

portables

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E-MAIL

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For Global Business

FACE-OFF

Tandy's Portables,
How They Differ

LOST IN ROM?

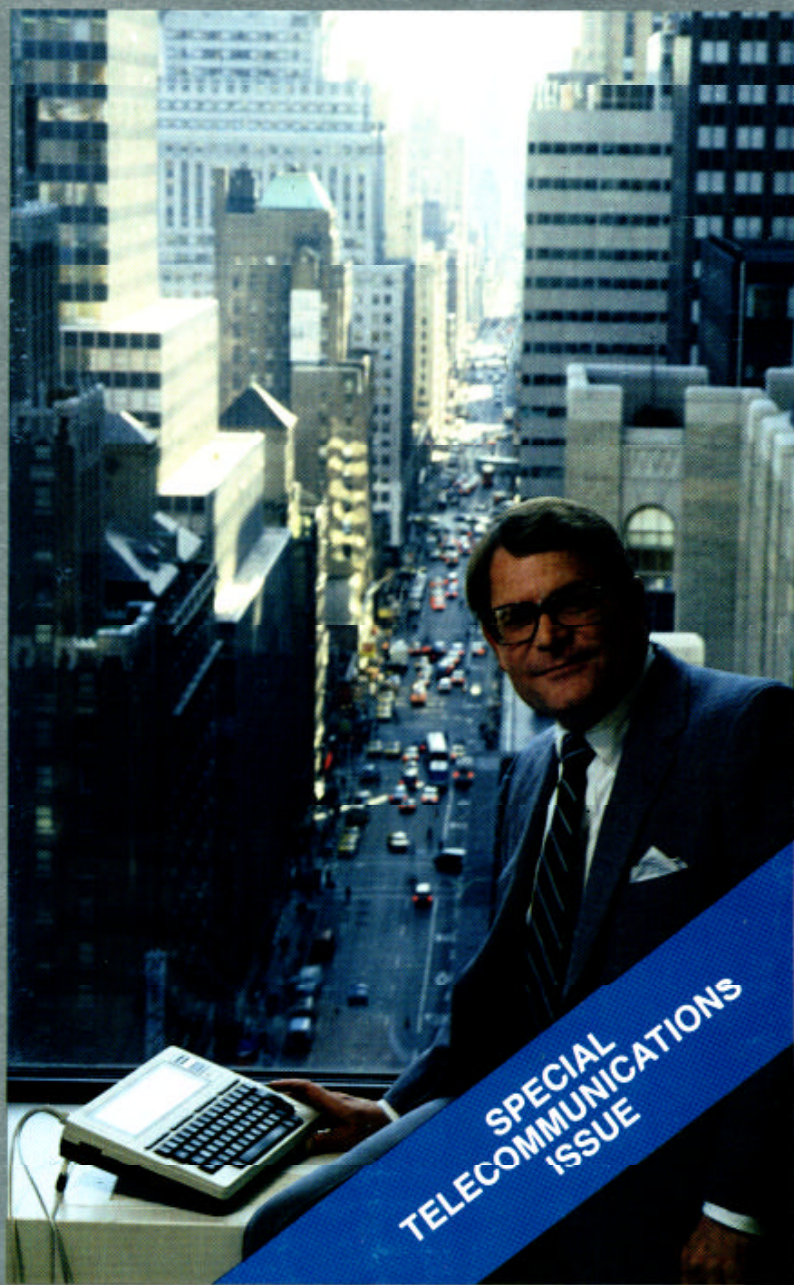
Here's a Map
for Exploring the 200

PROGRAMING A\$ to Z%

Getting Loaded,
Being Saved

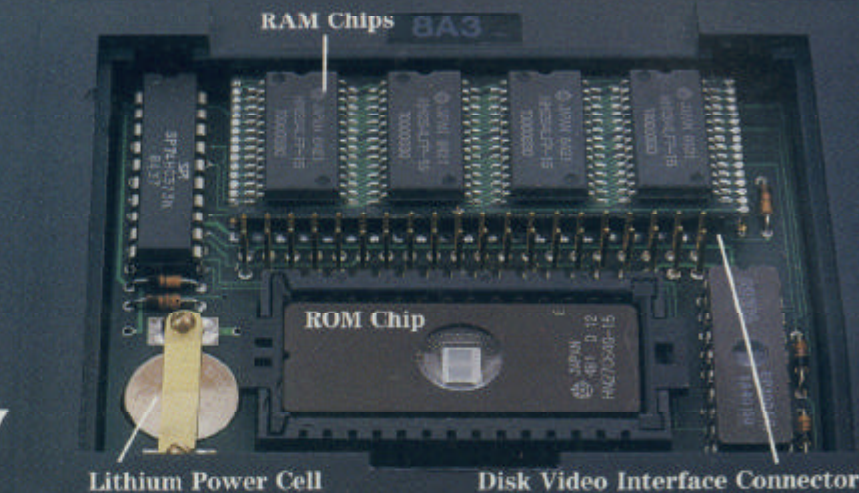
REVIEW

Long-Awaited
Bubble Descends



**SPECIAL
TELECOMMUNICATIONS
ISSUE**

State of The Art RAM Technology

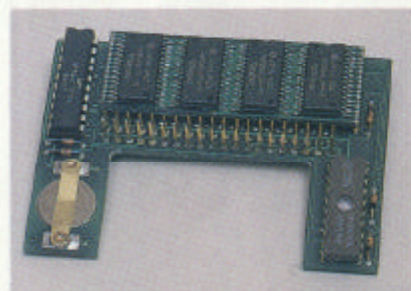


At last, a 96K Model 100!

"The new PG Design RAM should be in every Model 100 built!"

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Our miniaturized RAM chips are state of the art. They are the most advanced memory chips found anywhere in the world. Their tiny size allows us to keep a low profile in the expansion port of the Model 100. We use a technique called *vapor phase soldering* to ensure that each and every tiny connection is clean — perfect.



The RAM module is precision constructed.

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Each 32K RAM bank has its own command of the software that comes in your Model 100. BASIC, TEXT, TEL-COM, ADDRSS, SCHEDL are all there in each bank and you can use them as you would in the original bank. Each bank can be accessed from any of the other banks. We even have an optional data transfer program

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"Adding this 64K RAM module to your Model 100 is as easy as putting in new batteries." Once you've removed the expansion cover on the back of your Model 100, just snap the PG Design RAM module in. You can't get it wrong! The pins line up perfectly with the expansion holes in the Model 100 compartment. Snap the cover back on and turn your Model 100 over. Turn it on and enter BASIC. Type in the one line program we supply you and presto—you've got a Model 100 with 96K of RAM. You do not need a 32K Model 100 to utilize the PG Design 64K RAM module.

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The beauty of this RAM module is that we've enabled you to have a Model 100 with 96K of RAM and we've given you access to the other Model 100 options within the expansion compartment. The DVI connection can be made easily with our rugged connectors. Gone are the flat flimsy pins. And best of all, the ROM slot is clear to insert any ROM modules, (like Tandy's Multiplan on ROM). We designed this RAM module so it wouldn't ever have to be removed from your Model 100. But, if you should remove it, we've installed a lithium

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We stand behind all the products we manufacture at PG Design. If you are not completely satisfied with your purchase, call us! If we cannot solve your problem, return the product to us and we will refund your money. We are positive that you will be completely satisfied with all our products.

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64K RAM module — \$375

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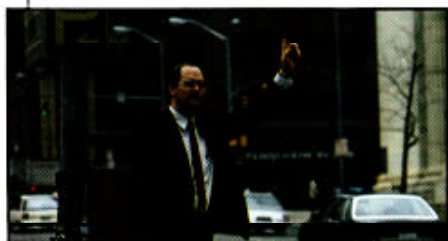
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100/200 VOLUME TWO NUMBER ELEVEN

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Cover photo by James H. Pickerell

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 Machine-language expert Carl Oppedahl has studied the Model 100 and Tandy 200.



LOST IN YOUR 200? 24
 A travelog to help you find your way around the 200's ROM.

NO ADDRESS UNKNOWN 30
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portable

100/200

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ISSN 0738-7016

ROM WITH A VIEW

When Tandy introduced the 200, dismay characterized the reception by some who had anticipated more. More crunching power. More usable user memory. Bigger screen. MS-DOS compatibility. After all, the Model 100 had been nothing short of revolutionary when it was introduced. But the Tandy 200 was not ordained to cause a revolution nor destined to set a standard to challenge the industry. It would not be the *enfant terrible* that the 100 had been.

Among third-party support vendors (software and peripherals suppliers) there's been some grumbling about the 200's shortcomings. It's even been suggested that commercial software programmers might not provide product for the new machine. (It should be noted that none of the major players in portable software are saying this, but are instead busily preparing product for market.)

I happen to be one of those rare birds who think Tandy may be more right than wrong in its approach. The great hue and cry in the industry today is for market-driven development, rather than technology for technology's sake. Mark Eppley, president of Traveling Software, in a guest editorial in our premiere issue of Data General Micro World, says it best: "...a remarkable technological advancement and a nickel won't always buy a cup of coffee." Magazines about the technology — such as this one — tend to judge everything we see by a "Gosh, Mr. Wizard" standard that puts everything to a cutting-edge-of-technology test. Rarely does profitability ride on the cutting edge.

It was explained to me by a Tandy insider that the 200 partly grew out of the objections to the 100 made by corporate buyers and that the the 200's enhancements efficiently and adequately correct the 100's more serious shortcomings.

If Tandy performed a true formal market study, then that should be applauded. If, to the contrary, Tandy developed a product that is neither up-to-date with standards the industry has grown to embrace *and* no thorough market analysis backs up that product, that's a different story that leaves us a little weak in the knees.

It also may have been unwise on Tandy's part to place a laptop on the market with a design limitation. Senior technical editor J.D. Hildebrand explains that "The 200's auxiliary ROM socket duplicates a Model 100 design peculiarity. The pin-outs don't match the pin assignments on standard EPROMs and EEPROMs. Firmware developers have to design special carriers that reroute the signals. This potentially makes ROMs scarcer and more expensive."

Incidentally, Hildebrand prepared that simple answer on a 200 which arrived at these offices a day earlier. So what's he think of it so far? "It may be all the computer I'll ever need. Beginning today, I've switched over to a Tandy 200 completely for all my writing and editing. I was using a 1000 with a color monitor. Now I just press a button and start editing. I never have to boot the system or format a disk. It's great!"

We've said it before here, but we'll say it again: We operate under the ponderous philosophy that the machine we got (or you got) is what we have, and it's what we're going to cover (and uncover) to reveal how to get the most computing life out of it.

So it is with the Tandy 200. In this issue frequent-contributor Carl Oppedahl tackles questions like: Will 100 software work on the 200? Which peripherals can be used? What do assembly programmers need to know about the 200? What are the input and output ports?

Meanwhile Greg Susong, president of Custom Software, unveils the 200's ROM map to help assembly-language programmers find their way around.

On the 100 side of the backslash, we finally get in our hands and review the much (and long)-touted Magnetic Bubble Memory.

And the cover story illustrates the use of 100s and electronic mail on an international big-business scale. It's another testament to the fact that the 100 has found its way into America's boardrooms.

Sincerely,



P.S. The thought for this month comes from the review by Melvin Maddocks of Richard Schickel's new book *Intimate Strangers* (Time, April 8): "...the issue is the battle for the soul of a culture seduced and battered by machinery that puts image before substance and claims before creativity."



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Left to Right: Prairie Power 5.5, 2.6, 8.
Front to Back: Tandy Model 100, Olivetti M10, NEC 8201A.

SPECIFICATIONS

Size	Rating	Weight	Dimensions
8 amp. hr.	160 hrs. (32K)	3.6 lbs.	6x3.75x2
5.5 amp. hr.	100 hrs. "	2.7 lbs.	6x3.7x1.3
2.6 amp. hr.	54 hrs. "	1.4 lbs.	6x2.3x1.3

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Universal Charger (\$11.95)

TERMS: Check, Money Order, Visa/MC, U.S. Funds only

Add \$4 to total for freight.

Name

Phone Address

City St Zip

VISA MC # Exp. Date

Signature

PUT OFF BY BUSY SIGNAL

While public data carriers can make traditional terminals work on their lines, service reps generally can't make your computer work on their network if it isn't listed in their reference book.

The terminal codes used by Western Union for its EasyLink service are mentioned repeatedly in the documentation but are only charted at length in appendix f2 — without a definition of the terms used. I use code 01 but 23 offers other advantages. Neither requires a line feed.

I use Tymnet to access OnTyme II and EasyLink. There's a book titled *How to Use Tymnet* available from your Tymnet sales representative. One important piece of data is found there. If you're going to use the Xon/Xoff protocol (the E in M711E) on your Model 100, you need to change your log-on procedure to avoid damaging your received files.

Type your terminal ID (A for Model 100), Ctrl-X Ctrl-R and your log-on, on one line.

This tells Tymnet to use the Xon/Xoff protocol, which uses Ctrl-S and Ctrl-Q to control data flow. Since OnTyme II takes Ctrl-Q as a delete-line command, it can result in lost lines in your file if the Tymnet network isn't expecting flow control and passes these characters to Ontyme.

Anytime you want to stop a screen to read it, press Ctrl-S (stop). The network will stop sending even if the service you're using doesn't. No data will be lost; the network holds it for you. To restart press Ctrl-Q.

Does anybody know a way to get the 100 to observe the clear-to-send (CTS) line on pin 5 of the RS-232 while using TELCOM? Several of the devices I'd like to use provide a busy or CTS signal but the 100 ignores them.

John Dewey
Crystal Lake, IL

Model 100 users should select terminal code 21 for accurate communication over Western Union lines

Your frustration with the 100's failure to respond to busy signals is common. It's not the hardware's fault but TELCOM's. The only way to make the 100 monitor the CTS line is with a BASIC or machine-language program. You can write

your own or contact Traveling Software, Software by Sigea or Micro Demon. All three firms offer telecommunications programs that solve the problem. — Ed.

Wiped Out

I am a journalism professor who uses a INEC PC-8201A for word-processing and moonlights as a copy editor for a newspaper. I use a powerful Atex VDT hooked to a main frame to edit stories and write heads.

I took my NEC and two tapes loaded with files to work the other night in my briefcase, stuck it under the desk and spent seven and a half hours processing copy on the Atex. The next morning I found that all my files had been wiped from both the NEC and tapes. So here's a warning: Keep your portable away from VDT terminals.

George L. Garrigues
Bridgeport, CT

Crash Reporting

I read with interest your article about how the St. Petersburg, Florida Police Department uses the Model 100 (March 1985, pg. 35). That's one of many uses in police work for the 100.

I'm a detective in a 120-man metropolitan police department. My duties include follow-up investigations on motor vehicle theft, vehicular assaults, insurance frauds and accident reconstruction. I use the 100 extensively to write reports. A popular spreadsheet helps me keep track of cases and their dispositions.

The 100 simplifies traffic accident reconstruction. I've written and copyrighted a program called TECHALBA (Technical Accident Investigation). It computes slide-to-stop speeds, drag factors, acceleration and deceleration rates, mass, kinetic energy, curve radius, fall, vault and critical speeds, and many other required figures.

The program is menu-driven and guides the user. Scrolling instructions on the last line of the screen eliminate looking up directions in a manual. Step-by-

step formula-solving is displayed and can be printed for a permanent record.

My 100 is the only one used on our department, but I'm working on a proposal to obtain 100s for our patrolmen and detectives. The officers who've seen TECHALBA in action are excited about its possibilities. Our department is also implementing a new computer-aided dispatch communications center. We're considering the 100 for digital communications during disasters and tactical operations.

William F. Ferguson
Bellevue, WA

Line-Feed Solution

In the November, 1984 issue a reader complained that there's no line-feed when uploading text. That reader found a solution applicable to the 100, but until I know more about the ROM of my NEC, I'm not going to poke around.

I came upon this solution: while in the menu, move the cursor to the file you want to send. Press F2. When asked for a name, type COM:. You'll see that even the .DO files will give a line feed.

This may help those who have a printer with a serial interface and are fed up with changing the settings each time you want to print.

C. Weyn
Tempe, AZ

Speedy Savings

I have noticed that BASIC programs are saved to tape faster than text programs on the 100. Recently I bought a neat program from Traveling Software called TBackup which saves the entire memory of my 100 to tape in about four minutes (I have 32K). The program bypasses the buffer system and saves everything through the BASIC mode.

I wish it were also possible to save individual text files at this faster speed. Is it technically feasible to write a program to save text files through BASIC? Such an
(continued on page 49)

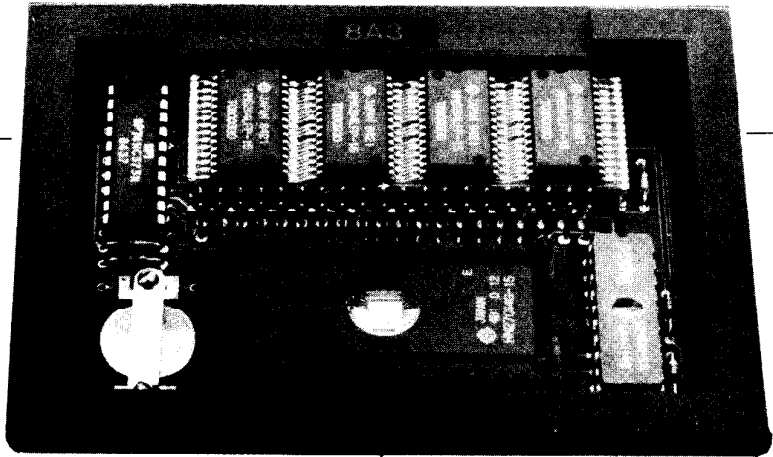
RAM SESSION

Memory bliss — PG Design Electronics Incorporated has introduced a 64K RAM memory module for the Model 100 that allows expansion to 96K RAM.

The module adds two 32K RAM banks to the Model 100, each of which can be accessed at any time. Available in two sizes, the one-bank 32K sells for \$250; the two-bank 64K lists for \$375. The 32K version may be upgraded for an additional \$150.

For more information, contact PG Design Electronics, 66040 Gratiot, Richmond, MI 48064, (313) 721-2744.

Circle No. 198



Free Info Accompanies Modem

The manufacturer of the Volksmodem 12, a 300/1200 bps modem, is offering a five-year warranty at no cost.

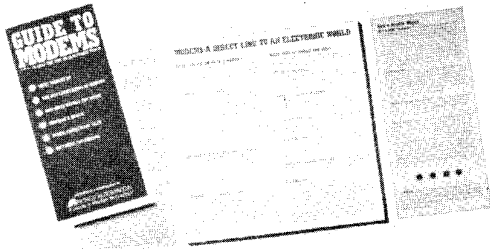
Anchor Automation's auto-dial, auto-answer modem retails for \$299. The company also manufactures a Hayes-compatible modem called the Signalman which sells for \$439. Their manual-300 bps modem costs \$79.95.

The company also has announced it will distribute a free telecommunications pamphlet. The Guide to Modems is

an eight-page booklet describing modem terminology, application and suggestions for product selection.

The pamphlet is distributed through Anchor Automation's dealer network, but also is available directly from the company. For information about either the modems or the booklet, contact Anchor Automation, 69813 Valjean Ave., Van Nuys, CA 91406, (818) 997-7758.

Circle No. 200



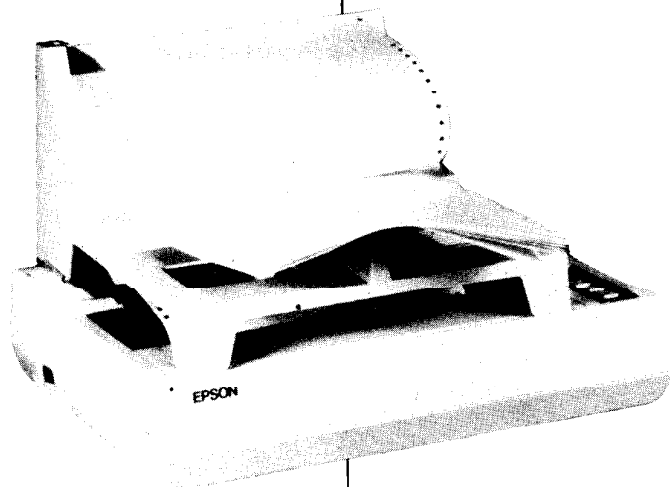
Paper Catcher

Buddy Products of Chicago has come up with a nifty device to solve a mundane problem: printer paper snarls. Paper Catcher neatly handles continuous fanfolded output from printers.

The lightweight plastic paper holder fits on top of standard 80- and 130-column printers such as the Epson MX, RX and FX series, the Okidata Micro-82 and Micro-92, and the Tandy DMP 120 and DMP 430. It sells for just under \$50.

For more information contact Buddy Products, 1350 South Leavitt St., Chicago, IL 60608, (312) 733-6400.

Circle No. 199



(continued on page 46)

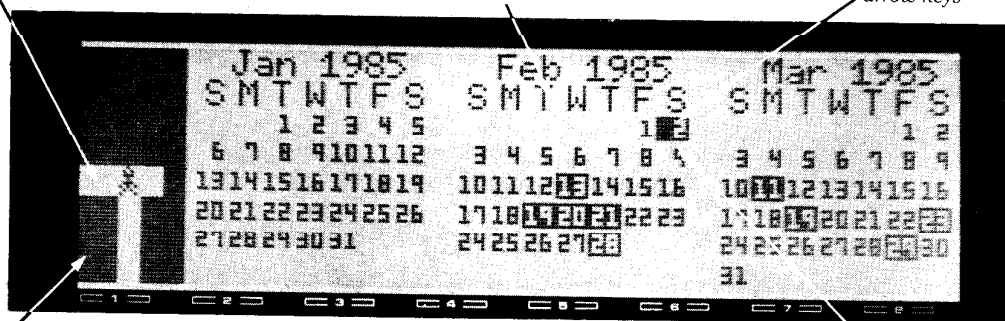
"It's about time someone wrote this software."

We've done it with TMPC (The Most Precious Commodity)

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Fast machine language program displays calendars in 1/2 second

Current day flashes, and can be changed with arrow keys



Fourteen other screens handle projects, print diaries, and monitor files

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Your TRS-80 Model 100 probably saves you time already. So why not use it to *manage* your time? The **TMPC** software from Acroatix transforms your Model 100 into a command center for appointments and projects.

More than a Calendar

Your Model 100 deserves more than a simple-minded replacement of a date book. The **TMPC** is designed around principles from Stephanie Winston's *The Organized Executive*, a popular self-improvement guide for anyone who wants to be better organized. Every **TMPC** feature has been carefully designed and tested to work for you.

Interested? Ask for our free demonstration program today. If you have a modem cable, we will

send it over the phone (see the box); the call takes about five minutes. Otherwise, send us \$3.00 for handling and we'll send a cassette with the sample. Discover the old-fashioned value in **TMPC's** space age design, and you'll agree that, "It's about time someone wrote this software."

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\$49.95 + \$3.00 shipping
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NY 1-800-962-1480 Ext. (353)
(operators take orders only)



COD orders accepted

AUTO LOG-ON PROGRAM FOR:

Free Sample

```
10 P#="16176575422" +
   " <=&ADAD?1tmpc^Mps>"
20 M=VARPTR (P#)
30 A=PEEK (M+1) + 256*PEEK (M+2)
40 CALL 21200
50 CALL 21293, 0, A
60 LOAD "MDM:BN1D", R
```

Note: Before running this program, connect your Model 100 to a telephone with the Radio Shack modem cable (see page 76 of the owners manual). Set TELCOM status to M8N1D.

Massachusetts residents must remove the area code in line 10.

Ac' rō·ă'tix Incorporated
P.O. Box 273 Wilmington, MA 01887

DOWNLOAD BY THE DOZEN

Software, software and more software — hundreds of programs for the 100 are to be found on the CompuServe 100 Special Interest Group (SIG). BASIC utilities, assemblers, text formatters, games and checkbook managers are available for only the cost of connect time.

Each of the programs on the SIG is stored in one of 10 different areas called data libraries. Each library is numbered and labeled by its contents:

DL	Contents
0	Text, SIG
1	Telcom
2	Sched, Adrs, Busnss
3	Games and Music
4	Tech Notes & Util.
5	Personal/Home
6	Products & Reviews
7	NECy & Oly
8	Groups & CO
9	Data News/Index

After you enter the SIG and see the Function: prompt, use the SIG command DL0 through DL9 to select a data library. Which library should be chosen? All programs uploaded from this magazine will indicate the appropriate data library. Next month SIG 100/200 will cover how to search data libraries for files of interest. This month let's assume that the name and data library of the file to be downloaded is known.

The data library will prompt you with its name — DL0 through DL9.

Downloading Steps

1. Type S filename.ext/DES. The SIG will reply with the name of the file, author and brief description. If a checksum is given with the description, write it

2. Press F2 for download and type a Model 100 name for the file. Press Return. The DOWN message over F2 will become inverse-video.

3. Type TYPE filename.ext. Press return. The file will appear on the screen and will be saved in RAM.

4. When the DL0 - DL9 prompt appears, press F2. Exit the SIG, Compu-

Serve and TELCOM.

5. Go into TEXT and examine the downloaded file. Remove extraneous characters such as carriage returns and CompuServe prompts from the start and end of the file.

6. If you have the DOWNCK.BA program in RAM, run it against the file. If the checksums don't match, look at the file to see if anything's missing.

7. Go into BASIC and LOAD the file. For more information read Danny Goodman's article, this issue.

Table one is a sample session, downloading DOWNCK.WM3 from data library four. The entire process from dialing to the end of the download took less than four minutes.

Software Flash

A new Tiny BASIC compiler is "...perhaps the most important develop-

ment for the Model 100 since XMODEM and the Chipmunk." That's the word from SIG Sysop Dave Thomas.

SIG member Michael Weiblen's program, which creates machine-language programs from BASIC source code, is well-suited for games and mathematical programming. For those who relished Ron Balonis' COBUG in the March issue, TCOMP is exciting news.

TCOMP is available in two files: TCOMP.DOC and TCOMP.101. Both are in the DL4 section of the SIG. Document file TCOMP.DOC explains the limitations of Tiny BASIC and describes the TCOMP.101 compiler program.

To put Tiny BASIC through the ropes, try PONGTC.100. SIG member Rick Perry designed this two-player arcade game to demonstrate TCOMP's compiler power. PONGTC.100 is located in DL3.

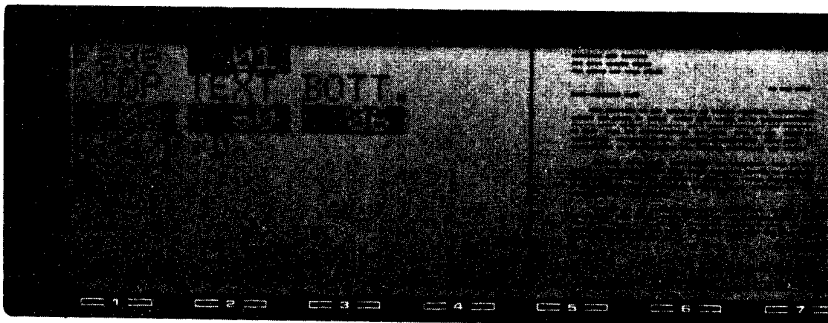
The checksum for TCOMP.101 is 328,384. PONGTC.100 is 258,912. □

table one

Page PCS-154

```
!go pcs-154
CompuServe
Request Recorded,
One Moment, Please
Thank you for Waiting
Welcome to Model 100 SIG, V. 3B(25)
Your name: PORTABLE 100/200 76703,372
Last on: 02-Apr-85 16:44:44
You are user number 331585
Function: dl4
Using Section 4 data library.
DL 4: scan downck.um3/des
[70235,232]
DOWNCK.WM3 05-Apr-84 930 374
Keywords: CHECKSUM DOWNLOAD
Download this short program. Then run it to compute a raw checksum of the ASCII
values of every character in a .DO file. Compare this value with the known checksum of
the correct file to be sure your copy is accurate.
Delete any extra characters at the start and end before DOWNCKing it.
DOWNCK of this program = 60,157 Woods Martin
DL 4: type downck.um3
```

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Only Text Power 100™ has Page Plot.™ At a glance you can see the full format of every page before printing.

Include the make of your printer with your order.
Text Power 100™ works with parallel printers only.
Include \$10.00 for each additional printer.
Make checks payable to The Covington Group.

Send your order to:
The Covington Group
310 Riverside Drive, Suite 916
New York City, N.Y. 10025
Questions? Phone 212 678-0064/864-1700

Name _____

Street _____

City _____ State _____ Zip _____

Phone _____ Master/Visa Card No. _____ Exp. Date _____

Computer _____ Signature _____

Who says size doesn't count?

From the software ads around here, you might get the impression that your portable computer can store the knowledge of the universe. But it can't. That's why you need to know just how big the software is. Or how small.

Keep this in memory: Text Power 100™ is 2,500 bytes long. Elf-writer (by Ceres Software) is 10,000 bytes long. Write + (by Portable Computer Support Group) is 3.5K. The Traveling Writer™ (by Traveling Software) is 5000 bytes. When our competitors' ads don't tell you how big their programs are, they're trying to tell you something.

Size is just one advantage of our 100 percent machine language code. The other is speed. Text Power 100™ formats faster than you can imagine. Faster than all of the competition's products working in parallel. Fast enough to format the Bible in 12 minutes. Right-justified.

Text Power 100™ features: Page Plot.™ merge text, edit mode, label printing, page numbering, formatted preview mode, parameter/file memory, right justification, footers, headers, internal format controls, page length, top margin, bottom margin, left margin, right margin, double/single spacing, vertical center, horizontal center, page break display, new page command, full printer customization and more.

Text Power 100.™ For the Model 100, Olivetti M10 and NEC PC-8201A. \$49.95 plus \$2.00 shipping. Available exclusively from The Covington Group/310 Riverside Drive, Suite 916, New York City, NY 10025/212 678-0064, 864-1700.

TEXT POWER 100

Anyone who experiences LUCID[®] won't settle for anything else.



is an advanced spreadsheet that is a program generator as well.

on Snap-In[™] ROM

Changes your Model 100 into a totally different computer with capability you never thought possible.

PCSG says "Satisfaction Guaranteed or your money back within 30 days!"

PCSG was the first to develop software for the Model 100. That was back in April of '83. We could have rushed out onto the market with an inferior spreadsheet, but we chose to undergo a significant development and produce a spreadsheet for the Model 100 that would truly be world class. A spreadsheet that would rival Lotus 1-2-3*.

LUCID[®] is here now. It is on a ROM cartridge that snaps into the compartment on the back of your Model 100. It takes no memory to load and no memory for operating overhead. That means you have the full 29.6k bytes free to store your data.

LUCID[®] is amazing in so many ways. First of all, it is memory conserving. It will let you build a large spreadsheet—255 row by 126 column capacity. Where other spreadsheets actually consume 4 to 5 bytes for an unused cell, LUCID[®] uses no memory for empty cells. This lets you build huge spreadsheets in

your Model 100's RAM that could consume 80 to 100K on a desktop computer.

Secondly, LUCID[®] is fast. Whenever you ask other spreadsheets to calculate a file of any size, you can get up and go get a cup of coffee before they are through. LUCID[®] is so rapid, a 36 column corporate financial statement took less than 4 seconds to calculate.

Thirdly, LUCID[®] has features you won't find in most other spreadsheets. For example, when you type a label (text) it will cross column boundaries, in other words when you type a label or title it will appear as you type it irrespective of column width. LUCID[®] also allows you to set column widths individually, and of course LUCID[®] has insert row and insert columns, as well as other standard features. LUCID[®] even lets your formulas refer to cells in other spreadsheet files. Further, LUCID[®] has what no other spreadsheet has: Cut,

Copy, and Paste. It uses the same keys as Cut and Paste in TEXT, but here's the difference: it takes all the formulas with it when you paste and they all automatically recalculate with the entire sheet.

And here is what is really amazing. You can copy or cut from one spreadsheet and paste into another spreadsheet or even a TEXT file.

LUCID[®] supports all BASIC math functions as well as Log, sine, cosine, tangent, exponentiation and other sophisticated math functions.

LUCID[®] has so many features that you will say "this is what I need in a spreadsheet", such as automatic prompting of an incorrectly typed-in formula showing just where the mistake was made.

LUCID[®] has expanded "go to" functions that remember and produce a windowing capability. It has a special block definition capacity that makes many other

features possible that refer to whatever section of the spreadsheet you designate. LUCID® has many enhancements that make it easy to use. Once anyone begins to use it they say "this is the way a spreadsheet ought to work".

In the same fashion as TEXT creates ".DO" or document files, LUCID creates ".CA" or calc-sheet files. In the same way you can get into any document file just by putting the wide bar cursor on the filename from the main menu, when you put the cursor on any ".CA" file, you are immediately working on that sheet.

But perhaps most remarkable is that LUCID® is not only a spreadsheet but a program generator as well. First, LUCID® lets you protect all cells against entry or change, and then unprotect just the cells you want for someone else to use as input fields.

Combined with the spill-over length feature, you can design input questions such as "What is your name?, What is your age?, Choose which applies to you: a) TALL b) MEDIUM c), SHORT, Type in the state where you were born". You can provide complete on screen instructions for use.

This lets you create a series of prompts so that you can have a person totally unfamiliar with computers, entering information that you want to process, to create a personalized report based on calculations made using the facts and numbers they put in.

You see, LUCID® will not only process values, but text input as well so that the facts other than numbers can be responded to. LUCID® has the ability for you to refer in a formula to cells containing words. This feature combines with the capacity of doing "if then" statements that work by doing table look-ups against even massive X/Y charts of text or numerical information. A simple example based on the inputs

illustrated above would be to report the recommended calcium intake for tall people based on their age. You can make even more specific inquiries and reports, such as recommended amount of Aerobic exercise based on age and weight. Answers can be values or words depending on the situation, eq. 150 lbs., 25 years might be "30 minutes" but 280 lbs., 50 yrs might be "Warning: Aerobic exercise could be dangerous". You can produce a program that responds to inputs with no programming knowledge whatsoever.

You can prepare a report section in your spreadsheet with instructions to your user for printout, and they can produce a personalized printout that responds to their input. All your formulas and tables that did the calculations and provided the facts are invisible to that user. LUCID® is useful for doctors for patient questionnaires, trouble-shooting technicians, purchase clerks, people doing job quotes, stores for customer workups, insurance agents and anybody who needs to process specific facts and numbers to produce a report based on those responses.

LUCID® comes with a manual that explains not only the characteristics of LUCID®, but will train you how to use a spreadsheet even if you have never seen one before. You are shown how to do budgets, forecasts, breakeven analysis amortizations and many other types of personal and business reports and calculations.

User friendly is such an over-used term in this industry, but we can tell you that everyone who uses LUCID®, who has experienced any other spreadsheet, says that LUCID® is amazingly easy to use. A typical comment has been "I have never seen a spreadsheet that does so much, and yet LUCID® is so much easier and faster to use."

LUCID® is a result of a most exhaustive developmental effort in which PCSG's objective was to develop a spreadsheet that was better than the state-of-the-art. We are so pleased because LUCID® provides for the Model 100 spreadsheet capability you cannot equal on a desktop computer. Plans are underway to offer LUCID® someday for larger computers, but for now TRS 80 Model 100 owners have the good fortune of having this powerful exciting ROM program exclusively.

LUCID® is the easiest to use, fastest and yet most feature-rich spreadsheet, with capability that takes it far beyond the definition of a mere spreadsheet. We are so excited about LUCID®, because it changes the Model 100 into a totally different computer with power and function most never dreamed possible.

LUCID® is, in our opinion and that of those who have examined it, a breakthrough. We sell it on a 30 day trial. If you are not completely satisfied, return it within 30 days for a full refund. Priced at \$149.95, on snap-in ROM. Mastercard, Visa or COD.

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© SPEC COMPARISON

	Lucid	1,2,3	Multiplan	Visicalc
Cut and paste into other spreadsheets or TEXT	Y	N	N	N
Individually variable column widths	Y	Y	Y	N
References to labels in formulas	Y	N	N	N
# Rows	254	2048	255	254
# Cols	126	255	63	63
References to cells in other spreadsheets	Y	Y	Y	N
Two dimensional table lookups	Y	N	N	N
Cell protection	Y	Y	Y	N
Redirectable output	Y	Y	—	N
Long labels spill over column boundaries	Y	Y	N	N
Insert row / col	Y	Y	Y	Y
Delete row / col	Y	Y	Y	Y
Replicate	Y	Y	Y	Y
Copy	Y	Y	Y	Y
Absolute and relative cell references	Y	Y	Y	N
Function to count cells occupied by a value	Y	N	Y	Y
SQR				
SIN				
COS				
TAN				
ATN				
LOG				
EXP				
INT				
TBL (Lookup, Choose, etc.)	Y	Y	Y	Y
RND				
SUM				
CNT				
MAX				
MIN				
★★				
Edit keys work on initial input	Y	N	N	N
Natural order of recalculation - with detection of circular references	Y	Y	Y	N
Automatic syntax checking of input - cursor stops at your mistake	Y	N	N	N
'Wander' mode on input of formulas to 'point' to cell references	Y	Y	Y	Y
'Wander' mode on edit of formulas	Y	N	N	N
'Go to' remembers where you 'came from'	Y	N	N	N
Sort by column and row	★	Y	Y	N
Graphing of selected ranges	★	Y	N	N
Automatic insertion of date into edit line with control-D	Y	N	N	N
Super compact - empty cells take no memory	Y	N	N	N
Table lookups can use labels as keys	Y	N	N	N
Available now on Model 100	Y	N	N	N
Automatically fits wide spreadsheets to narrow paper	Y	Y	Y	N
Ability to suppress zeros on printout	Y	N	N	N
Allows multiple printer fonts in same spreadsheet	Y	N	N	N

These Lucid functions operate on rectangular ranges as well as individual rows and columns.

- ★ Extensibility by optional personality modules, with function key access.
- ★★ Lucid is designed to perform by simple one time entry formulas all other functions not provided as built-in.

Speed and Precision Comparison				
All benchmarks performed on a spreadsheet occupied by 600 formulas. all times in seconds.				
	Lucid on Model 100	123 on IBM PC	Multiplan on IBM PC	Visicalc on IBM PC
Sum of 600 cells	2.0	1.4	11.5	7.0
Insert column	0.5	2.4	11.0	6.0
Square root 600 cells	133	12.0	112	298
Replicate 100 rows	20.0	1.5	20.0	12.0
Decimal precision	14 digits	11 digits	14 digits	12 digits

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Circle No. 161

By J.D. HILDEBRAND

It is appropriate that SoundSight, the maker of bubble-memory disk emulators for the Model 100, has a Hollywood address. The glittery city's predilection for illusion is mirrored in the company's product.

SoundSight began promoting its Magnetic Bubble Memory module in the third quarter of 1984 with a collection of impressive and expensive brochures. The company claimed that its product would provide virtually unlimited storage for Model 100 users in a form that consumed less energy and was significantly more portable than disk drives.

Later, when SoundSight began advertising their product, the ads read: "No delays . . . Inventory in stock — immediate delivery."

On March 28, 1985, more than six months after the first promotional materials were mailed to magazine editors, SoundSight supplied Portable 100/200 with a semi-working bubble-memory module. Several of the module's promised features weren't implemented, and the documentation — marked "Beta Test Version 1.2, not for general release" — contained errors and handwritten corrections.

A subsequent shipment, which arrived late even though SoundSight's shipping deadline was postponed twice, contained a bubble module that was closer to production standards. But this unit too had rough edges.

By the time you read this, hopefully SoundSight will have production versions of the Magnetic Bubble Memory in stock.

TINY BUBBLES

Bubble memory has been variously touted and ridiculed as a mass-storage medium for computers. Proponents sug-

gested in the mid-70s that bubble banks would replace hard disk drives as the chosen storage device for mainframes and minicomputers.

The arguments centered around bubble's solid-state features. A bubble-memory bank works just like random-access memory (RAM). There are no moving parts to break or wear out. No delicate heads or disk surfaces to crash during a power failure. No heavy electrical requirements. No delays while loading programs or data.

Despite the hoopla and the bubble's undeniable attractiveness, the technology hasn't caught on. Its proponents didn't foresee the economies of scale and product evolution that have reduced the price of Winchester storage. Nor did they count on microcomputer owners' willingness to tolerate the delays and relative unreliability that offset floppy disks' low media cost. And perhaps they should have anticipated the inertia that is often the prime hurdle between new technologies and market acceptance.

This isn't to say that bubble memory has found no applications. The technology has found uses in the mini-computer environment and, to a small degree, in portable computers such as the Model 100.

Bubble's ruggedness and low-power requirements have offset its high cost for a number of portable computer manufacturers. Bubble memory is built into laptop computers from Sharp Electronics, Grid Systems and Teleram Communications. The Sharp PC-5000's bubble scheme is particularly noteworthy. The computer has a socket that accepts interchangeable bubble cartridges. The user treats the cartridges just like super-rugged floppy disks.

SOUNDSIGHT'S SOLUTION

The SoundSight Magnetic Bubble Memory is a good idea. A battery-powered bank of memory that adds just an inch to the 100's thickness and about two pounds to its weight, it provides as much as 512K of program and data storage. A SoundSight official says a one-megabyte bubble array will be available later this year.

Operating the bubble-memory module is simple and convenient for some applications. But for others, more than a little BASIC programming skill is required.

To save a program to the bubble, the user precedes the filename with the bubble identifier B:. SAVE "PROGRAM" saves a BASIC program in the 100's RAM; SAVE "B:PROGRAM" saves it in the Magnetic Bubble Memory. SAVE "B:PROGRAM.DO" stores the program in text format instead of compressed binary.

Unlike most BASIC commands, which may be combined on one program line using a colon as a delimiter, the bubble's RUN, LOAD, SAVE and OPEN commands must appear in program lines by themselves. This, according to SoundSight, is due to parser limitations. Bubble files may be opened in INPUT, OUTPUT and APPEND modes.

Saving a text file isn't as simple as saving a program. Since the Model 100's built-in TEXT program doesn't recognize the bubble as B:, users must create and save files in RAM using TEXT, OPEN them and read in lines of text with a BASIC program, and SAVE separately the document in the bubble module.

Alternately, users can load SoundSight's VRAM, an operating system that performs the task from the 100's menu.

Within BASIC, the bubble module may be addressed using the familiar INPUT# and PRINT# commands. MERGE works on bubble files exactly as it does on 100 RAM files. RUN "B:PROGRAM" loads and runs a BASIC program, but the 100's LOAD "PROGRAM".R command doesn't work.

INSTALLATION & OPERATION

The Magnetic Bubble Memory plugs into the Model 100 via the 40-pin expansion bus located on the bottom of the computer. Users remove the four screws that hold the 100 together, place the Magnetic Bubble Memory under the computer and attach it with four longer screws.

It's a logical assembly procedure that
(continued on page 56)

100 Ends Deaf Editor's Isolation

By HENRY KISOR

I talk to my Model 100. "So," you say, "there's nothing unusual about an intimate relationship between a 100-user and his or her machine. Some of my best conversations are with my 100."

Eavesdrop a minute, though. This scenario will show you the difference.

I flop on a New York hotel bed, pop a pair of acoustic cups onto the phone, plug in the 100 and dial my Chicago home. The connection is made in split seconds.

"How many nulls do you need?" the 100 screen asks, echoing the computer 800 miles away.

"O," I type.

"Can your terminal use lower case?" inquires the screen.

"Y," I answer, for yes.

"Henry Kisor's private RBBS," (remote bulletin board system) announces the computer in Chicago, which then requests a name and password. I type those and a menu appears. I press C for chat and a message appears telling me the sysop (systems operator) is on line.

"This is Henry," I type.

"Hello, honey," my wife answers.

I've just used the 100 to keyboard-talk with my wife on a computer running bulletin-board software. Why didn't I just call her by voice?

Because I'm deaf — and have been for 41 of my 44 years. I lost my hearing from meningitis as a toddler.

When I bought my first computer system in 1982, I only intended to use it for freelance articles. For most of my life, I couldn't use the telephone. Others had to make phone calls for me. That worked but left me dependent.

For confidential matters I had to use mail. Business that took hearing people a few seconds with Ma Bell took me days or even weeks.

TAPPING NOT THE ANSWER

Technical advances enabled me to use the phone, but slowly and primitively. Then along came Sensicall about 18 years ago. It was a lamp the size of a quarter in a small box wired to the phone that allowed the user to receive messages in voiced Morse code. "Di-di-di dah-dah," the person at the other end would say to the befuddlement of unwitting onlook-

ers. The lamp would flash in response.

The deaf user replied in voice if he had speech (which I have) or in Morse if he didn't. This worked but unfortunately ham radio operators are generally the only people who know Morse code.

Sensicall was also a one-way device. A deaf user could make calls but not receive them, because he couldn't hear the phone ring.

Nine years ago I graduated to a TDD (telecommunications device for the deaf), a typewriter-like gadget with a tiny light-emitting diode above the keyboard. The phone handset fits into rubber acoustic coupler cups atop the device. Users can tap away on the keyboard with reasonable speed. A strobe flasher attached to the phone lets them know when it rings.

EXPENSIVE AND UNCOMMON

This was a big but expensive step. Both ends of the conversation need TDDs to communicate. Each costs about \$250. While a few institutions and businesses have TDDs for their hearing-impaired customers, by and large the TDD network is limited to the deaf community.

There's little interaction with the hearing world. I made airline and motel reservations with this device but otherwise was limited to calling from my office TDD to my family on the home TDD.

Three years ago I bought an Osborne and a Hayes Smartmodem. A year later I got a Model 100. My life is changing finally.

DUMPING GROUND

I bought the Smartmodem to transmit articles from the Osborne at home to the big Atex mainframe at the Chicago Sun-Times, where I work as book editor and computer columnist. My 100 enabled me to take notes on the fly and transfer them to both the Osborne and the Atex for assembly.

It wasn't long before I discovered public-domain electronic bulletin board software for CP/M computers: `BYE.COM` to answer and hang up the phone and `XMODEM.COM` to capture file transfers. This enables me to use the Osborne as a mother ship on which to dump Model 100 files from telephones hundreds of miles away. I use `XMO-`

`DEM.100` from the CompuServe Model 100 SIG (special interest group) to give my 100 the `XMODEM` file transfer protocol capability.

TWO-WAY AT LAST

Inspiration struck. How about two other public domain CP/M programs for the Osborne: `CHAT.COM` and `RBBS.COM`?

The former enables two remote computer users to keyboard-talk with each other. The latter allows messages to be left and picked up by either end. I found a friendly hacker who assembled and tailored a complete set of programs for me: Henry Kisor's Private RBBS.

It was a quantum jump. I could at last communicate with hearing people who don't own specialized equipment for the deaf — just a computer and a modem. And look what I can do on the phone:

- As a book editor, ask reviewers to take on books via electronic mail on CompuServe, the Source and Delphi as well as on my private RBBS;
- Conduct keyboarded-phone interviews of authors;
- Get readers' technical questions answered by posting them on local electronic BBS accessed by a dozen or more experts;
- Chat on the Model 100, Osborne or my new Zenith Z-150 with friends who own computers; and
- With the RBBS set up on the Osborne, keep in touch with my family from the office or from out of town.

WORLD AT MY FINGERTIPS

I can't overemphasize the feeling of confidence the Model 100 gives me as I tote it everywhere in my briefcase, even abroad. Four decades of frustrating isolation are over. And it hasn't taken a lot of money or exotic hardware. □

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FACE TO FACE

BAR-CODE READER

The 200 bar-code reader interface and the 100's are alike. When the bar scans something white, an interrupt 5.5 is generated and the data is presented to the CPU at bit 3 of input port BB. Bar-code driver software must be rewritten for the 200, but the same wand is used.

SERIAL PORT

Serial I/O performed by the 100 is through a 6402 UART (universal asynchronous receiver/transmitter). The 200 uses an 82C51 USART (universal synchronous/asynchronous receiver/transmitter). The synchronous capability of the USART is not used. Hereafter, it'll be referred to as a UART.

Before sending serial output the CPU must verify that the previous character has been sent. This is confirmed at bit 0 of input port CF (or C1, C3, C5 ... CD). The byte to send is output to port CE (or C0, C2, C4 ... CC). Transmit status in the 100 is at bit 4 of input port DU and bytes are transmitted at output port C0.

In either machine received data is announced by the RST 6.5 interrupt, and the data byte is at input port C0 (or C2, C4, C6 ... CE). Framing, overrun and parity errors must be checked for. In the 200 this is received from bits 3, 4 and 5 of input port CF whereas in the 100 the errors show up at bits 2, 1 and 3, respectively of input port D8.

In the 200 the RS-232 handshake signals may be controlled in software:

RTS	Output port CE, bit 5
DSR	Input port CF, bit 7
DTR	Output port CE, bit 1

The CPU cannot gain access directly to the signal CTS provided from outside, but CTS can be used to control data transmission. If bit 0 of port CE is turned on, then the UART will transmit only when CTS is asserted. Otherwise CTS is ignored.

This departs from the 100 design since it ignores all handshake signals and stops transmission only upon receipt of a control-S. The 200 can't always plug into a serial circuit where a Model 100 did. A 200 user might need a null modem to transmit and receive.

ROM routines used in COM: input and output are otherwise identical to their Model 100 predecessors, except for addresses:

Subroutine	100 address	200 address
DISC	52BB	61BA

CONN	52D0	61D0
DIAL	532D	622B
RCVX	6D6D	8508
RV232C	6D7E	8519
SENDQC	6E0B	8608
SENDCS	6E1E	8617
SD232C	6E32	8624
CARDET	6EEF	874A
SNDCOM	6E3A	8629
BAUDST	6E75	86AD
INZCOM	6EA6	86DE
SETSER	17E6	191D
CLSCOM	6ECB	87B5

TELECOMMUNICATIONS

The TELCOM program in the 200 differs in a few respects from the 100's. If you push F8 to disconnect and answer N, you'll end up out of terminal mode. This is disconcerting the first time it happens. There's good news though. You can go to the main menu, run a program, re-enter TELCOM and push F4 putting you back online — all without losing the distant computer. Pushing F8 and Y disconnects the line just as in the 100.

MODEM

Modem circuitry in the 200 is similar to that of the 100. The differences lie in the ability to do tone-dialing, which can be done through the acoustic coupler.

Originate/answer switching in the 200 is done through output port BA, bit 1. DIR/ACP status, available to the 100 programmer at input port BB, bit 5, is not available to the 200 programmer.

Jumpers are provided making it easy to convert the 200 to CCITT (European) tones rather than Bell-103 (U.S.A.) tones, and back again.

CASSETTE

The cassette hardware is identical in both machines. Gains, audio levels, and motor control specifications are the same. Cassette I/O take place through the interrupt mask, with the SIM and RIM opcodes. File formats are the same, and BASIC and document files may be freely exchanged between the two computers. Command files also may be transferred, but because of the ROM subroutine address differences, few machine-language programs from one computer will run on the other.

Cassette motor control in the 200 takes place through the same port (bit 3 of port E8) as in the 100. The method does differ in one respect. In the Model 100 the previous port contents are stored by the operating system at FF45. The Tandy 200 stores them at FCFF. Here are the common subroutines:

Subroutine	100 address	200 address
DATAR	702A	88B3
CTON	14A8	15C0
CTOFF	14AA	15C2
CASIN	14B0	15C8
CSOUT	14C1	15D9
SYNCW	6F46	87D1
DATAW	6F5B	87E6

PIEZO BEEPER

The piezo element in the 200 is just like its predecessor. In both computers, output port BA, bits 2 and 5 activate and toggle the crystal element, while the frequency divider capabilities of the 81C55 chip provide the SOUND command in BASIC. The subroutine MUSIC is the machine-language equivalent of SOUND, with Model 100 address 72C5 and Tandy-200 address 8BC0.

Sending a decimal 7 to the screen makes the familiar BEEP.

File Handling

Subroutine	100 address	200 address
Directory	F962	F252
MAKTXT	220F	2D7C
CHKDC	5AA9	6E4D
GTXTTB	5AE3	6E8C
KILASC	1FBE	2AB4
INSCHR	6B61	829C
MAKHOL	6B6D	82A8
MASDEL	6B9F	82DA

System routines

Subroutine	100 address	200 address
INITIO	6CD6	841C
IOINIT	6CE0	8439
MENU	5797	67A4

TIMEKEEPING

The Model 100's clock and calendar work with a uPD1990AC chip. In the Tandy 200 a more sophisticated chip with alarm function is used, the RP5C01. In each case the nicad battery keeps time while the computer is off.

The 200 has a delightfully clever circuit which allows the chip's alarm signal to power up the computer even when power has been switched off. Battery drain is thus negligible even when an alarm has been set for power-up.

In the 100 resetting time requires the CPU to go through a cumbersome software parallel-to-serial conversion. The 200's clock chip does most of its own addressing, so parallel loads to and from ports 90 through 9F suffice to determine time, date and alarm.

(continued on page 23)

Great Expectations

Two basic and sometimes conflicting factors fuel the evolution of micro-computer systems — and sometimes haunt their developers.

Technological innovation yields computers that appear on covers of trade magazines and serve as models for a seemingly inevitable spate of copycat products.

Marketing savvy results in systems that synthesize technological maturity and insight into users' real needs, rather than industry-hyped expectations. The products that result from market-driven management rarely are as flashy as their state-of-the-art "breakthrough" cousins, but generally are more cost-efficient to produce and sell, less expensive for the consumer and result in less fuss over promises made but not kept.

Tandy has a track record to prove that theorem. The TRS-80 was a technological innovation, but it became a standard. The rest of its family (Model 100 not included) were more or less upgrades of an established success.

The TRS-80 Model 100 was an innovative combination of technology that meets real needs. The Tandy 200 is designed to be an upgrade that builds upon that success, almost without regard on Tandy management's part for the generational leaps other portable manufacturers are making.

Clearly the 100's big little brother the Tandy 200 is not a technological breakthrough. In the laptop computer market its components are yesterday's news.

Instead of grabbing for the technological gold ring, Tandy sought to meet what management understood to be users' needs with mature, existing components and a compatible Model 100 upgrade path. If there's fault to be found here, it may be one of timing and the difference between what a user really needs and what he perceives that he needs.

Tandy may have misread what the consumer would be bombarded with in competing portables. The fact that they began designing the 200 at about the same time as the 100 was introduced may have been a timing accident.

Excited by positive reviews and overwhelming predictions that the 100 would be a winner, Tandy management committed to a next-generation project. Brainstorming sessions on the 200 began in February 1983, according to Bill Walters, the Radio Shack buyer who fostered the

100 through its design and introduction. That was fully two years before the 200's introduction.

Early 200 designs called for IBM compatibility and a 25-line, 80-character display, Walters says. But hardware engineers reported that no product with an IBM-compatible keyboard could be small enough to be truly portable.

By summer 1983, only four months after the 100's introduction, the 200 was conceived as an upgraded follow-up product to the Model 100. "No detail escaped scrutiny," Walters recalls. "Both sides (Tandy and Japanese hardware supplier Kyocera) spent a summer weekend putting the hardware specifications together. Two days later negotiations ended with a consensus on the product and the price: The unit would cost \$1,000 or less."

In September that same year Walters headed the Tandy team that roughed out details of software functions with Microsoft, the Seattle-based developer of the Model 100's internal programs. Walters reports that he and Microsoft "were in agreement about at least one thing. The next generation of portable software would include the features that made the 100 so popular, plus extras."

BASIC renumbering, hexadecimal math and random-access files were sacrificed to maintain Model 100 compatibility, while TELCOM and TEXT were enhanced to provide further functions. The team also settled on an electronic spreadsheet, Microsoft's Multiplan, as a built-in standard feature for business users.

CASTLES IN THE AIR

"The 200 is an upgrade of the 100," says Ed Juge, director of market planning for Tandy computers. "It's for people who want more capability than the 100 provides."

Tandy based its 200 design on Model 100 feedback, according to Juge. The company has monitored the CompuServe Model 100 Special Interest Group, met with Radio Shack store managers, tallied and analyzed phone calls, and solicited information from regional and district sales managers.

Juge reports that none of this data was put through a rigorous market test. That's probably not unique. What's significant, however, is that most of the information was collected after the 200's design was determined.

CASTLES DOWN THE STREET

Tandy believes the 200 will find even more applications in business than the Model 100 has. "Dow Jones has about four hundred Model 100s," Juge says, "and we've probably sold one to every working journalist in the world. There's a ton of them in the White House."

Hyperbole, probably. The 100 may have sold by the ton, but still not in sufficient numbers to prevent company officials from calling its sales figures disappointing. "Eventually there may be more than one" winner in the portable market, Juge says. "But one thing's for sure — there isn't as large a market for high-end portables (like the Hewlett-Packard 110, Data General One and Texas Instruments Pro-Lite) as people thought. People want simple, straight-forward machines.

"I don't know very many business people who *couldn't* use the 200," he continues. "There are very few people who don't need to write reports and memos. The 200 is perfect for anyone who does text preparation, outlines speeches or maintains small spreadsheets."

The company hopes the product's deliberately chosen monicker will help open doors in the business world. Radio Shack's traditional markets are consumer electronics and entertainment devices. Now that the company is moving into business markets, the Radio Shack brand name has potential disadvantages. The Tandy name delineates a new image for the business-product line, Juge believes.

Despite the business emphasis, the company isn't ruling out the home and hobbyist markets. "It's not just for travelers," Juge says. "You can use it at home sitting on the couch or on the bed — not just the computer room. I like to use mine outside by the swimming pool."

CASTLES WE NEED

"The 100 is a convenience item," says Juge, "and the 200 improves on it." It's the *idea of convenience* — embodied in the 200 — that Radio Shack is trying to sell. Tandy hasn't given consumers what they've asked for — and apparently didn't try. What the company *has* introduced, it says, is an improved tool for simplifying life. And Tandy hopes buyers will be people who believe their lives need simplifying. □

We've done it again!!!

More super software for your Model 100, Tandy 200 & NEC PC8201A!

MEN-U-TILITY

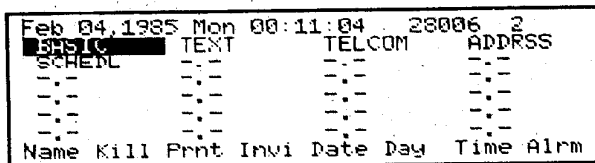
Men-u-tility is a powerful new utility for your Model 100. Once installed it is completely automatic and comes up when ever you would normally return to the main menu. As you move the cursor bar over the files, the length of each file is instantly displayed in the upper right corner. Men-u-tility adds 8 function keys to your main menu. You can kill files, rename files, make files invisible, set the day, date and time without ever leaving the menu.

Men-u-tility is also a print formatter. With F3, you can print any .DO file to your printer and you decide the right and left margins, top and bottom margins and page length! F8 sets an alarm that will go off no matter what mode you are in, BASIC, TEXT, TELCOM, etc.

If you have the Disk Video Interface (not required), the menu will appear on whatever screen you are using.

Men-u-tility only requires 1.8K of RAM and won't conflict with your other machine language programs. (100)

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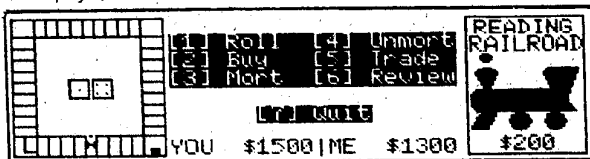


LET'S PLAY MONOPOLY*

It's you against the computer and the computer is a tough competitor. The computer makes all its own decisions. Super fast machine language graphics display the whole board at all times. You can tell at a glance who owns what property and the number of houses on each. It never takes more than 1 or 2 seconds for the computer to decide what to do. The computer is such a good player that you'll be lucky if you even win half of the time. (100,200,NEC)

*Monopoly is a trademark of Parker Brothers.

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ASSEMBLER

Our assembler is the answer to your assembly language programming needs. It has all the features you expect in an assembler and more! It requires less than 3K of your valuable RAM space and is relocatable to any convenient place in memory. There are several useful macros already built in. You can output all or any portion of the assembled listing to your screen or printer. An extensive 56 page manual covers the use of the assembler, the complete 8085 instruction set, useful sample programs and LOTS of information on the ROM and reserved RAM areas. (100,200,NEC)

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Melody Maker

Melody Maker is a musical program generator. Simple cursor controls are used to select a note and position it on the staff making it easy to enter in sheet music. You can even use Melody Maker to add musical routines to your own programs. (100,200,NEC)

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BYTEFYTER

Now you can expand the memory capacity of your portable computer by reducing the size of the programs that you store in it. Bytefyter is a 100% machine language program that does just that. It is relocatable so that it won't conflict with any other machine language programs that you use now, or may use in the future.

Bytefyter works on your BASIC programs just as they are, IN PLACE. It strips unneeded spaces and remark lines. But that's not all! Bytefyter is smart! Bytefyter combines the lines of the BASIC program to whatever maximum length you specify. Each line of a BASIC program takes 5 bytes just for the line number and pointer information. By combining lines, Bytefyter saves a tremendous amount of space, space that could be used for another program or text file. Bytefyter actually checks the logic of your programs and doesn't combine lines that would cause the program to crash.

Bytefyter is amazingly fast. It will do its job on even the largest BASIC program in just seconds! You'll want to use Bytefyter on all your BASIC programs, whether you wrote them or bought them. (100,200,NEC)

\$24.95

RENUMBER

Renumber is a machine language program that lets you renumber the lines of your BASIC programs IN PLACE! Renumber adjusts all references to line numbers throughout the program. It is completely relocatable so it won't conflict with your other machine language programs.

Renumber is FAST! It will renumber even the largest BASIC program in just seconds. You can renumber all or just part of a program. You decide the starting line number and the increment to use. It couldn't be any simpler. This is one utility that the serious BASIC programmer just can't afford to be without! (100,200)

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CBUG is the ultimate debugging tool for your lap computer. It only requires 3K of your precious RAM space and is relocatable to any convenient place in memory. CBUG is not just fast, small and easy to use, it is POWERFUL!! With CBUG you can step through an assembly language program or the ROM while it displays the registers, the status of the flags, and associated memory locations. You can set breakpoints and execute your code to that point. You can step through call instructions with a single keystroke and return to the point after the call. CBUG does number base conversion, hex addition and subtraction, search and display, search and replace and block moves of memory. CBUG allows you to alter the values contained in the registers, display memory and load values into memory like a monitor program. (100,200,NEC)

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SORT

Our Sort utility lets you sort any TEXT file in place. You can sort the file by any field. Sort is 100% machine language and only requires .8K of RAM. (100,200,NEC)

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FACE TO FACE (from 19)

The Model 100's habit of advancing the year has been cured in the 200. The problem was that the clock chip itself only kept month and date. The operating system did its own year calculation and often slipped up. The 200's clock chip does everything including the year.

The ROM routines work the same but have different addresses:

Subroutine	100 address	200 address
TIME	190F	1A7E
DATE	192F	1A9E
DAY	1962	1AC5

MACHINE LANGUAGE

Few machine-language programs from one computer will run on the other. The I/O ports are also different, so even a self-contained machine-language program (one which calls no ROM routines) likely won't run. MAXRAM in the two machines also differs. This is unfortunate since most programs written for the Model 100 (loading near F5F0 hex) can't load into the Tandy 200. F5F0 is firmly in the middle of the protected system RAM area.

EXPANSIONS

The expansion port is physically different but electrically identical. Portable Computer Support Group (PCSG) says their Chipmunk will soon be released with software and a cable for the 200. In the same marketing vein, anticipate Radio Shack to reissue the Disk/Video Interface for the 200 use. Only a software and cable change is needed for the switchover.

Option ROM pin assignments are identical in the two computers. Thus techniques used by PCSG and Polar Engineering to put an 8K EPROM into the 32K Model 100 option ROM socket will work in the 200.

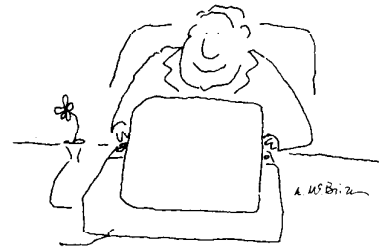
The means of bank switching is different for each machine. The 100's option ROM is switched-in by turning on bit 0 of output port E8. In the 200, bits 0-3 of output port D8 are used. Bits 0 and 1 determine the ROM bank in use: 00 is standard (BASIC, TELCOM, TEXT, etc.), 01 is MSPLAN, 10 is the option ROM. Bits 2 and 3 determine the RAM bank: 00 is bank 1 (standard RAM), 01 is bank 2 (option RAM bank 1), and 10 is bank 3 (option RAM bank 2).

BASIC

Model 100 programs which avoid CALL, INP, OUT, PEEK and POKE will run fine on the Tandy 200. The BASIC keywords and error codes are identical.

Please help us rate this article's overall value. If you've found it very valuable, circle 113 on the reader service card. If it was moderately valuable, circle 114—and if it wasn't valuable to you, circle 115.

FIVE VERY IMPORTANT REASONS WHY YOU SHOULD PROBABLY SKIP RIGHT OVER THIS MESSAGE



1. You're now getting all the value, benefit, power and pleasure out of your Model 100 that you need or want.
2. You simply can't use any more software.
3. Your own programing skills are finely honed and you can't benefit from handling the successful efforts of others.
4. You're not interested in saving quite possibly hundreds of dollars on software by availing yourself of good public domain stuff.
5. Or, worst of all, you're afraid your friends will think you're (gasp!) a hacker.

If, however, you could use more good solid application programs ready to run in your Model 100 or Tandy 200 . . . or games . . . or programing utilities . . . or graphics . . . or text formatters . . . then this message is indeed for you.

Or if you like the idea of getting maximum benefit out of your little computer and the time you spend in its brilliant, if arcane company, then, this is for you. And if you secretly like the idea of your acquaintances thinking you're not only a computer guru but quite possibly a personal friend of Stephen Wozniak, then . . .

. . . the Editors of PORTABLE 100/200 Magazine are pleased to introduce THE PORTABLE PROGRAM REVIEW — a new monthly newsletter featuring the best of public domain programs from the day of introduction of the Model 100 through and including everything that will follow for the Tandy 200.

Each month we will fill to overflowing the pages of THE PORTABLE PROGRAM REVIEW with the cream of the crop of ready-to-run program listings contributed by the readers of PORTABLE 100/200 Magazine — programs the Technical Editors have themselves run, tested and found to be particularly useful, worthwhile and fun.

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LOST

In Your 200?

The end of a BASIC program is marked with three binary zeros. The end of a TEXT file is marked with a 1A byte (26 decimal). The first six bytes of a machine-language program tell its start address, length and entry address in standard least-significant-byte/most-significant-byte (LSB/MSB) format.

EXECUTED ON THE SPOT

BASIC programs are executed in place regardless of where they're stored. This is true also for TEXT files. They're edited and revised where stored. Machine-language programs are moved to their start address before execution. To run one from menu, the memory address the program is using is first protected. CLEAR (see page 23 in the Tandy 200 BASIC manual) is used.

The second parameter tells BASIC where to set HIMEM. (The area from HIMEM to MAXRAM won't be used by BASIC to store variables.) A machine-language program is safe from BASIC trampling. With the cursor over a machine-language file and Enter pressed, the 200 moves the file from storage in low memory to its start address and executes it.

Because all programs and data are stored in RAM, it's easy for an error in the program to wipe out something important and cause a cold start. Backup copies of important data or programs should always be made before experimenting with machine language.

The system RAM area from EEB0 to FFFF is where machine variables are stored. The current cursor position, file directory and communication parameters are stored here. POKEing about in this area should be gently done.

USER RAM

The Tandy 200's read-only memory (ROM) in the Tandy 200 starts at location 0 and extends to 9FFF. User random-access memory (RAM) starts at A000 and extends to EEAF. The RAM from EEB0 to FFFF is system RAM, used to store the variables that the ROM programs need to operate.

To execute a ROM routine from BASIC, CALL is used (see page 22 in the Tandy 200 BASIC manual). For example the ROM routine to print a character on the screen is at location 20 (32 decimal). The entry conditions listed with this routine say that printed characters must be in the A register. To print B (66 decimal) on the screen, CALL 32,66 is used.

Some routines don't need parameters. To print time and date on the screen, CALL 28065 would be typed. To exit BASIC and go directly to TELCOM, CALL 24573 would be used.

The user RAM area from A000 to EEB0 is storage. All BASIC programs are stored first, TEXT files second and machine-language programs third. The rest of the space is used by BASIC to store variables and file I/O buffers.

BY GREG SUSONG

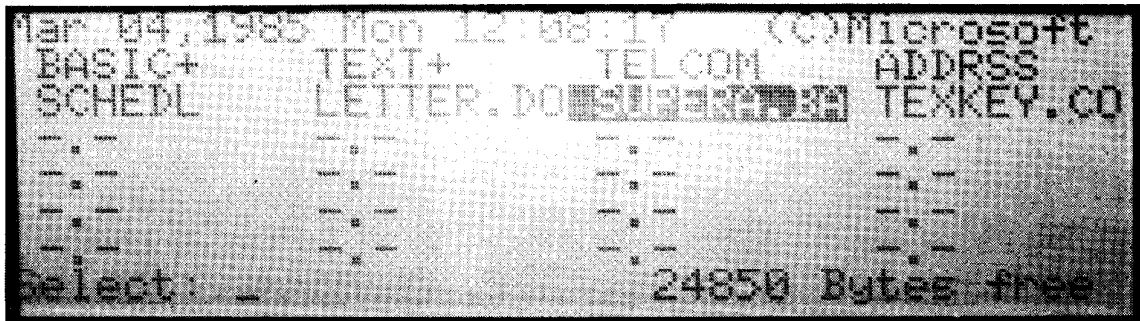
Here's a travelog and map to help you find your way around.

Tackling the read-only memory (ROM) unlocks the secrets of the Tandy 200 necessary to know before it's possible to write assembly-language software.

Disassembling the ROM gives the programmer control over program output. It's also a great help when programming in BASIC. Each usable routine is documented with the entry and exit conditions needed to perform functions (see ROM map).

Illustration by Steve Travis

The Model 300 Is Here... You Already Own It!



SUPERA: Like Getting A Whole New Computer

In January 1983, Micro Demon introduced PRO AID. Suddenly Model 100 users found that their computer had capabilities far beyond their expectations. In his InfoWorld review of PRO AID, Reviewer Greg Springer, anticipating the announcement of the Model 200, wrote,

"PRO AID adds enough new capabilities to the current model that the wait for upgraded portability is made much easier and maybe even unnecessary."

Well, the Model 200 is here. But so is SUPERA! SUPERA takes a giant step past PRO AID, and adds a multitude of powerful new features to the Model 100, making it into the computer it was meant to be.

Once it is loaded, SUPERA works transparently to you and your programs. If it weren't for all the wonderful things it does, you would never even know it was there. If you want to remove it, SUPERA is as easy to take out as KILLING a BASIC program.

Unique Format

SUPERA loads and runs as if it were a BASIC program (it's really all machine language). Because of this unique format, SUPERA is compatible with most other software and hardware. It also only requires 4.3K of memory.

With SUPERA installed, every facet of your computer suddenly takes on an aura of new-found power.

In Text

While in TEXT you can

- Use a really fast and flexible search and replace function.
- Turn on a special type-over mode in which typed characters replace type instead of being inserted.
- Read a second file while editing a first.
- Use control keys to delete words and lines, to change the case of the character under the cursor, and to activate the paste key.
- Cause the display to scroll slowly up or down a line at a time.
- Redefine special keys to act as SHIFted keys, control keys, or graphics characters.
- Turn the computer off without losing your place.
- Access special HELP files.
- Use 26 new macro function keys.
and more!

All of Supera's editing features become available whenever you enter EDIT mode to edit a BASIC program.

Super Function Keys

A great deal of SUPERA's power comes from its 26 macro function keys. These easy to define keys can be used in TEXT, TELCOM and BASIC. Each key generally defines a string of 14 characters, but in both BASIC and TEXT several keys can be concatenated into one so as to provide longer keys. The power of these function keys is hard to imagine until you try them.

In TEXT they can provide you with much more than just easy entry of boiler-plate strings. They can also be defined to automati-

cally carry out complicated editing sequences.

In TELCOM these keys can save you money while accessing a data base such as Compuserve. They also save you the trouble of remembering such things as passwords, ID numbers, and special commands.

In BASIC use the keys to enter BASIC commands, and to facilitate typing in programs, to name just a few applications.

Moreover, SUPERA allows you to save and load entire sets of function keys by a single control key action. Thus you might keep a set of keys called TEXKEY.CO handy to use in TEXT, another keyset for BASIC, and yet another for TELCOM.

In BASIC

You get the 26 function keys, and also

- Single stroke access to the built-in software such as TEXT and TELCOM
- Automatic Line Numbers
- Control key activation of selected BASIC commands
- You can redefine special keys

In Menu

You can use control keys to kill and rename files.

Calculator Mode

From BASIC you can enter an entirely new mode called Calculator mode. While in this mode you can quickly and easily evaluate expressions. Calculator mode also provides several new BASIC functions.

Better Than PRO AID

It's true that PRO AID was a significant enhancement to the Model 100, but SUPERA goes far beyond it. In a message on the Compuserve Model 100 SIG, system operator Dave Thomas said, ***"Now with SUPERA, the original PRO AID has been enhanced beyond belief... If there is a single, more useful utility on the market for the Model 100 than SUPERA, I haven't heard of it and t'would boggle my mind if t'was!!"***

TEX PRO For Word Processing

TEX PRO consists of ALL the TEXT editing features of SUPERA, uses only 2.8K of memory, and sells for just \$49.95. It may be the choice of those who seldom use their Model 100 except for word processing, and don't need all the additional power of SUPERA.

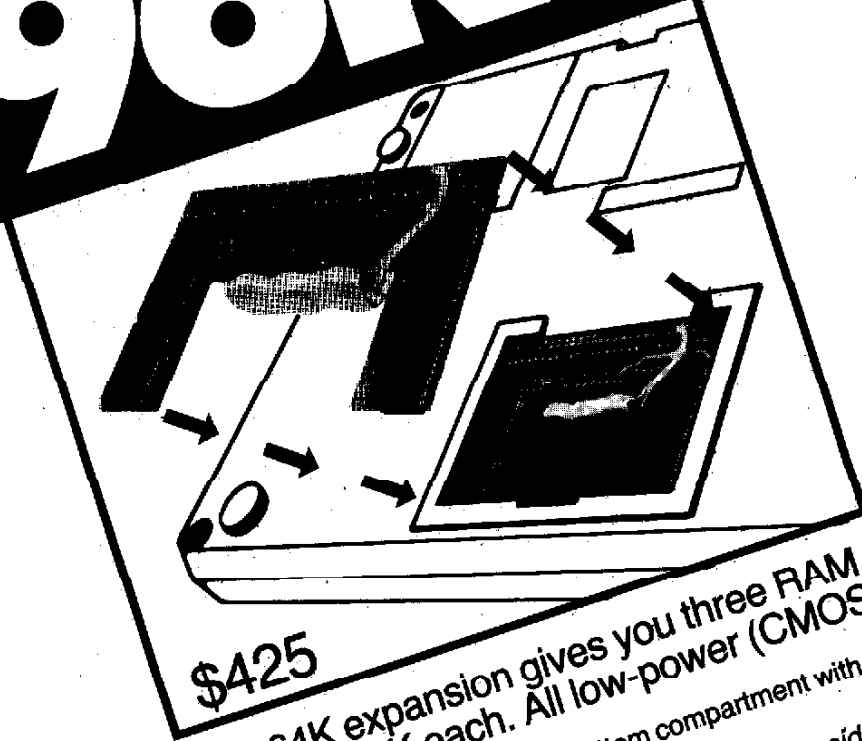
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- ROM socket is left free for Lucid, Write ROM or Disk + ROM
- The system bus is left free (for the Holmes portable disk drive or the DVI)
- Has its own NICAD battery, rechargeable from the Model 100 (guaranteed one year)
- Software included, transfers from bank to bank. Works like main menu!

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ROM MAP

For example, at location EF09 (61193 decimal) is a value that tells the 200 how many characters wide the screen is. Currently the value 40 is stored there. If this is changed by typing POKE 61193,10 the width will be changed to 10 characters. After 10 characters the cursor drops to the beginning of the next line. Typing POKE 61193,40 resets to 40 value.

ROUND THE LOOP

The following example shows how to create, store and execute a machine-language program on the 200. The assembly code below is a simple program that puts typed characters on display until you ESCape.

LOOP	CALL	\$12F7
	CPI	27
	RZ	
	RST	4
	JMP	LOOP

The first line calls the ROM routine that waits for a key to be pressed. When a key is pressed, the ASCII code is returned in the A register. Line two compares the A register value with the decimal value 27. If they're the same, the zero flag is set and the code in line three REturns to the menu. If the zero flag isn't set, line three is skipped and line four calls the ROM routine to display the character. Line five tells the computer to jump back to the location designated by the label LOOP. The process starts over.

An area of memory must be protected as a place for the program to reside. The program is 10 bytes long, so if 10 is subtracted from MAXRAM, 61094 is the highest point in RAM that this program can be safely located. So in BASIC. CLEAR 0,61094 is typed.

RIGHT ADDRESS

POKE the values for each instruction into memory at the correct address. The following BASIC program will do that:

```
10 FOR N = 0 TO 9
20 READ A
30 POKE N + 61094, A
40 NEXT . END
50 DATA 205,247,18,254,27
60 DATA 200,231,195,166,238
```

Type in the program, run it and save it on the main menu, type:

SAVEM "TEST",61094,61103,61094

The new machine-language program

will run when TEST.CO is entered from the menu. To exit, ESCape is pressed.

That's how machine-language programs are handled in the 200. Understanding that now allows for the creation of a useful machine-language subroutine. Quite often programs will need to be prompted for a filename to locate the file in memory so that data can be manipulated. The subroutine in table one does that.

FILENAME PROMPT

When prompting for a filename, if the file exists, the routine will return with the address of the file's storage area in

HL, the type of file in A and the address of the file's directory entry in DE. If the file doesn't exist, a beep will sound, and it will prompt for the information again. To exit the subroutine without giving a filename, SHIFT/BREAK is used.

The subroutine entry point is at the START label. To use this routine in assembly programs a CALL is made to START when a prompt is needed for a filename. □

(continued on page 62)

Please help us rate this article's overall value. If you've found it very valuable, circle 116 on the reader service card. If it was moderately valuable, circle 117—and if it wasn't valuable to you, circle 118.

table one

;Assign labels to ROM routines

```
BEEP EQU $4F45
PNXMSG EQU $6DFE
GETLIN EQU $54F0
MENU EQU $67A4
CAPLIN EQU $6D22
CK4FIL EQU $6E4F
FILADD EQU $6E8C
```

;Error routine

```
ERROR CALL BEEP ;Beeps and falls into main routine
```

;Subroutine entry point is at START

```
START CALL PNXMSG ;Display the Filename.prompt
DM Filename
DB 0
CALL GETLIN ;Get a line from the keyboard
JC MENU ;If BREAK was pressed then go to the MENU
DCR B ;Subtract 1 from length of line input
JZ ERROR ;If no characters entered, beep and retry
INX HL ;Point to first character of line input
PUSH HL ;Transfer the address to DE
POP DE
;
CALL CAPLIN ;Convert line input to uppercase if needed
XCHG ;Get line input address back into DE
MOV A,C ;Put length of line input into A
CALL CK4FIL ;Does the requested file exist?
JZ ERROR ;If not, beep and try again
MOV A,M ;Put the file type into A
PUSH HL ;Save the files directory entry address
CALL FILADD ;Put the files storage address into HL
POP DE ;Put the files directory entry address into DE
RET ;Return to caller
```

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PCSG says "Send it back in 30 days for a full refund if you don't agree."

WRITE ROM is the definitive word processing extension for the Model 100. Less than two months after the Model 100 was announced Portable Computer Support Group introduced the very first text formatter for the Model 100. That program, called Write + was licensed to Tandy and is now in Radio Shack Computer Centers as Script-100. Write + had many powerful features and most reviewers still say it is the best of the cassette based text formatters. But now eighteen months later PCSG has introduced WRITE ROM. Those who experience it have said "WRITE ROM literally doubles the text processing power of the Model 100."

WRITE ROM is what you would have expected PCSG, the software leader for the Model 100, to develop in the 18 months since Write + was brought to the market.

First of all WRITE ROM as its name implies is on a snap-in ROM. You simply take a quarter and open the little compartment on the back of your Model 100 and press in the ROM cartridge. It is as easy as an Atari game cartridge and can be snapped in and out instantly so that you can use other ROM programs whenever you wish.

WRITE ROM appears on the main menu just like one of your built in programs. It lets you do every formatting function you would expect like setting margins, centering, right justifying and having headers and footers. But it does them under function key control, with the clear and easy to learn and use techniques for which PCSG has become famous.

In keeping with PCSG's long standing reputation for superlatively simple yet comprehensive documentation, the manual is a model of lucidity.

WRITE ROM remembers your favorite format settings so that you can print a document without any set up, but you can change any formatting or printing parameters instantly with a function key.

WRITE ROM's 'pixel mapping' feature shows you an instant picture on the screen of how your printout will look on paper. Incidentally, PCSG introduced this feature on the Olivetti M-10 version of Write + over a year ago.

In all there are 44 separate features and functions that you can do with WRITE ROM, and some of these features are truly breakthroughs for the Model 100.

First, WRITE ROM lets you do search and replace, with function key ease of course. Any word or phrase in a document can be searched for and replaced with any other phrase where the search words appear.

Second, WRITE ROM lets you send any text (formatted or not) to any other computer over the phone with just a function key. What's more, it dials and handles sign on protocol automatically.

Third, WRITE ROM has a wonderful feature called 'Library' that gives your Model 100 power that you never thought it could have. Library lets you record favorite phrases, words, or commonly used expressions (sometimes called boilerplate). Any place you wish any library text to appear in your document you just type in a code. WRITE ROM automatically inserts the text just like a Xerox Memory Writer.

The library phrase is inserted as your document is being printed rather than as it is being typed, so this feature conserves memory in documents where a long phrase is used repetitively, since each occurrence of a library phrase in your document is indicated by a single code character.

This Library feature is so powerful these two pages could be devoted just to telling you about things it can do. For example, you can have names and addresses that you designate in one text file with a customer or supplier number. Or you can have inventory items with stock numbers.

In your document you simply type in the customer or stock number and that entry from the other file is automatically inserted in the document. Picture what you can do with that kind of capability.

Because WRITE ROM is written in machine code, it is blindingly fast. No one can claim faster operation.

Because it is on a ROM it uses virtually none of your precious RAM for its operation, and it does not interfere with other machine code programs in your RAM. It works with any printer, serial or parallel. At the touch of a function key you can find the size of a RAM file in bytes and in words (ideal for journalists and other writers who need to know how many words are in a piece). You can make a duplicate copy of a document file under a new name. You also can rename or delete (kill) any RAM file with function key ease.

This description only scratches the surface of this amazingly powerful piece of software. You can automatically insert the date or the time anywhere in your document; WRITE ROM senses when you are nearing the bottom of a page, and at your command will start a new paragraph on the next page.

Write + was the Model 100 pioneer in the use of 'dot commands' to allow control of such things as margins, centering, line spacing and other appearance related changes in the middle of a document. WRITE ROM goes a step further by making all the dot commands Wordstar compatible. This means that if you wish you can quite easily prepare a Wordstar compatible document. Then you can use features of WRITE ROM (such as pixel mapping) that Wordstar lacks, before uploading to your desktop.

A Mail Merge feature allows you to send the same document to every name on your mailing list, personalized for each recipient.

WRITE ROM enables you to do underlining, boldface and correspondence mode as well as any other font feature that your printer supports in a way that is so unique program users say "It is worth the price of the program just to have this one feature."

Here's how it works: When you want to underline you don't have to remember

some complicated printer code. You just type Graph-U, and to end underline you just type Graph-U again. For boldface it's Graph-B and to end boldface it's Graph-B again. It's easy to remember and easy to do. WRITE ROM lets you record the codes from your printer's manual one time only and then just use these easy to remember signals any time you want to do a printer font feature.

WRITE ROM does so many things that other text formatters cannot do. For example you can not only double space but triple, quadruple or any other.

WRITE ROM allows you to use your TAB key in a document so that you can indent the first line for a paragraph easily or space rapidly over many tab stops.

WRITE ROM has another nice feature. It allows you to undent. This means that you can have paragraphs that have a first line that projects to the left of the remainder of the paragraph.

WRITE ROM allows you to not only center a word or phrase on a line but you can center copy vertically on a page as well.

WRITE ROM has a feature that is unique to any word processor on any computer. It is called FORM. FORM is an interactive mechanism that lets you create screen prompts so that you or someone else can answer them to fill out forms, or supply information like to a questionnaire or answer correspondence rapidly inserting personal answers into a form letter.

It works sort of backwards from Library or boilerplate. As you recall, with the Library feature you type a code into a document and when you print, that phrase or word or paragraph is picked up from the Library file and inserted into the printed document. With FORM when you print, anyplace where you had previously typed in a GRAPH T in a document, the printer will stop and you are shown a prompt on the screen. You can type in directly on the screen and when you press ESC, what you typed is sent to the printer formatted like the rest of the document.

What is really great is that you created those prompts that appeared on the screen. By the way, the prompts won't appear in the printed document unless you want them to, and you don't have to be connected to a printer, you can write your completed forms to RAM files if you wish.

Think of how you can use FORM. A doctor or nurse could use it for a patient's history with each question appearing on the screen. An insurance salesman could have

his entire questionnaire, or a police department could do a complete arrest report. You can construct a series of prompts to answer correspondence, automatically inserting the answers into a generalized letter format for a given type of correspondence, like customer service. This feature lets you answer letters in a rapid fire fashion each one with its personalized responses.

Before WRITE ROM you had to be a programmer to create a series of prompts to answer questions or record information. Now it is as simple as typing Graph T.

There are many other examples of excellent programming evident in WRITE ROM. The line feed problem of the Model 100 is dealt with by the simple use of a function key. Files are selected by moving the wide bar cursor over the WRITE ROM menu.

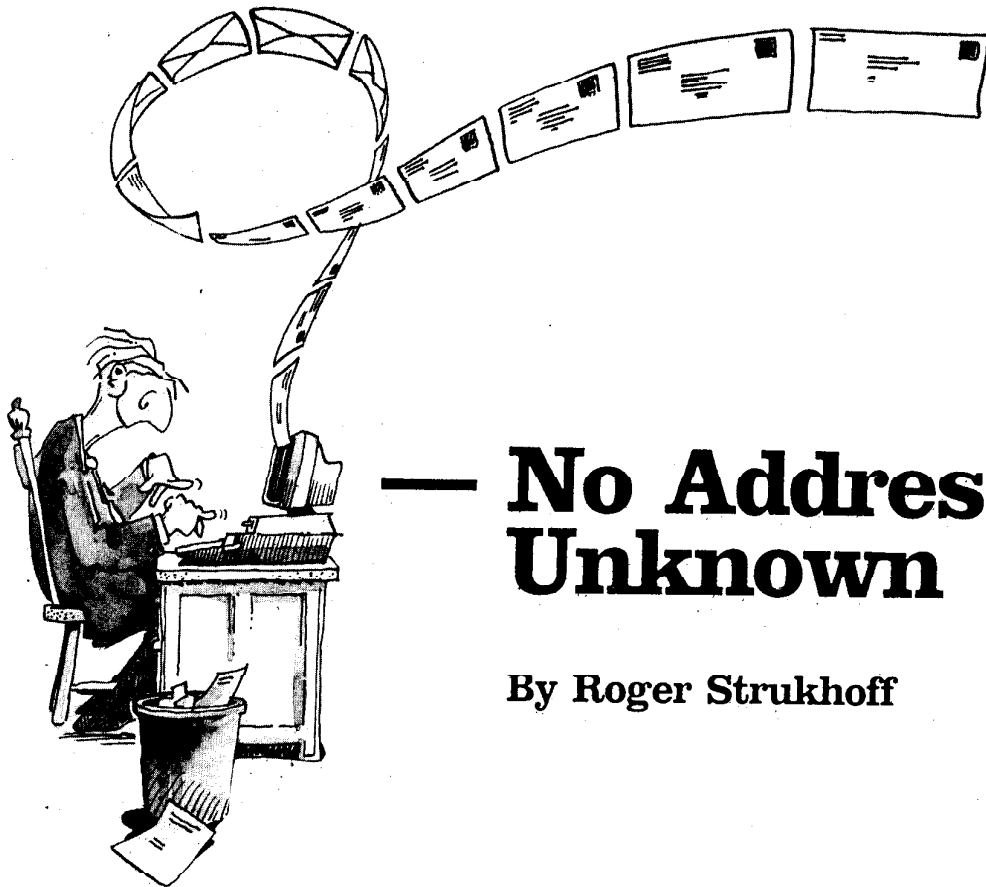
PCSG makes the claim that WRITE ROM is the easiest, fastest and most feature rich text formatter for the Model 100, as well as being the only one on a Snap-in ROM. You can do more with WRITE ROM than anyone thought possible for the Model 100. We at PCSG are happy to offer WRITE ROM because it expands the Model 100 to a dimension of text processing you cannot equal on even larger computers.

If you are already a PCSG customer you know the impressive quality of PCSG craftsmanship. We brashly state that WRITE ROM is the best you can buy. But don't take our word for it. It is sold on a thirty day trial. If you aren't as excited as we are, return it within 30 days for a full refund. Priced at \$149.95, on Snap-on ROM. Mastercard, Visa or COD.

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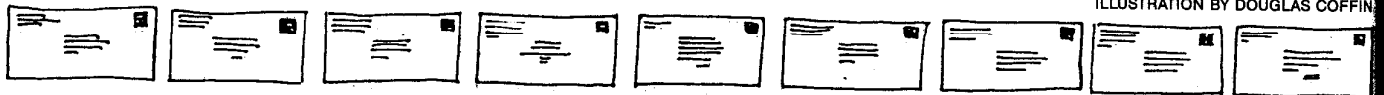
PCSG provides hotline software support for Model-100. Call 1-214-351-0564. Available now directly from Portable Computer Support Group. We endeavor to continue as The Leader in Software for the Model 100.



— No Address Unknown

By Roger Strukhoff

ILLUSTRATION BY DOUGLAS COFFIN



There's no escaping the mighty E-mail arm. Its global reach can send messages even to the darkest corners of the earth.

The buzz-word electronic mail (E-mail) implies transmitting the written word via telephone lines instead of through rain, hail, sleet or snow.

A user on a local area network can send a message across the hall to a colleague — a one-line reminder of a lunch appointment. A traveling sales professional can send an order to the billing and shipping departments. The U.S. agent of a major investment firm can transmit prospective client's financial particulars overseas for analysis.

These services provide access country-wide to tens of thousands of subscribers to these utilities. In fact, they should be thought of as enhancements to these companies' vast online data-base information retrieval services, rather than as stand-alone E-mail packages.

Since users' needs are diverse, the services must be too.

Some E-mail networks are closed loops to serve only those who pay subscription fees. Others allow message transmission to non-subscribers. Some networks serve

many users, others are limited to a few. Some are designed for businesses that have multiple users within one company. Others are for personal or home use.

BUSINESS OPTIONS

For a typical business application with a defined group of people regularly sending messages, there are information utilities to provide the solution. GTE Telenet's Telemail, Tymshare's Ontyme, Uninet's Gemservice and General Electric Information Service Co.'s Mark-Net are leading examples. These companies issue passwords, provide local access numbers and allow messaging among subscribers for flat monthly fees that range from \$50 to \$200, plus access charges of \$5 to \$50 per hour depending on the time of day.


Not to be overlooked in this area is Omnet. A Boston-based company that customizes its electronic mail services for each individual or organization, it handles all the behind-the-scenes connections with the large information utilities.



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E-MAIL

A problem with using a large utility is that infrequent users must subscribe to the same service. A company like Omnet assumes this headache by providing individual attention to accounts without offering a lot of bureaucracy.

The large utilities are dealing with the problem through X.400, a protocol recommendation they've developed with the CCITT, an international standards committee. The X.400 specification calls for an interconnection facility of competing electronic mail services, letting anyone send to anyone regardless of what subscriptions he or she has. The recommendation should improve significantly the situation by the end of 1986.

PERSONAL PLANS

For personal users, large information utilities like The Source and CompuServe provide valid E-mail options. The Source's SourceMail carries a \$100 initial subscription fee, \$10 monthly fee and access charges of \$8 to \$20 per hour. CompuServe's EasyPlex has a \$40 one-time fee with monthly and access charges similar to The Source's.

These services provide access throughout the country to tens of thousands of subscribers to these utilities. In fact, they should be thought of as enhancements to these companies' vast online data-base information retrieval services.

Another option for the personal user is the tremendous variety of computer bulletin boards that have sprouted all over the place in recent years. Users can find a bulletin board satisfying any desire and leave messages in the electronic mailboxes of like-minded individuals. The 100 owner thinking of using a bulletin board for electronic messaging should be forewarned: they can be highly addictive.

HYBRID ALTERNATIVES

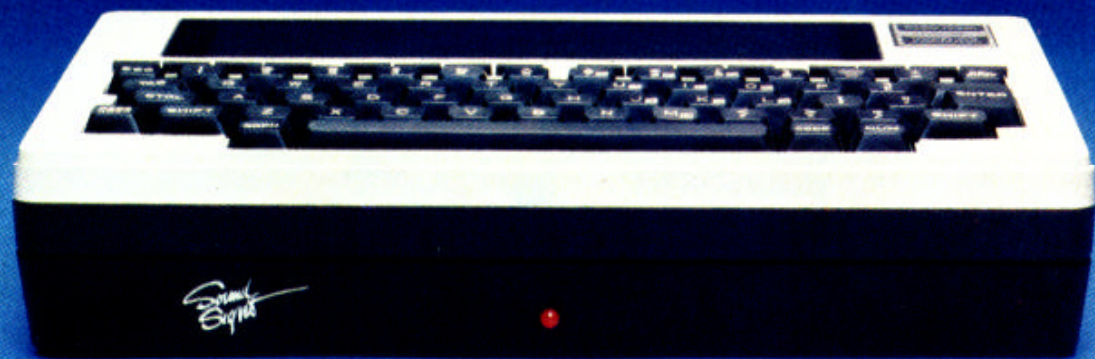
No outline of E-mail options would be complete without a mention of MCI Mail and EasyLink. These services integrate computer technology with printed mail.

MCI Mail's strength is overnight hard-copy delivery of computer-generated messages. Western Union's EasyLink's strength is its interface into the worldwide Telex system. But neither really provides E-mail in the sense of screen-to-screen electronic mailboxes.

As people become more accustomed to reading messages as well as data off a computer screen, electronic mail services will prosper. Electronic fund transfer, resume services, videotex shopping services and other functions will increase the role of communications integration with the small computer.

(continued on page 59)

BUBBLE MEMORY



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Telecommunications

100 Links Global Business

The Big Eight accounting firm of Peat, Marwick, Mitchell & Co. knows well the pressures of deadlines. Answers must be sent immediately, regardless of time or location. To maintain its empire of the eighties, it practically revolves around the Model 100 and electronic mail.—Ed.

By Bob Rafaeles

June 9, 1984. All hell breaks loose at the offices of Peat, Marwick, Mitchell & Company. Until this minute when the San Francisco office of this Big Eight accounting firm receives an electronic mail (E-mail) message, everyone believes the company has seven months to complete an international transaction.

Suddenly seven months turns into seven short hours. At the stroke of midnight a surprise move by Congress will take effect. New legislation restricting the international transfer of high technology as an effort to help balance the trade deficit, supposedly to take effect Jan. 1, 1985, has been moved forward to June 10.

It's 2 a.m. in Holland, but a company official is roused from his bed. "Round up a couple of attorneys, a banker and corporate notary," he's told. Everyone is spurred to action. The agreement is concluded before deadline both in Europe and in Singapore.

If the shock government action had been communicated by telephone or other conventional means, the message would have reached Peat Marwick offices too late. This story wouldn't have ended so sweetly.

CRITICAL INFO SOURCE

The Washington National Tax Prac-

tice, one of two of Peat Marwick's Washington, D.C. offices, serves as a resource for critical information originating in Washington. They provide the latest updates on IRS rulings or Securities and Exchange Commission actions. It's this staff who first got wind of the international transfer legislation.

These tax experts often are consulted on a crisis basis, and frequently by electronic mail. D.C. partner Peter Elinsky notes most of those requesting tax advice want the answer "yesterday."

Peat Marwick began experimenting with E-mail in 1980. Electronic message delivery is desirable not only because it's quick, but because messages sent don't require someone at the receiving end. A report transmitted during the night can be retrieved immediately.

After using E-mail on a limited basis in its tax practice, Peat Marwick began testing systems in 1982. A year later ITT Dialcom is chosen and simultaneously the Model 100 is selected for use with the new communication system.

"Portability" is the 100's attraction, says the partner in charge of information systems services consulting in New York. Bob Gilges adds, "It gives us a low-cost terminal to get us started, and it's able to go along with the consultants who spend most of their time traveling."

GLOBAL LINKS

Peat Marwick's 328 offices around the world depend on international communications using roughly 200 Model 100s and over 4,000 electronic mailboxes.

Over 6,000 microcomputers are used worldwide by the firm. Adding the 100 extends the reach of Peat Marwick's mail network, which formerly operated with larger, less portable terminals. With this growing family of computers and word

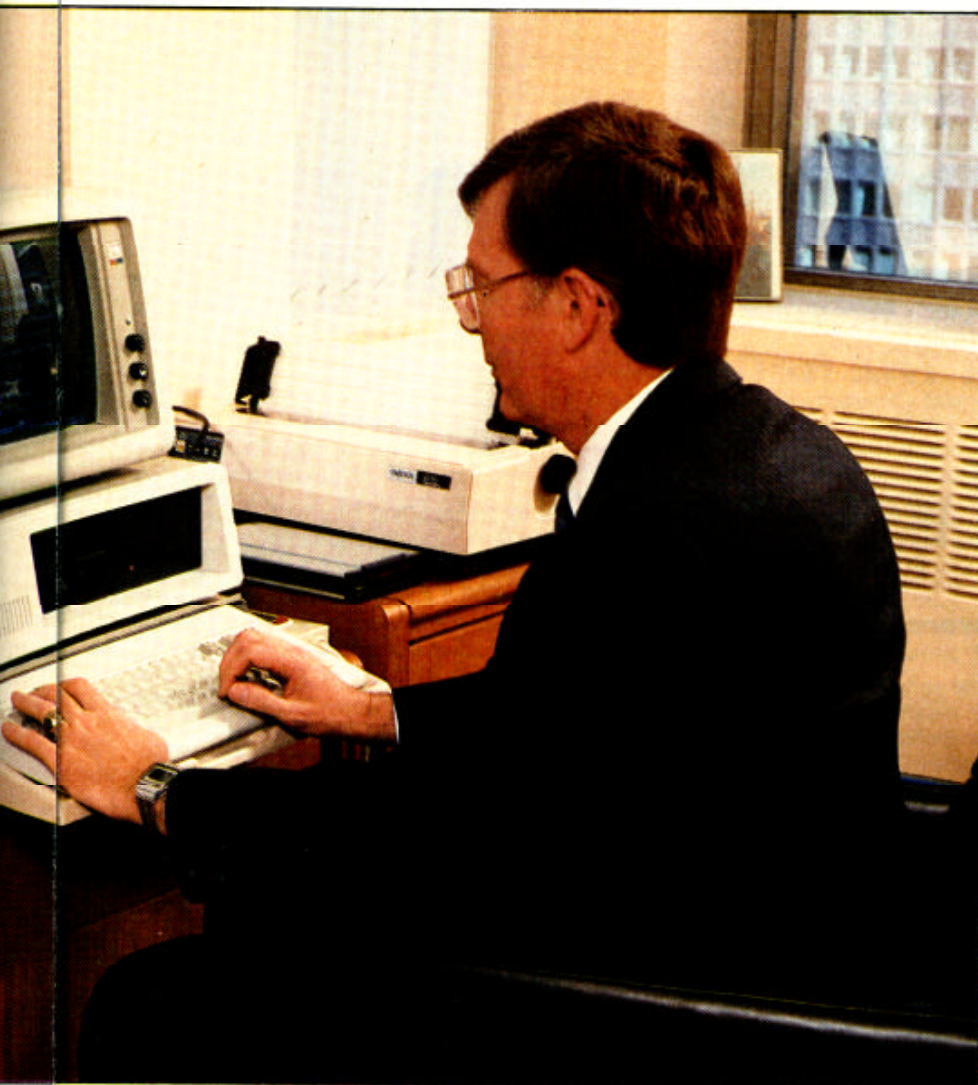
processors, communications gaps are scarce.

The Dialcom network links systems in the United Kingdom, Canada, West Germany, The Netherlands, Puerto Rico, Australia, Hong Kong, Singapore, Korea and Denmark. The international systems are usually identical in structure and licensed to the postal, telephone and telegraph agencies in the respective countries.

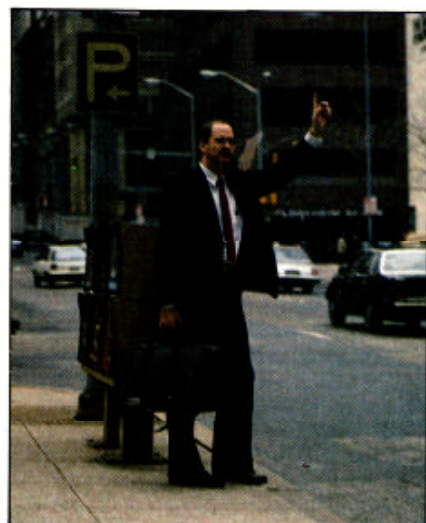
A traveling Peat Marwick executive can check his or her "mail" and communicate from anywhere in the free world to the home office via the Model 100. Using the 100 and Dialcom's Official Airline Guide/Electronic Edition, the traveler also can check on current airline schedules and fares for itinerary changes.

Dialcom also offers the latest news on Associated Press and United Press International newswires and financial market reports. Teletype and TWX messages composed on the 100 can be sent over





JAMES H. PICKERELL



CHARLES TUCK



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phone lines from any location.

The user-friendly service offers message acknowledgement, carbon copies, blind copies, message forwarding, automatic reply and electronic filing.

Built-in security safeguards are another important feature. And the value-added network provides easy interface with personal computers and communicating word processors.

FASTER THAN PHONING

Initially the firm used electronic mail for routine memo distribution. Today it's a prominent business tool. "Periodically I send messages by E-mail simply because I know it'll be seen before I can reach the parties by telephone," says a Washington, D.C.-based company official. "I can type faster than I can write," Lawrence Herman explains.

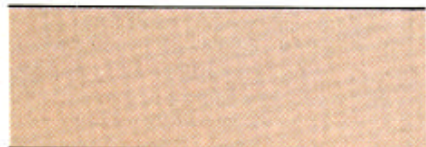
Dialcom lets microcomputers talk to each other. Even if direct plug-compatibility doesn't exist between machines

(such as the 100, Macintosh and IBM PC), "You can create a document on the Macintosh, send it on E-mail and access it on the Radio Shack models," explains Gilges.

Each of Peat Marwick's three major departments — audit, tax and management consulting — uses portables and E-mail extensively to serve clients. The 100 is favored by the firm's most mobile professionals — the management consultants. Gilges estimates that that department uses 75 percent of the firm's 200 Model 100s. They tote their 100s in company-designed computer carrying cases in the firm's burgandy and gray colors, complete with company logo.

Gilges also reports, "I probably sign on three times a day on the average and have a terminal at home as well as at the office." His counterparts in Australia, Singapore, Hong Kong, Paris, London, Toronto and Latin America are only a keystroke away.

Center: James Chase, director of computer services, receiving overseas transmission. Top: Peat Marwick executive with 100 in the bag. Middle: E-mailing from a Peat Marwick client's office. Bottom: Harold Ritchie, supervisor of administration, sending to a 100 in the field.



INTRODUCING THE

SIDESTAR

FOR THE NEC STARLET

The SideStar is a self-contained, plug-in, 128K RAM-disk cartridge the size of a wallet. It gives you more than memory—the SideStar gives your NEC Starlet (PC-8401A) new abilities.

Now Run the Powerful Software that Requires More Memory

DBASE II and many of the powerful CP/M software packages require a lot of memory, which means using 64K mode and a disk drive. (There goes speed and portability.) When a disk drive isn't convenient, your SideStar takes over. Now you can load and run large disk-based software at RAM speeds—any time, anywhere.

Expansion Connector Adds Flexibility

With the SideStar in place, the NEC Disk/Video Adaptor, 1200 baud modem, or other cartridge can be plugged into the SideStar's expansion connector. Now you can load and store programs or data from any source directly with room for up to 124 files. A single file can be 124K (126,976 bytes) long!

Forget About Changing Batteries

A 1.2 Amp Lithium battery sealed inside will power the SideStar for 5 to 7 years—into the next decade!

Is It Disk—or—Is It Ram?

Think of the SideStar as a diskette. It's a self-contained, mass-storage device that requires no outside energy

source. It can be used for transporting information between machines, long term storage, and temporary storage. Unlike a diskette, it doesn't require a disk drive, power supply, or cables—and it's very, very FAST! To the Starlet it's a disk.

A No Risk Offer

You can buy the SideStar for a 30-day evaluation. If you are not completely satisfied, return it within 30-days for a full and prompt refund. You get a 2-year warranty on parts and labor. If your SideStar should ever need service, we will fix or replace it within 72 hours.

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Price subject to change without notice. *DBASE II is a trademark of Ashton Tate.



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RS45

PEAT MARWICK

While at a client's office, a management consultant can use his 100 to draft a proposal and plug into a phone line to inquire about that firm's qualifications. The text can be transmitted to the home office where a word processor prepares the draft for review and signing when he returns.

The consultant can also call for help. Gilges says, "We'll go out through E-mail, broadcast to the other offices and say, 'Do you have anybody with this specific type of skill?' and get our responses back through the network."

PHONE TAG OBSOLETE

When it's 9 a.m. in New York, it's 3 p.m. in Paris and 10 p.m. in Hong Kong. Communications by phone are generally impossible. Even international couriers often need two or three days to make deliveries. The members of the Peat Marwick international steering group on information services, located in a number of countries, are connected by E-mail. They communicate efficiently without problems caused by time zone differences.

The frustration of trying to link up with someone across town, country or overseas has been reduced, says Mike McDonald, a partner in the New York office. He notes that requests for informa-

tion not requiring communication are a natural for E-mail. His job is to coordinate audit department equipment and information requests for both hardware and software, so he relies on his electronic mailbox.

Organizing the work of several people no matter where they're located is greatly facilitated by electronic mail—as long as they have their Model 100s. Drafts can be sent out electronically within seconds and answers received within minutes.

Peat Marwick staffers frequently take their 100s home. There they extend their office hours by drafting memos and transmitting them to communicating word processors. First thing in the morning they're ready to put their homework in final form.

Using the 100 gives staff members home access to various data bases. They can load the information into their mailbox or someone else's without leaving their easy chair.

Reading can be caught up too. The electronic bulletin board provided by Dialcom, called PMM Post, is the equivalent of the office bulletin board or in-box.

That same person can read the materials published electronically through the

New York offices. In fact there's an in-house publication that's available only in an electronic version.

E-MAIL SHRINKS WORLD

The 100 isn't just a word processor; it's a communicator. The world continues to grow smaller. As Gilges sums up, "It gives us the ability to talk over time zones, to avoid telephone tag, plus the ability for a consultant to carry the terminal with him or her, and use it while out of town, in flight or at a hotel."

That's not to say pressures imposed by the perennial deadline have lessened. Perhaps they're worse. Now when a deadline has been missed, there are few excuses to use. But with Peat Marwick's 100/E-mail duo, the Big Eight accounting firm doesn't need to fret over deadlines come and gone.

It's 3 a.m. in Majorca. Peat Marwick's man receives an urgent E-mail message. He throws the Model 100 out the window where it crashes on the cliffs and into the pounding surf below. He has narrowly averted another disastrous, sleepless night. □

Please help us rate this article's overall value. If you've found it very valuable, circle 122 on the reader service card. If it was moderately valuable, circle 123—and if it wasn't valuable to you, circle 124.

Photonet: Home-Front News While On Location

By Bob Rafaels



Photographers are a mobile lot. For many the Model 100 is as necessary as their camera bags.

A New York City-based communications and information network is another tool for 100-toting photographers. Photonet serves professional photographers, stock photo houses, book, magazine and newspaper publishers, advertising agencies and designers.

Patricia Woodson and Len Kaltman diverted their careers as travel and corporate photojournalist and fashion photographer to co-found Photonet. The company went online in September 1983 and now has almost 500 subscribers.

ELECTRONIC CLASSIFIEDS

An editor looking for pictures can follow a screen display that prompts him to enter basic information such as assignment or stock photo, acceptable formats, color or black and white, proposed usage and deadline.

The editor can then enter a detailed de-

scription of the desired photo, using up to 18 lines. The request is posted electronically to any combination of photo sources. Subscribers whose photo meets the description can respond by telephone or electronic mail.

A photographer or agency can post the availability of new photos, each with up to ten lines of detailed description.

Traveling photographers seeking additional assignments can list their itineraries. They also can adjust their travel schedules with the help of the electronic Official Airline Guide which provides schedule and fare information for thousands of domestic and international flights.

The custom-designed system makes available photo industry newsletters and directories. Subscribers can link up with priority customer professional support services offered by Nikon, Kodak and Calumet. The setup also gives subscribers access to a broad selection of services and information of a general nature. □

PORTABLE

Disk Drive

for the Model 100/200

\$599**Includes a library of
six powerful programs**

It's the Holmes Engineering/PCSG "chipmunk"

Uses the main menu concept. You see the disk directory instantly, arranged on your M-100 screen like your main menu. Just move the wide-bar cursor and transfer files with a function key. You can run a file directly from the diskette with the ENTER key. Uses 3½" microfloppy diskettes that have a rigid plastic casing and a metal core. They're tough and nonflexible. You can carry several in a shirt pocket without damage. There's 358K on a diskette. Ten of these in your briefcase and you've got 3½ megabytes.

Drive weighs only three lbs. and it works directly from the 110 outlet and recharges at the same time. It recharges in six hours with thousands of pages transferred between charges. It's compact, with dimensions of 2¼" x 5½" x 7.5"; and fits easily into your briefcase along with your Model 100 or 200.

Machine code programs, BASIC programs, *Lucid* files and documents all are saved and retrieved with no protocol – instantly, ready to run.

Portability in a disk drive is an engineering feat. It's worth the investment to have the power and freedom that this Portable Disk Drive can bring you.

In a special association, Holmes Engineering and PCSG have worked together combining the hardware knowledge of Holmes and the soft-

ware expertise of PCSG. The result is a product that can only be regarded as excellent.

But what makes the drive so very special is that not only does it allow you to store and access files from RAM, but it has a wonderful feature like you would find only on a desktop computer.

You see the disk directory instantly; works just like the main menu

Here is what is really exciting. The portable disk drive has Random Access. Included as part of the operating system in the drive (ROM) is a very powerful disk BASIC. This BASIC interfaces with the BASIC in your Model 100 in such a way that when the drive is connected they act as one.

This means that you can have BASIC programs that will access the diskette and read and write records directly on the diskette. Your RAM is used for programs while they are running and the data is then stored on the diskette, and only brought up into RAM for viewing or editing.

This means that your Model 100 combined with the portable disk drive is a very powerful data processing system. We have included with the drive six very excellent programs that make that statement a reality.

Just imagine yourself with this kind of capability.

Database – The portable disk drive stores your mailing list including names, addresses, phone numbers and information relevant to those names. You can have over 1500 names and addresses on a single diskette. You can also store inventory items, part #s and descriptions or any other data that you need to recall. You can design your own input screen to fit your needs. You can search for any word and the record or records appears on the Model 100 screen for viewing or editing. You can print out mailing labels or print out in a columnar fashion if you wish. You can merge names and addresses into form letters and print out promotional mailings to all or selected parts of your list.

Invoice (purchase order) – The portable disk drive prints out perfectly prepared invoices or purchase orders. This is an excellent program made possible by the features of the portable drive's operating system. You can have all your customers' names and addresses filed on the diskette or on another diskette. You can have your inventory of items you sell filed on the same or a separate diskette. All you have to do to print an invoice is type in the customer number. Automatically, that name and address is found from the diskette and inserted in the invoice, or

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you can type in any name you don't have in your records. To bill out items you just type in a stock number and the quantity being shipped.

You designate whether an item is taxable or non-taxable. Automatically the item name, description and price per unit are retrieved from the diskette and inserted on the invoice and the extensions are calculated.

358K on a diskette

You can keep entering more item #s and quantities, and you can type in any items or prices that are not on the diskette or need changing. When you have entered the last item, the totals are automatically figured including tax where applicable.

The completed invoice is then stored on the diskette. When you have completed all your invoicing, at the touch of a button you can print out your sequentially numbered, professionally done invoices on easily obtained standard forms. This is truly professional invoicing capability.

Purchase orders are just as easy. Supplier #s retrieve the name and address. Inventory #s automatically bring up the item and the cost. You type in the quantity ordered. You have all the features described in invoice preparation including storing your P.O.s on diskette and printing out beautifully formatted purchase orders with your company name, address and phone number as the letterhead.

Sort - This excellent utility allows you rapid sorting of any records you have compiled using the disk drive database program. You can sort on any file, for example, by last name, or city or zip code. Also, you can sort lists alphabetically or numerically. You can write the newly sorted list back in the same file on the diskette or to a new file.

Telcom interface - If you are a user that likes to access other computers or databases (for example CompuServe) by telephone then this powerful facility alone is worth the price of the disk drive. You can automatically download information from the distant computer onto the diskette. Large files of information are accessed by the program in a way that enables you to bring segments up into RAM for viewing later.

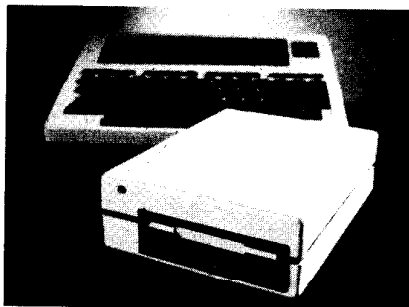
You can also automatically upload to your distant computer files that you have stored on your diskette.

Records or orders compiled on your Model 100 and stored on diskette can be sent over the phone at the touch of a function key.

Calendar - Everyone who has seen this program has said, "This is the first calendar/diary/scheduler on any computer anywhere that I can use. It is so functional."

The calendar program is usable for two reasons, first it is designed correctly, and second you have the memory (358K) on the diskette to log and access a tremendous amount of notes over a long period of time.

It works like this. On your Model 100 screen appears a month's calendar, for example June 1985, complete with all the dates arranged like a wall calendar. You can advance month by month with a function key or change to any month forward or backward any number of years with function key case.



On any month, on the screen you move the cursor with the arrow keys (like the Main Menu) to the day you want to view or log and press ENTER.

From the diskette immediately is loaded that day's diary. You can review or type in just like text and when your entry is complete, a function key stores your entry on diskette.

By the way, you don't have to know the date of an entry to review it. You have F1 (find) search capability for any word or phrase.

Calendar prints out a nice 8½ x 11" sheet of the daily entries arranged in boxes over a two-week period. You can print these out over any time period you designate. These are great to carry with you or give to your secretary or co-workers for your schedule.

This is a calendar you can use. It is not only a planner and scheduler, but a diary as well. The 358K on a diskette means you can truly keep your activities in a way that you can access and utilize. For most people

one diskette will easily handle several years of appointments and notations.

Personal Finance Manager - You'll say, "Why hasn't someone done this before?" This wonderful program truly lets you keep track of your finances, and is excellent for your business as well as for personal use.

All your records are kept on the diskette. You can manage as many accounts as you want. Bank accounts (checking and savings) and charge accounts such as MasterCard and Visa.

Study your balance or review any previous transactions on the screen whenever you like. Prints out complete statements showing all account activity and balance.

Everyone who has experienced the portable drive with this powerful library of application software has been so impressed that the typical comment is, "This is a portable system that truly gives me the computer capability I always hoped a computer could give."

We at PCSG believe we have the ultimate Model 100 system. When you combine the Model 100 with the Portable Disk Drive along with its bundled software plus the *Lucid* spreadsheet on snap-in ROM, *Write ROM* word processing and the new 64K RAM expansion now available from PCSG, you have a computer with real functionality that you can use every day.

We want you to find out for yourself at no risk, just what we are talking about. If you aren't totally satisfied within 30 days, simply return the disk drive for a full refund. Priced at \$599.95, including the software library. MasterCard, Visa, COD.

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The amount of memory available to BASIC is slightly less (by 256 bytes) than what's available in a .DO file, but the figure from the FRE(0) command will be close enough.

The zero in the parentheses is a dummy argument. This means you need a number there to indicate you want the numeric memory space, but it doesn't matter what number you use.

Another handy housekeeping chore lets you rename files already created. Let's say you're catching up on your correspondence and have only one letter to write. You open the TEXT file with the name LETTER.DO. Later you need to send another letter to someone else. You've already used the most logical filename on your first letter, so it's more convenient to rename the first one. Make it part of a series — LTR1.DO, LTR2.DO, etc. After displaying all files with the FILES command in BASIC, use the following command: NAME "LETTER.DO" AS "LTR1.DO".

As with KILL you need the quotation mark and the filename extensions as shown. Note that you can't change a .DO file to a .BA file or vice versa with this command. A more complex transformation between ASCII and binary files is

required for that transaction. Finally, to verify that the name change has taken place, issue the files command to receive an updated listing of your directory files.

GREAT TIMING

The main menu contains a great deal of information. When you turn on the computer the clock ticks away the seconds, while both the date and day of the week are clearly visible. For business travelers who find they've got to check the phone book cover in their hotel room to see what city they're in, this continual chronometer is no small assurance.

Setting the clock-calendar takes three separate steps because you set each element — day, date and time — individually. This can be accomplished only in BASIC. Once you set the clock-calendar, the elements work in synchronization.

The computer recognizes the day of the week according to a fixed convention of naming the days. A three-letter abbreviation is used: Sun, Mon, Tue, Wed, Thu, Fri, Sat.

Once you've set the day of the week, the computer automatically increments it at midnight. But the internal program does not compute the day of the week

from the date. If you load an incorrect day of the week, the computer will think that Tuesday is Saturday.

The day-of-the-week feature is really a set-it-and-forget-it parameter unless you cold start your machine. In that case everything reverts back to the non-setting that appears when the computer is initially turned on.

To set the day of the week to Wednesday, for example, enter BASIC and type DAY\$ = "Wed".

The computer is smart enough to take your entry in any combination of capital and lower-case letters and convert them to the above arrangement. Be sure to include the dollar sign and quotation mark.

To verify that your entry was accepted, type PRINT DAY\$. Don't forget the dollar sign.

Entering the date is trickier because a very specific format must be followed. A good reminder is to display what the computer likes to see as a date by typing PRINT DATE\$.

You'll see a date format — such as 09/11/83 — where 09 is the month, 11 is the day and 83 is the year. The three are separated by slashes. Note that each element must be two digits. If, as in our example, the day or month is a single

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RS13

GOODMAN

digit, then it must be preceded by a zero. To set the date to April 1, 1984 type DATE\$ = "04/01/84."

As with the DAY\$ command, you seldom need to change this element. The date is automatically incremented when the clock strikes midnight, and the computer knows which months have 28, 30 and 31 days. What it does not know is that every four years is a leap year. In February 1988 and every four years thereafter you'll have to reset the DATE\$.

Here's an interesting note about the DATE\$ function. With the current read-only memory (ROM) installed in the computers, the date displayed on the menu screen doesn't go past 1999. At the turn of the century the calendar goes back to Jan. 1, 1900. Eventually this may be corrected with an updated ROM.

KEEPING TIME

Time is maintained in a 24-hour cycle called military time. Remember in the old war movies when the squadron was scheduled to take off at "zero six-hundred hours?" That referred to 6:00 a.m.

The 24-hour clock counts the morning hours in sync with the common 12-hour

clock. But after noon the 24-hour clock keeps counting hours until midnight. Table one shows what happens to both clocks starting at high noon.

Set the hour to the correct 24-hour notation. Otherwise, the computer may think you're putting in a morning time, and the day/date won't increment until noon the next day.

To see the precise format that must be followed in entering the time, use PRINT TIME\$. Even if you haven't set your clock yet, the computer has been ticking away from 00:00:00 (zero hours, minutes and seconds) ever since the batteries were installed, so there'll be some value displayed on the screen.

The time may show up something like this: 14:25:37. This is the format to follow when entering the correct time. If you want to set the clock against a standard, such as the "At the tone ..." announcement from the phone company, you can.

First select a time a couple of minutes ahead of when you begin typing. The slower a typist you are, the more time you should allow between the moment you start typing and the instant you are going to set the clock. Say it's 7:23 p.m. according to an accurate timepiece. Type

TIME\$ = "19:25:00. Don't press Enter.

You'll be setting the clock to start when the time standard reaches 7:25 p.m. exactly. When you hear the "7:25 exactly" beep from the phone recording, press Enter. This activates the clock. Verify that all went according to plan by going to the menu and watching the seconds tick away. Your clock should be in sync with the next announcement, give or take a few milliseconds. □

12-hour	24-hour
12:00 noon	12:00 noon
1:00 p.m.	13:00
2:00 p.m.	14:00
3:00 p.m.	15:00
4:00 p.m.	16:00
5:00 p.m.	17:00
6:00 p.m.	18:00
7:00 p.m.	19:00
8:00 p.m.	20:00
9:00 p.m.	21:00
10:00 p.m.	22:00
11:00 p.m.	23:00
12:00 p.m.	00:00
1:00 a.m.	01:00

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RS41

NEW PRODUCTS (from page 6)

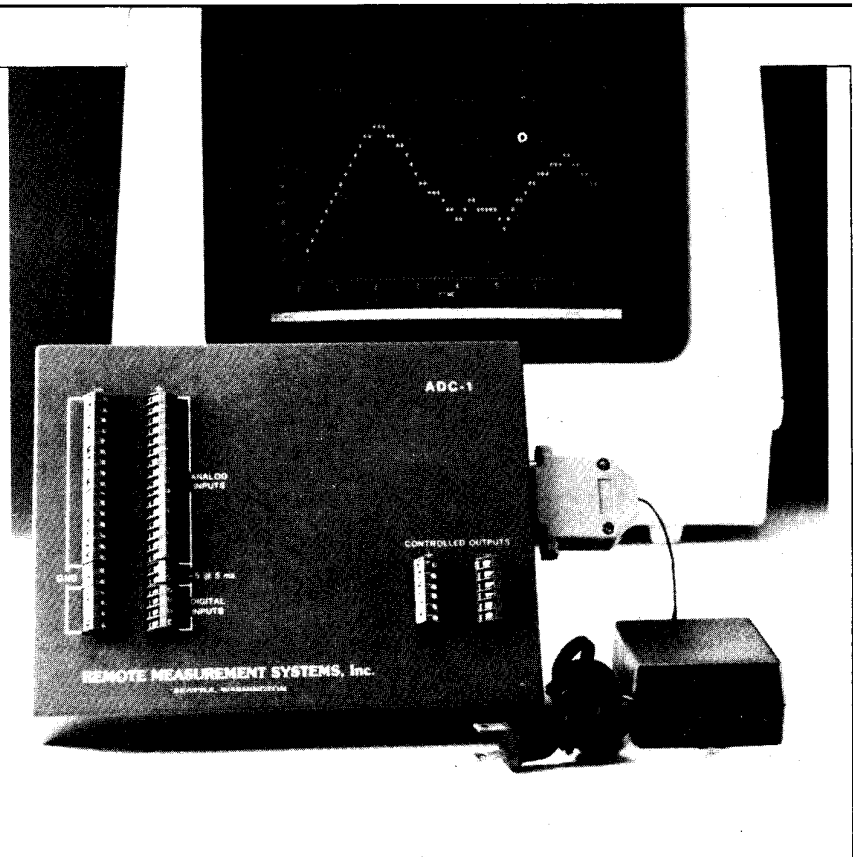
Measuring Up with Battery Power

Now there's a battery-powered analog-digital interface device which allows computers to communicate with measuring instruments and other devices.

From Remote Measurement Systems Incorporated (RMS) comes the ADC-1 Data Acquisition and Control System. It uses the computer's RS-232 port to input information directly from virtually any device that produces DC voltage or current. There are special pre-calibrated sensors available from RMS which include the following as counters: temperature, wind speed and direction, humidity, light level, soil moisture, security, and electrical energy.

The ADC-Unit 1, complete with BSR X-10 remote-use transmitter, sells for \$395. Various sensors sell from \$7 to \$100. Details are available from Remote Measurement Systems, 2633 Eastlake Ave., E., Suite 206, Seattle, WA 98102, (206) 328-2255.

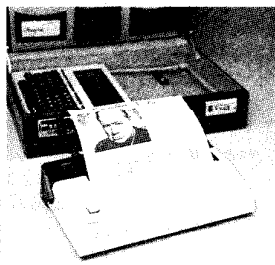
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NEW PRODUCTS

A Manual in Your Pocket

The TRS-80 Model 100 System Reference Card has been produced by Eighty Computing of Orinda, California. This card puts complete TEXT, ADDRESS, SCHEDL and TELCOM operating tips as well as BASIC commands at your fingertips.

It sells for \$2.50 per copy. Interested readers should write Eighty Computing, P.O. Box 154, Orinda, CA 94563.

Circle No. 195

Share Those Peripherals

With a flick of a switch you can end cable tangles. Via West has produced a line of switches designed to allow computers to share peripherals without cable-swapping.

Data Switch allows one CPU with limited ports to alternate between different input-output devices. The serial version, often called an AB switch, uses

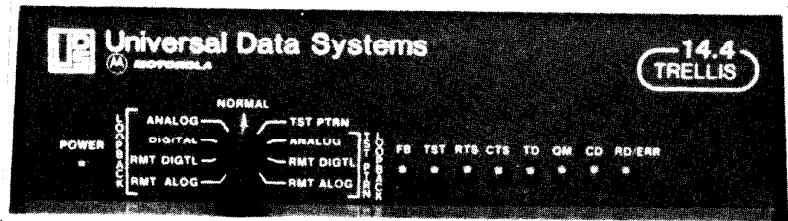
the standard RS-232 interface and retails for \$42. The parallel version is Centronics-compatible for \$49.

X-Switch allows two computers to share either one or two I/O devices. The serial version sells for \$55 and the paral-

lel sells for \$69.

Gender chargers also are available, both male-to-female, for \$15. Call Via West, 534 North Stone Ave., Tucson, AZ 85705, (602) 623 5716.

Circle No. 196



Turbo-Charged

For those for whom speed is the issue, Universal Data Systems has introduced a 14,400 bps modem. It is designed to run on unconditioned private telephone lines.

The UDC 14.4 Trellis supports digital and analog loopback and has fallback

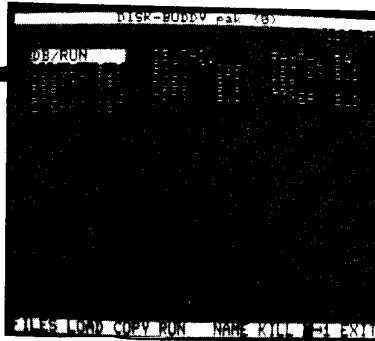
speeds of 12,000 and 9,600 bps. The single-unit price is \$3950, but discounts are available for quantity purchases.

Call or write Universal Data Systems, 5000 Bradford Dr., Huntsville, AL 35805, (205) 837-8100. □

Circle No. 197

Civilize the DISK/VIDEO INTERFACE MAKE SAVAGE THE MODEL 100

With DISK-BUDDY software for your D/VI, only function keys need touch your disk files!



Twelve programs for one low price, work together to give the TRS-80 Model 100 unique disk file handling abilities. Access disk files from menu, just like a RAM file. Commands you were tediously typing become simple function key selections. And that's just part of the power of the DISK-BUDDY PAK. It does things you can't:

- Create "superfiles" the length of the disk, over 170,000 bytes!
- Print out, or display on either screen, or copy to disk or other device, a disk data file of any length, **WITHOUT USING ANY ADDITIONAL RAM!**
- Furthermore, transfer records can be "filtered", an example:

An address file on disk can contain more than 1300 entries. You can move to RAM, or screen, or printer, etc., those

records which contain "California" and "Tennis" or whatever. Four logical modes of search are available.

- Also: Features to run, load, save, sort, kill, measure, append, and name, disk files and RAM files, and much more.

PCM Magazine (March, '85) said: "... an excellent buy" ... "manual is extremely well written" ... "will substantially increase the speed and ease of operation of the M-100 with the D/VI."

That was the idea in the first place.

TO ORDER THE DISK-BUDDY PAK (disk and manual): Send name, address, and check or money order for \$39.95 plus \$2.00 postage and handling to the address below. (For COD's call: 212-243-2129)



BuddySystems

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New York, NY 10011

RS4

MAIL 100/200 (from page 5)

innovation might save me the expense of buying a disk drive.

Karl Harshbarger
St. Mary's City, MD

According to Traveling Software's customer support representative, a program to save individual text files through BASIC is possible but not worthwhile. It would require substantial rewriting of T-Backup's machine-language subroutines to allow it to select a single file for saving and loading at high speed. The overhead would cancel the high-speed advantage.

The same overhead would make the writing of a special saving/loading routine unfeasible. If speed's important, you'd appreciate the disk drive all the more. —Ed.

200 is Engineer's Choice

I recently purchased a Tandy 200 which I use frequently at the office where I work as a civil engineer. The ROM-based Multiplan is especially useful. Though we have Visicalc on an Apple III, there are shorter spreadsheet templates that I keep on hand. I wonder if there aren't other engineers who'd find the 200 a logical choice for a second computer?

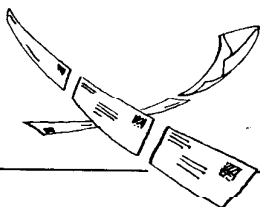
Our profession favors Hewlett-Packard products, but my 200 does all I need for a third of the price. My only complaint is that Microsoft didn't provide either vertical screen splitting capabilities or individually variable column width on the Tandy 200.

I can't get my FX-80 to accept embedded print commands using the ^P format. I wonder if this is a problem with the printer, the computer or me?

Barry Rands
Grants Pass, OR

The Ctrl-P embedded print command should work with all printers, including the Epson FX series. The control code only prints, however, if the file is printed using Save To: LPT, as opposed to Shift-Print.

If SAVEing your file to the printer doesn't work, make sure you're using the correct control codes. They're listed beginning on page 265 of your FX-80 manual. —Ed. □

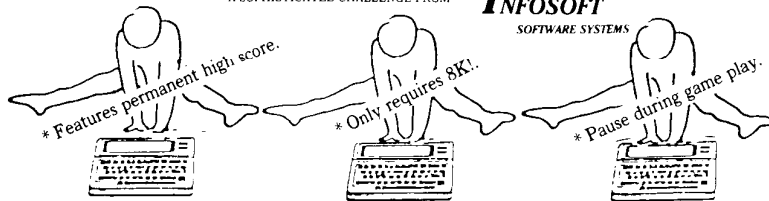


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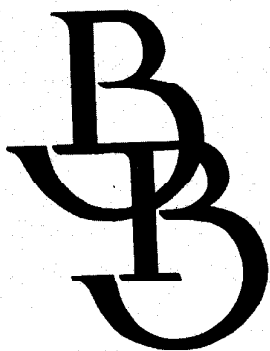
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The Brown Book
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 P.O. Box 3490
 Santa Barbara, CA 93130
 (805) 687-1140
 266 pages
 \$375, six quarterly issues (18 months)
 Circle No. 193

So you've finally decided to part with that first computer - a clunker, perhaps, but one you know has resale value. But to determine that you need to check a pricing guide of the industry.

At last a systematic reference has been compiled. The auto industry has its blue book - now the computer business has the Brown Book.

Named after Californian Fred Brown who launched this quarterly, it was designed for companies and individuals who need to know bottom line resale value on microproducts.

CLOSE THE GAP

Brown says his company published the Brown Book to close the information gap: "Frequently the difference between success and failure rests on the caliber of the information utilized. When attempting to evaluate the microcomputer mar-

ket, one is constantly faced not only with the scarcity of available data but the uncertainty of its source."

The Brown Book puts that material at your fingertips. The first edition (quarter 1, 1985) hits you with 600 products from over 200 manufacturers. Pricing information includes suggested retail, average selling and Brown Book values.

The authors don't, however, attempt to evaluate the relative merits of one manufacturer over another. Their goal instead is to reflect current pricing trends. The contents are divided into three sections:

systems, printers and monitors. Each entry is arranged alphabetically.

NO BAD PRODUCTS

A look under systems showed Radio Shack's array of computers. (See the Model 100's entry as a sample. Ouch! The Brown Book value is only \$120.) "There are no bad products, only bad prices," is how the authors sum up the book's tone. It's an easy-to-use encyclopedia. No computer users (companies or individuals) should enter the wheeling-dealing resale ring without it. □



Radio Shack Model 100 1983

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DISPLAY: N/included

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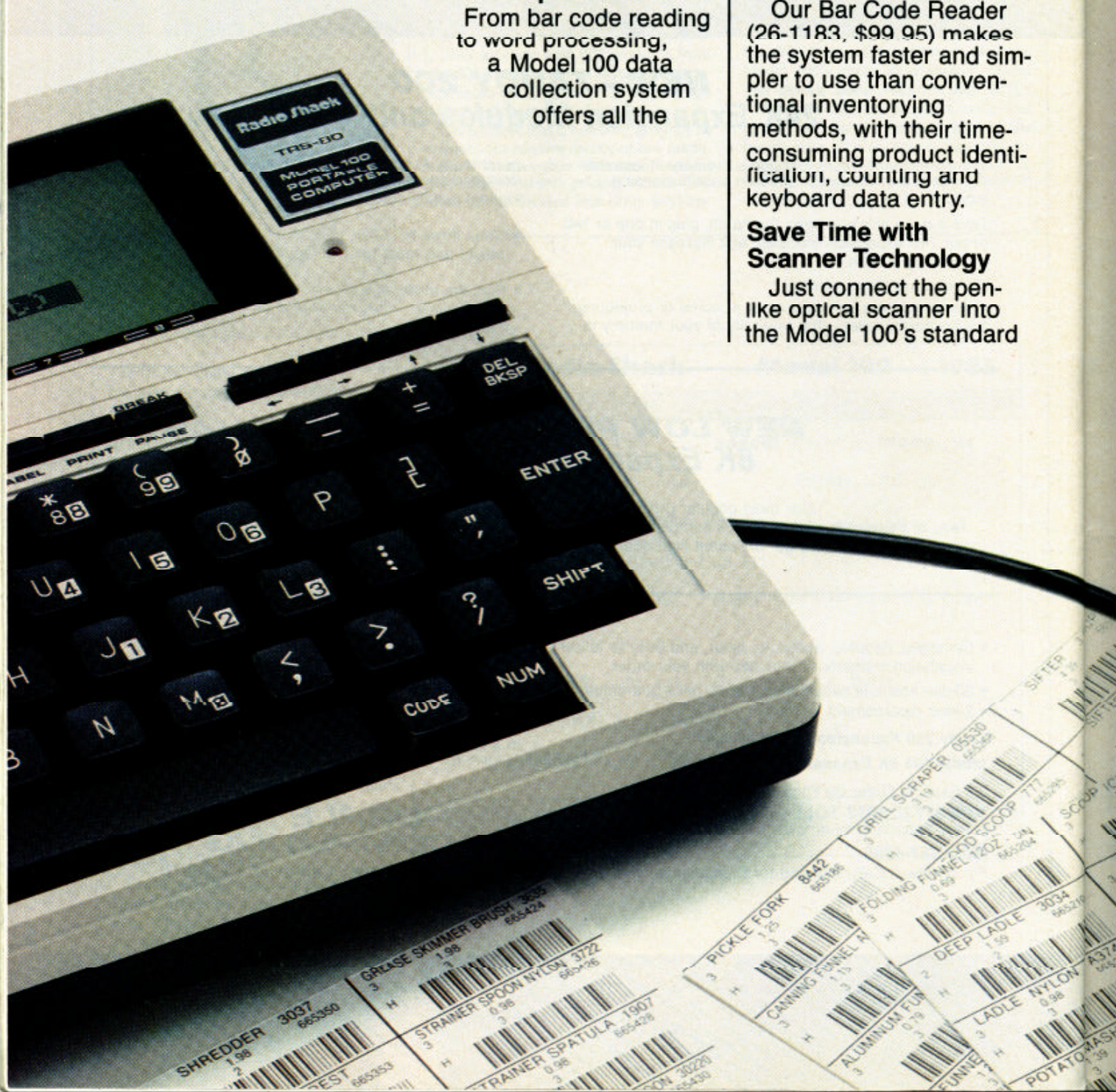
From bar code reading to word processing, a Model 100 data collection system offers all the

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Our Bar Code Reader (26-1183, \$99.95) makes the system faster and simpler to use than conventional inventorying methods, with their time-consuming product identification, counting and keyboard data entry.

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Just connect the pen-like optical scanner into the Model 100's standard



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ITALIAN RESCUE

Docutel/Olivetti, the Dallas-based U.S. distributor of the M-10 and other Olivetti office products, has received a buy-out offer from the Italian computer maker.

Lug. C. Olivetti & Co. currently owns 46 percent of Docutel/Olivetti, with the remainder owned by Docutel principals and other shareholders. Under terms of the proposed buy-out, Olivetti would purchase all outstanding shares at \$5.50 per share.

The buy-out requires the approval of Docutel/Olivetti's board of directors and stockholders. The board of directors has appointed a committee of independent analysts to review the proposal.

Olivetti's offer follows Docutel/Olivetti's disclosure of increased losses for the year ending December 31, 1984. The company sustained a net loss of \$41.9 million on revenues of \$164 million, compared to losses of \$18.3 million on \$221.8 million in 1983 revenues. Loss per share increased from \$2.69 in 1983 to \$6.16 in 1984.

Docutel/Olivetti attributes its losses to decreased sales, the absence of tax benefits (which amounted to more than \$8.1 million in 1983) and expenses related to the start-up and operation of off-premises automatic-teller machine networks.

Despite favorable reviews about its M-10 computer, Olivetti has reportedly discontinued U.S. sales of the Kyocera-designed portable. However, company officials state that the buy-out offer reflects a continuing interest in the U.S. market.

Survey: Readers Talk Back

Two-thirds of Portable 100/200's readers use their Model 100s primarily for business, according to a survey of 2,184 readers conducted by New England-800 Co. during the first quarter of 1985.

New England-800 responds to Portable 100/200 reader queries and accepts subscription orders over the telephone. As part of its service the company asks

readers a series of questions, then issues a quarterly summary to the editors.

Ninety-two percent of the first-quarter callers said they own Model 100s, with about ten percent claiming NEC PC-8201 ownership and fewer than two percent identifying the Olivetti M-10 as their chosen portable. Six percent of the callers report using a different briefcase computer.

Portable 100/200 readers are a sociable bunch. About three-quarters use 100s to communicate with other computers. Most surveys of modem-owning computer users find that fewer than one-quarter utilize the telecommunication capabilities.

The most significant findings for Portable 100/200's editors are those revealing how readers use their 100s. One-third of the survey sample specified personal applications as most important, with the remaining two-thirds identifying the 100 as a business tool.

This business orientation also is seen in responses to questions about Portable 100/200's contents. Nearly half the readers picked "business applications" as a valuable component of the publication, with 38 percent responding "programming" and 34 percent answering "telecommunications." Interfacing concerns were fourth at 29 percent, with home applications identified as important to 26 percent.

Coverage of the computer market was judged unimportant by most readers. Only 13 percent said Portable 100/200 would better suit their needs with more articles about the industry.

The 100's built-in TEXT, TELCOM and BASIC, in that order, were identified as the primary programs readers use. The only other application reported in significant numbers was financial planning. Sixteen percent of the respondents mentioned it as their primary reason for using the 100.

Modems à la Dick Tracy

Radio-frequency (RF) modems use radio waves instead of telephone wires to carry computer signals. Already used in portable pagers and terminals, new devices with greater signal-carrying range are being developed for broader applications. Though computer applications are still in experimental stages, prototype studies show that RF modems may be the most important development for portables since battery power.

RF modems work like telephone modems, which translate binary signals into matched tones that are introduced into the telephone system acoustically or via direct connection. Variations in frequency indicate the actual binary signal being sent.

By sending tones through radio transmitters and receivers, RF modems alter tonal frequencies to produce the required binary message. Computers communicate over radio waves exactly as if they were using conventional modems. To the computers involved, there's no difference; radio waves have simply replaced telephone wire.

A specialized RF terminal is marketed

by Dataspeed of San Francisco. The company's Quotrek terminal allows investors and stock brokers to request and receive stock-exchange information over FM radio in selected metropolitan areas throughout the continental United States — without wires, cables, or telephones. The device has a reception range of 40 to 50 miles. □



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100/200

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RS24

requires no special care or technical sophistication — with a couple of important exceptions.

The bubble module holds seven AA batteries that are accessible through hatches in the bottom of the unit. According to SoundSight, the batteries power the Model 100 as well as the bubble module, allowing users to replace discharged cells without removing the Magnetic Bubble Memory case.

The operating instructions included with the Magnetic Bubble Memory specify that Duracell batteries must be used with the unit. Other batteries, SoundSight says, "have a large internal resistance and may not work."

Users may also choose Eveready SF 500 or SF 15 batteries, which are rechargeable. However, the operator must be careful not to attempt to recharge conventional batteries, as they may rupture and damage the computer, the bubble module or both.

The documentation that comes with the Magnetic Bubble Memory gives complete installation instructions, but lacks diagrams. A warning — "Make sure that you do not plug the 40 pin connector in backwards as it will destroy the bubble memory components" — coupled

with the lack of illustrations restricts installation to the bold.

The bubble module's machine-language operating system is stored above the 100's high memory (HIMEM). This makes the unit incompatible with other programs that use HIMEM locations for program code or data. Users access the operating system with a CALL command from within BASIC.

The operating system organizes the bubble's contents into five 19-file menu pages. Users specify which page to view on the Model 100's screen and, optionally, on which page to store saved programs or text files. This is analogous to the MS-DOS subdirectory structure and is a nice touch.

The software also saves RAM files, including TEXT-created document files, in bubble memory.

The supplied software is written in machine language, so it isn't compatible with programs from Portable Computer Support Group and other companies who use machine language routines. Running any of these programs obliterates the operating system. SoundSight recommends that users store the operating system as a .CO file, run other programs, clear HIMEM and then reload it.

TOUCHING, FEELING

Despite its limitations, the SoundSight Magnetic Bubble Memory has the potential to be a valuable peripheral for Model 100 users. Its APPEND feature allows users to create text files hundreds of kilobytes long, and its CHAIN command lets users combine short BASIC code segments, emulating programs much too long to run on a standard Model 100. The device works faster and more reliably than disk drives.

The production version of the unit supplied to Portable 100/200 after deadline seems, after a quick inspection, to remedy some of the prototype's flaws.

Bubble modules are more expensive than portable disk drives and are more limited because the bubble can't be removed and exchanged. The benefits are enhanced portability, long battery life and high reliability.

For users who work frequently with a large data base, a bubble module could be the ideal solution.

SoundSight's Magnetic Bubble Memory is just an indication of where the solution may someday lie. Its incompatibility with popular Model 100 software, poor documentation and disquiet-

IT'S HERE!

Finally, an internal modem
for your NEC-8201A

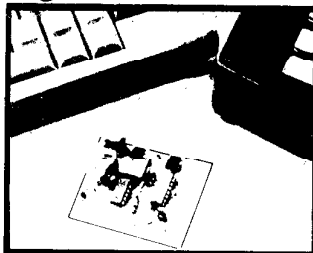
NEW Now, the TouchBase Modem
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TouchBase Design is proud to announce production of the TouchBase Modem—the only internal, direct connect modem designed for installation inside the NEC-8201A portable computer.

When using the TouchBase Modem, the phone line loops directly into the computer via an RJ 11 jack; dial the number, and you are on line! No extra batteries—the TouchBase Modem is powered by the computer, and virtually turns off (25 micro amps) when not in use. This unique design also allows the RS 232 port to be used with any other peripheral when the TouchBase Modem is not in use.

Installation is easy: by using the supplied instructions and a small screwdriver, the TouchBase Modem can be installed in about 10 minutes. Because of the friendly design, there is absolutely no soldering necessary.

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RS17

REVIEWS

ingly complex installation procedures make it less than ideal.

SoundSight has not, in our opinion, demonstrated its ability to deliver the Magnetic Bubble Memory to market in a timely, professional way. The bugs in the first system supplied to Portable 100/200 rendered it useless for any serious application. The second system arrived too late for thorough testing. Until there is some assurance that the bugs have been exterminated the product can't be recommended. □

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ENTRY ADRS (MENU):	58604
ENTRY ADRS (DIRECTORY):	58590

SoundSight's dot-matrix documentation lists CALL locations for bubble memory functions.

WordStar Look-Alike

Lapstar
Text-processor for the Model 100
\$79.95
CISS corp.
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Circle No. 162

By WOODY LISWOOD

Catch a falling star and port it to your 100, use it any day ...

If you've ever wished the renowned WordStar worked on the 100, your text-formatting dreams have been answered. CISS Corp. of St. Louis, Missouri, has dropped a winner in every 100 user's lap.

Lapstar does *almost* all of WordStar's word-processing stunts. It converts the 40 columns by 8 lines to 60 columns by 10 lines, and contains all but one of WordStar's control code sequences.

The only trick missing is that Ctrl-S

doesn't backspace. Randy More, author of Lapstar, says that since the Model 100 has an absolute interrupt of X-off when it sees Ctrl-S, he couldn't use it for the backspace command. But Ctrl-H or Backspace solves the problem.

Despite Lapstar's smaller character size, the display is easy to read. And while the 100's screen normally displays 320 characters Lapstar displays up to 600 characters.

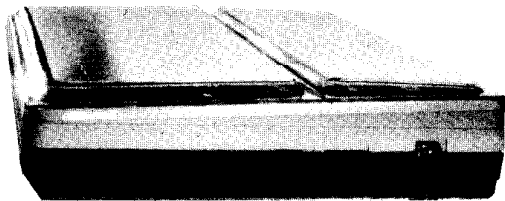
Lapstar uses about 4K of machine code and offers two options when loaded. Save it directly to memory with a small execution pointer file, or store it as a machine-code program that must be loaded into memory with each use. The latter requires additional overhead.

Since other machine-language programs reside in the same memory locations as Lapstar, Lapstar will have to be reloaded each time from tape or from a separate machine-language file. If Lapstar is your only machine-language program, save it directly to memory.

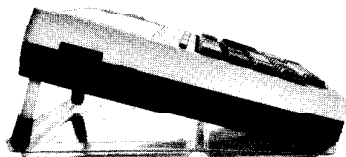
Lapstar starts with a menu:

F displays the directory.
N opens a non-document file.
D opens a document file.

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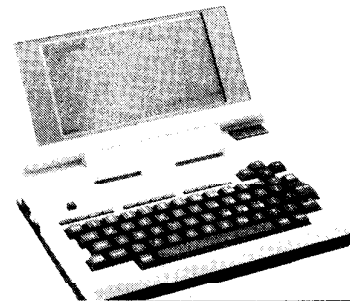


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REVIEWS

Y kills a file.
R renames a file.
X exits from Lapstar.
P prints a file.

CURSOR CONTROLS

The Lapstar cursor commands disable and replace the 100 cursor controls:

Ctrl-D moves the cursor one space to the right.

Ctrl-H moves the cursor one space to the left.

Ctrl-E moves the cursor up one line.

Ctrl-X moves the cursor down one line.

Ctrl-F moves the cursor one word to the right.

Ctrl-A moves the cursor one word to the left.

Ctrl-W scrolls the screen up one line.

Ctrl-Z scrolls the screen down one line.

Ctrl-R moves the cursor up one screen.

Ctrl-C moves the cursor down one screen.

Ctrl-QE moves the cursor to the top of the screen.

Ctrl-QX moves the cursor to the bot-

tom of the screen.

Ctrl-QC moves the cursor to the bottom of the file.

Ctrl-QR moves the cursor to the top of the file.

Ctrl-QD moves the cursor to the right end of the line.

Ctrl-QS moves the cursor to the left end of the line.

If unfamiliar, the control codes may seem cumbersome. But the advantage they provide is that you don't have to reposition your hands to perform the text-processing functions.

FIND

Lapstar has no replace function. To FIND a particular string press Ctrl-QF.

Ctrl-L moves the cursor to the next occurrence of that string. Ctrl-Q 0-9 moves the cursor to the appropriate marker.

These block moves are included:

Ctrl-KB sets the block start.

Ctrl-KK sets the block end.

Ctrl-KC copies the block to the cursor location.

Ctrl-KY deletes the marked block.

Ctrl-KV moves the block to the cursor location.

Ctrl-K 0-9 sets markers.

PRINTING

Lapstar's formatting options are limited to setting the width of the column and the length of the page. For more sophisticated printing a program such as Write+ is recommended.

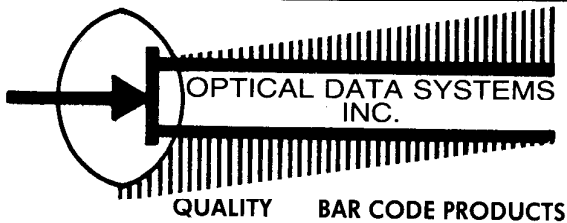
Lapstar uses a standard .DO file. If your print formatter uses dot commands, you can enter them with Lapstar and print with your other program.

WAITING FOR LAPSTAR 200

Lapstar has a couple of quirks but no apparent bugs. When scrolling, the program sometimes takes you past the end of the file where the memory contents are shown. If this occurs, terminate and start again. The biggest hassle for this reviewer was to not press Ctrl-S for back-space and to use instead the back-space key or Ctrl-H.

Lapstar is a fantastic program. And Lapstar with the Model 100 easily matches more expensive text-processing combinations.

If you do mostly text work, the Lapstar/100 duo is a better buy than the Tandy 200. But if Lapstar comes out with a version for the 200, that will be an unbeatable combination. □



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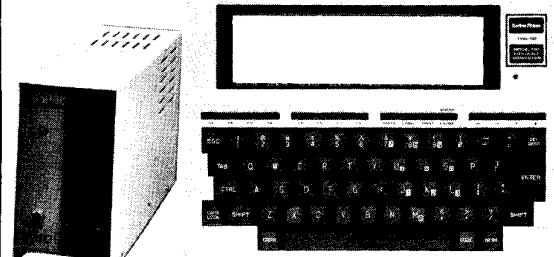
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"We really enjoy writing on the Model 100 and transferring files to the MicroMate." User's Guide review article in Vol.1 no.5. 1984.

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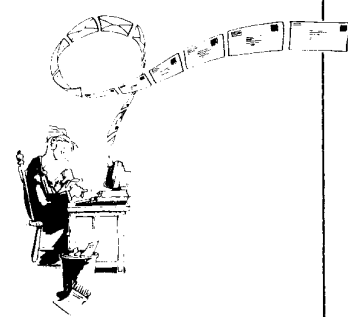
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Freelance writer Roger Strukhoff is a staff editor at Micro communications, a monthly magazine published in San Francisco. — Ed

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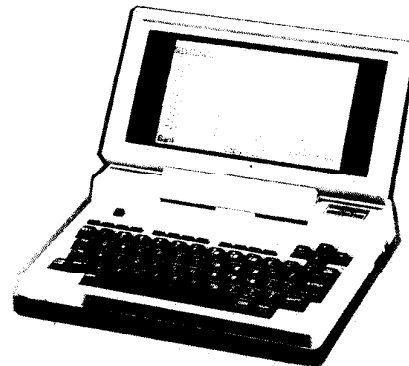
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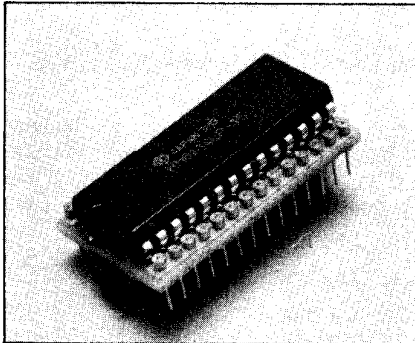
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users can read messages, add comments, then forward them to other subscribers for action. Filed phone messages may be recalled by date, phone number, company name, caller name or any part of the text. They become an electronic rolodex-style data base.

Most E-mail messages require the intended recipient's address. But some — special announcements, policy and guideline statements, job openings and the like — can be posted in public or semiprivate locations using the bulletin board feature.

FORMS MANAGEMENT

Dialcom lets users design forms that can be recalled and filled in. The Dialcom subscriber who is in sales can create a billing form with blanks for date, buyer, shipping address, product number, product description, quantity and price.

The seller can fill out the form right in the buyer's office, then route it electronically to the appropriate corporate mailboxes — accounts receivable and the warehouse shipping department.

Managers at branch offices can create forms for reporting payroll to the check-writers at the corporate nerve center. Warehouse managers can use forms for checking inventory, then route them via modem. Auditors can store tax forms online.

The forms management function is complemented by Dialcom's ability to store distribution lists online. Users can create a list of electronic mailbox addresses, then automatically copy the same message to the entire list. Top managers can send policy memos to their subordinates with a couple of keystrokes.

Data integrity and security issues always arise when proprietary information and financial plans are transmitted electronically. Dialcom uses a variety of methods to ensure that private information remains private.

If an executive logs onto the network then leaves the workstation, another user might gain access to privileged information. To prevent this unauthorized use, Dialcom automatically disconnects users after a couple of idle minutes.

Dialcom's software, which is written in Fortran and runs on Prime mainframes, is stored separately from user files. According to Dialcom, users can't modify the software to allow unauthorized access to protected information.

Log-on information and passwords are likewise stored separately from the message base. As further protection, this information is encrypted.

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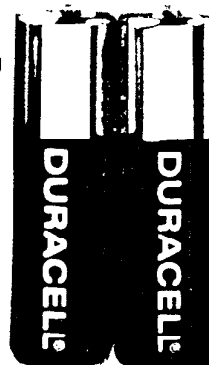
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the last log-on are displayed. This helps alert subscribers to use by others who have discovered their passwords.

Users also can change their passwords as frequently as they wish. Passwords may be as long as 30 characters.

Electronic mail is restricted to the message recipient. ITT Dialcom reports that even its staff is unable to enter a user's mailbox.

Finally, users may assign password protection to particular messages. This confidentiality requires that both the sender and the recipient know a password that is unique to a single encrypted message.

Dialcom suggests that users who send sensitive materials via E-mail use long, random passwords and change them frequently.

THE WORLD BEYOND

E-mail is just part of the ITT Dialcom story. The network also provides a gateway service that allows subscribers to access a variety of information sources.

Dialcom's News command provides access to more than 70 newswires that are updated around the clock. United Press International provides national, regional, state, sport and Washington coverage. Also included are the Associated Press's Videotex service, OPEC's oil newswire, weekly news and features from the International Medical Tribune Syndicate, English and Spanish-language reports from Deutsche Presse Agentur and farm news from the U.S. Department of Agriculture's USDA Online.

The latest stock market and commodities exchange quotations are available through the Unistox financial newswire.

The Official Airline Guide, which is updated daily, provides information on more than 820,000 direct and connecting flights from more than 105,000 domestic and international locations. Details include departure and arrival time, connections, type of meal service, aircraft and fare options.

Specialized information is available from a variety of data bases. The Bureau of National Affairs, for instance, provides two electronic publications: the Daily Tax Advance and the SEC Advance. The Food and Drug Administration publishes FDA Bulletin Board, which contains information on product recalls, proposed rule changes (as announced in the Federal Register), imported products that have been detained, and weekly reports on newly approved drugs and medical devices.

More than 250 additional data bases are accessible through ITT Dialcom, including Dialog, SDC Search and Bibliographic Retrieval Service (BRS). □

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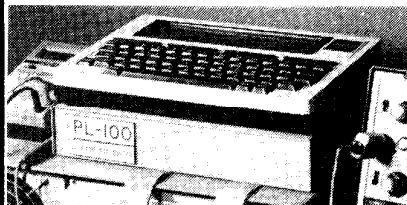
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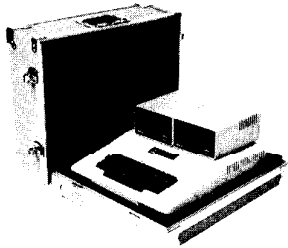
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ROM MAP (from page 27)

Tandy 200 ROM Map

```

0003 'MENU',0
0018 RST 3 - Compares HL and DE and sets flags accordingly
      IF HL < DE, Carry is set, Zero is reset
      IF HL = DE, Carry is reset, Zero is set
      IF HL > DE, Carry is reset, Zero is reset
001E PRINT A SPACE CHARACTER
      Entry Conditions: None
      Exit Conditions: A register contains 20
0020 RST 4 - PRINT THE CHARACTER IN THE A REGISTER
      Entry Conditions: A holds character to be printed
      Exit Conditions: None
0038 RST 7 - Jumps to 9C85 where byte following RST 7 instruction
      is used to calculate offset into branch table starting at
      F507. Control returns to a point 2 bytes after RST 7
      instruction. First 63 addresses in branch table point to
      RETURN instruction. Next 16 addresses in table point to
      BASIC'S PC error routine
0080 TABLE OF BASIC KEYWORDS - First Character of each has high-
      bit set. Extends to 025F
031c TABLE OF BASIC ERROR CODES - Extends to 0359
0415 ' Error',0
041C ' in ',0
0421 'Ok',CR,LF,0
0426 'Break',0
0488 DISPLAY ERROR MESSAGE - E holds error code
0653 SEARCH FOR A BASIC LINE NUMBER
      Entry Conditions: EP67 holds start address of BASIC program.
      DE has line number to search for
      Exit Conditions: BC has address to insert new line. Carry is
      set if line exists, else reset. HL has address of next line
0671 TOKENIZE A BASIC LINE
      Entry Conditions: HL points to untokenized line
      Exit Conditions: Tokenized line stored at EP6C
0C9F '?Redo from start',CR,LF,0
0DC9 '?Extra ignored',CR,LF,0
1013 CONVERT CHARACTER POINTED TO BY HL TO UPPERCASE
      Entry Conditions: HL points to character to be converted
      Exit Conditions: A register holds character. Character
      converted to its uppercase equivalent
1014 CONVERT CHARACTER IN A TO UPPERCASE
      Entry Conditions: A holds character to be converted
      Exit Conditions: Character converted to uppercase
12F7 WAIT FOR CHARACTER FROM THE KEYBOARD
      Entry Conditions: None
      Exit Conditions: Zero flag set if Function key was pressed
      Reset if normal key. A register holds value for key pressed
1549 POWER OFF AND RESUME WHEN POWER IS TURNED BACK ON
      Entry Conditions: None
      Exit Conditions: None
1590 SEND CHARACTER TO LINE PRINTER (TABS NOT EXPANDED TO SPACES)
      Entry Conditions: A register has character to be printed
      Exit Conditions: None
15C0 TURN ON CASSETTE MOTOR
      Entry Conditions: None
15C2 TURN OFF CASSETTE MOTOR
      Entry Conditions: None
      Exit Conditions: DE and AF are altered
15C8 READ A CHARACTER FROM CASSETTE AND UPDATE CHECKSUM
      Entry Conditions: C has current checksum
      Exit Conditions: A has character, C has updated checksum
15D9 SEND A CHARACTER TO CASSETTE AND UPDATE CHECKSUM
      Entry Conditions: A has character to be sent, C has current
      checksum
      Exit Conditions: C has updated checksum
1A7E READ SYSTEM TIME INTO BUFFER
      Entry conditions: HL points to 8-byte buffer to receive time
      Exit Conditions: HL = HL + 8, all other registers are altered
1A9E READ SYSTEM DATE INTO BUFFER
      Entry conditions: HL points to 8-byte buffer to receive date
      Exit Conditions: HL = HL + 8, all other registers are altered
1AC5 READ SYSTEM DAY INTO BUFFER
      Entry conditions: HL points to 3-byte buffer to receive day
      Exit conditions: All registers altered
21AF 'It's time to run '
2310 FC ERROR ROUTINE
2658 PRINT CHARACTERS TILL CR, EOF OR VALUE IN B IS REACHED
      Entry Conditions: HL points to characters to be printed. B
      has maximum number of characters to be printed
      Exit Conditions: The characters are printed until:
      (1) A carriage return is reached
      (2) An End of file marker (nex 1A) is reached
      (3) The number of characters specified in B are reached
      If condition 1 or 2 cause the return, HL will point to
      character that caused return. If condition 3 causes return,
      HL = HL + B
2697 RESET POWER DOWN COUNTER
      Entry Conditions: None
  
```

ROM MAP

```

26A4  Exit Conditions: A is altered
      KEY LIST
      Entry Conditions: None
26C6  Exit Conditions: A is altered
      PRINT PRINTABLE CHARACTERS FOR LENGTH IN B
      Entry Conditions: HL points to characters to be printed. B has
      number of characters to be printed
      Exit Conditions: Only characters greater than 31 are printed.
      Other characters replaced with spaces. HL and B are altered
2946  DUMP SCREEN CONTENTS TO PRINTER
      Entry conditions: None
      Exit Conditions: All registers altered
2A2A  DISPLAY VISIBLE FILES
      Entry Conditions: None
      Exit Conditions: All registers except HL are altered
2AB4  KILL A TEXT (.DO) FILE
      Entry Conditions: DE points to files storage address. HL
      points to directory entry flag
      Exit Conditions: None
2B2C  KILL A FILE
      Entry Conditions: HL points to files directory entry. File
      must be determined as either .BA, .DO or .CO file
      Exit Conditions: All registers altered
2D6B  'NOTE.DO'
2D7C  CREATE A TEXT FILE
      Entry Conditions: Filename is stored at F746. .DO extension
      not required
      Exit Conditions: HL has start address of new file. DE has
      address of directory entry flag. Carry flag is set if file
      already existed, otherwise reset
31F1  'verify failed',CR,LF,0
32D2  BEEP AND GO TO THE MAIN MENU
      Entry Conditions: None
      Exit Conditions: None
333A  'Top: ',0
3340  'End: ',0
3346  'Exe: ',0
3464  'Found:',0
346B  'Skip: ',0
4198  LOAD BC AND DE FROM LOCATION POINTED TO BY HL
      Entry Conditions: HL points to value to be put into C. HL + 1
      holds value for B, HL + 2 holds value for E, HL + 3 holds
      value for D
      Exit Conditions: HL = HL + 4
41A1  LOAD DE AND BC FROM LOCATION POINTED TO BY HL
      Entry Conditions: HL points to value to be put into E. HL + 1
      holds value for D, HL + 2 holds value for C, HL + 3 holds
      value for B
      Exit Conditions: HL = HL + 4
41BA  MOVE BLOCK OF MEMORY FROM DE TO HL IN AN INCREASING MANNER
      Entry Conditions: DE points to block to be moved. HL points to
      area to receive block. B holds length of block to be moved. If
      B = 0, 256-byte block will be moved
      Exit Conditions: HL = HL + B, DE = DE + B, B = 0. Block of
      memory has been moved
41C3  MOVE BLOCK OF MEMORY FROM DE TO HL IN A DECREASING MANNER
      Entry Conditions: DE points to end of block to be moved. HL
      points to end of area to receive block. B holds length of
      block to be moved. If B = 0, 256-byte block will be moved
      Exit Conditions: HL = HL - B, DE = DE - B, B = 0. Block of
      memory has been moved
4703  PRINTS " in " AND THE VALUE IN THE HL REGISTERS
470B  CONVERT BINARY VALUE IN HL AND DISPLAY IT
      Entry Conditions: HL holds binary value
      Exit Conditions: ASCII representation of binary value is
      displayed at current cursor location. All registers altered
4E0C  CHECK FOR UPPERCASE ALPHABETIC CHARACTER
      Entry Conditions: HL points to the character to be checked
      Exit Conditions: Carry is set if uppercase, reset if not
4E0D  CHECK FOR UPPERCASE ALPHABETIC CHARACTER
      Entry Conditions: A register holds character to be checked
      Exit Conditions: Carry is set if uppercase, reset if not
4F3E  PRINT CARRIAGE RETURN AND LINE FEED
      Entry Conditions: None
      Exit Conditions: A register altered
4F45  BEEP
      Entry Conditions: None
      Exit Conditions: A register altered
4F49  HOME CURSOR
      Entry Conditions: None
      Exit Conditions: A register altered
4F4D  CLEAR SCREEN AND HOME CURSOR
      Entry Conditions: None
      Exit Conditions: A register altered
4F54  SET SYSTEM LINE
      Entry Conditions: None
      Exit Conditions: A register altered
4F59  RESET SYSTEM LINE
      Entry Conditions: None
      Exit Conditions: A register altered
4F5E  LOCK OUT SCREEN SCROLL
      Entry Conditions: None
  
```

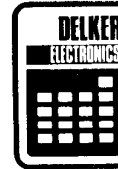
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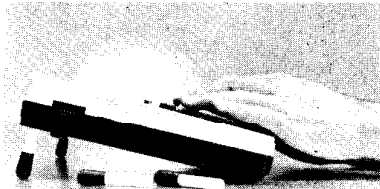
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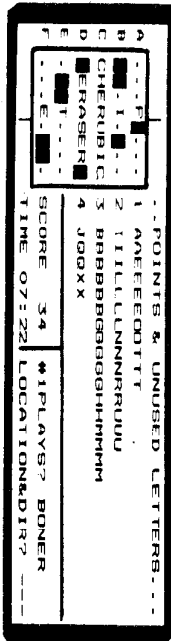
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ROM MAP

4F63	Exit Conditions: A register altered ENABLE SCREEN SCROLL Entry Conditions: None
4F68	Exit Conditions: A register altered TURN ON CURSOR Entry Conditions: None
4F6D	Exit Conditions: A register altered TURN OFF CURSOR Entry Conditions: None
4F72	Exit Conditions: A register altered DELETE CURRENT LINE Entry Conditions: None
4F77	Exit Conditions: A register altered INSERT LINE Entry Conditions: None
4F7C	Exit Conditions: A register altered ERASE TO END OF LINE Entry Conditions: None
4F88	Exit Conditions: A register altered TURN ON REVERSE VIDEO Entry Conditions: None
4F8D	Exit Conditions: A register altered TURN OFF REVERSE VIDEO Entry Conditions: None
4F8F	Exit Conditions: A register altered PRINT CHR\$(27) AND THE CHARACTER IN THE A REGISTER Entry Conditions: None
4F96	Exit Conditions: A register altered POSITION CURSOR TO THE BOTTOM LEFT CORNER OF THE SCREEN Entry Conditions: None
4F9B	Exit Conditions: A register altered POSITION CURSOR Entry Conditions: L register holds row (1-16), H register holds column (1-40)
4FC4	Exit Conditions: AF altered SET AND DISPLAY FUNCTION KEYS Entry Conditions: HL points to function key definitions
4FC7	Exit Conditions: All registers altered DISPLAY FUNCTION KEYS Entry Conditions: None
4FA9	Exit Conditions: All registers altered ERASE FUNCTION KEY DISPLAY Entry Conditions: None
54F0	Exit Conditions: All registers altered PROMPT WITH QUESTION MARK AND GET A LINE FROM THE KEYBOARD Entry Conditions: None
54F6	Exit Conditions: Same as 54F6 GET A LINE FROM THE KEYBOARD TERMINATED WITH ENTER Entry conditions: None
5A05	Exit conditions: Characters entered are stored starting at location EF70. String of characters is terminated with binary zero. B register holds length of string plus 1. HL points to one character before string storage area, EF6F If operation was terminated with SHIFT/BREAK, Carry flag will be set and location EF70 will hold binary zero PRINT THE CHARACTER IN THE A REGISTER Entry Conditions: A holds character to be printed
5A14	Exit Conditions: None SEND CHARACTER TO LINE PRINTER (TABS EXPANDED TO SPACES) Entry Conditions: A register holds character to be printed Exit Conditions: None
5DC1	Exit Conditions: None FILL A BLOCK OF MEMORY WITH BINARY ZEROS Entry Conditions: HL points to area to be filled with zeros, B contains length of block to be filled. If B contains 0 when routine is called, 256-byte block will be filled with zeros Exit Conditions: HL = HL + B, B = 0, A = 0
5DC2	Exit Conditions: None FILL A BLOCK OF MEMORY WITH ANY VALUE Entry Conditions: HL points to area to be filled, A contains value to fill with and B contains length of block to be filled. If B contains 0 when this routine is called, 256-byte block of memory will be filled Exit Conditions: HL = HL + B, B = 0
5FA8	Exit Conditions: None DEVICE TABLE - 'LCD', FF 'CRT', FE 'CAS', FD 'COM', FC 'WAND', FB 'LPT', FA 'MDM', F9 'RAM', F8
5FFD	Exit Conditions: None TELCOM ENTRY POINT
6033	'Telcom:', 0
603C	'STAT', 6077
6042	'TERM', 6378
6048	'CALL', 612D
604E	'FIND', 614B
6054	'MENU', 67A4
605B	TELCOM FUNCTION KEY DEFINITIONS - SET 1
6077	TELCOM'S STAT ROUTINE
60B7	'0 pps', 0
6142	'Calling', 0
61BA	DISCONNECT PHONE LINE Entry conditions: None

ROM MAP

61D0	Exit Conditions: AF and B are altered CONNECT PHONE LINE Entry conditions: None Exit Conditions: AF and B are altered
622B	DIAL PHONE NUMBER Entry Conditions: HL points to ASCII string consisting of phone number to be dialed. Terminate string with binary zero Exit Conditions: DE points to last character in phone number string. HL points to zero terminator. Other registers altered
632A	DIAL A SINGLE DIGIT Entry Conditions: A has ASCII number to be dialed Exit Conditions: All registers are altered
6378	TELCOM'S TERM ROUTINE
648A	FUNCTION KEY JUMP TABLE WHEN IN TERM MODE Extends to 6499
649A	F6 (blank) in TELCOM's TERM mode
649D	F1 (Prev) in TELCOM's TERM mode
64B8	F4 (Full) in TELCOM's TERM mode
64CA	F5 (Echo) in TELCOM's TERM mode
64FD	'FullHalfEcho', 'CR', 'Wait', 0
6517	F3 (Up) in TELCOM's TERM mode
6608	F2 (Down) in TELCOM's TERM mode
66C2	F7 (Brk) in TELCOM's TERM mode
66DB	F8 (Bye) in TELCOM's TERM mode
674D	CR, LF, 'Lost carrier', CR, LF, 0
675E	'File to Upload', 0
676D	'File to Download', 0
677E	' aborted', CR, LF, 0
6789	'No file', CR, LF, 0
6793	'Disconnect', 0
67A4	MENU ENTRY ADDRESS
67F3	' #', 0
6802	' (C)Microsoft', 0
6845	' -.-', 0
6869	MENU FUNCTION KEY DEFINITIONS
6903	' destination bank: ', 1B, 4B, 0
6961	TABLE OF ERROR MESSAGE LOCATIONS (10 bytes)
696B	'No target bank', 0
697A	'Target not initialized', 0
6991	'File exists', 0
69AC	'Memory full', 0
69B8	'Cannot copy NOTE.DO', 0
69F0	'Are you sure ? (Y/N) ', 1B, 4B, 0
6A91	DETERMINE AND PRINT LENGTH OF ANY FILE Entry conditions: HL points to subject files directory entry Exit Conditions: HL has length of file
6AA9	DETERMINE AND PRINT LENGTH OF A BASIC FILE Entry Conditions: HL points to start of file Exit Conditions: HL has length of file
6AB9	DETERMINE AND PRINT LENGTH OF A TEXT FILE Entry Conditions: HL points to start of file Exit Conditions: HL has length of file
6AC7	DETERMINE AND PRINT LENGTH OF A MACHINE-LANGUAGE FILE Entry Conditions: HL points to start of file Exit Conditions: HL has length of file
6CA9	'SCHEDL ', 0
6D22	CONVERT A STRING OF CHARACTERS TO ITS UPPERCASE EQUIVALENT Entry Conditions: DE points to string of characters to be converted. String must be terminated with binary zero Exit Conditions: DE points to binary zero terminator, C = number of characters in the string, including terminator. A is altered
6D51	POSITION CURSOR TO PRINT FILENAME ON MENU Entry Conditions: A has the file number (0-51) Exit conditions: Cursor is positioned accordingly
6DA1	PRINT TIME AND DATE AT CURRENT CURSOR POSITION Entry Conditions: None Exit Conditions: All registers altered
6DF6	PRINT A STRING OF CHARACTERS Entry Conditions: HL points to string of characters to be printed. String must be terminated with a binary zero Exit Conditions: HL points to the zero terminator, A = 0
6DFE	PRINT A STRING OF CHARACTERS AND CONTINUE Entry Conditions: String of characters to be printed must be stored directly after CALL 6DFE instruction and terminated with binary zero Exit Conditions: Program flow continues with first instruction following binary zero terminator
6E06	MOVE BLOCK OF MEMORY Entry Conditions: DE points to block to be moved. HL points to area to receive block. A contains length of block to be moved Exit Conditions: DE = DE + A, HL = HL + A, A = 0
6E11	COMPARE STRINGS Entry Conditions: DE points to first string. HL points to second string. C holds the maximum number of characters to be compared Exit Conditions: Zero flag is set if strings are equal, reset if not
6E1D	CLEAR FUNCTION KEY DEFINITION TABLE Entry Conditions: None Exit Conditions: DE and HL are altered
6E20	SET FUNCTION KEY DEFINITIONS Entry Conditions: HL points to table of function key

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ROM MAP

```

definitions. Each definition has 16-character maximum length
High bit of last character of each definition must be set.
Specify strings for all 8 function keys. If function key is
to be blank, use 80
Exit Conditions: DE and HL are altered
6E42 DISPLAY FUNCTION KEY TABLE (IF ENABLED)
Entry Conditions: If byte at location EFOA is other than
zero, table will be displayed, otherwise not
Exit Conditions: All registers altered
6E4F SEARCH DIRECTORY FOR A FILE
Entry Conditions: DE points to filename to be located
Filename must end with binary zero terminator. A register
has length of filename including zero terminator
Exit Conditions: HL points to files directory entry. Zero flag
= 0 if file found, 1 if not found
6E8C GET A FILES STORAGE ADDRESS
Entry Conditions: HL points to files directory entry
Exit Conditions: HL points to beginning of files storage area
6E92 'JanFebMarAprMayJunJulAugSepOctNovDec'
6EB6 FILE TYPE TABLE - B0,F0,C0,80,A0,00
6EC5 BASIC'S INITIAL FUNCTION KEY DEFINITIONS
The last character of each definition has the high bit set
6EE7 ADDRESS ENTRY POINT
6EE8 SCHEDULE ENTRY POINT
6F16 'not found',0
7030 'NOTE',0
7035 'SchdADRS',0
70D7 'ADRS.DO',0
70DF 'Adrs:',0
70E6 'Schd:',0
70ED 'FIND',6F9E
70F3 'LPND',6FA0
70F9 'EDIT',7000
70FF 'MENU',67A4
7106 'NOTE.DO',0
710E ADDRESS FUNCTION KEY DEFINITIONS - SET 1
7128 ADDRESS FUNCTION KEY DEFINITIONS - SET 2
719D TEXT ENTRY POINT
71C4 CR,'File to edit',1B,4B,0
71D4 BLANK SET OF FUNCTION KEY DEFINITIONS
71DC TEXT FUNCTION KEY DEFINITIONS
72EE 'Text ill-formed',BEEP,0
72FF CR,LF,'Press space bar for ',0
7316 'TEXT',0
7492 'Memory full',BEEP,0
79C3 'No match',0
79CC 'String:',0
7D03 BEEP,'Press space bar to continue',0
7D2C 'Print format',0
7D39 'Width:',0
7D40 'Left-margin:',0
7D4D 'Page size:',0
7D58 'Line/Page:',0
7D63 'Top margin:',0
7D6F 'Continuous Y/N?',0
7DFE 'Save to:',0
7E9E 'Load from:',0
829C INSERT A CHARACTER INTO A FILE
Entry Conditions: A has character to be inserted. HL
points to location to insert character
Exit Conditions: HL = HL + 1. Carry is set if out of memory
82A8 INSERT A SPECIFIED NUMBER OF SPACES INTO A FILE
Entry Conditions: BC has number of spaces to be inserted.
HL points to location to insert spaces
Exit Conditions: HL and BC are preserved. Carry is set if out
of memory
82DA DELETE CHARACTERS FROM A FILE
Entry Conditions: BC = number of characters to delete, HL
points to address to begin deletion
Exit Conditions: Characters deleted, BC and HL preserved
8316 MOVE A BLOCK OF MEMORY IN AN INCREASING MANNER
Entry Conditions: HL points to block of memory to be moved, DE
points to area to receive block, BC holds length of block to
be moved. If BC equals 0, 65536 bytes will be moved
Exit Conditions: HL = HL + BC, DE = DE + BC, BC = 0
8321 MOVE A BLOCK OF MEMORY IN A DECREASING MANNER
Entry Conditions: HL points to end of block of memory to be
moved, DE points to end of area to receive block, BC holds
length of block to be moved. If BC equals 0, 65536 bytes will
be moved
Exit Conditions: HL = HL - BC, DE = DE - BC, BC = 0
832C INITIAL DIRECTORY ENTRIES
838F ENTRY POINT FOR BASIC
83B8 'l1ist',CR,0
841C COLD START RESET
Entry Conditions: None
Exit Conditions: Everything altered
84C9 SEND CHARACTER TO THE LINE PRINTER
Entry Conditions: A register has character to be printed
Exit Conditions: None
8508 CHECK RS232 QUEUE FOR CHARACTERS
Entry Conditions: None
Exit Conditions: A equals number of characters in queue. Zero
flag is set if no characters pending, otherwise reset

```

ROM MAP

```

8519 GET A CHARACTER FROM RS232 RECEIVE QUEUE
    Entry Conditions: None
    Exit Conditions: A has character. Zero flag is set if no
    error, reset if error (PE,FF or OF). Carry is set if BREAK
    pressed, else reset
8608 SEND AN XON RESUME CHARACTER (CTRL Q)
    Entry Conditions: None
    Exit Conditions: None
8617 SEND AN XOFF PAUSE CHARACTER (CTRL S)
    Entry Conditions: None
    Exit Conditions: None
8624 SEND A CHARACTER TO THE RS232 OR MODEM (WITH XON/XOFF)
    Entry Conditions: A = character
    Exit Conditions: None
86AD SET BAUD RATE FOR RS232
    Entry Conditions: H has ASCII representation of baud rate
    (1-9,M)
    Exit Conditions: HI,DE,AF are altered
874A DETECT CARRIER
    Entry Conditions: None
    Exit Conditions: A register equals 0 if carrier is detected
    Zero flag is set if carrier, reset otherwise
87D1 WRITE CASSETTE HEADER AND SYNC BYTE ONLY
    Entry Conditions: None
    Exit Conditions: None
87E6 WRITE CHARACTER TO CASSETTE (NO CHECKSUM)
    Entry Conditions: A has the character to be sent
    Exit Conditions: None
8810 READ CASSETTE HEADER AND SYNC BYTE ONLY
    Entry Conditions: None
    Exit Conditions: None
88B3 READ CHARACTER FROM CASSETTE (NO CHECKSUM)
    Entry Conditions: None
    Exit Conditions: D has the character
8A03 SCAN KEYBOARD FOR A KEY AND RETURN WITH OR WITHOUT ONE
    Entry Conditions: None
    Exit Conditions: A has character if any. Zero flag is set if
    no key found, reset if key found. Carry flag is set if special
    character, reset if normal character
    Special Characters: A = 0      F1
                        1         F2
                        2         F3
                        3         F4
                        4         F5
                        5         F6
                        6         F7
                        7         F8
                        8         LABEL
                        9         PRINT
                        0A        SHIFT/PRINT
                        0B        PASTE
8B4D CHECK FOR BREAK CHARACTERS (CTRL C OR CTRL S)
    Entry Conditions: None
    Exit Conditions: Carry set if BREAK or PAUSE pressed,
    otherwise reset
8D76 TURN ON SCREEN PIXEL
    Entry Conditions: D = x coordinate (0-239), E = y coordinate
    (0-127)
    Exit Conditions: DE is destroyed
8D77 TURN OFF SCREEN PIXEL
    Entry Conditions: D = x coordinate (0-239), E = y coordinate
    (0-127)
    Exit Conditions: DE is destroyed
8D78 TURN ON OR OFF SCREEN PIXEL
    Entry Conditions: D = x coordinate (0-239), E = Y coordinate
    (0-127). A is on/off flag. If A=0, pixel will be turned off,
    otherwise on
    Exit Conditions: DE is destroyed
8BC0 MAKE TONE
    Entry Conditions: DE = frequency, B = duration
    Exit Conditions: AF is altered, B will equal 0
8D66 TURN ON RST 7.5 INTERRUPT
    Entry Conditions: None
    Exit Conditions: A is altered
8FA0 TURN OFF AND REARM RST 7.5 INTERRUPT
    Entry Conditions: None
    Exit Conditions: A is altered
8FAB MAKE A BEEP
    Entry Conditions: None
    Exit Conditions: A is altered
8FC9 PULSE BUZZER
    Entry Conditions: None
    Exit Conditions: A is altered
9063 CHARACTER SET
    $ bytes each, extends to 9762
9763 KEYBOARD MATRIX
9AFD PRINT BYTES FREE MESSAGE
    Entry Conditions: None
    Exit Conditions: All registers altered
9C4E ' Bytes free',0
9C5A 'TANDY 200 Software',CR,LF,'
    Copr. 1984 Microsoft',CR,LF,0
9F76 CR,'Calculator ',0
    
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
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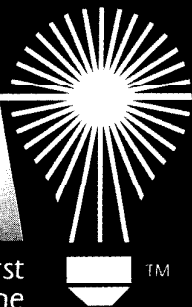
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To save a file to your other system's disk drive, you just move the widebar cursor to the file you want to save and press ENTER. It is saved instantly with no further action.

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To load a file from the diskette to your Model 100, you just move the widebar cursor to the file and press ENTER. The file is transferred to your Model 100's RAM instantly. You can press F8 and go back to the main menu, and the file you loaded from diskette is there, ready to use.

It is so nice to be able to keep your documents, programs (both BASIC and machine code) and *Lucid* spreadsheet files on the diskette, and bring them back when you need them. All files are ready to run or use with no changes or protocol by you.

If you have access to a desktop computer and don't have *Disk+*, then evidently we have done a poor job telling you about it.

All files and programs that you load or save, go over and come back exactly as they are supposed to be because of full error checking. This guaranteed integrity is really a comfort. *Disk+* is wonderful in so many other ways. For example, you can do a "save all" of all your RAM files with just a touch of a function key. That group of files is saved on the diskette under a single filename with a .SD (for subdirectory) extension. Any time you want, you can bring back all those files at once, or just one or two if you like, again with one-button ease.

Disk+ takes up no RAM. That's zero bytes either for storing the program or for operating overhead.

What really excites most *Disk+* users is text file cross compatibility. Your Model 100's text files are usable on your desktop computer, and your desktop's text files become Model 100 text files.

This means you can write something on your Model 100, and with *Disk+* transfer it

instantly to your desktop and start using it right away on your bigger computer. Or the way we like to work is to type in a document on the desktop computer and then transfer it to our Model 100 with *Disk+*. Then we print out the document, beautifully formatted, using WRITE ROM.

Disk+ works with just about every micro sold, from IBM PC and its clones, to all Radio Shack computers (yes, all), to Apple II, Kaypro, Epson and most CPM. Just ask us. More than likely, your computer is supported.

Incidentally, hundreds of Model 100 owners have gone to their Radio Shack stores and bought a color computer because it is so low priced, and with *Disk+* they have an inexpensive disk drive.

And if that weren't enough, how about this: *Disk+* also provides cross-compatibility between different computers like IBM, Apple or the Model 4 using the Model 100 as the intermediary device. Quite a feature!

The snap-in ROM is really great because you can use other ROMs like *Lucid* or WRITE ROM. They snap in and out as easily as an Atari game cartridge and you never lose your files in RAM.

Anyone who ever uses *Disk+* simply can't do without it. But so many times we have had new users call us and say, "Wow! I had no idea when I ordered it that *Disk+* would be so fantastic. I just couldn't believe that I could use my desktop computer's disk drive with my Model 100 just like it is another main menu."

That's why we sell *Disk+* on a thirty-day trial. If you aren't completely satisfied, return it within thirty days for a full refund. Priced at \$149.95 on Snap-in ROM. MasterCard, Visa or COD.

1-214-351-0564

PORTABLE COMPUTER SUPPORT GROUP

11035 Harry Hines Blvd., #207, Dallas, Texas 75229

PCSG provides hotline software support for Model 100. Call 1-214-351-0564. Available now directly from Portable Computer Support Group. We endeavor to continue as The Leader in software for the Model 100.

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