you read this article. I’m hoping that Tandy will soon offer telecommunication software (which will require the purchase of a modem) and Extended Basic.

The MC-10 is a good, compact, portable computer severely limited by its 4K size. You should evaluate future expansion capability and cost, as well as the competition, before rushing out to

---

**Gold Plug - 80**

Ahhh, instant relief! At last there is a permanent cure for contact oxidation on Model I edge connectors. Many TRS-80 users are familiar with the symptoms: untimely resets, spontaneous reboots, or the inability to get the computer started at all without a frustrating session with a pink eraser.

The Gold Plug 80 is a well made device consisting of an edge-card plug with gold plated contacts, available with either 34 or 40 contacts. The rear of the plug has terminals which fit exactly over the existing foil fingers on the TRS-80’s connectors. After installation, the original plugs have been extended about a half inch, meaning that the plastic door covers no longer fit. This did not trouble me, but you should take it into consideration. E.A.P.’s advertising leaflet, by the way, cautions you about the doors, which is refreshing. They also have the excellent policy of permitting you to return any plugs ordered for a refund if after seeing them you are unwilling to undertake the installation.

An excellent set of instructions accompany the plugs, and they are shipped promptly. I ordered mine by mail on a Monday and received my set of plugs by first-class mail on Tuesday of the next week.

**Installation**

Installation requires a soldering iron (I use a 40-watt Weiler), Rosin-core solder, a Phillips screwdriver, and your last pink Pearl. The keyboard and Expansion Interface have to be disassembled to get at the connectors, which are then cleaned—the eraser’s last fling. The Gold Plug 80 is fitted over the existing plug with the contacts centered, and then soldered to the board. I have some soldering experience, but it proved to be an easy, safe job. The contact is heated, a very small amount of solder applied, and then you go on to the next contact. It took about an hour to do all six plugs.

**Gold Plug 80**

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40 • 80 Micro, September 1983

**Advertisement**

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purchase one.
If a beginner becomes really interested, he'll quickly outgrow the MC-10's capabilities. He'll have to decide whether to purchase a new computer that can grow with his interest, or whether the MC-10 will satisfy him and at what cost.

On the other hand, if the beginner who buys an MC-10 finds no lasting interest in computers, he won't be out several hundred dollars.

Liberator
John Crane
Computer Shack
1691 Eason
Pontiac, MI 48054
Model I, III, and 4
$19.95 cassette
$24.95 disk

by Michael E. Nadeau

Yes, this is another Donkey Kong clone. But if Donkey Kong is your game, Liberator is the best of the lot for the Models I, III, and 4.
The game's plot pits you, a "brilliant scientist," against your own robot, which has gone haywire. You must work your way through an industrial complex where the robot is holding your helpers captive.
You climb ladders, hop elevators, jump barrels, and dodge drone robots in the attempt, at speeds fast enough to keep you on your toes, but not so slow that you easily master the game. You'll find it difficult to predict the frequency of the rolling barrels and movements of the drones; this adds to the game's challenge.
Liberator has five different screen and a total of four captive helpers. (You guessed it; they are young, helpless, and female. On the TRS-80, though, they look more like young, helpless fire hydrants. Computer Shack should have left the sex of the helpers up to the game player; after all, women play arcade games, too.)
On too many games that involve moving a player up and down ladders it's difficult to get the player properly aligned on the ladders. This is frustrating. With Liberator, I found it quite easy to get the player to move as I wished.
You control your player's direction with the arrow keys and make him jump with the space bar—a comfortable arrangement. The program permanently stores the top 10 scores, and the same disk boots on the Models I, III, and 4.
Liberator's documentation is brief and adequate. And, as usual with Computer Shack programs, the package is professionally presented with striking artwork.

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**Reviews**

My only complaint about Liberator is that the difficulty level doesn't seem to increase with your score. Computer Shack ads claim that the game has 20 levels of play, but my copy doesn't seem to have this feature.

Computer Shack might be referring to the sequence of the five screens. Each screen differs in complexity. The different screens seem to appear randomly at first, but the ratio of difficult to easy screens increases as your score gets higher.

Even without increasing the level of difficulty, Liberator still presents a challenge each time you play it. With the price of arcade-style games so high, their staying power is an important consideration that makes Liberator a good value.

| ★ ★ ★ |
| Computer Programming for Kids and Other Beginners on the TRS-80 Computer |
| Royal Van Horn |
| Sterling Swift Publishing Company |
| 1600 Fortview Road |
| Austin, TX 78704 |
| $9.95 |

| ★ ★ ★ ★ ★ |
| (see last paragraph) |

| ★ ★ ★ |
| Computer Programming for the Classroom Teacher |
| Joan M. Miller, Ruth King Chaya, and Debra J. Santora |
| Teachers College Press |
| 1234 Amsterdam Ave. |
| New York, NY 10027 |
| $15.95 |

by Mary Gasiorowski

These new books for beginners address two different audiences: children and teachers. They are not self-teaching books. Their emphasis is on programming, and they provide only one part of a complete training in computer literacy.

You could easily use these books in an elementary or middle school class for computer programming. *Computer Programming* offers basic training for kids, and *BASIC Programming* prepares the teachers.

**Computer Programming**

*Computer Programming* is designed for home use; it's a good resource for the whole family, and especially for children. It is printed in large, easy-to-read type.

In general, the book progresses from easy to more complex material. *Computer Programming* explains computer components (keyboard, CPU, ROM, RAM, screen), some special keys (enter, shift, clear, left arrow, break), and gets right into programming and graphics.

*Computer Programming* also has some exercises designed as classroom lessons. It gives you a program to try, usually asks a question about the result, and often encourages you to experiment further.

This is not a true self-teaching book. Adults should go over the material with children. For example, the instructions to turn on the computer are technical and perhaps scary—multiple pages of large type with very few pictures to depict what is happening.

*Computer Programming* implies many concepts without fully explaining them. It explains that a computer has two types of memory, RAM and ROM, but not why. More diagrams would help clarify the coordinate system for graphics.

This book has lots of examples illustrating some of the finer points of programming. It occasionally requires that the student write or read the result of the program example. This reinforces comprehension, but the book, or the adult working with the student, needs to do this much more often.

*Computer Programming* has many good points: It's easy to read and laid out well. It's interesting and fun, and it teaches elementary programming. You should read it in front of a computer, where you can try the examples.

And you shouldn't read the book alone. In fact, the author suggests you read it "with a friend," preferably an adult who can answer questions and offer suggestions on programming problems.

**BASIC Programming**

*BASIC Programming* is written by teachers for teachers. In a nontechnical way, it explains Basic commands and
"THE RESULTS ARE IMPRESSIVE..."
— Dennis Kitsz, 80 Microcomputing: 12/82

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REVIEWS

writing programs. It provides nonmath examples, so it’s a good book for teachers in all disciplines.

The material in this book is derived from the authors’ experiences giving service teacher workshops. It is designed for such workshops, rather than for at-home reading.

**BASIC Programming** accompanies the TRS-80, Apple, and Commodore PET computer systems with information and examples for all three. It is not intended to replace the manuals that come with the systems, however.

**BASIC Programming** introduces a command, gives an explanation and examples, and offers exercises to develop a clear concept of the command. It also provides answers to all the exercises, a glossary, a bibliography, and an extensive index. In addition, the authors have suggestions for using programming in the classroom.

The authors provide good descriptions of the various Basic commands, especially some of the more difficult concepts such as RND, ON-GOSUB and MID$. The examples are better than average. The exercises are thought provoking, and you should work them out at a computer.

In fact, you should study the whole book at the computer. Many of the examples don’t show the result of the program, so if you have no computer available and you’re not familiar with the result of the commands, you might find the discussions following the examples obscure.

The later chapters introduce some fairly complex programs. One chapter details a program to test for parts of speech in a language-arts lesson. Another chapter sets up a phonics quiz.

New commands and concepts are introduced in the last four chapters, but the exercises at the end of each chapter do not start simple and gradually become more difficult; they are all fairly complex. This could be a problem for beginners who need straightforward exercises to better understand a new command.

If you are a beginner and must choose only one book to read, this might not be the best one. For a real beginner, the comment in the first chapter, “your instructor, or the manual will...,” is not very helpful.

References to the enter/return key imply that one such key exists. Those who have used a variety of microcomputers know that some label the carriage-return key “enter” and others call it “return,” but this might be confusing to a beginner.

Another confusing aspect of **BASIC Programming** is the authors’ desire to provide information for several brands of computers. Some Basic commands are different from computer to computer.

If a school has several different types of computers, it’s great to find information applicable to each in one book. But if your school has only one type of computer, perhaps you should look for a book for beginners based on your computer.

In the preface, the authors express the hope that this book will help in-service and pre-service training for teaching effective classroom computer use. That is the best use for **BASIC Programming**. An experienced and knowledgeable instructor would talk through the material, answer questions, and provide more examples.

**BASIC Programming for the Classroom Teacher** is a quality reference and instruction book. It’s a good book for a school to have, a better book for several teachers to work on together, and a very good book for teacher in-service training.

I give **BASIC Programming** two ratings: three stars for general school and teacher use, and four stars for specific use in teacher-training workshops.

by Michael W. Ecker

The Executive Calculator
MCS Software
809 Parkway
Conway, AR 72032
Models I and III
One disk, 48K
$39.95

The Executive Calculator is a collection of over 150 business- and consumer-oriented programs.

A calculator could handle many of the smaller programs included here, and someone with a 9-1 background in elementary mathematics and program-
Omnitertm is the most flexible, powerful terminal program you can buy. Omnitertm lets you adapt your TRS-80 to communicate with 99.9% of the world's computers. Your company's mainframe, for example. Or any other personal computer, time-sharing computer, or communications service.

Omnitertm overcomes incompatibilities in screen formats, baud rates, character sets, control codes and file transfer protocols. Seven complete translation tables let you change any character, for complete compatibility of all input and output devices. Omnitertm is so flexible, users have even set up their ASCII-coded systems to communicate with EBCDIC-coded systems.

You can send all ASCII characters, even those that aren't on your keyboard. Reformat your screen to neatly accommodate any line length. Run your printer while you're sending or receiving data. And even review data that's scrolled off the top of the screen.

Omnitertm's well-thought-out design makes it easy to use. You can get a status display of all functions while on line to tell you what's going on, and make any changes at the same time. You can create a special file of your settings to make it easier next time. You also get XY cursor control, single keystroke sign-on and auto-dialing. Even a phone directory. And lots more.

You don't have to be a computer expert to use Omnitertm. Just spend a day with what the reviewers call "the best manual in the business." Then if you need help, just call, write, or contact us via CompuServe, Delphi, or Source.

Omnitertm is the proven terminal program. The program thousands of people have used successfully. And the one the editors call the "top program available" (Byte, 80-Micro, Infoworld, etc.)

Omnitertm comes with complete sample setting files, conversion utilities, a practical text editor, seven translation tables, and a 76-page manual with index.

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Only $595 for TRS-80 Models I, II or III (32K memory. one disk minimum). $175 for Models II, 12 or 16 (64K memory minimum). (In Mass., add 5% sales tax.) MasterCard, VISA, and C.O.D.

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CompuServe: 70310.267

Source: TCA818

Delphi: Lindbergh Systems

49 Beechmont St., Worcester, MA 01609
and hold keys are not disabled.

Skydive

From your block-ridge airplane, you eject the skydive by pressing the space bar. Open his parachute the same way. The object is to land on target. You set plane speed, wind speed, and target area.

The plane always travels horizontally, but its altitude varies with each run. When the chute opens, wind speed affects the diver's lateral movement. At high wind speeds, wraparound is disconcerting since it might take the diver through two complete passes of the screen.

If your diver plummets to earth with his chute unopened, a reasonable representation of a helicopter rescues him, the game ends, and you are unceremoniously dumped to the Basic ready prompt. Otherwise, entering new parameters or pressing the enter key to retain the same limits restarts the game.

A few random catastrophes (e.g., a chute failing to open) are thrown in for good measure. With the plane at its highest speed and a maximum wind velocity, an illegal function call appears on some runs. This doesn't impair the game at other settings.

The remaining games require a bit more digital dexterity in using the space bar and the enter key. The last three games add the greater than (>), less than (<), and repeat key for sideways movement. The slow response time when you repeatedly press a key is frustrating. Background graphics do not vary during any game.

Star Battle

In Star Battle, you're a fighter pilot protecting a base unimaginatively represented by a plus sign (+) at center screen. You can fire lasers horizontally along the center row as various enemies fly up to and then across that row to attack the base.

Your limited number of annihilator bombs (triggered by the enter key) let you eliminate attackers anywhere on the screen, especially from below where your lasers aren't effective. Star-studded galaxies roll up the screen between attacking waves, a nice touch.

An error terminates the game prematurely at some higher levels of difficulty.

The Wall

The Wall descends on your spaceship as you try to blast holes through to a stationary enemy space station. You lose if the wall squashes you, if you blast an embedded mine, or if one of two types of randomly appearing flying juggernauts clammers you.

Your approach speed increases with each successive pass of The Wall, and later stages include horizontal as well as vertical movement.

Space Swarm

Ten differently shaped antagonists chase you in Space Swarm. Some are capable of diagonal movement and others are armed with a series of line-segment energy rays. All the games give points for destroyed aliens, but Swarm offers intriguing varieties and requires quicker reactions than the previous games.

If you fire at an attacker but his missile reaches you first, you lose. You don't get credit for zapping the enemy. You'll probably find Swarm the most challenging and fascinating of the five games.

Mayhem

Mayhem pits your single missile silo against a lone bomber in one variation, or four types of destructive mechanisms in the other. They're out to obliterate four cities whose names you enter.

A direct hit on a city produces a small mushroom cloud, but when your missile silo blows or you lose all your cities, the nuclear blast fills most of the screen. The scoring mechanism appears to have a bug; it rolls back to zero on several occasions.

Mayhem is the only game in which you can fire missiles at angles other than vertical.

I wouldn't put TRS-DOS and Basic on the distribution disk, or run the distribution disk in your second drive as described in the manual. Instead, I suggest making the usual back-up copies since the disk isn't protected.

The games don't contain explanation frames, so read the adequate instructions before embarking on your adventures.

The games are all variations on tried and true themes. After all, the Model II character generator is not intended for detailed graphics, and Basic puts a damper on speed. Presumably, Maryland will rectify the problems by the time this review is published.

If you must have games for your Model II in spite of its infirmities, the disk from Maryland Games is not exorbitantly priced, the games are quickly and easily learned, and they'll keep game addicts occupied.

---

★★½

The Genie in the Computer

Rachel Kohl, Laura Karp, Ethan Signer
John Wiley & Sons
New York, NY
$12.95

by Richard Ramella

The idea behind The Genie in the Computer is learning TRS-80 Level II Basic through graphics. The graphics, though simple, give quick results that illustrate simple programming techniques for the neophyte computer user.

The genie of the title is a graphics face that begins as a few X's on the screen, but becomes more complex as the book progresses. The genie transforms into various guises and activities as the reader's programming capabilities become more sophisticated.

This book is a good idea. Standard texts that come with computers often fail to explain all the unit's capabilities. This book contains a lot of mildly interesting ideas and a few examples that will enlighten you. However, do not expect sophisticated graphics.

Chapter One sets the book's tone by presenting the genie's first face: two X's for eyes and three for a mouth. This elementary drawing explains line sequence in Basic.

The chapters continue to add other simple facial features in a kind of typewriter art on the screen. This is effective because the authors patiently explain the purpose of each line in the short programs.

Genie will help any beginner, and even barely literate children, start computing. Kids will probably forego the detailed instructions and simply type in the painlessly short programs. Even this is a useful introduction to Basic programming.
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80 Micro, September 1983 • 47
ming techniques could write them. However, the total package is impres-
sive and covers a wide variety of financial questions.

The Executive Calculator performs
the types of calculations listed in the
main menu: pricing and profit, interest
calculations, depreciation techniques,
real estate formulas, lease calculations,
graphs and charts, personal loans, fi-
nancial decision making, equivalents
and conversions, and miscellaneous cal-
culations.

The Model I version comes on cas-
sette. You have to transfer the nearly
one dozen modules to disk. The Model
III version is already on disk.

The programs themselves, although
nominally in Basic, are invisible. You
can display them from your directory
only by specifying invisible files (use
DIR (INV) or DIR (SYS, INV)). Conse-
quently, they’re difficult to modify.

The manual is an 85-page user’s
guide on saddle-stitched, colored paper.
It is fairly well done, has few errors, is
easy to read, and comes with program
examples. In general, the programs are
so straightforward I didn’t have to con-
sult the manual.

The loading instructions are simple,
although you invoke an unusual Copy
routine to reproduce the Model III disk
on one of your system disks. The direc-
tions show you a permanent patch to
TRSDOS that bypasses the initial date
and time prompts and automatically
loads The Executive Calculator.

Program Format

The programs are arranged in a main
menu with submenus for each entry.
The user’s guide illustrates each of
these, so you should first read the
manual to avoid confusion.

You must select one of the main
menu entries to access a submenu. After
each calculation, the program prompts
“Enter ‘A’ for Again, ‘X’ to return to
Main Menu . . . ?” This is a nice feature
that eases program use. I found that
you can also figure another calculation
by hitting the enter key.

Speaking of shortcuts, an INKEY$,
routine, instead of the Executive
Calculator Input routine, would allow
quicker, one-key responses to program
prompts.

Calculations

I found most of the programs to be
mathematically accurate. The loan
amortization program produces exactly
the same results as one I wrote. The
same is true of the interest calculations.
I don’t think that anyone need worry
about The Executive Calculator pro-
ducing incorrect values.

However, the vagaries of binary and
single-precision arithmetic do produce
some unsettling program results. In the
yards-to-miles conversion, entering
1,760 yards produces 1.9968 miles. In
fact, 1,760 yards is exactly one mile.
This type of error is unfortunate be-
cause the five decimal places suggest ac-
curacy to that level.

The manual contains a summary
sheet of the various utilities under the
main menu headlines. It’s fairly impres-
sive, although I thought some of the cal-
culations were a little too trivial to in-
clude.

The conversion module and some of
the miscellaneous calculations are not
much more than multiplication or divi-
sion, as in converting square feet to
square inches. Many also abbreviate to
the point of imprecision: Square inches
appear as inches, for example.

Some of the miscellaneous calcu-
lations are also trivial: finding a square
root, finding a tangent, multiplication,
and division. However, some useful
utilities appear in this same module: the
number of days between two dates, or
the day of the week a given date falls on.

The program does have other short-
comings, but MCS Software is planning
corrections for some of them. For in-
stance, I’d like to do further calculations of one type by hitting the enter key
in response to a prompt.

In the loan amortization program,
I’d like to see a way to change only the
interest rate for comparison purposes.
Along these lines, The Executive Calcu-
lator contains a terminology error: The
correct term for the actual yearly inter-
est rate is effective annual rate, not
nominal rate.

Another problem is that the section
on graphs always starts off with a bar
graph, even when you choose a line
graph. Since it is possible to toggle back
and forth between them, this is mostly
an inconvenience.

Evaluation

In spite of my specific criticisms, I
feel that this is a useful collection for
the average business user. Some of the pro-
grams include sound and graphics, and
you get a lot of solid financial programs
for the money.

The value of these small utilities is
their number and their presence in one
package. Comparable packages could
easily cost twice this much. If MCS at-
tends to the minor difficulties, what is
now an excellent buy will become even
better.

★★

Maryland Model II Games (Volume 1)
3304 Carlton Ave.
Temple Hills, MD 20748
$29.95

by Charles R. Perelman

Maryland Model II Games provides
five games in Radio Shack Basic.
Given the Model II’s limited resolution,
black and white CRT, and graphics
character set, you can’t expect Pac-
Man. All things considered, this is a
credible group of games.

Skydive, Star Battle, The Wall,
Space Swarm, and Mayhem are in order
of increasing complexity. You can ad-
just input factors to vary the difficulty
of each game.

Object definition is coarse, with small
symbolic representations for various
types of space attackers, weapons, or
ships. Movement is limited and much
slower than the usual arcade games.
Response time is also slow. The break
New Release
Now supports Mailing Lists, Form Letters, "ZAP-PROCESSING", and 18 more printer drivers.

The Magnificent
WORD PROCESSING SYSTEM
For the TRS-80 Model I and III

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- Brand new feature called "ZAP-PROCESSING", allows you to display and edit any type of data or program file in "ZAP" (byte-hexadecimal) format.
- Any character or symbol your printer can print, even dot graphics, can be used in mid-line printing with the Special Character feature.
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- Automatically justifies and word-wraps on the screen as you type.
- Search, Replace, and Global Search and Replace.
- Odd and even page user-definable headers, footers, and page number lines, with automatic page numbering.
- User-definable line-spacing, sheet size, top, bottom, left, and right margins.
- Move blocks of text and copy blocks of text from disk, to disk, and within the text.
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- Powerful full-screen editing features for EDTASM and BASIC files, including automatic renumbering of lines.
- Built in function to dump contents of screen to printer.
- Print-previewing formats text, inserts headers, automatically numbers pages, etc. on the screen without printing it on paper.
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- Supports both parallel and serial printers.
- Printer control code access.
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See List of Advertisers on Page 322

80 Micro, September 1983 • 49
Maxi Stat

The Business Division

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Longwood, FL 32750

Model I and III, 48K

Two disk drives, printer

$199.95

by John B. Harrell, III

Maxi Stat is a comprehensive statistics package and a valuable addition to the library of anyone who analyzes data. It is a full and powerful system that provides functions normally available only on mainframe computers.

You don’t need to be a programmer to use Maxi Stat. But it’s not a package for the casual user, and you need to know something about statistics.

Maxi Stat provides many analytical functions, including custom programming interface, write subfile, frequency distribution, descriptive statistics, cross-tabs and chi-square analysis, correlation and linear regression, t-test for matched pairs or independent groups, multiple linear regression, analysis of variance, and multiple variable response.

The write subfile option is not a true analytical function. It allows selection of a subset of data from one file and, possibly, recoding the data and writing it to another file. You can then use this subfile as further input to Maxi Stat.

To perform any statistical analysis using Maxi Stat, you must use the vari-

Gauntlet, Computer Shack, 1691 Eason, Pontiac, MI 48054, Models I and III, $19.95 cassette, $24.95 disk.

by Mary E. Ruth

Gauntlet is another tank game for the Models I and III. The game begins by informing you that aliens have landed in San Francisco—the opening sequence includes the alien spaceship hovering over the Golden Gate Bridge.

You battle the creatures within a 9-by-6-square matrix of city blocks. You have three tanks—use the arrow keys to traverse city streets and avoid aliens, then fire at them using the space bar.

You score 60, 70, 80, or 90 points for each alien, depending upon the type killed. When you kill an alien, another takes its place. For every 10,000 points you score, you receive a new tank. At least that’s what the documentation says—I wouldn’t know.

The game manual is serviceable if unimpressive. It mentions “terrific sounds”—after two or three games, the death-march tunes become annoying.

The game is difficult at first, and it doesn’t get any easier.

Dig Out, Computer Shack, 1691 Eason, Pontiac, MI 48054, Models I and III, $19.95 cassette, $24.95 disk.

by Mary E. Ruth

Dig Out, a Dig Dug play-alike, puts you at the controls of an underground rover who burrows tunnels and dodges monsters through 15 subterranean levels. Use the arrow keys to maneuver your rover through existing tunnels or create your own passageways as you go.

You begin the game with four rovers; you get another for every 10,000 points you score. Firing the space bar repeatedly at close range kills the enemy beasts roaming the tunnels; you score 500 points for each one killed.

Two rocks sit on each screen; touching one means certain death. For every monster the rock kills, you score 1,000 points.

The monsters travel through tunnels in any direction. In the absence of tunnels, they burrow up to the top of the screen. Don’t position yourself directly below one of them; they drop deadly eggs.

As you progress through the different levels, their speed and resourcefulness increase. You advance to another level only when you kill all the monsters in your present level.

The game comes in a brightly (although not cleverly) designed package. The documentation is adequate but riddled with misspelled words. The game’s sounds seem appropriate at first, but quickly turn into a tiresome drone.

But Dig Out is still fun and challenging.

Weerd, Big Five Software, P.O. Box 9078-185, Van Nuys, CA 91409, Models I and III, $19.95.

by Ronnie Brown

Weerd is a refreshing change of pace from run-of-the-mill computer games. Forget about energizers, disruptoids, and blue meanies. Just watch out for all those nameless critters that flit, skitter, and swoop around your screen.

Your mission is to defend a planet from all sorts of alien craft. Your shots must hit an invader or reach the top of the screen before you can fire another volley.

You have three ships and three sets of energy shields for each round. Shields last for six seconds and protect against all alien bombs, eggs, and debris, but not against kamikaze ships.

If you’re tired of playing computer simulations and serious arcade games, try Weerd.
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Assumes CPU can output text at a minimum of 3000 char/sec.
ous phases of the system to create codebook, data files, and control files. The Maxi Stat task execution system uses a set of these three files to perform the required analysis.

**Codebook Management Phase**

The codebook is the format description of the data file that the program's analysis section uses. You can enter data in the fixed or free format modes. This allows a wide variety of input formats, including output from most other programs that write an ASCII output file.

You can even edit files using most of the popular text editors. Data record size is limited to 255 characters in the fixed mode and 127 characters in the free format mode.

Begin the format control entries of the codebook by specifying the number of variables. A variable can be any type of data (an X-ordinate value, an answer to a question, and so on) and can be in numerical or alphanumeric format.

Each variable has a label of up to 40 characters. Maxi Stat uses the label to refer to this variable in any further input or output concerning it.

In the fixed-format mode, you then specify the starting column for the data and the number of columns required for the data field. As part of each variable, Maxi Stat allows the assignment of value labels to the expected responses.

Figure 1 shows a typical codebook entry. The example contains two variables. The first is the respondent's age in years. You enter it in fixed numeric format beginning in column one and taking two columns.

The second variable is the respondent's candy preference. You enter it in

<table>
<thead>
<tr>
<th>Fixed</th>
<th>(specifies the file format type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent's Age (in years)</td>
<td>(variable #1 name used by Maxi Stat)</td>
</tr>
<tr>
<td>1</td>
<td>(starting column number)</td>
</tr>
<tr>
<td>2</td>
<td>(number of columns used)</td>
</tr>
<tr>
<td>N</td>
<td>(specifies numeric type field)</td>
</tr>
<tr>
<td>@</td>
<td>(end of variable #1 description)</td>
</tr>
<tr>
<td>Respondent's Candy Preference</td>
<td>(variable #2 name)</td>
</tr>
<tr>
<td>3</td>
<td>(starting column number for fixed format)</td>
</tr>
<tr>
<td>1</td>
<td>(number of columns used)</td>
</tr>
<tr>
<td>A</td>
<td>(specifies alphanumeric type)</td>
</tr>
<tr>
<td>A = Stickers</td>
<td>(these three)</td>
</tr>
<tr>
<td>B = 3 Musketeers</td>
<td>(items specify)</td>
</tr>
<tr>
<td>C = No Preference</td>
<td>(the preferences)</td>
</tr>
<tr>
<td>@</td>
<td>(end of variable #2 description)</td>
</tr>
</tbody>
</table>

*Figure 1. Codebook file format.*

---

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52 • 80 Micro, September 1983
IF YOU'RE GOING TO BE PICKY ABOUT AN OPERATING SYSTEM SEE WHICH WAS PICKED BEST.

The readers of 80 Micro were asked to select their favorite operating system for the TRS-80 Model I & III. LDOS, DOSPLUS, TRSDOS, MULTIDOS, WOBOS I and NEWDOS/80 were all on the ballot. They picked NEWDOS/80.

The editors of 80 Micro have also awarded their Hall of Fame Awards. From among every software package on the market, the editors picked only six that they felt made a lasting and significant contribution to the TRS-80 computer. NEWDOS/80 was one of the six.

Since we first introduced the NEWDOS operating system we've been stating its features, capabilities and advantages. Thank you 80 Micro readers and NEWDOS/80 users for supporting us.

Version 2.0 . . .

High Performance DOS

NEWDOS/80 Version 2.0 is our highest performance system yet. The versatility and sophistication of Version 2.0 includes features like:

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- Selective variable clearing
- Can display BASIC listings page by page
- Automatic repeat function key
- Routing for peripheral handling
- Enhanced disassembler
- Command chaining
- Superzap to scan files
- Fast sort function in BASIC

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- Support for Apparat's and Radio Shack's Model III hard disk (optional available upon request for additional $60)

These features make NEWDOS/80 one of the most powerful additions you can make to your system. And Apparat's commitment to support assures that you've purchased a superior product, both today and tomorrow. At just $149.00 it could be the best investment you will make for your TRS-80.

For more information see your local computer store or contact Apparat, Inc., 4401 S. Tamarac Parkway, Denver, CO 80237, 303/741-1778.

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"The (Langley-St.Clair Soft-View) CRT is an excellent product and makes the TRS-80 an even better computer."

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Review in 80 U.S.

The instructions...are in pleasingly plain English, and I was able to install the CRT in about twenty minutes, even though I had never performed such a task before. The difference in the display is most gratifying; it has a much more 'professional' appearance. The contrast is much better, and it is definitely easier to use for sustained periods of time. The last item is particularly important, since my TRS-80 is mostly used for word processing.

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J. Kimble Rigney
Columbus, Ohio

REVIEW

a fixed, alphanumeric format beginning in column three and taking one column. The letter designations listed in the codebook file specify preferences.

Figure 1 appears extremely complex, but Maxi Stat makes it easy to create a file like this with a conversational input sequence that acquires the appropriate information from the user. You never see this file format unless you need to edit the file. The documentation is explicit in its description of all the file formats.

The Codebook Management Phase lets you add to an existing codebook, edit, and print, in addition to creating the file. The editor used for this and each of the other phases is a mixture of Basic and machine-language coding.

The commands are similar to those used in Electric Pencil, making the editor a snap for those already familiar with this system. A word of caution—this is not Pencil and significant differences do exist.

Maxi Stat uses a defined field size for all input required in the various routines. The program displays the specified input field size with the appropriate number of underline characters on the video terminal prior to input and then it updates the input field as you enter each character.

This helps when composing an appropriate data title. However, using the INKEY$ function in Basic slows the input routine considerably; a rapid typist can overtype the input routine.

Data Management Phase

The next major phase is the Data Management Phase. This is not essential to the system as you can prepare data with any other program as long as that program writes the data file to the disk in ASCII format. ASCII is the standard TRS-80 disk output mode of operation using the PRINT #n statement.

The Data Management Phase directly creates a data input file. The program prompts you for the input values of each variable in the codebook used by the creation program, and constructs the data file in a format the codebook specifies.

Once you create the codebook, this is an easy method to input data in raw form. But if you've reduced and prepared the data for computer input in accordance with the codebook format, a word processor can create the data file much faster.

The Data Management Phase also allows editing the data file and printing the raw data. The editor used is much the same as that used by the codebook manager. The most notable additions to the editor in this phase are data verification and the provisions for setting and using tabs in any video screen location.

You can use the data verification function to read any data file field and verify that each entry is within the specified bounds. This is an extremely valuable function that saves many hours of validating large raw data files.

Analysis Management Phase

The last part of Maxi Stat is the most important—the Analysis Manager. This phase allows the creation and maintenance of job control files that specify the tasks Maxi Stat performs. This allows the creation of many tasks to be saved as one file for execution as a batch system.

The functioning of the analysis manager is similar to the previous phases. The control file is created, edited, and printed as before. The most significant function of the analysis manager is execution of the analysis control file.

Figure 2 lists the contents of a typical control file. This file contains the complete list of tasks Maxi Stat performs; each task is separate and distinct from the others.

<table>
<thead>
<tr>
<th>Linear Regression Test of Maxi Stat</th>
<th>(page heading to be used for all tasks this run)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BKEX2:1</td>
<td>(codebook file name specified on drive 1)</td>
</tr>
<tr>
<td>ENDAT2:1</td>
<td>(data file name specified on drive 1)</td>
</tr>
<tr>
<td>Graphical Representation of Data</td>
<td>(title of this particular task)</td>
</tr>
<tr>
<td>5</td>
<td>(analysis selection—linear regression)</td>
</tr>
<tr>
<td>1</td>
<td>(variable number on the x axis of the graph)</td>
</tr>
<tr>
<td>2</td>
<td>(variable number on the y axis of the graph)</td>
</tr>
<tr>
<td>@@</td>
<td>(end of task symbol)</td>
</tr>
</tbody>
</table>

Figure 2. Task control file format.
In Fig. 2, the task is set up to execute a linear regression analysis, and prints out the pertinent statistics with a rudimentary graphical representation of the data, including the linear fit that the analysis determines.

The first entry in Fig. 2 is a page heading that appears on all printed pages. Next are the specified codebook and data files for the task to be performed. The last entries are a subtitle for the task and the analysis type.

The number of the variable to be analyzed (which corresponds to the variable number in the codebook used for this analysis) follows the analysis type. In most of these options, the program lets you input a range of variables on which a particular analysis acts. This saves you from reentering the task for each variable analyzed.

The only information missing in this example is the recoding of input data for the specified analysis. One of the analysis manager's most powerful features is the ability to construct recoding directions that allow data manipulation during task execution.

For example, you specify one variable as the respondent's age, and data analysis reveals that its range is 15 to 75 years. You want to group the respondents into age brackets and analyze the data within these brackets. You can manipulate this information during task execution by entering the proper recode directives into the analysis task file.

You can perform an absolute recode, a conditional recode, and a select-if recode as part of any task. Each choice is temporary, modifying the data only as the program reads it from the input file and writes it to the temporary file during data preparation for the analysis subtask.

You can make these changes permanently by using option number one, write subfile. The new file will now contain the recoded data.

Documentation

The user's manual comes in a high quality, three-ring binder. It's divided into six chapters and an appendix, separately tabbed for easy access. A section called Statistical Notes, consisting of the formulas and concepts used by Maxi Stat, provides enough background to let an accomplished programmer modify the system.

A section called Sample Outputs enhances the user's understanding of various Maxi Stat routines. It's not comprehensive or detailed enough for anyone but an accomplished programmer to make much use of it. Many of the examples aren't reproducible due to lack of proper input data.

In general, the manual is comprehensive and concise, if not wholly accessible to the beginner.

Pluses and Minuses

The menu-driven Maxi Stat system is easy to use. Error detection is good and prompting for error correction is clear.

System operation, particularly the input routines, is relatively slow because most of the system is written in Basic. However, Maxi Stat is responsive enough that the delay isn't annoying.

The input prompts are excellent. The program specifies each input field on the video screen by first displaying the field size using the underline character. Each input character then appears in the respective position in the field. This feature is particularly useful when you build the data file using the data management phase of Maxi Stat.

Many of Maxi Stat's features depend on the DOSPLUS 3.4 kernel on the system disks. The Getting Started section of the manual addresses how to move the programs from this system to another but does not address any system dependencies.

For example, the DIR command, which you can substitute for a file name at the appropriate prompts, works only with DOSPLUS. This is because under TRS-DOS the directory has an intentional error in the Hash Index Table (HIT) sector byte for DIR/SYS that makes the directory inaccessible to the operating system, and the data address marks on the directory track cause a "TRIED TO READ LOCKED/DELETED RECORD" error.

Maxi Stat can't communicate with the operating system in Basic under the TBasic interpreter supplied with the DOSPLUS kernel, although other systems, including DOSPLUS, can. Maxi Stat compensates for this by accessing Dir/SYS under Basic program control, and formatting and displaying the directory under program control.

Numerous conflicts in disk structure exist on the Model I double density disk. These conflicts make the disk unusable if you don't own a version of the DOSPLUS operating system or LDOS. The most significant conflict is location

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"I recently replaced the old black & white CRT in my (Healthkit) H89 microcomputer with one of the new Amber non-glare CRT's sold by Langley-St.Clair Instrumentation. The decrease in eye strain was quite dramatic and I highly recommend the amber tube in place of either the plain white or gashly green that Healthkit offers.
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John Roy
Review in Buss Newsletter December 1982

LSIS'S NEW SOFT-VIEW REPLACEMENT CRT
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80 Micro, September 1983 • 55
of the directory on a track other than track 17, and the use of more than five sectors in one granule.

Data disks formatted in single density under DOSPLUS in other than 35-track mode have the disk directory written approximately half the distance into the disk (e.g., a 40-track disk has the directory on track 20). This causes difficulty and additional head movement in finding the directory when you use the disk with a system expecting the directory on track 17.

The Maxi Stat system places two unnecessary restrictions on the user during specification of file names. First, you must specify a drive number for each reference to a file. This is not required when the file has been previously defined. Second, the Basic input routines do not allow for any file extensions.

Maxi Stat allows the use of floating point or real data as input values. The user must be careful when using data that is not integer in value. You can only use this particular data type in the free data format and it might cause problems in print output formatting.

One annoying feature of the editor routines used to maintain the codebook, data files, and task control files is the system reboot on exit from the editor. The Basic high memory value is set on entry to the editor to protect the code’s machine language portion that the Basic part of the editor loads.

After setting the word beginning at 40B1 hexadecimal (hex) to the appropriate value upon entry to the editor, the program rewrites this value by POKEing a Z80 HALT instruction into 402D hex (normal DOS exit point) and calling it via the USR function of Basic to exit the editor.

On the normal TRS-80, this causes a system reset, as the halt signal is tied to the reset line of the computer. This feature doesn’t work on other computers, such as the LNW-80, and requires pressing the reset button to exit.

The editor is a hybrid consisting of a Basic main program with machine-language support routines. The editor’s commands are almost identical to Electric Pencil and its performance is quite good.

One significant difference is the handling of insert/overwrite modes. The editor is normally in the overwrite mode of operation, meaning that text is replaced with the new text you type over it. Maxi Stat’s editor automatically goes into the insert mode if you attempt to extend a line and remains in the insert mode until you press the break key, the enter key, or the appropriate control key.

Another difference is that you can’t exit the editor, short of resetting the computer, without rewriting the text buffer to the disk.

The DOSPLUS 3.4 kernel selected for sale with this software package doesn’t have a sufficient number of commands to support full operation with this system alone. Maintenance of the Maxi Stat data disk using commonly found utilities and system functions from other operating systems eventually forces you to move this program to another operating system.

**Conclusion**

The Maxi Stat system is a superior product that provides a means of complete statistical analysis without accessing the programmer levels of the computer. The system is easy to use and relatively error free.

You would have to make a substantial programming effort to duplicate the program’s many functions. Maxi Stat is well worth its price.

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<table>
<thead>
<tr>
<th>★ ★ ★</th>
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</thead>
<tbody>
<tr>
<td>The Home Accountant</td>
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<tr>
<td>Continental Software</td>
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<tr>
<td>11223 South Hindry Ave.</td>
</tr>
<tr>
<td>Los Angeles, CA 90045</td>
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<tr>
<td>Model III, 48K</td>
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<tr>
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<tr>
<td>$74.95</td>
</tr>
</tbody>
</table>

by Timothy Daniel

Quick! Without looking, how much money is in your wallet? If your guess is accurate, you’re a good candidate for Continental Software’s Home Accountant. You don’t have to be rich to use it. But you have to care about your money and where it goes to appreciate this package.

At first glance, Home Accountant is just another checkbook program. But if you dig deeper, you’ll find a checkbook program gone wild.

You can use up to 99 budget categories, incorporate automatic depreciation or appreciation, search for individual transactions, print checks, generate graphs, print financial statements, and, yes, even balance your checkbook.

Here’s what you need to get started: a Model III with at least 48K RAM and TRSDOS 1.3, two disk drives, and a printer, preferably one that can handle 132-column printouts.

The multilevel menu format lets you select the options you want. You can start by trying to balance your checkbook. It’s a bit like hauling trash in a Cadillac, but when you’re ready to upgrade, the capability is there.

**At the Core**

The nucleus of Home Accountant is its budget module. You only have two budget categories in the simplest application, one for your checking account balance and the other for cash. The 99 budget categories are divided among expenses, income, assets, and liabilities.

Each category contains two values. The first is a current balance, reflecting the transactions entered to date. The second is assigned by you and is the amount you’ve budgeted for that category. While budget values aren’t required, they can help, since Home Accountant reports on their deviation from actual values.

Once you set categories and enter predicted values, the budget module becomes dormant and you can use the transactions module to enter daily expenses and income. Without complete and accurate reporting, Home Accountant is just an expensive time waster.

In a bare bones checkbook configuration, data entry and reconciliation take about an hour a month. If you choose to use full record keeping, plan on spending as much as an hour to enter a week’s worth of transactions.

Home Accountant’s two data entry shortcuts, automatic transactions and split payment, aren’t usually found in a home finance program. Home Accountant allows you up to five automatic entries per checkbook. Every time you run the Start New Month routine, transactions such as monthly car payments or retirement check deposits are automatically entered.

Split transactions are handy for when you write a check at the store and get some cash back. To keep square with your budget, allocate the amount of the check to two categories: food and cash.
Another split payment is insurance that covers both your home and car. You can split transactions among any number of categories, but, of course, the dollar total of the splits must equal the original transaction total.

You enter all transactions in a cash, credit card, or checkbook account. You must specify an existing budget category. This provides some measure of protection, but the most important error trap is when you reconcile the checkbook balances with your bank statement. If a problem occurs, you might need to use Home Accountant's search/edit feature.

You can base a search on something as vague as the dollar amount of a transaction or the budget category, or a criterion as specific as the date and check number. Once you locate a transaction of interest, you can review and correct it.

While this system of checks and balances might fall short of accepted accounting standards in the business world, it should be adequate for home accounting.

The Report Modules

Home Accountant really goes to work when you access the report modules, the most comprehensive of which is aptly named Printed Reports. Within the module are three sections: budget, personal balance sheet, and income/expenditure summary. Each of these offers several options.

Budget reports range from a simple printout of the categories you've defined and their assigned numbers to a 12-month budget summary. A third printout, identical to the budget summary, lists monthly totals for each category.

Both the actual and budget printouts require 132 columns. However, you might get by with your standard-width printer; Continental includes a software routine that sends user-defined control characters to your printer. That way, printers like the MX-80FT or the NEC 8023 can generate 132-column output using a reduced type size.

The second section of the Printed Reports module produces a personal balance sheet. This report represents your financial health, listing the current balances for all your assets and liabilities, including checking, cash, and credit cards.

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80 Micro, September 1983 • 59
balance sheet that compares your actual numbers with the budget numbers. A third option is a report that compares one month's data with the previous month's.

The last section of the Printed Reports module comprises the income and expense summaries. Just as the balance sheet calculates your assets and liabilities, the income and expense summary is a picture of the running balances of the income and expense accounts.

Formats include a single month's data, year-to-date totals or a range of fewer months, comparison to a prior month's total, and comparisons to budget. A numerical percentage accompanies each figure, showing its relationship to total income. Reports conclude with net income, the difference between income and expense totals.

The Printed Reports module provides totals only. For the story behind those totals, you'll need to use Home Accountant's Activity Report module.

You can tailor Activity Report printouts to your needs, ranging from a listing of all transactions entered to a highly focused report of transactions on a particular credit card that are tax deductible.

You produce Activity Reports using screens like those in the Transactions module's search/edit function. Specify the criteria of interest and the program searches the transactions file for a match.

Besides listing transactions, the Activity Reports module prints checks. You'll need a special kind of computer-compatible check to do this; Continental Software includes information on where to order them.

To print checks, you must enter the pertinent information in the transaction module, go to the Activity Reports module, and search for the appropriate entry. Before printing, you have a chance to enter a name and address, a handy addition if you want to use window envelopes.

Last but not least among Home Accountant's reports is the Graph module. Available only as a video display, the Graph module generates a histogram comparing 12 months of actual and budgeted values for a given category. The program fits a trend line to the actual values, letting you see what the totals might be in the future.

Home Accountant's features are aimed at middle- to upper-middle-class households where income comes from salary, most purchases are made by credit card or check, and investments are simple. If you have a complex portfolio or if you wheel and deal, you might want more flexibility than this program offers.

"Your computer-generated reports probably won't substitute for a loan application, but they do add credence to your claims."

Not Perfect

This accounting program's documentation is of mixed quality. For instance, the user's guide includes a brief introduction to the program and a step-by-step walk-through of setting up budget categories, entering and editing transactions, and printing reports.

After the first few sessions, you won't need the manual thanks to the menu-driven format, on-screen prompts, and error trapping. But the documentation falls down in providing realistic examples or advice on how to set up your budget.

Continental provides no demonstration disk or sample data base. If you want to experiment, you must start from scratch.

You must also watch for some pitfalls. Do plenty of planning before setting up your budget categories. Consider what information you need a year down the road; once you start a system, it's difficult to go back and change it.

Don't underestimate the time it takes to maintain accurate records. Ideally, you should keep a handwritten log of your daily expenses, entering them into the computer at least weekly. If you
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TRS-80 for Kids from 8 to 80  
Michael P. Zabinski  
Howard W. Sams & Co. Inc.  
4300 W. 62nd St.  
Indianapolis, IN 46268  
$9.95

by Richard Ramella

My 7-year-old son got first dibs on this book. Five minutes after he disappeared into the computer room with it, I heard a whoop and he came running into the front room. "It works!" he yelled. He successfully entered and ran a program on his own.

That's the most important thing I can say about TRS-80 for Kids from 8 to 80 by Michael P. Zabinski, founder of the National Computer Camp. The material works and encourages the reader to keep going. Any beginner can profit from this book's approach.

The 11 short chapters are in a workbook form familiar to elementary-school students. They include lots of white space, room to write in answers, illustrations, and humor.

The first chapter describes the TRS-80 Models I and III and sets the tone for what follows: simply presented material and questions designed to make the user look carefully at the computer. He'll also want to experiment.

The book increases in sophistication step by step. The user learns concepts, types in material, and—in the best of all possible worlds—gets the important idea that he can change parts of a program to make the computer perform interesting tricks.

The last chapter contains seven longer programs. The user, no longer a beginner, might have to work hard to get these programs running, but that's good. You can learn a great deal by keying in published programs.

One warning: Children enjoy achieving on their own, but an experienced adult should be ready to offer necessary help, no matter how simple the material. Tactful assistance keeps frustration low and encourages the child to continue alone.

TRS-80 for Kids is the first of two volumes. The second book offers more Basic programming concepts. I recommend this book, especially for children. Absorbing even a few of the ideas here will get them on their way to Basic competency.

**½

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by Wynne Keller

Forms and Prosort are both superb enhancements to the popular Profile III+ data-base management software. They feature extensive new printout formats and sort/select capabilities. Serious users won't want to be without them.

Forms

The Forms programs let you format virtually any type of report and have complete control over the placement of fields on a page. This frees you from the limitations imposed by Profile III+ relative to the number of lines per record and the spacing between records.

The Forms programs come on a TRS-DOS-formatted disk. Using simple Do file commands, you transfer one of the programs to your Profile Creation disk and some to your Runtime disk. This transfer creates a new menu that offers extended file functions.

The Forms programs come with a 65-page manual in a three-ring binder that includes an index and a table of contents. Experienced Profile users have little need for this manual because the Forms formatting instructions are similar to those for Profile's Report generator.

For those who need more help, the Forms disk provides a complete sample data base, and the manual provides a tutorial on creating an invoice form.

The largest form possible is 132 characters wide and 66 characters long. You can specify a shorter length, and you control width by proper field placement.

You have to be careful not to locate a field so that it overruns the form. If it does, a solution might be to print the form in reduced character format.

In developing a format for your form, you'll want a printout ruler to measure character width and line length. The screen displays the cursor position at all times.

Using the arrow keys and a few other keys, position the cursor and type. You can place almost anything on the form, including special characters if you have a printer that supports them.

As with Profile, the @ symbol prints the record number. Pressing the asterisk and field number prints that field. You can force fields to the left to close up spaces between adjacent fields. The program supports page numbering and dating.

Printouts

The program creates fancier printouts using special functions like underlining and half-line feeds if you have a Radio Shack Daisy Wheel II printer, a Dot Matrix 200, 400, or 500 printer; or a Line Printer V or VIII.

With some printers, you can also print characters not found on the keyboard, such as fractions or the English pound symbol.

If you have a different printer, four user-defined codes are available. This process requires patience and involves patching one of the programs with the hexadecimal codes for your printer. It should take programmers less than a half hour to make the changes.

The program does not have an option to select print size, but you can patch this into the spare codes, too.

To print records with Forms, you first have to build an index with Profile III+ or Prosort because Forms doesn't have sort or select capabilities.

Forms III is a fine program. It's easy to use and increases Profile III+’s flexibility tenfold.

Prosort

Prosort solves a variety of the problems inherent in Profile III+. With Profile III+, you can divide a data file into three segments, and any field used for sorting has to be in the first segment. Since the first segment cannot exceed 255 characters, some fields you want to sort might not meet this restriction.

Also, you have to assign field numbers in the proper order. The primary sort field must be first with the secondary sort field immediately following. For instance, Profile III+ would never sort a data file organized as part
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number, part name, and vendor code first by vendor, then by part name and number. To do so, vendor would have to be the first field.

Field length is nearly as important as field placement. The primary sort must include all the primary sort field, then as much of the secondary sort field as fits in the computer's memory. If the primary sort field is long, the secondary field might not fit.

These sort limitations are a serious problem in some applications. Initializing Profile III+ requires an extraordinary amount of advance planning, and it provides no flexibility should your needs change.

Prosort allows sorting by any field, in any order, from any segment, ascending or descending. You can save the indexes created by these sorts on disk and use them for printouts. It's also possible to build one index from another, thereby fine-tuning the selection process as much as necessary.

The Prosort programs come on a formatted TRSDOS disk. You can transfer them to your own Runtime disk with a simple command.

The 77-page manual has a hard cover and a three-ring binder. It's divided into a sample section and a reference section. The sample is a step by step tutorial using a data base provided on the disk. The reference section provides similar information in a more condensed form.

Running Prosort

Access Prosort through the Extended menu, which offers Prosort itself, printing labels or reports from Prosort indexes, and selection of records from a Prosort index.

You can save five indexes on disk for reports, and use a sixth for searches in the regular portion of Profile III+.

This sixth index, the Inquiry index, replaces the regular Profile index, and you access it from the usual Profile menu.

To build an index, specify the fields to sort and search. Five fields from any segment of the data file can be included in the sort. You control the length of the field to be sorted. Sorting just the first few characters of the field improves speed, and is frequently all you need.

You can put each field in ascending or descending order. Best of all, the sort fields do not need to fit in memory. If the file is too large, the program automatically sorts in segments, and the segments merge together into a single index.

The search can total 16 fields, but this number is misleading because you might use some fields more than once in the search. For example, if you want to search a range, enter the field of the range twice: once for the low number, once for the high.

Similarly, to search the state field for AZ, CA, and NY, you must select the state field three times. Even so, 16 fields should be adequate for most needs.

After specifying the select fields, enter the search relationship (And or Or), the search mode (Equals, Range, and so on), and the search item.

The sort/search then proceeds. I sorted four fields in a 225-record data base and the computer was busy less than a minute. When I added search operations, it was slightly slower, but well under two minutes. It takes you longer to set up the sort/search than it takes the computer to perform it.

Once you establish it, you can use an index over and over. Of course, you'll want to re-sort whenever you make changes or additions in the data base.

This points up the only flaw I found in the program: It doesn't save the search/sort criteria for any particular index. If you decide to re-create an index, you must start over specifying which fields to sort and search.

It is possible to create an index from another index. In this way, you can achieve sophisticated selection. Prosort also supports mass updates on an index. This permits the recalculation of math formulas on selected records—a powerful enhancement. The SuperScript function also works from Prosort indexes.

Forms and Prosort require a multi-drive system. Their sort/select and printout capabilities are valuable enhancements to your Profile III+ data base. If you depend on Profile, don't miss them.

★ ★

Optimal Manager
Transpower Corporation
1 Oak Drive
Parkerford, PA 19457
Model II, two disk drives
$495

by Charles R. Perelman

Here's your opportunity to improve efficiency by applying statistical and operations research techniques to your business. Optimal Manager is an impressive potpourri of quantitative analysis and useful algorithms that Donald Satz has gathered into 47 Model II programs covering many common business problems.

Three 8-inch disks contain the routines in compiled Microsoft Basic. Other versions are available for CP/M and Xenix operating systems.

You need two disk drives to run the software. Distribution disks are password protected and autoload from initialization to prevent copying or tampering.

If a disk is damaged, a registered user can obtain replacement disks from Transpower for $20. They furnish registered owners with any updates. If you have problems, call or write the author.

What the Programs Do

All programs are grouped in four modules: Optimal Product Investment, Optimal Product Manufacture, Optimal Product Distribution, and Optimal Product Pricing and Advertising.

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Your computer handles the complex mathematics, repetitive calculations, and iterations, so you don't need to understand calculus or any underlying theories.

However, you need to know the fundamentals of quantitative analysis management techniques or have ready access to a reference text to get anything meaningful out of this package.

I tested more than half the programs. All performed without error. The formats for the other programs were either more sophisticated or varied enough from the texts I consulted so I couldn't validate them with my references.

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cost, pricing, profit level, and plant expansion alternatives. You have several inventory control models as well as machine reliability, maintenance and replacement policy evaluations, resource allocation techniques, and quality control measurements.

Determination of the critical path for a Project Evaluation and Review Technique (PERT) network, and other scheduling and quality control routines are presented. You can use the system to evaluate job applicants, assign employee tasks, and select project teams.

Other programs help you determine plant or warehouse locations, shortest delivery routes, and shortest distance or cost for shipment or maximum flow path. Waiting line (queuing) procedures measure efficiency in serving customers.

Investors can benefit from programs that allocate investment funds, select a stock portfolio, and determine when to sell appreciating assets. Output is an optimum management solution, as the system name indicates.

To his credit, Satz has structured program inputs for practical application. This causes problems at times because of the rigidity of the system. No provision is made, and no information is given, for using a program if you are missing some of the inputs.

Running the Programs

From the master menu you choose a submenu listing all programs in a particular module, then select again from the submenu for the actual program. The program prompts inputs with an opportunity for correction.

After you enter all data, the program screens all input prompts individually without showing the data you previously entered. You must either enter new data or press the enter key if you recall that the original input is satisfactory.

Each time you run a particular program, the same input prompts appear. Pressing the enter key retains input data from the prior run. Reentering unchanged data using the enter key is fine, but not having the prior information on the screen for review is a problem. Since the disk is protected and the program compiled, you can't patch it to correct such an oversight.

Each program produces both screen and printer output. After completing a run with hard copy, "Dual Routing now OFF" might appear. Satz claims this is a TRS-DOS defect that shows up on some printers.

In the output, the program lists all parameters that the user specifies, but it often doesn't print assumptions chosen from screen menus. Printing them would produce a complete presentation.

If you want to abort a routine, Reset is your only recourse. You must use TRS-DOS initialization with autorun of Optimal Manager. Neither the hold nor the break key is active at run time. Satz states that these problems are unique to TRS-DOS and don't occur with other operating systems.

Other annoying program features include the following.

- Solutions scroll too rapidly to read, so you need a printout to review the entire output.
- The lack of a top-of-form prior to printout results in gaps in schedules when top-of-form occurs in the middle of a solution.
- Inability to change the length of page although the TRS-DOS Forms information appears during each printout routine.
- Most punctuation not accepted in titles apparently results from using Input rather than Lineinput.
- Lack of commas in large numbers makes them hard to read.
- No identifying numbers when you enter a series of related inputs such as a data table makes it difficult to keep track of entries.

For example, the second item might be followed by seven or eight unnumbered question marks for entry of parameters or details relating to that item. This problem is compounded when you try to correct an entry and can't view the original data.

Documentation

The distribution disk is configured for thin-line disk drives. Instructions in the manual for deactivating the thin-line patch for the standard Model II are incorrect.

I finally booted drive zero with a system disk for the Model II containing Patch. Then I switched this disk to the second drive and ran Unthin with the distribution disk in drive zero to make the necessary DOS changes. The documentation is being revised to correct this.

The manual is nicely prepared in a padded three-ring binder with plastic envelopes for the distribution disks. It is clearly and legibly printed with wide margins. You get a sample solution run for each program, a description that usually consists of one paragraph, and reference notes commenting on one or more input or output factors.

Unfortunately, the descriptions don't mention alternatives offered in some programs. Obviously, they need explanation. Each program has a screen description that you can read or skip since it duplicates the manual and offers no further enlightenment.

Pros and Cons

Optimal Manager is on the right track in offering a whole gamut of menu-driven programs that propose solutions to everyday business decisions.

Operations research proponents or students of quantitative analysis techniques might take issue with some of the models selected, but this comprehensive package gives managers insight and provides computer simulation for different resource allocations and business game plans.

Satz fails, however, to reach the level of most business decision-makers who are unskilled in quantitative analysis jargon and have no background in managerial science. I strongly disagree with his statement on the last page of the manual that "Inputs and outputs are very clear and simple to understand."

A number of programs require input of figures for standard deviation. Nowhere in the programs or manual is this fundamental statistical measure defined or its use explained. If you do understand the implications of its use, you'll want a table of area under the normal probability curve or a program to deter-

"You can use the system to evaluate job applicants, assign employee tasks, and select project teams."

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mine the area, neither of which is included.

Similarly, such terms as regretist, Poisson distribution, Erlang distribution, penalty coefficients, and sigma limits appear throughout the manual or programs without definition and some are abbreviated without explanation.

The manual tells you, for example, that the program uses the Cobb-Douglas function to determine proportions of labor and machinery for optimal production results. You enter two exponents, but you get no explanation of their significance. The reference note states that exponents are usually between 0.4 and 0.6.

After some research, I found that the exponents apparently relate to the relative increase in product from applying a 1 percent increase in labor or ma-

chinery (capital in the original Cobb-Douglas function). Quality documentation should explain all essential terms and illustrate usage if it's not obvious to a complete novice.

Figure 1, a documentation sample, is the description and reference notes for an algorithm to determine the shortest route through a network. Many manual descriptions contain more technical lingo than this one.

You can use this program to determine shipping routes between two destinations when a number of alternative paths exist. Figure 2 is the solution. A vertex is equivalent to a location or town at a junction in the network of connecting roads.

To use Optimal Manager, the majority of businessmen need a manual that contains definitions of unusual, scientific, or statistical terms in plain English, or at least some explanation of why a measure or parameter applies.

The manual also needs instructions for obtaining data required for input where not obvious or instructions on using estimated amounts for standard deviation.

A discussion of the meaning of results, including the significance of probability distributions, the meaning of regretist and other alternative choices, and the effect of penalty coefficients or other limitations on accuracy is missing.

The manual doesn't contain a presentation of the actual algorithm and references for further information on the technique and statement of assumptions inherent in the method. This would help interested users understand routines of special value to their business, then use the specific algorithm as the basis for a customized program.

In fairness, Satz often indicates the general analytical method or names the algorithm applied, and he lists four texts on the last page of the manual as the sources of some of his material. I found these references difficult to locate. You'll need more information if you want to go beyond mechanical use of the program.

The average user also needs statements of the algorithms' limitations and assumptions necessary for validity.

Suggestions of other types of problems for which a routine is suitable would be helpful. A limited number of alternative applications are mentioned in a few instances, but some of the programs have wider applications than title designations indicate.

The interface of manager and scientific analytical procedures through the documentation must be improved to render Optimal Manager truly useful. The software needs more tutorial documentation written in non-technical terms.

If you are familiar with quantitative analysis as applied to management decisions or are willing to spend time studying textual material to interpret the required inputs and meaning of outputs from these optimization programs, Optimal Manager is a worthwhile investment.

Be sure the range of methods encompasses problems you face. The software represents a considerable programming effort and furnishes a broad array of analytical management tools.

---

**Program Unit III: 5: Minimum Distance or Cost Path**

**Description**

This program unit uses Dijkstra's algorithm to locate the shortest path through a directed graph, given the distance matrix (distance from each vertex to each other vertex). Inputs to the program unit consist of the number of vertices in the graph or network, the distance matrix, the starting vertex, and the ending vertex. The program unit outputs consist of the sequence of vertices on the shortest path and the length of this path.

**Reference Notes**

Devise the distance matrix of your network before running this program unit. Remember that the "distance" may actually be cost or time, whichever is relevant to your problem.

*Figure 1. Sample documentation.*

<table>
<thead>
<tr>
<th>Vertex</th>
<th>Distance Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6</td>
</tr>
<tr>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>31  29  16  5  17</td>
</tr>
<tr>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td>6</td>
<td>32  17  10</td>
</tr>
</tbody>
</table>

Sequence of Vertices on the Shortest Path:

1, 4, 5, 6

Minimum Distance From Vertex 1 to Vertex 6: 46

*Figure 2. Solution to algorithm in Fig. 1.*

"While both word processing and business graphics are indeed thoroughly covered in this informative and comprehensive (if somewhat dry) work, nowhere are the two combined to show how graphics and charts, for example, can be incorporated in a report without cutting and pasting.


ListMaker, Reader's Digest Services Inc., Microcomputer Software Division, Pleasantville, NY 10570, Models I and III, $97.50.

"...ListMaker can handle large numbers of records, of course; its limitation is that it lacks the sophisticated multi-level sorting capabilities often required when working with long lists.

"...because the program is menu driven and interactive, it is extremely easy to use. ...Error handling was excellent. When trouble occurs, the program displays an error message in plain English." Creative Computing, June, p. 100.

SuperScritps 1.1.0, Tandy/Radio Shack, One Tandy Center, Fort Worth, TX 76102, Models I and III, Disk systems, $199.

"Radio Shack has released an updated version of SuperScritps, version 1.1.0, which corrects some of the problems associated with the original release.

"...It appears that this updated release has not lost any of the special features that made the original version so powerful. ...The special printing capabilities are more accessible now that drivers for all of the current Radio Shack printers are provided." Basic Computing, July, p. 113.

NEWBASIC 2.0, Modular Software Associates, 209 18th St., Huntington Beach, CA 92648, Models I and III, $39.95.

"NEWBASIC 2.0 adds a set of powerful commands to Disk Basic. ...A total of 49 new commands may be added.

"...NEWBASIC is a very useful tool for anyone programming in BASIC who wants very high speed graphics and animation effects that are simple to program, and needs the advanced commands and time-saving features this program provides." Basic Computing, July, p. 110.

Pro-Color-File, Derringer Software Systems, P.O. Box 5300, Florence, SC 29502, Color Computer, $79.95.

"...there will be a number of hours between 'program-arrival' and 'up and running', but I believe the effort is worth it.

"Pro-Color-File is a very sophisticated data base management program... P-C-F can best be described as a system rather than a program, because it consists of 8 programs and one control file, plus a series of at least 7 control and data files for each database. ...I describe it in such detail to indicate the versatility of the systems not the demands the system makes on the user." Color Computer News, June, p. 22.
September

12-14  IEEE Computer Society, Silver Spring, MD. International Conference on Computer-Aided Design Santa Clara, CA.

15-18  Northeast Expositions Inc., Chestnut Hill, MA. Twin Cities Computer Show and Software Exposition Minneapolis Auditorium, Minneapolis, MN.

16-18  Great Southern Computer and Electronics Show Veterans Memorial Coliseum, Jacksonville, FL.

16-18  ComputFair Seattle Center Exhibition Hall, Seattle, WA.

19-21  American Management Associations, New York, NY. User Documentation Course Washington, DC.

22-24  Northeast Expositions Inc., Chestnut Hill, MA. Rocky Mountain Computer Show Merchandise Mart, Denver, CO.

26-29  IEEE Computer Society, Silver Spring, MD. Compocon Fall '83 Marriott Crystal Gateway, Arlington, VA.

29-Oct 1 Northeast Expositions Inc., Chestnut Hill, MA. CP/M '83 East Hyenes Auditorium, Boston, MA.

October

3-6  IEEE Computer Society, Silver Spring, MD. 8th Data Communications Symposium Cape Cod, MA.

5-6  DeNardi Enterprises, Los Altos, CA. Compusource '83 Red Lion Inn, San Jose, CA.

7  Creative Learning Association, Charleston, IL. Compuscon '83 Martin Luther King University, Charleston, IL.

7-9  Great Southern Computer and Electronics Show Expo Center, Orlando, FL.

7-10  Institutes for Human Resources Inc., New Smyrna Beach, FL. The Electronic Village Expo 83-84 Tupperware Convention Center, Orlando, FL.

8-9  Tidewater Radio Conventions Inc., Portsmouth, VA. Computer Convention/Flea Market Virginia Beach Pavilion, Virginia Beach, VA.

16-18  Texas Association for Educational Data Systems, Austin, TX. TAEDS 1983 Convention Hilton Hotel, Austin, TX.

18-19  Architecture Technology Corp., Minneapolis, MN. Conference on Local Computer Networks Hilton Inn, Minneapolis, MN.

18-20  IEEE Computer Society, Silver Spring, MD. EdComCon '83: Applying Technology to Education Red Lion Inn, San Jose, CA.

19-21  Raging Bear Productions, Corte Madera, CA. National Software Show Trade Show Center, San Francisco, CA.

22  Plymouth State College, Plymouth, NH. Conference on Computers and Education PSC campus.

23-26  George Washington University Medical Center, Washington, DC. 7th Annual Symposium on Computer

Applications in Medical Care Convention Center, Baltimore, MD.

24-26  American Institute of Aeronautics and Astronautics, Orlando, FL. Computers in Aerospace Conference Hartford, CT.

24-26  Association for Computing Machinery, New York, NY. ACM '83 Sheraton Centre, New York, NY.

November

1-4  American Production & Inventory Control Society, Falls Church, VA. 20th Annual International Conference Hilton Hotel, New Orleans, LA.

7-9  IEEE Computer Society, Silver Spring, MD. 24th Annual Symposium on Foundations of Computer Science Tucson Marriott, Tucson, AZ.

10-12  Northeast Expositions Inc., Chestnut Hill, MA. Northeast Business Computer Show and Software Exposition Hyenes Auditorium, Boston, MA.

Coming Next Month

Ever feel that you're getting older while people around you stay the same? Turn the tables on them with the October 80 Micro—there's a relativity program that tracks the time and age difference between you, traveling in a spaceship at nearly the speed of light, and a friend left behind on Earth.

The issue's theme is science, and relativity is just the beginning. Model 1/II/III/4 astronomers will appreciate a seasonal sky display, that shows the night sky and indicates desired targets (such as Virgo, the Big Dipper, or Polaris), and a program that keeps your telescope in sync with the Earth's daily rotation.

You shouldn't look at the sun, but we've got a program that tells its altitude and azimuth from any location at any time.

For business users, there's a business trend forecaster and a financial health analyzer. Assembly-language Model 16 programmers can study a tutorial on the 68000, and people who hate decimals can try a utility that accepts and displays numbers in fractions.

Finally, the month's game lets you take a dangerous ride on a Spaceflyer. Spaceflies don't approach the speed of light; in fact, as you play you may find yourself aging rapidly.
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the distribution is the probability of a particular value occurring.)

Thus, while the interest might vary from 19.8 to 16.2, it's more likely to remain around the nominal, 18. You can describe this with a statistical distribution known as a normal curve (see Fig. 1).

The program randomly varies each assigned distributed variable about its nominal value according to the associated tolerance and distribution. The program calculates each variable independently, then determines an outcome by using these variables in the set of equations that defines the problem.

Monte Carlo runs many trials, records each of the results, and checks for limits. It might repeat this procedure several hundred times. Finally, the program evaluates the results of all the trials and calculates a probability to determine the answer.

**Variable Types**

You must define your problem within the system's constraints, using three unique types of variables to describe the environment.

- Distributed variables describe a number that varies over a predictable range. Enter it in the form:
  - **Name**, **Nominal Value**, Plus Tolerance, Minus Tolerance, Distribution

The name is a descriptive identifier from one to six characters long. For equation calculation, the program uses it in place of the actual number.

The nominal value is the numerical base for the tolerance calculations, the number the variable will most likely assume. The plus tolerance is the percent above the nominal that you let the value reach. The minus tolerance is the percent below the nominal that you let the value reach.

The distribution ranges from zero to five and describes how close to the nominal the majority of values lie. Zero defines a flat distribution and five is a narrow distribution (see Fig. 2).

The program randomly varies the distributed variables for each Monte Carlo trial. In a worst-case analysis, the program holds these variables at their extreme tolerances while it calculates the statistical variables. Sensitivity analysis determines the extent of the effect that the individual distributed variable has on each statistical variable.

The second category of variables, constant/calculated, has a dual purpose. You can use them as constants, variables whose values don't change, by entering them in the form:

- **Name**, **Value**

  Name is from one to six characters long. The program equations use it in place of the associated number. For instance, you might want to define an interest rate as: Rate, 19.2. In this case, every time the program sees Rate in an equation, it substitutes 19.2. This might be useful for documentation, although higher than the limit. Then it calculates the percentage of the total.

  This occurs in a similar manner for the low value. In addition to the percent over and under the limits, the program calculates the standard deviation, mean value, and highest and lowest numbers found out of all trials. The program does this in turn for each variable defined as statistical.

**Equations**

The program's heart is in the equation definition; it does all the calculations. By using the three variable types and relating them to each other with mathematical symbols, you can simulate general systems.

The computer evaluates each equation from left to right. The operators, or mathematical symbols, have no predefined precedence, so the program evaluates the leftmost operator first and the rightmost operator last. Consequently, the equals sign must be the last mathematical symbol encountered in the equation.

For instance, assume you want to find the payback on a simple interest loan. You write the equation as follows:

\[ \text{Rate} \times \text{Amount} + \text{Amount} = \text{Payback} \]

Notice the equation's syntax. It starts with a variable, followed by an operator, then another variable, and so on until the last part consists of an equals sign followed by the variable you wish to find.

You've previously defined the variables Rate and Amount. Payback is either a constant or statistical variable; the value of the expression immediately to its left determines its value. Note the space between each variable and the fol-
following operator. It lets the program distinguish correctly between the two.

Assume that Rate is a constant variable with a value of .18 (18 percent), and Amount is a constant with a value of 100. The program starts its evaluation on the left by multiplying the rate times the amount. Then it adds that sum to the previous amount. The program transfers the answer to the variable called Payback.

The program's math operators are the four basic functions, + − * /, and five special functions:

INT TAN SIN COS ABS

The INT function truncates a floating point number to the integer portion, without a rounding operation. TAN, SIN, and COS are the standard trigonometric functions calculated in radians. The ABS function converts a number to its absolute value (makes it positive).

To take a number's sign and divide it by another, use the following equation:

\[\text{SIN Number / Other = Ans}\]

The program calculates and treats each special function and the variable following it as a single variable.

For instance, to add a number to another number's integer, you'd use the following equation:

\[\text{Num1 + INT Num2 = Ans}\]

Notice how the program treats the function INT and the variable following it, Num2, as one variable. Only one operator (+) appears before and one operator (=) after the group.

You also have a comment function. The > character denotes the beginning of a comment. You can place it at the beginning of a line (in place of an equation), or at the end of a line (after an equation):

\[> \text{This is an example of a comment}\]

\[\text{Num + Var = Ans > Here's a comment}\]

The program ignores text following a >. Note that you need a space after the >, just like any other operator.

**Entering Data**

The program accepts data in one of two forms. When you first run it, the program asks whether you want to retrieve data from a disk file. If so, enter the file name. The program reads the data from the specified file into its memory (see sidebar for the disk data format). The program normally creates this data at the end of a session.

You can also enter data from the keyboard. The program asks you to enter values for each type of variable and all equations you want the program to use.

A prompt requests the number of distributed variables you wish to enter. Don't worry if you make mistakes entering the data. The editing features let you add, change, or delete. Enter the variables one at a time until all distributed variables are in the proper form.

Next enter the number of constant or calculated variables you want to use. It helps to define the problem before you begin entering so you know how many variables you're going to need. Enter the variables in the standard form described earlier.

When you enter the statistical variables, specify a generous amount. The program uses only those input here in the statistical calculations. First enter the number of variables you'll use, then the variables themselves in the proper form.

Your last input items are the equations. The number of equations directly affects the program's cycle time; the more equations you enter, the longer it takes to finish the calculations.

For instance, if you specify 250 trials and the program takes one minute per cycle (because of the number of equations), the complete run would last around four hours. This is not unusual, due to the inherent speed of the Basic interpreter.

Comments, however, don't take up much computation time and make the equations much more readable. You should try to use highly descriptive names for the variables.

**Editing**

Much of the program's power and flexibility comes from its editing capabilities. Once you enter your data, the program enters the edit mode. (If you enter data from the disk at start up, the program bypasses edit and asks for the number of trials.)

The first screen in this mode is an edit menu (see Fig. 10). Choose the proper group number to add, change, or delete variables or equations. When you choose a group, the information as it currently exists appears with a corresponding number on the screen. This is the data edit mode.

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copy of the line at the bottom of the screen, and enter the line edit mode.

The arrow (cursor) appears above the text to be edited, starting at the leftmost character. By typing from the keyboard, you can overwrite characters that are in the cursor position. The program increments the cursor after each keystroke, so you can completely retype the whole line or any portion of it.

You can also move the cursor without destroying the characters it indicates. Using the left-arrow key, you move the cursor one space to the left with each depression. When the cursor is in the leftmost position, additional keystrokes have no effect. The right-arrow key moves the cursor one character to the right in the same manner.

By using the shift right arrow or shift left arrow, you move the cursor immediately to the rightmost or leftmost position respectively. Two other features in the line edit mode are insert and delete.

Enter the insert mode by pressing the up-arrow key. At the cursor position, the program enters all characters you type. The line separates to let you insert without overwriting existing characters. Pressing any other edit key removes the program from the insert mode.

Use the down-arrow key to delete any character located directly under the cursor. The rest of the characters move left to fill the void created by the deletion. Successive pressing of the down-arrow key deletes multiple characters. You can also use the clear key to delete all characters from the current cursor position to the end of the line.

The last editing key is the shift up-arrow. Use it any time during the line edit mode to end editing and return to the data edit mode. The program will make no changes. This is helpful if you decide not to change a line after all. To end the line edit and save all changes, press the enter key.

The data edit mode lets you make changes, additions, or deletions to data already entered. For example, suppose that you’ve entered three distributed variables numbered 1, 2, and 3. To add a fourth variable between numbers 2 and 3, enter 2.5 in response to the prompt below (see Fig. 12).

```
Insert Line=Fraction – Delete Line=Null –
Abort Edit = ‘Enter’
```

This puts you into the line edit mode with all its features and lets you enter another variable. When you press return (ending the line edit mode), the variable list reappears on the screen. The program renumbers the list so the line you just entered occupies line number 3, and the remaining lines are adjusted accordingly.

To delete a line, enter the number corresponding to the line you want to delete. When you enter the line edit mode, press the clear key to erase the line, then press return.

When the program relists the data, the line is gone and the remaining lines

---

**Format of Data File**

After you enter data into the program for analysis, you have the option of saving that data to disk for future use. The program stores it as a sequential file in the following order:

1. An integer value of the number of distributed variables.
2. A string value containing the name of the first distributed variable.
3. A single precision value containing the nominal value.
4. A single precision value containing the plus tolerance.
5. A single precision value containing the minus tolerance.
6. A single precision value containing the distribution value.
7. The program repeats data #2 through #6 for each distributed variable that data #1 specifies.
8. A single precision value of the number of constant variables.
9. A string variable containing the name of the first constant variable.
10. A single precision variable containing the value of the first constant variable.
11. The program repeats data #9 and #10 for each constant variable that data #9 specifies.
12. A single precision value of the number of statistical variables.
13. A string variable containing the name of the first statistical variables.
14. A single precision value containing the upper limit.
15. A single precision value containing the lower limit.
16. The program repeats data #13 through #15 for each statistical variable that data #12 specifies.
17. A single precision value of the number of equations.
18. A sequential list of all the equations that data #17 specifies follows. The program stores each equation as a string variable.
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have moved up one position.

Return to the main menu from the data edit mode by pressing return without entering a number. You can choose another category to edit or go on to the analysis portion of the program (Monte Carlo trials or sensitivity analysis).

**Monte Carlo Analysis**

When you press the enter key from the main menu, the program enters the Monte Carlo analysis portion of the program. The computer randomly assigns numbers to each distributed variable within its range, then calculates the statistical variables found in each equation. This process occurs once for each trial you request.

Before the analysis begins, the program asks you how many trials you'll need. You can enter any number from zero to the numerical range of the machine. If you enter zero, the program returns to the main menu and takes no further action.

The more trials you enter, the longer it takes to complete the analysis. The length of time required for each trial varies depending on the amount and length of the equations. You can estimate about three seconds per equation per trial. If you have 20 equations, the program would take about one minute per trial.

You should limit the number of trials to between 50 and 100 to get best results. Less than 25 will not yield accurate results.

During the course of its analysis, the program keeps you updated as to its progress. On the bottom of the screen, you see the trial number and equation currently being evaluated.

When the program completes the required number of trials, it asks if you want a printout. If you enter Y and a printer is available, the output is directed to the printer as well as the screen. The program abbreviates the screen output due to the 64-column limitation.

The program next asks you to enter a comment line. You can enter any number of characters up to 255 for the program to use as a printout title.

As the program evaluates each equation, it dynamically checks for errors. If it encounters one, it displays a message and halts evaluation (see Table 1 for a list of possible error messages).

If the program encounters an error, you should return to the edit mode and review the equation in question. Check for proper syntax, and make sure you've previously defined all variables in one of the three variable sections.

A sample of a single trial Monte Carlo run appears in Fig. 13. It contains three distributed variables, two constant variables, four statistical variables, and four equations.

The first portion of the output shows the distributed variables, their nominal values (in this case, all had the value of 10), their plus and minus tolerances (5 percent), and their distributions (ranging from DIST1, a narrow distribution, to DIST3, a flat distribution).

I set up this program's variables to directly reflect the state of the distributed variables: I set STAT1 equal to DIST1 in the program's equation section. This is one way to see what is directly happening to the distributed variable.

The printout indicates that as the distribution becomes flatter (going from STAT1 to STAT3), the value the distributed variable assumes deviates further from the nominal, 10.
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You can also see this in the standard deviation of the statistical variable that quantitatively shows you the dispersion from the mean. The STD. DEV. increases from .14 to .18 as the distribution gets flatter.

The high and low values show the largest and smallest numbers that the statistical variable assumes out of all the trials run. This determines how far outside the limits the variable traveled.

The limits appear under the headings Minimum and Maximum. You set these when you first enter the statistical variable into the program. The percent of values outside these limits appears under the headings %Under and %Ovr.

The next section shows the equations used to calculate the statistical variables. By setting the statistical variable equal to the distributed variable, you can have the output track the distributed variable. Note that equation 1 is a comment line.

The final section shows the constants used in this example. Since STAT4 is equal to the constant, 10, the standard deviation in the statistical section is zero, showing no variation from the mean.

The statistical output consists of several numbers that describe a sample sufficiently to forecast what the whole population should look like in an infinite sample. The larger the sample size, the greater the accuracy.

The mean is the average number in the sample. The closer you get to this value, the more likely it is to occur (see Fig. 1). In a normal distribution, the mean is the curve’s highest part.

As you get further from the mean, less of the population will have that value in any one trial. The standard deviation is the percentage of that population that falls in any range of numbers.
## BUSINESS 100 PROGRAM LIST

<table>
<thead>
<tr>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RULE 78</td>
<td>Interest Apportionment by Rule of 78's</td>
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<tr>
<td>ANN1</td>
<td>Accrual computation program</td>
</tr>
<tr>
<td>DATE</td>
<td>Time/Date</td>
</tr>
<tr>
<td>LEASENT</td>
<td>Day of year, a particular date falls on</td>
</tr>
<tr>
<td>BREAIND</td>
<td>Breakdown analysis</td>
</tr>
<tr>
<td>DEPRSR</td>
<td>Straightline depreciation</td>
</tr>
<tr>
<td>DEPSRM</td>
<td>Sum of the digits depreciation</td>
</tr>
<tr>
<td>DEPRDB</td>
<td>Declining balance depreciation</td>
</tr>
<tr>
<td>DEPRDDB</td>
<td>Double declining balance depreciation</td>
</tr>
<tr>
<td>TAXDEF</td>
<td>Cash flow vs depreciation tables</td>
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<td>CHECK2</td>
<td>Prints N/S checks along with daily register</td>
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<td>CHECK9</td>
<td>Checkbook maintenance program</td>
</tr>
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<td>MORTGAGE/A</td>
<td>Mortgage amortization table</td>
</tr>
<tr>
<td>MULT.MON</td>
<td>Computes time needed for money to double, triple, etc</td>
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<tr>
<td>SALVAGE</td>
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<td>REV/REV</td>
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<td>RECO/RECP</td>
<td>Rate of return on investment with constant inflows</td>
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<td>Present value of a future amount</td>
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<td>Equal withdrawals from investment to leave 0 over</td>
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<td>Simple discounted analysis</td>
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<td>Sinking fund amortization program</td>
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<td>Black Scholes options analysis</td>
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<td>Value of a warrant</td>
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<td>EPSEST</td>
<td>Estimate of future earnings per share for company</td>
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<tr>
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<td>OPT/Loss</td>
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<td>FIQ/OQ</td>
<td>Fixed quantity economic order quantity model</td>
</tr>
<tr>
<td>CON/PROF/WH</td>
<td>As above but with shortages permitted</td>
</tr>
<tr>
<td>FIQ/OQ/BR</td>
<td>As above but with quantity price breaks</td>
</tr>
<tr>
<td>QUEU/EC</td>
<td>Cost benefit waiting line analysis</td>
</tr>
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<td>Net cash flow analysis for simple investment</td>
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</tr>
<tr>
<td>CAP1</td>
<td>Model analysis of project</td>
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- **29 WACC**: Weighted average cost of capital
- **60 COMBRL**: True rate on loan with compensating balance required
- **61 DISCBL**: True rate on discounted loan
- **62 MGERNL**: Merger analysis computations
- **63 FINSR**: Financial ratios for a firm
- **64 INV**: Net present value of project
- **65 LASEPI**: Lapse year price index
- **66 PERSIP**: Pauser price index
- **67 SEASON**: Discount seasonal quantity indices for company
- **68 TIMETR**: Time series analysis linear trend
- **69 TIMPON**: Time series analysis moving average trend
- **70 EUPRPR**: Future price estimation with inflation
- **71 MAILPAC**: Mailing list system
- **72 LETWR**: Letter writing system with MAILPAC
- **73 SORT**: Sort list of names
- **74 LABELS**: Shipping label maker
- **75 LABEL**: Name label maker
- **76 BUS/BUS**: D.O.M. business bookkeeping system
- **77 S/REL**: Computes weeks total hours from time clock info
- **78 ACCPTAY**: In memory accounts payable system storage-protected
- **79 INVOICE**: Generates invoice on screen and print on printer
- **80 VENT2**: In memory inventory control system
- **81 TEL/DIR**: Computerized telephone directory
- **82 TEMPS**: Use of assignment algorithm for optimal job assign.
- **83 ASGN**: In memory accounts receivable system-storage
- **84 ACCTRE**: Computes 3 methods of repayment of loans
- **85 TERMSP**: Computes gross paid for given net
- **86 PAYNET**: Computes selling price for given after tax amount
- **87 SEL/PR**: Arbitrage computations
- **88 SINKD**: Sinking fund depreciation
- **90 UPS/OZ**: Finds UPS zones from zip code
- **91 ENVELO**: Types envelope including return address
- **92 AUTO/EXP**: Automatic expense analysis
- **93 INS/FL**: Insurance policy file
- **94 PAY/ROLL**: In memory payroll system
- **95 DIL/PNL**: Dilution analysis
- **96 LOAN/AD**: Loan amount a borrower can afford
- **97 RENT/PCH**: Purchase price for rental property
- **98 SALE/LEAS**: Sale-lease analysis
- **99 RCON/BV**: Investor's rate of return on convertible bond
- **100 PORT/V/L**: Stock market portfolio storage valuation program

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The high and low values with the corresponding minimum and maximum limits are self-explanatory. When you use them in conjunction with the statistical descriptors, you can make a good estimation of a problem’s outcome.

During the output of the statistical data, the program asks if you want graphical output. If you answer yes, it produces a small bar graph for each statistical variable.

Figure 13 is a sample of a run with a graphical output. The first of the two columns left of the bar graph is labeled DIST2, 10, .05, .05, 3.

**Figure 11.** Line edit mode of distributed variable 2.

---

**Figure 12.** Prompt to add a variable.

---

---

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gory (range 10) contains 21 values that correspond to 12 asterisks (the integer value of 21 divided by 27 times 15).

By normalizing the graph in this manner, you keep the number of values always in scale. To the graph's right is the statistical data for the variable previously presented in the statistics output.

Since the range always starts with the minimum value specified for the variable and ends with the maximum value, judiciously select this range during the statistical variable input.

If the range is too large (minimum equal to zero and maximum equal to 100) and the actual high/low values are much closer together (e.g., low value equal to 47.2 and high value equal to 48.9), the resulting graph is meaningless.

You can't change the range after you've run the Monte Carlo simulation and keep the accumulated data intact. If the range is too large, you must begin the trials over again. I recommend that you first execute a trial run of only one or two trials to gauge the magnitude of the statistical variable value.

To reinforce the concept of the statistical variable distribution, you can use the graphical output shown in Fig. 13. Notice that DIST1 (equal to STAT1) has a distribution of five, DIST2 (equal to STAT2) has a distribution of three, and DIST3 (equal to STAT3) has a distribution of zero.

Notice the relative differences in the graphical output of the corresponding statistical variables. STAT1 ranges from 9.7 to 10.3 in a fairly narrow grouping. STAT2 has a broader distribution (more evenly grouped) from 9.7 to 10.5, while STAT3 is a relatively flat grouping from 9.6 to 10.5.

Sensitivity Analysis

You enter the program's sensitivity portion by choosing item 6 from the main edit menu (see Fig. 10). The sensitivity analysis determines the degree to which a particular distributed variable affects any one statistical variable.

For instance, if your equation relates a statistical variable to one distributed variable and one calculated variable, and the calculated variable relates in turn to two other distributed variables, it's difficult to determine which of the distributed variables has the greatest effect on the equation.

The sensitivity analysis places a quantitative measurement on each distributed variable as it relates to each statistical variable. This lets you easily ascertain its contribution to the overall statistical value.

Mechanically, the program operates much as it did for the Monte Carlo analysis: It must make several passes through each equation, varying a different value each time. However, the program individually assigns each variable its worst case tolerance value instead of random values.

The first pass sets each distributed variable at its nominal value. The screen shows a trial number of zero as the program calculates each equation.

Then the program begins by setting the first distributed variable to its maximum positive tolerance, leaving all other distributed variables at their nominal values. This appears on the screen as trial 1 to indicate that the program is

<table>
<thead>
<tr>
<th>INITIAL VALUES</th>
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<tbody>
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<td>PART</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>DIST1</td>
</tr>
<tr>
<td>DIST2</td>
</tr>
<tr>
<td>DIST3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STATISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF TRIALS = 100</td>
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<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>MEAN</th>
<th>STD.DEV.</th>
<th>HIGH VAL</th>
<th>LOW VAL</th>
<th>MINIMUM</th>
<th>% UNDER</th>
<th>MAXIMUM</th>
<th>% OVER</th>
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<tbody>
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<td>9.88</td>
<td>.27</td>
<td>10.27</td>
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EQUATIONS USED:

1 > EQUATIONS TO SHOW DISTRIBUTIONS
2 DIST1 = STAT1
3 DIST2 = STAT2
4 DIST3 = STAT3
5 CON1 + CON2 = STAT4

VARIABLES/CONSTANTS

| 1 CON1 | 0 |
| 2 CON2 | 10 |

Figure 13. Sample Monte Carlo run.
"The program's heart is in the equation definition..."

ingnominal. In this manner, the program makes a quantitative analysis on each individual distributed variable.

Next, the program returns the first distributed variable to its nominal value and proceeds to the second distributed variable. Trial 2 appears on the screen to inform you of the program's progress. This process continues until the program has tested all distributed variables.

At this point, the program shows only the positive effect of the distributed variables. It now repeats the process, varying each distributed variable to its maximum negative tolerance. A minus sign precedes the trial number corresponding to the number of the distributed variable currently being calculated.

The program's last type of calculation is the worst-case analysis. In this mode, it again varies each distributed variable to its maximum tolerance; however, all variables change at the same time.

The program uses the data accumulated during the first part of the analysis to determine which variation (maximum positive or negative tolerance) yields the worst case value for each statistical variable. This process occurs for the worst case positive and worst case negative situations.

This program calculates two sensitivity numbers, relative and actual. The actual sensitivity is a ratio of the percent change in the function's value to the overall change in the element or variable causing that change. The relative sensitivity is a ratio of the percent change in the function to the percent change in the variable.

In the equation \( V \times 5 / 10 = \text{STAT} \), assume that the variable \( V \) has a nominal value of 25 with a tolerance of plus and minus 5 percent. Now, you can calculate the actual sensitivity of the variable \( V \) with respect to the variable \( \text{STAT} \).

The program first calculates the nominal value of \( \text{STAT} \), or 12.5 (25 \times 0.5 / 10). Then it varies \( V \) to its maximum positive tolerance, 26.25 (1.05 \times 25). Next, the program recalculates the equation using the new value for \( V \) to arrive at the answer, 13.125 (26.25 \times 0.5 / 10).

Then the program subtracts the nominal value from the new value, divides the result by the nominal, and multiplies by 100 to obtain the percent of change. The actual sensitivity in this example is
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8970 N. 55th P.O. Box 23956 Milwaukee, WI 53223 (414) 355-5454
Program Listing. Monte Carlo.

UNIVERSAL MONTE CARLO ANALYSIS PROGRAM
VERSION 3.3 12/26/82
COPYRIGHT (C) 1982 BY RONALD A. CANGRO
7628 Regina Drive
Fort Wayne, Indiana 46815
(219) 493-3239
ALL RIGHTS RESERVED

10 ' INITIALIZATION
150 CLEAR 5000
170 DEFINT C,E,I,O,P,X,Y: DEFSTR B
180 DEF FNR=X+ABS(X-P(EK(15659)),""
190 DV=20
200 DIM ES(164)' EDITING STRING
210 DIM QV(DV,4), RA(DV,2), VA(DV), ST(DV,8), ME(DV), SD(DV)
220 DIM SP(DV, DV), SM(DV, DV), NO(DV) ' SENSITIVITY ARRAYS (USED FOR
M R X CASE & PL OT TING)
230 DIM MAR(S), FUS(S)' MATH & FUNCTION ARRAYS
240 DIM VS(DV,2) ' VARIABLE NAMES
250 DIM SS(DV)' STATISTICAL VAR NAMES
260 DIM LS(DV,2) ' EQUATIONS
270 DI=0' DEBUG FLAG
280 DE=0' DEBUG FLAG
290 DI=0' DEBUG FLAG (EQUATION FINAL VALUE)
300 FOR X=1TO S' MATH FUNCTIONS
310 READ MAS(X)
320 NEXT
330 DATA *,*/-/,+,-,
340 FOR X=1TO S' TRIG FUNCTIONS
350 READ FUS(X)
360 NEXT
370 DATA LOG,SIN,COS,TAN,INT
380 '---------------------------------------------
390 ' FIRST SCREEN
400.cls
410 PRINT STRING$ (63,"**") : PRINT : PRINTTAB (18) ; "MONTE CARLO SIMULATION"
420 PRINT : PRINTSTRING (63,"")
430 ' GET DATA FROM DISK
440 PRINT#896,"Do you want to recall data from the disk ( Y/N ) ? *".
450 GOSUB 9060 ' INPUT Y/N RESPONSE
460 IFAS="N" THEN 2980 ' INPUT NEW DATA
470 '---------------------------------------------
480 ' READ OLD DATA
490 PRINT#896,"What is the name of the file you wish to recall ?"
500 INPUT FS;IF LEN(FS)<0 THEN 520
510 GOSUB 9100:GOTO490
520 FS=LEFT$(FS,8)+"/UTA"
530 GOSUB9100
540 ON ERROR GOTO 18240
550 ER=0
560 OPEN "T",1,FS
570 IF ER<0 THEN 510
580 PRINT#896,'READING FILE ";FS;
590 RE=1
600 GOSUB 658 ' GET DATA
610 RE=0
620 GOTO 850 'EDIT ROUTINE
630 '---------------------------------------------
640 'SUBROUTINE TO READ OR WRITE DATA
650 IF RE THEN INPUT1,D ELSE PRINT1,D
660 PRINT1,1X0D
670 IF RE THEN INPUT1,VS(X),QU(X,1),QU(X,2),QU(X,4),QU(X,3)
ELSE PRINT1, VS(X) ;" ; QU(X,1) ; QU(X,2) ; QU(X,4) ; QU(X,3)
680 NEXTX
690 IF RE THEN INPUT1,C ELSE PRINT1,C

Listing continued
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Listing continued

780 FOR X=1 TO D+C
790 IF X=1 THEN INPUT1,VS(X),RA(X) ELSE PRINT1,VS(X);",";RA(X)
800 NEXTX
810 IF X=1 THEN INPUT1,SS(X),ST(X),ST(X,1)
820 NEXTX
830 IF X=1 THEN INPUT1,PS(X),ST(X,7),ST(X,1)
840 NEXTX
850 IF X=1 THEN INPUT1,ER ELSE PRINT1,ER
860 FOR X=1 TO E
870 IF X=1 THEN INPUT1,LS(X) ELSE PRINT1,LS(X)
880 NEXTX
890 CLOSE
900 RETURN
910 EDIT ROUTINE
920 CLS
930 PRINT"Enter the number to change or input."
940 PRINT"1 = DISTRIBUTED VARIABLES"
950 PRINT"2 = CONSTANT OR CALCULATED VARIABLES"
960 PRINT"3 = STATISTICAL VARIABLES"
970 PRINT"4 = EQUATIONS"
980 PRINT"5 = ALL"
990 PRINT"6 = SENSITIVITY ANALYSIS/WORST CASE"
1000 PRINT"ENTER = MONTE CARLO ANALYSIS"
1010 PRINT
1020 IF AS=INKEYS:IF AS="" THEN 950
1030 N=VAL(AS)
1040 IF N=1 THEN 3830 'START TRIALS
1050 ON N GOSUB 1020,1600,2150,2570,3100,7500
1060 GOTO 850
1070 'EDIST
1080 GOSUB 850 'SCREEN CHK
1090 NEXTA
1100 EDIST
1110 IF AS=INKEYS=İF AS="" THEN 950
1120 IF A<D THEN D=1
1130 IF A=D THEN GOSUB 1580 'SHIFTC
1140 IF A=1 THEN D=A;A=0;GOTO 1700;ADD A LINE
1150 IF A=2 THEN GOSUB 1430;E=**";GOTO 1700;SHIFT
1160 ES=VS(A;"**";STRS(QA(A,1));"**";STRS(QA(A,2));"**";STRS(QA(A,4));"**";STRS(QA(A,3))
1170 GOSUB 9250 'EDIT STRING
1180 GOSUB 1350 'SEPARATE STRING
1190 IF LE=1 THEN GOSUB 1560;GOTO1020;DDOWN (Delete line)
1200 VS(A)=ELS
1210 IF LE=2 THEN 1020;Partial String
1220 GOSUB 1350
1230 QA(A,1)=VAL(ELS)
1240 IF LE=2 THEN 1020
1250 GOSUB 1350
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<table>
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<tr>
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<th>HOME FAVORITES</th>
<th>AWAY FAVORITES</th>
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<td>80%</td>
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<tr>
<td>1980</td>
<td>53%</td>
<td>67%</td>
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<td>TWO YEAR AVG</td>
<td>55%</td>
<td>73%</td>
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<td>UPSET</td>
<td>HOME UPSETS</td>
<td>AWAY UPSETS</td>
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<tr>
<td>1981</td>
<td>63%</td>
<td>70%</td>
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<td>66%</td>
<td>68%</td>
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<td>71%</td>
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<tr>
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  - Over/Under Differential Graphing

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the sensitivity data. The printout shows each statistical variable, its nominal value, and worst case values.

Example Problems

Type in the listing (or load the program from Load 80), and save it to disk. You need to access only one file during the course of the program, and you don't need upper memory space. The program runs under any Radio Shack equivalent Disk Basic.

Load the program under file name Monte/BAS. When the program runs, the screen in Fig. 3 should appear. Since you haven't saved any data to disk yet, answer No to the question: Do you want to recall data from the disk (Y/N)? After reading the brief instructions, you can begin to enter data.

The first example is a simple electronic circuit problem (see the schematic in Fig. 15). The component on the far left is a battery, connected in series with a switch and resistor.

When the switch is in position 2 (closed), it lets current flow through the resistor and charges up the capacitor (right) to the battery voltage according to a formula. How long it takes to achieve a certain voltage depends on

```
RATE OF RETURN TYPE PROBLEM
INITIAL VALUES

PART   NOMINAL VALUE  +TOLERANCE  -TOLERANCE DISTRIBUTION

VARCOSt  4          0.01          0.01          5
VOLUME   10000        0.2           0.2           0

STATISTICS

NUMBER OF TRIALS = 10

VARIABLE  MEAN  STD.DEV.  HIGH VAL  LOW VAL  MINIMUM % UNDER  MAXIMUM % OVER

PROFIT  7997.98  2121.38  10072.4  6442   1000  0  100  10
RETURN  59.95     17.92    81.44    26.84   25    0  100  10

RANGE  NUMBER   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20

PROFIT  0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0

RANGE  NUMBER   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20

RETURN  0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0          0

EQUATIONS USED:
1 PRICE  =  VARCOSt * VOLUME = PROFIT
2 PROFIT / INVEST  =  1 * 100 * RETURN

VARIABLES/CONSTANTS

1 PRICE  4.75
2 INVEST  5000

Figure 17. Rate of return analysis.

Continued on p. 102

80 Micro, September 1983 • 93
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1670 VS(A)=E15
1680 IF ER<>2 THEN RA(A)=VAL(ES)
1690 GOTO1680
1700 Y=A-D
1710 GOSUB 2880-'CDOWN
1720 C=C-1
1730 GOTO1680
1740 '  
1750 ' SHIFTC SUBROUTINE
1760 Y=1
1770 GOTO 1990
1780 A=INT(A)+1' SHIFT SUB
1790 AI=A-1' INC C ON RETURN
2000 FOR X=D+C TO D+1 STEP -1
2010 VS(X+1)=VS(X)
2020 RA(X+1)=RA(X)
2030 NEXTX
2040 RETURN
2050 '  
2060 'CDOWN SUB
2070 Y=1
2080 FOR X=D+Y TO D+C-1' CDOWN SUB
2090 VS(X)=VS(X+1)
2100 RA(X)=RA(X+1)
2110 NEXTX
2120 RETURN
2130 '  
2140 ' ESTAT
2150 CLS
2160 PRINT " "NAME","UPPER","LOWER"
2170 A=6: X=S: FOR A=1 TO S
2180 PRINTA: TAB(5): SS(A),ST(A,7),ST(A,1)
2190 GOSUB9250' SCREEN CHEK
2200 NEXTX
2210 A1=S
2220 LI=S:GOSUB8950:S=LI
2230 IF A=0 THEN RETURN
2240 IF (A<>INT(A)) AND (S>DV) THEN 2150
2250 IF (A<>INT(A)) AND (A<>1) THEN GOSUB 2390:ES="":GOTO2280-SHIFTS
2260 IF A<>1 THEN ES="":GOTO2280' ADD A LINE
2270 ES=SS(A)+ST(ST(A,7)+"ST(A,1))
2280 GOSUB 9250' EDIT STRING
2290 GOSUB 1350
2300 IF ER=1 THEN GOSUB2480:GOTO2150'-SDOWN
2310 SS(A)=E15
2320 IF ER=THEN2150
2330 GOSUB 1350
2340 ST(A,7)=VAL(ES)
2350 IF ER=THEN2150
2360 ST(A,1)=VAL(ES)
2370 GOTO 2150
2380 '  
2390 A=INT(A)+1' SUB SHIFTS
2400 FOR X=S TO A STEP -1
2410 SS(X+1)=SS(X)
2420 ST(X+1,7)=ST(X,7)
2430 ST(X+1,1)=ST(X,1)
2440 NEXTX
2450 S=1
2460 RETURN
2470 '
calculations and to simplify long equations.

3850 PRINT* 3) STATISTICAL - These will be tallied for each trial 1 and a
3860 PRINT* statistical analysis will be performed after the
3870 PRINT* ast trial.
3880 GOSUB 9120 'WAIT TO CONT
3890 ' ENTER VARIABLE AND EQUATIONS
3900 CLS:PRINT"ENTER THE NUMBER OF DISTRIBUTED VARIABLES ( "DV+
3910 "1")"; INPUTD
3920 IF D<>V THEN CLS:GOTO3100
3930 IF D<>V THEN CLS:GOTO3300
3940 PRINT:PRINT"Enter the distributed variables in the form -"
3950 PRINT:PRINT"NAME,NOMINAL,TOL,TOL,DISTRIBUTION"
3960 PRINT:PRINT"Where - 'NAME' is a string of 8 characters or
3970 'NOMINAL' is the nominal value of the variab
3980 'TOLERANCE' is the per cent variation from n
3990 'DISTRIBUTION' is 0 for flat to 5 for narrow

3190 FOR A=1TO D
3200 PRINT$768,"ENTER DISTRIBUTED VARIABLE "#",";A
3210 INPUT$A,A,Q(A,1),Q(A,2),Q(A,4),Q(A,3)
3220 PRINT$768,CHR$(31);
3230 VS(A)=LEFTS(VS(A),8)
3240 IF Q(A,2)>0 THEN Q(A,2)=Q(A,2)/100
3250 IF Q(A,4)>0 THEN Q(A,4)=Q(A,4)/100
3260 IF Q(A,3)<0 OR Q(A,3)>5 THEN PRINT$"DISTRIBUTION MUST
3270 BE BETWEEN 0 AND 5";GOTO3200
3270 NEXTA
3280 ' GOSUB 9120:CLS 'WAIT TO CONT
3290 PRINT$"ENTER THE NUMBER OF CONSTANT OR CALCULATED VARIABLES
3300 ( "DV+1")"; INPUTC
3310 IF C<>D THEN CLS:GOTO3300
3320 IF C<>D THEN CLS:GOTO3300
3330 PRINT:PRINT"Input the constant variable name ( < 9 char. ), "
3340 PRINT"Followed by its constant value. Enter 0 if it is to"
3350 PRINT"be calculated."
3360 FOR A=1 TO D+C
3370 ' * * * * * * * * * * *
3380 ' 3390 PRINT$768,CHR$(31);"VARIABLE ";A=D;" NAME,CONSTANT";
3400 INPUT VS(A),RA(A)
3410 NEXTA
3420 GOSUB 9120
3430 GOTO 3460
3440 '
3450 ' 3460 CLS:PRINT"ENTER THE NUMBER OF STATISTICAL VARIABLES ("DV+1
3470 ")"
3470 INPUT S
3480 IF S>D THEN GOTO 3460
3490 IF S=0 THEN CLS:GOTO3590
3500 PRINT
3510 PRINT$TAB(30);"STATISTICAL VARIABLES"
Listing continued

3520 PRINT  
3530 PRINT"Input variable in the form: NAME,UPPER LIM,LOWER LIM."
3540 FOR A=1 TO 5
3550 PRINT?68;CHR$(30);"VARIABLE ";A;
3560 INPUT S(A),ST(A,7),ST(A,1)
3570 NEXTA
3580 GOSUB9120;CLS
3590 PRINT"ENTER THE NUMBER OF EQUATIONS";
3600 INPUT E
3610 IF E>2*DV THEN CLS;GOTO3598
3620 IF E=0 THEN 3830
3630 NEXT
3640 GOSUB1950
3650 PRINT"Enter the equations in the form:"  
3660 PRINT"oper var oper var oper var oper var = var comment"  
3670 PRINT"where VAR is a previously defined variable followed by a space"  
3680 PRINT"and OPER consists of one of the following math operators:"  
3690 PRINTTAB(22);"+ - / * ["  
3700 PRINT"or one of the following trig operators:"  
3710 PRINTTAB(20);"LOG SIN COS TAN INT"
3720 PRINT"the functions are in radians and the LOG is natural. Each"  
3730 PRINT"operator must be followed by a space. The expression is"  
3740 PRINT"evaluated from the left to the right. The COMMENT is ignored."
3750 PRINT"A null equation (for comment purposes) may be entered by"  
3760 PRINT"starting a line with a ' ' followed by a space."
3770 FOR X=1 TO E
3780 PRINT?896;CHR$(30);"EQUATION ";X;
3790 INPUT LS(X)
3800 LS(X)=LS(X)+" "
3810 NEXTX
3820 GOSUB9120;CLS
3830 INPUT;"ENTER THE NUMBER OF TRIALS"; N
3840 IF N=0 THEN 858 'EDIT
3850 PRINT?724;"MONTE CARLO ANALYSIS";
3860 PRINT?860;"TRIAL ":X;
3870 STATISTICS INITIALIZATION
3880 FOR A=1TO5
3890 ST(A,2)=0 ' BELOW LOWER LIM
3900 ST(A,3)=-189 ' HIGHEST
3910 ST(A,4)=189 ' LOWEST
3920 ST(A,5)=0 ' SUM
3930 ST(A,6)=0 ' SUM OF SQUARES
3940 ST(A,8)=0 ' ABOVE UPPER LIM
3950 SMA(A,1)=189:SM(A,13)=189
3960 FORX=1TO13
3970 SP(A,X)=0
3980 NEXTX
3990 SMA(AL)=ST(A,1):SMA(AL)=ST(A,1) ' SET UP RANGE
4000 S=(ST(A,7)-ST(A,1))/10
4010 FORY=2TO11
4020 SMA(A,Y)=SM(A,Y-1)+Z
4030 NEXTY
4040 NEXTA
4050 NEXT
4060 FOR TR=1 TO N

4070 GOSUB8580 ' RANDOMIZE SUB
4080 '  
4090 GOSUB 4140 ' CALC VARIABLES
4100 IF ER THEN GOTO850 ' EDIT
4110 GOTO4490
4120 '  
4130 'CALCULATE REMAINING VAR
4140 FOR A=1TO5
4150 PRINT860:CHR$(30);"TRIAL ";TR;TAB(15);"EQUATION ";A;
4160 LS(LS(A))
4170 PLS="*"
4180 AN=0
4190 ' MAINLOOP
4200 GOSUB5740 ' GETVAR
4210 IF ER=0 THEN 4260
4220 IF ER<2 AND PLS="*" THEN 4260
4230 IF ER=2 THEN 4440 'IGNORE COMMENT
4240 '  
4250 GOSUB 6580 ' RETURN ERROR
4260 GOSUB 7810 ' CALC
4270 IF ER=0 THEN 4380
4280 '  
4290 GOSUB 6580 ' RETURN
4300 IF D=0 THEN 4330
4310 PRINT"ANS=";AN
4320 PRINT"VPRES=";VP
4330 IF D<0 THEN 4370 ' CHECK FOR DONE
4340 PLS=OPS
4350 GOTO 4280
4360 ' MAINDONE
4370 IF D=0 THEN 4440
4380 PRINT"FINAL VALUE OF ";  
4390 IF ST=0 THEN 4240
4400 PRINT$$(IN);" IS ";VA(IN)
4410 GOTO4430
4420 PRINT$$IN;" IS ";RA(IN)
4430 GOSUB 6580
4440 NEXT A
4450 RETURN
4460 '  
4470 ' DO STATISTICS
4480 '  
4490 GOSUB 8720 ' STAT
4500 '  
4510 NEXT TR
4520 GOSUB 8860 ' CLEANUP
4530 '  
4540 ' PRN
4550 PRINT$896,CHR$(31);" Do you want a hard copy ( Y/N )?";
4560 GOSUB 9960
4570 IF AS="Y" THEN PR=1 ELSE PR=0
4580 INPUT"Enter a comment line";CS
4590 GOSUB 1920;CLS;IF PR THEN LPRINT CHR$(27);CHR$(14) ' DOUBLE WIDTH
4600 L=LEN(CS)
4610 PRINTTAB((64-L)/2);CS ' CENTER TITLE
4620 IF PR THEN LPRINT TAB((64-L)/2);CS
4630 PRINTTAB(25);"INITIAL VALUES"
4640 IF PR THEN LPRINTTAB(25);"INITIAL VALUES"
4650 PRINT
4660 IF PR THEN LPRINT" ";
4670 PRINT"PART";TAB(15);"Nominal Value";TAB(33);"+TOLERANCE";TA

Listing continued
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5700 PRINT "FILE SAVED"
5710 CLOSE:END
5720 "SUBROUTINE TO GET A VALUE FROM LS"
5730 ER=8
5740 IF DE=8 THEN 5770
5750 IF DE=8 THEN 5770
5760 PRINT "GETVAR SUB":PRINT
5770 GOSUB 6420
5780 IF ER=8 THEN 5840 CONT1
5790 IF ER=8 THEN RETURN' IGNORE COMMENT
5800 PRINT896,CHR$(30);"NO SPACE FOUND AFTER VARIABLE (";LEFT$(
5810 LS,10);") IN EQUATION ";A;
5810 RETURN
5820 "CHECK FOR RESERVED TRIG FUNCTIONS
5830 OP=8' CONT1
5840 IF TRIG=OP THEN 5850
5850 FOR X=1 TO 5
5860 IF TRIG=OP THEN OP=X
5870 NEXTX
5880 IF OP=8 THEN 6100' CONT2
5890 IF D1 THEN PRINT "TRIG FUNCTION ENTERED":PRINT
5900 GOSUB 6420' GETOKEN
5910 IF ER THEN 5800' SPACE ERROR
5920 GOSUB 6660' EVAL
5930 IF ER THEN RETURN
5940 ON OF GOTO 5960,5980,6000,6020,6030
5950 'LOG
5960 T0=LOG(T0):GOTO6440
5970 'SINE
5980 T0=SIN(T0):GOTO6440
5990 'COSINE
6000 T0=COS(T0):GOTO6440
6010 'TANGENT
6020 T0=TAN(T0):GOTO6440
6030 T0=INV(T0)
6040 IF D1=0 THEN 6280
6050 PRINT "FUNCTION":";FU8(OP)
6060 PRINT "ANSWER":T0:PRINT
6070 GOSUB 6570' DISP
6080 GOTO 6200
6090 'CONT2 - CHECK FOR CONSTANT
6100 X=ASC(LEFT$(T0,1));IF X=48 OR X>57 THEN 6180
6110 T0=VAL(T0)$
6120 IF D1=0 THEN 6280
6130 IF D1=0 THEN 6280
6140 PRINT "CONSTANT VAL=";T0:PRINT
6150 GOSUB 6570' DISP
6160 GOTO 6200
6170 'GOSUB 6660' EVAL
6180 IF ER THEN RETURN
6190 IF ER THEN RETURN
6200 VP=8
6210 IF DE=8 THEN 6240
6220 PRINT "VPHS=";VP
6230 GOSUB 6580
6240 GOSUB 6410
6250 IF ER=8 THEN RETURN' COMMENT
6260 IF SP THEN 6290
6270 ER=8
6280 RETURN
6290 IF ER THEN 5800
6300 'CHECK FOR PROPER MATH OPERATOR
6310 OP=8
6320 FOR=1TO6
6330 IF T0=MA$(X) THEN OP=X
6340 NEXTX
6350 IF OP=8 THEN 7120' ERROR
6360 OP=T0$'
6370 RETURN
6380 ''SUBROUTINE TO GET ONE VAR FROM LINE
6400 '
6410 'GETOKEN SUBROUTINE
6420 ER=8
6430 IF DE=8 THEN 6450
6440 PRINT "GETOKEN SUB":PRINT
6450 T0$=""
6460 SP=INSTR(LE$,"")
6470 IF (SP>9) OR (SP=0) THEN ER=1
6480 IF ER=1 THEN RETURN
6490 L=LEN(LE$)
6500 T0$=LEFT$(LS,SP-1)
6510 LS=RIGHT$(LS,L-SP)
6520 IF T0$="." THEN ER=2' COMMENT
6530 IF DE=8 THEN 6560
6540 PRINT "T0$":T0$;"LS":LS:PRINT
6550 GOSUB 6580' DISP
6560 RETURN
6570 '
6580 PRINT
6590 PRINT 'PRESS 'ENTER' TO CONTINUE'; SCREEN WAIT SUB
6600 INPUTS
6610 RETURN
6620 '
6630 'SUBROUTINE TO EVALUATE VARIABLES (EVAL)
6640 '
6650 '
6660 ER=8
6670 IF D1=0 THEN 6690
6680 PRINT "EVAL SUB":PRINT
6690 ST=8
6700 IN=8
6710 FOR X=1 TO C+D
6720 IF VS(X)=T0$ THEN IN=X
6730 NEXTX
6740 IF IN=8 THEN 6820' EVALS
6750 T0=RA(IN)
6760 IF D1=0 THEN 6800
6770 PRINT "TOKEN VALUE =";T0
6780 PRINT "INDEX =";IN;' RAND VALUES =";RA(IN)
6790 GOSUB 6580' DISP
6800 RETURN
6810 '
6820 FOR X=1 TO S' EVALS
6830 IF SS(X)=T0$ THEN IN=X
6840 NEXTX
6850 IF IN THEN 6910
6860 'GOSUB 6660
6870 PRINT896,T0$;"IS AN UNDEFINED SYMBOL IN EQUATION ";A;
6880 ER=1
6890 RETURN
6900 '
6910 ST=1
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two variables, size of the resistor and size of the capacitor, assuming a constant battery voltage.

First consider the problem's components. The battery produces a constant voltage of 9.0 volts. The resistor is 10,000 ohms and has a manufacturing tolerance of plus or minus 10 percent. The capacitor is .22 microFarads, which you can express as .22 times 10 to the minus six (.22 x 10^-6) Farads and has a tolerance of +50 and -20 percent. The switch does not enter into the calculations.

In defining the variables, use the following set-up:

CONSTANTS: BATT,9 (Battery)
DISTRIBUTED: RES, 10000, 10, (Resistor)
          10, 3
CAP, .22E-6, 50, (Capacitor)
          20, 2

To find how long it takes the capacitor to charge up to a specific voltage, use the following formula:

\[
T_c = - \ln \left(1 - \frac{\text{Output } V}{\text{Applied } V}\right) \times R \times C
\]

In this equation, the charge time \(T_c\) equals the negative of the natural log of the quantity in parentheses, times the resistor value \(R\) and times the capacitor value \(C\). Due to the program's limited mathematical evaluation power (it cannot use parentheses), you must break the equation above into several equations to input.

Call the output time \(T_c\) TIME and define it as a statistical variable, since it's the value with which you're ultimately concerned. The equation would appear as in Table 2.

The first equation evaluates the division within the parentheses. The second equation completes the rest of the calculation within the parentheses, and the last equation finishes the remainder of the original equation.

Notice that you have to create two intermediate calculated variables to simplify the equation (Ratio and CVolt). You must define these in the variable section before using them in an equation.

Note also the way you create the negative of the log function by subtracting it from zero. The program would flag a negative sign by itself as an error.

Now enter into the computer all the variables and equations as previously defined. You have four constant/calculated variables, two distributed variables, one statistical variable, and three equations. Return to the main menu and enter the edit mode by pressing keys one through four.

To run the Monte Carlo analysis, press the enter key. The program asks for the number of trials; enter 50 to begin. As the program executes, the trial number and the equation the computer is currently calculating appear at the bottom of the screen.

When it completes the analysis, the program asks if you want a printout. If you have an attached printer, you can answer yes. Your printout will be similar to Fig. 16.

The first printout line is the title you
assign when the program asks for a
coment line prior to the Monte Carlo
analysis display. Next the program lists
the initial values of the distributed
variables. The plus and minus tole-
rances are in decimal form.

The next section shows the actual
statistical analysis. The number of trials
run appears, followed by a summary of
each statistical variable. The mean is the
arithmetic average of all the trials run.

The Std. Dev. is the standard devi-
ation of the mean, the measure of how
close each value is to the calculated
mean. The smaller this number, the
more closely the values group around
the mean.

The high value and low value in the
sample are records of the highest and
lowest values the program calculated
for that variable over all the trials. This
gives you an idea of the range of values.
As the number of trials increases, these
numbers approach the worst case values
calculated in the sensitivity analysis.

The minimum is the lower limit you
set when you enter the statistical vari-
able. The percent under is the percent of
values that fell below the limit during
calculation of this variable. The maxi-
imum and percent over are the upper
limits and percent over that limit respec-

The sample printout also shows a
graphical representation of the statis-
tical section. The program automa-
tically calculates the range using the
minimum and maximum limits.

<table>
<thead>
<tr>
<th>CONSTANT/CALCULATED:</th>
<th>BATT,.9</th>
<th>VOLT, 3</th>
<th>(Battery voltage)</th>
<th>OUTPUT/APPLIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISTRIBUTED:</td>
<td>RES, 10000.0</td>
<td>10.3</td>
<td>(Output voltage)</td>
<td>Parenthesis eval</td>
</tr>
<tr>
<td>STATISTICAL:</td>
<td>TIME, .8E-6</td>
<td>.50, 20, 2</td>
<td>(Intermediate)</td>
<td>RES * CAP = TIME</td>
</tr>
<tr>
<td>EQUATIONS:</td>
<td>VOLT / BATT = RATIO</td>
<td>1 - RATIO = CVOLT</td>
<td>(Resistor)</td>
<td>104 • 80 Micro, September 1983</td>
</tr>
</tbody>
</table>

The number right of the range shows
the number of values less than or equal
to that range but greater than the pre-
vious range. When you total them,
these numbers should equal the number
of trials run.

Following the graphical sample is a
list of equations used in the calcula-
tions. Last is a list of constant or cal-
culated variables.

Note that the numbers after Ratio
and CVolt are not the numbers you ini-
tially entered because they're calculated
variables. They appear on the right side
of an equation. The number you see is
the one the program calculated for this
variable on the last trial run. This num-
ber might change, depending on other
variables in the equation.

This information indicates that you
have a large distribution of values over
the entire range in question. Five per-
cent is under your minimum limit, and
15 percent is over the maximum.

The lowest value recorded was
7E-04 or .0007 and the highest
number recorded was 1.3E-03 or
.0013—not that far from the limits of
.0003 to .0010. A small change in the
tolerance of your parts should get you
in range.

A sensitivity analysis would reveal
which of the two components affects
the answer more (is more sensitive). If possible, you should change that one.

Another Problem

Now, imagine a business decision problem in which you’re trying to market a new product. You need to invest $5,000 to bring this product to market. The three factors of uncertainty are selling price, variable cost, and annual sales volume. Each uniquely affects the profit from the product.

For the purposes of this example, assume the product has a one year life, and each of the factors is independent. You need two pieces of information from the analysis to make a more intelligent decision concerning this investment.

First, you need to know what kind of average return on your investment you can expect from this product. You also need to know how much risk is involved based on the probabilities of achieving different profit levels.

Set the amount of the investment and the price as constant values. The variable cost and volume are unknown values, so they assume a probability distribution. Enter the variables of concern, the profit and return on investment, as statistical variables. The equations reflect the necessary calculations to obtain the profit and return on investment numbers (see Table 3).

After you enter this data, run a Monte Carlo analysis. Figure 17 is a sample printout of 10 trials; I used the same format as for the electronic circuit problem, but I’ll briefly explain the data.

You see that a mean profit of about $8,000 is what you expect. A mean return of about 60 percent is also within your limits. However, a 10 percent over limit figure appears on both values. The distribution is a little on the high side.

You’d be more competitive if you could cut your price but still maintain your minimum limits. Also, you should tighten your distribution on the profit, an indicator of the venture’s riskiness. You can accomplish this by tightening the tolerances on your distributed variables.

Again, a sensitivity analysis would show the variables most sensitive to change and the absolute limits (worst case) of each variable. You should experiment with this problem to determine the optimum values for profit and return.

Remember that the benefit of Monte Carlo analysis over worst-case analysis is its ability to minimize risk through probability. It simulates the real world in a positive manner, instead of clouding your decision with unlikely pessimistic outcomes.

Contact Ronald A. Cangro at 7628 Regina Drive, Fort Wayne, IN 46815.

| CONSTANT VARIABLES: | INVEST: 5000 |
| DISTRIBUTED VARIABLES: | PRICE: 4.75 |
| VARCOST: 4, 1, 10, 5 |
| VOLUME: 10000, 20, 20, 0 |
| PROFIT: 1000, 5000 |
| RETURN: 100, 25 |

\[ \text{EQUATIONS: } \text{PRICE} - \text{VARCOST} \times \text{VOLUME} = \text{PROFIT} \]
\[ \text{INVEST} / \text{INVEST} - 1 \times 100 = \text{RETURN} \]

Table 3. Set-up for Business decision problem.
What's the DIF?

by David Haan

Format and print financial statements in one step with the DIF (data-interchange format) file while avoiding typographical errors.

I recently became the caretaker of my church's financial records. One of my duties is to provide monthly statements, in a simple form, for each church leader.

This statement includes a breakdown of the month's receipts, expenditures, and a balance forward (see Fig. 1). I also have to prepare a quarterly statement summarizing the monthly totals for credit and debits to date.

Generating a quarterly report that could be distributed to the general membership sounded difficult. In the past, this report had been typewritten using the general ledger. This method was time-consuming and error-prone; errors made had to be corrected and the report often had to be retyped.

VisiCalc, the package I chose to keep the church's records, contains an optional data-save format called DIF (data interchange format). A data file can be generated that is directly accessible from a Basic program of your own design. Using this technique, a report can be formatted and printed in one step, with no chance of typographical errors or an incorrectly read entry. See the sample quarterly statement in Fig. 2.

When you save a VisiCalc file using the DIF file option, a specific format is generated that can be accessed by many different languages, such as Pascal, Fortran, and Basic. This format standard, established by Software Arts Inc., is made up of header blocks that indicate the type of information that is to follow (see Fig. 3).

Header Items

Some of the seven different header items are the Table, Vectors, Tuples, and Data headers. When I saved the quarterly report of Fig. 2 as a DIF file, the first part of the file was organized in the format as shown in Fig. 4. In Fig. 4, the first header item is called Table. This header allows verification that the file is a data table. The two numbers following must be a zero and a one with a title string following. In this case, the title

| ANYONE'S CHURCH, ANYWHERE, USA. |
| SECOND QUARTER REPORT 1982 |
| DONATIONS | REQUIRED | OVER/SHRT | EXPENSES |
| THRU March 1982 | 11,242.99 | 10,313.55 | 929.44 | 10,192.21 |
| April 1982 | 3,562.36 | 3,173.40 | 388.96 | 3,404.45 |
| May 1982 | 4,258.42 | 3,966.75 | 291.67 | 3,668.54 |
| June 1982 | 3,001.56 | 3,173.40 | 171.84 | 3,440.22 |
| LESS: EXPENSES | 22,065.33 | 20,627.10 | 1,438.23 | 20,705.42 |
| GENERAL FUND BALANCE | 1,359.91 |
| CASH ON HAND | |
| July 1 1982 | 1,359.91 |

| GENERAL FUND REPORT |
| EXPENDED | BALANCE REMAINING ON BUDGET |
| Minister Salary | 11,100.00 | 11,100.00 |
| Sunday School | 362.87 | 287.13 |
| Choir | 150.00 | 50.00 |
| General Supplies | 1,375.16 | 774.84 |
| Secretary | 1,827.00 | 1,827.00 |
| Utilities | 3,823.56 | 2,576.44 |
| Repair & Maintenance | 2,066.83 | 3,933.17 |
| 20,705.42 | 20,548.58 |

Figure 1. Monthly statement.

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MX-80,.............SAVE
FX-100,.............SAVE

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> See List of Advertisers on Page 322

80 Micro, September 1983 • 109
The data in the DIF file has the following format:

Type Indicator, Value
String

The type indicators and meanings are as follows:

<table>
<thead>
<tr>
<th>Type Indicator</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>This type indicates that this is a special type of data. It is either a BOT (beginning of tuple) or an EOD (end of data). BOT or EOD will be in the string field and the value field will be 0.</td>
</tr>
<tr>
<td>0</td>
<td>This type indicates that this is numeric data and the data will appear in the value field. The data can be non-integer, signed, and have exponentiation. The string field will contain a V.</td>
</tr>
<tr>
<td>1</td>
<td>This type indicates that this is string data. The string data will appear in the string field, with a 0 in the value field.</td>
</tr>
<tr>
<td>2</td>
<td>This indicator is a special case and is used to pass special information between programs.</td>
</tr>
</tbody>
</table>

Figure 3. DIF file type indicators.

is null and the Table header will not be used for anything in this demonstration.

The next header item, Vectors, indicates that the information following will give the number of vectors in the data file. A vector can be thought of as either a row across the page or as a column down the page. Its definition depends on whether the data file is saved in rows or in columns.

I used the vector in its default state, where a vector is defined as a row of information across the page. The number of vectors is indicated by the second number following the word vectors. In Fig. 2, there are 22 vectors.

The third header item, Tuples, indicates that the information following will show the number of tuples in the data file. As with a vector, a tuple can be a row across the page or a column down the page. In the default condition, a tuple is a column of information. The number of tuples is indicated by the second number following the word tuples and in Fig. 2 it is 13.

The fourth header item, Data, indicates that the following data is either numeric or string data. You will notice that the first piece of information is a -1,0 followed by BOT. The field where the -1 is located is called the type indicator. Valid type indicators are -1, 0, 1, and 2. Figure 3 contains an explanation of what each type indicator means. As seen in Fig. 3, the -1,0 followed by BOT indicates that this is the beginning of a tuple. This will occur at the beginning of each tuple. The next item in Fig. 4 is a 1,0 followed by the word donations. If you refer back to Fig. 2, you will see that donations is the first piece of data located at the coordinates of the first vector and the first tuple. The type indicator 1 indicates that the data is string data, not numeric, and the number value field equals zero. The next data item of Fig. 4 is preceded by a 1,0, which is followed by Needed/Wk. In Fig. 2, Needed/Wk is at the coordinates of the first tuple and the second vector.

The third data item in Fig. 4 is a 0,793.35 followed by a V. The zero indicates that the data item is numeric and 793.35 is the value. The V following also indicates that the data is a numeric value.

If you continued printing the data beyond the end of Fig. 4, you would see that the data is saved one tuple at a time in the format of tuple 1, vector 1; tuple 1, vector 2; tuple 1, vector 3; and so on, until the entire tuple is saved. The next tuples are saved in the same manner until all of the tuples are saved. The final entry in the file after all the tuples are saved would be a -1,0 followed by EOD indicating the end of data.

This is a brief explanation of the DIF file format, and is only meant to give you the basics. For a complete explana-
If at any time an error in the DIF file is detected, an appropriate message will be printed on the screen and execution of the program will be aborted.

You might have noticed that in assigning the data from the DIF file to variables, I did not test to see whether the type of data being accessed was a numeric or string value by checking the type indicator. This was because I knew the vector and tuple location of each string or numeric value by looking at the layout of Fig. 2, and knew that this layout was not expected to change in the foreseeable future. This allowed the code in the demonstration program to be simplified.

If the layout of the DIF file is unknown, or if it will change now and then, you will have to test the type indicator of each piece of data and assign the data to appropriate variables. The remaining portion of the program formats and prints the data. The resultant report printed from this sample DIF file is shown in Fig. 5. A neat and consistent format is printed without the need for typing or corrections.

David Haan lives at 4361 Estes St., Littleton, CO 80123.
Program Listing. Basic program to generate report for general distribution.

10 REM THIS PROGRAM WILL ACCESS A DIF FILE GENERATED BY VISICALC AND
20 REM PROCESS THE DATA SO THAT A QUARTERLY REPORT CAN BE GENERAT
30 CLEAR 2000:DEFDBL D,E,O,R,S,T,V
40 BS="####.####";
50 DIM T(50),SU(50),FS(50),V(50),VS(50),RE(50):REM ALLOWS 50 VECT
ORS & TUPLES.
60 Dim NT(15),OS(50),RQ(50),DO(50),ET(50)
70 CLS:PRINT"THIS ROUTINE WILL GENERATE A QUARTERLY REPORT OF YOUR
80 PRINT:"ENTER YEAR":YR
90 PRINT:"ENTER THE QUARTERLY REPORT REQUIRED (1, 2, 3, 4).";
Q:IF Q<1 OR Q>4 GOTO 98
100 REM *****
110 REM THE DIF FILE IS OPENED AND THE NECESSARY HEADER ITEMS ARE R
120 REM ****
130 PRINT:INPUT"ENTER THE DIF FILENAME THE REPORT IS TO USE.";FS
140 OPEN "T",1,FS
150 INPUT #1,T,FS
160 INPUT #1,S,N
170 INPUT #1,SS
180 IF TS="VCTORS" THEN 220
190 IF TS="TUPLES" THEN 270
200 IF TS="DATA" THEN 350
210 GOTO 150
220 NV=N
230 PRINT"THE FILE HAS ";NV;"VCTORS"
240 IF NV<5 THEN 150:REM MAKES SURE FILE NOT TOO BIG.
250 PRINT"TOO MANY VECTORS TO HANDLE.";
260 CLOSE 1:STOP
270 NT=N
280 PRINT"THE FILE HAS ";NT;"TUPLES"
290 IF NT<5 THEN 150:REM MAKES SURE FILE NOT TOO BIG.
300 PRINT"TOO MANY TUPLES TO HANDLE.";
310 CLOSE 1:STOP
320 REM *****
330 REM GET DATA FROM DISK STARTING WITH FIRST TUPLE.
340 REM ****
350 FOR I=1 TO NT
360 INPUT #1,T1,V1
370 INPUT #1,SS
380 IF T1<>-1 GOTO 1050
390 IF SS<>"BOP" GOTO 1870
400 FOR K=1 TO NV:REM GET ALL VECTORS IN TUPLE.
410 INPUT #1,T1,V1
420 INPUT #1,SS
430 IF T1<>-1 GOTO 1050:REM MAKE SURE IT'S NOT BOT OR EOD.
440 V(K)=V1:VS(K)+SS+T1=1
450 NEXT K
460 IF I=1 GOSUB 1110:REM GET MONTHS OF YEAR FROM FIRST TUPLE.
470 IF I=2 GOSUB 1158:REM GET NUMERIC DATA.
480 IF I=NT(3) GOTO 500
490 ON (NT+1) GOSUB 1170,1210,1250,1290
500 NEXT I
510 CLOSE 1
520 REM *****
530 REM THIS SECTION FORMATS THE DATA AND PRINTS THE REPORT
540 REM ****
550 IF Q=1 THEN QS="FIRST"
560 IF Q=2 THEN QS="SECOND"
570 IF Q=3 THEN QS="THIRD"
580 IF Q=4 THEN QS="FOURTH"
590 LPRTAB(23) "ANYONE'S CHURCH, ANYWHERE, USA.";
600 LPRTAB(25) QS: "QUARTER REPORT";
610 LPRTAB:LPRTAB(29) "DONATIONS";
620 LPRTAB(72) "EXPENSES";
630 LPRTAB(29) "EXPENSES";
640 LPRTAB(72) "EXPENSES";
650 LPRTAB(44) "REQUIRED";
660 LPRTAB(59) "O
670 LPRTAB(59) "O
680 LPRTAB(59) "O
690 LPRTAB(59) "O
700 LPRTAB(59) "O
710 LPRTAB(59) "O
720 LPRTAB(59) "O
730 LPRTAB(59) "O
740 LPRTAB(59) "O
750 LPRTAB(59) "O
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770 LPRTAB(59) "O
780 LPRTAB(59) "O

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Fully compatible with both the Model I and the Model III. Mod I compiled programs work on a Model III, and vice-versa. ZBASIC works with NEWDOS-80, NEWDO+, DPLUS, LDOSET, MULTIDOS, ULTRADOS, TRSDOS etc. (Not TRSDOS Mod I double density)

BUILT-IN and much improved MUSIC and SOUND EFFECTS commands.

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ZBASIC 2.2 now has an INPUT @ command (similar to PRINT @).

The TAB function will now tab 255 columns on a printer. (BASIC cannot tab past column 64.)

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New math functions to calculate XOR and INTEGER REMAINDERS of a DIVISION.

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DEFSTR is now supported.

Eight disk files may be opened simultaneously; random, sequential or mixed.

LINE INPUT is now supported.

Invoke the compiler by simply hitting these two keys: "ZB".

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ZBASIC 2.2 Comes with CMD/FILE/CMC program from MISOSYS, to allow appending or merging compiled programs and machine language programs from tape or disk.

ZBASIC 2.2 DOES NOT SUPPORT THESE BASIC COMMANDS:

1. ATN, EXP, COS, SIN, LOG, TAN, and exponentiation. (However, subroutines are included in the manual for these functions.)
2. ERROR, ON ERROR GOTO, ERL, ERR RESUME
3. No direct commands like AUTO, EDIT, LIST, LUST ETC, although these commands may be used when writing programs.
4. Others NOT supported: CDLB, CIW, CSNG, DEFNN, FIX, FRE.
5. Normal CASSETTE I/O (ZBASIC supports it’s own SPECIAL CASSETTE I/O statements)
6. SOME BASIC COMMANDS MAY DIFFER IN ZBASIC. For instance, END jumps to DOS READY; STOP jumps to BASIC READY etc.
7. MEMORY REQUIREMENTS: to approximate the largest BASIC program that can be compiled in your machine (at one time), enter BASIC and type: PRINT (MEM-6500)/2. Remember, you can merge compiled programs together to fill memory.

ZBASIC 2.2 SPEED COMPARISON DEMO
To help give you an idea how fast compiled programs are, we have included this demo program.

ZBASIC 2.2 DEMO PROGRAM
Time to compile and run complete program: 10 MIN. 2 SEC.
BASIC Execution speed MOD I, LEVEL II: 17 MIN. 34 SEC.
BASIC Execution speed MOD I, LEVEL II: 10 MIN. 18 SEC.
BASIC Program size (WITHOUT VARIABLES): 895 BYTES
ZBASIC Program size (WITHOUT VARIABLES): 2733 BYTES

[Remember that the ZBASIC program includes an 1879 byte subroutine package.] Program shown exactly as compiled and run in BASIC and ZBASIC.

SIMUTEK COMPUTER PRODUCTS INC.
TECHNICAL QUESTIONS PLEASE CALL (602) 323-9391
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80 Micro, September 1983 • 115
Saving Strings

by David M. Keil

If you type faster than INKEY$ routines accept data, this program is for you. It keeps pace with even the fastest typists.

When you answer INKEY$ routine prompts, characters typed in too fast aren’t recorded. No matter how tight you make the routine, it never seems to keep up with the average typist. This is because the Model I/III takes time to verify each character, display it, and then add it to the input string. While the computer goes through this process, you might type in another character, which the computer doesn’t register. That’s the problem; here’s the solution.

How It Works

The computer keeps track of the cursor’s location and line 110 PEEKs it out of memory and puts it into Z1. Then it puts a block cursor at the present cursor position.

Lines 120 and 130 check whether a character has been input. The character is then converted to its ASCII value and stored in A. Numeric variables are faster to work with than strings.

The program then determines if you’ve pressed enter. If not, it checks for a valid character. If you’ve input no character or an invalid one, the program returns control to line 120. If the character is valid, the program POKEs a space into the current cursor position and continues to line 140.

Line 140 subtracts 15360 from Z1 to make it a Print @ location and compares it to LC. LC is the starting position of the input. If LC and Z1 are equal, the back arrow is an invalid input.

Then Z1 is compared to LC + IP. IP is the maximum number of characters allowed. If LC + IP and Z1 are equal, all characters except the back arrow are invalid.

If either condition is met, the character is not printed and control returns to line 110. Otherwise, the character prints and control returns to line 110.

Values are stored only on the screen. To put a character into memory, you just move the value from the screen into a string. You could PEEK the value from the screen one character at a time but a long string (20 characters or more) takes a while.

Line 150 is the line that makes this routine different. POKE a space into the current cursor position and add 15360 to LC to make it a memory address so you can compare it to Z1 (the cursor’s memory address). Next, use a little-known instruction called VARPTR, which loads the memory address of where A$’s address is

The Key Box

Model I and III
4K RAM
Cassette Basic

5 CLS
10 LC=512 : IP=10 : PRINT &LC: , ; : GOSUB 100
20 END
100 REM INKEY INPUT ROUTINE
110 21=PEEK(16417)*256+PEEK(16416) : POKE 21,143
120 AS=INKEY$ : IF AS="" THEN 128 ELSE A$=AS(AS) : IF A$>13 THEN
130 IF A$=9 AND A$=32 OR A$>9 THEN 128 ELSE POKE 21,32
140 21=21-15360 : IF 21=LC AND A$=8 Then 118 ELSE IF 21=LC+IP AND
A$>8 Then 118 ELSE PRINT A$: : GOTO 110
150 POKE 21,32 : LC=LC+15360 : A$=VARPTR(A$) : POKE A$,21-LC : POKE
E+A$,LC-40+LC/256)*256 : POKE A$,2,1MP(LC/256) : IP$=AS
160 RETURN

Program Listing
INSTANT ASSEMBLER 2.1

The Instant Assembler is a powerful assembly language development system for the TRS-80 and our new version is better than ever. If you are already an assembly language programmer, its unique design will greatly increase your productivity. If you are just getting started, there is no better assembler to help you learn the machine language and assembly programming. Some of its unique features are immediate assembly, which detects syntax errors as soon as is possible; and a complete source format that allows you to write assembly programs nearly three times as large as other assemblers in the same amount of memory. It also provides relocatable code modules that can be saved on disk or tape and linked together in memory, for large or multiple assemblies. The assembler can also be modified to meet your requirements for immediate debugging with the built-in debugger. You can quickly switch from assembler to debugger without losing your source. The built-in debugger will step through your program one machine instruction at a time, allow instruction and effect on the registers and memory. It can even use the symbols in your source code when stepping or disassembling. Our new version will load or save both conventional source files and its own condensed source format.

The Instant Assembler package includes six separate programs. The assembler itself includes the editor and built-in debugger. The Linking Loader is included in several versions for different memory sizes. A stand-alone version of the debugger (MicroMind) is also included. MicroMind can be relocated in memory, and has commands to single-step, step-breakpoints, display or alter registers or memory, find bytes or words, disassemble to screen or printer, convert between hex and decimal, and write SYSTEM tape records. The Linker comes with a comprehensive 65 page instruction manual with many examples.

 Specify Model 1 or Model III. TAPE INTASM 2.1 ................. $39.95 on tape
 Specify Model 1 or Model III. DISK INTASM 2.1 ............... $49.95 on disk

INSIDE LEVEL II

The Programmers Guide to the TRS-80 ROMS

This is a comprehensive reference guide to the Model I and Model II ROMS which allows the machine language or BASIC programmer to easily utilize the sophisticated routines they contain. Concisely explains set-ups, calling sequences, and variable passage for number conversion, arithmetic operations, and mathematical functions, as well as keyboard, tape, and video routines. Part I presents an entirely new complete composite structure which depends on the SYSTEM commands and executes in both BASIC and machine code with the speed and efficiency of a complex. In addition, the 18 chapters include a large body of other information useful to the programmer including tape formats, RAM usage, relocation of BASIC programs, USR call expansion, creating SYSTEM tape of your own programs, interfacing BASIC programs with machine code, and even some precautions for disk systems. INSIDE LEVEL II was reviewed in the April 1982 issue of 80 Micro which said "The book has no flaws; it is a perfect gem." Byte Magazine said "I recommend this book to serious machine language programmers.

 Includes updates for Model III. INSIDE LEVEL III ................ $15.95

DEMON DEBUGGER

DEMON (for DEBugger and MONitor) is a new and sophisticated tool with which you can explore and debug machine language programs. It has two modes of operation. In the STEP mode, it simulates the operation of the Z-80 and allows you to step through each machine language program one instruction at a time, showing you the address, hexadecimal value, Z80 mnemonic, register contents, and step count for each instruction. This ability is extremely useful in removing debugging your own program or that of others. In the INSPECT mode, which is also useful for examining the programs of others, you can examine the operation of the processor, the memory, and the registers. Demon also allows you to examine the program's memory, data, and features conditional assembly and listing, complete expression evaluation, ten significant characters for symbols, a complete range of pseudo-ops, and informative error messages. Demon comes with comprehensive instruction manual which includes the instruction set for each component and sample listings for assembly and C/0 subroutines. We also offer plans, schematic, and software to help you build your own inexpensive Demon program. The Demon is a readily available single chip computer that contains a RAM, EPROM, 680 oscillator, a counter/timer, and 271/0 lines in a single 40 pin package. A complete computer controller can be built with this one chip, a crystal, three capacitors, and a five volt power supply. Demon Model 1 or Model II. C8MS48 ................. $19.95 on disk

DUPLICATE SYSTEM TAPES WITH CLONE

The Tape Duplication system allows you to make copies of your own tape files, including basic programs and your own work. It is portable and can be used in conjunction with other systems. It is available in two versions, one for disk and one for tape. The system is based on the principle of hardware copying, which is simple and reliable. The system is compatible with all major disk and tape systems.

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 TELCOM II is an expanded version of the program for the most demanding telecommunications applications. It maintains the same ease of operation and all the features of our original program, but includes many enhancements. The terminal mode now has a help menu and a large window for simultaneous printer output at high baud rates. You can load disk files into the memory buffer from within the terminal mode, type into the buffer, transmit the buffer with a single command, and send files at a rate up to a 50 baud. You can even view the buffer or data that has already scrolled off the screen. TELCOM II has 10 different character programmable messages that can each be sent with a single command for auto logon or auto dialing, and the messages can include control codes and delays. It also has 5 different character translation tables for filtering and compatibility with different systems. TELCOM II also includes an error correction file transfer mode which is compatible with the LYNX program available on CP/M systems and the IBM PC. TELCOM II will exchange disk files with any computer running this protocol (including another TRS-80 running TELCOM II), automatically detect and set up the transmission. Files can be sent or fetched from an unattended computer. The extreme ease of use TELCOM I is known for has not been compromised. Reconfiguration of the programmable features is done internally, from clear menus for fast, easy operation. Both versions of TELCOM come with complete instruction manuals, which are available separately for $25 to help you decide which program is best suited to your needs.

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stored into A.

Now for the fun. You are going to POKE new values into A$’s memory addresses to move the contents of video memory into A$. First you POKE the difference between Z1 and LC into memory addressed by A. This holds the length of A$, which is 0–255. Next, A+1 and A+2 hold the least-significant byte and the most-significant byte of where A$ is stored in memory. You now POKE the address where the string is stored in video memory into A$’s memory addresses.

That’s it. Now A$ contains the values in video memory. In fact, A$ is actually stored in video memory. All you have to do is assign A$ to some other variable (in my program, IPS) and return.

All this seems to be a long process but to the computer it is fast and easy. You have eliminated string addition and subtraction and given your input routine a block cursor. All this makes for a very fast and powerful INKEY$ routine.

How to Use It

Using this program is easier than knowing how it works. Load LC where you wish your input to be. Then load IP with the maximum number of characters to be input. Now move the cursor to the correct location on the screen by printing at LC.

The program listed clears the screen and allows input at screen position 512.

“This program will work with any INKEY$ routine and eliminate those lost characters.”

When you press the enter key the program ends. When it ends, type the following:

PRINT A$,IPS

and press the enter key. Whatever you typed should print twice. To find out if A$ is stored in video memory, list the program and print A$ again. A$ contains whatever is on the screen at position 512. Now you see why you have to assign A$ to another variable before returning.

Here are a few more things you need to know before you use this program. Once A$ is reassigned it will be stored in high memory. So don’t worry about using A$ anywhere else in your program. You can locate lines 110–160 anywhere in your program.

Don’t be afraid to modify this program. Only the way of moving the input from the screen is new, so experiment. With a few changes this program allows you to use the shift right and left arrows to let the cursor move over characters without erasing them.

If you want to stop character loss in programs containing other INKEY$ routines I have another solution. A machine-language buffer utility will allow you to key ahead of your program. This program will work with any INKEY$ routine and eliminate those lost characters.

David Kell (10 W. Wilburn Ave., Greenville, SC 29611) is employed by the Better Software Assoc., where he is vice president in charge of software development.

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The Versatile Microprism

by Bradford N. Dixon
80 Micro Technical Editor

The IDS 480 Microprism provides the best features of a dot-matrix tabletop printer and adds the option of near-letter-quality output.

★★★★

The Microprism Printer
IDS Model 480
Integral Data Systems Inc.
Route 13
Milford, NH 03055
Models I and III
$649

Most printers fall into two categories: letter-quality printers that give a clean, professional appearance to correspondence and other writing projects, and dot-matrix printers with graphics capabilities and other options found only on these units.

Previously, you had to make a choice between these two types of printers. But the Microprism IDS 480, a dot-matrix printer with a near-letter-quality mode, gives you the flexibility to satisfy most of your printer needs.

Physical Description

The IDS 480 printer (see Photo 1) is an 18.7-pound tabletop unit nearly 16 inches wide, 11 1/2 inches deep, and 4 1/2 inches high. It accommodates 9 1/2-inch fanfold paper, cut sheet paper, and roll paper (mounted on a roller at the rear of the printer). The stepper motor feeds paper at a maximum rate of 3 1/2 inches per second.

The Microprism's case is white with a black dust cover and a clear plastic window for watching text and graphics as they are printed. The dust cover comes off to facilitate ribbon replacement and to set the DIP (dual in-line package) switches.

When the IDS 480 is viewed from the front (see Photo 2), the printer control panel is on the right. It features a red power indicator light, a green on-line/fault indicator, an on-line/off-line switch, a form-feed switch, and a line-feed/self-test switch.

As you look at the top of the printer with the dust cover removed, you can see the print head strike control lever within easy reach. The snap-in ribbon cartridge and mode-select DIP switches are also accessible.

The platen release lever is at the right rear of the printer's top surface. The power switch and a 25-pin EIA (Electronic Industries Association) interface connector are on the Microprism's rear panel. You can connect this plug to your computer via a serial EIA interface, RS-232C, or a parallel TTL (transistor-transistor logic) Centronics-compatible interface.

Performance

The IDS 480 Microprism is loaded with useful print controls that you won't find in many comparably priced dot-matrix printers.

As a serial printer, the Microprism offers switch-selectable data rates of 300, 1,200, or 9,600 bits per second. It also provides an automatic multiple-line buffer of approximately 1,400 bytes.

The IDS 480 supports the full 96-character ASCII set with true upper- and lowercase characters. Characters are available in two fonts, near-letter-quality and draft quality, at the flip of a switch.

The printer formats the 96 characters in a 24- by 9-dot matrix in the normal mode, 48- by 9-dot in the enhanced mode (double width). You can print up
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Photo 2. Front view of the IDS 480.

10 cpi normal

```
IJKLMNOPQRSTUVWXYZ
\_\_\_\_\_\_abcdefghi
10 cpi expanded
```

12 cpi normal

```
IJKLMNOPQRSTUVWXYZ
\_\_\_\_\_\_abcdefghi
```

12 cpi expanded

```
IJKLMNOPQRSTUVWXYZ
\_\_\_\_\_\_abcdefghi
```

16.8 cpi normal

```
IJKLMNOPQRSTUVWXYZ
\_\_\_\_\_\_abcdefghi
```

16.8 cpi expanded

```
IJKLMNOPQRSTUVWXYZ
\_\_\_\_\_\_abcdefghi
```

**Figure 1. Draft quality ASCII character set.**
to 110 characters per second (cps) in the near-letter-quality font.

Using the printer's DIP switches, you can select character densities of 10, 12, and 16.8 characters per inch (cpi). See Figs. 1 and 2 for examples of print types.

Maximum line length varies from 80 to 134 characters per 8-inch line, depending on the pitch setting. You can fit more characters on a line by opting for proportional spacing. The printer optionally inserts line spaces as small as 1/48 inch; normal line spacing is 1/12 inch.

Page formatting is software and DIP-switch selectable. Under software control, you can set top and bottom margins in 1/48-inch increments and left and right margins in 1/120-inch increments.

The wide variety of page formats and the quality of print make the IDS 480 a versatile tool for written documents. I wouldn't use the Microprism for important professional correspondence, resumes, or publication purposes.

But it seems perfectly suited for personal correspondence, interoffice memos, manuscripts, reports (with or without graphics), and other written material where letter-quality printing is not a necessity.

The Microprism printer can be completely software controlled; this is far and away its most significant selling feature. Software control is accomplished with special ASCII control characters.

Program-embedded functions might include character density changes, fixed proportional spacing, automatic text justification, line spacing, page length, margin positions, graphics data, double-width characters, and horizontal and vertical tabs.

The Owner's Manual

Care and feeding of the IDS 480 is a relatively simple matter. All normal maintenance is described in the owner's manual. It contains suggestions such as semiannual cleaning with a lint-free cloth or soft brush and lubrication with a high grade machine oil to keep the...
unit like new.

Replacing worn ribbon cartridges is a
snap because the dust cover comes off
easy access. However, since ribbon
life for the Microprism is estimated at
more than 1½ million characters, you
won't have to do this often.

The manual is a well-written expan-
ation of how to take full advantage of the
printer’s features. You should carefully
study the manual to become cognizant
of the valuable features you can call
through software control.

The manual is divided into five sec-
tions, and provides specific information
on running the printer. In addition, it
has a handy quick-reference index and a
glossary.

Conclusions

With a price tag of only $649, the IDS
Model 480 is a printer well worth the in-
vestment. Near-letter-quality characters
provide acceptable correspondence
text, while the graphics are comparable
to or better than other dot-matrix
printers in the same price range.

The manual is clear. Service and re-
pair procedures at the Integral Data
Systems Inc.’s home office have the
customer in mind.

The only problem I encountered dur-
ing testing was with the printer cable.
IDS doesn’t have a finished parallel
printer cable that connects the printer to
a TRS-80 Model I or III.

The cable provided for this review
had an adapter card attached that was
supposed to fit into the slot where the
25-pin male connector is located. It
didn’t fit.

At this time, the only way to use the
Microprism on a Model I or III is to file
down the card edges to make a tight
connection.

The people at IDS are aware of this
cable problem and have assured me that
it should be remedied before you read
this review. You must order the proper
cable for your computer separately.

Aside from the problems I encoun-
tered in trying to interface the printer,
the Microprism performed well. It is a
valuable acquisition if you need a small,
reasonably priced, tabletop printer.
DISK III
Internal floppy disk subsystem for Model III & 4 (includes controller, power supply, cabling, bracket and all associated mounting hardware).

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Project Assessment Technique

by David A. Plyer

Should you buy that roll-top desk and install new carpeting in the office? This program helps you appreciate depreciation in advance.

Project Assessment Technique (PAT) is a Level II Basic program for the TRS-80 Model I/III computer equipped with 16K of memory. It calculates the rate of return on an investment and lets you play "what if" games that help you choose between several business alternatives.

PAT displays a worksheet of 14 lines. You enter data about your project into the first 13 lines. PAT then computes the internal rate of return (IRR) based on your information and puts the answer in line 14. This number is a summary of the facts of your proposal, which you can compare with the IRRs of other projects. The larger the percent, the more desirable your venture.

PAT makes these assumptions:

- The project must prove itself within five years.
- All start-up expenditures occur at the same time.
- Capital is recovered at the rate of 20 percent per year.
- Product inventory is recovered fully in five years.

The Worksheet

PAT displays the worksheet shown in Fig. 1.

The mode indicator is < >. In addition to AUTO, there is MANL for

The Key Box

Model I or III
16K RAM
Cassette or Disk Basic
manual mode, PRNT for printing, and
CALC for calculating the IRR percent.
See the commands section for an
explanation of these indicators.

The asterisk is the marker. It tells you
where next to enter data. In the Auto
mode the marker automatically ad-
vances to the next line when you press
the enter key. You may move it up and
donw with the appropriate arrows (see
Commands).

You can enter a title of up to 35 char-
acters long. The title is automatically
centered when you hit the enter key.
Line 1, Non-depreciable Capital, is
the sum of all non-depreciable capital
associated with a project. Examples in-
clude buildings and land improvements
(items that do not wear out).

Line 2, Depreciable Capital, is the
sum of all depreciable capital needed to
start a project. This includes tools, fur-
niture or machinery (items that wear
out). The total is fully recovered in a
straight-line fashion over five years.

Line 3, Expense (A), is the sum of all
development costs, supplies, and so on
necessary to initiate a project. Line 4,
Expense (B), is the same as line 3. PAT
adds Expenses A and B and treats them
as one. They are shown as separate
items for your convenience.

Line 5, Product Inventory, is the
sales value of items produced but not
yet sold. This is an annual average
assumed to remain fixed during the
five-year life of the project. It is non-
depreciable and is fully recovered in
year five.

Line 6, Net Salvage, is the differ-
ence between the value received for facili-
ties made obsolete by the new project and
the cost to remove them. If cost exceeds
value received then enter a negative
number.

Lines 7-11, Net Income, are the fore-
cast of the income this project will
generate. The amount entered in each
line is the difference between income and
expenses for wages, taxes, and so on
in the corresponding year.

Line 12, Income Tax Rate (percent),
is the corporate tax rate on income.
Unless you enter another value, PAT
uses 43 percent. Consult the IRS for the
latest information.

Line 13, Investment Credit (percent),
is a one-time tax deduction based upon
the amount of depreciable capital in-
vested in line 2. PAT assumes a tax
credit of 10 percent. Consult the IRS for
the current tax credit on capital having a
five-year life.

Line 14, IRR (percent), is your ba-
rometer for the project. It summarizes
the first 13 lines of the worksheet. The
The following are multi-key commands. Key in amount then press enter to save amount keyed in clear to erase amount keyed in + — */ to modify a value by amount keyed in I to inflate income from * to year five by amount keyed in

The following are single key commands. Just press A to disable or enable automatic mode C to compute IRR (%) D to duplicate income from * to year five E to end program and clear screen H to recall instructions—press space bar to continue P to print contents of screen R to reset all values to 0 or default amounts T to revise title Up/Down arrow to move * up and down

Table 1. PAT commands.

```
2090
2100
2110 FOR X$: = 48 TO 57
2120 IF MS: <> CHR$(X$) GOTO 2150
2130 K = K + 1
2140 GOTO 4380
2150 NEXT X$
2160
2170 IF MS: <> " . " GOTO 2240:
2180 IF KI: <> 0 GOTO 1930:
2190 KI: = 1
2200 K2: = 1
2210 K: = 1
2220 GOTO 4460
2230
2240 IF MS: <> "T " GOTO 2400:
2250 K: = 0
2260 KI: = 1
2270 K2: = 0
2280 IL: = 1
2290 I: = 0
2300 TS: = " 
2310 PRINT$(64 * 11 + 7), " 
2320 IF V(11) <> 0 GOTO 2360
2330 PRINT$(64 * 11 + 35), AS;
2340 GOTO 6570
2350
2360 PRINT$(64 * 11 + 35), ;
2370 PRINT$("";V(11);
2380 GOTO 6570
2390
2400 IF MS: = "E " GOTO 7000:
2410 IF MS: <> CHR$(11) GOTO 2590:
2420 IF TS: = " " GOTO 1930
2430 PRINT$(64 * I + 35), AS;
2440 IF V(11) = 0 GOTO 2530
2450 IF I: <> 14 GOTO 2500
2460 PRINT$(1); ,
2470 PRINT$("";V(14);
2480 GOTO 2530
2490
2500 PRINT$(64 * I + 35), ;
2510 PRINT$("";V(1);)
2520
2530 GOSUB 4720
2540 K2: = 0
2550
2560 IF I: = 14 AND A: < 0 GOTO 1790
2570 GOTO 1930
2580
2590 IF MS: <> "H " GOTO 2630:
2600 GOSUB 4720
2610 GOTO 5870
2620
2630 IF MS: <> "C " GOTO 2700:
2640 PRINT$(64 * I + 7), " 
2650 PRINT$(58, "CALC ");
2660 GOSUB 4720
2670 IL: = 1
2680 GOTO 4860
2690
2700 IF MS: <> "R " GOTO 2830:
2710 IL: = 1
```

"Unlike the multi-key commands...single-key commands are immediate."

larger the value, the more attractive the proposal is. If you were to take each year’s income, adjust it for taxes and tax credits (lines 12 and 13), discount it by the IRR (percent), and add them together, their sum would equal your total investment in lines 1–6.

**Entering Data**

PAT operates in the Auto mode unless you tell it otherwise (see Commands). In this mode all entries are made by keying in a number and then hitting enter. The value is automatically right-justified and the marker (*) moved to the next line. To skip a line just hit enter. Continue entering data until you reach line 13. Now when you hit enter, PAT computes the IRR, displays the answer in line 14, and returns the marker to line 1. This is the simplest way to use PAT. Refer to the next section, Commands, for a more versatile approach.

**Commands**

PAT recognizes 17 commands. They are summarized in Table 1 and can be recalled at any time by typing H for help.

Use multi-key commands when entering data. They are multi-key because you first type DATA, then press the enter key to accept the value keyed in. This also advances the marker in the Auto mode.

Press clear to erase the value keyed in and reinstates the current amount.

Press + — */ to modify a value by an amount just keyed in. For example, if line 9 is currently 2,500 and you wish to reduce it by 25 percent just type .75*. PAT automatically multiplies 2,500 by .75 and displays 1,875. Addition, subtraction, and division work the same way: Key in the operator, then the modifier. You don’t have to use the shift key for multiplication or addition.

Press 1 to inflate income forecasts (lines 7–11) from the marker to the fifth year (line 11). For example, if the forecast in lines 7–11 is to be inflated by 2 percent annually, first put the
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marker on line 7. Then type 2 and press I. PAT automatically calculates the inflated amount (compounds annually) and displays the new values in lines 8–11. The line addressed by the marker is assumed to be year zero in the compound interest formula and does not change.

Unlike the multi-key commands that require a two-step operation, the single-key commands are immediate. Just press one of these keys (do not press enter).

Press A to change from the automatic mode to the manual mode and back. Each time you press A the message in the upper right corner of the screen confirms the new mode. For example, AUTO tells you that you are in the automatic mode. Pressing the A key puts PAT into the manual mode and MANL appears in the upper right corner of the display. In the manual mode the only way to move the marker is with the up and down arrows. The manual mode allows you to move the marker to line 14. This lets you enter a desired IRR percent while PAT computes and displays the net incomes necessary to achieve it in lines 7–11. Pressing A again returns you to AUTO.

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Listing continued

2720 GOSUB 4720
2730 A = -1
2740 FOR X = 1 TO 11
2750 V(X) = 0
2760 NEXT X
2770 V(12) = 43.00
2780 V(13) = 48.00
2790 V(14) = 0
2800 PRINT$(64 * I + 7, " "); ";
2810 GOTO 1620
2820
2830 IF MS <> CHR$(10) GOTO 3170: ***DN ARROW*
2840 IF TS = "" GOTO 2870
2850 PRINT$(64 * I + 35), AS;
2860
2870 IF I <= 14 GOTO 2938
2880 IF V(14) = 0 GOTO 2938
2890 PRINT$ 931, ;
2900 PRINT""; ""; V(14);
2910 GOTO 2970
2920
2930 IF V(I) = 0 GOTO 2970
2940 PRINT$(64 * I + 35), ;
2950 PRINT""; ""; V(I);
2960
2970 PRINT$(64 * I + 7, " ");
2980
2990 IF A > 0 GOTO 3870
3000 IF I <= 13 GOTO 3070
3010 IF MS <> CHR$(13) GOTO 3070
3020 PRINT$ 839, " ";
3030 I = 1
3040 MS = "C"
3050 GOTO 2630
3060
3070 I = 1 + I
3080 GOSUB 4720
3090
3100 IF A > 0 GOTO 3140
3110 IF I <= 13 GOTO 1810
3120 GOTO 1790
3130
3140 IF I > 14 GOTO 1790
3150 GOTO 1810: ;
3160
3170 IF MS <> CHR$(91) GOTO 3430: ***UP ARROW*
3180 IF TS = "" GOTO 3210
3190 PRINT$(64 * I + 35), AS;
3200
3210 IF I <= 14 GOTO 3270
3220 IF V(14) = 0 GOTO 3270
3230 PRINT$ 931, ;
3240 PRINT""; ""; V(14);
3250 GOTO 3310
3260
3270 IF V(I) = 0 GOTO 3310
3280 PRINT$(64 * I + 35), ;
3290 PRINT""; ""; V(I);
3300
3310 PRINT$(64 * I + 7), " ";
3320 I = I - 1
3330 GOSUB 4720
3340
3350 IF I >= 1 GOTO 1810
3360 IF A > 0 GOTO 3480
3370 I = 13
3380 GOTO 1810
3390
3400 I = 14
3410 GOTO 1810
3420
3430 IF MS <> "D" GOTO 3480: ***( D )***
3440 IF TS <> "" GOTO 3460
3450 IF I < 7 GOTO 3460
3460 IF I > 11 GOTO 3460
3470 FOR X = 1 TO 11
3480 V(X) = V(I)
3490 PRINT$(64 * X + 35), AS;
3500 IF V(X) = 0 GOTO 3530
3510 PRINT$(64 * X + 35), ;
3520 PRINT""; ""; V(X);
3530 NEXT X
3540 PRINT$ 932, AS;
3550
3560 IF A > 0 GOTO 1810
3570 PRINT$(64 * I + 7), " ";
3580 I = 11
3590 GOTO 1810
3600
3610 IF MS <> "I" GOTO 3480: ***( I )***
3620 IF I < 7 GOTO 1930
3630 IF I > 11 GOTO 1930

Listing continued
Press C to compute the IRR percent at any time and from any line. When you press C the marker disappears, CALC replaces the mode in the upper right corner of the screen, and a series of numbers flashes in line 14. When the correct IRR percent is found the display remains fixed, the upper right corner again displays the mode, and the marker reappears. This takes about 10 seconds.

Press D to duplicate, through year five (line 11), an income addressed by the marker. For an example, the income level in year two will remain constant through year five. Rather than entering that value over and over, just move the marker to year two (line 8) and press D. PAT automatically places that amount in years 3–5.

Press E to end the session and clear the screen. When you press E the screen clears and Ready appears. You can now enter other programs or run PAT. Pressing the break key has the same effect but does not clear the screen.

Press H to recall the command list. You may press H at any time. Doing so clears the screen and replaces the worksheet with a list and brief descrip-
tion of all commands. Then, pressing the space bar reinstates the worksheet as it was before you called for help. If you press H while entering a value, that value is automatically cleared just as though you had pressed C.

Press P to print the screen's contents. You can call for a copy of the worksheet or list of commands at any time. When PAT is printing, PRNT appears in the upper right of the screen.

---

"You can call for a copy of the worksheet ...at any time."

---

Press R to reset all values to zero and default amounts. Pressing R at any time sets the values of lines 1-11 and line 14 to zero (zeros appear as blanks). At the same time, the percentages in lines 12 and 13 become 43 and 10, respectively. Finally, the marker is returned to line 1 and PAT shifts to the Auto mode.

Press T to revise the title. Pressing T at any time moves the marker to the title

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<thead>
<tr>
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<th>CONTROLLER UPGRADE KIT (less drive) INCLUDES CONTROLLER, SWITCHING POWER SUPPLY, INSTALLATION KIT, AND COMPLETE INSTRUCTIONS.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>$349.95</td>
</tr>
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line. You may then key in any string of alphanumerics of up to 35 characters. Use the left arrow to backspace. When the string is complete press enter. PAT automatically centers the title and returns the marker to the line it addressed when you pushed T. When you are changing the title PAT recognizes only enter and clear.

Press the up or down arrows to move the marker up and down the worksheet. Pressing the up arrow when the marker is at line 1 moves the marker to line 14 in the manual mode and line 13 in the automatic mode. Similarly, pressing the down arrow when the marker is at line 13 repositions it at line 1 in the automatic mode and from line 14 to line 1 in the manual mode.

Error Messages

There are only two error conditions. Both involve the number of digits in a value and neither is serious. TOO BIG! appears when you attempt to key in more than the limit of six significant digits. The next keystroke clears the message.

The percent sign indicates that the result of a calculation exceeds the six significant-digit limit. The answer is correct but it will be preceded by % and the decimal points will not line up. In this case you may wish to divide all values by 10 or 100. As long as all amounts have the same relative magnitude the IRR percent does not change.

Sample Problems

We plan to buy office furniture for $1,125, incur miscellaneous expenses of $75, add soundproofing to the ceiling of our office at a cost of $750, and install a personal computer valued at $2,300 and a printer priced at $1,500. We also plan to develop software for this machine that will speed order processing. The cost of this development effort is $3,500. We expect to generate $7,500 in additional net income in the first year, $8,000 the next, and $9,500 in years 3-5. How does this proposal compare with another having an IRR percent of 27.8%?

First, be sure that PAT is in the automatic mode; Auto should appear in the upper right corner of the screen. If MANL is there press A to change to Auto and use the up or down arrows to position the marker at line 1.

Next, identify all non-depreciable expenses. There is only one, the new ceiling. Key in 750 and press enter. Since the office furniture, computer and printer are depreciable capital, PAT
treats them the same. So we add them and enter 4925. Alternatively you could put PAT into manual, use the plus (+) command, then return to automatic.

The third and fourth items on the worksheet are expenses. We have development and miscellaneous costs. PAT treats them the same so we could enter their sum. Therefore, we enter 3,500 and then 75. The marker is now on line 5, but we have nothing to type here or on line 6 so we skip them by pressing enter once to advance from line 5 to line 6 and again to move to line 7. Now we enter the net incomes as 7500, 8000, 9500, 9500, and 9500. There is no change in line 12, so again press enter. This brings us to line 13. Once more there is nothing to alter so hit enter.

When you press enter at line 13, the marker disappears, <CALC> replaces the mode in the upper right corner of the screen, and numbers flash in line 14. After about 10 seconds 58.1 remains in line 14, the marker returns to line 1, and Auto reappears. The completed worksheet appears in Fig. 2. This project’s IRR is much larger than the other project’s 27.8, so we’ll take this one.

What if development costs go up 15 percent or sales drop by half? Is this project still sound? Try these alternatives and see. You don’t have to enter all new information. Simply change the lines that apply. The manual mode may be helpful here and you might want to title each successive “what if.”

Contact David Plyer at 723 Crescent Parkway, Westfield, NJ 07090.

![Figure 2. Sample completed worksheet.](image-url)
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Tests were conducted on AEROCOMP'S "DDC", Percom's "Doubler A" and "Doubler II" and LNW's "LNDoubler" using a Radio Shack TRS80 Model I, Level 2, 48 K with TRS80 Expansion Interface and a Percom TFD100 disk drive (Siemens Model 82). Diskette was Memorex 3401. The test diskette chosen was a well used piece of media to determine performance under adverse conditions. The various double density adapters were installed sequentially in the expansion interface. The test consisted of formatting 40 tracks on the diskette and writing a 60B6 data pattern on all tracks. The 60B6 pattern was chosen because it is recommended as a "worst case" test by manufacturers of drives and diskettes. An attempt was then made to read each sector on the disk once - no retries. Operating system was Newdos/80, Version 1.0, with Double Zap, Version 2.0. Unreadable sectors were totaled and recorded. The test was run ten times with each double density controller and the data averaged. Test results are shown in the table.

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<table>
<thead>
<tr>
<th>MFR. &amp; PRODUCT</th>
<th>SECTORS LOCKED OUT WITHOUT &quot;DDS&quot;</th>
<th>SECTORS LOCKED OUT WITH &quot;DDS&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCOM &quot;DOUBLER II&quot;</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>PERCOM &quot;DOUBLER A&quot;</td>
<td>250</td>
<td>0</td>
</tr>
<tr>
<td>LNW &quot;LNDoubler&quot;</td>
<td>202</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: Same test procedures as "DDC".

☆ "DDS" .... $49.95 (use 1791 chip from your DD controller)
☆ "DDS" with disk controller chip included .... $79.95
★ Disk controller chip .... $34.95

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☆ "SDS" .... $29.95

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  - 80 track SS "Flippy" $329
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First Drive .......... $399
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Dallas, TX 75224

---
Here's a Model II/16 data base with a difference—it organizes financial transactions into categories and prints tally sheets for each or all.

**Program Listing**

1000  CLS:PRINTTAB(25);**T A S K # 1** A D D D A T A A .**PRINTDLN
1010  GOSUB 1100:IF A="B" THEN RETURN
1021  X1:=GOSUB 12000
1190  GOSUB 1102:IF A="M" THEN RETURN ELSE 1826
2000  CLS:PRINTTAB(20);**T A S K # 2 ; M O D I F Y  D A T A A .**PRINT DLN
2010  GOSUB 1100:IF A="B" THEN RETURN
2020  PRINT"Enter a number (*Dn*):**PRINT(3,8),"Enter ;DR;*, FILE NUMBER (*Dn*) of Transaction to be modified:**PRINT.
2030  LINK INPUT FILE:RN=SR=SR2=GOSUB 12758:X=1
2035  PRINT(9,30),"**AMM
2060  PRINT(11,30),"**PRINTUSING##;###**;ASC(MOS);ASC(DAY);ASC(YEAR);**PRINT(13,29),"**PRINTUSING###;###**;CYD(AMT)
2080  PRINT(15,30),"**PRINTUSING##;###**;A=**;ASC(A)=**
2090  PRINT(17,30),"**PRINT
2100  PRINT(19,30),"**PRINT
2110  PRINT(9,30),"**PRINT
2120  GOSUB 1102:IF A="B" THEN RETURN ELSE 1829
3000  CLS:PRINTTAB(15);**T A S K # 3 : P R I N T  T A L L Y  S H E E T:**PRINT DLN
3010  GOSUB 1100:IF A="B" THEN RETURN ELSE ERASE GT#;DIM GT(99),GT(99):GT(8):=74:0
3260  PRINT(9,5),CHR$(24):PRINT(18,8),"Press ;DR;*, file name of hard copy, or ;DR;*, F, key for video:**PRINT
3300  A=INPUTS(1):IF ASC(A)<1 AND ASC(A)<2 THEN 388ELSE FH=6+6;PC=88;SN=ASC(A):GOSUB 11218;IF DR=1 THEN PRINT$(18,25),"Bring Paper to Top of Page."
3340  GOSUB 1102:IF A="B" THEN RETURN ELSE ERASE GT=8+C=CC=0
3450  PRINT(5,5),CHR$(24):PRINT ;DR;*,;F;**;DR;*, all tally sheet or a ,;DR;*, F,**; PRINT(19,30),"**PRINT(19,30),"**PRINT
3560  A=INPUTS(1):GOSUB 31400:IF A="E" AND A="P" THEN 386ELSE PRINT A
3490  IF A="F" THEN PRINT(1,10):L(OP(1):=CO=CO(1)+CO(2):GOSUB 388:
3880  PRINT(6,8),"Start File Number (**CHR$(23)):**LINE INPUT A:IF VAL(A)<1 OR VA L(A)>LOP(1) THEN 388ELSE FH=VAL(A)

Your finances probably involve more than a simple checking account. You may have a small business with revenue in checks and cash, you may receive payment for professional services, or you may want to track office or other miscellaneous expenses. A detailed record of these transactions, broken down into your own predefined categories, would be a bookkeeping boon, especially at tax time.

FTR (Financial Transactions Recorder) is an automated transaction system for the Model II/16 TRSDOS 2.0 operating system that lets you post financial transactions to one of 99 different user-defined categories. You can obtain a tally sheet for any single category or a contiguous range of categories. In addition, you can opt to see all transactions posted, or only a limited range of transactions (such as only those made since your last tally sheet was printed). In both cases, the tally sheet provides you with a report total (a total of all the transactions on file) and a grand total (a total of all the transactions on file for each category).

**How FTR Works**

In the following example of FTR, assume you are a self-employed professional with a secretary, a small office, and the standard expenses (office supplies, insurance, and professional fees, for example). You might also have additional outside expenses and in-

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**The Key Box**

**Model II/16**

- 64K RAM
- Basic
- Printer (optional)
## Put Prices in Check

**Radio Shack**

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Price per Unit</th>
<th>Price per Dozen</th>
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<tr>
<td><strong>Line Printer I, II, &amp; IV</strong></td>
<td>$2.77</td>
<td>$29.92</td>
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<tr>
<td><strong>Line Printer VI &amp; VIII</strong></td>
<td>$7.99</td>
<td>$86.29</td>
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<tr>
<td><strong>Line Printer III &amp; V</strong></td>
<td>$6.49</td>
<td>$70.09</td>
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<td><strong>Innovative Concepts Flip’n’File</strong></td>
<td>$24.95</td>
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<td><strong>Cartridge Ribbons for Radio Shack</strong></td>
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<tr>
<td><strong>DAISY WHEEL &amp; DAISY WHEEL II</strong></td>
<td>$5.99</td>
<td>$64.69</td>
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<tr>
<td><strong>Protectall Line Voltage Surge Suppressor</strong></td>
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<tr>
<td><strong>Memorex Diskettes 5¼ Single-Side Dual Density #3481</strong></td>
<td>$24.99</td>
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<tr>
<td><strong>Maxell Diskettes 5¼ Single Side Dual Density MD-1</strong></td>
<td>$29.90</td>
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<tr>
<td><strong>Cartridge Ribbons for Apple Printers NEC 8023A C. Itoh ProWriter</strong></td>
<td>$9.95</td>
<td>$107.46</td>
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<td><strong>Cartridge Ribbons for Epson MX-80 MX-100</strong></td>
<td>$6.99</td>
<td>$11.95</td>
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<td><strong>Ribbons for IDS Printers</strong></td>
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<td><strong>440</strong></td>
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<td><strong>Paper Tiger</strong></td>
<td>$6.95</td>
<td>$75.06</td>
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<td><strong>Microprism</strong></td>
<td>$7.99</td>
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<td><strong>Prism</strong></td>
<td>$10.95</td>
<td>$118.25</td>
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<tr>
<td><strong>Label Special</strong></td>
<td>$2.99</td>
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<tr>
<td><strong>Most Ribbons Available in Colors Too!</strong></td>
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<tr>
<td><strong>Call or Write for Our Supplies Catalogue</strong></td>
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<tr>
<td><strong>On Orders Under $14.00 Please Add 13.00 for Shipping</strong></td>
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<tr>
<td><strong>Minimum Ribbon Order $30.00 or 1 Dozen</strong></td>
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Figure 1. FTR's main menu (screen 1).

Figure 2. Task identification screen (screen 2). In this case, the task chosen from the main menu was option 4, Define Categories.

Figure 3. The working screen for category definition (screen 3).

Figure 4. A category chosen from screen 3 appears on this screen (screen 4), along with any previous definitions for that category.

The three major areas of income listed above form three contiguous groups.

3. Office expenses
4. Insurance
5. Related professional expenses
11. Lecture fees
12. Lecture expenses
16. Author fees
17. Author expenses

Note that the numbers 1, 11, and 16 start each related financial category. Should your activities increase, you can add categories later on.

Program Overview

FTR is menu-driven. The first screen (main menu) asks whether you want to add or modify data, print a tally sheet, define your categories, print category...
Tired of WAITING on your printer
or is your printer too SLOW...?
CALL 1-800-231-6667

MBIP STAND-ALONE PARALLEL PRINTER BUFFER

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The MBIP in-line parallel buffer works with almost any computer/printer combination utilizing a Centronics type parallel interface. Available with up to 256K of RAM for data buffering, the MBIP can accept very large files for buffering as fast as your computer can send it.

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Improves Efficiency
Using the MBIP's touch sensitive front panel controls, multiple copies of your document can be made without tying up the computer any further. Printing may be halted at any point and continued where it left off later. You can even turn your computer off and the MBIP will continue until the print job is complete.

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INTERNAL PARALLEL BUFFER FOR EPSON

<table>
<thead>
<tr>
<th>MBP</th>
<th>MBP</th>
<th>MBP</th>
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<tr>
<td>16K</td>
<td>32K</td>
<td>64K</td>
</tr>
<tr>
<td>$159.95</td>
<td>$199.95</td>
<td>$249.95</td>
</tr>
</tbody>
</table>

Operation
The MBP is an intelligent Centronic-Compatible parallel interface for the Epson MX-80, MX-80 F/T, and MX-100 printers, with 16K, 32K, 64K bytes of on-board RAM for data buffering. FX80 and FX100 compatible.

Eliminates Printer Bottleneck
The buffering capability of the MBP increases your data processing efficiency by eliminating the wait normally experienced while printing. An Epson printer prints at 80 characters per second; at this speed it takes about five minutes to print a 16,000 character document. During most of this time the computer is waiting for Epson to finish one line so it can send the next. By using the MBP it takes the computer only four seconds to send a 16,000 character document. The Practical Peripherals MBP interface typically accepts data as fast as the computer can send it, until full, returning use of the computer to you while it handles the printing. You can continue with other processing while simultaneously printing data from a previous job, gaining all the time you normally would have spent waiting for the printer to finish. Any program that involves printed output will be speeded up using the MBP.

The MBP supports all standard Epson Commands, is compatible with GRAFTAX-80, and is plug compatible with the standard Epsom cable. THE MBP does not require any user software for control.

Installs In Minutes
The MBP is easy to install — it simply plugs into the existing auxiliary interface connector inside the Epson without modification of the printer.

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When you select a task, a new screen replaces the menu and identifies the task you selected at the top of the screen (see Fig. 2). A prompt to continue (C) or return to the main menu (R) appears along the bottom of the screen. Pressing C brings up a third screen, the screen on which you perform the task you selected.

I will go through each of the tasks and describe the screens associated with them.

**Defining Categories**

The first thing to do in developing the database is define your transaction categories. When you choose this option from the menu (option 4), the task identification screen appears (see Fig. 2). If you press C, the third (working) screen appears with space for 20 categories and a prompt (see Fig. 3). You define your categories on this screen.

When you select a category number, a fourth screen appears (see Fig. 4). If you select a number where a category was previously defined, the old category appears along with a prompt asking you if you want to retain the old category or redefine it.

---

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Figure 5. Screen 5 (above) lists all the categories defined. If you enter 100 at the cursor, your checks are automatically numbered.

Figure 6. Status of the check-numbering routine (screen 6).

Figure 7. Enter financial transactions on this screen (screen 7).

Figure 8. Above is an example of screen 7 completed, with options to save data, cancel new entries, or enter more data (screen 8).

replace it with a new one.

If you want to enter a new category, type it in and answer yes to the save prompt. You can enter more categories or return to the main menu.

Once you’ve finished entering all your categories, screen 5 appears, listing all the categories (see Fig. 5). Enter 100 to initialize FTR’s numeric check tracker. This feature lets you define the starting check number and thereafter automatically increments and posts that number.

FTR accepts string input of check numbers to accommodate money orders or items with numbers and letters or you can make short notes, such as denoting a cash payment. The procedure to implement this system appears in Fig. 6.

Entering Transactions

Once you’ve set up all your categories, you can begin entering data into them. To enter a transaction, select option 1 from the main menu and answer C (to continue) in response to the task

Listing continued

Listing continued
HARDWARE

Model III 48K 2 Disk System .................. $1395.00
Model 4 64K 2 Disk + RS-232 .................. 1549.00
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Model 4 Kit with 2 Drives .................. 5999.00
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15 Meg Hard Disk .......................... 1599.00
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Figure 9. Screen 9 (above) appears when FTR is storing data. Note the assignment.

Figure 10. This screen (screen 10) appears when you try to locate a nonexistent file.

screen prompt. This calls up screen 7 (see Fig. 7).

Notice that the cursor appears to the right of the payee category. As you type in the dollar amount, the characters appear in reverse video. Press the enter key to record the figure and the numbers revert to normal video, indicating that the figure is saved.

Use the down-arrow key to position the cursor at the date category. Enter dates in the format 9.183 or 9.1/83. Should you make an error, 9999/99/99 appears.

Hit the down-arrow key again, position the cursor by the amount category, and fill that in.

Afterward, bring the cursor to the check number category. If you are making a payment by personal check, press the F2 key and the check number is automatically posted.

If you've made any errors in the entries, use the up-arrow key to position the cursor beside the category containing the mistake and make the correction.

When you are satisfied that all your entries are correct, press the F1 key. Screen 8 appears with all the entries you've made displayed and with three options, listed at the bottom of the screen (see Fig. 8).

Pressing E lets you enter new data. If you press C, all new entries are cancelled and the program displays a message indicating that. You start off with a clean slate, so to speak.

Pressing S saves the data you enter. This operation is indicated in screen 9 (Fig. 9) and FTR assigns a number to that file.

A fourth option (not listed on the screen), R, brings you back to the main menu.
### TALLY SHEET - 31 Jan 1983

<table>
<thead>
<tr>
<th>FILE#</th>
<th>DESCRIPTION</th>
<th>DATE</th>
<th>AMOUNT</th>
<th>CHECK NO.</th>
<th>CAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. M. Reese</td>
<td></td>
<td>1/15/83</td>
<td>$275.00</td>
<td>006H</td>
<td>1</td>
</tr>
<tr>
<td>11. T. Johnson</td>
<td></td>
<td>1/15/83</td>
<td>$120.00</td>
<td>186</td>
<td>1</td>
</tr>
<tr>
<td>12. Coast Office Supplies</td>
<td></td>
<td>1/15/83</td>
<td>$11.29</td>
<td>1240</td>
<td>3</td>
</tr>
<tr>
<td>13. Mountain Professional Society (DUES)</td>
<td></td>
<td>1/17/83</td>
<td>-550.00</td>
<td>1241</td>
<td>5</td>
</tr>
<tr>
<td>14. Mrs. Jones</td>
<td></td>
<td>1/21/83</td>
<td>$574.85</td>
<td>1242</td>
<td>2</td>
</tr>
<tr>
<td>15. J. Hancock</td>
<td></td>
<td>1/21/83</td>
<td>$58.75</td>
<td>11A-2376</td>
<td>1</td>
</tr>
<tr>
<td>16. Coast Office Supplies</td>
<td></td>
<td>1/22/83</td>
<td>-119.67</td>
<td>1243</td>
<td>3</td>
</tr>
<tr>
<td>17. W. Green</td>
<td></td>
<td>1/29/83</td>
<td>$375.00</td>
<td>799</td>
<td>1</td>
</tr>
<tr>
<td>18. Home Assurance (Office Insurance)</td>
<td></td>
<td>1/30/83</td>
<td>-625.85</td>
<td>1245</td>
<td>4</td>
</tr>
<tr>
<td>19. Mrs. Jones</td>
<td></td>
<td>1/31/83</td>
<td>$234.60</td>
<td>1246</td>
<td>2</td>
</tr>
</tbody>
</table>

*Figure 12. A sample tally sheet.*

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Modifying Data

If you record an error from one of the screens and need to go back to correct it, select option 2, modify data, from the main menu and answer C to the continue/return prompt at the bottom of the task ID screen. The program asks you for the file number to be modified. Should you enter a nonexistent file number, screen 10 appears (see Fig. 10). Press C to try again. An appropriate response calls up screen 11 (see Fig. 11).

Screen 11 is almost identical to screen 8. The differences are that the file number is displayed and a status indicator appears (A for active, D for delete) that lets you keep or remove a record from your tally sheet. It doesn't delete the record, but ignores that file during a tally. Make your correction and press S to save the modified data.

**Printing Category Definitions**

You will need a permanent record of category definitions, obtained through menu option 5. After answering C at the task ID screen, you see the message "Bring Paper to Top of Page." Press the F1 key. FTR uses a machine-language utility to format reports at 66
lines long and 80 characters wide. The continue and return prompt reappears as a last-minute opportunity to make any changes you want.

Pressing C prints the list of category definitions to be generated. If an error occurs, the program displays an error message and returns you to the main menu. When the categories are printed, the message "Printing Completed. Press ANY key to continue." appears.

**Printing Tally Sheets**

FTR's primary purpose is compiling tally sheets. Select task 3 from the main menu and answer C to the task identification screen. When the next screen appears, press the F1 key to get the full tally sheet printed or F2 to have the tally sheet displayed on the video screen. In either event, the continue and return to main menu options are displayed at the bottom of the screen.

If you press F1, the message "Bring Paper to Top of Page" appears. If you then press C, the screen clears and the prompt Print (F)ull Tally Sheet or a (P)ortion appears. A full tally sheet contains all records on file, a portion lets you select a range of records and a range of categories.

If you select a portion of a tally sheet, the program prompts you for starting and ending records. You are then asked the start and ending points for tally sheet categories. See Fig. 12 for a sample tally sheet.

**Getting Started**

Enter the program in Listing 1 and save it under the name FTR. FTR uses a short, machine-language utility, FRMS, to automatically set forms. Since you'll be in Basic, type SYSTEM and press the enter key. When TRSdos READY appears, type DEBUG ON. Type MF000 and press the F1 key. The standard Debug display appears on the first video (F000) line. Now type 56234E06423E 11CFC9. Check all characters for accuracy. Then press the F2 and escape keys and press the O key. Type DUMP FRMS (START=F000, END=F000). When TRSdos READY again appears, your directory should show a new file, FRMS. You're now ready to keep track of your financial transactions.

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They are nightmares common to all business managers at one time or another: an employee's paycheck gets lost in an overflow of paperwork in the manager's office; a client's file is overlooked, resulting in delayed payment; the bookkeeper leaves you muttering, "Where did all the money go?"

More and more companies and small businesses use microcomputers to help them maintain and process vast amounts of valuable information. To meet the demand, software manufacturers have written business software that satisfies just about any office requirement.

This Buyer's Guide provides a sampling of the various business packages available to TRS-80 owners. Besides payroll, general ledger, accounts payable/receivable, invoice, and inventory programs, there's quite a selection of software for both unusual applications and specific industries.

Among the programs that passed our desks were software designed to test and evaluate manager response to different situations, a bookkeeping system developed specifically for gas stations, a construction template program to help contractors determine accurate estimates, an aircraft maintenance program, and several software packages designed for use by Amway distributors.

For each software manufacturer that submitted programs to this guide, we've written a brief summary of what the program does, how much it costs, TRS-80 compatibility, and, where necessary, the program's limitations (listed in parentheses at the beginning of the program description).

Some software manufacturers produce several business programs, so we've included only one or two samples of their product line. You should contact these companies for a catalog and further information regarding their software.

For those of you who already have an inkling of the type of business software you need, quick-reference charts are provided. Listed under each are the names of the manufacturers who make relevant software. Refer to the text for further descriptive information concerning those programs, and for the company's address and phone number.

When reading through this Buyer's Guide, please remember that these listings are based on information supplied by the manufacturer. We have not tested or reviewed these products, and cannot guarantee manufacturer claims. Also, the price of some of these software packages may change by the time you read this issue, so contact the manufacturer for updates on newly released software programs and for revised program prices.

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LEDGER: A 12-column ledger that prints out income or expenses with page, month, and grand totals on standard 8½-inch-wide paper. Column 1 is the income or expense amount. The user assigns the other 11 column headings.

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AUTO-DIALER/TIMER: Stores up to 500 names and phone numbers. User types in the name to be dialed through a $3 Radio Shack interface relay. Elapsed time is displayed on the screen, and the computer redials the last number entered. Schematic to connect phone is included, and no computer modifications are required.

TOLL CHARGE: Real-time display of phone charges by the second.

INVOICE: Products and prices are stored in memory. The program does all the necessary calculations. A standard 80-column printer is required.

Blechman Enterprises also makes business-related software for Amway distributors. Software packages include Order Verification/Generation, Monthly Bonus Calculation, Monthly Gross Profit, Distributor Family Tree, Ledger, and much more.
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Other offered programs include Multi-Location Inventory Control, Mailing List, Part Number Cross Reference Program, Invoice Control, and more.

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INVENTORY CONTROL

(Color Computer)

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#179-003

See List of Advertisers on Page 322

80 Micro, September 1983 • 155
provided with four costs, four locations, selling history, and vendor information for each item. The program costs $195.

PAYROLL (Color Computer)

Besides collecting key employee information, this program allows entry of pay rates for standard hours, overtime, and salary. Hourly, salary, and commissioned employees may be paid weekly, bi-weekly, semi-monthly, or monthly. You can sort all the reports by employee number, social security number, employee name, or state code. The program automatically reports federal and state taxes, and permits changing tax rates and maximums according to government changes. The program comes with password protection and sells for $295.

ACCOUNTS PAYABLE (Color Computer)

This program collects vendor invoice information and reports the business' cash commitments and payment history. For each invoice entered, the program stores the invoice number, vendor, invoice date, invoice amount, and payment document number. Reports include Account Cross Reference, Account Master, Account Summary, Accounts Past Due, Payment Forecast, and Activity. These may be sorted by vendor number, vendor name or invoice date with range selection available for selective reporting. The system is available for $195.

ACCOUNTS RECEIVABLE (Color Computer)

Provides reliable and timely information regarding the status of all customer accounts. The program tells you which accounts are past due, forecasts how much money to expect for cash flow planning, and keeps you on top of your customer's credit positions. Customer name, address, credit limit, invoice, and payment information is recorded. Available reports include Account Summary, Account Overdue, Account Aged, Payment Forecast, Audit Trails, Account Master, and Account Cross Reference. This system sells for $149.

CUSTOM SOFTWARE SERVICES
P.O. Box 150
Porterville, CA 93258
209-784-7966

ENHANCEMENTS TO R/S PAYROLL (Models II, 12, and 16)

Improvements to Radio Shack's payroll program increase capacity to 999 employees on hard disk (475 employees with a two-disk-drive system), replaces the Basic sort with a machine-language sorting program capable of sorting 999 employees and creating an index file in under a minute, allows escaping from a displayed employee's check during payroll processing without creating the check, sends the screen's contents to the printer during editing and payroll processing sessions, and adds the amount of the check in word form to all payroll checks.

The enhancements are available for $100, and a copy of your R/S Payroll must accompany your order to verify that you have purchased the program. The disk is reformatted under TRSDOS 2.0 and the improved versions of each program are copied to your disk.

ACCOUNTS RECEIVABLE SYSTEM (Models II, 12, and 16)

Designed for trucking companies, this system handles up to 300 customers, 500 transactions per customer each month, with a maximum of 7,600 transactions each month when used on a three-disk-drive system. Also included are five load-management programs for

Data's already successful Church Donations program, while the Custom Ledger is a stand-alone program. Both programs allow the user to track five separate checking accounts with five account types and nine categories under each account type. The Church Ledger permits 100 general-ledger accounts and 570 transactions per month, and the Custom Ledger allows 200 general-ledger accounts and 2,175 transactions per month. Both generate a chart of accounts, a trial balance, a statement of income and expenses, a balance sheet, a transaction journal, a check register, checkbook reconciliation, a budget report, and a sessions transaction journal. For those with two-disk-drive systems, the Model III version costs $180, and the Model II, 12, and 16 versions cost $225. Four-disk-drive systems cost $199 for the Model III, and $249 for Models II, 12, and 16.
billing on a per-barrel, per-gallon, per-ton, per-hundred weight, and percentage of hundred weight basis.

The system generates a complete set of reports, including sales analysis reports and year-to-date summaries for each customer, as well as standard statements and invoices. This accounting system is priced at $500.

DATA MANAGEMENT SYSTEMS
211 N. El Camino Real
Suite 101C
Encinitas, CA 92024
619-942-0744

CCDS (Model 16)

CCDS is a relational data-base system. The user views data as simple collections of flat files or tables, and each row of a table is viewed as a data record. Records may be selected based on data values, and specified fields of each record are displayed or printed. In addition, you can combine data from different files and display or print the combination. Standard and formatted reports and displays can contain derived fields, and users can enter simple English queries for retrieval. CCDS is offered at an introductory price of $595 and comes with a 30-day trial period.

DEMI-SOFTWARE
6 Lee Road
Medfield, MA 02052
617-359-4502

DEMI-PLAN: PROJECT MANAGEMENT SYSTEM
(Model 1 and III) (48K)

A project management program for defining and maintaining a file of project tasks and resources. The information is used to print various forms of Gantt Charts, Resource Histograms, and Task/Resource reports. The system determines the critical path of a project, and lets the project manager introduce "what-if" data to test the effect of date and resource changes on the project's completion date. It sells for $49.95 post-paid, and documentation only costs $5.

Demi-Software manufactures numerous business-related programs other than their Project Manager System. A sampling includes Personal Finance Package, Mailing List, Label Printer,

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CULVER CITY, CA. 90230

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Program Cross Reference, Mortgage Calculations, and much more. Contact their office for further program information and pricing.

ELTECH ASSOCIATES
2466 Moreno Drive
Los Angeles, CA 90039
213-663-0347

MANUFACTURING CONTROL SYSTEMS (Models II, III, and 16)

A labor reporting/performance system that monitors and measures the efforts of your work force. It provides you with the daily, weekly, and monthly information you need to control your costs. You can trace each employee's work efforts, each department's performance, and all production-job labor costs. In addition, you can monitor indirect labor charges on your expense accounts with weekly and monthly reports. The system handles 400 employees, 500 production jobs, and 200 departments or work centers. The Model III version sells for $345, and the Model II/16 version for $445.

Eltech makes nine other business programs, including Shop Order Control, Purchase Order Control, Manufacturing Job Cost Control, Inventory Control, Bill of Materials Processor, Production Planning Control, Material Planning Control, and others. Contact Eltech for further information concerning product descriptions, pricing, and Radio Shack compatibility.

EXECUTIVE SOFTWARE INC.
255 Delaware Ave.
Buffalo, NY 14202
705-722-3373

DECISION ANALYST
(CP/M Operating System Required)

A program package that helps businessmen analyze complex business problems where many alternatives and/or criteria exist. It takes the user through eight menu-selected sections that include problem definition, statement of decision purpose, establishing and valuing must and want criteria, calculation of criteria values, defining alternatives, weighing and scoring alternatives against criteria, assessing possible adverse consequences, and final conclusions. This program is offered at $139, and it is recommended that the user have access to an 80-column printer.

G&G CUNNINGHAM, CPAs
610 Park Blvd.
Austin, TX 78751
512-458-5760

G&G GL (Model II)

A general ledger program written by a certified public accountant for accounting practices with numerous client records. The program supports as many as nine departments. Printouts are available for each department, all departmental information, or summary information only for all departments. The chart of accounts for a particular installation and the number of transactions between closings are both unlimited, subject to the user's disk space. The program prints standard transmittal letters to accompany prepared financial statements. This package costs $495 and comes with a 30-day refund if you are not satisfied.

G&G 1040 (Model II) (64K)

A tax preparation package that accepts IRS-supplied forms as input sheets. It supports 27 IRS forms and the results of all calculations are carried to other forms as appropriate. Where computations are necessary to choose the least-tax alternative, the program selects and computes the result with the lowest tax rate. A variety of print options are available, and you can easily recompose and reprint your entire return in fewer than 15 seconds. The Professional Series costs $750, and the Starter Series (11 schedules, and no depreciation or batch options) sells for $195.

GOOD SOFTWARE CORP.
12900 Preston Road
Dallas, TX 75230
214-239-6085

INVESTOR III
(Models II, III, 12, and 16) (64K)

Allows you to quickly evaluate real estate investments. Calculate up to 20 years of projections based on depreciation tax shelter, future property values, mortgage balances, capital gains and recapture taxes, net proceeds from resale, return on equity, and internal rate of return. A sensitivity analysis feature permits rapid change of assumptions and revised projections with output to printer or screen.

The program costs $249 plus $5 shipping and handling, and comes with a 30-day warranty. Good Software also
replaces defective disks at a substantial
discount. Demo packages cost $50 plus
$5 shipping.

GOOTH SOFTWARE
931 South Bemiston
St. Louis, MO 63105

INCOME TAX PROGRAMS

These 70 Tax Programs, including
the 1040, 1040A, 1040EZ, all schedules,
and most of the forms, sell from De-
cember 1 through April 1 of each year.
On January 15, the 1120, 1120S, 1041,
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Revproc printing format as approved
by the IRS. The computer prints the en-
tire form, so there is no need to obtain
IRS forms or schedules. Exceptions to
this are those forms that the IRS re-
quires in original format. The programs
cost $24.95 per disk. Contact Gooth
Software for further information on
specific tax programs.

HOLMAN DATA PROCESSING
2059 West Lincoln
Oroville, CA 95965
916-533-5992

GENERAL LEDGER
(Models I, III, and 4)

A large-capacity general ledger sys-
tem that handles over 400 accounts and
5,000 transactions per month on a two-
disk-drive system. You define all head-
ings and spacing, and see all reports in a
three-column format. Reports include

Continued from p. 137

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(NICE)
Balance Sheet, Statement of Changes in Financial Position, and Income Statement. Transactions can be entered, edited, and listed. You can even exit without posting. A test set ($50) lets you check the suitability to your business. The complete system is priced at $149.95.

ACCOUNTS RECEIVABLE (Models I, III, and 4)

Handles up to 5,000 customers and 15,000 transactions. The program has a balance-forward system, and is capable of entering and posting 120 invoices per hour. You can add a customer in 30 seconds without having to sort the customer file. Reports include aging, copy of statements, labels, late charges, posting audit trail, and so on. A test set limited to 15 accounts sells for $50. The complete system is priced at $149.95. The General Ledger program is only $50 if you order it with Accounts Receivable.

HOWARD W. SAMS & CO. INC.
4300 West 62nd St.
Indianapolis, IN 46268
317-298-5419

MIND TOOLS (Model II) (VisiCalc)

This program temporarily interlocks with the VisiCalc spreadsheet so you can immediately perform 17 common financial planning calculations. Mind Tools allows you to calculate present, net present, and future values; yields; internal and financial management rates of return; and basic statistics. It also allows break-even analyses, depreciation schedules, and amortization tables. This system costs $69.95, and comes with complete documentation, including 128-page user's manual and a 40-page quick-reference guide.

MAGNUM (Model III) (48K)

A powerful data management system that lets you create, store, search, sort, edit, display, and print records in data files up to 1,200 records long. You can search 10 ways for up to eight items in one or all fields, and display or print the results in record-order or sort on up to three fields. Magnum prints any of four predefined columnar reports on any of three mailing-label formats and prints on up to six different forms, such as checks and invoices. This software package sells for $79.95. An 80-column printer is recommended.

HOWE SOFTWARE
14 Lexington Road
New City, NY 10956
914-634-1821

SMALL BUSINESS ACCOUNTING (Models I, II, and III)

Keeps track of income, expenditures, and payroll for a small business. Enter income and expenditures on a daily, weekly, or monthly basis. The program computes monthly, through last month, and year-to-date summaries. The payroll section, not included in the cassette version, records individual employees and their paychecks with up to six categories of payroll deductions. The disk version sells for $59.95, the cassette version for $29.95, and the Model II version for $69.95.

MAILING LIST (Models I, II, and III) (48K)

Maintains mailing lists of up to 1,328 names. Commands allow adding, changing, deleting, and finding names. The program sorts by machine language, according to the data in any field (name, address, and zip code). Labels are printed in up to four columns in master list or on video display. Tabs adjust to fit any size labels. The program is available only on disk. The Model I/III version costs $69.95; the Model II version is $79.95.

IN-MEMORY DATA-BASE MANAGEMENT (Models I, II, and III)

Defines files of various descriptions and maintains them on either cassette or disk. An in-memory system, the program allows files of up to 50 fields, with the number of records available determined by RAM space. Commands include add, change, or delete records; find a specific item; sort according to the data in any field; print file on display or printer; save file on cassette or disk; and total items in a single field with or without comparison. Reports are formatted in several ways. The cassette version costs $29.95, the disk version $34.95, and the Model II version $49.95.

SMALL BUSINESS MANAGEMENT SYSTEM (Models I, II, and III)

Contains everything you need to manage a small business. The software includes Order Desk, to enter orders and print invoices and mailing labels; Bookkeeping, a complete general ledger; Inventory, summarizes all products sold by product type and price charged; and Customization, a complete installation package for each business to tailor the program to its own requirements. Before you buy this system, check its capabilities and limitations. The Model I/III version sells for $350, the Model II version for $400.

JOSEPH NICHOLS PUBLISHER
P.O. Box 2394
Tulsa, OK 74101
918-583-3390

WRITER'S PROFESSIONAL SUBMISSION REGISTER (Model III) (48K)

A menu-driven program that lets the writer record each submission by manuscript title, publisher or magazine, address of publisher or magazine, date of submission, and identification of the literary form. An update feature provides the date of acceptance or rejection, and a comment line for recording money received or editorial remarks.

The program displays or prints the current submission of a manuscript, all the places the script was submitted, all manuscripts sent to a particular publisher or magazine, a list of all the submissions in a particular literary form, and a listing of the complete register. The disks hold approximately 150 manuscript title records, 2,500 submission records, and 300 addresses. The Register sells for $59.95 on two disks written in Cobol.

K.J.K. MANAGEMENT
GROUP INC.
Systems Division
546 Columbia St.
Weymouth, MA 02190
800-323-5511

GAS-PRO (Model III)

A comprehensive bookkeeping system developed specifically for service stations. It permits shift-by-shift checkout of the day's gas and repair sales, accumulating to a one-page sales summary with a detailed statistical analysis of gas sales. Gas-Pro maintains accounts receivable, prints customer statements, tracks accounts payable, details invoices for payment, provides a daily breakdown of parts and labor into 20 user-defined categories, and it tracks mechanic's sales and commissions.
weekly or monthly.

It is available from K.J.K. for $6,800, including hardware, software, disks, in-house instruction on system use, and free system updates for one year.

LIZCON TRADING
2949 South 3rd West St.
Salt Lake City, UT 84116
801-484-8179

A/R-STMT OF ACCOUNT
(Model I, II, and III)

Print the following: statement of account, statement of commission, accounts receivable ledger, accounts receivable aging, price list by product class, alphabetical listing of customers, mailing labels, and alphabetical listing of vendors. The random-access method creates all data files and speeds data update and retrieval. The Model I/III version costs $199, and the Model II version $289.

INVOICE-INV PROGRAM (Models I, II, and III)

Allows you to print sales receipts and interact with customer and inventory files. You can quickly track down a rented item by entering its inventory number; the screen shows the name of the renting customer and the date rented or returned. The program is priced at $399.

MANAGEMENT SERVICES
2901 Clendenen Lane
Longview, TX 75601
214-757-4558

MARKET MASTER
(Model I, II, and III) (48K)

Market Master, a stock and commodity market analysis tool that creates, maintains large price data files, tests a trading system in various markets, graphs prices and results of a trading system, provides daily buy/sell recommendations, and provides printouts in any report mode. Nine versions of this system are available, each containing one of the following unique trading systems: Dual Moving Average, Percentage Band, Channel, Oscillator, Delay Oscillator, Delayed Channel, Linear Regression System, Composite Index, and Exponential Internal Index. Each version of Market Master sells for $124.95. If you want to purchase the complete set, the company recommends that you buy the Magnum series for $595 on the Model I/III and $695 on the Model II. The Magnum series is a more powerful version of the Market Master system.

Market Master is just one of several stock programs put out by Management Systems. A sampling of programs includes Datamax, Comdata Package, MJK Package, Analyst II, Data Files, and the Magnum System.

MANHATTAN SOFTWARE
P.O. Box 1063
Woodland Hills, CA 91365
213-453-6943

AMWAY BUSINESS MANAGER
(Model I and II)

An interactive, three-part program,

---continued on p. 164
Stretch the Twelve Days of

Give a gift subscription to 80 Micro today and relax...you can't find a better gift for active computerists. Every issue gathers together the latest programs and projects for Radio Shack's personal computers, business computers, and portables. Your favorite computerist will be busy round with:

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**80micro**
PO Box 981
Farmingdale, NY 11737
63988
Micro Architect's Mail-X program prints labels, and accesses over 32,000 records in one file.

Continued from p. 161

this software package controls inventory, verifies incoming SA-1 orders, and compiles PV and BV for personal orders. The program provides inventory initialization, restocking, and non-order withdrawal. Any product can be checked on the display at any time, and the data updated or edited as necessary. A random-access disk file provides full information on 450 products, including stock number, name, PV, BV, and wholesale and resale costs. The program also accommodates detailed information on 200 distributors. Reports provide Inventory Status, Sales, Product Records, Reorder Needs, and Distributor Records. The program is supplied with a 50-page manual and comes with demonstration figures in several of the files. It sells for $149.95.

THE AMWAY COMPANION (Models I and III)

A supplementary program that interacts with the indexes and files of the Amway Business Manager package to provide the following features: automatic printing of a single-page or multi-page SA-2R RDC order, with all information placed in the appropriate spaces of the order lines; order information inserted from the reorder file of the Business Manager program into the Companion program with a month-to-date total of PV and BV feature; product rearrangement and product updates; on-screen scrolling of all product records; and page-formatted printouts of Product Records, Inventory Status, and Sales with page heading and numbering. The program costs $49.95 and requires a friction-feed printer if you want SA-2Rs single-sheet printed.

AMWAY BONUS MANAGER (Models I and III)

Another supplementary program for the Business Manager software package. This program provides the following capabilities: printed reports on downline groups and families, on-screen and printed reports on upline relationships of any distributor in the Business Manager's files, calculation of bonuses due to each distributor, editing feature to update any distributor's record filed with the Business Manager, and added transfers and other bonus information for a complete record of bonuses receivable and payable at any level. This supplementary package sells for $99.95.

1,000 items (2,400 on a Model III), and has the following features: screen input, order entry, shell sort, and a powerful report writer. This program sells for $89; for an additional $10 you receive an optional data disk.

Micro Architect manufactures over 30 other business programs for the Models I/III and Model II computers. A small sampling includes a cassette data base, stock security information system, sorting utility, sale analysis, mailing list system, accounts receivable, general ledger, payroll, accounts payable, and so on.

MICRO 80 INC.
2665 North Busby Road
Oak Harbor, WA 98277
800-528-6050 (Orders only)
206-675-6143 (Inquiries)

MANAGEMENT SYSTEM II (Models I and III)

A cassette-based file management program executing all commands by single-letter entry. File presentation is a maximum of two horizontal lines (100-plus characters) with one to nine vertical columns. Column titles are easily created, and files may be added, updated, listed, deleted, or saved to either tape or printer. Special features include a machine-language sort of any column you choose and a total function for adding integers in any column. There is also a Labels command that lets you produce mailing labels, file labels, and so forth. The cassette is priced at $26.95.

MICRO-ORGANIZER I (Models I and III)

A three-program set that itemizes expenditures by the day, week, month, or year. You can analyze necessities, scrutinize non-essentials, and review wasteful spending habits. It comes with a claims adjuster program so you can conduct an accurate inventory of your possessions and account for your untold assets. The system also features Schedulizer, an up-to-date appointment calendar. This program is available on both tape and disk at $19.95.

MICRO-ORGANIZER II (Models I and III)

A three-program set capable of creating and manipulating name and address files. Comes with Comparison Shopper, a comprehensive cross-reference system that identifies and com-
**Which TRS-80® Accounting Software Do I Buy...**

That’s a tough question. I know, I asked it myself not very long ago. I’m Mike Motta. As president of Shawmut Systems, specialists in TRS-80® custom software, my customers were asking me for Model II and 16 Accounting Software – GL, AR, AP and Payroll. But I said “Why write the software. There must be a good package already available.” So I searched for the best I could find. And I found it!

Now, when I tell you that these are the best Accounting programs I’ve seen on a microcomputer, you probably think that you are just listening to another sales pitch. But you’re not. You’re listening to a businessman with over twenty years combined experience in sales, management, and programming. So when I say that these programs will work for you, it really means something.

Each program, designed for the Model II or 16, will work with one or more floppy or hard disks. With each program, I’ll include a 200 page manual written with the first user in mind, and a set of sample data files so you can start using the program right away.

But I won’t stop there. If you have a question, or a problem, call me. You won’t get an operator, or order taker. You’ll get me. And if I can’t talk to you on the spot, I’ll call you back. And I’ll fix your problem, FAST.

Now I could say a lot more about these programs, but you really won’t know how good they are until you try them. So, order the programs you need, and try them for 14 days. If you’re not convinced that these are the programs for you, send them back, and I’ll refund your money.

My price for these programs is only $289.00 each, postpaid. I could charge hundreds more, but I want you to have the best programs at the best possible price. So mail or call your order today. I’ll make sure you’ll be satisfied.

**Shawmut Systems**

105 Circle Drive • PO Box 324-A
Somerset, MA 02726
(617) 672-9794

Ask about our Model I and III versions.
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R.R. BELANGER, Ph.D.
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213-969-4112

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SHAWMUT SYSTEMS
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Somerset, MA 02726
617-672-9794

ACCOUNTS RECEIVABLE  
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A complete invoicing and monthly statement-generating system that keeps track of current and aged accounts receivable. This package maintains a Customer Master File of customer name, address, phone number, type of account, current balance, tax rate, and other useful account status information, and a Transaction file that contains information on each invoice and payment posted to the customer account.

Other features include Summary Aging/Detailed Aging reports, recovery routine for hardware failure, sample data for demonstration, open credit reconciliation procedures, automatic customer billing option, open item or balance forward, and much more. This program interfaces with the General Ledger System to provide automatic monthly journal entries. Pricing for this package is: Models I/III $139; Model 4 $189; Models II/12/16 $289; and Model 16 with Xenix $489.

PAYROLL  
(Models I, II, III, 4, 12, and 16)

Allows a company to prepare periodic payroll for hourly, salaried, and commissioned employees while accumulating relevant tax information. It generates monthly, quarterly, and annual returns that are filed with local, state, and federal governments. It also prepares employee W-2 forms and maintains an up-to-date information reference for each employee. The Payroll System includes tables for federal withholding and FICA, as well as withholding for any state and up to 20 localities for precomputed or user-generated tables. The system automatically produces payroll checks. It interfaces with the General Ledger to provide automatic monthly journal entries. The Payroll System costs the same as the Accounts Receivable System.

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Reports generated by this program include Open Voucher Report, Cash Requirements Report, and Aged Payables Report. The system prints checks for each vendor, and lists all vouchers paid by this check. In addition, there is an End-Of-Period Processing Program that accumulates the debt and credit transactions passed to the user's general ledger, and prints out a transaction register with this data. The pricing
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(Model III (64K), and III)

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SOFTWARE MODELS
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FINANCIAL TEMPLATES
(Model II, III, 12, and 16)

These models forecast your sales and finances, and provide you with a complete projection to show bankers and investors. The program includes a break-even analysis, cash budget, means projected, profit/loss, balance sheet statements, ratio analysis, and five depreciation tables and formulas to calculate net present values. Examples come from SBA forms. This program is available for $59.95.

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(Model III, 12, and 16)

NIREB Forms B, C, D, G, and I-A provided on disk accomplish the following: Form B analyzes a single-income property, Form C compares various investments, Form D compares tax results from various types of taxable income, and Form G determines the gain on sales subject to income tax. The fifth form is the Net Proceeds of Sale, and the last is Form I-A, which calculates the true rate of return in percentage form. This program package sells for $59.95.

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Available for Model I or Model III. $25.00 on cassette or $33.50 on disk (with enhancements) All versions require 16K.

If you order direct, please specify whether you have Model I or Model III (the media are different) and whether you want disk or cassette. Include $1.50 and indicate UPS or first class mail. Illinois residents add 5% sales tax. Visa and Mastercard accepted.

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SOUTHWEST SYSTEMS
Microcomputer Sales & Services
44 3rd Ave., Suite F
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619-425-5500

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At the end of each quarter, the 941 continuation sheet is prepared, as well as a summary for preparation of state and federal tax forms, and a summary of non-standard deductions by category. This program sells for $150, and the accompanying documentation costs $15. This program contains California state tax computations, so you must inquire about the availability of other states' before ordering.

Southwest Systems manufactures several other business-oriented programs that include Minibiz Bookkeeping System, Aircraft Maintenance System, Project Cost Control System, Manufacturer's Cost Estimating System, Order Entry & Invoicing System, and much more.

STAR VALUE SOFTWARE
12218 Scribe Drive
Austin, TX 78759
512-837-5498

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(Models I and III) (48K)

A stock market spreadsheet program for brokers and individual investors that compares investment alternatives using basic option strategies. The program quickly answers "what-if" questions and is capable of handling the following types of investments: ordinary stock purchase or short sale, ordinary call or put option purchase, covered writing, naked writing, and ratio writing. It is available on disk or cassette for $189 which includes documentation and shipping.

OPTIONVUE-B
(Models I and III) (48K)

Also a spreadsheet program, but designed to work with situations involving the simultaneous use of two options on the same underlying stock (spreads, straddles, and combinations). The program takes into account an estimate for trade commissions based on the user's choice of full service or discount broker, and opening cost is based strictly on the Securities and Exchange Commission rules for margin requirements. Available on both disk and cassette, it sells for $189.

OPVALU/ADVANCED OPVALU
(Models I and III) (32K)

OPVALU is a program for determining the fair market value for listed put and call options. It is ideal for spotting an overpriced or underpriced option in the market. It sells for $39.95.

Advanced OPVALU determines the fair market price for arrays of listed put and call options on a single issue. It is available for $129. Both come on either disk or cassette and with complete documentation.

TARANTO & ASSOCIATES INC.
P.O. Box 6216
121 B Paul Drive
San Rafael, CA 94903

PAYROLL (Models I and III)

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forms. It sells for $75, and the user’s manual costs $20.

This is just one of several business software programs that Taranto & Associates makes for the Model I/III. Other programs include Accounts Payable, General Ledger, Cash Journal, Accounts Receivable, Invoicing, and Inventory Control.

MEMBERSHIP ACCOUNTS RECEIVABLE (Models II, 12, and 16)

This package is for organizations that supply products or services to organization members, rather than customers. The program monitors up to 8,000 members and 20,000 transactions. Special features include a balance-forward system that discards transactions at the end of a month, cash accounting that reports income as collected, and monitors up to 38 income accounts for direct posting, a periodic billing facility for dues that has 20 different dues rate categories to select from, recurring transaction facility for individual members, aged statements with descriptive reference, and selective mailing facility in member code or zip code sequence. This software package is available for $500, and runs under TRSOS or CP/M.

Taranto & Associates Inc. makes several other business programs for Radio Shack Models II, 12, and 16. Other programs of interest include Accounts Payable, Purchase Order, Payroll, Job Costing, Inventory Control, Accounts Receivable, Invoicing, Sales Analysis, and so on.

THE SOFTWARE TERMINAL
P.O. Box 53376
223 Fairway Drive
Fayetteville, NC 28305
919-483-2003

INSURE: LIFE INSURANCE
AGENT MANAGEMENT SYSTEM
(Model II)

Designed for a single life insurance agent or agency. The system stores 480 bytes of client information in the Client Master file alone. In addition, separate files maintain information on policies, source of payments and descriptions, paid business, and pending business. Major features of Insure include records accessed in under two seconds, over 900 client history records of almost 40 items per disk, full screen editing, summary reports of income by agent or company, mailing list and labels, and a file for keeping MDRT credits for each agent with credits automatically figured. A demo disk with documentation costs $25 and can be credited toward the system price of $250.

ACCOUNTS RECEIVABLE
(Model II)

This system handles the receivables of a small- or medium-sized business. It helps management keep a hand on billing, and monitoring incoming funds. Special features of this program include full screen editor; up to 1,000 receivables monitored; file access in under two seconds; sales and payments posted using transaction codes for easy-to-follow audit trails; sales information transferred to inventory; and statements aging reports, transaction journals, and alphabetical account listings printed. A demo disk with documentation costs $25 and is credited toward the system cost of $200. You can purchase both the Accounts Receivable and Inventory Management System for $300.

INVENTORY MANAGEMENT
SYSTEM (Model II)

This program provides you with current information concerning sales inventory volume, present purchases, and inventory performance. It stores up to 3,000 inventory items and 900 vendors on disk. Any stock item is accessed in under two seconds. Sales information enters from the screen or from the Accounts Receivable without rekeying. In addition, all vendors and/or stock can be automatically transferred from Radio Shack’s IMS without rekeying.
Useful reports include reorder point, price list, performance report, and full listing of inventory. The $25 for a demo disk and documentation can be credited towards the system price of $175. Both this program and the above Accounts Receivable program can be purchased together at the special discount price of $300.

THINK SOFTWARE INC.
572-810 W. Broadway
Vancouver, BC,
Canada, VS2 4C9
604-261-7261

WALL STREET TAP SYSTEM
(Model I and III)

Consists of three computer programs: Stockline, an advanced stock appraisal package; The Stock Stalker, a beginner's stock analysis program; and the TAP Communications Package, a terminal package for downloading information from Compuserve.

Stockline provides comparison charts, moving average, on-balance volume, point and figure, and price/volume charts. All for $149.95. The Stock Stalker, the simpler stock appraiser, is available for $59.95 and offers comparison charts to spot confirmation signals and relative strength, and price/volume charts to analyze price and volume trends.

The Wall Street TAP sells for $59.95 alone, and if you order both the Stockline and the TAP together you save 10 dollars and get them for $199.95.

TSASA INC.
2 Chipley Run
West Berlin, NJ 08091
609-346-3063

(Color Computer)

This software manufacturer has over 30 business programs compatible with the Color Computer. A small sampling of the available software for business use includes The Accountant, Accounts Receivable and Payable, Order Tracker, Business Inventory, Cash Flow Model, The Predictor-Linear Regression, Investment Analyst, Utility Bill Saver, and much more.

UNIVAIR INTERNATIONAL
9024 St. Charles Rock Road
St. Louis, MO 63114
314-426-1099

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Projects or cases are easily entered and can be cross-referenced in several ways. Twenty-six types of reports and statements are generated with this program, including Inter-Office Master Reports, Client Master Activity Reports, Daily Office Production Reports, and Monthly Statements and Forms. The entire package sells for $950; a demo package costs $250.

This Legal Time and Billing System is one of 10 business programs manufactured by Univair International. They have Management System programs for Medical, Dental, Insurance, and Real Estate practices. In addition, they make Accounts Receivable/Payable, General Ledger, and Inventory programs.

UNIVERSAL DATA
RESEARCH INC.
2457 Wehrle Drive
Buffalo, NY 14221
716-631-3011

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keyfiles for sorts, modifies data within a file using conditional operations, and prints any size or number of mailing labels. Parts I and II of this system each cost $99, as does the Model III version.

The Data-Base Manager program is one of 12 business programs that Universal Data Research Inc. makes for the Color Computer. Additional programs include Accounts Receivable/Order Entry, Accounts Payable/Purchase Order, General Ledger System, Report Writer II, Balanced Billing System, Inventory II, Payroll Package, Manufacturer’s Inventory, and so on.

VOLKSMICRO COMPUTER SYSTEMS INC.
202 Packets Court, Suite C
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Also included is TMODEM, a file transfer program for automatic transfers of any file (even if in machine-language programs) between you and others having TMODEM. This package is available on disk for $79.95. If you don’t have a modem, you can purchase their Hayes Smart Modem and Commwhiz for $299, a savings of $59.95.

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Database Facility is designed to access records within one second. It has an unlimited number of both files (each file of up to 255 fields of 64 characters each), and keys (every field can be a key). Three levels of key readiness allow fast data entry mode and fast retrieval. It has easy file definition and maintenance, and can be called directly from Basic.

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Satellite Word Processing

by Henry Aldrich

If your Model I/III is in heavy demand as a word processor, use Color Computers as satellite terminals and let the I/III do the printing.

Word processing with a Model I/III disk system is popular in my university department. However, the heavy demand for the system makes getting access to it difficult.

The most time-consuming aspect of word processing is typing in the copy. If satellite terminals were available for text preparation, you could prepare copy on a terminal and use a computer to do the printing. I'll describe such a system using a Color Computer as the satellite terminal and a Model I/III as the host computer.

I initially hoped that I could transfer text between the Color Computer and a Model I/III since both write to and read from tape at 1,500 baud. Unfortunately, the Model I/III does not read Color Computer tapes. The two computers format lead-in and termination information differently, so that reading tapes from one computer by the other doesn't work without changing these parameters.

Machine-language programs could probably be developed to accomplish this; however, my configuration works without special software and requires no hardware modifications. You do, however, have to make simple cable connections.

The System

The satellite word-processing system described here is relatively low-cost. Tandy's 16K Color Computer sells for $199.95 and a Color Scripsit ROM pack costs $40. Almost any black and white television set serves as a Color Computer monitor for word processing. See Table 1 for a list of software and hardware requirements.

This system provides the most important features of text formatting except superscripts, subscripts, and underlining. However, these capabilities are available with word-processing software from independent suppliers.

The Color Computer's 16K memory provides storage for about six single-spaced or 12 double-spaced pages. As you near this storage limit, you should store text files in blocks on tape. The amount of memory available is easy to judge since Color Scripsit displays it at the bottom of the screen.

It is possible to prepare text on the 16K Color Computer with Color Scripsit, then transfer the text across the built-in RS-232C interface to a Model I or III with its own RS-232C interface, disk drives, and a smart terminal program.

Once the Model I/III receives the text, it is stored on disk. Then, with the Model I/III running Scripsit or one of its enhancements, the main system loads, chains, and prints the disk files. Underlining and other sophisticated commands are quickly and easily inserted with the global change functions of Model I/III Scripsit.

---

**Required Software**

Color Scripsit, on plug-in ROM pack.
Lindbergh Software's Omniterm or similar smart terminal program for Model I or III.
Scripsit for the Model I or III.
Super Color Terminal program from Nelson Software (optional).

**Required Hardware**

TRS-80 Color Computer and monitor.
TRS-80 Model I or III with RS-232 interface.
Cable to connect RS-232 printer output of Color Computer to RS-232 interface of Model I/III.

*Table 1. Required software and hardware.*

---

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Cable Construction

Building the cable is straightforward. You'll need a four-wire cable about 6 feet long (phone wire works well), a four-pin DIN plug (for the Color Computer output), and a 40-contact card-edge plug (for the Model I RS-232) or a 25-pin male DB 25 plug (for the Model III RS-232). Radio Shack stores stock all of these components.

The proper cable connections appear in Table 2. Most are obvious, except for the cable connection between the Color Computer's "receive data" line and the Model I/III "data terminal ready" line. This connection satisfies a system requirement of the Color Computer. Its input line must receive a constant signal from the Model I/III indicating that it is ready to receive data. This connection assures an uninterrupted data flow.

Set-up Procedure

Load Omniterm into your Model I/III. Set Omniterm parameters to match the printer default protocols of Color Scripsit. One of Omniterm's nice features is the ease with which you can change these parameters. Simply hit the @ key twice to enter the command mode and change the UART (universal asynchronous receiver-transmitter) settings to:

<table>
<thead>
<tr>
<th>Baud</th>
<th>600</th>
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<tr>
<td>Data bits</td>
<td>8</td>
</tr>
<tr>
<td>Stop bits</td>
<td>2</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
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Then open the input buffer by pressing the I key.

All of the other parameters can remain at default—printer off, screen reformatter 54, carriage return suppression off, line feed suppression on, duplex full, echo off, CR/LF grouping off, and output from buffer off. Use the break key to return to the display mode.

Interconnect the two computers with the appropriate cable as indicated in Table 1. If you're using a Model I, the Color Computer must be far enough away from it so the Model I's radio frequency interference doesn't disrupt the Color Computer's display.

Boot up the Color Computer with a Scripsit ROM pack in place. Load your text from tape, or type NEW TEXT. Reformat the line width on the Color Computer to your preference. I use a 32-character line width, so lines print as they appear on the screen.

Since Color Scripsit behaves as if it is controlling a printer, the computer transmits a carriage return at the end of each line of text. Failure to reformat the text before sending it to the Model I/III results in 32-character lines with a carriage return at the end of each line. You can remove them in Model I/III Scripsit, but it is tedious. Reformattting prior to transfer avoids the problem. Select the Print option from Color Scripsit's main menu. Then answer the "Printer or tape?" query with "Printer." Begin text transmission to the Model I/III. The color display scrolls as each line is printed.

Alternatively, you could use Nelson Software's Super Color Terminal program. It transfers text in the Color Computer's buffer directly to the Model I/III without carriage return commands at the end of each line, circumventing the problem found with Scripsit.

Save Color Scripsit's text files on tape in the conventional manner. Then load Super Color Terminal from tape or ROM pack. Use its tape-to-buffer feature to load the Scripsit text file from tape into the buffer. Then, from the main menu, select "LPRINT BUFFER."

When transmission is complete, put your Model I/III into command mode and toggle the input buffer off by typing I. Save the data in the buffer on disk using the standard Omniterm choices from command mode. Return to the Model I/III disk operating system by using Omniterm's X command or by pressing the reset button.

Enter Scripsit in the usual way. Load the text file from disk. Operate normally in Scripsit to edit, print, and so on. If you use the Nelson program, remove the series of carriage returns corresponding to the pagination points on the Color Computer.

Color Scripsit in ROM pack does not display lowercase letters, but uses reverse video capital letters instead. This is surprisingly easy to get used to, however. Some of the cassette word processors, such as Telewriter, do display lowercase, but they require a 32K machine to provide sufficient text storage.

You might want to drive a printer directly with the Color Computer, particularly since many users already have a parallel printer. There are three economical options: first, serial printers, such as the Radio Shack DMP-100, for around $300 by mail; second, Epson plug-in serial interface card for its parallel printers for less than $100; finally, independent suppliers' universal serial-to-parallel converter for about $70.

You can use the Color Computer as a portable word processing terminal, providing you take along a cassette recorder and the universal TV interface cord. Radio Shack sells a sturdy, inexpensive Color Computer vinyl case for transporting the unit. If you connect the Color Computer to a modem and use a smart terminal program such as Nelson Software's Super Color Terminal, it is even possible to transmit manuscripts or data to your home office from field locations or motel rooms. First check with the manager to be sure the alarm won't go off if you disconnect the room's TV cable from the set!

Scripsit becomes word processing capabilities are within nearly everyone's personal budget using this system, if a Model I or III is available for the final printing operations.

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80 Micro, September 1983 • 183
Contrary to what you're probably thinking, Spacemap isn't the latest Model I arcade clone—it's a track-by-track disk directory.

Have you ever needed to know where on a disk you have some free space? Or needed to locate a particular file to correct disk errors? I had the same problems and wrote a Model I program that identifies the location of a disk's files in terms of tracks and granules (see Program Listing).

I wrote the program in Assembly language for a 32K or 48K system with at least one disk drive. It occupies three granules on a disk, resides in memory from 7000-8F80 hexadecimal (hex), and works under TRSDOS, NEWDOS80, and DOSPLUS.

**Spacemap in Action**

When you boot up the program, a vanity screen first appears on the display while the program does some housekeeping chores.

Then the main menu appears (see Fig. 1). When you select an option, the program displays a space map like the one in Fig. 2. The display includes the name and creation date of the disk, the number of free granules, the number of allocated granules, and the number of granules not available.

It may seem odd that there are some granules unavailable. Spacemap is developed for 40-track disks; if the disk being mapped is formatted for only 35 tracks, the nonexistent tracks (35–39) are denoted under Not Available (see Fig. 3).

**Visible User Files Only Options**

The Spacemap directory identifies four tracks per line with a total of 10 lines on the display. Each track is subdivided into its two granules, labelled G-1 and G-2.

Figure 2 shows the space map of one of my disks, called Workdisk, after I selected the Visible User Files Only op-
tion. The free granules are indicated by dots. Tracks 38 and 39 are free. Solid lines denote the allocated granules. Only user files are shown with an identifying letter.

System and Invisible Files Only Option

Conversely, system files appear as a solid white line without a letter. For example, the program EDUSM/ CMD, coded with the letter E, resides in track 3, granule 2 and all of tracks 4, 5, and 6.

Now look at Fig. 4 where system files on the same disk are identified. Note track 17, where you find both granules identified with the letter D. Below that you see that D stands for Dir/SYS, the disk directory. Granule 1 of track zero is coded with an A, occupied by Boot/SYS. The unidentified solid lines contain the user files identified in Fig. 2.

All Files Option

This option requests identification of all files. No unidentified granules are shown (see Fig. 5).

Additional Details

With the map on the screen, there isn't enough room to display all the file names simultaneously. Underneath the map, on video line 16, is another menu (see Figs. 2-5). Option F, Filespec, displays the file names—they stay on the screen as long as you keep the F key depressed. When you release the key, the space map returns. Another option, H, Hardcopy, produces a printout of both the map and its file names. If you want to map another disk, type N, return to the main menu and read the new directory. If you don't want to read a new directory, type R, bypass the directory-read, and reuse the directory currently in memory. To end the program, type E. See the Program Listing for Spacemap's program flow.

Disk Directory

The disk directory occupies all 10 sectors of track 17. Sector zero contains two tables. The first one is the granule allocation table (GAT), the second one the lockout table. There is a byte in these tables for each possible track, and this byte describes the status of that track. Consider the lockout table first. If, for example, the tenth byte, describing track 9, doesn't equal FC hex, this track is locked out and unusable.

In the granule allocation table, a byte may indicate that both of its granules are free if it is FC hex, or that both granules are allocated if it is FF hex. If the first granule is allocated and
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map and, once built, is used for all maps. After the directory is read or ignored, depending on the read switch setting, a granule table is built in memory. This table is 80 bytes long, each byte representing one granule for a 40-track disk. The table is filled with 50 hex, 51 hex, or 52 hex, depending on the information found in the GAT and lockout table.

After this table is complete, the program checks sectors 2-9 for files, keyed to the map by name. The files checked depend on the option taken earlier when you answered the query for file names. A file code counter is started and incremented for each file you use. This code is then inserted into the granule table in the granules where the file resides. Later, this code converts to the more convenient A-Z, 1-9, 10 and up configuration for display purposes.

A file name area is built showing these codes and their associated file names.

After a check of sectors 2-9 is complete, the now-updated granule table is decoded and a screen display pattern is built. The display pattern then moves to the screen memory. Pressing the F key replaces it with the key file names.

When you release F, the display pattern moves back to video. This happens very quickly. You get a printout by sending data bytes to the printer ROM routine from the map area, followed by the file name area. In order to center the output, eight blanks precede each line. Find more detailed comments in the program listing.

A careful look at the map shows whether a file is badly fragmented or not. Fragmentation depends upon the number of contiguous granules available to the system when a file is saved. Single-drive owners see how many systems files have to be carried on each disk.

Spaceemap is handy, especially when mapping disks with different operating systems, or data disks without the system programs. The program produces a map as long as the directory criteria are the same.

Modifications
I own the Microline-80 printer, and the CR/LF code for is 0A hex. If your printer requires a different code, change line 8110 in the Program Listing. If your printer doesn't print block graphics, make the changes listed in Fig. 6; they should produce acceptable graphics.

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Listing continued

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Listing continues
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79C9 3F 08530 KBIND DBFB 'Z'
79C9 00 08540 SECNUM DBFB 0
79C9 00 08550 FCRTR DBFW 0
79C9 00 08560 ALCTR DBFW 0
79C9 00 08570 NACTR DBFW 0
79C9 00 08580 SCTCR DBFW 0
79D1 00 08590 CDOCTR DBFW 0
79D2 00 08600 WCSTL DBFW 0
79D3 00 08610 LINCCTR DBFW 0
79D4 00 08620 ROMCTR DBFW 0
79D5 00 08630 SECADR DBFW 0
79D7 00 08640 CTADDR DBFW 0
79D9 00 08650 FSADDR DBFW 0
79DA 00 08660 BASADR DBFW 0
79DB 00 08670 EXADR DBFW 0
79D9 00 08680 MEADDR DBFW 0
79D9 00 08690 DNSAGE DBFW 0
7A50 00 08700 GETBL DBFW 0
7A53 30 08710 TRXTBL DBFW 88-08-928-8710-1112-1516-1928-2224-2226-3332-3536-39

7A65 1027 08720 CONVSB DBFW 1000
7A67 003 08730 DBF 1000
7A67 003 08730 DBFW 1000
7A68 0A80 08750 DBFW 10
7A6D 0180 08760 DBFW 1
7A6F 56 08770 ASCLL DBFW 1

8010 00 08780 SECDB DBF 256
8000 08790 SECT DBF 256
8040 08800 SCRFAT DBF 1024
8040 08810 SAREA DBF 1024
8040 08820 FSAREA DBF 1024
8774 20 08830 BLKANS DBF
8774 20 08830 BLKANS DBF
8774 20 08830 BLKANS DBF
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8774 20 08830 BLKANS DBF
8774 20 08830 BLKANS DBF

0800 00 08830 SEND DBFW 0
0800 00 08830 SEND DBFW 0
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0000 TOTAL ERRORS

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--- 80 Micro, September 1983 ---
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The LDOS Toolbox

by Jim Heid

The utilities to perfect LDOS are available in Powersoft's Toolbox. You'll also get patches and filters to make your system manageable.

Finally, a set of tools I can use without busting my knuckles! The Toolbox for LDOS is a set of utility programs, patches, and filters that makes the best TRS-80 disk operating system even better.

What's a Utility?

A utility is a program that makes using the computer easier. Some utilities add features your computer lacks, such as a different keyboard arrangement. Some work with your word processing program to improve your text.

Others make life easier for disk drive owners by simplifying certain disk operating system (DOS) commands and functions. And some come to the rescue to repair a disk when that vital file won't load.

The Toolbox does all the above and more (see Table 1). Kim Watt, the author of Super Utility Plus, wrote it. The programs in The Toolbox do many things that Super Utility Plus (SU+) does, but they work with LDOS-formatted disks only.

They also work with double-sided disk drives and with hard disks, something even SU+ can't do. In fact, this package lets you work with all LDOS-supported disk drives, including single- or double-density, single- or double-sided, 5¼- or 8-inch floppy disk drives, and fixed or removable hard disk drives.

The Package

The Toolbox package contains 19 machine-language programs, two LDOS filter programs, one LDOS patch, and two sample files, all stored on two 5¼-inch disks and accompanied by a 6- by 9-inch, 51-page manual.

You cannot duplicate the disks, but they contain an easy-to-use copy program that transfers the Toolbox programs onto your own single-density disks. Once you transfer them, you can copy them as often as you want.

The Toolbox utilities are written for use with LDOS 5.1.3. Model I users can use them without modification on any LDOS 5.1.x release. Model III users must patch 15 of the programs; the patches are easy to apply and are listed in the front of the manual. You cannot use the programs with the LDOS 5.0.x series.

The Programs

PMOD lets you examine and modify the contents of memory or of a disk. You can browse through the contents of a disk using the arrow keys, or supply a file name to modify or examine the contents of a particular file without searching the entire disk.

You can type your modifications in hexadecimal (hex), ASCII, decimal, binary, or octal. A sample PMOD screen appears in Fig. 1.

PCHECK is a directory-checking utility. The directory is a disk's table of contents. It contains the information that tells LDOS where your files are located on the disk, how much free space is available, when you last updated a file, and so on.

PCHECK reads a disk's directory and performs a complex, three-stage test to ensure that the directory's information is accurate. It's capable of finding 16 possible error conditions (see Fig. 2).

The error messages are definitely not phrased for the novice, but this makes sense, since the directory is a complex place that novices don't usually access anyway. How could you phrase "Directory links to record not linking back to it" for the novice?

PFIX is the companion program to PCHECK. It fixes most directory errors that PCHECK finds, and also repairs a disk that no longer boots.

The instructions for PFIX state, "In conjunction with PCHECK, most directory problems can be easily located and corrected without extensive knowledge of how directories are formatted."

To test this claim, I set up a test disk and, using PMOD, introduced five errors in the disk's directory. I then checked the disk using PCHECK. It found all the errors, and reported them as shown in Fig. 3.

Next, I ran PFIX to repair the GAT table. (You don't need to know what these letters stand for to use the pro-
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- TRS-80 FILE FOR MYSTIC...
- WRITING BASIC ADVISONS FOR TRS-80...
- SUM COMPUTER PROGRAMS FOR THE HOME...
- 80 PROGRAMS FOR TRS-80...
- 101 PROJECTS FOR THE 80...

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grams; you simply tell PFIX what PCHECK told you when it tested the disk, and it does the rest.) The disk drive came on for a few seconds, and a message told me that the fix was completed. I ran PCHECK to make sure. PFIX had located and repaired all the errors.

If you have a disk formatted a few years ago that is victim to frequent "SECTOR NOT FOUND" or CRC errors, the magnetic charges in the disk's surface might be weakened. PREFORM, a utility that formats a disk without erasing the data on it, can help.

PREFORM reads a track, reformats the track, then rewrites the data that it read. I used it to refresh several older disks, and it works well. PREFORM does not work with hard disk drives.

PVU is a disk-verification utility. It reads a disk and informs you of any faulty sectors. You can specify the drive to be tested, the track number to start testing, and a pause at each bad sector.

PCLEAR erases all unassigned granules, any part of the disk that a file isn't using. It also erases the contents of a particular file and cleans up a disk's directory by clearing unused directory records.

Using PCLEAR, you can wipe out every trace of that confidential memo. Better yet, you can replace the confidential data with the string of your choice.

Assume you have a file called Secret/SCR. At the LDOS READY prompt, type PCLEAR, SECRET/SCR, "HA! FOOLED YOU!". The phrase HA! FOOLED YOU!, repeating over and over again, replaces the data in the file. It's a fine way to foil file foes.

PSS is a sector status utility. It lets you identify which file is assigned to any sector on a disk. You simply supply PSS with the drive, track, and sector numbers, and it determines whether that sector is assigned to any file. If the sector is in use, PSS tells you the file name that it is assigned to, and the relative sector number within that file.

PMAP lets you locate the sectors that make up a particular file and determine the status of all granules on a disk. You can print the report that the program displays.

The PASSGO utility is handy when you forget a password. It lets you remove a password from a single file or an entire disk. You can also specify that passwords be removed on invisible and system files.

PUN is a disk un-repair program. It reverses the effect of the LDOS Repair (alien) command, which makes Model I TRSODS disks readable by Model III LDOS.

PUN changes the data address marks on a repaired disk, so Model I TRSODS can read the repaired disk. One trip through Pinland, and LDOS and TRSODS can read your disk. PUN works on the Model I only.

PKILL is a utility that lets you kill a number of files quickly with a minimum of typing. PKILL lets you classify the files to be killed according to various categories. For example, the command PKILL :1,/CMD kills all files on the disk in drive 1 with the /CMD extension. The command PKILL :1,A kills all files on the drive I disk.

Table I. The Toolbox at a glance.

<table>
<thead>
<tr>
<th>Type of System</th>
<th>utility package for LDOS users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine-language command files, one LDOS patch</td>
<td>Utility programs are parameter driven</td>
</tr>
<tr>
<td>Help screens provide on-line description of parameters</td>
<td>Package supplied on two single-density disks, each containing a copy program for transferring the files</td>
</tr>
</tbody>
</table>

Summary of Programs

PMOD—disk editing utility that allows examination and modification of disks.

PCHECK—directory check utility that reads directory and reports any errors.

PFIX—directory repair utility that repairs errors found by PCHECK.

PREFORM—disk reformat utility that formats a disk without erasing its data.

PVU—disk verification utility that finds and reports faulty disk sectors.

PCLEAR—disk clean-up utility that clears directory entries for killed files and clears unassigned granules.

PSS—sector status utility that identifies which file is assigned to any sector.

PMAP—disk/file mapping utility that locates sectors comprising a file and determines the status of all granules on a disk.

PASSGO—password removal utility that removes passwords from a single file or all files on a disk.

PUN—disk unrepair program that reverses effect of LDOS repair (alien) command.

PKILL—file killing utility that permits killing of multiple files with a minimum of typing.

PCOMPARE—disk/file comparison utility that compares two disks or files and identifies differences between them.

PFIND—search and replace utility that finds a given string or byte value and optionally replaces it.

PMOVE—file copying utility that transfers multiple files.

PERASE—disk bulkerase utility that removes all traces of data from a disk.

PDRT—directory read utility that permits reading of a Model III TRSODS disk directory without leaving LDOS.

PEX—disk drive exercising utility that steps head in and out.

PHELP—LDOS help utility that contains descriptions for all LDOS library commands and some utilities.

PMX/FLT—filter for printing TRS-80 graphics on Epson MX-80 printer.

DVORAK/FLT—filter that converts the keyboard layout to Dvorak arrangement.

PFILT/FLT—user definable filter that filters input or output devices.

PBOOT/FLT—patch for customizing LDOS boot display.

Figure 1. Sample PMOD display.
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Adding an exclamation mark to a PKILL command causes the utility to zero the directory entry for each file killed, making it impossible to recover those files. PKILL also lets you use partspecs (part of a file name) when specifying file names. For example, the command PKILL :1,STEST kills all files from the drive 1 disk with names that begin with TEST.

PKILL's best feature is its speed. The program operates by reading a disk's directory into memory, killing whatever files you specify, then writing the newly modified directory back to the disk. This technique lets PKILL perform a complex file-killing procedure in little more than the time it takes to read and write a directory.

PKILL's flexible parameters and its speed make it a must-have for hard disk users. One or two passes through PKILL can take the place of a 10-minute disk clean-up session.

PCOMPARE is the disk or file comparison utility. Supply two file names or two drive numbers containing disks to be compared, and PCOMPARE "holds them up to the light, side-by-side" and tells you if the data on them is the same or different. If it's different, PCOMPARE tells you the position of the mismatch within the file or disk.

The program displays a summary at the end of the comparison that gives the number of sectors compared, the number of sectors not matching, and the number of bytes not matching.

The PFIND utility is a string search-and-replace program. It lets you locate and, if desired, replace strings in memory, within a single file, or on a disk-wide basis. You can supply the search string in one of four formats: case dependent (each specified letter must match exactly), case independent (specified letters can be in upper- or lowercase, or a mixture of both), in byte-list format, or in word-list format.

The last two formats let you search for a string of bytes or of 2-byte words. The program accepts byte or word values in binary, decimal, hex, or octal.

PMOVE is the ultimate file copier. It lets you transfer a number of files from one disk to another in one easy operation. PMOVE also lets you supply default file extensions.

Transferring files with PMOVE is much faster than with the LDOS Copy command. In my tests, performed on an unmodified Model III, transferring 10 small files (of fewer than three grains each) took three minutes using the LDOS Copy command, but only one minute and 30 seconds using PMOVE.

This is another utility no hard disk owner should be without.

The PERASE utility turns your computer into a $15 bulk eraser. It erases all data on a disk. A bulk eraser does the same thing as PERASE but faster, but bulk erasers sometimes extend their magnetic fields to include important disks located several feet away. PERASE only erases the disk you specify.

PDIRT lets you read Model III TRSDOS-formatted disks without leaving LDOS. You can specify that the directory listing include invisible files, system files, and system overlays. This utility does not work on a Model I that you haven't modified for double-density operation.

The PEX utility is a disk drive exerciser. It doesn't take your drives out for a walk on cold winter days, but it does give their stepper motors a workout. In its manual mode, PEX lets you position the head to a specified track. You can use this feature when aligning a drive.

In its automatic mode, PEX steps the head back and forth from track zero to the drive's highest-numbered track.

You can use PEX along with a head-cleaning disk, although The Toolbox documentation advises against using the automatic mode for more than 15-30 seconds.

PHHELP, the largest program in The Toolbox, provides a summary of each LDOS library command and of the LBasic, Format, Backup, Conv, Patch, and Repair programs.

To use PHHELP, type PHHELP followed by a space, then the name of the library command. A short description of the command's purpose, use, and parameters appears and the program returns to the LDOS Ready prompt.

The descriptions in PHHELP are clearly written, and most summarize the command as well as possible in one screen. Some LDOS commands, such as System, DIR, and ATTRIB have many parameters and are too complex to describe completely on one screen. The summaries for these commands are more useful as memory joggers than as replacements for the LDOS manual.

Filters and a Fix

One of the features that sets LDOS
apart from other disk operating systems is its ability to filter a device. A device is anything attached to the computer that sends or receives data to or from the computer. Printers, disk drives, video monitors, and keyboards are typical devices.

The keyboard is an input device, since it supplies information to the computer. The video monitor and the printer are output devices, since they display and print information sent from the computer. The disk drive is an input or an output device, since it either supplies stored information to the computer or saves information sent by it.

LDOS lets you intercept and change the data going to or coming from a device. You might, for example, filter the printer to change the number of characters printed on each line.

You could also filter the keyboard so that entire sentences appear when you press a certain key. Filtering is a powerful feature you can use to overcome software or hardware limitations, or to make your computer easier to operate.

Three filters are included in The Toolbox package. The first, PMF/FLT, is for Epson MX-80 printer users. This filter adjusts the MX-80 graphics characters so that they print as normal TRS-80 graphic characters. This lets you retain the special capabilities of the MX-80 that are otherwise lost when you put it in the TRS-80 mode.

Dvorak/FLT is a keyboard filter that lets you try the famous Dvorak simplified keyboard arrangement. This keyboard layout places frequently used keys in more logical positions than the standard QWERTY layout. Once installed, you can alternate between Dvorak and QWERTY by holding down the clear key and pressing the zero key.

This filter does work, although I didn't spend much time experimenting with the Dvorak layout. I had a hard enough time learning where the space bar is; I'm not about to learn to type all over again.

PFILT is a powerful filter you customize for your own applications. Unlike filters designed for a specific device, you can use PFILT with either input or output devices.

To use it, you must first create a translation file using the LDOS Build command, or any word processor that saves files in ASCII format. This file contains the information that tells PFILT what to do with the data it intercepts.

I put together a short filter file that I use to filter the output to my dot-matrix printer. This file lets me change type styles in the middle of the text by simply pressing two keys.

Two sample filter files in The Toolbox illustrate the power of the PFILT filter. These files, called Code and Decode, are used to scramble and unscramble whatever you type when they are active. They're not of much practical value, but they help you figure out how to use PFILT for your own applications.

PBOOT is a patch that lets you customize, to a small degree, the appearance of the LDOS boot screen. PBOOT lets you add three 22-character message lines displayed next to that big

---

"Filtering is a powerful feature you can use to overcome software or hardware limitations."

---

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PACKER: Machine language program that edits all or part of your Basic program to run faster, save memory, or ease editing. The options include UNPACK—unpacks multiple statement lines into single statements, merging logic, inserts spaces and renumbers lines; SHORT—deletes unnecessary words, spaces, and REM statements; PACK—packs lines into maximum multiple statement lines including all branches; MOVE—moves line or blocks of lines to any new location on program; On 2 cassettes for 16K, 32K, 64K.

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206 - 80 Micro, September 1983
LDSO that appears when you boot the system.

I found this patch a convenient way to mark my system disks. I have several LDSO system disks that I use, depending on what I'm doing—one for programming, one for word processing, one for telecommunications, and so on.

PBOOT lets me put a small message in each disk's boot screen. The message appears every time I reset the system, reminding me which system disk I'm using.

Using the Programs

All the programs in The Toolbox are parameter-driven, meaning that you have to type words and values to tell each program what to do, as opposed to selecting options from a menu. Parameter-driven programs are generally more difficult to learn because you have to either memorize each parameter or refer to the manual often.

Powersoft has, however, worked around this drawback. When a program runs, the screen clears, and the program's name, a copyright message, and a prompt for the parameters appears. If you press enter, you get a list of allowable parameters.

You can see this list any time during a program's execution by pressing the enter key in response to the prompt. Although I still prefer menu-driven programs like Super Utility Plus, this method of providing on-line help works well.

All the programs in The Toolbox operate the same way—beautifully. The programs are carefully error-trapped. The screen displays are consistent and readable, and the error messages, while sometimes very technical, are complete. As an added touch, you can instruct the programs that display reports—disk maps, directory checks, and so on—to send data to the printer as well as to the screen.

Documentation

The manual that accompanies The Toolbox is adequate if you are very familiar with LDSO and with disk terminology in general. It was not written with the novice in mind. It assumes that you know what HIT and GAT mean, and what sectors and data address marks mean.

It doesn't warn the inexperienced computer user that one or two mistakes with a disk modification utility like PMOD can destroy the disk's contents. Finally, the manual is one of those run-it-off-right-justified-on-the-

daisy-wheel-printer-and-reduce-everything-50-percent jobs, and is, therefore, unattractive and difficult to read.

Who's It For?

This toolbox is definitely the craftsman's tool set. The programs in The Toolbox are error-free and work well with LDSO. They are powerful and easy to use, but you must have some knowledge of LDSO and of disk technical terminology, because the manual is geared for the expert user.

If you don't have any experience with disk and memory modification utilities, read one of the many books on the subject and experiment on some unimportant disks before working with valuable ones.

The file-moving and killing utilities are real time-savers. If you have a hard disk drive or several floppy disk drives, these gems are worth the cost of the package in themselves. In fact, at the new price of $69.95 (these same programs used to sell for $149.95), The Toolbox should be part of every LDSO user's system.

Jim Heid is a technical editor for Wayne Green Books Inc. Contact him c/o 80 Micro.
The Artful Plotter

by Jerry O'Dell

Plot intricate, eye-catching figures on Radio Shack's plotter/printer. Programs like these convert even amateurs into artists.

When Radio Shack reduced the price of their plotter/printer (catalog number 26-1190A), I had to buy one. This digital plotter produces 8½- by 11-inch plots with a resolution superior to even the large, $35,000 plotters of my college days. I've written some programs for the plotter that show off its high-resolution graphics in figures that are attractive and unique.

The plotter uses a ballpoint pen and thus isn't capable of doing work in India ink; that is not an insuperable drawback.

While I purchased the plotter for scientific purposes, I couldn't resist trying to make some intricate drawings. Since the manual provides only a few programs, I had to write my own. Some of the drawings were fascinating—almost beautiful. With proper modifications, these programs support almost any plotter; none of the features used are unique to my plotter.

The Programs

I consulted analytic geometry texts to learn how to create these figures. These books contain formulas for certain classic curves, such as those in the rose in Fig. 1. Many of these famous curves are defined in terms of polar coordinates. As such, they are difficult to draw on a printer, but are easily drawn on a plotter.

Plotters have a limited set of commands. Indeed, the programs in this article use only four true plotter commands found on virtually all plotters. In Program Listing 1, lines 20–50 establish certain constants for the rose. If you like, vary A to change the size and N to change the number of petals on the rose. The plotter connects to the computer's printer output and is addressed through LPRINT statements.

Line 60 puts the plotter in plotting mode, with LPRINT CHRS(2). Line 70 is important. It reads:

70 LPRINT "G50X950Y0" 'MOVE TO NEW ORIGIN

This line moves the plotter pen to the

The Key Box

Model III
16K RAM
Basic
Plotter Printer

Program Listing 1

```
10 REM ROSE PROGRAM
20 A=100
30 N=4
40 C=57.29578
50 LPRINT CHRS(2)
60 LPRINT "G50X950Y0"
70 LPRINT "G03X0Y0"
80 FOR K=1 TO 30
90 A=A+15
110 FOR J=0 TO 360 STEP 1
120 TH=J/C
130 R=A*SIN(N*TH)
140 X=R*COS(TH);Y=R*SIN(TH)
150 LPRINT "G01X";INT(X);"Y";INT(Y);"PLOT SEGMENT"
160 NEXT J
170 NEXT K
180 LPRINT "G50X0Y0"
```

```
Program Listing 1
```

Figure 1. Classic rose curves.
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coordinates $X = 950$, $Y = 0$ with the pen up. Thus, a G50 command moves the pen without drawing a line. Line 80 reads:

80 LPRINT "G03X0Y0"
'SET NEW ORIGIN

It resets the pen's origin to the current position (here, $X = 950$, $Y = 0$). From this point on, all pen movements are compared (referred) to $X = 950$, $Y = 0$. The phrase G03X0Y0 instructs the plotter to use the current position as a new origin.

The remainder of the program, particularly lines 130-140, contains a complicated formula to draw the rose. Plotting takes place in line 150, which reads:

150 LPRINT "G01X";INT(X);"Y";INT(Y)
'PLOT SEGMENT

Statements like G01X50Y60 move the pen holder with the pen down, drawing a line from the present pen position to coordinates $X = 50$, $Y = 60$. Line 150 says the same sort of thing, but variables X and Y go into the print statement as they are calculated by the formulas. Thus, the first time you encounter line 150 the plotter draws a short line from the origin (where you last left the pen) to the first point on the curve. The second time you encounter line 150, the plotter extends the line segment of the curve. Notice that Fig. 1, then, is made up entirely of many short, straight lines.

You should have little trouble converting these programs so they work on your machine. In fact, the little $250 plotter that Radio Shack has just begun to sell seems ideal for the amateur.

Listing 1 also shows the method used to draw the figures. The rose is actually drawn in lines 110-160, but since a single rose isn't very interesting to the eye, I added the loop in lines 90 and 170 to make the plotter draw several roses of ever increasing size. You can produce completely different figures by changing the numbers in lines 20, 30, and 100.

If the plot is a bit coarse for you, make the step smaller in line 110. Or, make the steps larger for fascinating, odd, angular figures, completely unlike the original.

I decided to plot an epicycloid, a curve traced by a point on a circle that rolls on the outside of a fixed circle (see Fig. 2). The epicycloid program is similar to the first program (see Program Listing 2).

Since it's used more than once, the function for the epicycloid is moved to a subroutine at line 200. This program introduces a new complication: While the rose began at the origin, the epicycloid begins at a distance from the origin. Consequently, in lines 110 and 120 you

```
10 REM EPICYCLOID PROGRAM 11/24/82
20 BR=150
30 FC=10
40 C=57.29578
50 LPRINT CHR$(2)
60 LPRINT "G50X950Y0"
70 LPRINT "G03X0Y0"
80 FOR K=1 TO 30
90 BR=BR+10
100 LR=BR/FC
110 GOSUB 200
120 LPRINT "G50X";INT(X);"Y";INT(Y)
130 FOR J=0 TO 359 STEP 1
140 PH=J/C
150 GOSUB 200
160 LPRINT "G01X";INT(X);"Y";INT(Y)
170 NEXT J
180 NEXT K
190 END
200 REM EPICYCLOID POINT ROUTINE
210 FT=BR+LR;XC=FT/LR
220 X=FT*COS(PH)—LR*COS(XC*PH)
230 Y=FT*SIN(PH)—LR*SIN(XC*PH)
240 RETURN
```

Program Listing 2

---

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<thead>
<tr>
<th>Task</th>
<th>SUPER Time</th>
<th>dBASE II Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set up/Program</td>
<td>5:20 min.</td>
<td>12:18 00 hrs.</td>
</tr>
<tr>
<td>Input 100 records</td>
<td>50:29 min.</td>
<td>1:27 50 hrs.</td>
</tr>
<tr>
<td>Sort &amp; Print Labels</td>
<td>6:41 min.</td>
<td>4:18 18 min.</td>
</tr>
<tr>
<td>Totals</td>
<td>1:02:30 hrs.</td>
<td>13:50 08 hrs.</td>
</tr>
</tbody>
</table>

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must move the pen to the start of the figure or you'll have an ugly, unwanted line from the origin to the beginning of the curve. The remainder of the program is just like Listing 1; change the shape of the figure by changing the numbers in lines 20, 30, 90, and 130.

Sometimes small modifications in the formulas lead to significant changes in appearance (see Program Listing 3). By changing the values in line 20 to 100, and in line 90 to 15, and changing the step size in line 130 to 0.5, the plus sign in line 210 to a minus sign, and the minus sign in line 220 to a plus, you obtain the hypocycloid shown in Fig. 3.

A hypocycloid is drawn by a point on a circle rolling around the inside of a larger circle. These figures remind one of a spider's web.

Sometimes, even erroneous formulas of geometric figures produce nice results. In Fig. 4, I wanted to plot a set of ellipses, one inside another. But I used the wrong polar formula for the ellipse so the ellipses shifted a bit each time one was plotted (see Program Listing 4).

Basically, it's the same program as the others. Only the formula for the ellipse in the subroutine starting in line 200 is different, along with some other variables to set the size.

---

**Program Listing 3**

```plaintext
10 REM HYPOCYCLOID PROGRAM 11/24/82
20 BR=100 'RADIUS OF BIG CIRCLE
30 FC=10 'SCALING FACTOR
40 CS=57.29578 'RADIANT CONSTANT
50 LPRINT CHR$(2) 'START PLOTTER
60 LPRINT "G50X950Y0" 'MOVE TO NEW ORIGIN
70 LPRINT "G83X0Y0" 'SET NEW ORIGIN
80 FOR K=1 TO 40 'OUTER LOOP
90 BR=BR+15 'INCREMENT BR
100 LR=BR/FC 'GET SMALL RADIUS
110 GOSUB 200 'GET COORDINATES OF START
120 LPRINT "G50X";INT(X);"Y";INT(Y);"MOVE THERE, PEN UP"
130 FOR J=0 TO 359 STEP 0.5 'PLOTTING LOOP
140 PH=J/C 'GET RADIAN EQUIVALENT
150 GOSUB 200 'GET COORDINATES
160 LPRINT "G01X";INT(X);"Y";INT(Y);"PLOT SEGMENT"
170 NEXT J 'END PLOT LOOP
180 NEXT K 'END OUTER LOOP
190 END
200 REM HYPOCYCLOID POINT ROUTINE
210 FT=BR-LR:XC=FT/LR 'GET CONSTANTS
220 X=FT*COS(PH)+LR*COS(XC*PH) 'GET X
230 Y=FT*SIN(PH)-LR*SIN(XC*PH) 'GET Y
240 RETURN
```

**Program Listing 4**

```plaintext
10 REM ELLIPSE PROGRAM
20 A=500 'SIZE
30 E=0.90 'ECCENTRICITY
40 ST=1 'STEP SIZE
50 C=57.29578 'RADIANT CONVERSION
60 LPRINT CHR$(2) 'START PLOTTER
70 LPRINT "G50X550Y0" 'GO TO ORIGIN (PEN UP)
80 LPRINT "G03X0Y0" 'SET NEW ORIGIN
90 FOR E=0.7 TO 0.98 STEP 0.015 'MULTI-ELLIPSE LOOP
100 TH=0 'SET ANGLE TO ZERO
110 GOSUB 280 'GET COORDINATES 1ST POINT
120 LPRINT "G50X";INT(X);"Y";INT(Y);"GO THERE"
130 FOR J=0 TO 360 STEP 20 'PLOT LOOP
140 TH=J/C 'ANGLE TO RADIAN
150 GOSUB 280 'GET COORDINATES
160 LPRINT "G01X";INT(X);"Y";INT(Y);"PLOT LINE"
170 NEXT J 'END PLOT LOOP
180 NEXT E 'END MULTI-ELLIPSE LOOP
190 END
200 REM ELLIPSE EQUATION
210 R=+(A*(1-E*E))/((1-E*COS(TH))) 'ELLIPSE EQUATION
220 X=R*COS(TH):Y=R*SIN(TH) 'TO RECTANGULAR COORD
230 RETURN
```

---

Figure 3. A hypocycloid.

Figure 4. Shifted ellipses.
Some patterns just don’t turn out the way you hope (see Program Listing 5). For example, Fig. 5 was supposed to provide some lovely moiré effects. Two circles are drawn, one on top of the other, with rays from the center. I don’t like the way it turned out, though, and no amount of fiddling with the constants improves it. Listing 5 shows how this angry-looking plot was developed.

Finally, some patterns you think would be ideal for the plotter just don’t work out. In the March 1982 issue of 80 Micro (p. 112), Bob Boothe had some lovely figures, including a number of superimposed sine waves. A plotter does a great job plotting sine waves, so you would think that I could have surpassed Boothe’s figure using Program Listing 6.

The result, Fig. 6, is disappointing—my plotter doesn’t do as good a job as Bob Boothe’s printer. The ball point pen doesn’t seem to provide sufficient blackness. The constant pressure from the ball point pen wrinkles the paper. It takes about two hours to draw Boothe’s Eye Killer, and the paper gets an awful workout during that time.

In all, however, I find the results of my little experiments pleasing. The programs to make these designs are short. Many more complex programs are available so that you can plot almost anything you want.

Jerry O’Dell is a professor of psychology at Eastern Michigan University, Ypsilanti, MI 48197.

Program Listing 5

10 REM DOUBLE RAY PLOTTER
20 C=57.29578
30 LPRINT CHR$(2)
40 LPRINT "G50X950Y0"
50 LPRINT "G03X0Y0"
60 DS=-20
70 FOR K=1 TO 2
80 FOR J=0 TO 359 STEP 3
90 X1=50*COS(J/C)+DS
100 Y1=50*SIN(J/C)
110 X2=50*COS(J/C)+DS
120 Y2=50*SIN(J/C)
130 LPRINT "G50X";INT(X1);"Y";INT(Y1) "GO TO INNER POINT"
140 LPRINT "G01X";INT(X2);"Y";INT(Y2) "PLOT RAY"
150 NEXT J
160 DS=20
170 NEXT K
180 LPRINT "G50X0Y0"

Program Listing 6

10 REM EYE KILLER PROGRAM (AFTER BOOTHE)
20 HH=175
30 C=57.29578
40 LPRINT CHR$(2)
50 LPRINT "G50X200Y0"
60 LPRINT "G03X0Y0"
70 N=0
80 FOR J=1 TO 2000
90 N=N+1
100 IF N>50 THEN N=1
110 IF N<25 THEN 170
120 LPRINT "G50X0Y0";INT(-J)
130 FOR X=0 TO 1400 STEP 5
140 Y=5IN(X/C)+HH-J
150 LPRINT "G01X";INT(X);"Y";INT(Y) "PLOT CURVE"
160 NEXT X
170 NEXT J
180 LPRINT "G50X0Y0"
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80 Micro, September 1983 • 215
Aid for AIDS-III

by Ameé Eisenberg

In March and April 1983, 80 Micro published tandem articles on AIDS-III, a data management system (pp. 136 and 168, respectively). The software was sound, but after reading the articles I still didn't understand how to make the darned thing run. Many moons passed before I figured out the system. I'll give you the benefit of my insight.

The Automated Information Directory System (AIDS) comprises three parts: the field, the record, and the file. AIDS handles these parts in specific ways, but allows you an almost unlimited definition of them.

Fields are the smallest possible blocks of data. In the checkbook example cited in the AIDS articles, the fields are check number, dollar amount, payee, etc. Although this sample uses five fields, you can specify up to 12 fields.

Records are blocks of data made up of a set of fields. In AIDS-III, a single record contains the five fields used to describe the information on each check.

Files are blocks of data comprising a set of records. The number of records allowed in a file is determined by the amount of available memory.

AIDS-III got you stymied? Here are some tips on how to use this data management program.

Running AIDS

To run AIDS, you must initialize Basic and reserve file space. Use the syntax "BASIC - F:n", where n is the number of files you want to open. I usually use three. You must initialize the files despite the default value of three files for Basic. Without initialization, a BAD FILE NAME error results in all attempts to write or read a file.

AIDS is not necessarily the system you think you see. It is flexible enough to let you modify it to suit your data management needs. You have to change a few lines of Basic code to configure AIDS. This is where imagination comes in. For example, say I need a system that keeps track of friends’ birthdays so I can send greeting cards.

The procedure is simple. Lines 4990-5120 in the March AIDS-III program contain the data statements that create an AIDS system. List these lines and study the remarks associated with them. Change the lines according to your needs. In my case, for instance, I need names, addresses, and birth dates. While I was at it, I decided to file phone numbers as well. My address system appears in Fig. 1.

Save the AIDS program with your custom system configuration under its own name. This way, you can refer back to the original system any time you need to create a new AIDS system.

Once you've created your system, the next step is getting your data in and out of it on demand. Run your AIDS system. After the initial AIDS message is displayed, the program displays your system and the menu options on the screen (see Fig. 2).

If you are developing a new system, the only menu option applicable is Add Records. Add your data, then return to the main menu (press the shift and uparrow keys simultaneously). See Table 1 for the AIDS control keys. One note: AIDS does not accept lowercase input.

To save the information just added, choose the Select & Save Records op-

```
5000 DATA AMEE'S ADDRESS SYSTEM
5010 DATA 5: 'NUMBER OF FIELDS COMPRISING A RECORD
5020 DATA NAME: 'NAME OF FIELD #1
5030 DATA 25: 'NUMBER OF CHARACTERS IN FIELD #1
5040 DATA STREET: 'NAME OF FIELD #2
5050 DATA 25: 'NUMBER OF CHARACTERS IN FIELD #2
5060 DATA TOWN, ETC: 'NAME OF FIELD #3
5070 DATA 25: 'NUMBER OF CHARACTERS IN FIELD #3
5080 DATA PHONE: 'NAME OF FIELD #4
5090 DATA 14: 'NUMBER OF CHARACTERS IN FIELD #4
5100 DATA BIRTHDAY: 'NAME OF FIELD #5
5110 DATA 7: 'NUMBER OF CHARACTERS IN FIELD #5
```

Figure 1. Lines inserted in AIDS-III to keep track of names, addresses, birth dates, and phone numbers.

```
1—SELECT & LOAD RECORDS
2—ADD RECORDS
3—SORT RECORDS
4—SELECT & UPDATE RECORDS
5—SELECT & DELETE RECORDS
6—SELECT & PRINT RECORDS
7—SELECT & SAVE RECORDS
8—WRITE DESCRIPTOR FILE
9—QUIT, ALL DONE
```

Figure 2. AIDS-III menu options.
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<thead>
<tr>
<th>Year</th>
<th>Games Won</th>
<th>Games Lost</th>
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<td>76</td>
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<td>0</td>
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<td>TOTAL</td>
<td>1195</td>
<td>742</td>
<td>414</td>
<td>30</td>
</tr>
</tbody>
</table>

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tion. This asks you to select which records you want to save. Then it asks for the name of the saved file. You may create a new file, or save the selected records to a file previously created by your AIDS system. Your system writes to the files it creates, not to files created by a different AIDS system. For instance, my address system won't write information to a file created by the AIDS-III checkbook management system.

With all "SELECT &" menu options, you control two parameters. First, you choose the field, and second, you choose a logical operator by which selections are sorted. For example, if I wanted a printout of all the names in my address system, I would choose field A (Name). The logical operators from which I choose appears in Fig. 3.

I'd then ask the computer to print out those names not equal to (#) Z. Then (providing I'm not best buddies with someone who goes by the moniker "Z") I'd get all the names in my address system.

Alternatively, if I needed to know whether any of my friends had a birthday today, I'd use the Select & Print option and field E (birthday) all those birthdays equal to (=) today's date. Then, if anyone's name was displayed, I'd send them a card.

Running Maps, CALCS, and Merge

Option 8 on the main AIDS menu is Create Descriptor File. Descriptor files become important when (and only when) you wish to use the files you've created in your AIDS system with some AIDS subsystem such as Maps, CALCS, and/or Merge. These programs appear in the April 1983 80 Micro (p. 168) and are designed to manipulate previously created data files in ways beyond the simple sorts of which AIDS is capable.

Create Descriptor File writes a file that contains the system configuration of your AIDS system. This tells the subsystem programs what to expect when they read a file from your AIDS system. The Address/DSC descriptor file that I created from my address system indicates that my system is called Amee's Address System, that each record has five fields, and the names and lengths of those fields.

When first run, the AIDS subsystems ask for the descriptor file name. Once the descriptor file has configured the subsystem program, it can then read any other AIDS system file created according to the descriptor file format.

Maps, for example, reads selected files or records and offers three ways to print your data: Print Down Page, Print Across Page, or Print User-Defined Format. The user-defined formats let you sort the fields so you can print data records in any format you choose. In my address system, a user-defined format of A/B/C (field A, skip down one line, field B, skip down one line, field C) creates a mailing label. See Table 2 for the Maps format specifiers.

CALCS is a subsystem that allows you to do some numerical calculations with the data in its files. You may create two formulas and process any field or record through either of those formulas.

Merge manipulates files and records to create lists defined by specified parameters. One nice feature for people working on mailing lists is that Merge searches out and deletes duplicate records. That could save a lot of money by preventing the same person from getting two or three of the same brochure.

In Closing

This article attempts to help you figure out AIDS. It is by no means comprehensive. AIDS is a large and versatile system. But, if you read the March and April articles and play with the system a little, I think you can get a good handle on using AIDS.
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All year long, you have to listen to manufacturers tell you which software is best. Here's your chance to tell them, with the 1983 Reader's Choice Awards.

This year, we've made it easier for you. We've printed the ballot on the bind-in card opposite p. 226; you don't have to tear out a page from your magazine to vote. To avoid ballot stuffing, we can accept only original cards—no photocopies please.

The entries in this year's poll were compiled from manufacturers' responses to a questionnaire. To this list, we added last year's first place winners, as well as any product that received 10 percent of the vote in its category.

Look through the entrants, and select your favorite software in each category that applies to you. Write the numbers of your choices on the ballot. If your favorite program isn't on the list, write in its name and manufacturer. All past and present commercial software packages are eligible.

The deadline for returning ballots is Oct. 7, 1983. We'll publish the results in January.

---

Model I/II Software

I/II—Accounting

1. Accounting Program (McClintock Corp.)
2. Accounting Software (CompuMax Associates)
3. Accounts Payable (MAS90)
4. Accounts Payable (Radio Shack)
5. Accounts Receivable (Taranto & Associates)
6. Accounts Receivable (Universal Data Research)
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8. Accounts Receivable (MAS90)
9. Accounts Receivable (Radio Shack)
10. Accounts Receivable (Taranto & Associates)
11. Accounts Receivable (Universal Data Research)
12. ACCT (Micro Architect)
13. Amortization (Rockware Data Corporation)
14. Annuity F/A (Sturdivant and Dunn)
15. Balanced Billing (Universal Data Research)
16. Cashbook (Cotgridge & Associates)
18. Check Register (MAS90)
19. Church Contributions (Universal Data Research)
20. Cycle Billing System (Computer Shack)
21. Data Train's "The Accountant" (Thoughtware Publishing Company)
22. Datagraph (Micro Software Systems)
23. Expense Ledger (Manhattan Software)
24. Fixed Assets (DepAcra) (Nepenthe Programs)
25. Flying Club Management System (Communications Systems Laboratories)
26. General Ledger (Universal Data Research)
27. General Ledger (MAS90)
28. General Ledger (Taranto & Associates)
29. General Ledger (Holman Data Processing)
30. GL90 General Ledger (AT-80)
31. Intermediate Bookkeeper (Sturdivant and Dunn)
32. Inventory (McClintock Corp.)
33. Inventory Control (Taranto & Associates)
34. Inventory II (Universal Data Research)
35. Inventory (MAS90)
36. Job Cost Control (McClintock Corp.)
37. Lynn's Accounts Receivable System (Joe Lynn Computer Services)
38. Lynn's Payroll System (Joe Lynn Computer Services)
39. Maxi CRAS (Adventure International)
40. Non-Disk Check System (Futureview)
41. Non-Disk Electric Bookkeeper (Futureview)
42. Payroll (McClintock Corp.)
43. Payroll (Radio Shack)
44. Payroll (Taranto & Associates)
45. Payroll (Universal Data Research)
46. Payroll (Write-up only) (Nepenthe Programs)
47. Quick Check (Chuck Atkinson Programs)
48. Repeat Billing (MAS90)
49. SSBSG Accounts Payable (Small Business Systems Group)
50. SSBSG Accounts Receivable (Small Business Systems Group)
51. SSBSG General Ledger (Small Business Systems Group)
52. SSBSG Inventory (Small Business Systems Group)
53. SSBSG Invoicing/Order Entry (Small Business Systems Group)
54. SSBSG Payroll (Small Business Systems Group)
55. Schedule K-1 Manager (Empire Software)
56. Single Entry General Ledger (Universal Data Research)
57. Small Business Accounting (Howe Software)
58. Superstar (Rockware Data Corporation)
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60. TaxPalm (Videotronics of Sarasota)
61. TaxPlan (Contract Services Associates)
62. Taxpro (Contract Services Associates)
63. Viz-A-Con (Abacos Associates)

I/II—Business

1. Accounts Payable (Nepenthe Programs)
2. Accounts Receivable (Nepenthe Programs)
3. ACNAP (BY Engineering)
4. Advanced Opus (Star Value Software)
5. Agristar (Radio Shack)
6. Armway Business Manager, The (Manhattan Software)
7. APL+ Plus (STSC)
8. BizGraph (Micro-Lab)
10. Budget Management (Radio Shack)
11. Business Management (Instant Software)
12. Business Mailing List (Radio Shack)
13. Cassette Mailing List (Radio Shack)
14. Checkwriter Register (SoftCol)
15. Checkwriter Register (Radio Shack)
16. Church Attendance (Custom Data)
17. Church Donations (Custom Data)
18. Client Files (Coolidge & Associates)
19. Commercial Cooling & Heating Load (McClintock Corp)
20. Construction Spreadsheet Templates (Software Models)

21. Cycle Analysis (Mar-Tec Stock Market Software)
22. Datagraph (Micro-Soft Systems)
23. DesktopPlan (Radio Shack)
24. Directory for Churches (Custom Data)
25. EasyCalc (Instant Software)
26. Enigma—an Unbreakable File (Caiser Computing)
27. Executive Calculator—150 Business Progs (MCS Software)
28. Executive Scratch Pad Software of the Future
29. Finance Spreadsheet Templates (Software Models)
30. Food Service Cost Estimating (Neperite Programs)
31. Heating Fuel Cost (McClintock Corp)
32. Inventory Control (Radio Shack)
33. Inventory Master (Logical Systems)
34. Investor III (Good Software Programs)
35. Imoctem (Computer/Busines Services)
36. Imoctem (Computer/Busines Services)
37. Job Costing (ELTECH Associates)
38. Job Collection (ELTECH Associates)
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41. Lynn's Payroll System (Joe Lynn Computer Services)
42. Mail (Micro Architect)
43. Mail List Manager (Manhattan Software)
44. MailFile Series II (Logical Systems)
45. Mailing List (Howe Software)
46. Mailing List System (Precision Prototypes)
47. Manufacturer's Cost Estimating (Neperite Programs)
48. Manufacturing Inventory Control (Radio Shack)
49. Mar-Tec Charts (Mar-Tec Stock Market Software)
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73. Project Manager (Radio Shack)
74. Purchasing Control (ELTECH Associates)
75. Quick Register (Chuck Atkinson Programs)
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77. Real Estate II (Radio Shack)
78. Real Estate III (Radio Shack)
79. Real Estate IV (Radio Shack)
80. Real Estate Spreadsheet Templates (Software Models)
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82. Small Business Management (Howe Software)
83. Statistician, (The Quant Systems)
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86. Tickerstock (Max Ule & Company)
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27. Videotex Communications Package (Radio Shack)
28. VIS/Brige/DJ (Solutions)

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1. DOSPLUS (Micro Systems)
2. Labimakr (ETS Center)
3. LCDOS (Siksys Limited Systems)
4. LDDOS 5.1 (Logical Systems)
5. MULTIDOS (Gomscopian Electronics Corporation)
6. Nametag (ETS Center)
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8. TRSDOS (Radio Shack)
9. TISHARE Multi-User (ComSoft)
10. UCSD p-System (PDC Systems)
11. ZDOS6 (Cosmopolitan Electronics Corporation)

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4. CAIWARE-3D (Fireside Computing)
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53. Typing Tutor (Microsoft)
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55. Words for the Wise (Teach Yourself by Computer Software)
56. Wordum (SoftCo)

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<tr>
<th>Amount of Insurance</th>
<th>Annual Premium</th>
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<td>Up to $2,000</td>
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<td>$11,001-$14,000</td>
<td>$105</td>
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37. Pro-Pix (Adventure International)
38. QSort (BV Engineering)
39. Reap (BV Engineering)
40. Record Library (Software of the Future)
41. Seven Program Package (BAPS Software)
42. Sex-O-Scope (AGS Software)
43. Sign (Precision Prototypes)
44. SMAS (Spiral Enterprises)
45. Stockpick (Radio Shack)
46. Super Calendar (Precision Prototypes)
47. Super-Log II (Micro-80)
48. Superfax (Rockware Data Corporation)
49. Tallymaster (Prosoft)
50. Tax Planner (Computer Systems and Services)
51. Transit Star (AGS Software)
52. Trendex Stock Trend Analysis (Radio Shack)
53. Video Library (Software of the Future)
54. Your Family Tree (Acorn Software Products)

I. III—Music

1. Fantasia (Software Affair)
2. Greatest Hits (Software Affair)
3. Music "Magic" (Pioneer Software)
4. Orchestra-85 (Software Affair)
5. Orchestra-90 (Software Affair)
6. Piano-85/90 (Software Affair)

I. III—Spelling Checkers

1. Chektext (Apparatus)
2. Electric Webster (Cornucopia Software)
3. Grammatik (Aspen Software)
4. Hexspell (Hexagon Systems)
5. Microprooft (Cornucopia Software)
6. Random House Proofreader (Aspen Software)
7. Scripsit Dictionary (Radio Shack)

I. III—Utilities

1. Aceli 364 (Allen Gleder Software)
2. AOS Utilities #1 (Howard W. Sams & Co.)
3. Arranger (Triple-D Software)
4. Assemiz (Instant Software)
5. ASMB-18 (Allen Ashley)
6. ASMB-20 (Allen Ashley)
7. ASMB-38 (Allen Ashley)
8. ASMB-48 (Allen Ashley)
9. ASMB-61 (Allen Ashley)
10. ASMB-29 (Allen Ashley)
11. Basic Answer, The (Logical Systems)
12. Basic Compiler (PCD Systems)
13. Boss (Cosmopolitan Electronics Corporation)
14. BOSS/ReRun 80 (Cosmopolitan Electronics Corporation)
15. CASM Editor/Assembler (Crown Micro Products)
16. Casop (B.T. Enterprises)
17. CD-DIR Cursor Oriented Directory (Picotrin Technology)
18. Commotr (Sykam Systems Limited)
19. Complete Memory Dump (Roger S. Dildine)
20. Comref (Apparatus)
21. Copy III (B.T. Enterprises)
22. Count, The (Sturdivant and Dunn)
23. DCV-1 Tape to Disc (Small System Software)
24. Depux (Radio Shack)
25. Disk Index (Numum Micro Systems)
26. DISKLIB (Sykam Systems Limited)
27. DISMATA Disaster (ProAm Software)
28. DLDIS (Instant Software)
29. DoseAside (Philadelphia Consulting Group)
30. DSBM/LR I (MISOYSYS)
31. EDAS (MISOYSYS)
32. Edit (Allen Gleder Software)
33. Edit (Full Screen Editor) (D.C.S. Software)
34. Editor/Assembler (Series II) (Radio Shack)
35. EDITASM (Radio Shack)
36. Enigma—An Unbreakable File (Casler Computing)
37. Epson Driver Program (Apparatus)
38. Fast Sort (Precision Prototypes)
39. Faster (Prosoft)
40. FED (Logical Systems)
41. File Transfer Program (Personal Computer Products)
42. Filter Package #1 (Logical Systems)
43. Filter Package #2 (Logical Systems)
44. FLEXTEXT Plus (Apparatus)
45. Fortran Compiler (PCD Systems)
46. Fourier Analysis (Roger S. Dildine)
47. Full Screen Text Editor for Basic, The (Computer Applications Unlimited)
48. Hex Man (Hexagon Systems)
49. I/O Monitor (Logical Systems)
50. Instant Assembler (Numum Micro Systems)
51. Interactive Control Language (XYZT Computer Dimensions)
52. Invmt (Inventory Management) (D.C.S. Software)
53. LC (MISOYSYS)
54. LDOS Help Command (Vinzant & Associates Software Division)
55. LED (Logical Systems)
56. Lisp Interpreter (PCD Systems)
57. Loadex Disk File Transfer (Crown Micro Products)
58. Macro-Monitor (Howard W. Sams & Co.)
59. Manipulator, The (Vinzant & Associates Software Division)
60. Mastery Directory (Howard W. Sams & Co.)
61. Maxi Stat (Adventure International)
62. Maxprint (Peggytronics)
63. Maxprint Plus (Peggytronics)
64. MCopy (Stewart Software)
65. MDIS (Sykam Systems Limited)
66. Meta (Far West Systems & Software)
67. Monitor #3 (Howe Software)
68. Monitor #4 (Howe Software)
69. Monitor #5 (Howe Software)
70. M-Zai (Computer Applications Unlimited)
71. NEWBASIC 2.0 (Modular Software Associates)
72. Pascal Compiler (PCD Systems)
73. Pascal-80 (New Classics Software)
74. PDS (MISOYSYS)
75. PDS (Allen Ashley)
76. Powerbot (Powersoft Products)
77. Powerdraw (Powersoft Products)
78. Ram-Slides (XYZT Computer Dimensions)
79. RPM (Prosoft)
80. RSM19 (ERCOM) (Small System Software)
81. RSM3 (Small System Software)

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Model II/12/16 Software

II/12/16—Accounting
1. Accounting Program (McClintock Corp.)
2. Accounting Software (Compumax Associates)
3. Accounts Receivable (Radio Shack)
4. Accounts Payable (Taranto & Associates)
5. Accounts Receivable (Taranto & Associates)
6. Accounts Receivable Balance Forward (Taranto & Associates)
7. ACCT (Micro Arch)
8. Amortization (Rockware Data Corporation)
9. Asset (PC/SD Systems)
10. CBook (Contract Services Associates)
11. Corporate 1120 (CPAids)
12. Data Train’s “The Accountant” (Thoughtware Publishing Corporation)
13. General Ledger (Taranto & Associates)
14. General Ledger II (CPAids)
15. Integrated Accounting Package (Micro Arch)
16. Inventory (McClintock Corp.)
17. Inventory Control (Taranto & Associates)
18. Job Cost Control (McClintock Corp.)
19. Master Tax Program (CPAids)
20. Payroll (Radio Shack)
21. Payroll (McClintock Corp.)
22. Payroll (Taranto & Associates)
23. Quick Check (Chuck Atkinson Programs)
24. SBSG Payroll (Small Business Systems Group)
25. SBSG Accounts Payable (Small Business Systems Group)
26. SBSG Accounts Receivable (Small Business Systems Group)
27. SBSG General Ledger (Small Business Systems Group)
28. SBSG Inventory (Small Business Systems Group)
29. SBSG Invoicing/Order Entry (Small Business Systems Group)
30. SBSG Payroll (Small Business Systems Group)
31. Small Business Accounting (Hoe Software)
32. Superlax (Rockware Data Corporation)
33. Tax Planner (CPAids)
34. Taxplan (Contract Services Associates)
35. Taxpro (Contract Services Associates)
36. Time Accounting (Radio Shack)
37. Vizi-Print (The Proper Touch)

II/12/16—Business
1. Accounts Paid System (Windham Software)
2. AID-S III (Meta Tech.)
3. ARINV (The Software Terminal)
4. Autograph (Roklan Corporation)
5. Bill of Materials Processor (ELTECH Associates)
6. Check Register Plus (SoftCo)
7. Church Alien (Custom Data)
8. Church Donations (Custom Data)
9. CMICS (Dynakote Information Systems)
10. Commercial Cooling & Heating Load (McClintock Corp.)
11. Construction Spreadsheet Templates (Software Models)
12. Country Club Management (The Software Terminal)
13. Dental Office System (Windham Software)
14. Directory for Churches (Custom Software)
15. Ecometrics (Century Software Systems)
16. Electronic Broker (Radio Shack)
17. Finance Spreadsheet Templates (Software Models)
18. Financial Decisions (Century Software Systems)
19. Financial Planning with VslCalc (Howard W. Sams & Co.)
20. Financial Statement Analysis (Century Software Systems)
21. General Ledger (Radio Shack)
22. Heating Fuel Cost (McClintock Corp.)
23. HELU Accounting (PCD Systems)
24. HELU Property Management (PCD Systems)
25. Instant Mathematical Programming (PCD Systems)
26. Insure (The Software Terminal)
27. Inventory Control System (Radio Shack)
28. Inventory Management System (Radio Shack)
29. Investor III (Good Software Corp.)
30. Job Costing (ELTECH Associates)
31. Job Costing (Radio Shack)
32. Labor Collection/Performance (ELTECH Associates)
33. Lease Versus Purchase Analysis (Century Software Systems)
34. Life Cycle Cost (McClintock Corp.)
35. Linear Programming (Century Software Systems)
36. Litigation Support (Radio Shack)
37. Loancomp (Contract Services Associates)
38. Mail (Micro Arch)
39. MailFile Series II (Logical Systems)
40. Mailer (PCD Systems)
41. Mailing List (Hoe Software)
42. Mailing List II (Radio Shack)
43. Manufacturing Inventory System (Radio Shack)
44. Medical Office System (Windham Software)
45. Medical Office System (Radio Shack)
46. Medoffice (PCD Systems)
47. Management Inventory Control (ELTECH Associates)
48. NutriCalc (PCD Systems)
49. Order Entry (American Small Business Computers)
50. Order Entry (Radio Shack)
51. Order Entry with Inventory Control (Radio Shack)
52. Patient Data Management (The Software Terminal)
53. Pension Plan Defined Benefit System (Emmanuel B. Garcia, Jr. & Associates)
54. Pension Plan Defined Contribution System (Emmanuel B. Garcia, Jr. & Associates)
55. PERS-Mail (SoftCo)
56. Personal Data Base (PCD Systems)
57. Personnel Search (Radio Shack)
58. Point of Sale Inventory (SoftCo)
59. Powermail (Powersoft Products)
60. Premium Financing Insurance (Program Innovations)
61. Professional Time Accounting (Computer Systems and Services)
62. Property Management (The Software Terminal)
63. Purchasing Control (ELTECH Associates)
64. Quick Register (Chuck Atkinson Programs)
65. Real Estate Analysis (Century Software Systems)
66. Real Estate Spreadsheet Templates (Software Models)
67. Sales Analysis (Radio Shack)
68. Series Print Control (Business Services)
69. Shop Order Control (ELTECH Associates)
70. Small Business Management (Hoe Software)
71. Statistical Analysis (Radio Shack)
72. Statistician, The (Custom Data)
73. Statistics (Century Software Systems)
74. Supermail (American Small Business Computers)
75. Tickertac (Max Ula & Company)
76. TRS-80 Means Business Set (John Wiley & Sonja)
77. Vending (The Software Terminal)
78. VslCalc (VisiCorp)

II/12/16—Data Base Management
1. AIDS-III (Meta Tech.)
2. CCDSS—Relational Database Management System (Data Management Systems)
3. Database Management (Institute for Scientific Analysis)
4. IDM (Micro Arch)
5. In-Memory Database Management (Hoe Software)
6. LogCalc (PCD Systems)
7. Logiquest (PCD Systems)
8. MDS III (International Software Enterprises)
9. PD Base (PCD Systems)
10. Profile of Church Members (Custom Data)
11. Profile II (Radio Shack)
12. Q-Pro 4 (Quic-N-Easi Products)

II/12/16—Data Communications
1. Binary Synchronous Communications (Radio Shack)
2. Lync (International Software Alliance)
3. Omniterm (Lindbergh Systems)
4. Smart Terminal (Hoe Software)
5. STB-III (Small Business Systems Group)
6. Teleremot (Telexpress)
7. Videotex (Radio Shack)
8. VslBridge/DJ (Solutions)

II/12/16—Disk Operating Systems
1. A0N CRMF 2.2 Floppy (A0N international)
2. A0N CRMF 2.2 LS 812 Meg HD (A0N international)
3. CPM (Digital Research)
4. DOSPLUS II (Powersoft Products)
5. TRS80-R锻炼 Date.
6. UCSD P-System (PCD Systems)

II/12/16—Education
1. Instant Mathematical Programming (PCD Systems)
II/12/16 — Engineering
1. Auto-Load for Finite Element Analysis (McClintock Corp.)
2. Commercial Cooling & Heating Load (McClintock Corp.)
3. Concrete Beam Design (McClintock Corp.)
4. Concrete Column Design (McClintock Corp.)
5. Critical Path Project Management (McClintock Corp.)
6. Duct Design (McClintock Corp.)
7. Enhanced Finite Element Analysis (McClintock Corp.)
8. Fault Current Analysis (McClintock Corp.)
9. Finite Element Analysis (McClintock Corp.)
10. Fire Sprinkler Grid System (McClintock Corp.)
11. Fuse & Breaker Coordinator (McClintock Corp.)
12. Hardy Cross Water System Analysis (McClintock Corp.)
13. Heating Fuel Cost (McClintock Corp.)
14. HVAC Energy Consumption (McClintock Corp.)
15. Hydraulic Pipe Design (McClintock Corp.)
16. Life Cycle Cost (McClintock Corp.)
17. Lighting Design (McClintock Corp.)
18. One-Way/Two-Way Concrete Slab Design (McClintock Corp.)
19. Pipe Bending (McClintock Corp.)
20. Residential Cooling & Heating Load (McClintock Corp.)
21. Solar Wall Design (McClintock Corp.)
22. Solar Collector F-Chart Calculation (McClintock Corp.)
23. Steel Beam Design (McClintock Corp.)
24. Steel Column Design (McClintock Corp.)

II/12/16 — Games
1. Adventure (Adventure International)
2. Chess (Kuzel Computer Services)
3. Galactic Invaders (Kuzel Computer Services)
4. Interactive Fiction (Adventure International)
5. Maryland Model II Game (twin sixteen magazine)

II/12/16 — Home/Personal Management
1. Astro Star I (AGS Software)
2. Astro-Scope (AGS Software)
3. Home Budget (Howe Software)
4. Home Spreadsheet Templates (Software Models)
5. Mailer (PCD Systems)
6. Personel Databook (PCD Systems)
7. Powermail (Powersoft Products)
8. Sector (Sykam Systems Limited)
9. Sex-O-Scope (AGS Software)
10. Superprintemps (AGS Software)
11. Supertex (Rockwell Data Corporation)
12. Transit Star (AGS Software)

II/12/16 — Spelling Checkers
1. Grammatik (Aspen Software)
2. Scripsit Dictionary (Radio Shack)

II/12/16 — Utilities
1. 3D Plotter (Maxtek)
2. BACKPACK (Formal/Backup/Reorganize) (Skyline Software)
3. Basic Compiler (PCD Systems)
4. Basic Cross Reference (Good-Lydon Data Systems)
5. Basic Surrogate (ATON International)
6. CPM to P/Executive (PCD Systems)
7. Development Package (Racet Computers)
8. Development Utilities (Allen Ashley)
9. Disassembler (Program Innovations)
10. Disassembler/Overlay Map (Skyline Software)
11. Disk Sort (Good-Lydon Data Systems)
12. Editor/Assembler (Radio Shack)
13. Extended Built-In Functions (Snappware)
14. File Transfer Program (Personal Computer Products)
15. Fortran Compiler (PCD Systems)
16. Fortran Extension Library (The Proper Touch)

II/12/16 — Word Processors
1. Electric Pencil (Michael Strayer)
2. Electric Pencil (McClintock Corp.)
3. Formlet (Contract Services Associates)
4. Formlet for Churches/Custom Data
5. KWIX (Key Word Index for Scripsit) (Skyline Software)
6. Scripsit 2.0 (Radio Shack)
7. Typewr (Contract Services Associates)
8. WordStar (Micro Pro)

Color Computer Software

**CoCo — Accounting**
- Accounts Payable (Universal Data Research)
- Accounts Receivable (Universal Data Research)
- Balanced Billing (Universal Data Research)
- Church Contributions (Universal Data Research)
- General Ledger (Universal Data Research)
- Inventory II (Universal Data Research)
- Non-Disk Check System (Futureview)
- Non-Disk Electric Bookkeeper (Futureview)
- Payroll (Universal Data Research)
- Single Entry General Ledger (Universal Data Research)

**CoCo — Business**
- Accounts Receivable (Brantex)
- Data Plotting Software (Kern Publications)
- General Ledger (Brantex)
- Graphic Software (Kern Publications)
- Non-Disk Check System (Futureview)
- Non-Disk Electric Bookkeeper (Futureview)
- Non-Disk Sales/Inventory (Futureview)
- Personal Finance (Radio Shack)
- Small Business Accounting (Brantex)
- Spectaculator (Radio Shack)
- Stock Portfolio Management (Superior Graphics Software)

**CoCo — Data Base Management**
- C.C. File (Trans Tek)
- C.C. Mail (Trans Tek)
- Data Base Manager (Universal Data Research)
- Data Plotting Software (Kern Publications)
- TIMS (Sugar Software)

**CoCo — Data Communications**
- COLORCOM (Eigen Systems)
- Microtext (The Micro Works)
- Remotemaster (Star-Kits)
- Super Color Terminal (Nelson Software)

**CoCo — Disk Operating Systems**
- FLEX/Fla mate (RS) (Data-Comp)
- Forth (Forthright Software)
- Star-DOB (Star-Kits)
- TRS-80 DOS (Radio Shack)

**CoCo — Education**
- Advanced Graphics (Radio Shack)
- Alpha Key (Radio Shack)
- Author I (Radio Shack)
- Beattie, The (Radio Shack)
- Bingo Math (Radio Shack)
- C.A.R.D. I (Radio Shack)
- Change (Brantex)
- Charles Lindbergh/ Amelia Earhart (Radio Shack)
- Color LOGO (Radio Shack)
- Computer Discovery for Junior High (Radio Shack)
- Computer Discovery for Senior High (Radio Shack)
- Data Plotting Software (Kern Publications)
- Dracula (Radio Shack)
- Early Games for Young Children (Counterpoint Software)
- Electric Typing Teacher (Soft-Side Marketing)
- Flashcards (Forthright Software)
- Galactic Hangman (Sugar Software)
- Geography Pack (Radio Shack)
- Graphical Analysis of Experimental Data (Radio Shack)
- Graphic Software (Kern Publications)
- History of American Learning Unit (Radio Shack)
- Hound of the Baskervilles, The (Radio Shack)
- Interpreting Graphs in Physics (Radio Shack)
- Inventions That Change Our Lives (Radio Shack)
- Matrices, Determinants, and Simultaneous Equations (Radio Shack)
- Micro PILOT (Radio Shack)
- Moby Dick (Radio Shack)
- Number Theory (Radio Shack)
- Numeric Data Entry Practice (Radio Shack)
- Pioneers in Technology (Radio Shack)
- Plane Analytic Geometry (Radio Shack)
- Quadratic Equations (Radio Shack)
- Quiz (Radio Shack)
- Silly Syntax (Sugar Software)
- 20,000 Leagues Under the Sea (Radio Shack)
- Typing Teacher (Instant Software)
- Typing Tutor (Radio Shack)
- Vector Addition (Radio Shack)
- Vocabulary Tutor 1 (Radio Shack)
- Vocabulary Tutor 2 (Radio Shack)
CoCo—Games
1. Air Flight Simulator (Instant Software)
2. Alchemist's Laboratory, The (Real Software Company)
3. Animated Hangman (Soft Sector Marketing)
4. Astro Blast (Mark Data Products)
5. Bedlam (Radio Shack)
6. Bingo Math (Radio Shack)
7. Black Sanctum (Mark Data Products)
8. Brekithru (Avalon Hill)
9. Brickway (Brett Monk, CDP)
10. Calixto Island (Mark Data Products)
11. Canyon climber (Radio Shack)
12. Card Games (Radio Shack)
13. Cassette Copy (B. Erickson Software)
14. Cassette Dump (B. Erickson Software)
15. Castle Guard (Radio Shack)
16. Cave Hunter (Mark Data Products)
17. Chek-Chess/Starship-3 (B. Erickson Software)
18. Chess (Radio Shack)
19. Chess (Flex) (Data-Comp)
20. Clowns and Balloons (Radio Shack)
21. Color Backgammon (Radio Shack)
22. Color Berarkan (Mark Data Products)
23. Color Bonanza (Soft Sector Marketing)
24. Color Caterpillar (Soft Sector Marketing)
25. Color Craps (Adventure International)
26. Color Cubes (Radio Shack)
27. Color Pac Attack (The Micro Works)
28. Color Robot Battle (Radio Shack)
29. ConcentrationConnect (Soft Sector Marketing)
30. Cosmic Dogfight (American Small Business Computers)
31. Craps/Slot Machine (B. Erickson Software)
32. Crosswords (Radio Shack)
33. DC Ohms Law/FLC-FRC (B. Erickson Software)
34. Death Planet: The Dogstarri Adventure (Adventure International)
35. Death Trap (Soft Sector Marketing)
36. Dino Wars (Radio Shack)
37. Double Back (Radio Shack)
38. Escape (Branlex)
39. Galactic Attack (Radio Shack)
40. Galactic Hangman (Sugar Software)
41. Gauntlet (Avalon Hill)
42. Gin Champion (Radio Shack)
43. Gliaxons (Mark Data Products)
44. Gone Fishing/Concentration (B. Erickson Software)
45. Graphics Pack (Radio Shack)
46. Haywire (Mark Data Products)
47. Horse Race Handicapping System (3G Company)
48. Hurdlers Tape (Soft Sector Marketing)
49. ICTime-01/ICTime-02 (B. Erickson Software)
50. In Between/Shell Game (B. Erickson Software)
51. Kid Stuff I (Forthright Software)
52. Lokar's Magic Staff (Real Software Company)
53. Madness and the Minotaur (Radio Shack)
54. Mega-Bug (Radio Shack)
55. MegaMaze (Real Software Company)
56. Micros (Radio Shack)
57. Micro Painter (Radio Shack)
58. Monster Maze (Radio Shack)
59. Moon Shuttle (Datasoft)
60. Moonlander (American Small Business Computers)
61. Mortar Battle/Puzzle (B. Erickson Software)
62. Name That Tune (Forthright Software)
63. Night Tower Descent (Real Software Company)
64. Number Guess/Dice Roll (B. Erickson Software)
65. Offender (American Small Business Computers)
66. P.T. Boat/Turtle Race (B. Erickson Software)
67. Packet Man (American Small Business Computers)
68. Phase VII.3.0 (Futureview)
69. Polaris (Radio Shack)
70. Pollergeist (Radio Shack)
71. Popcorn (Radio Shack)
72. Project Nebula (Radio Shack)
73. Pyramid (Radio Shack)
74. Raaka-Tu (Radio Shack)
75. Roman Checkers (Radio Shack)
76. ROM-Save (B. Erickson Software)
77. Safari/Starship-2 (B. Erickson Software)
78. Sands of Egypt (Radio Shack)
79. Santa Paravia and Flumaccio (Instant Software)
80. Shooting Gallery (Radio Shack)
81. Shootout at the OK Galaxy (Avalon Hill)
82. Silly Syniax (Sugar Software)
83. Skiing (Radio Shack)
84. Space Assault (Radio Shack)
85. Space Raiders (Mark Data Products)
86. Squeeze (Real Software Company)
87. Star Blaster (The Micro Works)
88. Starship/Belchlock Holmes (B. Erickson Software)
89. Strip Concentration (Adventure International)
90. Strip Dice (Adventure International)
91. Strip Tease (Brett Monk, CDP)
92. Super Bustout (Radio Shack)
93. Tank Attack/Association (B. Erickson Software)
94. Teasers/Mouse (B. Erickson Software)
95. Tennis (Radio Shack)
96. Think/Luck & Logic (B. Erickson Software)
97. Three D Tic-Tac-Toe (Adventure International)
98. Treasure Island/Rescue (B. Erickson Software)
99. VC (Avalon Hill)
100. Voyager (Avalon Hill)
101. Wildcatting (Radio Shack)
102. Xaxxon (Datasoft)

CoCo—Graphics
1. Art Gallery (Radio Shack)
2. Color Show Displays (Real Software Company)
3. Images I (Radio Shack)
4. Images II (Radio Shack)
5. MPP Graphics (Superior Graphics Software)

CoCo—Home/Personal Management
1. Audio Spectrum Analysis (Radio Shack)
2. Bridge Tutor (Radio Shack)
3. C.C. Calc (Trans Tek)
4. Champs (Radio Shack)
5. Check 'N Tax (Star-Kits)
6. Color Accountant, The (Programmer's Institute)
7. Color File (Radio Shack)
8. Data Plotting Software (Kern Publications)
9. Diet-Trac (Flex) (Data-Comp)
10. Graphic Software (Kern Publications)
11. Handyman (Radio Shack)
12. PersonalFile (Radio Shack)
13. Personal Finance (Radio Shack)
14. REKORD Planner (Radio Shack)
15. Stock Analyzer (Branlex)
16. Tax Handler, The (Programmer's Institute)

CoCo—Spelling Checkers
1. Spell 'N Fix (Star-Kits)
2. Spell-Rite (Eigen Systems)

CoCo—Utilities
1. 8086 Disassembler (The Micro Works)
2. AutoRun (Sugar Software)
3. Basic Aid (Eigen Systems)
4. CBUG Monitor (The Micro Works)
5. CCEED (Eigen Systems)
6. Color Graphic Editor (Soft Sector Marketing)
7. ColorZAP (Software Options)
8. OPrint (Micro Labs)
9. Diagnostic ROM (Radio Shack)
10. Disassembler 6809 (Soft Sector Marketing)
11. Editor/Assembler (The Micro Works)
12. EDITASM + (Radio Shack)
13. Graphics Character Set (Forthright Software)
14. Graphics Screen Editor (Real Software Company)
15. Humbug (Star-Kits)
16. JBUS Monitor Program (U.P.C. Products Co.)
17. MACRO-80c Editor/Assembler Monitor (The Micro Works)
18. Master Control II (Soft Sector Marketing)
19. Monitor (Forthright Software)
20. Newtalk (Star-Kits)
21. OKin-Print (Soft Sector Marketing)
22. SDDS Editor/Assembler/Monitor (The Micro Works)
23. Sigmom (Data Soft)
24. Stripper (Eigen Systems)
25. Tape Dir (Soft Sector Marketing)
26. Term (Flex) (Data-Comp)
27. WOBOIS I (Western Operations)

CoCo—Word Processors
1. C.C. Writer (Trans Tek)
2. Color Script (Radio Shack)
3. Super Color Writer II (Neilson Software)
4. Telewriter-64 (Cognitex)
EXPENSIVE – The LNW System Expansion II and built-in comes with a full 32K of 200ns RAM, RS232c 20 MA current loop serial interface. That’s for starters. Next, consider our heavy gauge steel case, power indicator lamp, gold-plated connectors, FR-2 glass epoxy circuit board with solder mask and silk screen legends. Then there is the parallel printer port, screen printer port, real time clock, and extra heavy duty onboard power supply with over current protection, over voltage protection and thermal shutdown. If that’s not enough then there is the floppy disk controller, guaranteed operation at a 4MHz CPU speed and our 6 month warranty. Every one of these features is STANDARD. This is true system expansion. You get every ‘expensive’ feature without spending more.

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*8" drive operation requires special cable, 6" double-density requires 3.5MHz CPU speed-up modification or LNW 80 4MHz computer.
You can use your Model III as a dumb terminal to access mainframes and minicomputers, taking advantage of their advanced computing features.

At times, I need the computing power and speed of a mainframe or minicomputer, but I also want the convenience of working at home or at my office desk. Since I write terminal emulation software for minicomputer and microcomputer systems as part of my job, I decided to do the same for my Model III. This way, I could take advantage of the capabilities of the larger systems using my computer as a terminal. I've used the software with a large IBM mainframe as well as a UNIX-based minicomputer system.

I'm familiar with a wide variety of interactive terminal systems and programming languages, so my software needs all the functions of a conventional "dumb" terminal. The most important consideration is the ability to enter, from the keyboard, the full 128-character ASCII character set, as well as implement the break signal. It must correctly display all normally displayable characters as well as the control characters that cause cursor movement. It also has to set transmission speed, parity, number of stop bits, and duplex.

I also included features found only in more sophisticated terminals: an audible bell, tab stops, and alternate cursor types. And since I was not really using a terminal, but a computer, I added functions to transfer disk files to and from another computer, load Intel-format object code from a remote computer, and save a profile of all terminal characteristics.

Like most software, this program doesn't provide features that satisfy everyone. I have not included user-translate tables and special function keys, since most of the systems I use already provide them. Anyone familiar with Z80 machine language would have little trouble adding them.

Program Overview

Since the program is fairly large (in excess of 2,000 lines), I divided it into six parts. Although the listings shown here are in Radio Shack's EDTASM format, a more viable approach would be to use an assembler that generates relocatable code and a linkage-editor to combine object files into an executable module (Microsoft's MACRO-80 and LINK-80, for instance). I have used equations to absolute addresses for those symbols referenced in modules other than the one in which they are defined. Although this method works, it is prone to error and makes changes to the program difficult. I would highly recommend the use of MACRO-80 to anyone contemplating making substantial changes to the program.

The six Program Listings are called UT1/SRC, UT2/SRC, and so on up to UT6/SRC. The first listing consists of the program start-up routines, the basic keyboard, and RS-232 character-handling routines. The second program contains the Intel-format object code loader and its support routines. The third listing comprises the RS-232 I/O drivers. The fourth program deals with parameter selection, and the fifth with file transfers. The sixth listing contains some program variables and constants.

The following is a description of each of the six program listings.

Program Listing 1

The first 48 bytes of Program Listing 1 are reserved for the program stack.
Entry to the program from the system occurs at label UTERM, in line 01360. The old stack pointer is saved and restored prior to exiting to the system, and a new one is set. System routine INITIO ensures that the display input/output (I/O) driver is in its original state so special graphics characters and space compression characters in the various menus display properly. Since RS-232 input is interrupt-driven, the receive interrupt vector points to my interrupt handler (see Program Listing 3).

While the sign-on logo is displayed, the program checks for the existence of the file Profile/TRM. Once found, the file should contain the various option settings saved through option 8 of the main menu (see Program Listing 4).

```
"Most control characters received from the RS-232 are ignored. Those that aren't receive special treatment because they don't display correctly."
```

The file consists of a single 256-byte record containing all optional terminal characteristics, as well as the character representations of those settings displayed in the menus. The program reads the record and initializes those settings. Afterward, control passes to LOGON (see Listing 4) to display the main menu, letting the user alter any terminal characteristics.

The remainder of Listing 1 comprises the program's main loop. Control always returns to label CHKRMT in line 02430 to process characters received from the RS-232 interface. If no input is available, control passes to label CHKKB (line 03290), to process keyboard input. All available characters from the RS-232 input are processed before any keyboard input with the exception of break, but only one keyboard character is processed before returning control to CHKRMT. This scheme gives the RS-232 input priority over the keyboard.

Most control characters received from the RS-232 are ignored. Those that aren't receive special treatment because they don't display correctly. Since
Listing 1 continued

0990 SWPGRF EQU 15H ; SWAP TO GRAPHICS CHARS
1000 DABCHR EQU 17H ; SWITCH TO DOUBLE SIZE CHR
1010 CURSLT EQU 18H ; CURSOR LEFT
1020 CURSR EQU 19H ; CURSOR RIGHT
1030 CURSDN EQU 1AH ; CURSOR DOWN
1040 CURSRM EQU 1CH ; CURSOR DOWN
1050 CURSRST EQU 1DH ; CURSOR TO START OF LINE
1060 CLSRNC EQU 1FH ; CLEAR TO END OF SCREEN
1070 SPCOMP EQU 0CDH ; SPACE COMPRESSION CHARS
1080 MBK EQU 0D3H ; MICRO SYMBOL
1090 ;
1100 ;
1110 ;
1120 ;
1130 ;
1140 ;
1150 ;
1160 ;
1170 ;
1180 ;
1190 ;
1200 ;
1210 ;
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1880 ;

a carriage return (X'0D') moves the cursor to the start of the next line, rather than the current one. The cursor-to-start-of-line character (X'1D') appears. The LNSFFD routine at line 05230 displays line feed characters (X'0A').

The TRS-80 displays line feed the same as carriage return, so line feed becomes a cursor-down character. However, since a cursor-down displayed on the bottom line of the screen causes the cursor to move to the top line of the system calls the Scroll routine to scroll up one line instead. Back-space (X'08') appears as a cursor-left character so it doesn't erase any characters.

The bell character (X'07') generates an audible tone through the cassette port. In order to hear it you need to connect a small amplifier and speaker to the AUX jack of the cassette cable.

"If the remote system does not support the protocol, characters are lost whenever scrolling takes place, the screen is cleared, a carriage return is displayed, or line-wrap occurs."

The form-feed character (X'0C') clears the screen. The tab character (X'09') moves the cursor to the next tab stop. The sequence ESC (X'1B', X'02') signals that the data following it is Intel-format object code to be loaded into memory (see Listing 2).

Since interrupts are disabled during output to the screen, XON/XOFF flow control occurs whenever the possibility exists that characters will be lost due to scrolling or other lengthy operations. See Listing 3 for a description of this protocol.

If the remote system does not support the protocol, characters are lost whenever scrolling takes place, the screen is cleared, a carriage return is displayed, or line-wrap occurs. The problem occurs only at transmission speeds greater than 300 baud.

The code at label CHKKBD processes keyboard input. Since part of the ASCII character set is unavailable from the keyboard, I devised a method to enter those omitted characters. The two-character sequence [ESC] [character] represents the nonexistent characters.
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Enter the Escape command by pressing the shift and up-arrow keys. This sequence is also used to initiate file transfers, and to exit to the main menu display. Table 1 summarizes the escaped characters.

The break signal is a frequently misunderstood part of terminal-to-computer communications. It generates an error condition in the transmission of data by causing a character to be sent with no stop bit(s). The Model III user's manual contains a good description of the composition of a character as it is transmitted via the RS-232 port. This error condition is detected by the receiving hardware as a framing error and signals an interrupt to the computer.

The TRS-80 generates a break by turning off the transmitter for a period of time. Therefore, when the break key is pressed, the transmitter turns off for the time it takes to send two characters, and then turns back on. Since the time off depends on the transmission speed (baud rate), the delay factor is kept in the variable BRKTIME, which is changed whenever the baud rate is changed. This ensures that the computer receiving the break signal detects it, regardless of the transmission speed.

Control characters received from the keyboard are treated in much the same manner as those received from the
The clear key has the same effect as CTRL L: it clears the screen and sends an FF character to the RS-232 port. The up-arrow key generates a [ and pressing control-G rings the bell. Line feed is entered with the down-arrow key. Note that if you select the full-duplex option, characters don't appear when they're entered. The remote computer should echo them back to you if necessary, and they are displayed as received.

The routine TABSET at line 04530 sets or clears tab stops. An 8-byte table TABTBL (see Program Listing 6), stores tab settings. Each of the 64 bits in this table represents a column on the screen. A 1 bit signifies the presence of a tab stop. The routine TABCHR at line 04770 moves the cursor to the next tab stop. Note that once the cursor reaches the end of a line, it advances no further. The BRINGG routine at line 05420 rings the bell, and CURCOL (line 05590) computes the cursor's current screen column relative to zero.

"...if you select the full-duplex option, characters don't appear when they're entered. The remote computer should echo them back to you if necessary, and they are displayed as received."
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236 • 80 Micro, September 1983
Have you had too much firing laser cannons, guarding fuel cannisters, eating ghosts, avoiding missiles, and just plain getting killed off in pursuit of a few points? Or maybe you never really liked arcade games in the first place; either way, there is a program that you shouldn’t be without. The name of this program:

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Included with the program is a 40 Page Handbook on how to rule a country successfully. (It is 8 1/2 by 11 inches, spiral bound; most business programs don’t have a manual as good as ours!) The program is top-quality with excellent input and display routines. The 16K and 32K versions are provided together on cassette; the 32K version contains a SAVE GAME feature. **PRICE: **$18.50

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This is not to say that THE BATTLE OF ZEIGHTY isn’t a good program; it is a well-made one player game. It allows you to set up a small army to your own specifications, and then you must use it to try to take over the fictional Zeighty Pass. You give each of your army divisions specific orders, while the computer plays the defending army. The display is satisfactory, consisting of a “Map” that shows the position of the army divisions. Land features (terrain) are not taken in to account, but you’ll have enough to keep you busy.

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<table>
<thead>
<tr>
<th>Listing 1 continued</th>
</tr>
</thead>
<tbody>
<tr>
<td>04590    SRL  C        ; C = BYTE OFFSET 0-7</td>
</tr>
<tr>
<td>04600    SRL  C</td>
</tr>
<tr>
<td>04610    LD  B,0</td>
</tr>
<tr>
<td>04620    LD  HL,TABTBL</td>
</tr>
<tr>
<td>04630    ADD  HL,BC    ; HL = TABLE ADDRESS</td>
</tr>
<tr>
<td>04640    LD  B,A</td>
</tr>
<tr>
<td>04650    XOR  A</td>
</tr>
<tr>
<td>04660    SCF</td>
</tr>
<tr>
<td>04670    TBSBIT  EQU  A</td>
</tr>
<tr>
<td>04680    RR  A         ; SET OBJECT BIT</td>
</tr>
<tr>
<td>04690    DJNZ  TBSBIT</td>
</tr>
<tr>
<td>04700    LD  B,(HL)    ; INVERT TAB SETTING</td>
</tr>
<tr>
<td>04710    XOR  B</td>
</tr>
<tr>
<td>04720    LD  (HL),A</td>
</tr>
<tr>
<td>04730    JP  CHKRT      ; NO TX OR DISPLAY</td>
</tr>
<tr>
<td>04740    ;</td>
</tr>
<tr>
<td>04750    ; TAB CHARACTER PROCESSING</td>
</tr>
<tr>
<td>04770    TABCHR  EQU  $</td>
</tr>
<tr>
<td>04780    CALL  CURCOL       ; GET CURSOR COLUMN</td>
</tr>
<tr>
<td>04790    CP  63           ; EXIT IF AT END OF LINE</td>
</tr>
<tr>
<td>04800    JR  Z,TBE DIT</td>
</tr>
<tr>
<td>04810    LD  C,A         ; CURSOR COLUMN</td>
</tr>
<tr>
<td>04820    LD  HL,TABTBL   ; TAB TABLE ADDRESS</td>
</tr>
<tr>
<td>04830    XOR  A          ; COLUMN COUNTER</td>
</tr>
<tr>
<td>04840    LD  D,8         ; TAB TABLE COUNTER</td>
</tr>
<tr>
<td>04850    TBTGET  EQU  $</td>
</tr>
<tr>
<td>04860    LD  E,(HL)      ; GET TABLE BYTE</td>
</tr>
<tr>
<td>04870    LD  B,8        ; SHI FT COUNT</td>
</tr>
<tr>
<td>04880    PUSH AF</td>
</tr>
<tr>
<td>04890    LD  A,E</td>
</tr>
<tr>
<td>04900    OR  A           ; IF TABLE BYTE = 0</td>
</tr>
<tr>
<td>04910    JR  NZ, TBNONZ</td>
</tr>
<tr>
<td>04920    POP AF</td>
</tr>
<tr>
<td>04930    ADD  A,B       ; INCREMENT COL COUNT + 8</td>
</tr>
<tr>
<td>04940    JR  TBNEXT      ; CHECK NEXT TABLE BYTE</td>
</tr>
<tr>
<td>04950    TBNONZ  EQU  $</td>
</tr>
<tr>
<td>04960    POP AF</td>
</tr>
<tr>
<td>04970    TBSFT  EQU  $</td>
</tr>
<tr>
<td>04980    RL  E           ; GET TAB SET BIT</td>
</tr>
<tr>
<td>04990    JR  NC, TBOFF</td>
</tr>
<tr>
<td>05000    CP  C           ; IF ON</td>
</tr>
<tr>
<td>05010    JR  Z,TBOFF    ; IF PAST CURRENT COLUMN ...</td>
</tr>
<tr>
<td>05020    JR  NC, TBCOMP</td>
</tr>
<tr>
<td>05030    TBOFF  EQU  $</td>
</tr>
<tr>
<td>05040    INC  A         ; H AVE NEXT TAB STOP</td>
</tr>
<tr>
<td>05050    DJNZ  TBSHT</td>
</tr>
<tr>
<td>05060    TBNEXT  EQU  $</td>
</tr>
<tr>
<td>05070    INC  HL</td>
</tr>
<tr>
<td>05080    DEC  D          ; POINT TO NEXT TABLE BYTE</td>
</tr>
<tr>
<td>05090    JR  NZ, TBT GET</td>
</tr>
<tr>
<td>05100    DEC  A          ; UNTIL ALL DONE</td>
</tr>
<tr>
<td>05110    TBCOMP  EQU  $</td>
</tr>
<tr>
<td>05120    SUB  C          ; FORCE COL 64</td>
</tr>
<tr>
<td>05130    LD  B,A</td>
</tr>
<tr>
<td>05140    LD  A,CURSR    ; TAB TO NEXT STOP</td>
</tr>
<tr>
<td>05150    TBTAB  EQU  $</td>
</tr>
<tr>
<td>05160    CALL  VDCHAR</td>
</tr>
<tr>
<td>05170    DJNZ  TBTAB</td>
</tr>
<tr>
<td>05180    TBE XIT  EQU  $</td>
</tr>
<tr>
<td>05190    RET            ; RETURN TO CALLER</td>
</tr>
<tr>
<td>05200    ; DISPLAY LINE- FEED CHARACTER</td>
</tr>
<tr>
<td>05210    ;</td>
</tr>
<tr>
<td>05220    ;</td>
</tr>
<tr>
<td>05230    LNFEED  EQU  $</td>
</tr>
<tr>
<td>05240    LD  HL,(CURSAD) ; ON LINE 16 ?</td>
</tr>
<tr>
<td>05250    LD  BC,VIRSAN+LIN16</td>
</tr>
<tr>
<td>05260    OR  A</td>
</tr>
<tr>
<td>05270    SBC  HL,BC</td>
</tr>
<tr>
<td>05280    JR  C,NOSCRL    ; NO - DON'T SCROLL</td>
</tr>
<tr>
<td>05290    LD  A,CURSOR    ; TURN OFF CURSOR</td>
</tr>
<tr>
<td>05300    CALL  VDCHAR</td>
</tr>
<tr>
<td>05310    CALL  SCROLL   ; SCROLL UP 1 LINE</td>
</tr>
<tr>
<td>05320    LD  A, CURSOR   ; TURN CURSOR BACK ON</td>
</tr>
<tr>
<td>05330    CALL  VDCHAR</td>
</tr>
<tr>
<td>05340    RET            ; RETURN TO CALLER</td>
</tr>
<tr>
<td>05350    NOSCRL  EQU  $</td>
</tr>
<tr>
<td>05360    LD  A,CURSDN    ; MOVE CURSOR DONN</td>
</tr>
<tr>
<td>05370    CALL  VDCHAR</td>
</tr>
<tr>
<td>05380    RET            ; RETURN TO CALLER</td>
</tr>
<tr>
<td>05390    ;</td>
</tr>
<tr>
<td>05400    ; RING BELL THROUGH CASSETTE PORT</td>
</tr>
<tr>
<td>05410</td>
</tr>
<tr>
<td>05420    BRINGG  EQU  $</td>
</tr>
<tr>
<td>05430    LD  C,CASPR T  ; CASSETTE PORT ADDRESS</td>
</tr>
<tr>
<td>05440    LD  A,1         ; INITIAL SOUND VALUE</td>
</tr>
<tr>
<td>05450    LD  B,128       ; DELAY VALUE</td>
</tr>
<tr>
<td>05460    NXTWAV  EQU  $</td>
</tr>
<tr>
<td>05470    PUSH  BC        ; SAVE DELAY</td>
</tr>
<tr>
<td>05480    OUT  (C),A     ; OUTPUT WAVE LOGIC</td>
</tr>
</tbody>
</table>

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White Black White Black
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2. g1-f3  d7-d6  18. d3-c2  e5-c4
3. d2-d4  c5-d4  19. e3-f2  b5-b4
4. f1-b5  c8-d7  20. c2-b3  a6-a5
5. b5-d7  d8-d7  21. d1-d4!  b7-b5
6. f3-d4  g8-f6  22. c3-b4  a5-b4
7. b1-c3  g7-f6  23. a1-c1!  c4-b6
8. e1-g1  f8-g7  24. c1-d8+  b8-c8
9. c1-e3  e8-g8  25. b3-c4  b5-d7
10. d1-d3  a7-e6  26. c4-b4  c8-a7
11. c3-d5  b7-b5  27. b4-b8*  f6-e8
12. d5-b6  d7-b7  28. d4-c4  a7-c6
13. b6-e8  b7-a8  29. b6-a8  c6-e5
14. f2-f3  b8-d7  30. c4-c6  g8-f8
15. f1-f1  f8-c6  31. a2-a4  a5-d3
16. c2-c3  a8-b7  32. c8-d8!  resigns

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Program Listing 2

Program Listing 2 calls the Loader routine at line 00330 whenever it receives the escape key-[STX] sequence from the RS-232. It loads Intel-format object code into memory. Table 2 describes this object code. The object file must have this format for the loader to work correctly.

The lowest and highest address locations loaded are stored and displayed along with the entry point address when the load is complete. The program displays the load address of each record as it is received. A message informs you when a checksum error occurs, but the load continues. When the load is complete, regular terminal operations resume. To save the loaded code, exit to TRSDOS and use the Dump command to create a command file.

The routines GETBYT (line 01590), GEDURE (line 01790), and CVB (line 01890) read a pair of hexadecimal (hex) digits and return their binary value. The routine CVH at line 02070 converts a word to four hex digits for display.

This loader doesn't check for invalid load addresses or program code that overlays part of the terminal program. It could hang up waiting for correct data if you failed to use a valid Intel-format object file.

"When the load is complete, regular terminal operations resume."

<table>
<thead>
<tr>
<th>Offset</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(indicates start of record)</td>
</tr>
<tr>
<td>1</td>
<td>Two hexadecimal characters representing the length of object code in the record.</td>
</tr>
<tr>
<td>3</td>
<td>Four hexadecimal characters specifying the address at which the code will be loaded.</td>
</tr>
<tr>
<td>7</td>
<td>Two hex digits giving the record type: '00' the record contains object code. '01' end record, load address is the entry point address.</td>
</tr>
<tr>
<td>9</td>
<td>n pairs of hexadecimal digits containing the object code, where n is the length specified at offset 1.</td>
</tr>
<tr>
<td>9+2n</td>
<td>Two hexadecimal digits representing the checksum, which is such that the sum of all the bytes of code, address, length, record type, and checksum is equal to 0 modulo 256.</td>
</tr>
</tbody>
</table>

Table 2. Intel-format object code.

---

Program Listing 2

00100 ;
00110 ;
00120 ;
00130 ;
00140 ;
00150 ;
00160 ;
00170 RSRCV EQU 565CH
00180 ;
00190 ;
00200 ;
00210 VDCLS EQU 01C9H ; CLEAR SCREEN
00220 ;
00230 ;
00240 ;
00250 VIDRAM EQU 3C00H ; VIDEO RAM
00260 LIN14 EQU 13<6 ; - VIDEO LINE 14
00270 LIN15 EQU 14<6 ; - VIDEO LINE 15
00280 LIN16 EQU 15<6 ; - VIDEO LINE 16
00290 ;
00300 ;
00310 ;
00320 ;
00330 LOADER EQU $;
00340 LD HL,-1 ; SET INITIAL LOAD LIMITS
00350 LD (LOADER),HL
00360 INC HL
00370 LD (HIADDR),HL
00380 CALL VDCLS ; DISPLAY INITIAL MESSAGE
00390 LD HL,LDMSG
00400 LD DE,VIDRAM+LIN14
00410 LD BC,LDMSG
00420 LDIR
00430 ;
00440 ;
00450 ;
00460 CONTRL EQU $
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Listing 2 continued

<table>
<thead>
<tr>
<th>Line</th>
<th>Instruction</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>00470</td>
<td>CALL RSRVC</td>
<td>READ A BYTE</td>
</tr>
<tr>
<td>00480</td>
<td>JR C,CTRL</td>
<td>UNTIL COLOR RECEIVED</td>
</tr>
<tr>
<td>00490</td>
<td>CP ' '</td>
<td></td>
</tr>
<tr>
<td>00500</td>
<td>JR NZ,CTRL</td>
<td></td>
</tr>
<tr>
<td>00510</td>
<td>XOR A</td>
<td>ZERO CHECKSUM BYTE</td>
</tr>
<tr>
<td>00520</td>
<td>LD C,A</td>
<td></td>
</tr>
<tr>
<td>00530</td>
<td>CALL GETBYTE</td>
<td>READ TEXT LENGTH BYTE</td>
</tr>
<tr>
<td>00540</td>
<td>LD B,A</td>
<td>SAVE FOR LATER</td>
</tr>
<tr>
<td>00550</td>
<td>CALL GETBYTE</td>
<td>READ LOAD ADDRESS</td>
</tr>
<tr>
<td>00560</td>
<td>LD H,A</td>
<td></td>
</tr>
<tr>
<td>00570</td>
<td>CALL GETBYTE</td>
<td></td>
</tr>
<tr>
<td>00580</td>
<td>LD L,A</td>
<td></td>
</tr>
<tr>
<td>00590</td>
<td>CALL GETBYTE</td>
<td>READ CONTROL BYTE</td>
</tr>
<tr>
<td>00600</td>
<td>CP 1</td>
<td>1 =&gt; END CARD</td>
</tr>
<tr>
<td>00610</td>
<td>JR Z,LORENDB</td>
<td></td>
</tr>
<tr>
<td>00620</td>
<td>OR A</td>
<td>0 =&gt; TEXT CARD</td>
</tr>
<tr>
<td>00630</td>
<td>JR NZ,CTRL</td>
<td>IGNORE ALL OTHER TYPES</td>
</tr>
<tr>
<td>00640</td>
<td></td>
<td></td>
</tr>
<tr>
<td>00650</td>
<td></td>
<td>PROCESS NEW LOAD ADDRESS</td>
</tr>
<tr>
<td>00660</td>
<td></td>
<td></td>
</tr>
<tr>
<td>00670</td>
<td>PUSH HL</td>
<td>SAVE LOAD ADDRESS</td>
</tr>
<tr>
<td>00680</td>
<td>LD DE,(LOADDR)</td>
<td>NEW LOW</td>
</tr>
<tr>
<td>00690</td>
<td>OR A</td>
<td></td>
</tr>
<tr>
<td>00700</td>
<td>SBC HL,DE</td>
<td></td>
</tr>
<tr>
<td>00710</td>
<td>POP HL</td>
<td></td>
</tr>
<tr>
<td>00720</td>
<td>JR NC,LDISP</td>
<td></td>
</tr>
<tr>
<td>00730</td>
<td>LD (LOADDR),HL</td>
<td>YES - SAVE IT</td>
</tr>
<tr>
<td>00740</td>
<td>LDISP EQU $</td>
<td></td>
</tr>
<tr>
<td>00750</td>
<td>PUSH BC</td>
<td></td>
</tr>
<tr>
<td>00760</td>
<td>PUSH AL</td>
<td></td>
</tr>
<tr>
<td>00770</td>
<td>LD DE,LDADDR</td>
<td>DISPLAY LOAD ADDRESS</td>
</tr>
<tr>
<td>00780</td>
<td>CALL CVH</td>
<td></td>
</tr>
<tr>
<td>00790</td>
<td>LD HL,LDADDR</td>
<td></td>
</tr>
<tr>
<td>00800</td>
<td>LD DE,VIDRAM+LIN14+LDMSGL</td>
<td></td>
</tr>
<tr>
<td>00810</td>
<td>LD BC,4</td>
<td></td>
</tr>
<tr>
<td>00820</td>
<td>LDIR</td>
<td></td>
</tr>
<tr>
<td>00830</td>
<td>POP HL</td>
<td></td>
</tr>
<tr>
<td>00840</td>
<td>POP BC</td>
<td></td>
</tr>
<tr>
<td>00850</td>
<td>LD A,B</td>
<td>LOAD LENGTH = ?</td>
</tr>
<tr>
<td>00860</td>
<td>OR A</td>
<td></td>
</tr>
<tr>
<td>00870</td>
<td>JR Z,CHKSUM</td>
<td>YES - PROCESS CHKSUM BYTE</td>
</tr>
<tr>
<td>00880</td>
<td></td>
<td>LOAD OBJECT TEXT</td>
</tr>
<tr>
<td>00890</td>
<td></td>
<td></td>
</tr>
<tr>
<td>00900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>00910</td>
<td>TEXT EQU $</td>
<td></td>
</tr>
<tr>
<td>00920</td>
<td>CALL GETBYTE</td>
<td>READ OBJECT BYTE</td>
</tr>
<tr>
<td>00930</td>
<td>LD (BL),A</td>
<td>LOAD OBJECT BYTE</td>
</tr>
<tr>
<td>00940</td>
<td>INC HL</td>
<td></td>
</tr>
<tr>
<td>00950</td>
<td>DJNZ TEXT</td>
<td></td>
</tr>
<tr>
<td>00960</td>
<td>PUSH HL</td>
<td></td>
</tr>
<tr>
<td>00970</td>
<td>LD DE,(HIADDR)</td>
<td>HAVE NEW HIGH</td>
</tr>
<tr>
<td>00980</td>
<td>OR A</td>
<td></td>
</tr>
<tr>
<td>00990</td>
<td>SBC HL,DE</td>
<td></td>
</tr>
<tr>
<td>01000</td>
<td>POP HL</td>
<td></td>
</tr>
<tr>
<td>01010</td>
<td>JR C,CHKSUM</td>
<td></td>
</tr>
<tr>
<td>01020</td>
<td>LD (HIADDR),HL</td>
<td>YES - SAVE IT</td>
</tr>
<tr>
<td>01030</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01040</td>
<td></td>
<td>CHECKSUM BYTE IS NEXT</td>
</tr>
<tr>
<td>01050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01060</td>
<td>CHKSUM EQU S</td>
<td></td>
</tr>
<tr>
<td>01070</td>
<td>CALL GETBYTE</td>
<td>READ CHECKSUM BYTE</td>
</tr>
<tr>
<td>01080</td>
<td>LD A,C</td>
<td>CHECKSUM = ?</td>
</tr>
<tr>
<td>01090</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01100</td>
<td>JR Z,CTRL</td>
<td>YES - CONTINUE LOAD</td>
</tr>
<tr>
<td>01110</td>
<td>LD H,LDADDR</td>
<td></td>
</tr>
<tr>
<td>01120</td>
<td>LD DE,CSUMAD</td>
<td>NO - DISPLAY WARNING</td>
</tr>
<tr>
<td>01130</td>
<td>LD BC,4</td>
<td></td>
</tr>
<tr>
<td>01140</td>
<td>LDIR</td>
<td></td>
</tr>
<tr>
<td>01150</td>
<td>LD HL,CSUMER</td>
<td></td>
</tr>
<tr>
<td>01160</td>
<td>LD DE,VIDRAM+LIN15</td>
<td></td>
</tr>
<tr>
<td>01170</td>
<td>LD BC,CSUMEL</td>
<td></td>
</tr>
<tr>
<td>01180</td>
<td>LDIR</td>
<td></td>
</tr>
<tr>
<td>01190</td>
<td>JR CTRL</td>
<td>LOOK FOR NEXT CARD</td>
</tr>
<tr>
<td>01200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01210</td>
<td></td>
<td>END CARD ENCOUNTERED</td>
</tr>
<tr>
<td>01220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01230</td>
<td>LDEND EQU S</td>
<td></td>
</tr>
<tr>
<td>01240</td>
<td>CALL GETBYTE</td>
<td>READ LAST CHECKSUM BYTE</td>
</tr>
<tr>
<td>01250</td>
<td>LD DE,LDTRA</td>
<td>INSERT TRA IN MESSAGE</td>
</tr>
<tr>
<td>01260</td>
<td>CALL CVH</td>
<td></td>
</tr>
<tr>
<td>01270</td>
<td>LD HL,(LOADDR)</td>
<td>INSERT START IN MESSAGE</td>
</tr>
<tr>
<td>01280</td>
<td>LD DE,LDSTA</td>
<td></td>
</tr>
<tr>
<td>01290</td>
<td>CALL CVH</td>
<td></td>
</tr>
<tr>
<td>01300</td>
<td>LD HL,(HIADDR)</td>
<td>INSERT END IN MESSAGE</td>
</tr>
<tr>
<td>01310</td>
<td>DEC HL</td>
<td></td>
</tr>
<tr>
<td>01320</td>
<td>LD DE,LDEND</td>
<td></td>
</tr>
<tr>
<td>01330</td>
<td>CALL CVH</td>
<td></td>
</tr>
<tr>
<td>01340</td>
<td>LD HL,LDONE</td>
<td>DISPLAY DONE MESSAGE</td>
</tr>
<tr>
<td>01350</td>
<td>LD DE,VIDRAM+LIN16</td>
<td></td>
</tr>
<tr>
<td>01360</td>
<td>LD BC,LDONEL</td>
<td></td>
</tr>
</tbody>
</table>
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<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>01370</td>
<td>LDIR</td>
<td></td>
</tr>
<tr>
<td>01380</td>
<td>RET</td>
<td></td>
</tr>
<tr>
<td>01390</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01400</td>
<td></td>
<td>LOADER MESSAGES</td>
</tr>
<tr>
<td>01410</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01420</td>
<td>LOADDR DEFW -1</td>
<td>LOWEST ADDRESS LOADED</td>
</tr>
<tr>
<td>01430</td>
<td>HIADDR DEFW 0</td>
<td>HIGHEST ADDRESS LOADED</td>
</tr>
<tr>
<td>01440</td>
<td>LDMGL DEFM 'Loading'</td>
<td></td>
</tr>
<tr>
<td>01450</td>
<td>LDMGL EQU $-LDMGL</td>
<td></td>
</tr>
<tr>
<td>01460</td>
<td>LOADDR DEFM 'NNNN'</td>
<td></td>
</tr>
<tr>
<td>01470</td>
<td>CSUMER DEFM 'Checksum error near '</td>
<td></td>
</tr>
<tr>
<td>01480</td>
<td>CSUMB DEFM 'NNNN'</td>
<td></td>
</tr>
<tr>
<td>01490</td>
<td>CSUMEL EQU $-CSUMER</td>
<td></td>
</tr>
<tr>
<td>01500</td>
<td>LDONE DEFM 'Load complete: START='</td>
<td></td>
</tr>
<tr>
<td>01510</td>
<td>LDSTA DEFM 'NNNN,END= '</td>
<td></td>
</tr>
<tr>
<td>01520</td>
<td>LDEND DEFM 'NNNN,TRA='</td>
<td></td>
</tr>
<tr>
<td>01530</td>
<td>LDTA DEFM 'NNNN'</td>
<td></td>
</tr>
<tr>
<td>01540</td>
<td>LDONE EQU $-LDONE</td>
<td></td>
</tr>
<tr>
<td>01550</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01560</td>
<td></td>
<td>READ 2 HEX DIGITS</td>
</tr>
<tr>
<td>01570</td>
<td></td>
<td>CONVERT TO BINARY, RETURN IN A</td>
</tr>
<tr>
<td>01580</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01590</td>
<td>GETBYT EQU $</td>
<td></td>
</tr>
<tr>
<td>01600</td>
<td>PUSH DE</td>
<td>SAVE REGISTER</td>
</tr>
<tr>
<td>01610</td>
<td>CALL GETDIG</td>
<td>GET HIGH DIGIT</td>
</tr>
<tr>
<td>01620</td>
<td>SLA A</td>
<td>SHIFT LEFT 4</td>
</tr>
<tr>
<td>01630</td>
<td>SLA A</td>
<td></td>
</tr>
<tr>
<td>01640</td>
<td>SLA A</td>
<td></td>
</tr>
<tr>
<td>01650</td>
<td>SLA A</td>
<td></td>
</tr>
<tr>
<td>01660</td>
<td>LD D,A</td>
<td>SAVE HIGH NIBBLE</td>
</tr>
<tr>
<td>01670</td>
<td>CALL GETDIG</td>
<td>GET LOW DIGIT</td>
</tr>
<tr>
<td>01680</td>
<td>OR D</td>
<td>COMBINE NIBBLES</td>
</tr>
<tr>
<td>01690</td>
<td>PUSH AF</td>
<td>SAVE REG</td>
</tr>
<tr>
<td>01700</td>
<td>ADD A,C</td>
<td>ADD TO CHECKSUM</td>
</tr>
<tr>
<td>01710</td>
<td>LD C,A</td>
<td>RESTORE CHECKSUM</td>
</tr>
<tr>
<td>01720</td>
<td>POP AF</td>
<td>RESTORE BYTE</td>
</tr>
<tr>
<td>01730</td>
<td>POP DE</td>
<td>RESTORE REGISTER</td>
</tr>
<tr>
<td>01740</td>
<td>RET</td>
<td>RETURN TO CALLER</td>
</tr>
<tr>
<td>01750</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01760</td>
<td></td>
<td>READ 1 HEX DIGIT</td>
</tr>
<tr>
<td>01770</td>
<td></td>
<td>CONVERT TO BINARY, RETURN IN A</td>
</tr>
<tr>
<td>01780</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01790</td>
<td>GETDIG EQU $</td>
<td></td>
</tr>
<tr>
<td>01800</td>
<td>CALL RSRCV</td>
<td>READ A BYTE</td>
</tr>
<tr>
<td>01810</td>
<td>JR C,GETDIG</td>
<td></td>
</tr>
<tr>
<td>01820</td>
<td>CALL CVB</td>
<td>CONVERT TO BINARY</td>
</tr>
<tr>
<td>01830</td>
<td>JR C,GETDIG</td>
<td>IGNORE IF NOT HEX DIGIT</td>
</tr>
<tr>
<td>01840</td>
<td>RET</td>
<td>RETURN TO CALLER</td>
</tr>
<tr>
<td>01850</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01860</td>
<td></td>
<td>CONVERT HEX DIGIT IN A TO BINARY</td>
</tr>
<tr>
<td>01870</td>
<td></td>
<td>RETURN RESULT IN A, CARRY SET IF ERROR</td>
</tr>
<tr>
<td>01880</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01890</td>
<td>CVB EQU $</td>
<td></td>
</tr>
<tr>
<td>01900</td>
<td>SUB '0'</td>
<td>IS IT &lt; '0'?</td>
</tr>
<tr>
<td>01910</td>
<td>JR C,CVBRET</td>
<td>YES - ERROR</td>
</tr>
<tr>
<td>01920</td>
<td>ADD A,'0'-'G'</td>
<td>IS IT &gt; 'F'?</td>
</tr>
<tr>
<td>01930</td>
<td>JR C,CVBRET</td>
<td>YES - ERROR</td>
</tr>
<tr>
<td>01940</td>
<td>ADD A,'6'</td>
<td>IS IT '0' TO 'F'?</td>
</tr>
<tr>
<td>01950</td>
<td>JP P,CVBADJ</td>
<td>YES - OK</td>
</tr>
<tr>
<td>01960</td>
<td>ADD A,'7'</td>
<td>IS IT '0' TO '9'?</td>
</tr>
<tr>
<td>01970</td>
<td>JR C,CVBRET</td>
<td>NO - ERROR</td>
</tr>
<tr>
<td>01980</td>
<td>CVBADJ EQU $</td>
<td></td>
</tr>
<tr>
<td>01990</td>
<td>ADD A,'10'</td>
<td>MAKE IT BINARY</td>
</tr>
<tr>
<td>02000</td>
<td>OR A</td>
<td>INDICATE NO ERROR</td>
</tr>
<tr>
<td>02010</td>
<td>CVBRET EQU $</td>
<td></td>
</tr>
<tr>
<td>02020</td>
<td>RET</td>
<td>RETURN TO CALLER</td>
</tr>
<tr>
<td>02030</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02040</td>
<td></td>
<td>CONVERT NORD IN HL TO 4 HEX DIGITS</td>
</tr>
<tr>
<td>02050</td>
<td></td>
<td>PLACE RESULT (DE)</td>
</tr>
<tr>
<td>02060</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02070</td>
<td>CVH EQU $</td>
<td></td>
</tr>
<tr>
<td>02080</td>
<td>LD C,4</td>
<td>DIGIT COUNTER</td>
</tr>
<tr>
<td>02090</td>
<td>CVH1 EQU $</td>
<td></td>
</tr>
<tr>
<td>02100</td>
<td>LD B,4</td>
<td>SHIFT COUNTER</td>
</tr>
<tr>
<td>02110</td>
<td>CVH2 EQU $</td>
<td></td>
</tr>
<tr>
<td>02120</td>
<td>RL L</td>
<td>SHIFT NEXT DIGIT INTO A</td>
</tr>
<tr>
<td>02130</td>
<td>RL H</td>
<td></td>
</tr>
<tr>
<td>02140</td>
<td>RL A</td>
<td></td>
</tr>
<tr>
<td>02150</td>
<td>DNZ CVH2</td>
<td></td>
</tr>
<tr>
<td>02160</td>
<td>AND 8F</td>
<td>ISOLATE DIGIT</td>
</tr>
<tr>
<td>02170</td>
<td>OR '0'</td>
<td>MAKE HEX CHAR</td>
</tr>
<tr>
<td>02180</td>
<td>CP '9'+'1'</td>
<td>IS IT A - F?</td>
</tr>
<tr>
<td>02190</td>
<td>JR C,NOAPLH</td>
<td>YES - ADJUST</td>
</tr>
<tr>
<td>02200</td>
<td>NOAPLH EQU $</td>
<td></td>
</tr>
<tr>
<td>02210</td>
<td>LD (DE),A</td>
<td>SAVE IN OUTPUT AREA</td>
</tr>
<tr>
<td>02220</td>
<td>INC DE</td>
<td>INCREMENT OUTPUT PTR</td>
</tr>
<tr>
<td>02230</td>
<td>DEC C</td>
<td>DECREMENT DIGIT COUNT</td>
</tr>
<tr>
<td>02240</td>
<td></td>
<td>UNTIL DONE</td>
</tr>
<tr>
<td>02250</td>
<td>JR NZ,CVH1</td>
<td>RETURN TO CALLER</td>
</tr>
<tr>
<td>02260</td>
<td>RET</td>
<td></td>
</tr>
<tr>
<td>02270</td>
<td>END</td>
<td></td>
</tr>
</tbody>
</table>
This form of protocol is very useful in transferring data at high speeds. In fact, some computer network interfaces don't function properly without it."

in the process of being sent. For this reason, the receiving system must be prepared to accept some additional data after sending XOFF.

Characters received at the RS-232 interface are read by the interrupt handler RXINT (line 000880) and stored in a 256-byte circular buffer IBUFF (see Program Listing 6). Pointers address the next available spot in the buffer and the oldest character in the buffer (IBUFU and IUBFU). The counter IBUFC contains the current number of characters in the buffer.

When this count approaches an upper limit (240 in this case), FLOOFF at line 01460 is called to halt the incoming flow of data. Because the remote computer supports XON/XOFF flow control, no characters are lost due to the main program's inability to empty the buffer as fast as it is filled. This is particularly useful, if data is received while one of the menus is displayed.

The main program receives and processes characters through calls to
RSRCV at line 00530. This routine returns the next character from the input buffer, or, if none is available, sets the Carry flag to indicate that. FLOO at line 01720 resumes input if the number of characters in the input buffer decreases to a safe level.

The routine RSTX (line 01280) outputs characters to the RS-232 interface. It does so only if an XOFF is not received previously from the remote computer, thus maintaining its own flow control support. If the flow halts, RSTX waits until it receives an XON before resuming the character and returning.

This section of code shows one of the flaws of this form of flow control. If an XOFF is sent (perhaps inadvertently as data), without being followed by an XON at some later time, the data flow is permanently suspended. This is a significant problem, particularly in computer networks, where large numbers of systems and differing forms of data are involved. One possible solution would be to ignore the XOFF and resume output if no corresponding XON is received within a reasonable amount of time.

The FLOO routine turns off remote input by transmitting an XOFF character. This only occurs if XOFF is not already sent with no corresponding XON. A four-character time delay lets the computer receive any characters in transit before returning to the caller.

FLOO is the counterpart of FLOO. It allows input to resume by sending an XON to the remote system. This happens only if an XOFF is previously sent to halt input, and if the input buffer contains fewer than 128 characters.

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Program Listing 4

This section of the program contains the various menus and associated routines to select terminal characteristics, start terminal emulation, or terminate the program. (The file transfer menus are contained in Program Listing 5).

Each routine calls MENDSP at line 04760 to display its menu, prompt for a response, and return the value of the response.

MENDSP requires, as parameters, the address of the menu to be displayed, the option number which is to be the default, and the maximum option number that can be selected. It returns to the caller the number of the option selected last one. (This makes it easier for the calling routine to index into a table of values or addresses with the result.) MENDSP displays the menu until a valid response is entered.

LOGON (line 00920) displays the main menu from which other menus are chosen, terminal emulation started, the profile created, or control returned to TRSDOS.

SLBAUD (line 01630) allows selection of the RS-232 baud rate. Eight values are allowed from a possible 16, ranging from 110 to 19,200 baud. When the desired rate is chosen, it is inserted into the main menu for display. The break signal timer value is set at this time, along with the actual data output to the baud rate control port. These values are saved in BRKTIM and RSBAUD (see Listing 6). If you want to alter this menu to allow other baud rates, note that you also have to update the tables at BDATBL, CBDBS, and BRKTTB.

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SLRTY (line 02570) changes the
terminal parity to even, odd, or none.
Even parity is the default. The program
enters the new parity into the main
menu for display and also includes it in
the variable RSTYPE.

SLSTPS (line 03130) chooses the
number of stop bits to be used. Normally,
1 stop bit is sufficient; 2 stop bits are
used mainly in conjunction with 110
baud. As with baud and parity, the new
setting is saved for display in the main
menu and in RSTYPE.

SLCURS (line 03560) changes from
half-duplex operation to full-duplex
and vice versa. In half-duplex mode,
characters entered at the keyboard dis-
play immediately on the screen. No di-
play occurs with full-duplex. The new
value is saved in the main menu, and the
Duplex flag in Flags reflects the new
setting.

SLDUPL (line 03990) allows the use
of one of four different cursors. The
cursor can be either an underscore or a
block, blinking or nonblinking. The
system locations CURSCH and
CURSBL set the cursor type.

SLSTRT (line 04480) is called when
you select the default option from the
main menu. The RS-232 interface is
re-initialized to reflect any changes in baud
rate, parity, or stop bits. RS-232
receivers are enabled, the screen is
cleared, and terminal emula-
tion mode is entered.

SYSRET (line 04620) returns control
to TRSDOS. RS-232 interrupts are disa-
bled to prevent spurious interrupts af-
ter the program is terminated, I/O
drivers are restored by a call to INITIO,
and control returns to the system.

Continued on p. 352
01910 ; BAUD RATE MENU
01920 ;
01930 BMENU EQU $0
01940 DBFI CURSHM
01950 DBFO CLSCHR
01960 DBFM 'BAUD rate selection:'
01970 DBFM LF
01980 DBFM LF
01990 DBFM LF
02000 DBFM SPCOMP+4
02010 DBFM '1 - 110'
02020 DBFM LF
02030 DBFM SPCOMP+4
02040 DBFM '2 - 150'
02050 DBFM LF
02060 DBFM SWPGRF
02070 DBFM PTR1
02080 DBFM PTR2
02090 DBFM PTR3
02100 DBFM SPCOMP+4
02110 DBFM '3 - 300'
02120 DBFM LF
02130 DBFM SPCOMP+4
02140 DBFM '4 - 1200'
02150 DBFM LF
02160 DBFM SPCOMP+4
02170 DBFM '5 - 2400'
02180 DBFM LF
02190 DBFM SPCOMP+4
02200 DBFM '6 - 4800'
02210 DBFM LF
02220 DBFM SPCOMP+4
02230 DBFM '7 - 9600'
02240 DBFM LF
02250 DBFM SPCOMP+4
02260 DBFM '8 - 19200'
02270 DBFM CR
02280 ; BAUD RATE SETTING TABLE
02290 ;
02300 BDTABL EQU $0
02310 DBFB B110
02320 DBFB B150
02330 DBFB B300
02340 DBFB B1200
02350 DBFB B2400
02360 DBFB B4800
02370 DBFB B9600
02380 DBFB B19200
02390 DBFM CBTDAB DEFM '110) (150) (300) (1200)
02400 DBFM '2400) (4800) (9600) (19200)
02410 ;
02420 ; BREAK TIMER TABLE
02430 ;
02440 ;
02450 BRTTBE EQU $0
02460 DBFW 3333H ; 2/10 SEC.
02470 DBFW 2222H ; 2/15 SEC.
02480 DBFW 1111H ; 2/30 SEC.
02490 DBFW 0444H ; 2/120 SEC.
02500 DBFW 0222H ; 2/240 SEC.
02510 DBFW 0111H ; 2/480 SEC.
02520 DBFW 0089H ; 2/960 SEC.
02530 DBFW 0044H ; 2/1920 SEC.
02540 ; DISPLAY PARITY MENU
02550 ;
02560 ;
02570 SPRTY EQU $0
02580 DBFW HL,PRMEN
02590 DBFW BC,0103H ; DEFAULT 1, MAX 3
02600 DBFW HL,PRTABL
02610 DBFW HL,PRTABL
02620 DBFW HL,BC
02630 DBFW A,(RSTYPE)
02640 AND 255-PAREVN-PARDIS
02650 OR (HL)
02660 DBFW HL,PRTABL
02670 DBFW HL,PRTABL
02680 DBFW HL,PRTABL
02690 DBFW HL,PRTABL
02700 DBFW HL,PRTABL
02710 DBFW HL,PRTABL
02720 DBFW HL,PRTABL
02730 DBFW HL,PRTABL
02740 DBFW HL,PRTABL
02750 DBFW HL,PRTABL
02760 DBFW HL,PRTABL
02770 DBFW HL,PRTABL
02780 DBFW HL,PRTABL
02790 DBFW HL,PRTABL
02800 DBFW HL,PRTABL
02810 ;
02820 PRMEN EQU $0
02830 DBFO CURSHM
02840 DBFO CLSCHR
02850 DBFO 'Parity selection:'
02860 DBFO LF
02870 DBFO LF
02880 DBFO LF
02890 DBFO SWPGRF
02900 DBFO PTR1
02910 DBFO PTR2
02920 DBFO PTR3
02930 DBFO SWPGRF
02940 DBFO '1 - Even parity'
02950 DBFO LF
02960 DBFO SPCOMP+4
02970 DBFO '2 - Odd parity'
02980 DBFO LF
02990 DBFO SPCOMP+4
03000 DBFO '3 - No parity'
03010 DBFO CR
03020 ;
03030 ; PARITY SETTING TABLE
03040 ;
03050 PRTABL EQU $0
03060 DBFO PAREVN ; 1 - EVEN PARITY
03070 DBFO PAREVN ; 2 - ODD PARITY
03080 DBFO PAREVN ; 3 - NO PARITY (DISABLED)
03090 DBFO 'EVEN ODDNONE'
03100 ;
03110 ; DISPLAY STOP BITS MENU
03120 ;
03130 SLSTPS EQU $0
03140 DBFW HL,SBMEN
03150 DBFW BC,0102H ; DEFAULT 1, MAX 2
CALL MENDSP
LD HL,STPTAB ; GET STOP BIT SETTING
ADD HL,BC
LD A,(RSTYPE) ; CLEAR OLD SETTING
AND 255-SB2
OR (HL) ; SET NEW ONE
LD (RSTYPE),A
LD A,C ; CONVERT TO CHARACTER
ADD A,'1'
LD (CSTMMSG),A ; INSERT IN OPTIONS MSG
JP LOGON ; RETURN TO MAIN MENU

03300 SBMENUEQU $
03310 DEFB CURSHH
03320 DEFB CLSCHR
03330 DEFM 'Stop bit selection:'
03340 DEFB LF
03350 DEFB LF
03360 DEFB LF
03370 DEFB SWPGRF
03380 DEFB PTR1
03390 DEFB PTR2
03400 DEFB PTR3
03410 DEFB SWPGRF
03420 DEFM '1 - 1 stop bit'
03430 DEFB LF
03440 DEFB SFCOMP+4
03450 DEFM '2 - 2 stop bits'
03460 DEFB CR
03470 ; STOP BIT SETTING TABLE
03490 ;
03500 STPTAB EQU$
03510 DEFB SB1
03520 DEFB SB2
03530 ;
03550 ;
03560 DLDupl EQU$
03570 LD HL,DPMENU ; DISP MENU, READ RESPONSE
03580 LD BC,0102H ; DEFAULT 1, MAX 2
03590 CALL MENDSP
03600 LD A,(FLAGS) ; CLEAR CURRENT DUPLEX
03610 RES DFLUX,A
03620 OR C
03630 LD (FLAGS),A
03640 LD A,C
03650 LD HL,CDHALF ; ASSUME HALF DUPLEX
03660 OR A
03670 JR Z,MOVDUP
03680 LD HL,CDFULL ; MAKE FULL IF SO
03690 MOVDUP EQU$
03700 LD DE,CM5SG ; INSERT IN options MSG
03710 LD BC,4
03720 LDIR
03730 JP LOGON ; RETURN TO MAIN MENU
03740 ;
03750 ; DPMENUEQU$
03760 DEFB CURSHH
03770 DEFB CLSCHR
03780 DEFM 'Terminal duplex selection:'
03790 DEFB LF
03800 DEFB LF
03810 DEFB LF
03820 DEFB SWPGRF
03830 DEFB PTR1
03840 DEFB PTR2
03850 DEFB PTR3
03860 DEFB SWPGRF
03870 DEFM '1 - Half-duplex'
03880 DEFB LF
03890 DEFB SFCOMP+4
03900 DEFM '2 - Full-duplex'
03910 DEFB CR
03920 DEFM 'HALF'
03930 DEFM 'FULL'
03940 ;
03950 ;
03960 ;
03970 ;
03980 ;
03990 SLCURS EQU$
04000 LD HL,CMENU ; DISP MENU, READ RESPONSE
04010 LD BC,0204H ; DEFAULT 3, MAX 4
04020 CALL MENDSP
04030 LD A,C ; GET SETTING
04040 LD B,C\;BLOCK ; ASSUME BLOCK
04050 BIT A,A ; IS IT UNDERSCORE?
04060 JR NZ,NOUNDS
04070 LD B,'_'; YES - USE UNDERSCORE
04080 NOUNDS EQU$
04090 PUSH BC ; SAVE CURSOR CHARACTER
04100 CP 2 ; IS IT BLINKING?
04110 JR C,NOBLNK
04120 LD B,0 ; YES - SET BLINKING
04130 NOBLNK EQU$
04140 LD A,B
04150 LD (CURSB),A
04160 POP AF ; RESTORE CURSOR CHARACTER
04170 LD (CURSC),A ; SET NEW CURSOR CHARACTER
04180 JP LOGON ; RETURN TO MAIN MENU
04190 ;
04200 ;
04210 ;
04220 CRMENU EQU$
04230 DEFB CURSHH
04240 DEFB CLSCHR
04250 DEFM 'Cursor type selection:'
04260 DEFB LF
04270 DEFB LF
04280 DEFB SFCOMP+4
04290 DEFB SFCOMP+4
04300 DEFM '1 - Underscore'
04310 DEFB LF
04320 DEFB SFCOMP+4
04330 DEFB SFCOMP+4
04340 DEFM '2 - Block'
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Program Listing 5

This part of the program deals with disk file transfers and with the creation of the Profile/TRM file.

SLFPRM (line 01160) alters the values of various special characters used in the file transfer routines. It functions in the same manner as the menu routines in Listing 4. The program calls one of four routines to read and save the new value of a special character. The default option returns to the main menu. Although each of these routines allows input of characters in the range X'00' to X'FF', the file transfer system deals with characters from which the parity bit (bit 7) has been removed. Therefore, characters in the range X'80' to X'FF' are not recognized.

FPSTFC (line 01850) changes the start-of-file character. This character signifies the beginning of a file received from a remote computer. Data received before the start-of-file character is ignored.

FP EOF (line 02090) chooses the end-of-file character, used to signify the end of a file from the remote system.

FP EOF (line 01930) selects the end-of-record character. This character marks the end of a logical record of data in a file being received.

FPPRCH (line 02010) selects the remote computer's prompt character. Most computers use some form of prompt to signify that they are able to accept input; in fact, most large mainframe systems require that input not begin until this character is sent.

Each of these four routines calls GETHEX to prompt for and read the two hexadecimal digits representing the character.

SAVPRF at line 02770 appears after you select option 8 from the main menu. It creates a record of the current terminal characteristics: duplex, baud rate, parity, stop bits, tab stops, cursor type, and the four special file transfer
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characters, and writes this record to the file Profile/TRM. This destroys any previously saved profile.

Routines FILERX and FILETXT complete file transfer. The mechanism for initiating a file transfer is simple. The remote system command to start the file transfer is entered from the keyboard as usual, without its terminating CR. It is assumed that the input-termination character is the CR. Then simultaneously press the escape and < keys to send a file or the escape and > keys to receive a file, followed by the TRS80 file name, followed by CR. The escape-key sequence and the file name are not sent to the remote computer, but are used to open a TRS80 file.

As soon as it receives the escape-key sequence, the program does a shift lock, so that the file name input is in uppercase, and calls READFN (line 05630) to read the file name. This input is accomplished using the system routine

```
"The remote system command to start the file transfer is entered from the keyboard as usual, without its terminating CR."
```

KBLINE, so all the usual TRS-80 input-editing characters may be used. For example, assuming that the command "type file name" lists a file at the terminal, the following transfers the remote file "myfile" to the TRS80 file Myfile.TXT:

type myfile [ESC] > MYFILE.TXT [CR]

Frequently, an editor is used to receive a file from the TRS-80. For example:

edit myfile [CR]
input [ESC] < MYFILE.TXT [CR]

causes the TRS80 file Myfile.TXT to be input to the remote file myfile. The Input command causes the editor to enter input mode.

Receiving a File

To receive a file, FILERX (line 03370) opens the TRS80 file, sends off the terminating CR and waits for the start-of-file character. When this character
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actor is received, the data following is saved for disk output in a 256-byte buffer FILBUF. When the buffer is full, it is written to disk with a call to DSKOP. All control characters except Tab and FF are discarded. Each character received that matches the end-of-record character is translated to CR, and added to the buffer. This cycle continues until the end-of-file character is received, or until you press the break key at which time the file closes and normal terminal operations resume.

Sending a File

Like FILERX, FILETX at line 04260 reads the TRSOS file name and opens the file, which must exist. Each disk record is read into FILBUF. Before each logical record of data is sent, the remote prompt character must be received. A logical record is a block of data terminated by CR. Once the prompt character is received, data is transmitted up to and including the next CR. This process continues until either end-of-file is encountered, or the break key is pressed on the keyboard.

Because many of the editors used to receive such a file treat a logical record consisting of a single CR as the signal to exit from input mode, a blank (X'20') is inserted between any consecutive CRs found in the file. Once the file is sent, control returns to normal terminal operations. At this point you must exit from input mode in the editor and issue whatever command is necessary to save your new file on the remote system.

Disk Operations

Because most TRS-80 disk I/O operations disable interrupts for a considerable length of time, it is necessary to guard against the possibility of losing data received during such operations. Therefore, the routine DSKOP (line 05490) performs all disk I/O. The address of the TRSOS I/O routine is passed as a parameter.

Prior to performing the operation, FLOOFF is called to halt the incoming flow of data from the remote. Then the I/O operation is done, and FLOON is called to resume the flow of data, if necessary. It is essential that the remote sys-

---

```
34342: SET END-OF-RECORD CHARACTER
34343: FPEORC EQU $
34344: LD HL,FPEOR
34345: DE,HSTEOF
34346: CALL GETHEX
34347: JP SLFPRM
34348: SET PROMPT CHARACTER
34349: FPPRC EQU $
34350: LD HL,FPPRM
34351: CALL GETHEX
34352: JP SLFPRM
34353: SET END-OF-FILE CHARACTER
34354: FPEOF EQU $
34355: LD HL,FPEOF
34356: CALL GETHEX
34357: JP SLFPRM
34358: READ 2 HEX CHAR FROM KEYBOARD
34359: CALL KLINE
34360: XUR A
34361: LD (CAPSLK),A
34362: LD DE,FILBUF
34363: CALI CH TO BINARY
34364: JR C,GXERR
34365: SLA A
34366: SLA A
34367: LD H,A
34368: INC DE
34369: LD A,(DE)
34370: CALL CBV
34371: JR C,GXERR
34372: OR H
34373: POP DE
34374: CALL CBV
34375: JR C,GXERR
34376: POP DE
34377: LD (DE),A
34378: LD (DE),B
34379: INC HL
34380: LD (HEXERR),C
34381: RETURN TO CALLER
34382: GXERR EQU $0
34383: LD HL,HXERR
34384: CALL VLINE
34385: JR HXPRM
34386: TRY AGAIN
34387: SETHEX MESSAGES
34388: HEXMSG EQU$
34389: DEF B CURSON
34390: DEFM 'Enter character as 2 hexadecimal digits'
34391: DEFF SWPGP
34392: DEF PTR1
34393: DEFF PTR2
34394: DEFF PTR3
34395: DEFM 'Invalid hexadecimal input'
34396: DEF B CR
34397: DEF B
34398: SAVE TERMINAL PROFILE
34399: SAVPRF EQU $
34400: LD DE,FILBUF
34401: LD HL,TRMPT
34402: INSERT TERMINAL OPTIONS
34403: Continued on p. 264
```
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JR z,FCLOSE
NEG
LD (DCB+5),A
; SET RECORD DELIM OFFSET
LD IX, WRITE
; WRITE LAST RECORD
CALL DSKOP
CALL NZ,ERMSG
; DISP ERROR MESSAGE IF ANY
LD HL,(DCB+12)
; DECREMENT ERN
DEC HL
LD (DCB+12),HL
FCLOSE EQU $8
LD IX,CLOSE
; CLOSE FILE
CALL DSKOP
CALL NZ,ERMSG
; DISP ERROR MESSAGE IF ANY
LD HL,FIELD
CALL VDLINE
; DISPLAY DONE MESSAGE
JP CHKRTM
; EXIT TO MAINLINE
SEND FILE TO REMOTE
FILETX EQU $9
LD HL,PTXIND
; DISPLAY <
CALL VDLINE
CALL READPN
; READ FILENAME
LD A,C
; SET <CR>
CALL RSTX
POP AF
; RESTORE ERROR CODE
JR 2,GETREC
; IF ERROR ...
CALL ERMSG
; DISPLAY ERROR MESSAGE
JP CHKRTM
; EXIT TO MAINLINE
READ NEXT DISK FILE RECORD
GETREC EQU $A
LD HL,FIELD
; READ DISK RECORD
LD B,0
LD IX,READ
CALL DSKOP
JR 2,GETREC
; IF ERROR ...
CP ERROF
; IF NOT END-OF-FILE
JR 2,PTXEOF
CP ERRNFR
CALL NZ,ERMSG
; DISP ERROR MESSAGE IF ANY
GETREC EQU $B
LD HL,(DCB+10)
; NEXT RECORD #
DEC HL
LD DE,(DCB+12)
; LAST RECORD #
SBC HL
; IS THIS THE LAST RECORD ?
LD HL,FIELD
JR NZ,HAVREC
; NO - CONTINUE
LD A,(DCB+8)
; YES - GET BYTE COUNT
LD B,A
END DATA TO REMOTE
HARYREC EQU $C
LD E,HL
; SAVE BUFFER PTR
EX DE,HL
BIT CRTX,(HL)
; WAS <CR> LAST CHAR SENT ?
JR Z,NOWTFR
; NO - DON'T NEED TO WAIT
LD HL,HPRMP
; YES - WAIT FOR HOST PROMPT
WTPRMP EQU $D
CALL KBRRK
; EXIT IF <BREAK>
JR NZ,PTXEOF
CALL RSTX
; READ CHARACTER
JR C,WTPRMP
; PROMPT ?
JR NZ, WTPRMP
; NO - NEXT CHARACTER
NOWTFR EQU $E
EX DE,HL
; RESTORE BUFFER PTR
WRTRE EQU $F
LD A,(HL)
; GET NEXT BYE
AND 255-FARBIT
; CLEAR PARITY BIT
LDC HL
; INCREMENT BUFFER PTR
INC HL
; IS IT <CR> ?
JP Z,ENDREC
; YES - END-OF-RECORD
JR Z,ENDREC
; YES - END-OF-RECORD
LD B,0
LDD (HL),A
; IS IT <TAB> ?
JR Z,WRCHR
; YES - OK
CPI 3
; IS IT <PF> ?
JR Z,WRCHR
; YES - OK
JR 2,WRCHR
; IS IT A CONTROL CHAR ?
JR C,WRNXT
; YES - IGNORE
WRTCH EQU $G
LD (VIDRAM+63),A
; NO - DISPLAY IT
CALL RSTX
; SEND IT TO REMOTE
LD HL,A,(FLAGS)
RES C RTX,A
LD HL,(FLAGS),A
WRTX EQU $H
DJNE WRTX
; UNTIL BUFFER EMPTY
LD A,(HL)
GETREC
; READ NEXT DISK RECORD
END OF LOGICAL RECORD
ENDREC EQU $I
LD DE,HL
EX DE,HL
LD HL,FIELD
; POINT TO FLAG BYTE
BNE CRTX,(HL)
; WAS <CR> LAST CHAR SENT ?
JR Z,NOWTFR
; NO - CONTINUE
JR A,''
; YES - INSERT A BLANK
CALL RSTX
WRTEND EQU $J
SET CRTX,(HL)
; INDICATE SENDING <CR>
LD A,C
; SEND <CR>
LD A,C
CALL RSTX
; BUFFER NOT EMPTY, WAIT
LD A,CR
JP GETREC
; OTHERWISE READ NEXT RECORD
END-OF-FILE REACHED
PTXEOF EQU $K
LD IX,CLOSE
; CLOSE FILE
CALL DSKOP
CALL NZ,ERMSG
; DISP ERROR MESSAGE IF ANY
Listing 5 continued
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Program Listing 6

```
00100 ;
00110 ; UT6/SRC
00120 ;
00130 ; ORG $025H;
00140 ;
00150 ; PORT ADDRESSES
00160 ;
00170 RSBRG EQU $E9H ; RS-232 BAUD RATE PORT
00180 B110 EQU $22H
00190 B150 EQU $44H
001A0 B300 EQU $55H
001B0 B1200 EQU $77H
001C0 B400 EQU $AAH
001D0 B400 EQU $0CH
001E0 B900 EQU $EEH
001F0 B19200 EQU $FFH
00200 RSQUART EQU $EAH ; RS-232 UART CONTROL PORT
00210 PAREVB EQU $EH ; EVEN PARITY
00220 ND7 EQU $20H ; 7-BIT WORDS
00230 SB1 EQU $00H ; 1 STOP BIT
00240 SB2 EQU $10H ; 2 STOP BITS
00250 PARDIS EQU $08H ; PARITY DISABLE
00260 TXINB EQU $04H ; ENABLE TRANSMIT, 0=BREAK
00270 DTR EQU $01H ; DATA TERMINAL READY
00280 ; ASCII CHARACTERS
00290 ;
002A0 STX EQU $02H ; START OF TEXT (CTRL-B)
002B0 ETX EQU $03H ; END OF TEXT (CTRL-C)
002C0 CR EQU $0DH ; CARRIAGE RETURN (ENTER)
002D0 XON EQU $11H ; AUX ON (CTRL-Q)
002E0 ; KEYBOARD ESCAPE CHARACTERS
002F0 ;
00300 ESCR EQU $0BH ; ESC-0 <NULL>
00310 DBF0 DFC0 $DH ; ESC-1 RIGHT SQUARE
00320 DBF0 DFC0 $CH ; ESC-2 BACKLASH
00330 DBF0 DFC0 $BFH ; ESC-3 CARET
00340 DBF0 DFC0 $5FH ; ESC-4 UNDERSCORE
00350 DBF0 DFC0 $7BH ; ESC-5 LEFT CURLY
00360 DBF0 DFC0 $7DH ; ESC-6 RIGHT CURLY
00370 DBF0 DFC0 $77H ; ESC-7 BAR
00380 DBF0 DFC0 $7FH ; ESC-8 TILDE
00390 DBF0 DFC0 $7FH ; ESC-9 <DEL>
003A0 DBF0 DFC0 $1FH ; ESC-A <SOH>
003B0 DBF0 DFC0 $1FH ; ESC-B <ESC>
003C0 DBF0 DFC0 $1FH ; ESC-C <US>
003D0 DBF0 DFC0 $1FH ; ESC-D <EM>
003E0 ; TERMINAL OPTION VARIABLES
003F0 ;
00400 TRMOPT EQU $ ; START OF TERMINAL OPTIONS
00410 DBF0 DFC0 $ ; FLAGS BYTE
00420 DBF0 DFC0 $ ; FULL DUPLEX
00430 DBF0 DFC0 $ ; ESCR=RECEIVED FROM KBD
00440 DBF0 DFC0 $ ; ESCR=RECEIVED FROM LINE
00450 DBF0 DFC0 $ ; <XOFF> SENT TO REMOTE
00460 DBF0 DFC0 $ ; <CR> SENT TO REMOTE
00470 DBF0 DFC0 $ ; RS-232 BAUD RATE
00480 DBF0 DFC0 $ ; PARAVN+WT7+TXINB+DTR ; RS-232 UART VALUES
00490 DBF0 DFC0 $ ; BREAK TRANSMIT TIME
004A0 DBF0 DFC0 $ ; TAB SETTING TABLE
004B0 DBF0 DFC0 $ ;
004C0 ; DISK FILE AND RS-232 VARIABLES
004D0 ;
004E0 DBF0 DFC0 $ ; 'PROFILE/TRM' ; DISK FILE DCB
004F0 DFC0 $ ;
00500 DBF0 DFC0 $ ; DBCFNL EQU $;DCB
00510 DBF0 DFC0 $ ; IBUFF DBF0 INPUT BUFFER INPUT PTR
00520 DBF0 DFC0 $ ; IBUFF DBF0 INPUT BUFFER OUTPUT PTR
00530 DBF0 DFC0 $ ; IBUFF DBF0 INPUT BUFFER COUNTER
00540 DBF0 DFC0 $ ; IBUFF DBF0 STACK POINTER SAVE AREA
00550 DBF0 DFC0 $ ; IBUFF DBF0 RS-232 INPUT BUFFER
00560 DBF0 DFC0 $ ; IBUFF DBF0 END OF INPUT BUFFER
00570 DBF0 DFC0 $ ; IBUFF DBF0 DISK FILE BUFFER
00580 DBF0 DFC0 $ ;
00590 ;
```

Continued from p. 256, the XON/XOFF protocol for the file transfer to work correctly. All TRSDOS error messages encountered as the result of disk I/O are displayed in full by calls to ERRDSP.

Program Listing 6

This last section of the program contains only data. Table 3 describes each variable and its function.

Building the Program

Since the program is assembled in six sections, it is necessary to create a single executable command file. Load the six separate command files with the Load command and use the Dump command to create the final module. Since the program is ORGed to start at X'5200', and the Dump command doesn't dump memory lower than X'6000', you must relocate the six parts first with the RELO command, and then use the RELO option of the Dump command, to relocate the final code to its original location.

The easiest way to accomplish this is with a Build command. Each of the six parts is relocated upward in memory by adding X'1E00' to its start address. The offset is then subtracted from the start address in the Dump command. Once EDTASM has been used to assemble each of the six parts of the program, the following sequence of commands creates the final command file.

RELO UT1/CMD (ADD = 7030)
RELO UT2/CMD (ADD = 72FA)
RELO UT3/CMD (ADD = 745C)
RELO UT4/CMD (ADD = 7520)
RELO UT5/CMD (ADD = 79EA)
RELO UT6/CMD (ADD = 7E25)
LOAD UT1/CMD
LOAD UT2/CMD
LOAD UT3/CMD
LOAD UT4/CMD
LOAD UT5/CMD
LOAD UT6/CMD
DUMP UTERM (START = 7030, END = 7E7A, TRA = 5230, RELO = 5230)

Enhancements

Enhancements are always possible. If you need to have several different profiles available, you could pass the profile file name as a parameter to the program, rather than having a fixed name. The ability to display all control characters received in a visible format (transparency) is sometimes useful when communicating with an unknown system. Cursor addressing could be added to communicate with systems that support such a feature, although...
the small screen size could make this impractical.

Additional code in the Intel-format loader could provide checks for load addresses outside of the bounds of available RAM, or for addresses that would overlay the loader program. I did not provide the ability to escape from the loader once it had started (by pressing the break key, for instance), so you might want to add that.

The file-transfer utilities do not send control characters, with the exception of Tab, FF, and CR. Remove this restriction if you want to move files containing such characters. However, you must be careful, since most interactive systems interpret some control characters as something other than data. XON and XOFF are good examples. Backspace is usually treated as the erase character. If you know which control characters cannot be sent as data, you can translate them to something else prior to sending them, or not send them at all.

The file transfer routines strip the parity bit from each character, making it impossible to send or receive any of the special graphics or space compression characters. If the system with which you are communicating can tolerate data with no parity, then you could remove this restriction as well.

Translate tables could be provided to translate each character received or sent. It would require an additional 512 bytes of memory for the two tables. The actual translation is easily implemented in the RS-232 transmit and receive routines, but the mechanism allowing the user to define the contents of the tables would be costly in terms of the code required. These tables would also be saved in the profile, requiring extra code to read and write them on disk.

You could add a number of special-function keys. These would be implemented by the escape sequence described in Listing 1 to generate a string of characters with two keystrokes. Again, such a feature is costly in terms of the amount of code and data area required.

My study of existing communications software for the TRS-80 convinced me that my software program functions as well as most packages costing in excess of $100. If you tailor it to suit yourself, it should prove to be an adequate tool for most of your communications requirements.

Write to Douglas Payne at 56 Brendanwood Crescent, Waterloo, Ontario N2J 4J5, Canada.

---

**Table 3. Program variables.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCCHS</td>
<td>Table of characters used by the escape sequence</td>
</tr>
<tr>
<td>TRMOPT</td>
<td>Start-of-terminal option variables which are saved in the profile.</td>
</tr>
<tr>
<td>FLAGS</td>
<td>Program flag byte</td>
</tr>
<tr>
<td>DUPLEX</td>
<td>Full duplex when set</td>
</tr>
<tr>
<td>ESCKD</td>
<td>Last character typed was (ESC)</td>
</tr>
<tr>
<td>ESCIN</td>
<td>Last character from RS-232 was (ESC)</td>
</tr>
<tr>
<td>XOFFTX</td>
<td>(XOFF) sent to RS-232</td>
</tr>
<tr>
<td>CRTX</td>
<td>Last character sent during file transfer was (CR)</td>
</tr>
<tr>
<td>XOFFRX</td>
<td>(XOFF) received</td>
</tr>
<tr>
<td>RSBAUD</td>
<td>Value output to baud rate generator port</td>
</tr>
<tr>
<td>RTYPE</td>
<td>Value output to UART control/status port</td>
</tr>
<tr>
<td>BRKTIM</td>
<td>Value used by Delay routine to time the break signal</td>
</tr>
<tr>
<td>TABTBL</td>
<td>Table of tab stops</td>
</tr>
<tr>
<td>HSTSTF</td>
<td>Start-of-file character</td>
</tr>
<tr>
<td>HSTEOF</td>
<td>End-of-record character</td>
</tr>
<tr>
<td>HPROMP</td>
<td>Prompt character</td>
</tr>
<tr>
<td>HSTEOF</td>
<td>End-of-file character</td>
</tr>
<tr>
<td>DCB</td>
<td>Disk file DCB</td>
</tr>
<tr>
<td>IBUF1</td>
<td>Input buffer fill pointer</td>
</tr>
<tr>
<td>IBUF0</td>
<td>Input buffer extract pointer</td>
</tr>
<tr>
<td>IBUFC</td>
<td>Input buffer character count</td>
</tr>
<tr>
<td>SPSAVE</td>
<td>Stack pointer save area</td>
</tr>
<tr>
<td>IBUFF</td>
<td>RS-232 input buffer</td>
</tr>
<tr>
<td>IBUEF</td>
<td>End of input buffer</td>
</tr>
<tr>
<td>FILBUF</td>
<td>Disk file I/O buffer</td>
</tr>
</tbody>
</table>

---

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CYBORG
As a competitor in the famous Cyborg arena, you have access to five power sleds! You must now use these sleds to travel through the mazes and collect the signal modules. Of course there is nothing that poses a crowd more than a little violence, so the makers of the arena have also installed guardian robots within its limits! Using your shield, you must destroy them while trying desperately to complete your task. Cyborg has a total of five different levels, each much more challenging than the one before. Now CYBORG is unprotected.
MODEL I/III ............ TAPE $22.95/DISK $25.95

CLASH
Once again, one of the markets most creative programers, Bill Dunlevy has created CLASH, a fantastic new arcade simulation! Mounted upon your great white winged stallion, prepare yourself for a clash within the arena. This day, you will be competing against famous riders from all over the planet. As the tournament begins, there is a frenzy of flapping wings and bucking horses, but finally all riders are airborne and the contest has begun. With a firm grasp on the reins, maneuver your horse above the others and then descend upon them. You must dismount the other riders, before their skill prevails and they dismount you.
MODEL I/III ............ TAPE $19.95/DISK $24.95

DIG OUT
UH OH! The wackiest game to ever hit an arcade is now invading your computer! As the game begins, you'll find yourself amidst tons of rock and earth. You must dig your way through the surrounding tunnels and hunt down the deadly monsters. But watch out!!! As the hunter, you just might become the hunted. The monsters are strangely powerful, their touch can destroy and their eggs can obliterate. Besides all this, the underground is their natural habitat. DIG-OUT is truly another COMPUTER SHACK classic. In each of its fifteen different levels, DIG-OUT combines the best sound, fantastic graphics, and above all, exciting action.
MODEL I/III ............ TAPE $19.95/DISK $21.95

CONVOY
From the creators of DEMON SEED comes a great new game that promises to keep you on the edge of your seat... CONVOY!!
A convoy of trucks has been assigned to move food rations for the troops in the field; but what about the enemy? You must protect the convoy, utilizing the fire power of the big new super tank. This requires a lot of skill and strategy. In all, the game has three totally different screens. Fury takes you beyond the traditional computer arcade space flight. Allowing one or two players, sound and graphics are used to their utmost and the disk version even talks!
MODEL I/III ............ TAPE $22.95/DISK $25.95

FURY
Written by the twice acclaimed Doug Frayer (co-author of Cyborg and Jovian), FURY combines strategy and quick reflexes with its three totally different screens. Fury takes you beyond the traditional computer arcade space flight. Allowing one or two players, sound and graphics are used to their utmost and the disk version even talks!
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MOON ROVER
Moon Rover is an exciting game played on the moons surface. In your Rover you must shoot down enemy aircraft jump over wide meteorite holes and rescue your countrymen from certain death. Moon Rover has superior graphics and with its many levels of play will never get boring. Moon Rover should become one of your favorite games.
MODEL I/III ............ TAPE $22.95/DISK $25.95

STRONGHOLD
Ken Olson and Larry Chow
In Stronghold you have four cities that have built mobile energy shields that'll repel the bombs bouncing around the planet. With all the skill you can muster, protect your city by moving your two shields and stopping the bombs from hitting your city.
One or two player action with sound and split second graphics that'll amaze the eye and ear. Thats STRONGHOLD, try it you'll enjoy it!
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GAUNTLET
One of my favorite games. Operating a super tank you must destroy the enemy. Every building is a barricade every street a battlefield, can you even hope to defeat the hordes of alien tanks? Very fast graphics and exciting sound make this game a must for any arcade game player.
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Mod II File Transfer Utility

by J.H. Nestor

I think computer disk files breed secretly at night. In the darkened security of my computer room, snug within their paper covers, they multiply. ASCII files marry object code files, big files beget little files. First two, then four. They have no shame.

A fantasy nightmare? Maybe. But the contents of my briefcase make this scenario plausible. I've collected a mass of disks, each with its own family of files.

It seems that no matter how carefully I plan things, the files I need are always on another disk. I can't recall how many times I've typed the Copy and Move commands and then waited in vain for those files to be moved.

The problem is less severe with CP/M and Oasis operating systems, which permit flexible wildcarding of commands. For example, the CP/M command PIP B:=A:* sends the files ACCT1, ACCT1.BAS, ACCT2.FOR, and ACCT9.DAT to Drive B.

TRSDOS 2.0 added a limited wildcard capability to some of their commands. For example, the command MOVE */BAS:0 TO :1 transfers all files with the extension /BAS from drive zero to drive 1.

The wildcard also works on the other side of the equation. Thus, the command: MOVE MYPROG/.*:0 TO :1 is valid. This command copies any file with the name MYPROG, regardless of its extension.

The addition of the wildcard to TRSDOS 2.0 was an improvement, but it is still not the answer to my file-moving woes. It is not uncommon for me to move a list of two dozen files, none of which meets the wildcard parameters. My solution was to write a Mod II file move utility.

The Program

The Transfer program lets you type a list of files to be moved from one disk to another. You can examine the list, correct any errors, and then leave while the file transfer takes place.

I could use the Build command to create a Do file with all of the Copy filename/ext:drive spec to filename/ext: drive spec data for each file to be copied, but that requires a lot of typing. Besides, the Build command is slow and cumbersome.

The Transfer Program

The solution is simple. I wrote a program that creates a Do file, executes it, and then erases it. Well, almost . . .

The first priority of Transfer is to minimize typing. Why retype the source and destination drive numbers each time? Transfer prompts for these numbers (see Fig. 1) and uses them in every command line. It also inserts COPY and TO in the command (see Fig. 2).

You are asked to enter a list of the file names to be copied. Pressing enter in
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Program Listing

16005 'TRANSFER/BAS
16010 'assembles a list of filenames to be copied
16020 'creates a DO file to be executed
16030 'written by J.H.Nestor 9/6/82
16040 '16050 CLS
16060 CLEAR 1600
16070 DIM AS(100)
16080 GOSUB 11800 'get the list of files
16090 GOSUB 12000 'any corrections ?
16100 GOSUB 15830 'open original do file
16110 GOSUB 16000 'append new commands
16120 GOSUB 13000 'execute or abort
16130 END
16140 '11800 '11810 'get the list of files to copy
11820 '11830 CLS
11840 PRINT TAB(18)CHR$(26)"TRANSFER - File Copy Utility"
"CHR$(25)
11850 PRINT TAB(18)"Enter SOURCE Drive Number.......";:LINEINF
UT D1S
11860 PRINT TAB(18)"Enter DESTINATION Drive Number....";:LINEINF
UT D2S
11870 PRINT
11880 AS=1
11890 PRINT TAB(18)"Enter Filename # ";PRINT USING "###";A$;PRINT 
" or [ENTER] to end list.....";:LINEINPUT AS(A$)
11900 IF LEN(AS(A$))=0 THEN NA=A$-1:GOTO 11130
11910 A#=A#+1
11920 GOTO 11090 'next filename
11930 RETURN
12000 '12010 'any corrections ?
12020 '12030 GOSUB 17000 'erase
12040 PRINT @ (21,10),"Are there any corrections (Y/N)?";LINEIN
PUT ANS
12050 IF ANS="Y" THEN 12140
12060 GOSUB 17000 'erase
12070 PRINT @ (21,10),"Enter Filename ";:LINEINPUT N$ 
12080 N%=VAL(N$)
12090 IF NN<1 OR NN>NN WHEN 12030
12100 GOSUB 17000 'erase
12110 PRINT @ (21,10),"Filename ";NS;is ";AS(NN)
12120 PRINT @ (22,10),"Enter new Filename ";NS;... ";:LINEINPUT 
T AS(NN)
12130 GOTO 12030
12140 PRINT CHR$(2);RETURN
13000 '13010 'execute COPY or abort ?

How Transfer Works

There are five components to the Transfer program.

The first, Enter Transfer Drives (in lines 11030-11060), clears the screen,
prints a heading, and accepts the source and destination drive numbers. String
variables 01$ and 02$ are used for the drive numbers.

The second, Enter Filenames (in lines 11080-11130), contains the routine
to enter the file names. They are entered into the string array AS($). The array
is dimensioned to 100 elements in line 10700, which is actually overkill since
TRSDOS accepts only 96 file names including system files. Line 11100 tests
the length of the file name entered. Pressing enter without entering a file name produces 
AS(0%) with a length of zero, thus ending the entry routine.

The third part of the program, in lines 12000-12140, lets you correct any
file name you might have mistyped. Answer Y to the prompt "Are there any
corrections (Y/N)?". Enter the offending line number, and reenter the correct
file name for that line.

The fourth part builds the Do file. While it should be the easiest part of the

response to the prompt ends the list. Once it is completed, you can reenter
any of the file names in case a mistake was made.

Transfer takes the file names and creates a command such as: COPY
MYPROG/ASM:0 TO :1. This command is written to the Do file. When the
Do file is completed, you can execute the commands or abort the
operation.
program, it isn't. I examined a typical Do file and found it to be an ASCII sequential file. When I tried using an editor to create a Do file of the same format, it didn't work. When I issued the command DO MYFILE, TRSDOS responded with error 31, file not found. I checked the directory, and there it was, MYFILE: record length of 1, 87 records long. When I used the TRSDOS Build command to enter the same commands, it worked.

Apparently, the Build file does a special kind of write to the TRSDOS directory when creating a Do file. That could be why it is so slow.

First, I use Build to create a Do file called DOCOPY. The file consists of one statement: CLS. Typing DO DOCOPY clears the screen, and creates a properly designated entry in the TRSDOS directory. To be sure I didn't accidentally erase this precious file, I used the ATTRIB function to give it a password. The command was: ATTRIB DOCOPY (ACC=JHN UPD=JHN PROT=EXEC), and the file is now DOCOPY.JHN.

To append DOCOPY.JHN, the fifth Transfer component, open the file in line 16030 for sequential output. Then write the command strings created in lines 16010–16080 to the file using the statement in line 16090.

When it didn't work, I examined the file DOCOPY.JHN and found that some sort of control character was written into the single CLS statement.

I added program lines 15040 and 16040: line 15040 reads in the first line from DOCOPY.JHN and line 16040 writes it back as the first line of the new file. Whatever was in the file is still there, and it now works.

I mentioned that the program changes the Do file when it is executed; it reuses the same file each time it's used. The OPEN O command in line 15030 erases the existing file when the updated version is written, so that there is only one DOCOPY.JHN file on my disk at any one time.

The fifth part of the program executes or aborts the operation.

There are probably other uses for this method of building and executing a Do file of TRSDOS commands. I plan to explore them as time permits. Perhaps you could even construct a form of Job Control Language. If you find applications for the concept, I would appreciate hearing from you.

---

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Dr. J.H. Nestor lives at 39114 Rte. 303, Grafton, OH 44044.
Portable Word Processor
by Thomas Hartmann

For anyone who does a lot of writing, word processing is a major boon. A major drawback is the lack of portability of most word-processing systems.

There are a few portable computers around, but try working on an airplane with an Osborne in your lap—without a power source. You might as well be carrying a briefcase full of bricks.

There is a way, though, to combine portability and word-processing capabilities. By interfacing a Sony Typecoder with your Model III, you can have the best of both worlds. That procedure is described here.

Be prepared for the moment when inspiration strikes; carry your word processor with you.

The Typecoder is a small (11 1/8 by 13 3/4 by 8 5/8 inches) and lightweight (3 lbs., 1 oz.) electronic typewriter of sorts. It's actually a dedicated microcomputer, ROM-equipped to provide a single function—word processing. It has 2K RAM and uses a 40-character liquid crystal display (LCD). Your copy is saved on microcassettes a page at a time, a page being about 30 lines. A single microcassette stores 100 pages of text.

The machine provides a variety of word-processing functions, with dedicated keys for character and word insertion or deletion, and scrolling through a document. You can edit on a page-by-page basis, saving each page on the cassette.

Probably the most exciting feature of the machine, aside from its light weight, thin profile, and versatility, is the fact that its keyboard feels like a conventional typewriter keyboard. The keys are spaced similarly to TRS-80 and other standard keyboards, and emit a faint click when touched. They have just enough of a spring to make them comfortable.

The only differences are the locations of the left shift key (one key over from where it is on the TRS-80), and the apostrophe key (next to the semicolon, as on IBM typewriters). I found these both to be rather inconsequential considerations; my fingers easily adjusted to the slight change.

There's a special display status mode on the Typecoder that locates most documents on the tape without too much trouble and also displays error messages. You can adjust tabs, margins, and the volume of the key clicks from the keyboard.

An unusual feature of the Type-

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Table 1. Basic steno character assignment.
corder originally designed for secretaries and stenographers, but with a little practice usable by anyone, are the Steno keys. These keys, located on either side of the space bar, automatically convert a symbol to a word, or generate suffixes or entire words with a single keystroke.

For example, to type the word “people” you would touch the letter P and hit the Steno key. Instantly the word “people” appears on the display. Each letter has a reserved word that is displayed if that single letter is printed followed by the Steno key.

To produce a suffix, simply type the word without the suffix—for example, “victimiz,” and press the Steno key. The word is instantly transformed into “victimization.”

Printing a number and then touching the Steno key spells out that number on the screen. This can be done with the words hundred, thousand, million, dollar, percent, and cent. A listing of the Steno key character assignment is shown in Table 1.

The typecorder operates for about five hours on a set of batteries, two or three hours if they’re rechargeable NiCads. There’s also a rechargeable battery pack available from Sony, as well as 110-volt ac and 12-volt dc power supplies.

I’ve used the basic 6-volt dc Universal Battery Eliminator available from Radio Shack to power my Typecorder when I lie in bed in the evening and write. The advantage of the Radio Shack unit is that you can reverse the tip polarity, and the Typecorder uses a negative tip and positive ring, the opposite of most battery eliminators. When traveling, I carry two sets of NiCads and a charger/power supply.

To really make use of the Typecorder, you need some way of getting hardcopy. Sony provides three options: their OA-J1110 Communications/Printer Interface, used to interface the Typecorder with the TRS-80, the Sony Compact Printer, and the Sony Electric Typewriter Actuator.

I haven’t used the Compact Printer or the Electric Typewriter Actuator that sits over an IBM or other standard typewriter and strikes the keys, so it’s difficult to comment on them. Given the proliferation of inexpensive printers on the market, neither appeared to me to be a good buy for the money (the printer is priced over $800).

The OA-J1110 Communications/Printer Interface gives you QUME-compatible printer output, an RS-232C Serial output, and a built-in power supply. This device is necessary to connect the Typecorder to the TRS-80, or to send data along modem lines or to serial printers.

Using the Typecorder and Model III Together

Using the Typecorder with the Model III requires some way of getting the data in through the RS-232C port so that it can be saved as a file. There are probably a number of communications and terminal packages designed to use with modems that do this; I’ve found one of the most versatile, and one ideally suited to the Typecorder, to be Lance Miklas’ ST80III.

This program works so well because it’s possible to create specific configuration data bases that tell the program to ignore or modify certain incoming signals. Because the Typecorder sends out a string of control codes containing page numbers and other information that isn’t accepted by the Model III, you get some strange screen changes as data is accepted through the serial port with a standard terminal package.

To set up the ST80III, run the Basic program, Tcon/BAS, that comes on

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the ST80111 disk. From the menu, go to the
Change Video Translation Table and change it so it’s set up as in Table 2.
From the main menu, save this new
translation table with the name Sony/ TBL onto the disk with your ST8011/ CMD program.
To run the entire system, first write a
document on your Typecorder. My first
experiment was a 20,000-word sci-fi
novella that was great fun. I did it on
the train between my home in New
Hampshire and my office in New York
City, over the course of about three
weeks. I’d suggest you set the right
margin at 63 on the Typecorder, as this
makes things easier later on (the max-
umum margin on the TRS-80 is 63).
Then, hook the communications
interface up to the RS-232C port on the
Model III. Plug the cables from the in-
terface into the Typecorder and rewire
the tape to the beginning of your docu-
ment. Touch the play button to load the
first page of your document into the
Typecorder’s RAM.
On the TRS-80, type “ST80111
SONY” from TRSDOS. The terminal
package loads and accesses your new
translation table. Open the memory
buffer by performing a TEC “C” com-
mand and, if you want the copy to go
to your printer simultaneously, a TEC
“P” command.
Hold down the Code button on the
Typecorder and touch either the Y or X
key. Code Y sends the entire document,
page after page, to the TRS-80. Code X
sends only one page at a time.
The Typecorder displays “IN COM-
MUNICATION” and the screen of your
TRS-80 should busily scroll with the
document you transferred from the
Typecorder tape. After about 15 pages
are loaded (if your document is that
long—the display of the Typecorder
tells you which page you’re on), it’s a
good idea to break the text with the
Typecorder’s Reset button and save the
file, because this is approaching Scrip-
sit’s memory limit on a 48K machine.
Save the file by executing a TEC “X”
to close the memory buffer, and a TEC
“F” to prompt you for a file name and
write the file to disk. Then, you can go
back to a TEC “C” to begin with a new
file and a clean buffer to load the rest of
your document.
The last step is to go to Scripsit
or some other word-processing pro-
gram and edit the document. I’ve been
using Scriplus, a useful modification to
Scripsit.
You’ll notice when you load the doc-
ument that at the end of each line is a
forced line feed symbol. This occurs be-
cause each line on the Typecorder re-
quires a forced line feed. For many
applications this presents no problem. I
prefer to have more flexibility in
formatting my printouts, however, so,
after setting my right margin on the
screen at 63 with a “Break: W = 63”
command, I simply run through the
document laying a space on top of
(replacing) each line feed, except those
at the ends of paragraphs. This takes
about 25 minutes for a 20,000-character
file, and also presents a good oppor-
tunity to do some editing and review.
I could have configured the ST80111
to ignore all the line feeds, but then I’d
have to go back over the document and
locate all paragraph beginnings to
insert a line feed. I tried this, and it was
too confusing, so I settled on the above
procedure.
Summary
Anyone who uses a typewriter more
than 10 or 15 hours a week and also
travels will probably find that the Type-
corder/Model III combination is hard
to beat. It’s versatile, portable, easy to
use, and relatively uncomplicated.
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Model 100 Conversions:  
**Easy as I, II, III**

by Beve Woodbury  
*80 Micro* Technical Editor

You can convert many Model I, II, and III programs for the Model 100 with few modifications. In fact, some programs don't require any changes. This article will help you choose and convert programs appropriate for the Model 100.

**What to Avoid**

Avoid programs that require direct access (disk) file input and output. As of now, the 100 offers only sequential file input and output. Since Model 100 programs and files are stored within the computer, your 100's memory size limits the size of the programs and files you can use.

Also avoid programs that use **POKes** and **PEEKs**. If you're not familiar with machine language and the Model 100's memory map, these commands may give you some strange results.

Finally, avoid programs that require large screen displays such as game graphics. You can alter screen displays for the Model 100 providing you keep in mind the limitations imposed by the 40-character by 8-line display. Change any **Print@** statements in your conversion so that it prints at the correct location on your 100.

**A Sample Program**

Math Program is a Model I/II/III program that I converted to run on the Model 100 as a conversion example (see Program Listing 1).

*Once you boot up the program, enter your name and choose from a menu to add, subtract, multiply, divide, or quit. When you choose the function you want, you're given the option of Level 1 (for numbers 0-9) or Level 2 (for numbers 0-100).*

The program uses random numbers in the math problems. It prints the problem on the screen and waits for your answer. If you answer correctly, the computer tells you so; if you're wrong, the screen displays **WRONG** along with the correct answer.

When you quit the program, it reads an input sequential file to see if your name exists in the file. If it does, the program prints the scores you achieved last time along with your current scores. Scores are calculated for each math function as well as overall.

Your current scores replace your old scores on the output sequential file or, if you aren't already on the file, the program adds your name and scores to the end of the output file.

**Establishing Files**

Prior to running Math Program on any TRS-80, you must enter Basic with two files and an established sequential input file.

On Models I/II/III, enter Basic by typing **BASIC - F:2.** To establish the sequential input file for Math Program, type in:

```
OPEN "O",1,"SCORES";CLOSE
```

and press the enter key.

On the Model 100, the command **Maxfile=2** in line 10 opens the Basic file channels. Enter the text mode to establish the sequential input file. When the screen prints **"File to edit?"**, type **SCORES**, press the enter key, and then press the Model 100's F8 key.

You only need to establish the Scores file before the program's first run or when the Scores file has been killed.

**Model 100 Math Program Changes**

Program Listing 2 is Math Program converted for the Model 100. Compare the two programs. I'll explain what changes were made and why. I have kept the line numbers the same in both programs for easy comparison.

**Remark Statements**

Remark statements, indicated by **REM** or an apostrophe, help you understand and debug a program. They illustrate the program's flow, explain what's being done in certain areas of the program, and help locate problem areas. Remarks also define a particularly confusing or unusual command area.

Each character or space in a remark statement takes up 1 byte of memory. Because of the Model 100's memory limitation, it is advisable to remove all spaces and remark statements from the program. But you should keep a printed copy of the complete program for future reference in making changes, debugging, or understanding program flow.

**GOTO and GOSUB Statements**

Programmers sometimes have **GOTO** or **GOSUB** statements reference a remark statement that explains a routine that follows. When you remove REM lines, be sure to change the line number in any **GOTO** or **GOSUB** statement that references, the deleted remark line number to the correct number. See program lines 390 and 810. If you miss one of these corrections, you'll get an undefined line error (UL).

**Altering the Display Command**

Print **@** statements require the most changes (see lines 290-360 in Listing 1). You have to modify print locations from a
Opening Files

Model 100 commands to open files are different from those

Table 1. Math Program variable list.
of the other TRS-80s (lines 770 and 780). These commands must appear as shown in Listing 2. Spaces can be inserted between words if desired. Refer to p. 165 in the Model 100 manual for a more detailed explanation of opening files.

**Random Numbers**

The Model 100's random number generator returns numbers between 0 and 1. Therefore, all random numbers are decimal numbers to 14 places. The program produces whole numbers by multiplying the decimal numbers generated (line 1520 in Listing 2).

The random numbers are not truly random, however, as the same number sequence is generated each time a program runs. The Model 100 manual provides a short program on p. 175 that ties the random number generator to real time. This produces a different number sequence for each program execution (lines 1500-1510 in Listing 2).

**Other Conversion Problems**

I am aware of two other problems not demonstrated in Math Program. You must include the Then in an If...Then...GOSUB statement. You cannot use If...GOSUB as you can on the Model III. But in an If...Then...GOTO statement, either the Then or the GOTO can be left out.

Character strings (CHR$) 32-125 are the same on all TRS-80s. Any other character string may or may not be different on the 100 and must be checked carefully to determine the appropriate CHR$ command for the Model 100.

**More Changes?**

This covers the changes I've found necessary in converting programs to the Model 100. Give it a try and if you come across any others, let me know about them and I'll include them in a future issue.

---

**Program Listing 2. Math Program for the Model 100.**

```plaintext
10 MAXFILES=2
10 CLS
110 ONEERRORGOTOL1140
120 P$=".***.###.###.###.###.###"
140 PRINT#92,"MATH PRACTICE"
150 PRINT#167,"TYPE YOUR NAME, PLEASE."
160 PRINT#254,"":"INPUT NS"
210 CLS:PRINT"Choose the math function you want."
220 PRINT"I will print number problems to solve."
230 PRINT"When you quit, I will print your scores and your last date."
260 PRINT#243,"Press ANY key to continue."
270 IS=INKEY$;IFS="**THEN270"
290 CLS:PRINT#56,"1. ADD"
320 PRINT#96,"2. SUBTRACT"
330 PRINT#136,"3. MULTIPLY"
340 PRINT#176,"4. DIVIDE"
350 PRINT#216,"5. QUIT"
360 PRINT#280,"ENTER NUMBER OF MATH FUNCTION WANTED":INPUTF
380 IFP>5THEN290
390 IFP<5THEN770
400 T=T+1
410 CLS:PRINT"PRINT" LEVEL 1
430 PRINT"PRINT" LEVEL 2 numbers 0 to 9
460 PRINT"PRINT" ENTER LEVEL SELECTION 1 OR 2 ";:INPUTL
470 IFL>2THEN410
480 CLS:ONLGOTOS#500,530
500 GOSUB1580:A=X1:GOSUB1580:B=X1
520 GOTO550
530 GOSUB1580:A=X2:GOSUB1580:B=X2
550 ONP2GOTOS#75,620,670,710
570 CLS:PRINT#95,A="B":INPUTC
590 IPC=A-BTHENM=AR+1:GOTOL1120
600 PRINT0175,A="/B"="A+B=AW=+1:GOTOL1130
620 IFB>ATHENM=A:B=B:H
630 PRINT#95,A="/B"=":INPUTS"
640 IFS=A-BTHENSr=Sr+1:GOTOL1120
650 PRINT#175,A="/B"="A-B=SW=+1:GOTOL1130
670 PRINT#95,A="/B"=":INPUTM
680 IFS=A-BTHENMr=Mr+1:GOTOL1120
690 PRINT$175,A="/B"="A-B=MW=MN+1:GOTOL1130
710 DV=A:B:IFB>ATHENM=B
720 PRINT#95,DV="/B"=":INPUTD"
730 IFD=DV>BTHENRD=RD+1:GOTOL1120
740 PRINT#175,DV="/B"="DV/BD=DW=DW+1:GOTOL1130
770 OPEN"RAM:SCORES.DO"FORINPUTAS1
780 OPEN"RAM:NWSCORE.DO"FOROUTPUTAS2
790 IFEOF(1)THEN930
800 INPUT#1,NSL,A1,A2,S1,S2,M1,M2,
D1,D2,T1
810 IPNIS=N5THEN850
820 PRINT#2,NSL,"","A1:A2,S1,S2,M1,M2,
D1,D2,T1
830 GOTO790
850 PA=(A1/(A1+A2))
860 PS=(S1/(S1+S2))
870 PM=(M1/(M1+M2))
890 PT=(A1+S1+M1+D1)/T1
900 GOSUB1180
910 Y=1:GOTOL790
930 NA=AR/(AR+AW)
940 NS=SR/(SR+SW)
950 NM=MR/(MR+MN)
960 ND=DR/(DR+DW)
970 NT=(AR+SR+MR+D)/T
990 CLS:PRINT#18,NS
1020 PRINT#88,"ADD SUB MULT DIV TOTAL"
1040 IFY=0THENGOSUB1100:GOTOL070
1050 PRINT"OLD"":PRINT"USINGIFS:PA,PS,PM,PD,PT:PRINT"
1070 PRINT"NEW"":PRINT"USINGIFS:NA,NS,NM,ND,NT"
1090 CLOSE:KILL"SCORES.DO":NAME"NWSCORE.DO"AS"SCORES.DO":END
1100 PRINT#2,NSL,"","AR:AW;SR;SW;MR;MW;
DR;DW;T
1110 RETURN
1120 PRINT#178,"RIGHT":GOTOL260
1130 PRINT#114,"WRONG":GOTOL260
1140 IFERR=1THENRESUMENEXT
1150 S=VAL(RIGHTS(TIMES,2))
1150 FORI=FORCE-X=RND(1):NEXT
1528 X1=INT(X*10):X2=INT(X*100):RETURN
```

---

**C:Notes**

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Disassembler

by David Cloutier

Soon after I got my Model 100, I tried to map its ROM and RAM. I downloaded the two disassemblers on CompuServe to do so, but both were too large to run on an 8K machine. So, I had to write my own program (see Program Listing 3).

Run Listing 3 and enter the memory location you wish to examine. You must enter the location in decimal format. Originally, I wrote the program so you could enter it in either decimal or hexadecimal, but, to conserve memory, I had to remove the subroutine that provided this option.

If your machine has more than 8K, you can reinsert this option by changing line 12520 to:

12520 INPUT"Start address (suffix with H if hex)";SS

and adding the lines in Fig. 1.

After the memory location you're interested in is mapped, press the R key to enter another memory location. Or, press the Q key to end the program.

One problem with this disassembler is its length. If you have an 8K machine, you'll probably have to remove all other files in memory or save them to tape. Between each mnemonic and its operand is a tab—there are no spaces.

When the program first runs, it arrives at memory location 7D33. This isn't surprising since the first command in memory is JP 7D33. When the program reaches locations 7D31–7D33, it tests for a time delay. If the check comes back negative, the program sends some numbers to port D3.

As it continues through memory, the disassembler eventually arrives at 7EE1. This subroutine tests the memory size by getting the value of the first memory location of a chip and then complementing the value and loading it back into memory. If a read finds the number is the complement of the original, the memory is RAM and the program checks for any remaining RAM chips (see "Monitor 100," 80 Micro, July 1983, p. 178 for a memory map).

If the test fails or if all the chips are accounted for, the program loads the beginning location of all RAM into FAC0.

The subroutine 5A7C copies the default labels from ROM into RAM locations F789–F809. Call 6C93 makes a copy of F789–F809 and puts it into F80A–F88A. Call 6C9C does the reverse—it copies the label file in F80A–F88A to F789–F809.

Call 0FE8 retrieves the character in the memory location HL points to; if the character is lowercase, the call converts it to uppercase and returns with the new character in the HL register pair.

Call 2542 is similar to the Z80 command LDIR. It takes the block pointed to by the HL register (block length in register B) and moves it to the memory pointed to by the DE register.

Write to David Cloutier at Bullard Road, North Brookfield, MA 01535.

---

Figure 1. If your Model 100 has more than 8K RAM, add these lines to the disassembler; they give the option of entering the RAM address in decimal or hexadecimal.

---

Program Listing 3. Disassembler.

5 CLEAR70:DIMAS(256)
10 DATA"NOP","LD (BC) A","INC BC","INC B";
20 DATA"DEC B","LD B,1","RCL A","EX A,F","ADD HL,BC","LD A,(BC)"
30 DATA"DEC BC","INC C","DEC C","LD C,1","RRCA","DJNZ @"
40 DATA"LD DE","INC D","DEC D"
50 DATA"LD D,1","RLA","JR @","ADD HL,DE","LD A,(DE)","DEC DE"
60 DATA"INC E","DEC E","LD E,1","R"
70 DATA"LD HL","LD H,LD L","DEC HL","INC HL","INC H"
80 DATA"DEC HL","INC HL","LD L,1","CPL","JR NC,@","LD D","SP","LD (####),A","INC SP","INC HL"
90 DATA"LD (HL),","SCF","JR C,8","ADD HL,SP","LD A,(###)
A,DEC SP","INC A","DEC A"
F,110 DATA"LD F,1","LD F,F","LD F,H","LD F,L"
130 DATA"LD F,(HL)","LD F,0"
140 DATA"LD H,1","LD H,E","LD H,L","LD H,(HL)
H,1","LD H,L","LD H,(HL)","LD H,C","LD H,D"
150 DATA"LD H,1","LD H,E","LD H,L","LD H,(HL)
H,1","LD H,L"
Listing 3 continued

160 DATA LD (HL), C, *LD (HL), D,*

200 DATA ADD A, (HL), *ADD A, (HL), D,*

210 DATA ADC A, (HL), *ADC A, (HL), D,*

220 DATA SUB A, (HL), *SUB A, (HL), D,*

240 DATA XOR A, (HL), *XOR A, (HL), D,*

280 DATA OUT (!), A,*CALL NC, #,*P

USH DE, "SUB I", "RST 10H", "RE"

T C", "EXX", "JP C, "

290 DATA IN A, (11), "CALL C, "Un

300 DATA EX (SP), HL,*CALL PO, 
P

USH HL,*AND I", "RST 20H", "RE"

310 DATA DE, HL,*CALL PE, "U

unkown", "XOR", "RST 28H", "RE"

320 DATA PUSH AF,*OR I", "RST 30H", "RE"

M", "LD SP,HL", "JP M", "EI",

Call M, #", "Unknown", "CP I", "

38H

1000 FOR=X0255: READAS (X): NEXT

1010 X=0: GOTO12500

1012 IFX=0553ORX=THEN12520

1015 P=PEEK (X): P=CHR$ (P)

1020 PS=AS (P): ML=GX: GOSUB12800

1025 GOSUB1700

1030 P=MSL+CHR$ (9)+P$

1040 IFRIGHTS (PS, 1)=*1: THEN GOSUB11000

1050 IFRIGHTS (PS, 1)=*1: THEN GOSUB1500

1055 IFRIGHTS (PS, 1)=*2: THEN GOSUB1500

1060 GOSUB1900: PRINTPS; TAB (25); P$

1065 IF=INKEY$: IF$="r" OR$="r" THEN12520

1070 X=X+1: GOTO1012

1500 PS=LEFTR (PS, LEN (PS) - 1): X=X+1: C=PEEK (X): P=PS+CHR$ (C): IF C=27 THEN C=-C-256

1520 ML=ML+X:C=GOSUB12800: PS=PS+ML: RETURN

1700 IFP="34 (AND D)<>50 THEN1720: ELSE GOSUB1800

1710 MID (PS, 5, 4)=PS+PS+PS: RETURN

1720 IFP=42 THEN GOSUB1800: MID (PS, 8, 4)=PS+PS: RETURN

1740 IFP=58 THEN GOSUB1800: MID (PS, 7, 4)=PS+PS: RETURN

1760 IFP=21 THEN X+1: P=PEEK (X): P=PS+CHR$ (C): P=GOSUB10000: PS=C:MID (PS, 6, 2)=P: RETURN

1770 IFP=20 THEN X+1: P=PEEK (X): P=PS+CHR$ (C): P=GOSUB10000: PS=C:MID (PS, 7, 2)=P: RETURN


1900 FOR=X10LEN (PS): IFASC (MID (PS, R1, 1)) =32 THEN MID (PS, R1, 1)="": RETURN

1910 NEXT X: RETURN

10000 HS"=0123456789ABCDEF"

10100 L=INT (C/16): X=C-L*16

10200 CS=MID (HS, R1, 1)+MID (HS, R1, 1)+MID (HS, R1, 1)

10300 RETURN

11000 PS=LEFT$ (PS, LEN (PS)-1)

11100 X=X+1: C=PEEK (X): P=PS+CHR$ (C): GO

11200 SUB10000

11200 PS=PS+C$: RETURN

11500 PS=LEFT$ (PS, LEN (PS)-1)

11510 X=X+2: C=PEEK (X): P=PS+CHR$ (C): GO

11520 SUB10000

11530 P=PS+C$: RETURN

12000 MS=INT (ML/256): LS=ML-MS*256

12010 C=MS: GOSUB10000: ML=CS

12020 C=LS: GOSUB10000: ML=CS+ML

12030 RETURN

12500 CLS

12520 INPUT "Start address": S

12550 X=S: GOTO1812

Elapsed Time

by Richard Ramella

The Model 100 command PRINT TIMES displays the current time in 24-hour, military format, but the time is embedded in a data string and can't be easily substituted in mathematical equations. Elapsed Time (Program Listing 4) solves this problem by letting you use the enter key to mark start and end times of a program and telling you how much time passes between the two.

I used Elapsed Time as a subroutine in programs. It's helpful when I'm trying to pare the running time of a new program, but it can time any event that lasts fewer than 24 hours. The program has various applications, but since the machine
only states times to the second, it isn’t useful for timing events
that require split-second accuracy.

The program calculates the hours, minutes, and seconds of
start and end times, stores them in separate number variables,
and then subtracts the start time from the end time. Remem-
ber that the decimal system is not useful when working in
60-second, 60-minute, and 24-hour units.

Running the Program

The program begins with this prompt: “To start, tap
enter.” Hitting the enter key sets the start time. Another
prompt then appears: “Timing has begun. To end, tap enter.”
This second tap stops the program timer. Then the start time,
the end time, and the elapsed time are given in this format: 2
hours 23 minutes 1 second.

How It Works

Lines 150 and 200 set A$1(1) and A$2(2) as start and end
times. The For...Next loop in lines 240–280 isolates the hour,
minute, and second totals of the start and end times and as-
signs their variable values. This is done using the LEFTS,
MIDS, and RIGHTS string commands to isolate the correct
two characters for hours, minutes, and seconds, then trans-
forming these into numbers with the VAL command.

Here’s an example of how this works:

10 Z$ = "4"
20 W = VAL(Z$)
30 PRINT W

Line 30 produces the number 4, which is subject to normal
mathematical computation on the computer. This example
won’t work if, for instance, line 10 reads Z$ = “four”.

The reverse of this process is STRS$:

10 W = 4
20 Z$ = STRS$(4)
30 PRINT Z$

Line 30 prints a 4 again, but it’s a string 4 and subject to
string variable rules.

Elapsed Time changes parts of a string into numbers. These
numbers are dealt with in lines 330–380. I won’t explain all
these lines, but I’ll translate one.

In effect, line 330 (in Listing 4) says: If the start- and end-
seconds numbers are equal, zero seconds is the answer, so go
to the next line. If the end number is higher than the start
number, the number of elapsed seconds is the end number
minus the start number. The only other possibility is that the
start number is bigger than the end number, so the elapsed
time number for seconds has to be 60 seconds minus the start
number plus the end number. If this is the case, you must bor-
row the 60 seconds from the minute number.

The minute and hour figures are handled in roughly the
same manner. Lines 360–370 print the elapsed time. If no
hours or minutes have passed, the program doesn’t print “0
hours 0 minutes.” But, Elapsed Time does pay attention to
plurals and adds an S to the words hour, minute, and second if
needed.

In using this routine as a timer for a program in progress, I
include program lines to set the value of A$1(1) as the timed
routine begins and to set the value of A$2(2) when it is com-
plete. Then I send the test to lines 240–380; the lines in Elapsed

Time are renumbered higher than the lines at the end of
the program being timed, so no significant overlap exists. Once
the elapsed time is stated, you can go back to the timed pro-
gram to try to shorten its run time.

Write to Richard Ramella at 1493 Mt. View Ave., Chico,
CA 95926.

100 REM * Elapsed Time * TRS-80 Model
100 * Richard Ramella *
110 CLS
130 PRINT "To start, tap Enter."
140 INPUT X
150 A$(1)=TIMES$
160 CLS
170 PRINT "Timing has begun."
180 PRINT "To end, tap Enter."
190 INPUT X
200 A$(2)=TIMES$
230 CLS
240 FOR A=1 TO 2
250 H(A)=VAL(LEFTS$(A$(A),2))
260 M(A)=VAL(MIDS$(A$(A),4,2))
270 S(A)=VAL(RIGHTS$(A$(A),2))
280 NEXT A
290 PRINT "Start: ":A$(1)
300 PRINT "Finish: ":A$(2)
310 PRINT STRING$(20,"-"
320 PRINT "Elapsed time...
330 IF S$(1)=S$(2) THEN 340 ELSE IF S$(2)>S
(1) THEN S$(3)=S$(2)-S$(1) ELSE S$(3)=S$(1)
+S$(2):M$(3)=M$(3)+1
340 IF S$(1)<S$(2) THEN 350 ELSE IF M$(1)>M
(2) THEN M$(3)=M$(3)+1 ELSE M$(3)=M$(1)
+M$(2):H$(3)=H$(3)+1
350 IF H$(2)=H$(1) THEN 360 ELSE IF H$(2)>H
(1) THEN H$(3)=H$(3)+1 ELSE H$(3)=H$(1)
+H$(2):S$(3)=S$(1)+60-S$(2)
360 IF H$(3)>0 THEN PRINT H$(3) "hour":
370 IF M$(3)>0 THEN PRINT M$(3) "minute":
380 IF S$(3)>0 THEN PRINT S$(3) "second":
390 END

Program Listing 4. Elapsed Time.

If It’s Tuesday . . .

Conversion by Marc-Anne Jarvola
80 Micro Technical Editor

You may have noticed that your corner liquor store stocks
your favorite brands in half-liters instead of those familiar
fifths and pints. And it’s just as likely that the local service sta-
tion now dispenses gas in liters rather than gallons. Despite
these minor concessions to metric conversion, the United
States, for the most part, stands apart in a world of
kilometers, liters, and grams.

But if travel or business takes you abroad, or even across
the border to Canada or Mexico, you may need to convert

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U.S. measurements and currency into metric equivalents and foreign monies and back again. Conv.BA does all the hard work (see Program Listing 5).

Measurement Conversions

After boot-up, the program displays the menu shown in Fig. 2. If you choose option 1 or 2, conversions between U.S. and metric measurements, a new menu appears and you choose the conversion you want to make (see Fig. 3). For example, you can convert inches to centimeters or liters to gallons.

After this, enter the number you want converted and the answer appears on the screen. You can then return to the main menu for another conversion.

Currency Conversion

If you select Foreign Currency from the main menu, a submenu displays two options: to convert U.S. dollars into foreign currency or vice versa.

If you choose to convert U.S. dollars to a foreign currency, the program displays seven countries and their monetary denominations in parentheses (see Fig. 4). Select the country/currency of interest.

After you select the exchange, the program prompts you for the current currency exchange rate. For instance, if you wanted to convert dollars into French currency, the program asks you the exchange rate for one franc. You’ll find exchange rates in the financial section of your local newspaper or The Wall Street Journal under the heading “U.S. $ Equivalents.”

When you enter the exchange rate, the program prompts for the number of dollars you want converted. When the answer appears, you can return to the main menu.

If you want to convert foreign currency to U.S. dollars, you would choose option 2 from the submenu. When you choose the currency to which you want your dollar figure converted, the program prompts, “What is the current exchange rate for one U.S. dollar?” Again, this information is found in your newspaper’s financial section, under “Currency per U.S. $.” Enter the appropriate number, then enter the number of dollars you want converted and your answer appears on the display.

If for any reason you want to change the calculations for figuring out the currency, alter lines 1040 and 1100.

Bon Voyage

Have fun converting and don’t leave home without your Model 100. Hopefully this program will help you the next time you buy gas by the liter at a German service station.

---

**Program Listing 5. Conv.BA.**

```
10 REM CONVERSION
20 CLS:PRINT"1. U.S. STANDARD"
21 PRINTCHR$(154);"PRINT";"METRIC"
30 PRINT:PRINT"2. METRIC";"PRINTCHR$(154);"PRINT";"U.S. STANDARD"
40 PRINT:PRINT"3. FOREIGN CURRENCY"
50 PRINT:INPUT"ENTER 1, 2 OR 3";N
60 IF N=1 GOTO90
70 IF N=2 GOTO210
80 IF N=3 GOTO890 ELSE 20
90 CLS:PRINT"1. FAHRENHEIT TO CELSIUS"
100 PRINT"2. INCHES TO CENTIMETERS"
110 PRINT"3. FEET TO METERS"
120 PRINT"4. MILES TO KILOMETERS"
130 PRINT"5. OUNCES TO GRAMS"
140 PRINT"6. POUNDS TO KILOGRAMS"
150 PRINT"7. GALLONS TO LITERS"
160 INPUT"ENTER NUMBER OF CONVERSION";R
170 ON R GOSUB
330, 370, 410, 450, 490, 530, 570
180 PRINT:INPUT"DO YOU WANT ANOTHER"
190 CONVERSION (Y/N)";A$=A$="Y" THEN 20
190 IF A$="N" THEN 1210 ELSE 180
210 CLS:PRINT"1. CELSIUS TO FAHRENHEIT"
220 PRINT"2. CENTIMETERS TO INCHES"
230 PRINT"3. METERS TO FEET"
240 PRINT"4. KILOMETERS TO MILES"
250 PRINT"5. GRAMS TO OUNCES"
260 PRINT"6. KILOGRAMS TO POIDS"
270 PRINT"7. LITERS TO GALLONS"
280 INPUT"ENTER NUMBER OF CONVERSION";S
290 ON S GOSUB
310, 350, 390, 430, 470, 510, 550
300 PRINT:INPUT"DO YOU WANT ANOTHER"
310 CONVERSION (Y/N)";A$=A$="Y" THEN 20
310 IF A$="N" THEN 1310 ELSE 300
```

Listing 5 continued.
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Table 2. Conv.BA variable list.

<table>
<thead>
<tr>
<th>T</th>
<th>Menu choice</th>
<th>X</th>
<th>Degrees Celsius</th>
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<tr>
<td>N</td>
<td>Menu choice</td>
<td>W</td>
<td>Centimeters</td>
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<tr>
<td>R</td>
<td>Menu choice</td>
<td>E</td>
<td>Meters</td>
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<td>S</td>
<td>Menu choice</td>
<td>K</td>
<td>Kilometers</td>
</tr>
<tr>
<td>V</td>
<td>Menu choice</td>
<td>G</td>
<td>Grams</td>
</tr>
<tr>
<td>D</td>
<td>Degrees Fahrenheit</td>
<td>B</td>
<td>Kilograms</td>
</tr>
<tr>
<td>I</td>
<td>Inches</td>
<td>L</td>
<td>Liters</td>
</tr>
<tr>
<td>F</td>
<td>Feet</td>
<td>C</td>
<td>Current exchange rate</td>
</tr>
<tr>
<td>M</td>
<td>Miles</td>
<td>U</td>
<td>How many units?</td>
</tr>
<tr>
<td>O</td>
<td>Ounces</td>
<td>AS</td>
<td>Y/N Input</td>
</tr>
<tr>
<td>P</td>
<td>Pounds</td>
<td>BS</td>
<td>Singular currency</td>
</tr>
<tr>
<td>Q</td>
<td>Gallons</td>
<td>CS</td>
<td>Plural currency</td>
</tr>
</tbody>
</table>

Table 3. Conv.BA line descriptions.

Line Description

10-80 Menu (Main)
90-200 Menu (U.S. Standard to Metric)
210-330 Menu (Metric to U.S. Standard)
340-600 Calculations (U.S. Standard to Metric)
610-880 Calculations (Metric to U.S. Standard)
890-910 Menu (Main-Foreign Currency)
920-1010 Menu (Choice of Currency)
1020-1070 U.S. $ to Foreign Currency
1080-1130 Foreign Currency to U.S. $
1140-1200 String Values
1210 End

Listing 5 continued

```plaintext
310 IF AS="Y" THEN 20
320 IF AS="N" THEN 1210 ELSE 300
330 REM F TO C
340 CLS: INPUT "DEGREES FARENHEIT" ; D
350 PRINT; PRINT D; "DEGREES FARENHEIT = "; 5/9*(D-32); " DEGREES CELSIUS"
360 RETURN
370 REM INCHES TO CENTIMETERS
380 CLS:INPUT"HOW MANY INCHES";I
390 PRINT;PRINT I; "INCHES = ";I*
2.54; "CENTIMETERS"
400 RETURN
410 REM FEET TO METERS
420 CLS:INPUT"HOW MANY FEET";F
430 PRINT;PRINT F; "FEET = ";F*
.3048; "METERS"
440 RETURN
450 REM MILES TO KILOMETERS
460 CLS:INPUT"HOW MANY MILES";M
470 PRINT;PRINT M; "MILES = ";M*
1.609; "KILOMETERS"
480 RETURN
490 REM OUNCES TO GRAMS
500 CLS:INPUT"HOW MANY OUNCES";O
510 PRINT;PRINT O; "OUNCES = ";O*
28.35; "GRAMS"
520 RETURN
530 REM POUNDS TO KILOGRAMS
540 CLS:INPUT"HOW MANY POUNDS";P
550 PRINT;PRINT P; "POUNDS = ";P*
.45; "KILOGRAMS"
560 RETURN
570 REM GALLONS TO LITERS
580 CLS:INPUT"HOW MANY GALLONS";Q
590 PRINT;PRINT Q; "GALLONS = ";Q*
3.8; "LITERS"
600 RETURN
610 REM C TO F
620 CLS:INPUT "HOW MANY DEGREES CELSIUS";X
630 PRINT;PRINT X; "DEGREES CELSIUS = ";X*5/9+32; "DEGREES FARENHEIT"
640 RETURN
650 REM CENTIMETERS TO INCHES
660 CLS:INPUT "HOW MANY CENTIMETERS";W
670 PRINT;PRINT W; "CENTIMETERS = ";W*

.39; "INCHES"
680 RETURN
690 REM METERS TO FEET
700 CLS:INPUT "HOW MANY METERS";E
710 PRINT;PRINT E; "METERS = ";E*
3.28; "FEET"
720 RETURN
730 REM KILOMETERS TO MILES
740 CLS:INPUT "HOW MANY KILOMETERS";K
750 PRINT;PRINT K; "KILOMETERS = ";K*
.62; "MILES"
760 RETURN
770 REM GRAMS TO OUNCES
780 CLS:INPUT "HOW MANY GRAMS";G
790 PRINT;PRINT G; "GRAMS = ";G*
.035; "OUNCES"
800 RETURN
810 REM KILOGRAMS TO POUNDS
820 CLS:INPUT "HOW MANY KILOGRAMS";B
830 PRINT;PRINT B; "KILOGRAMS = ";B*
2.2; "POUNDS"
840 RETURN
850 REM LITERS TO GALLONS
860 CLS:INPUT "HOW MANY LITERS";L
870 PRINT;PRINT L; "LITERS = ";L*
0.264; "GALLONS"
880 RETURN
890 CLS:PRINT "1. U.S. $ "; PRINTCHR$(154)
; "PRINT" FOREIGN CURRENCY";PRINT " ( U.S. $ EQUIVALENT )"
900 PRINT;PRINT "2. FOREIGN CURRENCY"
; PRINTCHR$(154); PRINT " U.S. $ "; PRINT " ( CURRENCY PER U.S. $ )"
910 PRINT;PRINT "ENTER 1 OR 2";T
920 CLS;PRINT "1. CANADA (DOLLAR)"
930 PRINT "2. BRITAIN (POUND)"
940 PRINT "3. FRANCE (FRANC)"
950 PRINT "4. MEXICO (PESO)"
960 PRINT "5. W.GERMANY (MARK)"
970 PRINT "6. SPAIN (PESETA)"
980 PRINT "7. JAPAN (YEN)"
990 INPUT "ENTER NUMBER OF CURRENCY";V
1000 ON V GOSUB
1140,1150,1160,1170,1180,1190,1200
1010 IF T=2 THEN 1800
1020 CLS;PRINT "WHAT IS THE CURRENT

Listing 5 continued

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Still Up in the Air

by Eric Grevstad
80 Micro News Editor

From the moment Radio Shack introduced the Model 100, people have considered the portable a suitable seatmate for plane trips. After three months on the market, the 100 has logged a lot of flying time, but still hasn’t earned its official license.

Hundreds of owners use their micros, with and without asking permission, on commercial flights. A few ask for permission and are turned down, though, as far as anyone knows, no planes have suffered instrumentation interference or near-disaster as a result of airborne computing. Past that, users waiting for an authoritative yes or no on the 100’s airworthiness are still waiting.

As reported in 80 Micro (July 1983, p. 169), Federal Administration rule 91-19 outlaws all electric devices except hearing aids, pacemakers, tape recorders, and shavers—unless an airline chooses to allow them. From Model 100 owners' chats on CompuServe, there’s no doubt that many airlines are tolerating the 100.

The bulletin board contains dozens of messages like E. Brad Meyer’s: “Took Northwest Flight 287 from Boston to Chicago today. Asked permission to use the 100, received it, and used the machine intermittently throughout the flight, including during the final approach. No problems reported.”

InfoWorld gave two pages of its June 20 issue to a rather giddy article by Bob Louden of Palo Alto, CA, who played with his new Model 100 from San Francisco to New York and back: “Years ago, a friend told me that you aren’t a real success in this country until the stewardesses always stop by to say ‘Hello,”’” Louden wrote. “You can achieve the same effect with a Model 100, at least until everybody else has one.”

Besides impressing flight attendants, Louden pointed out an advantage of CMOS RAM over magnetic media: “The Model 100 has now been X-rayed twice by the airlines, with no loss of memory,” he wrote.

On his way home, Louden used the portable’s BASIC and sound routines to write a program that played five octaves of music in whole, half, quarter, and eighth notes—presumably trying the patience of people sitting nearby, but apparently causing no harm to the plane’s communication and navigation equipment.

According to John Revelle of Rohnert Park, CA, the first rule of Model 100 air travel is to notify the flight crew of its use: “Although the rule is a federal one and the authority is supposed to be with the airline, the actual final word rests with the captain,” wrote Revelle in a letter to 80 Micro.

Meanwhile, Radio Shack is trying to end the uncertainty by collecting owners’ reports and offering test 100s to airlines. Said director of computer merchandising Ed Juge, “I don’t think there’s been any official word yet. The only cases I’ve heard of someone not using the 100 or being stopped from using it were on USAir. There were a couple of incidents of the stewardess acting on her own, saying ‘It’s a rule that you can’t have personal computers on the plane.”

“It doesn’t look like there’s a major problem at all,” Juge said. “It’s just a matter of history and of accumulating evidence to tell the airlines that people have used it, with the captain’s permission, and there’ve been no problems.

“We’re in contact with several airlines, all of whom have been offered units for testing; we’ve made some inroads with them and will possibly be contacting some more,” Juge said of Radio Shack’s requests for a definite all-clear. “We’re trying to work within the existing law; we’re not trying to go to the FAA and get a new law. And the existing law states that it’s up to the airlines and the individual captains.”

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The Shack’s software future

Model 4 gets CP/M, but IBM gets the limelight.

Generalizations about the computer market have a half-life of approximately eight hours, but—in the absence of Peanut, Popcorn, Lisa, and McIntosh—the micro scene of mid-1983 made room for three definite hot properties.

One was the portable computer, with Radio Shack’s Model 100 setting the pace; another was the inexpensive home micro, with more powerful machines like the Commodore 64 and the Coleco Adam replacing Timexes and VICs. The third was the IBM PC, attracting flocks of work-alike hardware and compatible software manufacturers.

The PC’s success has overshadowed Tandy’s Model 4. For years, the naysayers’ view was that the TRS-80 was stuck with an orphan operating system, that TRSDOS was a software sideline compared to the 8-bit standard, CP/M. Now the Model 4 is getting, after half a year’s postponement, the latest CP/M 3.0—just as software companies are rushing to 16-bit PC-DOS and MS-DOS products. The Model 4 may not be an orphan, but it seems IBM has the biggest family.

Has Radio Shack gone from a DOS dead-end to a hardware dead-end? Microsoft Corp., proud of its Model 100 software and Model 16 Xenix operating system, is maintaining a hands-off attitude toward the rest of the line: “The Model 4 is an 8-bit system, therefore Microsoft doesn’t have anything to offer it in the way of an operating system,” said public relations director Pam Edstrom.

Microsoft is enjoying immense success in the 16-bit world. The firm’s MS-DOS is arguably the single-user standard—even Digital Research Inc. has decided to offer its language products on MS-DOS as well as its own CP/M-86.

As for the multi-user Xenix system, which Microsoft licensed to Radio Shack for the Model 16, Edstrom says, “I guess I’d credit Radio Shack to some extent for having Xenix take off and build some momentum. When Radio Shack, which is one of the major OEMs in the market—and this was the first time Radio Shack had gone outside for an operating system—picks a product, that reassures people it’s going to be around for some time.”
Radio Shack "went outside" for its alternate Model III operating system, LDOS; Tracy Licklider, vice president of operations for Software Arts of Cambridge, MA, saw LDOS—in Model III mode—playing a sizable role on the Model 4.

"I think that the Model 4 will do fairly well," Licklider said. "I think there's going to be a market for machines of that capability for some time. I think Radio Shack sees it as an upgrade of the Model I/III, analogous to Apple's beefing up the II into the IIe.

"In terms of software, I think it will help somewhat that they have CP/M on the 4, but I think enough of the mainstream applications will be under LDOS in Model III mode or TRSDOS 6.0. I think it'll have the main spread of applications."

Licklider praised the Model 4 as "a very well-priced machine," saying its $1,999 two-drive model (64K compare favorably with the Apple IIe—"There's no color graphics, but for lots of applications such as VisiCalc or word processing you don't need graphics." His one reservation concerned a missing language:

"I think it's sad there's no Logo on it, even a black-and-white one. I understand the Model III has been very popular as a school machine, and Logo would seem a natural thing to have, but I guess the low-resolution graphics prohibited that."

Licklider admitted that the 4 isn't likely to attract state-of-the-art programs: "As for new major innovative software under TRSDOS, I think not; that'll probably be 16-bit or MS-DOS material. But the 4 represents a reasonable market. We have done VisiCalc under TRSDOS 6.0, and, though I can't yet say anything definitively, there's lots of interest in it as a TK!Solver machine."

Bill Hogue, president of Big Five Software, was more pessimistic about Tandy's prospects. Big Five, the company behind such classic TRS-80 games as Galaxy Invasion and Cosmic Fighter, makes its new bestseller, Miner 2049er, exclusively for Atari micros.

"I'm pretty worried about the TRS-80 market," Hogue said. "We have officially left it, though we're still selling some of our older games. If we hadn't come out with our Atari game at the time we did, we probably would have gone out of business. If we'd come out with a TRS-80 game at the time, we would have gone out of business."

"I've talked to other people and they've told me that nobody's buying TRS-80 software, that sales are down. A lot of stores in my area that used to sell it, as well as Apple and Atari programs, have discontinued it.

"I don't think Radio Shack is going to go bankrupt or anything like that," Hogue said. "But I think they're a little bit behind in technology. I never did like their Color Computer. I heard they were coming out with a new one, and I just saw that toy [the MC-10] they made, and I hope that isn't it."

As a game designer, Hogue prefers Atari's ROMPack capability: "Cartridge is the only place to be. We can put our games on that and piracy's almost eliminated." Asked whether the Model 4's CP/M will boost Radio Shack sales, he said, "No way. The way you make your money is mostly in the games market; that's the home market. Ask the average person who's bought a computer and he doesn't know what CP/M is."

Outside of games, though, CP/M should increase the Model 4 software library. George Tate, president of Ashton-Tate, said "The TRSDOS market is something we haven't been involved with, so I haven't paid much attention to it." Asked whether his firm's dBase II would appear on Model 4 CP/M, however, Tate replied, "Oh, yeah, absolutely. There isn't question one about that."

Can Tandy stay competitive with IBM? "Tandy certainly has their own market. They have a lot of retail stores, and they can be competitive with anyone they choose," Tate said. "And they've shown an ability to do some surprising things, like come out with the Model 100, which I think is a great machine."

"If you look at the market of Radio Shack over time, it's a market that's been almost immune to outside competition," Tate pointed out. "Most everything that's been sold for them has been sold through Radio Shack stores. I don't think it's a dead end at all."

The consensus that CP/M will mean access to many current, if not brand-new, programs, while new software will come primarily from Radio Shack, was accepted by Ed Juge, Tandy's director of computer merchandising.

"I think there's a lot of CP/M stuff out there," Juge told 80 Micro. "Now whether we're going to spark a whole rush of new software for the 4, I doubt it. I don't think anybody goes into using the CP/M system with the idea that anybody's going to come out with a lot of new material. You do it to use existing software.

"We don't have any intention of bringing out software under the CP/M system. It's there for the people that want to use CP/M, or the people who want to support it. We believe TRSDOS is pretty locked in now. We've got 50 to 60 people on the phone using it and answering questions, and I don't want to have to hire another 50 or 60 people."

There will, Juge confirmed, be new TRSDOS 6.0 software from Radio Shack. "Probably the first things will be Scripsit and SuperScripsit in 80-column format. There'll be a new Cobol accounting package. That's overdue now, as is CP/M—we thought we'd have CP/M from DRI [Digital Research Inc.] around February or March, and now it looks like the first of September. If there's anything we can do to speed that up, we'll certainly do it, because we think that's an important product."

As for other new software or systems, Juge might have endorsed Tate's comment on Radio Shack:

"They certainly don't do everything right, but they do enough right to survive. My opinion is that Radio Shack will survive and do well and astonish us many times."

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As this issue went to press in late June, Radio Shack confirmed that Jon Shirley, vice president of computer merchandising, was leaving the firm to become president of Microsoft Corp., effective August 1st. Shirley told 80 Micro that his replacement, while "almost 100 percent likely to be someone from within" Radio Shack, had not been decided upon.

For a full story on Radio Shack and Microsoft, see next month's news section.
GROWING PAINS FOR STRINGY FLOPPY

Since its introduction at the 1978 West Coast Computer Faire, the Exatron Stringy Floppy (ESF) has attracted a small but loyal following of TRS-80 Model I owners, but has never caught on with the mass market. That’s changing now, as new low-end computers launch a stringy floppy boom—which, ironically, leaves Exatron and its current customers out in the cold.

Earlier this year, Texas Instruments licensed the tape-cartridge drive’s technology from Entrepo Corp. (Exatron’s new name) for its CC-40 Compact Computer (see 80 Micro, June 1983, p. 318). At June’s Consumer Electronics Show in Chicago, stringy floppyies appeared in several products, from Atari’s Graduate upgrade for the VCS to Unibronics’ 48K, $200 Sonic home micro.

Ard, giving perhaps the biggest boost to the stringy floppy, Coleco included a non-Entrepo unit in its 80K CP/M-compatible Adam, for which company spokesmen expected sales of half a million units by Christmas.

Meanwhile, current and potential Exatron end-users are stymied by the Sunnyvale, CA firm’s reorganization. Wayne King, chairman of Exatron’s New York City workshop (a combined user group and sales force), said he’d heard the company would no longer sell drives or software, just blank waferes, the stringy floppy’s storage medium.

It appeared, King told 80 Micro, that Entrepo was abandoning the retail market for OEM sales, though official information was hard to come by: “Entrepo hasn’t notified workshop chairmen, which they could do for the cost of a mailing. The management they have seem to me to be a little bit nutty. They can’t decide in which direction they’re pulling.”

Robert Howell Sr., Exatron’s founder, confirmed King’s hunch about Entrepo’s market direction, though he admitted that the situation was “very confused”: “Entrepo is the new name of the company. I started this thing in my garage several years ago, and about a year ago we bought in new financing and outside management, and they elected to change the focus of the business from the end-user to OEMs. What’s going to happen to the end-user business is too confusing to guess. I think it’ll get picked up by somebody and carry on as a separate business.”

“The [Entrepo] board of directors doesn’t know what the hell they want to do yet,” Howell said on June 7. “I’m [Exatron’s] chairman of the board, founder, major stockholder, and currently I don’t have a thing to say about anything. If we got this thing reorganized, I’d hope to restart the end-user business.”

Asked to summarize his view of the stringy floppy’s prospects, Howell was optimistic but candid: “My opinion is that the stringy floppy is going to be the standard mass storage technology for the under-$500 computer and be produced in the tens of millions each year. But I’ve been believing that for a long time and it hasn’t happened yet.

“It is a superb machine—small, fast, inexpensive, easy to use. I don’t think there’s anything that can touch it. But there’s only so much you can do without money. I’ve been running this out of my garage for a long time.”

King agreed, saying that the ESF’s low profile had obscured its merits as a high-speed, low-cost compromise between cassette and disk systems. “The machine is a great little device, and it’ll do a lot that’s never really been tapped,” he said. “I’d like the situation to be that when you buy a computer and start out with bulky I/O, before you have disk drives, you have something like a stringy floppy.

“But they never did support software very well, which I thought was a big failing, because the stringy floppy would support a lot of things that it never had software for.”

According to King, Exatron had had to rely on hobbyists rather than offer its own line of programs: “The way it was, if someone wrote a nice patch to convert a disk program and sent it to them, they’d buy it, but that was about it. So mostly you were left with cassette-based software, and the advantage of that is it loads very quickly, but other than that you might as well have a cassette.” The only major commercial program offered for the ESF was Electric Pencil 2.0.

Of the new Entrepo management, King said “They’ve changed a whole lot from what they used to be. They used to be very reliable, very interested in the end user, and very willing to help out. Obviously, they’ve got their eyes on the big money, they’re going to be the big OEM manufacturer. Which is all right, but if they’d supported the stringy floppy they could have already started a market. There’d be a big base of people using stringy floppies, so other companies would support it.”

Robert McDonald, president of Entrepo, shared Howell’s optimism while answering King’s complaints. “We’re winding down the mail-order part of the business,” McDonald confirmed. “We have decided to end it. It’s going to be ended as far as Entrepo is concerned, it’s going to be sold off to somebody. It’s a small business, and less strategic, and in a way distracting from the OEM side...Entrepo is really concentrating on selling OEMs to the large computer manufacturers.”

However, McDonald said, the re-
Gold Plug - 80

Ah, instant relief! At last there is a permanent cure for contact oxidation on Model I/III connectors. Many TRS-80 users are familiar with the symptoms: un­timely resets, spontaneous reboots, or the inability to get the computer started at all without a frustrating session with a pink eraser.

The Gold Plug 80 is a well made device consisting of an edge-card plug with gold plated contacts, available with either 34 or 40 contacts. The rear of the plug has terminal tabs which fit exactly over the existing foil fingers on the TRS-80’s connectors. After installation, the original plugs have been extended about a half inch, meaning that the plastic door covers no longer fit. This did not trouble me, but you should take it into consideration. E.A.P.’s advertising leaflet, by the way, cautions you about the doors, which is refreshing. They also have the excellent policy of permitting you to return any plugs ordered for a refund if after seeing them you are unwilling to undertake the installation.

An excellent set of instructions accompany the plugs, and they are shipped promptly. I ordered mine by mail on a Monday and received my set of plugs by first class mail on Tuesday of the next week.

Installation

Installation requires a soldering iron (I use a 40-watt Weiler), Rosin-core solder, a Phillips screwdriver, and your last Pink Pearl. The keyboard and Expansion Interface have to be disassembled to get to the connectors, which are then cleaned—the eraser’s last filing. The Gold Plug 80 is fitted over the existing plug with the contacts centered, and then soldered to the board. I have some soldering experience, but it proved to be an easy, safe job.

The contact is heated, a very small amount of solder applied, and then you go on to the next contact. It took about an hour to do all six plugs.

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We did not handle the phase-out very professionally, either, so I guess I owe an apology to the end-user.

As this issue went to press in late June, Howell reported raised hopes for confused owners: "It looks like we're well on our way to reorganizing our end-user business. It looks as if the ESF owners' association is going to take over support of the product and distribute both hardware and software.

"There is a group of people actively involved in putting together a support system. If it happens, we'll send an announcement in the mail to our customers."

GAMES

Whatever happened to Tandyvision?

Plunging prices end Mattel/RS venture.

First there was Atari, with a monopoly on both home video games and VCS software; then came Mattel Electronics' Intellivision, with George Plimpton hawk ing better graphics. Then came ColecoVision and the improved Atari 2600, and hundreds of game cartridges from dozens of companies. The video game industry has always been chaotic: by early this summer, with consumers abandoning game systems for competitively priced home computers, it appeared the bottom had dropped out of the market.

Radio Shack is a computer, not a video game, company; the Color Computer is priced and positioned above both game machines and low-end micros, and the Models 1/III/4 have unashamedly bad graphics. But the Fort Worth firm did make a stab at the Space Invaders market last year with Tandyvision—a relabeled Intellivision, made by Mattel and sold in Radio Shack stores.

Tandyvision was introduced in November 1982, just in time for the Christmas buying rush. Within six months, it had sunk without a trace. Gail LaCourse, manager of Displayed Video's RS dealership in Ypsilanti, MI, told 80 Micro, "Radio Shack has discontinued those, I believe around March. They were SOWG's, Sold Out When Gone. They don't even sell cartridges anymore. We couldn't order them if we tried."

What happened? From all indications, Tandyvision was torpedoed by the unsettled game market generally and by Intellivision price cuts specifically: Radio Shack bought units from Mattel and, adding a margin for profit, sold them to consumers—until Mattel offered price reductions and rebates for its version, leaving Tandy in the position of someone who buys something the day before a sale.

When Tandyvision debuted in the November 1982 catalog, it was competitively priced at $249.95. Within weeks, however, Plimpton was on TV plugging a $50 Mattel rebate. By spring, discount stores were offering Atari VCS systems for under $100, and Intellivision and ColecoVision prices had fallen to $180, with sale prices as low as $150.

"From what we understand, what happened to Radio Shack was the same thing that happened with the TDP-100 versus the Color Computer," said Jack Torres of Computer Plus in Littleton, MA. "When Radio Shack took on the line, Mattel reduced the price, and you could get an Intellivision for less than a Tandyvision."

Added Displayed Video's Lacourse, "The reason [Tandyvision was discontinued] is the simple fact that Mattel, while selling the product to Radio Shack, did not inform Radio Shack that they were going to continue to lower prices and offer $50 rebate programs. So the dealers were complaining, be-

cause people could buy them in the store for less than they [dealers] were paying for them.”

For its part, Mattel isn’t talking. Kathy Kennedy, Mattel Electronics’ press agent, told 80 Micro, “Our company has a policy of not commenting on someone else’s business.”

While the unit was a Mattel item, she said, “Tandyvision was really their brand name. They marketed it and that was their product. You’d have to talk to Radio Shack about that.”

Kennedy did acknowledge Mattel’s aggressive rebate policy: “There were like three rebates at different times. There was one in October; I believe there was a $25 rebate as well, leading up to Christmas.” Also, there were Plimpston’s $50 rebate commercials of early 1983, with the spokesman first refusing to participate in a circus ad and later agreeing after being put in a lion’s cage. “There have been several rebates,” Kennedy concluded, “to help the retailers sell the product and increase our installed base.”

Leon Lutz, Tandy/Radio Shack’s video game buyer, confirmed that the remaining Tandyvisions will be the last: “Oh, we’re selling them out. We’ve got them on sale at $159.95 and cartridges at half price. We haven’t bought any more units from [Mattel]. They dropped Intellivision and came out with Intellivision II, which we don’t sell.”

The product will, he said, be supported: “We service them ourselves, if it’s a Tandyvision. The cartridges are Intellivision cartridges; if there’s a problem with them you send it to Mattel. We have quite a large number of cartridges left, and we’re selling them off.”

Did Mattel’s price reductions stab Tandy in the back? “I can’t say they stabbed us in the back. I mean, the market went to pot when Texas Instruments introduced their $100 computer. Everybody and his uncle got into the act with computers and video games. And Mattel responded to the market with a $50 rebate.”

Rather than be too critical of Mattel—“Well, the rebate kind of kicked it in the butt a little bit, but again, that was the market”—Lutz thought that some dealers might have cleared Intellivision inventories to make way for Atari. “You can find them at a lot of different prices around the country. I would assume some people are trying to unload some units because of Atari’s wanting an exclusive marketing agreement.

“There are some Mattel distributors and dealers out there who are selling units at a very good price simply because of that arrangement; if you want to sell Atari, you can’t sell any other unit. But that’s just speculation on my part.”

(Bruce Entin, Atari’s vice president for public relations, rebutted Lutz’s idea of Atari’s marketing policy: “That is not true. We use exclusive distributors, but you can’t tell a retailer what to sell or what not to sell. You can see the different machines in stores all over the place.”)

Ultimately, Lutz said of the Tandyvision venture, “We want to be competitive in the marketplace, and we could not be competitive at the gross margin the company operates on. We tend to want to make money on our product line.”

Has the Tandyvision incident soured relations between Mattel and Radio Shack? “We’re still good friends, in fact I met them at the CES show in Chicago.” Might the two work together again? “It’s not impossible. There’s nothing planned at the moment, but it’s not unthinkable.

“I think they’re a good company, a very good company, and it was just their having to respond to the marketplace, not a problem with us. There’s no bad feelings in the company.

“The video game market is kind of unstable, in my opinion.”

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**Game Over?**

From recent reports, it looks as if losing the video game business was no hardship for Radio Shack.

In London, where Intellivision prices have fallen from $218 to $157, the head of Mattel’s British unit told the Wall Street Journal, “Our forecast for 1983 and 1984 is just about static. The market is under attack by the home computer sector.”

Looking at U.S. companies, Fortune’s Bro Uttal was more severe: “The entire video game market could collapse because the line between game consoles and home computers is blurring. If the line vanishes, the computer is likely to replace the game console because it can do more than just play games.”

At this rate, the whole industry might repeat the marketing shift from games to programming that Tandy made with the Color Computer. And Mattel—whose Aquarius computer has barely scratched the market—may be the worse off.
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80 Micro, September 1983 • 299
10-megabyte floppy disk

A breakthrough that will keep the familiar floppy disk competitive with hard units can be summarized in a crude analogy: More cigars can be packed into a box standing on end than lying flat.

Eastman Kodak Co.'s Isomax floppy disk, introduced at the National Computer Conference in Anaheim, CA, uses isotropic cobalt-enhanced magnetic particles to store up to 10 times the information of a normal disk. (Isotropic means "having properties with the same values along axes in all directions.")

Today's floppies use cigar-shaped particles aligned horizontally, parallel to the disk's surface; Kodak's egg-shaped particles can store data vertically, squeezing up to 10 megabytes in a 5¼-inch space.

The dense-pack disks were created by Kodak's research labs in France and the U.S., and are being produced by the company's Spin Physics division in San Diego, CA. William Kroon, the division's director of marketing, told Computerworld that Isomax disks hold data horizontally as well as vertically, or at any angle in between, but that the vertical format gives the greatest capacity for the money. The floppies cost between $10 and $20 per disk in quantities of 1,000.

The disks will be commercially available late this year and carry a two-year (five-million-pass) guarantee, but you can't pop one into your TRS-80: Kodak is now selling them to about 10 major disk drive manufacturers, who are producing drives that meet Isomax's requirements (a 20- instead of 50-micron gap between recording head and media).

Horizontal recording, however, isn't dead yet. This September, Amlyn Corp. of San Jose, CA will start shipping a half-height drive that uses a mylar scale and precise head control to put 170 tracks per inch on a 5¼-inch floppy, providing 3.3 megabytes unformatted or 2.13 megabytes formatted storage.

A home away from home

If a bed, a bath, sanitized glasses, and Magic Fingers aren't enough, you might want a room with a micro. Two companies are now supplying in-room smart terminals to upper-bracket hotels, allowing travelers to play games or send electronic mail as easily as scan the room service menu.

Travelhost Inc. of Dallas, TX, the nation's largest hotel supply company, has agreed to purchase as many as 500,000 videotext terminals from Quazon Corp. over the next two and a half years. The membrane-keyboard, Z88-equipped terminals link with the rooms' TV sets and United Telecom Inc.'s Uninet communications network to offer airline schedules, news and stock information, and e-mail (using ITT Dialcom).

The company anticipates adding games, restaurant menus and reviews, and online shopping to the service, which costs $20 per hour in prime time and $7 per hour at night. Member hotels, such as the Midland in Chicago (the first to offer Travelhost's terminals), receive $1 every time a guest goes on line.

A similar service is provided by SuiteTalk, the creation of HotelTech International. The Belvedere, CA firm charges hotels $1,000 a month to lease a Concierge source micro, designed in cooperation with Sony, and $30 a month for each in-room SuiteTalk unit—a device that looks like a slightly modified Color Computer, though HotelTech cofounder Susan Martel says "It's something we're going to be making ourselves."

SuiteTalk users have free access to menus describing hotel services, local shopping and transportation guides, and CBS and NBC information services. Guests connect with a home or office computer for the cost of the phone call, and $20 an hour ($9 at night) provides access to games, news, word processing, e-mail, and airline information. The hotel management can put local businesses' ads on SuiteTalk, too.

Both HotelTech and Travelhost stress their terminals' ease of use and convenience for data-hungry travelers. As the price of technology comes down and micros become standard equipment in more hotels, Martel says, even computer novices will get hooked: "I think it's going to be a terrific way to sell more personal computers. People who use them in the hotel will want one of their own."
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80 Micro, September 1983 • 301
Remembering the Model I

It's an insult if an IBM PC owner calls your TRS-80 a "museum piece," but it's all right if the Smithsonian Institution does. The National Museum of American History in Washington, DC owns over 100 computers; of the fewer than 12 micros in the collection, one is a vintage Model I.

According to InfoWorld reporter Kathy Chin, the Smithsonian's panel "chooses items that it judges to be historical firsts or that represent the state of the art in microcomputing." The Model I, "one of the early popular computers," shares exhibit space with an Imsai 8080 ("one of the well-known homemade models") and the price-breaking Timex-Sinclair 1000.

Other classic-computer organizations seem to be following the museum's lead, pioneering in a field where machines from 1978 have almost antique status. The Blacksburg Group of Blacksburg, VA, which preserves older micros as a sideline to producing computer books, has a Model I in its collection. And Jamie Parker, exhibit coordinator of The Computer Museum of Marlborough, MA, says her institution is looking for a Model I donor.

InfoWorld's Paul Freiberger and John C. Dvorak, lumping early Tandy micros with Exidy Sorcerers and Sol-20s in an article titled "Obsolete Computers," say "Many tight-fisted users consider the TRS-80 Model I to be a workhorse. They have found ways to upgrade to double-density disks and add uppercase and lowercase, and they manage to keep the machines running.... With about 250,000 old Model Is out there, it will be a while before they are truly obsolete."

"The big plus for the old Model I," Freiberger and Dvorak claim, "was the detachable keyboard, which was ahead of its time. It allows users to sit back in their easy chairs and type away, without having to worry about the back strain that comes from hunching over an immobile terminal keyboard. Many TRS-80 fanatics still wonder why Radio Shack puts an old-fashioned immobile keyboard on its newer machines."

Radio Shack's vice president for computer merchandising, Jon Shirley, gave one answer to that question at a Boston Computer Society meeting in May (see 80 Micro, August 1983, p. 280). The TRS-80, Shirley reminded the audience, is extremely popular with schools; teachers and administrators prefer the one-piece design, he said, as it means fewer pieces to lose and cables to tangle.

Breakdowns and shakeups

- Enter Date (MM/DD/YY): MASSACHUSETTS' new auto emission and safety inspection campaign stopped abruptly on June 1. While service stations' 1,205 Hamilton Test Systems computers worked without a hitch during their first two months on the job, the machines' chips refused to accept "June" in their programs.

Repair crews hurried to fix the June bugs; some computers were temporarily reprogrammed and told it was December. Meanwhile, the state considered extending the monthly inspection period, and motorists, like uninsured cars, fumed.

- With heavy competition in the video game market, the model 400 and 800 computers showing their age, and the 1200XL crushed by the less expensive Commodore 64, ATARI has regrouped. Warner Communications has merged its troubled subsidiary's computer and game divisions, dropped the three unsuccessful micros, and introduced four new models: the 600XL, 800XL, 1400XL, and disk-equipped 1450XLD. The firm has also hired Alan Alda to do commercials.

Atari watchers expected the consolidation to mean a loss of several hundred jobs at the firm's Sunnyvale, CA headquarters. A possible upturn might come in early 1984, when Warner's Atariel line begins shipment of computer telephone devices.
While Atari's slipping, IBM is in the CHIPS. In fact, so many Blue Imitators want to use IBM's 8088s and 8086s with their PC clones that there's a five-month-plus waiting list. One supplier is said to have turned down a spring order for 400,000 of the 16-bit CPUs because it had already sold its entire 1983 production.

Dave House, vice president of Intel's microprocessor division, told the Wall Street Journal, "The market's going crazy with buying. It's not healthy and it cannot last. What's scary is that there are at least 30 customers out there who each are buying microprocessors as if they intend to capture 30 percent of IBM's market."

Electronic Arts, a San Mateo, CA publisher of Apple, Atari, and Commodore programs, is leading the way in CELEBRITY software. Cartoonist Gahan Wilson is designing graphic games for the firm, and NBA stars Larry Bird and Julius Erving have donated their strategies and images to basketball games.

"Desktop USE is not keeping pace with desktop purchases," says the Yankee Group, a Boston-based market survey firm. In two surveys, the group found that more than two-thirds of corporate managers used their micros less than half an hour per day.

To keep deserts from gathering dust, the surveyors call for integrated, easy-to-use software, machines designed for managers rather than professionals, and more emphasis on communications (data base access, file compatibility, and electronic mail). "Function, rather than price, will fuel market growth," they conclude.

Next month, for a change, End Bytes will not mention new computer MAGAZINES. This month's crop includes Personal and Professional, for DEC desktop users; Microkids, a bimonthly for 10- to 16-year-old beepers from Warner Software; Teaching, Learning, Computing, a computer resource for educators; and Personal Robotics News, a monthly newsletter for the infant home-and-industry industry.

A new toll-free number lets users express their opinions or ask questions about the health effects of CRT TERMINALS (see 80 Micro, July 1983, p. 338). The number, 800-521-VDTS (in Ohio, 800-522-VDTS), was created by 9 to 5, a national association of clerical workers, in the wake of the Massachusetts legislature's introduction of a bill to regulate CRT installation.

The Massachusetts bill would require six month's advance notice of CRT installation, employer-paid annual eye exams, "ergonomically correct" or adjustable equipment, and regular work breaks for CRT operators.

Last month, this column mentioned Epson's sponsorship of the Miss World pageant in the U.K. Here in the States, the firm projects a more serious image. The latest product from Epson America Inc. is a $150,000 LIMOUSINE.

As reported in Computerworld, Epson commissioned a Beverly Hills, CA remodeler to add 52 inches to an already lengthy Mercedes 450 SEL, outfitting the interior with QX-10 and IX-20 computers and a printer—as well as TV, video cassette recorder, telephone, bar, electric clothes steamer, manicure set, nail dryer, and shaver. It seems the average corporate executive wastes about 40 hours a month traveling by car, out of reach of office messages and stock reports; Epson's auto keeps the wheels of business turning.
Caimans and condos

What was that?” I asked, veering to avoid some sort of animal in our path.

“I don’t know, but they’re all over the place,” Mad Max peered fearfully out the window. “Reptiles. Lizards.”

“Stop a minute,” Mercedes ordered. I did so, thinking she meant to wait while the things crossed the road. Instead, she popped out the door and came back with one.

“It’s a crocodile!” shrieked Max, climbing onto the PMC for safety.

“No, it’s an alligator,” I reassured him. Max stayed perched.

“It’s a caiman,” Mercedes said, stroking the thing. “Lots of them here in Florida. Isn’t it cute?”

“Cute?” We were more shocked at the caiman’s use of the word than its application to the toothy creature.

“Yeah. I think he likes me,” she beamed, oblivious to Max’s protests of being allergic to amphibians.

Speaking of Alien Defense, what do you think of this?” I asked, trying to steer the conversation back to our alleged topic at hand. I handed Max a letter from Ken Corless of Pomona, NY, in which he claimed an astronomical score of 13,485,500.

“My God!” Max screamed.

“The man’s obviously made a deal with the underworld,” said Mercedes.

“The Devil and Ken Corless.”

“But wait,” said Max. “Listen to this: ‘It seems that if your last humanoid is being picked up and you shoot him, the program does not recognize that you should go to deep space. Instead, it thinks you have 256 humanoids left that cannot be picked up. As a result, each completed wave awards 25,600 bonus points.’”

“Geez,” said Mercedes, reading over Max’s shoulder. “He played for 16 hours, and had over 100 ships and bombs left!”

“He says he got 1,111,100 the legitimate way,” Max continued. “There’s a trick to that, too. You go into deep space, shoot open a pod, and hyperspace. Then you accelerate slowly until you see swarmer right on your tail. Next, you shoot another pod and hyperspace again. Now you’ve got two pods’ worth of swarmer half a screen behind. Any other pods you shoot will not release swarmer.”

“Nothing’s sacred anymore,” Mercedes said. “Next thing you know, people’ll be getting 10 million in Lunar Lander.”

After two more hours on Route 95, we finally found a restaurant on our side of the road. Two salesmen selling time-sharing vacations joined us.

“To be frank, honest, and candid, some of these scores are getting ridiculous,” I said as I wolfed down my smoked swordfish. “What do you say we kick a few of these games off the Big Board?”

“Let’s talk condos,” Ed, one of the salesmen, said.

“What do you suppose caiman meat tastes like?” Max asked into his Boffo Burger Platter.

“That’s disgusting,” said Mercedes.

“It probably tastes like chicken,” Fred, the other salesman, said.

“Everything tastes like chicken to you,” Ed replied. “How about a little bungalow on Sanibel Island?”

“Take Galaxy Invasion, for instance,” I continued. “It’s no longer a game—it’s an endurance test, a marathon. I’d just as soon go sit on a flagpole for three weeks.”

“Get your fingers out of my fries,” Max growled at Fred.

“Fred doesn’t eat much these days,” said Ed. “You know, I’ve got some nice, clean mobile homes in Clearwater.”

“And Bounceoids,” I went on. “We’ve got people who have to stop playing because they can’t see the screen through all the extra ships.”

“We already have a mobile home,” Mercedes said sourly.

“Where’s Sanibel Island?” Max asked.

“Hey, you said we could go to the Epcot Center!” Mercedes said.

“Life is short, kid,” said Ed. “You gotta think of the future.”

“So then it’s decided,” I said. “Galaxy Invasion and Bounceoids are off the board. And Alien Defense. And Armored Patrol. And Liberator, and Skyscraper.”

“Don’t call me ‘kid,’” Mercedes retorted, “unless you want this sundae down your shirt.”

“Feisty, isn’t she?” Fred said.

“She has her days,” I sighed.

“Now, this is science,” I said as we drove toward the gleaming sphere that marked the Epcot Center. “This’ll be educational.”

“I can’t wait to see what they’ve done with epiphytes,” said Mercedes from under a seat, where she was playing with the caiman.

“I’m going on all the rides, too,” Max said agreeably.

As we approached the entrance, a dozen or so more time-sharing salesmen emerged from the bushes. They walked stiffly toward us, pale, gaunt, arms ghoulishly outstretched. I turned my eyes at the horrible sight.

“When there’s no more room in hell,” Max intoned, “the salesmen shall walk the earth.”

I downshifted through the horde, and prepared to enter the Experimental Prototype Community of Tomorrow.

“Where’s Max?” asked Mercedes as we left the Kraft exhibition. “I kept looking for him while you were up on stage dancing with the animated food.”

“I don’t know,” I said with my souvenir hat pulled over my eyes, embarrassed at having mistaken the show for a flashback. “He must have found an
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"Let's get some of these new high scores out of the way," I said as we ate supper. We seemed to be doing a lot of eating lately, which suited Max fine.

"Well, Kyle Hoyt, who lives right around here, sent a score for Dig Out," Mercedes said. "And he sent in high scores for Gauntlet, Missile Attack, and Outhouse.

"Thinks he's hot stuff, doesn't he?" Max grumbled.

"Now, now," Mercedes said. "You've still got the high score in Bable Terror."

Then there was Kevin Josephson of Chilliwack, B.C., who reported six high scores—in Rear Guard, Panik, Space Castle, Frogger, Crazy Painter, and Stellar Escort. Max was suspicious of all those nice round numbers, but we like to give people the benefit of the doubt.

"I'm tired," said Mercedes. "Let's get out of this place."

"Where to?" I asked.

"Well..." said Max, as he rummaged through his various contracts. "If we hustle down to Ft. Meyers, we can still catch a couple of days in our cabana. Soak in some rays, do some shelling, set up the Cafe..."

"OK," I said. "But then we've got to head north. It's too humid down here for anything but caimans."

*****

The salesmen were still milling about when we left. They'd overturned one car, and had an elderly couple in a Winnebago under siege.
"Don't look, Mercedes," I said. "This isn't something someone your age should see."

Naturally, she ignored my advice, and ogled the horrifying carnage.

"So what?" she gulped. "Doesn't bother me.

But she was strangely silent after that, and woke up with nightmares in the wee hours of the next morning.

"I wish she hadn't seen that," I said to Max later.

"The minions of reality stalk the borders of every fantasy land," Max said philosophically. "She's going to grow up sooner or later."

Still, the incident bothered me. I hope she never has to buy a used car.
The Big Board

<table>
<thead>
<tr>
<th>Game</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Panic</td>
<td>38,120</td>
</tr>
<tr>
<td>Attack Force</td>
<td>1,306,810</td>
</tr>
<tr>
<td>Bable Terror</td>
<td>7,858</td>
</tr>
<tr>
<td>Barricades</td>
<td>17,520</td>
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<tr>
<td>Caterpillar</td>
<td>362,883</td>
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<tr>
<td>Chicken</td>
<td>8,922</td>
</tr>
<tr>
<td>Cosmic Fighter</td>
<td>581,280</td>
</tr>
<tr>
<td>Crazy Painter</td>
<td>250,000</td>
</tr>
<tr>
<td>Cyborg</td>
<td>99,960</td>
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<tr>
<td>Defense Command</td>
<td>126,170</td>
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<tr>
<td>Demon Seed</td>
<td>94,210</td>
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<tr>
<td>Dig Out</td>
<td>265,900</td>
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<tr>
<td>Dungeon Escape</td>
<td>2,028</td>
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<tr>
<td>Eliminator</td>
<td>474,950</td>
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<tr>
<td>Flying Saucers</td>
<td>1,786</td>
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<tr>
<td>Fortress</td>
<td>187,600</td>
</tr>
<tr>
<td>Frogger</td>
<td>100,000</td>
</tr>
<tr>
<td>Galaxy Invasion</td>
<td>1,113,600</td>
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<tr>
<td>Gauntlet</td>
<td>52,570</td>
</tr>
<tr>
<td>Ghost Hunter</td>
<td>41,190</td>
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<tr>
<td>Insect Frenzy</td>
<td>520,610</td>
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<tr>
<td>Jovian</td>
<td>133,320</td>
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<tr>
<td>Laserball</td>
<td>72,530</td>
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<td>Laser Defense</td>
<td>1,000,000</td>
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<tr>
<td>Leaper</td>
<td>35,410</td>
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<tr>
<td>Lunar Lander</td>
<td>9,600</td>
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<tr>
<td>Mad Mines</td>
<td>10,420</td>
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<tr>
<td>Martian Patrol</td>
<td>17,740</td>
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<tr>
<td>Meteor Mission</td>
<td>119,750</td>
</tr>
<tr>
<td>Missile Attack</td>
<td>42,730</td>
</tr>
</tbody>
</table>

Monster Invaders 32,620 Troy Scerpansky, Uncasville, CT
Olympic Decathlon 9,598 Matt Dossay, Osala, FL
Outhouse 1,000,000 Kyle Hoyt, Titusville, FL
Paddle Pinball 3,980,310 Brian Gehrich, Quincy, IL
Panik 48,000 Kevin Josephson, Chillick, B.C.
Penetrator 345,510 George Heineman, Framingham, MA
Planetoids 56,450 Carl Pflanzar, Gillette, NJ
Rear Guard 73,290 Kevin Josephson, Chillick, B.C.
Robot Attack 143,250 Mark Fettig, Northville, MI
Scarfman 679,490 David Heyman, Conway, PA
Sea Dragon 552,890* John Hope, Kingston, Ont.
Space Castle 52,700 Kevin Josephson, Chillick, B.C.
Space Intruders 14,080 Ron Johnston, Emporia, KS
Space Warp (Level 8) 261 Jer McLanahan, New Canaan, CT
Stellar Escort 625,000 Kevin Josephson, Chillick, B.C.
Strike Force 433,900 C. Athanas & N. Kincad, Topshem, ME
Super Nova 2,138,710 Mark Fettig, Northville, MI
Swamp Wars 59,130 Farhad Abrishami, Silver Spring, MD
Temple of Apsheq 390 Carl Pflanzar, Gillette, NJ
Time Runner 89,479 Mad Max
Venture 29,440 Farhad Abrishami, Silver Spring, MD
Voyager I 833 Farhad Abrishami, Silver Spring, MD
Weird 17,120 Chris Athanas, Topshem, ME
Wild West 15,400 Gorman Miller, Titusville, FL

* Expert mode: 339,000 (David Smith, Kingwood, TX).

Gamer’s Cafe readers are invited to submit their high scores, preferably with screen photos, for these and other Model I/III/IV games. Sorry, but we are no longer accepting entries for Color Computer games and, due to known bugs or ridiculous high scores, the following: Alien Defense, Armored Patrol, Bounceoids, Galaxy Invasion, Liberator, and Skyscraper.

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Send any questions or problems dealing with any area of TRS-80 microcomputing to Feedback Loop, 80 Micro, 80 Pine St., Peterborough, NH 03458.

As the author of the Weather Forecast program (January 1983, p. 400), let me state that contrary to the "discovered error" in the May Debug (p. 26), the program works correctly. The error was in how Rea Plowman used the program.

First, some pertinent information about the program: It is important that the user input the barometric pressure value obtained at or near the location of the forecast, and that it is measured by a barometer adjusted to indicate the barometric pressure at sea level. Using a non-adjusted barometer, regardless of how expensive or accurate, results in inaccurate forecasts.

To properly determine the correct values to enter in the program follow these steps:

- Lightly tap the barometer and copy down the value indicated.
- Repeat this step an hour later.
- Compare the readings. If they differ by .05 or more the change is considered rapid. Less is considered slow and no change should be recorded.
- Wind direction should be recorded at the time of the second barometer reading, and is always counted as the direction the wind is coming from, not the direction it is blowing toward.
- Enter these values into the program and record the resulting forecast.

As you can see, the short, simple, and user-friendly program isn’t really that simple. Use of this program by those uninformed in the fundamentals of using a barometer and determining wind direction can result in incorrect forecasts.

A.P. Kenosha, WI

Thanks for the update; I appreciate your taking the time to clarify the proper use of your program.

I have answers for two readers’ ques-
tions posed in the April 1983 issue.

First, for D.F. in Columbus (p. 380), here’s how to use SuperScritpsit with NEWDOS 2.0:

- Load SuperZap and select the DFS function.
- Answer the file prompt with SCRIP-SIT/CMD.
- Type in F;CD,90,52.
- After the cursor finds this byte sequence, modify it to 00,00,00.
- SuperScritpsit now works with NEWDOS 2.0, except for the display directory function. This isn’t a problem since you can now access MINIDOS.

Second, B.H. in Brazil (p. 396), can be assured that the CP-500 is almost an exact duplicate of the Model III. The only differences I can find are: The main circuit board is mounted horizontally without any RFI shielding, the power supply is sturdier and incorporates a cooling fan, and there’s a resident machine-language monitor in ROM that is invoked via the break and reset keys. I’ve been using Radio Shack software extensively on this computer for the last six months and have had no problems.

D.C.L.
Sao Paulo, Brazil

Thanks for the information.

The correct answer to D.R.’s question (March 1983, p. 414) is this: Find the start, end, and execution addresses for machine-language programs, CLOADM the program, but don’t execute it. After it’s loaded, type

PRINT 256*PEEK(487) + PEEK(488)

to get the start address. Then type

PRINT 256*PEEK(126) + PEEK(127) - 1

to get the end address. And finally, type

PRINT 256*PEEK(157) + PEEK(158)

for the execution address. Now you can type

CSAVEM "NAME", START, END, EXEC.

M.R.
Englishtown, NJ

B.B.
Smithtown, NY

Boy, am I embarrassed about missing that one.

I’m responding to your question to those who’ve used EDTASM 1.0 and 1.1 (April 1983, p. 394). I first used EDTASM 1.0, but it only saves 200 lines of source code, as I discovered when I typed in a 400-line program.

I exchanged it for version 1.1 and have had no problems using it for the last 10 months except for an occasional bad load due to the use of uncertified tapes.

W.B.
Osceola, PA

I’ve encountered problems with EDTASM on my Model I. Everything works fine until it’s time to reload the object code back into the EDTASM buffer to edit the program.

A service center told me my problem was that the code recorded after assembling wasn’t object code, but was instead Assembly code. The Write command is used to store object code on tape.

J.S.
Thornton, CO

I have tried to use EDTASM 1.0 on my Model III, but it won’t write system tapes. Any attempt to do so bombs the program. The manager of Radio Shack refunded my money and sent the program back to Fort Worth. To say the least, I’m furious with Radio Shack for their lack of interest in the needs of their computer owners.

R.B.
Nepean, Ontario
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**DEALER INQUIRIES WELCOME!**
I believe I know the source of A.L.'s problem (April 1983, p. 394), although in my case the problem usually occurred only when I had a long object code file to write to tape.

When writing the header record to tape and writing the first data record, EDTASM goes off and does some sort of calculation that takes almost two seconds. The result is a long inter-record gap between the first two records. This probably doesn't bother most TRS-80s, but in my old Model I on the CTR-80 the inter-record gap causes a problem. It appears that when the next pulse comes along after the gap, a circuit starts ringing. The result is that the first byte of the new record is garbled so that the computer doesn't recognize the record and hangs up.

I solved the problem two ways. First, I wrote a short loader program that ignores, but reports, errors in the first byte of a data record, which should be 3CH. I've found that many once unreadable tapes are now OK. The second solution was to move up to disk drives.

J.V. McLean, VA

It seems that there are several problems with EDTASM 1.0 and 1.1. First, version 1.0 can't write more than 200 lines of source code to tape, and second, there are problems with object and source code files. The only solution for the first problem is to get version 2.0. The second problem is more difficult.

Make sure you're using EDTASM properly. There are two ways to save a file to tape. One is as a source code program, the other is as an object code program. A source code program uses the Write command and stores on tape a duplicate of your file in memory with all labels, line numbers, comments, and so forth exactly as stored in memory. If you want to add or edit the program you have to reload the source file. The source code can't be loaded into Basic with the System command. Source code is only to be used for creating object code and editing.

The object code file is the actual machine-code instructions of your program. This file is stored on tape after you issue the Assemble command. If any errors are discovered during assembly, you can still save the file to tape, but it bombs if you try to use it. EDTASM does not load object code programs into memory; it can only load

source code files. If you discover a bug in your object code program, you must use the source code file to make any changes to the program, and then reassemble and save the new object code program.

Finally, the overlap inter-record gap is a problem which I don't know how to solve, except to do as J.V. did and write your own loader program. For convenience, you may want to write a program that loads and then resaves the program without the overlap gap between records. Does anyone have a suggestion on how to handle this problem?

I recently upgraded my Model I to disk drives, but I bought two new slimline TEAK 40-track drives. After several months of searching before buying the drives, I decided to start with TRS DOS. The Radio Shack stores were willing to sell me a disk and manual for $35 ($15 for the disk, $20 for the manual), but I found a source, Total Access (P.O. Box 3002, Richardson, TX 75080, 214-458-1966), that was willing to sell both for only $20. When I called them, they wanted to know what drives I had so they could patch TRS DOS accordingly. So, at no extra charge, I received a 40-track version of TRS DOS 2.3!

I'm just beginning to learn disk operations, but I haven't had any problems with their patched version of TRS DOS 2.3.

J.M. Kettering, OH

What a coincidence! I was just finishing a program to patch TRS DOS 2.3 for 40-track operation when I read the letter from K.S. of Pittsburgh (May 1983, p. 381). I'm calling it VCT540 and selling it for $32.50. Anyone interested in converting from 35-track to 40-track operation can order it from Mysoft Computer Software, P.O. Box 417, Arroyo Grande, CA 93420, 805-481-3992.

L.P. Arroyo Grande, CA

In response to K.S.'s question (May 1983, p. 381) about converting TRS DOS 2.3 to 40-track operation, Percom (211 N. Kirby, Garland, TX 75042) sells a program called Patchpak #4 which does this, but it also makes some patches to the operating system that makes it incompatible with your drives.

I converted TRS DOS 2.3 without making the additional changes to the operating system. Unless all the changes made by Patchpak are suitable and you have a two-drive system available for the conversion process, I suggest you contact me for a copy of my 40-track TRS DOS.

M.B. Munhall, PA

I have a patch so that you can operate TRS DOS 2.3 with 40-track drives. If you'll forward my name and address to K.S., I'll be happy to provide him with the patch.

W.F. Ft. Knox, KY

W.F., it's done! And thanks to everyone else kind enough to help K.S. out of his bind.

I own a Model I with the two-chip ROM set. With the following program:

```
10 AS = INKEY$:IFA$ = """" THEN0ELSE PRINTASC(A$):GOTO10
```

it is possible to print out the ASCII codes for every key pressed except the shift-down arrow keys. Why doesn't the shift-down arrow return a value?

C.G. Munich, West Germany

The Model I uses the shift-down arrow as a control key combination, since it doesn't have a separate control key. A control key doesn't have an ASCII value.

When you press the shift-down arrow keys, ROM interprets this as meaning that you want to type a control key (ASCII value from 1 to 26, keyed by pressing the appropriate letter of the alphabet, ASCII value 65–91). Thus, it waits for the alphabetic keystroke and subtracts 64 from it to get the control code value. In other words, if you press the shift-down arrow keys followed by the M key, the ROM returns the value 13 to your program.

I have a Model I Level II with an LNW Expansion Interface (EI) and two disk drives. I've had three problems: the CPU to EI cable, the terminating resistors, or an easily corrected problem with the FD1771B chip.

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Can they be replaced? Do I have to use Model III ROMs?  
G.M. Kirkland, WA

It sounds like a problem that occurred with the earlier versions of the Model I ROMs. When Level II was introduced, it had a few bugs. Radio Shack went through several revisions before settling on the current two-chip ROM set. One of the versions, primarily associated with the revision G CPU board, had a flaw in the Read Data sequence. To correct this flaw, you have to issue the command POKE 16553, 255 before attempting to use the Read and Data statements.

Try doing this first. If it solves the problem, you don’t have to worry about replacing the ROMs. If it doesn’t, get a memory test program from your local computer repair center and have it check out the ROMs. The checksums given by the program should match the checksums listed for your ROM chips. If they don’t match, you have to replace the ROMs.

The Model III ROM won’t work in a Model I, so you needn’t worry about that. However, I don’t know how compatible the two-chip ROM set is with the Exatron Stringy Floppy. So call Exatron and ask them if it turns out that your ROMs need to be replaced.

I’ve been trying to contact The Bottom Shelf in Decatur, GA, but receive no response to my letters and phone calls. What’s up?  
G.P. Glendale, WI

TBS went out of business over a year ago. I can’t find any leads on the people who ran it. Sorry!

I’m writing in response to J.M.’s letter in the May 1983 issue (p. 384), and to anyone else having trouble loading the Checkers 80 program. After failing to get a successful load, I listened to the recording for faded tape, static, or hiss. What I found was a recording at a noticeably different frequency from other loadable tapes.

My solution is to physically alter the CTR-80 recorder to play at a different speed, which results in a successful load. To alter your tape recorder you’ll need a small (30-watt) soldering iron, a Phillips screwdriver, a voltmeter, two feet of insulated small gauge wire (#22 to #30) and a 50-ohm rheostat. You may also need a 6-volt lantern battery.

First, listen to the tape and compare it with another loadable tape. Determine if the recording is either too high or low a frequency. If it’s too low you’ll need the lantern battery.

Second, unplug all plugs and remove the batteries.

Third, remove the back of the tape recorder (two screws up front and one in the battery compartment), being careful not to break the battery compartment wires.

Next, find the cable leading from the motor (mine was brown) and follow it to where it’s soldered to the circuit board. You should see one insulated wire and one uninsulated braided wire coming from the cable.

Now put the batteries in and press the play button. Use the voltmeter to find the positive end of the motor, press stop, and remove the batteries.

Remove the positive wire from the motor, and solder an 8-inch length of wire to the motor. Solder another 8-inch wire to the circuit board at the end of the negative lead and solder the center terminal of the rheostat to the positive wire.

If the frequency is too high, solder the other wire to either of the other two rheostat terminals, and skip the following instructions. If the frequency is too low, solder a short piece of wire to one of the other two rheostat terminals and attach the other to the positive terminal of the recorder. Connect the wire you soldered to the circuit board to the negative terminal of the battery. The motor should start turning. If it doesn’t, double check your wiring. Remove the wire from the battery.

Wrap tape around the soldered wires and put the tape recorder back together, but don’t put the screws back (reattach the wire to the lantern battery if you used it).

Put the cassette in the recorder and adjust the rheostat until it sounds right. When it does, rewind the tape and try to load it into the computer. Keep trying until it loads.

If you have a machine-language monitor, load and use it to load Checkers 80. With Checkers 80 in memory use the monitor to find the start, end, and execution addresses of the program, and then save it (after removing...
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your modifications) to a new tape. The new tape should load correctly every time.

P.S.
Oregon, WI

Sounds like an awful lot of work. Rather than do all that, try what the next fellow did. If this doesn't work, then try P.S.'s solution.

I also had a problem loading Checkers 80, as well as Invasion Force, on my Model III. It seems, after listening to the tapes, that these programs were recorded at a slightly different speed than the other Radio Shack tapes. On the Model I it doesn't matter, but the Model III is more finicky and refuses to load the tapes.

My solution was to connect a wire-wound potentiometer across the remote jack on the recorder to slow the motor speed enough to read the program. I used a 5,000-ohm control with a patch cord ending in a mini-plug. Just wire one of the patch cord leads to the center and the other to one of the end terminals of the potentiometer. A few attempts may be necessary.

B.P.
Borden, Ontario

Your suggestion should work quite well for those people with tapes recorded at too high a frequency. Thanks.

M.G. of Parma Heights (May 1983, p. 388) wants to connect a Sperry-Remington 101 to a Model I. The 101 is an IBM Selectric in disguise, and the only way to use it is to add solenoids and circuitry. Escon makes a special version of their kit to convert the SR101. Since the kit costs about $500, most people would be better off with an Epson or DMP printer.

For an off-the-cuff conversion of hexadecimal numbers, Basic is convenient. Just enter

\[
A = 10; B = 11; C = 12; D = 13; E = 14; F = 15
\]

Then, to convert 6E, type 6*16+E. Of course, after doing this many times you'll eventually memorize hexadecimal notation and won't need the table. In the meantime, however, it's useful.

D.B.
Gainesville, FL

Thanks for the help.

This concerns the printer functions of the Radio Shack Inventory Control System (February 1983, p. 408). Although your method may work, Radio Shack published an article concerning that problem. It's the result of the design of their earlier line printers, and how a form feed was handled. On all current copies of TRSDOS, Radio Shack includes a utility called LPC/CMD which corrects this error. If you don't have LPC/CMD, you can get it from Radio Shack Computer Centers free of charge.

Even though this article was published in the Tandy Newsletter in 1981, they should include a note about this problem in their software packages sold today.

D.G.
Junction City, KS

You're right, LPC/CMD does correct the problem for people with older, or non-Radio Shack printers.

I have a Model I Level II 16K computer. I wanted to buy an Expansion Interface, but I now learn that they aren't available. Do you know where I can get one, or if someone else makes one that works on the Model I?

H.R.
Elkhart, IN

Rider Radio (Peterborough, NH 03458, 603-924-3911) still has a few units left. They are new 32K units with RS-232 boards, and are fully covered by Radio Shack's warranty. They cost $550, shipping included.

LNW sells an expansion interface kit for the Model I. You assemble it yourself, putting on the components for the features you want, when you want them. Holmes Engineering also sells an expansion interface, as does Micro-Design. All three companies advertise in 80 Micro, so check their advertisements for features and prices.

I'm having serious problems with my Model III. It starts up with a high-pitched squeal from inside, similar to the sound a TV makes. After a few moments the image on the screen flickers and moves as if a strong mag-

netic field is present. What's happening, and how can I fix it myself?

B.G.P.
Aston, PA

Your squealing problem is in the picture tube, just like a TV. The insulation on the high voltage line to the tube is breaking down, causing the squealing noise. After a period of time a static charge builds up on the tube and generates a magnetic field that distorts the picture. This is a potentially dangerous situation. What you need to do is to get some "high voltage dope" from a TV repair shop and spread it on the high voltage line to your picture tube. The dope re-insulates the line, eliminates the leakage, and fixes your problem. If the repair shop gives you static about the dope, just explain the problem.

If the dope doesn't cure your problem, you'll have to take it to a repair shop. Since the problem is with the picture tube, just about any TV repair shop can do the job for you, and probably cheaper than Radio Shack.

I want to add disk drives to my Model III, and want to know what's the best configuration, 40- or 80-track? single- or dual-headed? single- or double-density?

Second, in what format are most disk programs sold (what track count, single- or double-density, etc.)?

Third, what's the best DOS?

Fourth, what brand of drive should I buy? And from whom should I get it? Also, who has the best disks?

Next, what are the differences between Level II and Disk Basic?

My friend and I have been exchanging programs we write. He has a single-density drive. If I get a double-density drive, will we still be able to exchange programs?

And finally, what's a locked disk? Is it one you can't copy?

P.H.
APO San Francisco, CA

I like short, simple questions like yours.

First, for drive zero you should get a double-density 40-track unit. This keeps you compatible with most disk-based Model III software, which is sold in that format. Many game programs are self-loading and won't boot in a drive other
of the hill!  It's a jungle out there, but the latest news on the Color Computer grapevine is that, above the surging mists of confusion, more and more people are discovering the Rainbow. Now in its third year, the Rainbow has become the standard by which all other Color Computer magazines are judged. It towers above the crowd, now offering more than 300 pages each month, including more than two dozen type-in and cut-and-paste listings, a host of articles, and in excess of 20 hardware and software product reviews.

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than a 40-track double-density drive. As third and fourth drives, 80-track drives are fine but you'll have difficulties using them efficiently as drives zero and 1.

Whether the drive is single- or double-sided is a personal choice you'll have to make. From a software point of view, it doesn't matter. The primary advantage is that one double-sided drive is cheaper than two single-sided drives, and takes up less room. The disadvantage is that a double-sided drive costs more than a single-sided drive.

TRS/10 is the simplest DOS to use, but is unreliable as compared with the other DOSes on the market. I prefer MULTIDOS Basic because it reads the disks of almost any other DOS. Very handy. It also has a super Basic for program writers, and maintains the most compatibility, in command syntax, with TRS/10 2.3. In addition, it is one of the easiest systems to learn. My next choice is DOSPLUS, which has a lot of bells and whistles added, making it very versatile and fairly easy to use. NEWDOS 80 and LDOS are designed for professionals, and require hard study before you can begin to use them effectively.

Since you have a Model III, you'll need a drive-zero kit. The drive-zero kit contains the disk controller circuitry, mounting hardware, and power supply for the drives. You must have it before you can use drives. Your next drive, drive 1, won't need a case since it mounts inside the Model III case. You also should not need a power supply, since most drive-zero kit power supplies can power two drives. All you'll need is a bare drive. Which company you buy from is up to you. Your criteria should cover price, motor speed, stepping speed (the faster the better), and your proximity to a repair center. If you get a non-Tandy drive and there isn't a computer repair center close by, you'll have real problems if your drive needs work in the future. You may end up having to remove it from your computer and sending it to the drive manufacturer. In that case, buying a Tandy drive makes more sense since you can just take it to any Radio Shack store and have them send it to their repair center for you.

The primary differences between Disk and non-Disk/Basic are in the disk I/O commands and in a few miscellaneous commands. The real power of Disk/Basic depends on which DOS you get, since they all offer different features.

Exchanging programs with your friend will depend on your DOS. LDOS, NEWDOS 80, MULTIDOS, and DOSPLUS are all capable of reading Model I disks in a Model III, especially if the disk was formatted by their Model I versions. Most of them, if the Model I has a double-density board, read Model III disks in Model I systems, but they require that both computers use the same operating system (Model I MULTIDOS reads Model III MULTIDOS disks, but only if the Model I has a double-density board). For more information on their transfer capabilities, call or write the manufacturers.

Finally, there are software techniques...
that you lock the data on a disk and prevent it from being backed up or copied. I consider locked disks to be a "caveat emptor," buyer beware! Some software is worth having, even if you can't make back-up copies. You have to decide whether it's worth it.

I have a Model I with one disk drive. I need a disk directory program and would appreciate some advice. I have mostly TRSDOS disks, but also a few NEWDOS. Do any of the directory programs let you change the disk's name?

L.S.
Worcester, MA

I can't adequately answer your question since I don't use directory programs myself. I do know, however, that there are several that allow you to read non-TRSDOS disks and also let you change the disk name. You should check the advertisements in 80 Micro. They'll give you more information about the directory programs. If you have any back issues of 80 Micro, check the review section. You may find a review that answers your question.

I plan to transfer some applications programs I've written in Basic on my Model III to an IBM PC. The IBM uses Microsoft Basic, as does the Model III. Both can save programs as ASCII files. The only differences I can see in the dialects are that IBM's Basic has a few enhancements that I don't need for my programs and the IBM doesn't have a PRINT@ command.

My programs don't use any machine-language routines, and use only three or four PEEKs and POKEs. Can I save my programs in ASCII format on the Model III and transfer them to the IBM PC via the RS-232 port? If so, what software do I need?

M.W.
Edison, NJ

Yes, you can make the transfer. For the Model III you'll need a terminal program such as Omniterm ($95 from Lindbergh Systems, 41 Fairhill Road, Holden, MA 01520, 617-852-0233). Since I don't have an IBM (yet), I can't recommend terminal software, but here are three to start you off: Westico (25 Van Zant St., Norwalk, CT 06855, 203-853-6880, $175), Microcom (1400A Providence Hwy., Northwood, MA 01262, under $100), and Saturn Computing Group (147 West 26th St., New York, NY 10001, 212-675-7753, no price given). Others are listed in PC World (555 De Haro St., San Francisco, CA 94107).

You shouldn't have any trouble transferring the programs as long as they're in ASCII format. I've had no trouble doing this from my Model I to other computers such as the Apple, Color Computer, Model III, and so on.

I recently purchased a new DMP-500. It has many improvements over my LP V, and I had hoped the correspondence type font would allow me to write...
office notes without having to use the DW11 printer in another office. I didn't expect letter quality, but I was shocked to discover that the lowercase Y in the correspondence mode ruins the entire type font. The Y is offset vertically from the other letters in the font. It almost looks like a capital letter if you use it in words like “you” or “your.” Since I need to print letters with non-slashed zeros (which is available only in the correspondence type font), neither DMP-500 type font is acceptable for business purposes. If you have any suggestions for correcting this problem, please let me know. I gather that the character-generator chip would have to be reprogrammed to correct this problem.

C.H. Newport, RI

I'm writing to let you know that Tandy has released three new boards for the Color Computer: an MC board, a TDP board, and a board without any ID at all. I have the last one. The board layout is different from the C, D, and E boards. My machine is a factory-installed 32K model with 64K chips. Is this normal? All four Berg jumpers say 16K/64K. Also, the technical manual (26-3193) doesn't apply to my board. Is there a new one?

L.C. Folsom, CA

Yes, it's normal for 32K machines to use 64K chips. You have the latest Color Computer board, designed to convert to 64K operation with the proper software. Radio Shack is currently working on a new Extended Basic ROM chip to let you access the full 64K RAM while in Basic. I've been told that the ROM will respond to the prompt PRINTMEM with 60,383. The remaining 4K is reserved for page-zero variables, text screen, and high memory port addresses (RS-323, SAM chip, and so on). When we'll see this new software is guesswork.

By the way, high-level management at Radio Shack vehemently denies that the Color Computer is going to be dropped. The new MC-10, according to an internal memo sent to store managers, is not a replacement unit but a new low-end computer designed to compete with the Timex-Sinclair Spectrum.

My Radio Shack technician tells me that the only manual available is the one you listed. Even though he has a new 64K board in his shop, he doesn't have any technical information on it yet. When the updates are available you'll be able to get them through National Parts (900 East Northside Drive, Fort Worth, TX 76102, 817-870-5662).

I'm confused about the numerous anti-glare screens on the market today. Will the plastic screens stop X-ray emission and eliminate eye fatigue? Do slow- or medium-decay monitors work

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well with fast-action games? How do replacement monitors compare with anti-glare screens?  

B. G. P.  
Aston, PA

The only thing that stops X-rays is lead. Plastic puts up as much resistance to X-rays as glass does, which is to say none at all.

Eye fatigue is the result of staring at the blue-white phosphor of a monitor for several hours, and the inability to move in relation to that screen. For example, if you could move the keyboard back and forth from the monitor and tilt the monitor's screen up, down, left, and right as you can with some other computers, you would eliminate most eye-fatigue problems.

Phosphor-induced eye fatigue is a different problem. Your eyes are not designed for constant use with these particular light frequencies. They prefer instead frequencies closer to the middle of the visible light spectrum. That's why many people hate fluorescent lights: The white light is slightly painful to them. But white phosphor is used because it's easy and cheap to apply.

Glare also enters the picture, since anything that makes the screen harder to read makes you strain your eyes.

The primary advantage to slow- and medium-decay monitors is reduced eye fatigue, which means longer periods of work without having to rest your eyes, greater productivity, and happier workers. The disadvantage is that you have to replace your current monitor with a more expensive one.

Green screens reduce eye fatigue by changing the monitor's blue-white light to green. They help, but replacing the monitor with a green or amber screen is better. The primary advantage to plastic green screens is that they're cheap by comparison with replacing a monitor. If you get a green screen, get one made of hard plastic, not molded plastic. The soft plastic is hard to clean without tearing it.

If you decide to get a replacement monitor, get one with a built-in anti-glare screen; it'll cost a few dollars more, but as long as you're getting a new monitor you might as well do it right the first time.

Also note that plastic green screen covers with built-in anti-glare are not made. Placing the two together means that you have to turn the video intensity of your monitor quite high, which eventually will burn out the phosphor in your monitor. The amber/green monitors are designed to prevent this.

Finally, using games with the slow- and medium-decay green/amber monitors isn't a problem. You will notice a slight tail (as the phosphor decays) behind rapidly moving graphics objects, but you quickly get used to it. And besides, the reduced eye fatigue more than makes up for this disadvantage.

Terry Kepner is a freelance writer and programmer, and the vice president of Interpro. He's been writing about microcomputers since 1979.

---

**TRS-80 Model I is alive and well at the Micromint. We still have the expansion interfaces you need!**

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"Reviewing Disk-80 is almost incongruous, because any comments can be summarized with the sentence, 'It works.'" Dennis Bathory Kitai, 80 Microcomputing, March 1982.

All interfaces are Radio Shack hardware and software compatible and carry a 60 day warranty including parts and labor.

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**Comm-80**

As featured in Garcia's Circuit Cellar

Byte Magazine, May and June 1980

The COMM-80 is the only interface you need to turn your TRS-80 Model I into a time sharing terminal with provisions for a printer. The COMM-80 combines the most used features of the RS expansion interface in a low cost unit containing a built-in RS-232-C interface, a full 8-bit parallel port and a 40 pin bus connector for future expansion. Terminal software is included at no extra cost.

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Micromint Inc.
581 Willow Avenue
Cedarhurst, NY 11516

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80 Micro, September 1983 • 319
Lots of you write urging me to include more business programs on Load 80. This month, I did just that. This issue's theme is business, and Load 80 offers some intriguing applications.

The magic of successfully automating your company lies in finding a program that satisfies your requirements. Some of this month's programs may be just what you need; some may not. How do you decide?

You should begin by defining what you need the computer to do. Consider what you currently do manually. Do you send out large mailings? A data-management system can create and sort your mailing lists. Do you want the computer to print your mailing labels?

You must select software compatible with your printer.

How do you keep track of your inventory? The right program can predict your needs and encourage low overhead by reducing your on-hand merchandise.

Do you need special reports on a regular basis? Do you handle a lot of correspondence? A good word processor is a must.

Additionally, you must examine your business's projected growth over the next year, five years, and even 10 years. The software you choose must keep up with your growth.

The computer's role in business management is handling information. A well-chosen system provides up-to-date reports faster than you can generate by hand, increases productivity, and improves your use of capital thanks to more efficient information-handling. In other words, the computer helps you coordinate information.

The small-business computer system consists of three parts: the computer (hardware), programs (software), and support (liveware). As a TRS-80 owner, you've already made your hardware choice.

Your software choice should take into consideration your company's needs as well as the people who will work with the program. If you're going to run the computer yourself, you should realize that data entry could take a lot of time that might be more profitably spent. If you plan to train an employee to run the computer, the program must be well documented and easy to use.

You should also analyze the software to see if it needs modifications for your particular business and whether you can make those modifications yourself. Commercial business applications do standardized jobs; if your company handles those jobs in an unconventional way, you need to customize the program.

Not all the programs we've included this month will help you. But they give you a chance to see what a computer can do for your business. Think carefully about whether you need each program in your business before you incorporate it.
## Load 80 Subscription Notice

Load 80 circulation is handled here in Peterborough. If you have a problem with your Load 80 subscription, please notify Lori Eaton at 80 Pine St., Peterborough, NH 03458. Some people contact 80 Micro’s fulfillment company in Farmingdale, NY, with their Load 80 problems; this delays our reply by about four weeks. And that’s a drag for all of us.

### Load 80 Complaints and Questions

If you have technical problems with any Load 80 program, please write or call me. If I don’t have the answer, I’ll find it. Keep those cards and letters coming!

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Color Load 80 directory.

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Letters and Numbers

by Richard Ramella

September is back-to-school month. I go back to Clown-Around University to work on my degree in Funhouseology, and you go back to the next higher grade.

This is kind of a sad time for some people who get left behind—the little brothers and sisters of the world. It will be lonely for them.

Before I burst into tears, let me say that I’ve done something about this situation. I have some programs you can take home for the kids who haven’t started school yet.

All these programs have a few goals: learning the alphabet and numbers one to nine, adding numbers up to five, and learning the keyboard for typing. The programs are short.

Some work in both Level II and Color Basic. Others have separate Level II and Color Basic listings. In all programs, line 100 indicates for which sys-

---

100 REM * REPEAT * TRS-80 LEVEL II AND COLOR BASIC 4K
110 REM * FUN HOUSE / SEPT. '83 / R. RAMELLA
120 CLS
130 A$=INKEYS
140 IF LEN(A$)>1 THEN A$=RIGHT$(A$,1)
150 IF A$<"" THEN PRINT A$ " ;
160 GOTO 130
170 END

Repeat

100 REM * LETTER FIND * TRS-80 LEVEL II AND COLOR BASIC
110 REM * FUN HOUSE / SEPT. '83 / R. RAMELLA
120 CLS
130 CLEAR 480
140 A$="ABCDEFGHIJKLMNOPQRSTUVWXYZ"
150 B$=A$
160 A$=RND(26)
170 $S=CHR$(64+A$)
180 B$=LEFT$(B$,A$-1)"" +RIGHT$(B$,LEN(B$)-A$)
190 PRINT $,B$;
200 PRINT
210 PRINT
220 D$=INKEYS
230 IF D$="" THEN 220
240 IF D$<"" THEN PRINT "NO -- "; ELSE PRINT "YES -- ";
250 PRINT I$;
260 FOR T=1 TO 500
270 NEXT
280 CLS
290 GOTO 150
300 END

Letter Find

100 REM * ABC * TRS-80 4K LEVEL II AND COLOR BASIC
110 REM * FUN HOUSE / SEPT. '83 / R. RAMELLA
120 CLS
130 N=180
140 I=0
150 A=65
160 A$=INKEYS
170 PRINT 440,"SCORE: ",N;
180 IF A$="" AND A$<CHR$(A$) THEN N=N-1; B=B+1
190 IF B=3 THEN D=0; PRINT 360,CHR$(A$); FOR T=1 TO 500: NEXT
T: PRINT 360, " ;
200 IF A$=CHR$(A$) THEN 160 ELSE PRINT 360,CHR$(A$); A=A+1; Z=Z+1
210 IF A=91 THEN PRINT: PRINT "YOU DID IT!": END
220 GOTO 160
230 END

ABC

---

The Key Box

Model I and III
Color Computer
4K RAM
Level II Basic
Color Basic
tems the listings are meant. Look closely to be sure you’re typing in a program that fits your machine.

Now, I’m not an educator; I’m just a poor old fun house attendant. But I do know a few things about little kids and learning and computers.

First, the programs here leave out some important aspects of learning: hearing, saying, and writing down. Little kids need crayons, pencils, and paper to play with the ideas in these programs.

Printing numbers and letters gives them small muscle coordination that helps when they go to school and learn what to do with a pencil. Sesame Street and you can help the kids hear and say their numbers and letters.

Second, make sure the kids don’t think the computer is magic. Let them know it’s just a machine.

Third, small children are often smeared from head to toe with peanut butter and jelly, so wash them off before you let them near the computer. Don’t tell them I said that.

Before you open the Early Childhood Learning Surprise Packet, I want you to know that I’m willing to help anyone who has trouble keying in Fun House programs. My address is: Richard Ramella, 1493 Mountain View Ave., Chico, CA 95926. A self-addressed, stamped envelope gets you a quick answer.

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Listing continued

350 FOR Y=3 TO 23
360 SET(X,Y)
370 SET(X+40,Y)
380 NEXT Y
390 PRINT @ 196,ES(1); 400 PRINT @ 264,CHR$(186)+SS+CHR$(181); 410 I=20
420 X=X-2
430 FOR Y=15 TO 20
440 SET(X,Y)
450 SET(X-2,Y)
460 T=T-2
470 X=X-1
480 NEXT Y
490 Y=Y-1
500 FOR X=16 TO 25
510 SET(X,Y)
520 NEXT X
530 FOR T=1 TO 15
540 FOR K=1 TO 2
550 PRINT @ 196,ES(K); 560 FOR L=1 TO 20
570 NEXT L
580 NEXT K
590 NEXT T
600 FOR T=1 TO 100
610 NEXT T
620 GOTO 120
630 PRINT @ 18,"NO";
640 FOR T=1 TO 500
650 NEXT T
660 FOR B=253 TO 224 STEP -1
670 PRINT @ B,"*";
680 FOR T=1 TO 10
690 NEXT T
700 NEXT B
710 FOR T=1 TO 500
720 NEXT T
730 H=1
740 FOR B=224 TO 224+(A*3)-3 STEP 3
750 PRINT @ B,H
760 PRINT @ B+128,H
770 B=B+1
780 FOR T=1 TO 100
790 NEXT T
800 NEXT B
810 FOR T=1 TO 500
820 NEXT T
830 GOTO 120
840 PRINT @ 8,SS
850 C=C+1
860 I=I+3
870 RETURN
880 END

Repeat
This short program is for Level II and Color Basic. Type RUN and tap the enter key. Then let the little one take over. Any key tapped endlessly repeats a character on the screen. When the child taps another key, it starts repeating.

This is fun for very small children. It shows that something happens on the screen when you tap keys.

Letter Find
This listing works in Color Basic and Level II. The program printsocument exception for one letter that it leaves blank. The player figures out which letter is missing and taps that letter on the keyboard. The program indicates whether the choice is right or wrong and prints the mystery letter. It repeats endlessly. This exercise helps the youngster learn the alphabet and the keyboard.

ABC
Again, this listing supports
Level II and Color Basic. The player starts with a score of 100, but the screen is blank. The object is to type in the alphabet in order from A to Z.

Nothing happens if the player types a letter out of order. If he makes three wrong choices in a row, the right letter briefly appears on the screen. The game ends when the player correctly types the entire alphabet.

Type

Level II and Color Basic are in the same listing. In lines 130-170, I have written 54 words that are useful to know. The program shows the word, then the player tries to type that word. If he makes a mistake, the player taps the space bar, the mistake disappears, and he starts typing over from the beginning of the word.

You can put other words in data lines 130-170, but you must replace these words on a one-to-one basis so you always have 54 words. If you change

```
100 REM * NUMBER TAP * TRS-80 COLOR BASIC 4K
110 REM * FUN HOUSE / SEPT. '83 / R. RAMELLA
120 C=0
130 G=0
140 N=0
150 I=224
160 A=RND(9)
170 PRINT "@ 160",A;
180 A$=INKEY$;
190 IF A$="" THEN N=N+1
200 IF A$=CHR$(32) THEN 568
210 IF C=9 THEN N=200
220 IF N=200 THEN 240
230 GOTO 100
240 IF C<>A THEN 330
250 PRINT " @ 96","YES";
260 FOR H=1 TO 5
270 SOUND 284,2
280 SOUND 193,1
290 SOUND 185,2
300 SOUND 176,2
310 NEXT
320 GOTO 120
330 PRINT " @ 96","NO";
340 FOR H=1 TO 2
350 SOUND 193,3
360 SOUND 176,3
370 SOUND 178,3
380 SOUND 159,5
390 NEXT R
400 FOR B=253 TO 224 STEP -1
410 PRINT " @ B",CHR$(128)
420 SOUND B-29,1
430 NEXT B
440 FOR T=1 TO 500
450 NEXT T
460 FOR B=224 TO 224+4*(A$)-3 STEP 3
470 B$=CHR$(143+a$+RND(7)*16)
480 PRINT " @ B",B$;
490 SOUND B-50,5
500 FOR T=1 TO 50
510 NEXT T
520 NEXT B
530 FOR T=1 TO 750
540 NEXT T
550 GOTO 120
560 SOUND 125*RND(5)*13+150,1
570 C=C+1
580 X$=CHR$(143+a$+RND(7)*16)
590 PRINT " @ X",X$;
600 I=I+3
610 RETURN
620 END
```

Number Tap—Color Basic
the number of words, count the total words in lines 130–170. Replace the number 54 with your new total in lines 190, 200, and 250.

If you put in hundreds and hundreds of words, you must change line 180 CLEAR 500 to a higher number, perhaps CLEAR 1000. Above all, remember that you can’t use the left-arrow key to erase.

**Number Tap**

This program has separate Level II and Color Basic listings. In both versions, a number from one to nine appears on the screen. The player taps the space bar as many times as the number indicates. If a three appears, the player taps the space bar three times.

Each tap produces a new rectangle of light on the screen. The player must act quickly because if nothing happens within five or six seconds, the computer assumes a wrong answer.

In Level II Number Tap, if the answer is right, the word “YES” appears along with a smiling face. If the answer is wrong, a “NO” appears and the computer counts out the right answer.

In Color Number Tap, a right answer gets a happy song, and a wrong answer gets a sad

---

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... Add Shipping & Handling...
song. The right answer always appears.

How Many?

This program presents endless addition problems with answers less than or equal to nine. It plays an adding game that lets the player add up the answer in a way that teaches both counting and addition.

Say the problem is 2 + 3 = ?. Beneath the 2 are two light blocks; beneath the 3 are three blocks of light. The player taps an answer between one and nine.

The separate Level II and Color Basic versions are slightly different. In Level II How Many?, a wrong answer gets a few rows of “NO” and a right answer gets rows of the word “YES.” If the answer is wrong, the right answer flashes over the wrong answer.

In Color How Many?, a sad song signals no, and a happy song signals yes. The program corrects wrong answers.

Next month I’ll have some activities that will help people already in school. Don’t play hokey because you think Fun House will be like eight hours of math drill. It won’t! ■
Fame and Fortune may be yours by entering:

80 Micro's Young Programmer's Contest 1983–1984

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(These prizes are in addition to our regular purchase price.)

If you are an aspiring Programmer, 18 years or younger, enter 80 Micro's 2nd Annual Young Programmer's Contest. Your entry may be for any TRS-80. Programs will be judged on originality, documentation (more on this below), and program elegance. The age categories are 11 and under, 12 through 14, and 15 through 18. All entries will be judged by the 80 Micro staff.

Rules
1. Final entries must be in by November 1, 1983.
2. All entries must be submitted in a 10 x 13" envelope and must include: typewritten, double-spaced documentation; a printed copy of the program listing; a magnetic disk or cassette containing the program listing, documentation, and any figures or tables; and a completed entry blank.
3. Documentation should consist of an explanation of the program, its purpose, how to use it, and the necessary software and hardware needed to use it (including memory requirements). Good documentation also points out the interesting algorithms and program techniques used without giving a line-by-line account.
4. Entries must be original and unpublished.
5. All winning programs become the property of 80 Micro.
6. The category in which you will be judged will be determined by your age as of November 1, 1983. You must not have turned 19 by that date.
7. You may submit as many entries as you like, however, each one must be submitted separately and must have all of the information and materials stated above.

The 80 Micro Young Programmer's Contest

Name ___________________________ Age ___________ Date of Birth ___________
Street Address _____________________ City _____________________________
State/Zip_________________________ Phone _____________________________
Machine (circle one) Model I Model III Model IV Model II/12/16 Model 100
Color Computer Pocket Computer Other _____________________________

Include this form with your entry and return to:
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This column features Model II, 12, and 16 conversions of earlier programs. Readers who have converted programs for their own use are encouraged to submit them.

“Mail List” first appeared in 80 Programs for the TRS-80 100101 Inc., Peterborough NH, 1979, pp. 54-56. This Model II conversion was done by Byron Lott of 913 Inverness Way, Sunnyvale, CA 94087.

“Mail List” offers 12 program options including search; list by name, city, state; and so on. The program lets you add and save data, or make changes to existing data. Your list, once compiled, either appears on the screen or is sent to the printer. You take care of only the postage.

Program Listing

Listing continued
LISTING

LSEQG0T475
472 PRINT"INPUT"PRINT INDIVIDUALLY OR COMPLETE LIST (1 OR C)";QPS
473 GOSUB1928;GOTO408
475 PRINT
490 FOR=I705:PRINT:NEXTT
500 FOR=R710:R
510 IFC=15(R):THEN458
520 IFN=1(R):THEN615
530 GOTO615
540 IFN=1(R):THENFIP0="*";THENGOSUB1925;GOTO615ELSEPRINT;GOSUB1925;PRINT"INPUT"HNF READY TO PRINT DEPRESS <ENTER>";Q$;GOTO615
590 PRINT
590 PRINT285(R);":";N18
590 PRINTA(R)
590 PRINT315(R);"*:C25(R);*:C35(R)
590 IF11="*"THENPRINT0S(R)
590 PRINT
600 PRINT"PRINT
605 C=C+1;1F=3THENC=:INPUT25
610 NEXTT
615 FOR=I705:PRINT:NEXTT
630 INPUT"DEPRESS <ENTER> TO RETURN TO MENU";Z35
640 CLE5;GOTO28
650 INPUTWHAT IS THE KEYWORD(OPTION CODE)";K5
655 PRINT"INPUT
660 C=R;INPUT DO YOU WANT THE LIST ON VIDEO OR PRINTER (V OR P)";Q$:IFQ$=0"THEN
662GOSUB09625
665 PRINT"INPUT INDIVIDUALLY OR COMPLETE LIST (1 OR C)";QPS
667 GOSUB1928;GOTO678
665 PRINT"INPUT PRINT INDIVIDUALLY OR COMPLETE LIST (1 OR C)";QPS
670 FOR=R710:R
675 C=C+1;1F=3THENC=:INPUT25
680 NEXTT
685 FOR=I705:PRINT:NEXTT
700 INPUTDEPRESS <ENTER> TO RETURN TO MENU";Z35
710 GOSUB28
720 PRINT285(R);":";N18
730 PRINTA(R)
735 PRINT315(R);"*:C25(R);*:C35(R)
740 PRINT;PRINT;PRINT
750 CC=C++1;1F=3THENC=:INPUT25
760 NEXTT
765 FOR=I705:PRINT:NEXTT
780 INPUTDEPRESS <ENTER> TO RETURN TO MENU";Z35
790 CLE5;GOTO28
800 C=R;INPUT ENTER CITY NAME;C15
810 PRINT
820 INPUTENTER KEYWORD(OPTION CODE)";K5
830 PRINT
840 INPUT DO YOU WANT THE LIST ON VIDEO OR PRINTER (V OR P)";Q$:IFQ$=0"THEN8625
850 LSEQG0T98
850 PRINTINPUT INDIVIDUALLY OR COMPLETE LIST (1 OR C)";QPS
870 GOSUB1928;GOTO408
880 FOR=R710:PRINT:NEXTT
890 FOR=R710:R
895 INPUT"DEPRESS <ENTER> TO RETURN TO MENU";Z35
900 CLE5;GOTO28
905 C=R;INPUT ENTER THE ZIP CODE;C35
910 PRINT
915 INPUT DO YOU WANT THE LIST ON VIDEO OR PRINTER (V OR P)";Q$:IFQ$=0"THEN985
920 LSEQG0T99
950 PRINTINPUT INDIVIDUALLY OR COMPLETE LIST (1 OR C)";QPS
970 GOSUB1928;G0TO985
990 PRINT
1000 FOR=I705:PRINT:NEXTT
1005 FOR=I705:PRINT
1010 IFC=315(R):THEN140
1020 IFN=1(R):THEN915
1030 GOSUB1928;GOTO999
1040 IFQ$=0"THENPRINT*;*";THENPRINT925;GOTO1999ELSEPRINT;GOSUB1925;PRINT"INPUT WHEN READY TO PRINT DEPRESS <ENTER>";Q$;GOTO1999
1050 PRINT
1050 PRINT285(R);":";N18
1060 PRINTA(R)
1070 PRINT315(R);"*:C25(R);*:C35(R)
1080 PRINT;PRINT;PRINT
1085 C=C++1;1F=3THENC=:INPUT25
1090 NEXTT
1095 FOR=I705:PRINT:NEXTT
1100 INPUTDEPRESS <ENTER> TO RETURN TO MENU";Z35
1105 CLE5;GOTO28
1110 C=R;INPUT WANT LIST WITH OPTION CODE(Y OR N)";Z15
1120 PRINT
1125 INPUT WANT LIST WITH PHONE NUMBER (Y OR N)";Z25
1135 PRINT
1140 INPUT WANT LIST WITH PHONE NUMBER (Y OR N)";Z25
1155 PRINTPRINT"INPUT PRINT INDIVIDUALLY OR COMPLETE LIST (1 OR C)";QPS

Listing continued

TYPISTALL

The SCRIPTSi compatible Word Processor TYPISTALL is a new word processing program which is upward compatible with SCRIPTSi for the Model 1 and 3 TRS-80. TYPISTALL includes features like these: assign any sequence of keystrokes to a single control key. See the formatted text on the screen before printing. Send the formatted text to a disk file for later printing. Merge data from a file while printing. Send any control or graphic character to the printer. Use the same version on the Model 1 or 3. Reenter the program with all text intact if you accidentally exit without saving text. TYPISTALL (disk only)...........$29.95
Manual only (100 pages)...........$25.00

SYSTEM DIAGNOSTIC


TRS-80 MODEL III ASSEMBLY LANGUAGE

A complete course in assembly language, written for the beginner. Basic concepts, the Z-80 instruction set, complete Model III ROM and RAM information, programming examples, the disk controller, the TRSDOS 1.3 disk operating system, RS-232-C interface. With the book you can also purchase Monitor 5, a complete machine language monitor for the Model 1 or 3. Book only ............. $16.95
Book and Monitor 5 on disk ....... $29.95

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TAKE II

Listing continued

1157  GOSUB128;GOTO1190
1160  PRINT"1050;PRINTNEXT
1165  FORM=10100
1200  IFNS1(R)="*THEN2149
1210  IFPS.""THENIPSF="";THENGOSUB125;GOTO1200;ELSEPRINT;GOSUB125;PRINT;INPUT
1220  "WHEN READY TO PRINT DEPRESS <ENTER>";Q5:GOTO1288
1225  PRINTN1S(R)=";";N1S(R)
1230  PRINTT1S(R)
1240  PRINTC1S(R);"*";C2S(R);"*";C3S(R)
1250  IF1S="*";THENPRINT1S(R)
1260  IF2S="*";THENPRINT2S(R)
1270  PRINT;PRINT
1275  C=1;IFC=THENVARS1=NPRTSE
1280  NEXTR
1285  PRINT;PRINTNEXT
1290  DOR=INT50;PRINTNEXT
1315  INPUT;DEPRESS <ENTER> TO RETURN TO MENU";335
1320  CLS;GOTO20
1330  A=4;IP1S1(R)=";THEN465ELSEFORE=170481:IF1S1(R)="*";THEN3137
1335  A=3;INPUT;PRINT;"THERE ARE ";A;" NAMES IN THE CURRENT LIST"
1400  PRINT;PRINT;PRINTNOTE: ENTER "*" AFTER THE LAST DATA ENTRY TO INDICATE -E-
1405  OP=*
1350  PRINT
1360  FORM="(A1)";TO180
1370  PRINT;PRINT4*;R
1380  INPUT;ENTER LAST NAME";N1S(R)
1385  PRINT
1390  IFNS1(R)="*";THENCLS;GOTO20
1400  INPUT;ENTER FIRST NAME AND MIDDLE INITIAL";N2S(R)
1405  PRINT
1410  INPUT;ENTER ADDRES";A5(R)
1415  PRINT
1420  INPUT;ENTER CITY STATE ZIP CODE (C...C, SS, SSSSS);C1S(R),C2S(R),C3S(R)
1425  PRINT
1430  INPUT;ENTER OPTION CODE";O9S(R)
1435  PRINT
1440  INPUT;ENTER PHONE NUMBER";PHRS(R)
1450  NEXTR
1455  CLS;GOTO20
1465  CLS;PRINT;LIST NOT OPEN";GOTO20
1470  INPUT;ENTER LAST NAME";N1S(R)
1475  PRINT
1480  INPUT;ENTER FIRST NAME AND MIDDLE INITIAL";N2S(R)
1490  FORM=10100
1500  IFN1S(R)="*";THEN3138
1530  IF1S(R)=1S(R)AND(LEPTS(N2S,4)+LEPTS(N2S,4)+THEN3155
1520  NEXTR
1530  CLS;PRINT;"SORRY, NAME REQUESTED NOT FOUND IN LIST"
1540  PRINT
1550  GOTO20
1555  QS="";PRINT;PRINTNOTE: IF NO CHANGE TO DATA, DEPRESS <ENTER> TO CONTINUE"
1560  PRINT
1565  PRINT;CURRENT LAST NAME=";N1S(R)
1570  INPUT;ENTER NEW LAST NAME";N1S(R)
1575  PRINT
1580  PRINT;CURRENT FIRST NAME AND MIDDLE INITIAL";N2S(R)
1585  INPUT;ENTER NEW FIRST NAME AND MIDDLE INITIAL";N2S(R)
1590  PRINT
1595  PRINT;CURRENT ADDRESS";A5(R)
1600  INPUT;ENTER NEW ADDRESS";A5(R)
1605  PRINT
1610  PRINT;CURRENT CITY STATE ZIP CODE";C1S(R);";C2S(R);";C3S(R)
1620  INPUT;ENTER NEW CITY STATE ZIP CODE (C...C, SS, SSSSS);C1S(R),C2S(R),C3S(R)
1625  PRINT
1630  PRINT
1635  PRINT
1640  PRINT;PRINT;PRINTNOTE: IF NO CHANGE TO DATA, DEPRESS <ENTER> TO CONTINUE"
1650  PRINT
1655  PRINT;CURRENT PHONE NUMBER=";PHRS(R)
1660  INPUT;ENTER NEW PHONE NUMBER";PHRS(R)
1665  PRINT
1670  PRINT;PRINT;PRINTNOTE: IF NO CHANGE TO DATA, DEPRESS <ENTER> TO CONTINUE"
1675  PRINT
1680  INPUT;ENTER NAME OF FILE TO SAVE";NFS
1690  PRINT;PRINT;PRINTNOTE: IF NO CHANGE TO DATA, DEPRESS <ENTER> TO CONTINUE"
1700  PRINT;PRINT;PRINTNOTE: IF NO CHANGE TO DATA, DEPRESS <ENTER> TO CONTINUE"
1710  OPEN"*",1,NFS
1715  PRINT;PRINT;PRINTNOTE: IF NO CHANGE TO DATA, DEPRESS <ENTER> TO CONTINUE"
1720  FORM=1020
1730  PRINT1;R;N1S(R);"*";N2S(R);"*";A5(R);"*";C1S(R);"*";C2S(R);"*";C3S(R);"*";O9S(R);"*";PHRS(R)
1740  NEXTR
1745  CLOSE
1750  CLS;PRINT;"LIST SAVED";GOTO20
1760  INPUT;ENTER NAME OF FILE TO LOAD";NFS
1770  OPEN"*",1,NFS
1780  PRINTIN(3);"*";LOADING LIST FROM FILE *****
1785  INPUT;I,Y
1790  FORM=1704
1800  INPUT1;R,N1S(R),N2S(R),A5(R),C1S(R),C2S(R),C3S(R),O9S(R),PHRS(R)
1810  NEXTR
1815  N1S(R)=Y=1="***";
1820  CLS;PRINT;PRINT;PRINTLOADING COMPLETE";CLOSE;GOTO20
1830  PRINT
1840  R=8;IP1S1(R)="*";THEN1890
1850  FORM=170180
1860  IFPS="*";THEN1890
1870  R=R+1
1880  NEXTR
1890  PRINT;PRINT;PRINT;"THERE ARE ";R;" NAMES IN THE LIST"
1900  FORM=1707
1910  CLS;INPUT;IF PRINTER READY DEPRESS <ENTER>";Q5S;PRINT;PRINT;TOP OF PAGE Y OR N";Q5S
1920  CLS;INPUT;IF PRINTER READY DEPRESS <ENTER>";Q55;PRINT;INPUT;TOP OF PAGE Y OR N";Q5S
1930  IFPOS="*";THENSYSTEM"FORMS T"
A MAGICAL INTRODUCTION TO COMPUTING.

COMPUTER CARNIVAL has arrived, with 60 easy-to-use TRS-80 Level II BASIC programs for children of all ages. Characters like Sugar Louie and Madam Zelda will help your child expand his or her creativity and develop keyboard skills through games, puzzles, and educational quizzes.

COMPUTER CARNIVAL by Richard Ramella features:
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★ A WAYNE GREEN PUBLICATION

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DATA SYSTEMS

(305) 788-2145
BOX 99 • FERN PARK, FL 32730

336 • 80 Micro, September 1983

TAKE II

Listing continued

1924 PRINT: INPUT*"WHEN READY TO PRINT DEPRESS <ENTER>*";Q6$;RETURN
1925 LPRINT"#";T;$ITEM NO.";R
1930 LPRINT"#";T;"0000";R
1940 LPRINT"X";R
1950 LPRINT"Y";R
1960 LPRINT"Z";R
1970 LPRINT"*";RETURN
1980 PRINT:PRINT:"*";RETURN
1990 INPUT:"CURRENT LIST SAVED IN DISK FILE (Y OR N)?";Q65
2000 IF Q65="Y" THEN 1818
2010 IF Q65="N" THEN 1218
2020 IF Q65="DE" THEN GOTO 2020
2030 PRINT:PRINT:"RETURNING TO MENU1*":PRINT:PRINT:GOTO28
YOUR TRS-80* NEEDS

*TRS-80 is a trademark of Radio Shack division of Tandy Corp.

It needs software before it can do anything. And good software is as valuable as any piece of hardware you can buy.

The Encyclopedia for the TRS-80 is a ten-volume reference series with over 200 programs for the Model I, Model III, and Color Computer. In each volume, you’ll find:

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Get some help for yourself and your TRS-80 with the Encyclopedia for the TRS-80 and Encyclopedia Loader.

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Multi-Color Plotters

The Strobe 200 drum-type plotter features an easy-to-use control panel, an efficient paper-loading system, and a holder that accepts a wide variety of pens for graphics and lettering. It plots areas of up to 8 by 10 inches, with a step size of .002 inches along the X or Y axis.

The plotter costs $845, including a TRS-80 parallel interface card. An RS-232C serial interface for CP/M microcomputers provides four foreign-language character sets and costs $195.

Watch Out for Falling Planets!

You are space-wrecked on a civilized alien planet that is apparently deserted. You and your robot companion, Floyd, have up to 10 days to solve riddles, stop the planet from plummeting into the sun, and save the planet’s plague-stricken population. Nothing too difficult for the seasoned gamer... or is it?

Planetfall, written by Steven Meretzky, is the third in a series of science fiction games from Infocom Inc. The game heightens realism by increasing the interaction between the player and Floyd, and by allowing players to find food, eat, sleep, get sick, and even dream. Depending on your actions, different moves take different amounts of time, a serious consideration since you are competing against time to win. All game commands are in English, with a vocabulary of over 600 words to draw from.

Planetfall’s packaging is different from most other games. Inside a folder-like package you find a Stellar Patrol ID Card, a space diary, futuristic postcards, and other elements that complement the story. Planetfall costs $49.95, is available for both the Models I and III, and can be purchased from either Infocom Inc. (55 Wheeler St., Cambridge, MA 02138, 617-492-1031) or any major computer store.

Model 4 Upgrade

Now you can convert your 16K cassette Model 4 computer to a 64K or 128K disk-drive system with Micro-Design’s new upgrade kit. This kit includes the new MDX-6 disk controller board, drive mounting towers, two disk drives, a power supply, sound board, an RS-232 serial board, and memory. An illustrated user’s manual provides instructions on kit installation.

The MDX-6 disk controller board is redesigned to run with the Model 4 at its 4 MHz speed. It controls up to four installed or add-on disk drives. The drives may be either 5¼- or 8-inch capacity, single- or double-sided, or any combination. The MDX-6 also has gold-plated edge connectors to ensure trouble-free operation.

This upgrade kit costs $399 and is available from Micro-Design, 6301 Manchaca Road, Suite B, Austin, TX 78745, 800-531-5002.

Wild Irish... Disks?

A new flexible disk, produced using a special binding method, that cleans disks as they spin is being made by Irish Magnetic Industries Inc. (270-78 Newton Road, Plainview, NY 11803, 516-293-5582). The 5¼- and 8-inch disks are produced from high-quality, mylar-based, magnetically coated materials with unique surface lubricants that minimize head and disk friction and ensure data integrity.

All disks are individually jacketed and are packaged 10 to a box. The 5¼-inch, 48-tracks-per-inch disks have a suggested list price of from $32.90 to $49.80 for single- to double-sided format, and single to double densities. The 8-inch disk costs range between $49.80 and $69.80 for single and double densities.

Reader Service 558

New Products listings are based on information supplied in manufacturers’ press releases. 80 Micro has not tested or reviewed these products and cannot guarantee any claims.
Ammicro introduces the first letter quality printer for $680 that can also be used as a typewriter.

The MICROWRITER™ Daisy wheel printer.

There was a need for a low cost letter quality machine that would be suitable for use as an office typewriter, and as a computer printer. Ammico met that need by combining the Microwriter parallel interface and the traditional Olivetti craftsmanship that was available in their Praxis machine.

With the Microwriter you can have the best of both worlds a letter quality printer, and a high quality office typewriter all in one machine, that sells for less than the cost of a good dot matrix printer!

It's not just printer or a typewriter that comes complete with a deluxe carrying case, but a feature-packed, lightweight machine that doubles as an office typewriter. This printer is a simple, low cost, reliable unit which can be utilized with word processing systems, microcomputers, personal computers, and small business systems.

The Microwriter's low noise level and slim modern styling allow it to blend with any decor.

The Microwriter's print quality is identical to the finest office typewriters on the market. This machine is not only perfect for letters and manuscripts, but with its 165 character, 12 inch print width, the machine is perfect for letter quality budget spread sheets, price lists, data sheets, and forms.

The Microwriter can tab, rule single lines both vertical and horizontally, underline and print at 10, 12, or 15 characters per inch (switch selectable)! Its ten character memory for automatic error correction, lift off correction ribbon, and fixed or programmable page formats are a few of the many features that make it a perfect office typewriter. Microwriter not only handles letter and legal size sheet paper in widths up to 12 inches wide, but also handles fanfold paper.

There's a wide selection of 21 interchangeable daisy wheels available. And ribbon cassettes that just drop in.

It's operation as a computer printer is simple. Just load it up with paper and you are ready to go. Centronics compatible parallel output cables are currently available from stock for the following computers: IBM PERSONAL COMPUTER™, OSBORNE 1™, ZENITH Z-100™, BURROUGHS B-20™, Convergent Technologies models IWS & AWS™, TRS-80 MODEL I, II, III™, APPLE II™... custom cables also available by special order.

This machine creates a new standard by which all current low cost letter quality printers will follow. Ammico's Microwriter is truly designed for the lifestyles of the 80's and for decades to come.

Why settle for just any printer when you can have a MICROWRITER, a fine letter quality typewriter for you and your computer.

The Microwriter is the only daisy wheel printer on the market for $680. For more information, see your local computer dealer or contact Ammico directly.
NEW PRODUCTS

Letter Quality for Under $700

The ComRiter CR-II, a letter-quality printer, provides personal computer users with word processing features previously available only in more expensive printers. These features include superscript, subscript, backspace, underline, boldface, double-strike, and proportional spacing. It has a 5K buffer that lets you reproduce original and multiple copies of documents stored in memory. The buffer saves up to three pages of data and text.

The printer measures 19½ by 6 by 13 inches, weighs 20 pounds, and has an average print speed of 12 characters per second. The unit features bidirectional printing and logic-seeking. The print wheel comprises the standard 96 ASCII characters, and the ribbon is the standard cassette-type.

Optional features include tractor feed, color ribbons, a cut-sheet feeder, and interchangeable print wheels compatible with the Comrex CR-I.

ComRiter daisy-wheel printer. The Centronics parallel version of ComRiter CR-II costs $629; the RS-232C serial version $699. It is manufactured by Comrex International Inc., 3701 Skypark Drive, Torrance, CA 90505, 213-373-0280.

Reader Service 576

Z80 Applications

With James W. Coffron’s new book, Z80 Applications, you’ll learn the necessary programming and interfacing techniques for connecting the Z80 microprocessor to common microcomputer expansion units. You will also learn how to use the Z80 with ROM, static and dynamic RAM, and how to use basic and advanced I/O techniques, such as interrupts.

This 288-page instructive text contains diagrams and thorough examples that explain everything you need to know to implement useful Z80 applications. It costs $14.95 plus $1.50 shipping when ordered from Sybex.
DOES STRING COMPRESSION HAVE YOU TIED UP IN KNOTS?

LET TRASHMAN CLEAN UP THE MESS!

THIS PROGRAM IS A MUST FOR EVERYONE WHO USES "BASIC" ON A TRS-80. Why? Because it can reduce BASIC's string compression time delays by 95% or more.

WHAT'S STRING COMPRESSION?

When a BASIC program changes a string (words, names, descriptions), it moves it to a new place in memory, and leaves a hole in the old place. Eventually, all available memory gets used up and BASIC has to push the strings together to free up some space. This takes time. Lots of time. The computer stops running for seconds or minutes, and you may even think it's "crashed".

Yes! String compression is what's been causing all those intolerable delays. The keyboard won't work, and until all the strings have been collected, you just have to sit and wait. Then things run for a while, until string compression is needed again. And again.

If you're using your computer for business, that wastes your money. If you're using it personally, it wastes your time.

WHAT'S THE SOLUTION?

As soon as you start using TRASHMAN, those delays will almost disappear. The program is very easy to use, so you don't have to be a computer programmer to take advantage of it. It's written in "machine language" and uses only 576 bytes of memory for itself, plus two bytes for each "string" in your program. It works with other machine language programs and all the major operating systems.

HOW WELL DOES IT WORK?

If you use it with a BASIC program that has only a few strings, very little time is wasted in string compression, and TRASHMAN will be only slightly helpful. But, in programs that use hundreds or thousands of strings, including large string arrays, TRASHMAN is just what you need. If you have any remaining doubts, just look at the chart, and then get yourself a copy as fast as possible.

TRASHMAN is available on disk for just $39.95.

ATTENTION SOFTWARE PUBLISHERS:

Trashman may be licensed for use with your packages. Call for details.

SAVE TIME WITH FASTER

"FASTER" speeds up most TRS-80 BASIC programs by 20-50%. It's helped hundreds of satisfied people and it can help you. Detailed instructions make it easy to use. FASTER analyses your BASIC programs while they run, then displays a simple change, usually one line, that sequences program variables so the ROM will find them faster.

You can use FASTER to speed up programs you've bought, as well as programs of your own. Since it isn't a compiler, your BASIC programs can be read and changed afterwards. FASTER works on business programs, models, and games. The more complex your program, the better the results.

Does FASTER really work? Yes! Just check the reviews in Personal Computing, May 1981, p. 116: "FASTER is effective and easy to use": 80 U.S. Journal, April 1982, p. 106: "I recommend FASTER to everyone": and 80 MICRO (April 1982, p. 40): "If you would like a significant increase in the run-time speed, then buy FASTER."

FASTER runs on the TRS-80 Models I and III. 16-48K tape or disk, and all major operating systems. $29.95

"QUICK COMPRESS" takes only 276 bytes of memory, and removes the blanks and remarks from even the largest BASIC program in less than 3 seconds. It produces smaller, faster programs without altering their logic. $19.95

SPECIAL: FASTER and QUICK COMPRESS: $39.95

ERRATIC DISK DRIVES?

You can avoid unnecessary disk errors and repair bills by using RPM. This easy-to-use program measures the rotational speed and fluctuations of your disk drives, and warns you if they are running too fast, too slow, or unevenly.

Incorrect or erratic speed is a common cause of unexplained disk errors and loss of data. RPM's documentation explains how to detect and correct these problems quickly and easily. As 80 MICRO (April 1982, page 41) said: "If your drives have problems I recommend RPM before paying to get it repaired."

RPM is supplied on diskette for the TRS-80 Models I and III. We suggest you order a copy before you need it. $24.95

ORDER FROM YOUR LOCAL SOFTWARE DEALER, OR CALL NOW, TOLL-FREE: (600) 824-7888, Operator 422

FOR ORDERS OR INFORMATION CALL: (213) 764-3313, or write to us.

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(All timings done on TRS Model I. Model III 15% faster, but pct. improvements identical. Listing of timing program available on request.)
COMPLETE MODEL III HARD DRIVE SYSTEM $1295.

THIS IS NO JOKE. We have a large quantity contract to bring you the highest quality system at the lowest price available. The combination of Tandon Hard Drives and Western Digital’s error checking and correcting drive controller board create the backbone of the Hard Drive Specialist System. The balance of the interfacing is by (the) oldest engineering teams in the Model III/Hard Drive business. Unlike other hard drive companies, we rate a hard drive AFTER format (a 15 Meg drive is actually 19.1 MB before format). These units are fully assembled and tested ready to plug into your computer, all that you need to add is software. Power required 105-130 volts AC 60Hz
Dimensions 8-1/4”x6-1/2”x13” (just a little bigger than two regular disk drives)

<table>
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<th>Model III/ 4 HARD DRIVE SYSTEMS</th>
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SECONDARY DRIVES
(Ready to plug into any HDS system for added storage capacity)

| 5 MEG............................$895. |
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| 15 MEG...........................$1295. |

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Hard drive patches are available for DOSPLUS, NEWDOS, and LDOS, for the Model I, III, 4 priced at $50. each.

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342 • 80 Micro, September 1983
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all include an RS232

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prime grade pre-tested RAM with instructions

MODEL 4 RS232 KIT $69.95
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All of the Compukit Model 4 Disk Drive Upgrade Kits contain these features that other companies usually do not provide. Switching power supplies + Tandon disk drives * 64K of Model 4 RAM * Sound * and an Easy to Use installation Manual. Requires only a screwdriver (no soldering) The no drive upgrade kit .................................................................$299.
One drive upgrade kit .........................................$499.
Two drive upgrade kit .........................................$999.
Two double headed drive kit ..................................899.

MODEL III to MODEL 4 UPGRADE $750.

Converts your Model III into a Model 4 (except for cabinet and disk drives). Includes new keyboard, 64K RAM, Sound, and free installation (required). Ship us any working Model III, even if it’s not all factory equipment, and get back a Model 4, in your case.

MODEL 4 SOUND UPGRADE $29.95

No soldering required, includes instructions

COMPUKIT DOCTOR $29.95
Disk based diagnostic software package for the Model I, III, and soon the Model 4

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One drive upgrade kit .........................................$479.
Two drive upgrade kit .........................................$679.
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Perfect for replacement or add on drives for any 5" drive system including Model I, III, 4, COCO, IBM PC, LNW, MAX80, and many more.
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Dual Case with extenders ....................................$99.95.
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TM50-2 DS-40trk $219.
new microprocessor drives
TM55-2 DS-40trk $249.
TM55-4 DS-80trk $299.

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Complete drive 0 including case and controller card $449.00

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with a Tandon Thinline
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80 Micro, September 1983 • 343
Inland's Diskette Carousel.

Inc., 2344 Sixth St., Berkeley, CA 94710, 415-848-8233.
Reader Service 584

A Good Combination
Applied Creative Technology Inc. (2723 Ave. E East, Suite 717, Arlington, TX 76011, 800-433-5373 or 817-261-6905), makes an adapter, called Type & Print, that connects the Olivetti Praxis 30 and 35 to any Centronics parallel-interface computer.
This unit essentially provides you with a letter-quality printer for under $500. The Type & Print costs $179 and requires no soldering or hardware modifications for hook-up. The Olivetti Electronic Typewriter is readily available from most office supply stores at prices comparable to the lowest-priced dot-matrix printers.
Reader Service 566

Disk Carousel
Now you can protect and store up to 72 5¼-inch floppies in Diskette Carousel, a high-impact, smoked plastic rotating file. Disks are stored in colorful envelopes that brighten the room and help you color-code your disks. The rotary base stores disks vertically so that the envelopes don’t touch the magnetic coating. This minimizes static electricity and provides fast disk access.
The Diskette Carousel is compact. It measures 6 by 13 inches and can be stacked on other carousels. It is sold by Inland for $29.95 (32051 Howard Ave., Madison Heights, MI 48071, 313-585-2330 or 800-521-8428).
Reader Service 564

Programmable Menu
A CP/M version of Custom Software Services’ Programmable Menu is now available. Written in machine language, the Programmable Menu reads and displays menu selections created by the operator using any text editor.
Up to nine selections can be created for each menu, with multiple menus supported. Sub-menus return to the master menu by pressing the break key.
Designed to run under Pickles & Trout’s implementation of CP/M 2.2 for Models 11/12/16, the program costs $29.95 and is sold by Custom Software Services, P.O. Box 150, Porterville, CA 93258, 209-784-7966.
Reader Service 572
Back to School

VisiCalc neophytes can rest at ease. An audio cassette how-to book from FlipTrack Learning Systems "talks" you through the development of a complex VisiCalc model. *How to Use VisiCalc* begins with the basics like setting up a spreadsheet with labels, values, and formulas, and progresses to more advanced concepts, such as replicate, choose, lookup, and net present value functions. The result is an effortless introduction to every VisiCalc command and function.

The course is presented in a friendly, conversational manner on four cassettes, accompanied by a fully indexed lesson summary. By flipping over the tape at key points in each lesson, you can receive additional information on special-interest topics. *How to Use VisiCalc* costs $65 and is available from FlipTrack Learning Systems, P.O. Box 711, Glen Ellyn, IL 60137, 312-790-1117.

Reader Service ▶ 569

** ****

The CP/M Workshop is a simple-to-use program that shows first-time users of CP/M-based microcomputers how to get started. The program is entirely self-paced and comes complete with diagrams, exercises, reviews, demonstrations, hints, and evaluation sessions. Within a very short time you can begin to run programs, control information on floppy disks, copy files, and print documents using rapid, interactive, and graphics formats.

CP/M Workshop comes complete with a user’s manual, and both a working and backup disk for 8-inch drives. It costs $115. For more information, contact Datascan Inc., 2716 Ocean Park Blvd., Santa Monica, CA 90405, 213-452-9114.

Reader Service ▶ 553

How to Use VisiCalc: *Starts with the basics.*

Save Your Data!

Inmac’s Datasafer protects computer systems by taking over the computer’s power requirements within 12 milliseconds of a detected brownout or total power failure. It supplies back-up power for two to five minutes at full rated power output, and for 15 to 30 minutes at half rated output load. A front panel LED and a buzzer alert you to the shortage, giving you time to shut down the system before ac power loss occurs.

Datasafer consists of a rechargeable battery with an automatic charger, a solid-state power inverter, an ac line-voltage monitor, and a cut-out switch. It is available for both the Models I and III and costs $485 from Inmac (2465 Augustine Drive, Santa Clara, CA 95051, 408-727-1970).

Reader Service ▶ 550

**Misosys’ Version III**

Version III of Misosys’ labeling disassembler is now available. It disassembles Z80 object code files directly from disk or from memory. Output is directed to a paged display, a printer listing, or a source-disk file. The line-numbered output file is automatically partitioned into multiple files whose size the user defines.

Version III screens text
WE'RE GIVING MAIL ORDER A GOOD NAME...

You no longer have to sacrifice quality products, personal service, or fast delivery for rock-bottom prices. With MICRO DATA SUPPLIES, you can have it all. And it's only a phone call away: (216) 481-1600. Looking forward to your call.

Russ Knotts - President

We sincerely thank our thousands of past customers who have made this claim possible.

NEW DATING/80
Version 2.0
Model I and Model III

The hottest Disk Operating System is now available in its latest version. This is the ONE from Apparatus, Inc.; the people whose systems have made the TRS-80 the reliable computer.

$139.95

THE FLOPPY DOCTOR

By Dave Stambaugh

FLOPPY DISK/MEMORY DIAGNOSTIC programs are designed to thoroughly check out the two most trouble prone sections of the TRS-80: the disk system (controller and drives) and the memory array.

MODEL I ... $24.95
MODEL III ... $29.95

BOOKS

OTHER MYSTERIES

TRS-80 DISK ... $19.95
Microsoft Basic Decoded ... $24.95
The Custom TRS-80 ... $28.95
Basic Faster & Better ... $29.95
How To Do It On The TRS-80 ... $28.95
TRSDOS 2.3 Decoded ... $28.95
The Custom Apple ... $28.95
Machine Language Disk 1/0 ... $29.95
CP/M Primer ... $15.95

LABLMAKER

The most useful program you'll ever own. Prints Marking Labels on standard 1" x 3½" labels. Sixteen print formats to choose from including the #1 Visibility Jumbo Print Type. TRS-80 Model I & III, 48K, 1 Drive, Epson MX-80 type printer (Or equivalent).

LABLMAKER KIT - w/400
5½" x 3½" labels ... $29.95

CASSLABEL KIT - w/400
Cassette labels & 200 5½" x 3½" labels ... $34.95

PRINTERS

New Lower Prices

GEMINI 10 by Star Micronics ... $349.00
GEMINI 15 by Star Micronics ... $499.00
Okidata Microline 82 ... $429.00
Okidata Microline 83A ... $CALL
Okidata Microline 84 ... $CALL

PRINTİNG ACCESSORIES

Graftrax Plus ... $85.95
MX-80 Ribbons ... $7.95
MX-100 Ribbons ... $18.95
Epson Service Manual ... $34.95

PRINTİNG CABLES

TRS-80 Model I & III
10 ft. Parallel ... $24.95
10 ft. Parallel cable extensions ... $24.95

ELECTRIC PENCIL
Version II
Model I and Model III

An expanded version of the critically acclaimed original word processing system! Includes all features of Version I plus many new extensions.

Disk Version ... $79.95
Tape Version ... $69.95

ELECTRIC WEBSTER

"Cadillac" of Spelling Checkers 80 Micro 9/82.

- 50,000 WORD DICTIONARY
- FAST AND ACCURATE - No other Spelling Checker comes close!
- INTEGRATED - Proofs and corrects from within most popular word processing programs!
- SMART - Finds and displays correct spelling!
- HYPHENATES automatically - inserts discretionary hyphens with 100% accuracy (optional).
- COMPLETE - One step proofing system.

Electronic Webster w/correcting feature ... $129.95
Hyphenation feature ... $49.95
Grammatical feature ... $39.95
COMPLETE SYSTEM all Four Programs ... $199.00

NEWSCRIPT 7.0

NEWSCRIPT is the versatile TRS-80 word processing program. It supports "smart" printers like the Epson, Okidata, NEC, Canon, and others.

NEWSCRIPT ... $109.95

THE HOME ACCOUNTANT

The #1 best selling program for home and small business accounting is now available for TRS-80 Model 3. Handles up to 99 accounts, cash checksheets, multiple income accounts, and can split transactions to any number of accounts. Prints net worth statements, income statements, as well as custom designed reports. Displays a bar chart and trend for any selected category. It is easy to use and yet provides all the power you'll need. (By Continental Software, requires Model 3, 2 drives, 48K) ... $82.95
SUPER WABASH SALE!

**Bulk Diskettes** with envelopes

- 5¼" Soft Sector
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  - Single Density
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  - 100% Certified
  - 1 Year Warranty
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  - 100% Certified
  - 1 Year Warranty
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  - Double Density
  - W/Hub Ring
  - 100% Certified
  - 1 Year Warranty
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  - Double Density
  - 100% Certified
  - 1 Year Warranty
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*Now Get High Quality at a Low Price Manufactured by a Major Disc Company For MDS Without Their Name on Diskettes.
*Minimum order 20 diskettes with Tyvek envelope and storage shipping box
*Quantity discounts - 100 deduct 3%, 1000 deduct 5%, 10,000 deduct 10%

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Speed up cuts computer operation time in half, saves time and money. Fast 4 MHz 280B CPU included, installs in 15 minutes with no soldering or cutting.

**Sprinter III for MOD III**
**$95.95**

**Sprinter I for MOD I**
**$95.95**

**Model I Double Density Package**

Everything you need to convert your TRS-80 Model I to run double density. Complete with software hardware, and instructions, installs in minutes with no soldering, wiring or cutting.

Dosplus V 3.4 w/LNDoubler 5/8...
**$199.00**

LNDoubler 5/8 Board w/o dos...
**$169.00**

**16 K RAM SPECIAL**

4116. 200ns. Guaranteed one full year...
**$17.95**

**Electronic Protection Devices**

The PLUM 3-way EMI-RCI AC Power Line Noise Filter (wall outlet)...
**$44.95**

The LEMON - 6-way Surge Suppressor for AC Power Lines (wall outlet)...
**$54.95**

The LIME - same as LEMON w/5ft. cord and on-off switch...
**$79.95**

The PEACh - 6-way Surge Suppressor, EMI-RCI Line Filter (wall outlet)...
**$89.95**

The ORANGE - same as LIME w/EMI-RCI Filtering PLUM & LIME Combined...
**$129.95**

**Ultra Term**

Supports both manual and auto dial modems. Exclusive Ultra Term direct to disk file transfer mode, allows unattended operation at the receiving computer. Line printer support with a 1K print buffer. Half & full duplex support. Universal ASCII format file transfer with a 33K buffer and a full featured host program...
**$49.95**

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**Monday thru Saturday**

**Dealer Inquiries Welcome**
data to direct the disassembler to output selected address fields as byte, word, or literal data. These output formats are double-byte and double-word statements compatible with the EDAS assembler.

Two Version III packages are available: DSMBLR is supported under TRS-DOS and LDOS on the Model 1/11, and PRO-DUCE supports LDOS 6.0 and TRS-DOS 6.0. Each costs $40 and is sold by Misosys, P.O. Box 4848, Alexandria, VA 22303, 703-960-2998.

Reader Service 7 577

Wipe Away Your Problems

The Statklear Cloth is impregnated with a dry chemical treatment that removes CRT static and built-up dust with a single wipe. Because it’s made of flannel and uses no liquid cleaner, no streaking, film residue, or scratches affect your CRT screen.

It comes with a secure-seal pouch for storage, and, used daily, retains its chemical potency for up to six months. Each 12-by-12-inch cloth costs $2.95 from Evans Speciality Co. Inc., 14 East 15th St., P.O. Box 24187, Richmond, VA 23224, 804-232-8946.

Reader Service 7 574

Model 100 Bar Code Readers

The Scanhandler MS190 is a lightweight (15-ounce) laser bar code scanner that is plug-compatible with the Model 100. With 5-volt wand emulator signal levels, the Scanhandler is a cost-effective alternative to wand readers and more expensive scanning systems.

All the optics and electronics required for non-contact scanning are contained in this Class I unit. The laser operates at 150 scans per second, has a near-100 percent first read rate, a 10-inch maximum depth of field, and delivers both audible and visual indications of successful reads.

This is the first laser bar code scanner to include scanning, decoding, and communications capabilities in a single unit. It costs $1,800 (special OEM discounts available) and is available from Metrologic Instruments Inc., 143 Harding Ave., Bellmawr, NJ 08031, 609-933-0100.

Reader Service 7 559

Compact Disk Carrier

Diskaddy is an anti-static vinyl disk carrier that stores up to 22 disks (both 5¼- and 8-inch) in accordion-style pockets. Each pocket holds two disks, comes with two indexes for filing, and has an inner pocket to store disk directories. Adjustable pocket flaps have visible index tabs for disk labels and an elastic closure to secure the unit.

Diskaddy is used to carry valuable disks from place to place, to file disks in an accessible unit where every disk is readily seen, and to store disks in a protective, compact unit.

It is available from Fourdee Products Co. Inc., 9380 Activity Road, Suite J, San Diego, CA 92126, 619-693-1105. Retail prices start at $5.99.

Reader Service 7 567

Go Ape Over Bananas!

Banana is an 80-column dot-matrix printer from Lead-
ing Edge's new Gorilla line. It prints alphanumerics or graphics characters on fan-fold forms from 4½ to 10 inches wide, and prints 50 characters per second. The characters are printed in a clear 5-by-7 matrix similar to that of CRT terminals.

Although the Banana has the standard character spacing of 10 characters per inch, you can select double-width characters under software command. The printer also features both a character- and dot-addressable graphics mode, with a density of 63 by 60 dots per inch. Line spacing in the graphics mode is reduced from six to nine lines per inch.

Banana is compact (16 by 5 by 8 inches) and weighs 12 pounds. It has a Centronics-type parallel interface that allows direct hookup to the Models I, II, and III. The Gorilla Banana is available for $249.95 from Leading Edge Products Inc., 225 Turnpike St., Canton, MA 02021, 800-343-6833.

Reader Service » 560

A Clean Hit

Copysource Anti-Stat Clean Kit is a quick and easy system for eliminating static dust on CRT screens for up to two months per treatment. Each kit contains 50 pads impregnated with a non-streak, non-static cleaning solution and a lint-free buffing cloth.

This compact kit is conveniently affixed to your computer with self-adhesive mounting tape. Single kits cost $12.95; three kits run $32.85; 10 kits (a case) cost $89.50. To order, contact Chope-Stevens Paper Co., Dept. 111, 1800 18th St., Detroit, MI 48216, 313-237-0300.

Reader Service » 579

Model 16 Spreadsheet

Horizon Spreadsheet is a new and versatile spreadsheet designed for the UNIX operating system. It does, however, operate on any UNIX-like system, including Xenix for the Model 16.

The program offers the largest electronic spreadsheet available, a grid 256 cells square (VisiCalc offers 64 by 256 cells). Unlike other systems, the Horizon Spreadsheet employs virtual memory for full use of all cells in the system.

It can be integrated to Horizon Word Processing, has a multi-line Help menu, and features powerful built-in functions including date arithmetic, and science and financial calculations. In addition, it permits both consolidation and extraction of multiple and subordinate spreadsheets.

Priced at $245, the Horizon Spreadsheet is available from Horizon Software Systems Inc., 185 Berry St., Suite 4821, San Francisco, CA 94107, 415-543-1199.

Reader Service » 552

Lost for Words?

With FirstDraft and DocuMentor you'll never again face a blank page. FirstDraft is a text-formatting spreadsheet that helps you organize and outline documents before you invoke word processing software. By continuously refining the outline and answering computer prompts, you think through the design of the document before you begin writing.

DocuMentor, a document data-base manager, is the first computer-assisted writing package on the market. Any document that requires a standard organization but unique text requirements is covered. Templates that contain the structure, standard text paragraphs, and writing instructions are provided so you can customize your text.

Both software packages
Because it's there. And it'll be there until you have Easy Calc, Business Analysis and Master Plot... three essential additions to the modern professional’s survival gear. Why spend endless hours forecasting, calculating and graph-plotting when Instant Software’s business programs can do it for you? At a fraction of the time. And at a fraction of what you’d expect to pay.

**MASTER PLOT**

Get your point across graphically with this professional graph-plotting and printing package.

- Enter graph data from keyboard equations or from your BASIC programs.
- Plot up to 10 sets of data on the same graph.
- Create your own plotting symbols.
- Choose any number of horizontal and vertical lines.
- Select your own number of interpolated points between your data points.
- Print graphs any size from 1 x 1 to 7 x 24 inches.

Plus much more! Make your charts and graphs the easy way... with Master Plot.

Requires: TRS-80® Model I only 48K Disk Epson® MX-80 printer with Graphtrax #0435RD $149.95

**BUSINESS ANALYSIS**

Get forecasting capabilities previously available only on large computers. This flexible, professional time series analysis and forecasting package lets you:

- Forecast and analyze sales.
- Perform product and business planning.
- Analyze stock trends and growth rates.
- Research business cycles.
- Forecast spending and energy consumption.

Plus much more! Analyze and forecast like a pro with Business Analysis.

Requires: TRS-80 Model I and III 32K Tape #0140R $75.00 Disk #0152RD $99.95

**EASY CALC**

Turn your TRS-80 into an electronic spreadsheet!

- Write numeric data into simple rows and columns on your screen.
- Add, subtract, multiply, divide or exponentiate single values or rows and columns.
- Calculate percentages and summations of rows or columns.
- Enter and save entire series of calculations.
- Handles up to 600 figures.

Written for non-computerists. Easy to understand instructions. Easy to use.

Requires: TRS-80 Disk 48K
Model I: #0269RD $49.95
Model III: #0369RD $49.95

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---

**YES! I want to conquer that mountain!**

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Rte. 101 & Elm Street  
Peterborough, NH 03458  

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NEW PRODUCTS

are available for CP/M, 8-bit computers. FirstDraft costs $195 and includes a user’s manual and a book on computer-assisted writing; Docu- Mentor costs $295; pur- chased together they cost $395. For further information, contact PromptDoc Inc., 833 West Colorado Ave., Colorado Springs, CO 80905, 303-471-9875.

Reader Service 554

Hard Disk

VR Data has added Hard Disk III to its line of Win- chester disk drives. The Hard Disk III Subsystem is available as a formatted 5 mega- byte fixed and/or removable disk. It comes fully assembled and includes case, power supply, cables, and mounting hardware.

Other configurations available for the disk drive sub- system are 10-, 15-, 20-, and 30-megabyte capacities. Adapt- ers for the Model I and III start at $150, and the prices for the Hard Disk III start at $995. Both are available from VR Data, 777 Henderson Blvd., Folcroft, PA 19032, 800-345-8102.

Reader Service 561

Power Console

The Model 038 from PMC Industries Inc. (9353 Activity Road, San Diego, CA 92126, 619-695-3520) is a new power

cable specifically designed for use with personal and small business computers. It protects computers and data from power line noise, transients, and high-voltage surges. It eliminates RFI/EMI noise up to 55 decibels, and high-voltage and high-energy spikes up to 70 joules.

The unit comes with a 6-foot, three-wire shielded ac line, a 15-amp resettable circuit breaker, a main on/off switch, and a power indicator light. It can be wall, floor, or bench mounted, and comes in an aluminum and steel case that measures 13 by 4 1/2 by 2 5/8 inches and weighs four pounds. All parts are UL list- ed. The unit is designed for 120-volt, 15-amp use, and costs $125.

Reader Service 565

The Extender

You can now simplify Ba- sic programming on the Models I and III with Sole- electronics’ new software package. The Extender is a ma- chine-language patch into the Basic interpreter that lets you use labels instead of line numbers to identify a line of the program in GOTO, GO- SUB, ON...GOTO, ON... GOSUB, ON ERROR GO- TO, or IF...THEN, and lets you use the first 40 characters of a variable name instead of only the first two characters.
NEW PRODUCTS

This applies to simple variable names, array names, and function names of all types.

All currently running Basic programs and all Basic commands may be used with The Extender without modification. The program loads into the top 1000 bytes of memory and costs $29.95 for both the Model I and III versions. To order, contact Solecronics, 400 Ashbury Ave., Evanston, IL 60202, 312-866-8737.

Reader Service 575

Let's Get Digital

Datalock is a high-quality digital tape assembled in a premium cassette shell with an oversized pad to ensure accurate alignment. Its specifications are superior to audio tape for digital recording: less distortion, cleaner high-end response, higher output ratio, and longer wear.

Datalock costs $3.75 for a single cassette, $5.95 for a two-pack, and $29.95 for a 12-pack in a smoke-plastic case. For further information, contact National Distribution Center, 117 West 23rd St., Independence, MO 64055, 816-254-0400.

Reader Service 583

Helpful Wallcharts

Ever forget a VisiCalc or SuperScriptit command and were too lazy or busy to look it up? Crest Software (2132 Crestview Drive, Durango, CO 81301, 303-247-9518) has found the answer: wallcharts of the systems' commands. Each 18-by-25-inch two-color chart graphically depicts all commands in large, readable type.

In addition to the commands, the chart depicts the keystroke combinations and provides explanations. In smaller print are the remaining operations and math functions. The result is a one-stop, all-inclusive reference center for anyone's use.

Both the VisiCalc and SuperScriptit charts cost $4 each plus $2 for handling and shipping. The SuperScriptit chart is designed for the Model III; the VisiCalc chart is for universal computer application.

Reader Service 582

Model I/III Goes Color!

Computer Shack has done the impossible! You can finally copy and use your Color Computer disks on any Model I or III. CIII (pronounced C-three) lets you copy programs and data files from machine to machine without conversions or retyping.

It acts much like a variable file utility: insert CIII and the Color Disk of your choice into the disk drives and select the files you want to transfer. You'll be able to copy from a Model I/III to or from your Color Computer disk in a

• Disassemble from disk/memory
• Disassemble to disk/printer/video
• Automatic output partitioning
• Full label generation
• Data area screening generates DB, DW

• $40 + $2 S&H

MISOSYS
P.O. BOX 4848
ALEXANDRIA, VA. 22303
703-960-2998

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matter of seconds.
CIII is available from ma-
or computer stores or direct-
ly from Computer Shack
(1691 Eason, Pontiac, MI
48054, 313-673-8700) for
$24.95.
Reader Service \(\rightarrow\) 581

Disk Back-up
Beta-DTS lets Models I
and III users back up one
megabyte of disk images on
a standard 60-minute cassette
tape. Retrieval of a disk from
cassette is automatic and in-
cludes formatting.
Beta-DTS requires a cas-
sette recorder with cable, one
disk drive, and 32K of mem-
ory. It comes complete with a
self-boot operating system
disk, a user's manual, and
necessary hardware to do
the job.
Available from Beta En-
terprises Inc. (14049 Settle-
ment Acres Drive, Cleveland,
OH 44142, 216-362-6191),
Beta-DTS costs $149.95 plus
$5 for handling and shipping.
Reader Service \(\rightarrow\) 562

Printer Utility
The Printer Utility Pack-
age from MicroSmith Com-
puter Technology (P.O. Box
1473, Elkhart, IN 46515) con-
sists of eight programs to en-
hance your Model I's and
III's printing capabilities with
the Epson MX-80. There are
programs that allow direct
printer initialization for bold,
compress, and italic modes;
print block, enlarged, nor-
mal, and small characters on
lines left/right justified or
centered; generate banners
printed at 90 degrees to the
normal lettering and run
down the length of the paper;
and print multiple copies of
the same label on single- and
double-wide label stock.
All these programs are
supplied as Basic source files,
and are written with special
attention to the Epson MX-80
command codes. The package
is available for either a 48K
CP/M 2.0 system on a stan-
dard 8-inch single-sided, sin-
gle-density disk or for the
Models I and III with 48K.
The price for either is $35.
Reader Service \(\rightarrow\) 570

Network Analysis
AC Network Analysis Pro-
gram (ACNAP) analyzes elec-
tronic circuits with up to 70
components. It is optimized
for speed and is capable of
analyzing a five-node, 10-
component circuit in less
than one second. ACNAP
works with component toler-
ances to provide worst case,
Monte Carlo, and Sensitivity
analysis.
Both linear and logarithmic
frequency increments can be
specified for all operations.
Automatic noise equivalent
bandwidth calculations are
provided, as is the genera-
tion of a Spectral Data file.
ACNAP is menu-driven and
allows simple entry and
editing of circuits by compo-
nent name. Models I and III
versions cost $39.95 and are
available from BV Engineer-
ing, P.O. Box 3351, Rivers-
side, CA 92519, 714-781-
0252.
Reader Service \(\rightarrow\) 556

Blown Away
70 PSI is an aerosol dust
and lint remover that re-
moves microscopic dust from
instruments, magnetic tape
heads, and computer disks
and drives. As the name
implies, it delivers 70 pounds of
pressurized, non-toxic inert
gas triple-filtered for max-
imum purity. The gas leaves
no residue and is moisture-
free.
Each 14-ounce container
has a three-way adjustable
valve for precise spray con-
trol and an extension tube for
difficult-to-reach areas.
The product is available
from Chemtronics Inc. (681
Old Willets Path, Haup-
pauge, NY 11788, 800-645-
5244 or 516-582-3322) and
costs $3.75.
Reader Service \(\rightarrow\) 571

Printed Switch
The new Centronics-com-
patible Printer Switch from
Intra Computer routes hard
copy to a letter-quality daisy-
wheel or high-speed dot-
matrix printer. It measures
3 1/4 by 6 1/4 inches, and is
both code and speed trans-
parent.
The Printer Sharing Switch,
also Centronics-compatible,
lets two computers share one
printer. The interface cable
from a single parallel port of
each computer is plugged in-
to a connector on the Printer
Sharing Switch. A built-in
6-foot cable is attached to the
printer.
Both products cost $165,
come with a one-year war-
 ranty, and are available from
Intra Computer, 101 West 31
St., New York, NY 10001,
212-947-5533.
Reader Service \(\rightarrow\) 563

Model 100 Software
Typing Teacher, originally
compatible with the Models I
and III, is now available from
Instant Software Inc. (Route
101 and Elm St., Peter-
borough, NH 03458, 603-
924-9471) for the Model 100.
The program comprises a
seven-part package that fa-
miliarizes you with key loca-
tion, goes through words and
phrases, and ends with com-
plete mastery of the board.
Screen diagrams show cor-
correct finger placement and
related proper techniques.
Completely documented and
fully guaranteed, Typing
Teacher costs $17.95 and re-
quires 8K of memory.
Reader Service \(\rightarrow\) 578
If you guessed that a Practical Peripherals Microbuffer™ printer buffer saves time, you’re right. For the way it works, this inexpensive product is the most practical addition to your microcomputer system ever.

With Microbuffer, you don’t have to wait for your printer to finish before you resume using your computer. Data is received and stored at fast speeds, then released from Microbuffer’s memory to your printer. This is called buffering. The more you print, the more productive it makes your workflow.

Depending on the version of Microbuffer, these buffering capacities range from a useful 8K of random access memory — big enough for 8,000 characters of storage — up to a very large 256K— enough for 256,000 characters of storage.

Practical Peripherals makes stand-alone Microbuffers for any computer and printer combination, including add-on units especially for Apple II computer and/or Epson printers. Each has different features like graphics dumps and text formatting besides its buffering capabilities. You can choose one that’s just right for your system.

Best of all, they’re built to last and work exactly like they’re supposed to.

If you’re still guessing whether you can afford to have one, talk with any computer dealer. That’s the best way to find out how practical a Practical Peripherals Microbuffer is.

PRACTICAL PERIPHERALS

31245 La Baja Drive
Westlake Village, CA 91362
(213) 991-8200

GUESS WHO HAS MICROBUFFERTM
That's what you get with the LNW80 Model 2—undoubtedly the most versatile, powerful and fully equipped microcomputer in its class today. A machine so superior in concept and design, that it will define the standards of microcomputer performance for years to come.

**VERSATILITY**

The LNW80 2 performs wonders with the most complete library of software available to any microcomputer on the market today. Every LNW80 2 comes complete with this outstanding library of Business Software. LNW SMALL BUSINESS AND PROFESSIONAL ACCOUNTING SERIES.

- General Ledger, Accounts Receivable, Accounts Payable, Payroll; ELECTRIC SPREADSHEET®; ELECTRIC PENCIL® WORDPROCESSOR; MICROTERM® MODEM PROGRAM; CHART EX® HIGH RESOLUTION BUSINESS GRAPHICS CHARTING PROGRAM; CP/M® 2.2®; DOPSUS®; LNWBASIC®; MICROSOFT BASIC®.

In addition to a comprehensive line of LNW80 2 Software, it is also fully compatible with software from TRS80® (Models 1, 3, 4), CP/M® and Cromemco® worlds—a capability which gives you access to the most extensive and mature libraries of business, scientific, engineering and entertainment software applications. So no matter how far you expand into user applications, the LNW80 2 will expand right along with you.

**POWER**

The LNW80 2 performs miracles with the computing power of 96K RAM (standard) and user memory matched with a mass storage capability which handles 5½" floppy disks and 5½" hard disk drives. And while the unit comes with built-in controllers for 5½" and 8½" floppy disks (single/double sided, single/double density, up to 4.5 Megabytes capacity), the LNW80 2 also gives you the unique ability to read and write diskettes from a greater variety of other popular computers than does any other microcomputer. So regardless of how big you grow, you will never end up with thumb-twiddling down time while you expand to a more powerful system. The LNW80 2 will always have enough muscle to handle your biggest and toughest jobs.

**FULLY EQUIPPED**

The LNW80 2 was developed to anticipate the needs of both expansion and compatibility. So the computer was designed with enough built-in features to keep you from having to spend a small fortune as you move down the road to higher levels of user sophistication. Standard features include high and low resolution graphics in both color and black-and-white, an asynchronous serial communication channel, and a wide variety of tape, printer, monitor and hardware expansion ports. In addition, the LNW80 2 contains an array of quality construction features that fully justify its remarkable one-year limited warranty.

So if you're looking for a microcomputer that will satisfy your performance needs as you grow and develop, take a long, hard look at the LNW80 2. It's the one microcomputer built to meet the challenges of tomorrow—for a long time to come.

For more information and the name of the dealer nearest you, write or telephone:

LNW Computers
2620 Walnut, Tustin, California 92680
Telephone: 714/544-5744

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STATE-OF-THE-ART ENGINEERING
STATE OF TOMORROW PERFORMANCE.