

TERRY KEPNER'S

# portable 100

\$3.95/CAN \$4.95  
A MONTHLY PUBLICATION (EXCEPT COMBINED JULY/AUGUST ISSUE)

## From this — to — this!

```
Print "Eliminate Blanks ? --- ";
Gosub [Answer] : SQ=Answer

Print "Enter Conditionals --- ";

[Loop_Cond]
Print @PP(13),BL$;
For I=0 To 9
  DD$=Mid$(DG$,I+1,1)
  If CA(I) Then DD$=RV$+DD$+OV$ ' Reversed
  Print DD$;
Next I

Gosub [Digit] : If DI<0 Then [Exit_Cond]
CA(DI)=Not CA(DI)
If CA(DI) And DI>0 Then CA(0)=False

Goto [Loop_Cond]
[Exit_Cond] CLS
```

```
Gosub [Menu]
On Error Goto [Abort]
```

```
' Allocate Symbol Table
' SY$( ) holds the symbol (capitalized)
' RF!( ) holds the equivalent line-number
' CT ( ) holds the symbol's occurrence count
' TP is the index of the TOP-most symbol
```

```
Dim SY$(MX),RF!(MX),CT(MX)
TP=0
```

```
1680Print"Eliminate Blanks ? --- ";
1690Gosub930:SQ=Answer
1700Print"Enter Conditionals --- ";
1710'
1720Print@DD(13),BL$;
1730For I=0To9
1740DD$=Mid$(DG$,I+1,1)
1750IfCA(I) ThenDD$=RV$+DD$+OV$
1760PrintDD$;
1770NextI
1780C=rev960:IfDI<0Then1820
1790CA(DI)=NotCA(DI)
1800IfCA(DI)AndDI>0ThenCA(0)=False
1810Goto1710
1820CLS
1830Gosub1060
1840OnErrorGoto3170
1850DimSY$(MX),RF!(MX),CT(MX)
1860TP=0
1870For Pass=1To2
1880Print@PP(5),UsingFM$;Pass;
1890Print@PP(6),UsingFM$;0;
1900In=False:TF=2:IN=0:L2!=ST
1910OpenN$For InputAsTF
1920Print@PP(1),UsingBB$;N$;
1930IfPass=1Then1960
1940OpenO$For OutputAs#1
1950Print@PP(0),UsingBB$;O$;
1960'
```

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**ON THE COVER:**

*Trying to keep all those GOTO and GOSUB numbers straight has always been a problem in BASIC programming—until now.*

TANDY LAPTOP COMPUTING MARCH 1990 VOL. 7 NO. 3

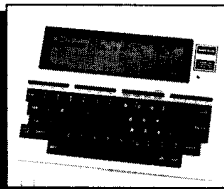
**portable 100**  
A MONTHLY PUBLICATION OF THE TANDY CORPORATION

**From this — to — this!**

```
Print "Eliminate Blanks? ... ";
Gosub [Answer] 100Answer
Print "Enter Conditionals ... ";
[Loop Cond]
Print #P(13);BL5;
Print #D(10);T(1);
IF CA(1) THEN DOS+RVS+ODS+OVS ' Reversed
Print DOS;
Gosub [Digits] : If D(0) Then [Exit_Cond]
CA(0)=R(0) CA(1)
IF CA(1) AND D(0) THEN CA(0)=False
[Base_Cond] BL5
-----
Gosub [Menu]
On Error Goto [Abort]
-----
' Allocate Symbol Table
' D(0) holds the symbol (capitalized)
' R(1) holds the equivalent line number
' C(1) holds the symbol's occurrence count
' TP is the index of the 100 most symbols
Dim SYS(100),R(1)(0),C(1)(0)
TP=0
```

**In two easy steps!**

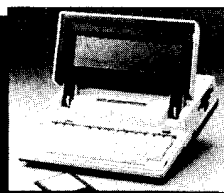
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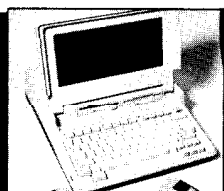
Tandy 102



Tandy 200



Tandy 600



Tandy 1400LT

**BASIC AND LINE NUMBERS: LIFTING THE CURSE**

by Dr. William T. Verts

*A simple and easy way to program without line numbers (and an IBM version lets you create Model 100/200 programs for porting back to your portable)!*

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**PRINTING TO GO: THE EXPRESSWRITER 301**

by Terry Kepner

*A solid little portable printer.*

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**ADDING MEMORY TO YOUR TANDY WP-2**

by Daniel Grotta

*Going beyond tape cassette and a mere 32K of RAM.*

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**EXPERTISE-TO-GO:**

**MODEL 100/102 APPLICATION NOTES**

by Stan Wong

*This compendium of developer's expertise can save you time (and money).*

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**DEPARTMENTS**

**ROM WITH A VIEW**

I/O

**THE IDEA BOX**

**DEFUSR**

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**PICO BACK ISSUE CLOSE OUT SALE!**

*M100 to Space Shuttle.*

*Tandy replies to Daigle.*

*The wizard of DOS, pt. 2.*

*FLOPPY and Lucid problems.*

*WP-2, Model 100/200, & IBM.*

*Software, hardware, back issues.*

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**BACK COVER**

## ROM WITH A VIEW

**D**elays, delays, delays. NASA seems to have as much difficulty staying on schedule as *Portable 100* does. By the time you read this, however, Space Shuttle Columbia should already be in orbit, and I will have used my Model 100 to contact the astronauts in space. Neat!

One facet of Columbia's mission is SAREX (Shuttle Amateur Radio Experiment), wherein shuttle astronauts communicate via amateur ("ham") radio with mere terrestrials like you and me. It's been done before. Back in 1983 Owen Garriot, aboard Columbia's STS-9 flight, made voice contacts with other amateur radio operators on Earth, making him the first ham in space. Two years later Tony England, on STS-51F, operated amateur slow-scan television as well. And now, on STS-35, mission specialist Ron Parise will add "packet radio" to the repertoire.

Packet radio enables computers to communicate via radio, rather than cables or phone lines, thanks to what's called a terminal node controller (TNC). This device connects between the computer's RS-232 serial port and a radio transceiver (transmitter/receiver), giving you, in essence, a "radio modem." Words you type in *TELCOM* are formatted by the TNC into data "packets," converted into audio tones, and then sent to the transmitter, which broadcasts your precocious prose over the airwaves.

Any similarly equipped station within range—even in outer space—can receive your signal. Its TNC decodes your words of wisdom and squirts them into the receiving computer's serial port, where they are then displayed on the screen and/or captured into a file. In most respects it's like operating your computer connected directly to another or through a bulletin board system (BBS). In fact, hundreds—perhaps thousands—of packet BBS's (PBBS) exist worldwide, and hams routinely leave each other messages, bulletins, programs and data files—for free!

Furthermore, I can address a message to my brother Jay at his "home" PBBS (one near him) in Michigan, and send it to any PBBS I happen to be near. Messages are automatically routed and forwarded to arrive at his home BBS, usually within a day.

You already have the computer—just get a TNC and radio. TNC's come in several sizes and flavors. Mine is a tiny HK-21 Pocket Packet from Heathkit, about the size of a deck of cards, with built-in rechargeable batteries. One of my favorite radios is an ICOM IC-2SAT, not much larger than a pack of cigarettes. My whole packet station fits in the same shoulder bag I use daily, including a Diconix 150 Plus printer.

To transmit, you must have an amateur radio operator license, but even without one, you can have a lot of fun (and learn a lot) just monitoring the action. In that case, you only need a receiver, not a transceiver. You may already have a VHF scanner, which should work nicely if it covers the 2 meter (144-148 MHz) amateur band.

You'll need to do a little homework—I haven't enough space here to give you all the details. I just want you to know that it exists, it's easy, and it's a lot of fun. More information is available. Books and articles on packet radio, and ads for radios and TNC's, appear in various ham radio magazines. Try these:

73 *Amateur Radio*, WGE Center, Forest Road, Hancock, NH, (603)525-4201; *CQ Amateur Radio*, 76 North Broadway, Hicksville, NY 11801, (516)681-2922; and *QST*, American Radio Relay League, 225 Main Street, Newington, CT 06111, (203)666-1541 (The ARRL is also a good source of info on becoming an amateur radio operator).

"SAREX-90" in the May '90 issue of 73 lists frequencies, schedules, and even tells how non-hams can get a confirmation card (QSL) for receiving the shuttle's signals.

So much more to say ... so little space. More later. 73 (means best regards)!

*Nugent*

## Toolbox

Manuscripts were typed into Microsoft Word 3.0 on a Tandy 1400 HD, where they were edited, spell-checked, and had basic format instructions inserted. From there they were loaded into a Tandy 4000 (80386 CPU, Tandy EGA Monitor, Tandy LP-1000 LaserPrinter) desktop computer and placed into Aldus' IBM PageMaker 3.01. Once there, design decisions on photo, figure, and listing sizes and placements were made. Here, pull quotes are placed, headlines, intros, and bylines are sized and positioned, and advertisements positioned.

Normally, the Tandy LP-1000 is capable of emulating only a Hewlett Packard Laser Printer Plus. But with the

addition of the Destiny Technology Corporation (300 Montague Expressway, Suite 150, Milpitas, CA 95035. (408) 262-9400) PageStyler 4.5MB kit, the LP-1000 is turned into a fully-compatible PostScript printer, with all 35 native fonts that are found in the Apple LaserWriter Plus printer. The Destiny PageStyler is available through the Tandy Express Order Hardware system.

Page previews were output from the LaserPrinter. When everyone was satisfied with the appearance, final pages were output and artwork and lineart ads were positioned. The finished magazine was then delivered to the printer, who printed it, labeled it, and mailed it to you.

## TERRY KEPNER'S portable 100

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# TANDY SPEAKS OUT

**I**t's been a long time since I've written a letter to an editor, and it looks like it's your turn. Michael Daigle's "The Peasants..." article (*Portable 100*, January 1990) does border on "revolting", to use his term. He admits his opinion may be a "quick and very biased look..." at our two portables. As a long-time portable (Model 100 and 1100FD) user, I'd just like to provide another viewpoint.

My WP-2 experience is limited, but I didn't find the keyboard objectionable at all. No, I didn't like it as well as a Model 100, but have you ever met a Model 100 user who does NOT say it's his all-time favorite keyboard? It's a tough act to follow!

I am an 1100FD user, so let me address the blue-on-green screens on both portables at once. Granted, it's not the color I'd paint my den. But, we evaluated the available options, and it was THE best combination for contrast (readability), in non-backlit LCD screens. Many users gladly swap a backlit screen for an extra hour of battery life. Because of that, best readability under less than ideal conditions, gets my vote over "designer colors" any time.

Michael is correct... inserting text in the middle of a lengthy paragraph is slow on the WP-2. If he will insert a carriage return first, insert his text, and remove the CR, inserts will not be slow. Word processing software often uses this "insert a line" method.

The modem being optional lets individual users choose the cost/performance combination of their choice.

Conversion of text to ASCII is a common way to interchange data between programs or computers which may not be on intimate terms. There is room for error doing this (and other things) on any PC.

The WP-2 isn't Michael's personal cup of tea. It isn't mine either... I prefer the 1100FD. But, many folks love it. A technology writer (PCs and other subjects) friend, one of the most knowledgeable around, says of the WP-2, "It's not perfect, but it's closer than anything else on the market to being my ideal portable." Different strokes for different folks!

The 1100FD ad assumed readers would know a disk ultimately is needed. The point is, you don't need to dig around and find one BEFORE you can start your note-taking. Sometimes, that's an advantage. The 1100's exceptional battery life gives you more than enough time to get to your nearest Radio Shack and buy a disk.

Michael confuses "size" with "weight" in discussing the 1100FD. Size: Compared to a typical "2-inch" notebook, the 1100FD is 3/8" thicker, 1/2" wider, but almost 2" less deep. Weight: A notebook full of paper gets pretty heavy! The 1100FD doesn't quite weigh the "7 pounds" he quotes, even including the battery charger/AC adapter. Sorry, Michael!

A handle would have been welcomed by some users. But when the box is small enough to tuck in your briefcase, and has a couple of carrying cases available, why add the weight and cost?

Keyboards are a very personal thing. Personally, I like the 1100's. I've shown the 1100FD to many writers, and Michael is the first to find it less than quite acceptable.

No, we don't send out 200,000 questionnaires on what a new product should be. Most manufacturers do focus group studies and similar limited surveys. Thousands aren't needed to get a statistically valid sample. Most of our model-to-model changes result from customer feedback. We always appreciate ideas, and look forward to what may come from Michael's reader request.

One danger in uncontrolled feedback is just what he called "pie-in-the-sky" ideas. Many suggestions aren't technically or economically feasible, and expectations get out of hand. When a new model comes out—including those changes which do make sense—the reaction amongst "pie-in-the-skyers" WILL be, "Well, there they go again... barfing up some half-baked next-generation notebook computer without regard to what customers really want!" Oops... sorry again Michael, seems like that's what you already accused us of doing. What a coincidence!

**Ed Juge, Director of Market Planning  
Radio Shack, Ft Worth, TX**

## MULTIPLE COLUMNS AND SPELL CHECKING

Concerning Alicia Goodsby's quest for a spelling checker (INPUT/OUTPUT, Nov. '89), I have a much better solution than trying to locate the ROM-based product mentioned in her letter. If one has easy access to an MS-DOS machine, get a copy of Club 100's *Portable Communicator* file transfer program plus a copy of the *ShareSpell* shareware spell checker. Put both programs in a directory on your path.

*ShareSpell* is a new, top-rated spelling checker which works from the DOS command line, on ASCII files. You don't have to load the file into your word processor to use it. Imbedded control codes and high-order characters inserted for print formatting are unaffected. Two sources are CompuServe and Public Brand Software (800-IBM-DISK).

Set up a portable-disk drive subdirectory on the (recommended) hard disk, change to it, run *Portable Communicator*, with *PowerDOS*, transfer the text file to be checked, then shell to DOS, type *SHARESPELL [filename]*, and your file will be checked and the program automatically terminates to the DOS prompt. EXIT back to *Portable Communicator*, go to the Model 100 keyboard, and reload the file. Get rid of the backup file *ShareSpell* created, before reloading, as you'll have trouble with the Model 100 confusing a text file having the .BAK extension with a BASIC file.

On another topic, everyone owning a Model 100 should get a copy of *CURSOR*, a freeware program available on the CompuServe M100SIG. I renamed the program *TXTVUE* (text-viewer), which is more descriptive. This gem allows proofreading and limited editing of text files at up to sixty columns on a single screen, and more with horizontal scrolling. It gives the 100/102 nearly the screen capacity of the 200.

**Ronald A. Cameron  
Upper Darby, PA**

## 1400 SHUTDOWN DANGEROUS?

At a meeting of our Portable 100 club a number of our members were passing around their Summer '89 issue of *Portable 100*. Now that Bob Liddil has a new

## Int/Ext's for Laptops/Desktops

Tandy 1400 HD, perhaps he can answer a question. Since the 1400 is a portable, battery-supported system, some provisions must have been made to shut down the HD to conserve energy. If one were using Lotus 1-2-3 and the system shut down the HD, all of the current information (not saved) would be lost. What, if any, allowances have been made for this possibility?

Also, how about a review of the Packard-Bell laptop, model 80C286 with HD, 1.44 MD floppy disk drive, with 6/12 MHz speed and 20 MD hard drive or optional 40 MB with 27 ms speed?

**Ray Sampson  
Tacoma, WA**

*Ray, 1400's conserve power by "falling asleep" after a user-defined period of keyboard inactivity, but they don't shut off completely. While power-hungry devices like the backlit screen and the modem turn off, the RAM memory remains on, and thus, intact. When you press a key, the machine "wakes up" and continues right where it left off. You needn't worry about your data—it's safe.*

*Review a Packard-Bell machine in a "Tandy Laptop Computing" magazine? Nope. Sorry.*

*How about telling us more about your Portable 100 club? I'll bet there are others in your area who would like to learn about it and share in the activity. Thanks!*

MN

### TROUBLESHOOTING A TROUBLESHOOTER

Now that I'm into machine language programming (for communications) with the Model 100, it didn't take me long to find a fix for the garble I was getting when using the M100 to test protocol at 1200 baud.

Your May '88 article, "Protocol Testing With Tandy," by Philip Ouellette, does not mention any problem with garble, probably because the author did not evoke the conditions that would cause it. If he had observed the results of a full 1200 baud data stream, of a size greater than the capacity of two screens, he would have observed occasional character omissions. This garble would only add to the troubles of the troubleshooter!

The problem is in the scroll. The 1200 baud data fills the screen quickly but slows down during the scrolling process, and the processor is not free to do its

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I/O work. The unit being tested may have the capability to respond to the M100's call to stop sending; however, this is not always the case. For instance, some satellite data receivers do not have the memory to handle the stream flow, and thus, will not allow such protocol.

More important, a technician does not have the time to set up handshaking, since it may be hardware or a strange type of software control. If hardware, does it require a change in cabling? It is much easier to strap pins 4-5 and pins 6-8-20 on the tested unit's RS-232 port and say, "Let it pour!"

The fix is simple to enter TELCOM a different way. First enter BASIC, type CLS: CALL 16959: CALL 20809 and press ENTER. Then proceed as normal.

The CALL 16959 disables scrolling, and CALL 20829 enters TELCOM at a point beyond the code that enables scrolling. The screen at first fills but then begins overwriting on the last line. Otherwise, TELCOM works the same.

**Greg Dasso  
Clancy, MT**

### LOOKING FOR A NEW MACHINE

I have a Model 100 for primarily one reason: along with the printer and modem cables, spare batteries and etc., it fits snugly in only one side (i.e., half) of my briefcase. I run the M100 with 32K, a Polar ROM2, and (when home) a DVI. It is, however, slow and very software limited.

I have been waiting for a modern notebook computer, and they are beginning to appear on the market. Compaq's new LTE series is exactly the same size as the M100. Unfortunately the LTE/286 with a few peripherals, retails for approximately \$6,100. That's a lot of cash. The NEC's Ultralite, while less expensive, lacks availability of many peripherals.

I don't need backlighting, a 25x80 screen (I can use the monitor at home), or a battery pack and charger combination that alone costs as much as a basic M100. What I need is a faster M100 with much more memory and a faster modem (the "Booster Pak" won't do as it ties up the

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system bus so that the DVI can't be used). How about subscribers to *Portable 100* getting together and hiring a firm to redo the insides of the old M100? How about pressuring Tandy to produce a modern notebook machine? Do others feel the same way?

**Paul Harris  
Morristown, NJ**

*You can speed up your M100 a little bit if you're willing to open it up and perform alterations to the circuitry. If you aren't electronically inclined, don't try it. For more information on this I'll have to refer you to the M100SIG on CompuServe.*

*The Worldport external modem is available in both 1200 bps and 2400 bps versions. They are smaller than a pack of cigarettes and are very light.*

*As for the future, well, we don't know of any small and inexpensive computers on the market that will do what you want (TELCOM on the WP-2 isn't reliable for ASCII communications; the Atari Portfolio requires a separate module to add RS-232 capabilities so you can add a modem, plus it doesn't have any communications software to drive the modem; the Poqet is \$2,000, but the screen is quite small, and it also requires a separate modem).*

*Other M100 owners are also waiting for the next generation M100 (see Daigle's column in the January 1990 issue). Writing to Tandy with your suggestions on what you need (note that word need, not want) is your best bet, but remember, Tandy doesn't really design most of their equipment; they market projects brought to them by developers. If no one designs this perfect machine and shows it to Tandy, Tandy won't sell it.*



# The Wizard Of DOS

## Part 2

**I**n Part 1, our clumsy hero Michael Daigle falls off his porch during a storm and winds up mysteriously transported to the corporate headquarters of the mystical Emerald Enterprises. He finds himself armed only with a backpack containing his trusty Model 102, called a "Tote-02" in this strange alternate reality.

Help arrives (more or less) in the form of N.A. Countit, a small spreadsheet worker (number cruncher) known as a "Crunchkin." Alarmed by the realization that his customary sneakers have somehow been replaced by Florsheim high gloss wing tips, Michael realizes that he must escape quickly or become a permanent fixture there. To complicate matters, he and N.A. (who has made the fatal mistake of wearing the wrong tie that day) are being pursued by Mr. Reemer, the ruthless Head Of Corporate Conformity (known as the Wicked Snitch In A Vest).

At the end of Part 1, Reemer and his horde of simpering "yes-men" have captured our boys. And now, the moment those of you who are still awake have waited for ...

### THE WIZARD OF DOS—PART 2:

"You lead us a merry chase, my friend," Reemer said. With the expression that was on his weasely face he could have been the poster child for smugness. Still, I was looking for a way out, and he did seem to be in a position of authority. I explained who I was and what had happened to me just before I "dropped in" at Emerald Enterprises. He didn't believe a word of it—well, almost none of it.

"So you're a writer, eh? Well I'll say one thing for you—you have the imagination for it."

"Well thanks, I—"

"Now listen," he hissed, "I don't know what you're trying to pull with this feeble story, but I'm sure we'll find out eventually—from you, or," he glared at N.A. "from your little accomplice."

N.A. looked as comfortable as a nun at a biker bar, but I had problems of my own. Sometime during the last few

minutes, my jeans had turned into pin striped slacks that looked like the bottom half of an expensive suit. They went well with the dress shoes, but clashed with my Bart Simpson "Don't have a cow, man" sweatshirt. I had a feeling my sweatshirt would be sprouting buttons and a collar soon. I didn't like to think what that might mean.

"Look, I'm not trying to pull anything. I don't even want to be here. There's nothing for me to do in a place like this anyway. Sure, I write some ad copy, but I'm strictly freelance, and—"

"Ad copy? Advertising?" he asked, suddenly interested. His ears almost seemed to perk up and swivel slightly in my direction.

"Yes, but—"

**"Throw him off the roof," Reemer said.**  
**"How can I help?"**  
**I asked.**

"Simmons, aren't we short an ad man?" he asked one of his crew.

"Why, yes sir, we are. Foster, sir."

"Ah yes, Foster." Reemer smiled like a snake that had just swallowed a hamster. "Foster was caught last week wearing what, Simmons, wrong tie?" He sneered at N.A., who trembled slightly.

"Brown socks with a blue suit, sir."

"That's right, that's right." Still looking at N.A., he said, "He met with an unfortunate accident." He looked back at me. "That's what I like about advertising writers—they're expendable. And that gives me a good idea."

He stood up. "Bring them along. I

may have a way to kill two birds with one stone."

The room was large and sterile. Everything was white—the walls, the tile floor, even the desk and the water cooler parked next to it. Reemer and his horde of three-piece lackeys seemed right at home there. Myself, I would have added a Connie Chung poster or something.

"Welcome to our Faculty 'Understanding Computer Knowledge' Education Department lab, or as we like to call it—" he paused dramatically—"the Beta Lab." Reemer chuckled to himself, and a toady or two chimed in nervously. "I have need of someone to test our newest acquisition. You'll do nicely."

"I don't think so," I said. "Look, I hate to rain on your parade, but I'm just not interested."

"Throw him off the roof," Reemer said.

"How can I help?" I asked.

"Much better," he said. He pointed to the desk. There was a huge case on top of it. "This is the new Toshiba Gargantuan Mark 12 laptop computer. We're considering buying them for our executives. We want someone to work with it for awhile."

"Why me? Why not use your own people?"

"I think that will become clear in time," he said.

He walked over to the front of the case and pushed a button. From deep within the case came the whir of small servos and hydraulic lifts. Slowly the keyboard slid out from the bottom of the machine as the screen rose and folded back to a standard viewing angle.

"I thought you said this was a laptop computer," I said. "This thing wouldn't have fit on Orson Welles' lap. It must weigh, what, 30 or 40—"

"87.6 pounds," he said.

"What?!"

I ran his fingers lovingly over the keyboard. "It's powered by the new Motortel 586000 chip. It comes with 12



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megabytes of RAM, a 5 gigabyte optical hard drive, a color LCD display, built-in wheels and a telescoping push handle."

"This is goofy," I said. "A portable? No way. How long will it run between charges?"

"Just under four minutes," he admitted.

"Four minutes," I repeated, laughing. "That's not even enough time to test all the RAM."

Reemer was not smiling. "We're aware of that. That's where you come in." He pointed at the heavy cord coming out of the side of the case. "It's running on wall current at the moment. 220 volts AC, of course."

"Of course," I said, past all surprise or so I thought.

He opened a drawer in the desk and took out a small bag. Then he flipped open a cover to reveal a round port on the side of the computer. He handed me the bag. There was a nuclear radiation warning symbol on it, printed just above the instructions. *Insert the Power-To-Burn(TM) rod into the proper slot veeerrry sloooowwly. Once installed, do not drop*

*your computer. Have a nice day.*

"Once my assistants and I move to the safety of the Observation Room, you are to open this lead-foil pouch, remove the rod, and place it inside that port. Then you will sit there and use the computer. If you survive, we may allow you to join the staff and replace the unfortunate Foster. In fact," he continued, pointing at my chest, "you're actually starting to fit right in."

I looked down and discovered that I was Bart-less. I was wearing a white long sleeve dress shirt with a conservative red tie. I noticed with a sick sensation that my company tie clasp matched my company cufflinks.

Reemer and his gang started to move toward the door, taking poor N.A. as collateral. I wasn't about to go through with this. I had to do something quick, but I didn't know what. I needed to buy some time to think.

"Wait!" I shouted.

He stopped. "Well?"

"Uh ... what are these executives going to do with these new computers, anyway? So I can, you know, give it a realistic run for its money." Lame.

"The usual," he said. "Send memos to each other. Write the occasional letter. That's about it."

"That's it? That's it? All this power for memos and letters? Why?"

"Because it's there," he answered.

I had a sudden inspiration. Maybe I could negotiate my way out of this jam. "Look, Reemer, I'll make a deal with you—I'll show you a machine that's even better than the Coupe DeVille here—"

"Gargantuan Mark 12," he corrected.

"Whatever. Believe me, this is what you're looking for. You can buy them dirt cheap, and I could teach your people how to use them in under half an hour." I glanced at his crew. One of them was picking his nose with a ball point pen. "OK, under a week. Look, I'll show you." I took my backpack off just in the nick of time—the shoulder straps were starting to turn into suspenders—and I took out the Tote-02 and handed it to Reemer.

He took it and looked at it like it was a poodle offering to the Carpet God.

Continued on page 25.

**COMPATIBILITY:** Tandy 100/102 and Tandy 200 and MS-DOS portables (creates Model 100/200 programs for porting to them).

## BASIC and Line Numbers: Lifting the Curse

*Tired of those silly numbers? Here's a simple, easy solution!*

by Dr. William T. Verts

**T**here is an old joke about two ladies seated next to each other on an airplane. The first admires the huge stone on the ring the second is wearing. The wearer tells her companion that the stone is the "Plotkin Diamond," and that it comes with a curse. "What is the curse?" the first asks. "Mr. Plotkin!"

The Tandy notebook-laptops, with their built in BASIC, telecommunications and text editor, provide a well integrated portable setting for small tasks. The internal file handling software is robust enough to hide from the user most of the details of assigning memory space and moving files. Using one of these machines, however, is very similar to owning a diamond coupled with an intimate and familiar curse: a severely crippled BASIC interpreter.

Because the file system moves BASIC programs around in memory as needed, and because BASIC programs are interpreted rather than compiled, they are independent of the address space of the hardware (not the case with machine language programs, which require location at fixed memory addresses). Unfortunately, the dialect of BASIC that Microsoft built for the Tandy machines uses line numbers. This fixes each line within the "absolute address space" of each program. Requiring programmers to give each line of a program a unique number leads to several problems. This article offers a solution to those problems.

### THE PROBLEMS

When examining a numbered program, it is impossible to tell which line numbers are the targets of GOTO, GOSUB and IF-THEN-ELSE statements and which are merely placeholders. One common approach to handling this problem is to start each subroutine at a number which is a multiple of one thousand (the first subroutine starts at 1000, the second at 2000, and so on).

Also, code added after the program is written must go into an appropriate "gap" left in the line number sequence. For example, many programmers use a gap size of ten between lines (100, 110, 120, etc.), so they can add up to nine lines per gap. There are only two choices when the gap is filled.

The first alternative is to renumber the program (by hand or by using a specialized program) to separate the lines by a new gap. Lines with artificially special numbers, such as the entry points to subroutines, lose their uniqueness during automatic renumbering. Renumbering by hand is unspeakably tedious and error-prone. Not only must you change the line numbers at the beginning of each line, but you must also update the line numbers in GOTO, GOSUB, and IF-THEN-ELSE statements to the appropriate new value.

```

100' William T. Verts - August 1988
110' Symbolic BASIC Translated to Standard BASIC
120Goto1160
130C1=1:C2=Len(L$)
140IfC1>C2ThenL$="":Return
150IfMid$(L$,C1,1)=BL$ThenC1=C1+1:Goto140
160IfMid$(L$,C2,1)=BL$ThenC2=C2-1:Goto160
170L$=Mid$(L$,C1,C2-C1+1):Return
180IfL$=""ThenReturn
190ForCC=1ToLen(L$):A=Asc(Mid$(L$,CC,1))
200IfA>=97AndA<=122ThenMid$(L$,CC)=Chr$(A-32)
210NextCC:Return
220CC=0
230'
240CC=Instr(CC+1,L$,TB$):IfCC=0ThenReturn
250Mid$(L$,CC)=BL$
260Goto230
270LG=Len(BD$):IfLG=0ThenReturn
280LL$="":CH$=BL$:SN=0:Quoted=False
290'
300SN=SN+1:LC$=CH$:CH$=Mid$(BD$,SN,1)
310IfCH$=QQ$ThenQuoted=NotQuoted
320IfQuotedThen360
330IfCH$=BL$Then370
340IfCH$=""Then390
350IfCH$="[ "Then410
360LL$=LL$+CH$:Goto570
370If(NotSQ)And(LC$<>BL$)ThenLL$=LL$+CH$
380Goto570
390IfNotSIThenI.I.$=I.I.$+Mid$(BD$,SN,I.G-SN+1)
400SN=LG:Goto570
410SN=SN+1:BR=Instr(SN,BD$,"]")
420IfBR=0ThenBD$=BD$+"]":LG=LG+1:BR=LG
430L$=Mid$(BD$,SN,BR-SN):SN=BR
440Gosub130:Gosub180
    
```

Continued

Listing 1. The Model 100 listing of VBASIC. The MS-DOS version is available on the Portable 100 Bulletin Board.

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The alternative is to insert a *GOTO* at the end of the gap to jump to another place in the program. This then performs the required function and branches back into the sequence at the line past the first *GOTO*. Programs that use this technique are extremely difficult to read and debug. They also contain what we call "spaghetti code."

By themselves, the difficulties with line numbers make writing a lengthy *BASIC* program on the Model 100 and its kin a slow, painful and tedious task.

Developing programs is more difficult because of the limited RAM memory. Programmers feel pressured to remove blanks and comments from their programs and to compress the statements to fit several on one line (separated by colons). A compressed program also tends to run faster than does its uncompressed equivalent, because the *BASIC* interpreter has fewer characters to examine. Furthermore, statement compression is also a result of the *BASIC* restriction that *IF-THEN-ELSE* statements must be single long lines rather than multiline constructs as they are in other languages.

So, the programs published in *Portable 100* have that look about them that only a compiler could love (or an interpreter, for that matter).

### THE SOLUTION

The solution is to use a version of *BASIC* that does not depend on line numbers. You can edit a program written with this form of *BASIC* with a text editor to insert, delete, and modify lines as necessary. There's no need to worry about which lines are targets of a jump. Programmer-specified mnemonic labels represent those few places in the program that really are jump targets.

*TURBO-BASIC* (Borland International) and *Quick-BASIC* (Microsoft) give this capability (among others) to IBM-PC class machines. As far as I know, no such utility exists for the Model 100.

Rather than completely rewrite the Model 100's *BASIC* interpreter, I wrote a program that translates an unnumbered *BASIC* program into its equivalent numbered version. The input text file contains the *BASIC* program with mnemonic jump labels. The Model 100's built-in *BASIC* interpreter can load and run the resulting output.

The notation I use is to call the translator itself *VBASIC* (appearing as *VBASIC.BA* in the file menu), and to refer to the

```

45ØLB$=L$:Gosub6ØØ
46ØIfDX=ØThen51Ø
47ØL$=Str$(RF!(DX))
48ØCT(DX)=CT(DX)+1
49ØGosub13Ø
50ØGoto55Ø
51Ø'
52ØUn=True
53ØL$="65529"
54ØGosub84Ø
55Ø'
56ØLL$=LL$+L$:CH$="# #"
57Ø'
58ØIfSN<LGThen29Ø
59ØBD$=LL$:Return
60ØLW=1:HH=TP
61Ø'
62ØIfLW>HHThenDX=Ø:Return
63ØDX=(LW+HH)\2:IfSY$(DX)=LB$ThenReturn
64ØIfLB$<SY$(DX)ThenHH=DX-1ElseLW=DX+1
65ØGoto61Ø
66ØIfTP=>MXThenGosub83Ø:Return
67ØTP=TP+1
68ØPrint@PP(7),UsingFM$;TP;
69ØPrint@PP(8),UsingBB$;LB$;
70ØCC=TP
71ØC1=CC-1
72ØIfC1=ØThen79Ø
73ØIfSY$(C1)<=LB$Then79Ø
74ØSY$(CC)-SY$(C1)
75ØRF!(CC)=RF!(C1)
    
```

Continued



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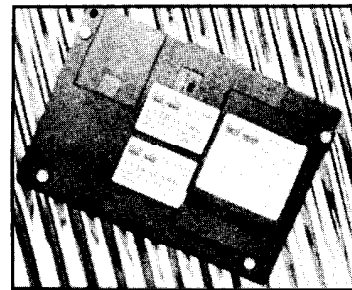
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translatable programs as "written in VBASIC." From here on, I will refer to the normal Model 100 *BASIC* as "normal *BASIC*" or simply as "*BASIC*."

## HOW TO WRITE A VBASIC PROGRAM

Always create *VBASIC* programs in the text editor, never in *BASIC*. A statement in *VBASIC* is in general the same as written in normal *BASIC*, except that the initial line number is missing. (Note that *BASIC* treats a statement entered without a line number as a direct command and not as part of a program.)

Statements that are otherwise unchanged include *LET* (assignment statements), *CLEAR*, *DIM*, *MAXFILES*, *DEFINT* (declarative statements and type declarations), *FOR/NEXT* loops and *READ*, *INPUT*, and *PRINT* (Input/Output statements). *DATA* and *REM* statements have special problems which I will discuss in a moment.

Lines that contain jumps or are targets of jumps require special handling. I define a "jump" as a *GOTO* or *GOSUB* statement, or the *THEN/ELSE* part of an *IF*. *THEN* statement where a line number appears.

A line that is the target of a jump has a label as its first token. The label is a string of characters surrounded by square brackets. The string between the brackets may be of any length and may contain any character except the brackets themselves. *VBASIC* treats lower case letters the same as upper case letters, and removes initial and trailing blanks from the string. Some examples of labels are *[Loop]*, *[LOOP]*, *[<-<]*, and

*[Change Tabs To Blanks]*. Note that *[Loop]* and *[LOOP]* are really the same label.

A label is defined when it is the first item on a line. You can define a unique label only once in a program, but you can use it in many different jump statements. Two of the most common errors are to define a label more than once, or to refer in a jump statement to an undefined label. If the label *[Loop]* appears more than once or is undefined, for example, then *GOTO [Loop]* would not know where to go (too many choices in the first case and none in the second).

A jump statement simply uses a label as its target instead of a line number, as in: *GOSUB [Print Routine]*, *IF X=0 THEN [End\_If]*, and *GOTO [Loop]*. When *VBASIC* finds a jump statement in the input file, the translator writes that statement to the output file, replacing the label with the appropriate line number.

Figure 1 contains a *VBASIC* program and the equivalent Tandy 100 *BASIC* program. Despite the differences in syntax and flavor of the two programs they are still very much the same program. Notice, however, that the *VBASIC* program is significantly easier to read than the *BASIC* program with line numbers. Clearly marked are the two lines that are the targets of jumps. The choice of label for those

```
CLS
[Loop] Print "Enter a Number ";
Input N
If N<0 Then [Exit]
Print "The Square Root Is: "; SQR(N)
GoTo [Loop]
[Exit] Menu

100 CLS
110 Print "Enter a Number ";
120 Input N
130 If N<0 Then 160
140 Print "The Square Root Is: "; SQR(N)
150 GoTo 110
160 Menu
```

Figure 1. A comparison of a *VBASIC* program and a standard *BASIC* program. Note how much easier it is to read and understand the *VBASIC* version.

lines shows the purpose of those jump points. In the equivalent *BASIC* program, it is impossible to tell that line 110 is in any way more or less special than line 120 without examining the entire program. Longer and more complex programs exacerbate the difference between these two styles.

## SPECIAL FEATURES OF VBASIC

*VBASIC*, as I've defined it, has several features and extensions over simple label replacement.

Labels may appear at the start of any statement, or they may appear on lines by themselves. Indent any statement, including those with label definitions, with either blanks or tabs (the translation process automatically changes the tabs into blanks). Lines may be entirely empty or may contain up to 255 characters (the maximum string length in *BASIC*).

Except for blanks inside quoted strings, *VBASIC* automatically compresses sequences of blanks to a single blank. You can instruct *VBASIC* to delete blanks entirely (Model 100 *BASIC* does not require blanks between tokens, although other *BASIC*'s do require them).

Under normal circumstances, *VBASIC* examines all lines to see if they contain labels that need replacement with line numbers. The translation algorithm is extremely simple and only looks for labels to replace that aren't part of quoted strings, regardless of how you use the labels. So, unless you tell it otherwise, the translator examines all lines, replacing symbols and dropping blanks regardless of the context. This is not appropriate behavior for *DATA* statements and *REMARKS*. To avoid that problem, and to provide extra features, there are several special cases that come into play when certain characters appear as the first non-blank character on a line.

The first case is that of the *DATA* statement (mentioned earlier). Items in the body of a *DATA* statement must not be altered. This is because of the interplay between commas, blanks, brackets, and quotes (both single and double quotes). The *DATA* statement must be exempt from translation. Unfortunately, the *DATA* statement is not uniquely identifiable by its first character. To show that the line is a *DATA* statement, replace the word *DATA* with an equal sign "=" . The translator will substitute *DATA* for "=" and not touch the rest of the line. Blanks will not be cut.

Similarly, the word *REM* is not uniquely identifiable by its first character (if selected you can choose to remove comments from the text of the output file). Normal *BASIC* allows the use of the single quote to indicate a comment, and so does *VBASIC*. If you don't want comments removed from the text, the quote version insures that blanks internal to the comment remain. Incidentally, *VBASIC* still identifies and removes quote comments if they appear at the end of a compound statement. Note that if you use the keywords *DATA* and *REM* literally, or if they are internal to a compound statement (statements separated by colons), *VBASIC* will treat them like all other normal statements.

To prevent a statement from being modified or eliminated, a line can start with an exclamation point. *VBASIC* will remove the "!" from the line, and the remainder of the line will pass through "as is" (unchanged). This is useful when you select the option to drop the comments, yet want certain comments to remain in the output file. Each of those special comments has the exclamation point added to the beginning of the line. Note that this technique applies to the two previous cases, where *!DATA* and *!REM* could have been used instead of "=" and "" respectively.

An additional problem is that many programmers must reinvent the wheel for every program that they write. A lot of code is moved unchanged from one program to the next, and subroutine libraries in standard *BASIC* must agree ahead of time on line-number conventions to avoid conflicts. To maintain common code across *VBASIC* programs, specify the name of a file that contains program lines to be "included" as part of the program text, and let *VBASIC* worry about resolving the line-numbers. To include an external file in the current pro-

```

1880Print@PP(5),UsingFM$;Pass;
1890Print@PP(6),UsingFM$;0;
1900Un=False:TF=2:LN=0:L2!=ST
1910OpenN$ForInputAsTF
1920Print@PP(1),UsingBB$;N$;
1930IfPass=1Then1960
1940OpenO$ForOutputAs#1
1950Print@PP(0),UsingBB$;O$;
1960'
1970IfTF<2Then2900
1980IfNotEof(TF)Then2020
1990CloseTF:TF=TF-1
2000Print@PP(TF),UsingBB$;BL$;
2010Goto1970
2020'
2030LN=LN+1:Print@PP(6).UsingFM$;LN;
2040LineInput#TF,L$
2050Gosub220:Gosub130
2060IfL$=""Then2110
2070NN=Instr(1,DG$,Left$(L$,1))-1
2080IfNN<0Then2110
2090IfCA(NN)ThenGosub810
2100IfNotCA(NN)ThenL$=""+"L$
2110'
2120LB$=""
2130BD$=""
2140RP=False
2150IfL$=""Then2770
2160CH$=Left$(L$,1)
2170IfCH$=""Then2380
2180IfCH$=""Then2410
2190IfCH$="|"Then2450
2200IfCH$="!"Then2320
2210IfCH$="%"Then2250
2220RP=True
2230BD$=L$
2240Goto2770
2250'
2260Gosub810
2270Gosub180
2280IfTF>=MaxfilesThen2350
2290Print@PP(TF),UsingBB$;L$;
2300TF=TF+1:OpenL$ForInputAsTF
2310L$="" :Goto2770
2320'
2330Gosub810
2340BD$=L$:Goto2770
2350'
2360LB$=L$:Gosub860:LB$=""
2370L$=""+"L$
2380'
2390IfSUThenL$=""
2400BD$=L$:Goto2770
2410'
2420Gosub010
2430IfL$<>""ThenBD$="Data "+L$
2440Goto2770
2450'
2460RP=True
2470BR=Instr(2,L$,"]")
2480IfBR=0ThenL$=L$+"]":BR=Len(L$)
2490LB$=Mid$(L$,2,BR-2)
2500BD$=Right$(L$,Len(L$)-BR)
2510L$=LB$

```

Continued

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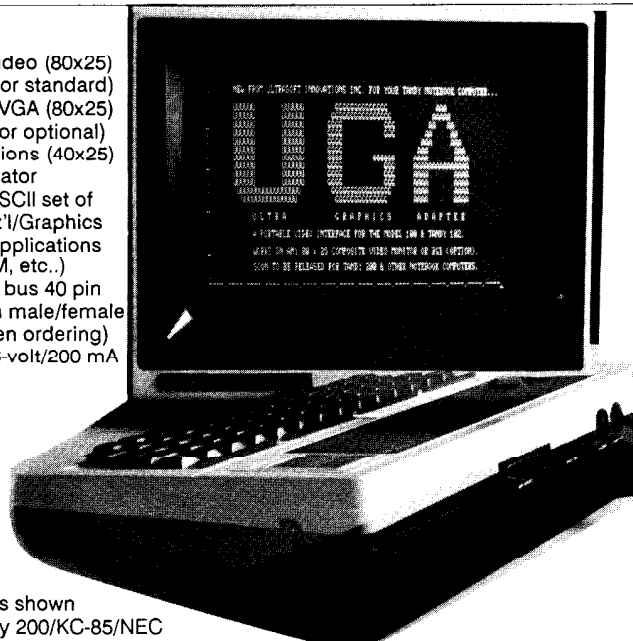
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```
2520Gosub130
2530Cosub180
2540LB$=L$
2550IfLB$=" "ThenLB$=" [ ] "
2560IfPass=2Then2600
2570Gosub600
2580IfDX=0ThenGosub660
2590IfDX>0ThenGosub870
2600'
2610L$=BD$
2620Gosub130
2630BD$=L$
2640IfLeft$(BD$,1)=" "AndSUThenBD$=" "
2650IfBD$<>" "Then2760
2660IfPass=1Then2730
2670L$=Str$(L2!):Gosub130
2680Print#1,L$;
2690IfNotSQThenPrint#1,BL$;
2700Print#1," ";
2710IfNotSUThenPrint#1,LB$;
2720Print#1," "
2730'
2740L2!=L2!+NC
2750IfL2!>65529ThenGosub850
2760'
2770'
2780IfBD$=" "Then2880
2790IfPass=1Then2860
2800IfRPThenGosub270
2810IfBD$=" "ThenBD$=" " "
```

Continued

gram, start a VBASIC line with a percent sign "%" followed by the filename. "Include" files may include other files, to a maximum depth of four (in this implementation of VBASIC). The name must be a valid name under the rules of Tandy BASIC (the .DO extension is optional).

When developing a program, a programmer often wants to be able to switch debugging statements on and off. Alternatively, a programmer might want to produce the same program for slightly different machines, selecting statements written for one machine on one occasion, and statements for another machine later. What allows this is a technique called "conditional assembly." (For example, the Model 100 and the NEC 8201A are essentially the same machine except that they use different protocols for positioning the cursor on the screen. Using conditional assembly, a single program can be written that will run on either machine, depending on which statements you activate.) Because there are no line numbers, VBASIC uses digits at the beginning of lines as conditional assembly selectors. When running VBASIC, you specify which of ten different conditional assembly modes are active (none, all, or any combination of "0" through "9"). Lines in the source that begin with digits are either accepted as valid source lines or turned into comments, depending on whether the digit that starts the line is an active conditional assembly mode. If the line is valid, VBASIC removes the conditional assembly selection character from the beginning of the line. For example, if conditional assembly modes 0, 1, and 2 are active, only those lines that start with "0," "1," or "2" are accepted. Lines starting with "3" through "9" become comments.

To summarize, lines that start with "=" are DATA statements, lines that start with "" are comments, lines that start with "!" pass through unchanged, lines that start with "%"

```

2820L$=Str$(L2!):Gosub130
2830Print#1,L$;
2840IfNotSQThenPrint#1,BL$;
2850Print#1,BD$
2860L21=L21+NC
2870IfL21>65529ThenGosub850
2880'
2890Goto1970
2900'
2910NextPass
2920IfUnThenPrint#1,"65529 END"
2930Close
2940IfTP=0Then3000
2950LN=-1
2960ForI=1ToTP
2970LB$=SY$(I)
2980IfCT(I)=0ThenGosub880
2990NextI
3000'
3010IfNotSMThen3120
3020Open"SYMBOL.DO"ForOutputAs#1
3030Print#1,TB$;" Line";TB$;" Count";TB$;
;"Name"
3040Print#1," "
3050ForI=1ToTP
3060Print#1,I;TB$;RF!(I);TB$;
3070IfCT(I)=0ThenPrint#1,"Unused";
3080IfCT(I)>0ThenPrint#1,CT(I);

```

```

3090Print#1,TB$;SY$(I)
3100NextI
3110Close
3120'
3130Goto3260
3140CLS:Print"Insufficient Memory to Start Program"
3150Clear1:Gosub1030:Menu
3160Gosub1060
3170Print@PP(11),"Fatal Error";Err;"at";
Erl;
3180Print@PP(12),UsingSP$;BL$;
3190IfErr=7ThenPrint@PP(12),"Out Of Memory";
3200IfErr=14ThenPrint@PP(12),"Out Of String Space";
3210IfErr=15ThenPrint@PP(12),"String Too Long";
3220IfErr=52ThenPrint@PP(12),"File Not Found";
3230IfErr=53ThenPrint@PP(12),"File Already Open";
3240IfErr=55ThenPrint@PP(12),"Bad File Name";
3250SP$=" "
3260Gosub1030
3270ScreenSS
3280Menu

```

## HOW VBASIC CAME TO BE

Normally, I use *Turbo-Pascal* version 5.5 on an IBM-PC. This dialect of *Pascal* supports separate compilation of program units, information hiding, object-oriented data structures, and many other extensions over the already rich definition of the language. With the proper tools developed over the last four years, I can now "boiler plate" a huge test program in minutes, and write some 2000 new lines of (working) code during a weekend. So, to write a *BASIC* program over a few dozen lines in length in a dialect that uses line numbers is akin to torture of the worst kind.

This situation had to change. I carry the Model 100 in my backpack everywhere I go; even though I own both an IBM-PC Portable (the luggable) and an IBM-PC Convertible (the laptop) it is often more convenient to schlep along the Tandy. I found myself having to create the proper development tools from scratch. VBASIC was born.

I wrote the first version of VBASIC in *Turbo-Pascal* on the PC. This allowed me to get the program and data structures designed correctly before committing to *BASIC*. When that version was working, the first major VBASIC program that I wrote was a VBASIC copy of the VBASIC translator itself. The result was a version of the VBASIC translator written in standard *BASIC* (with line numbers). I used conditional assembly to produce a version for *BASICA* on the PC and for the Model 100 (there are slight differences in the syntax); this allowed me to debug the *BASIC* version on the PC, then

download the correct Model 100 version to the Model 100. This is a classic example of "bootstrapping" a complex program from a system with good development facilities to a system without such amenities.

The surest test for a bootstrapping system is to run the source text for the translator through the *BASIC* version of the translator produced by the *Pascal* version, run the source text through the *BASIC* program thus produced, then once again through the *BASIC* program produced by the last step. When the results of the final two translation steps are exactly the same, you can be fairly certain that the code is working correctly (the results of the *Pascal* translation and the *BASIC* translation are not quite character-for-character identical; the hassle of the extra translation steps eliminates any discrepancy).

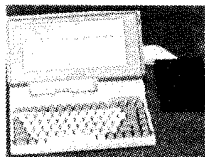
Once I had a working Model 100 version of VBASIC, I then tuned the code so the version presented here will fit in 60 characters (the source text of a properly indented program is usually wider than the normal 40 characters supported in the native screen mode; I use UltraScreen on the Model 100 to get 60-character lines). I intend to submit programs to *Portable 100* magazine soon—all such programs will use the VBASIC protocol and will fit in 60 character lines. Neatness counts when writing programs for you (the programmer) to debug and for other people to read, and I have found that 40 characters is not enough for that purpose.





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specify "include" files, and lines starting with the digits "0" through "9" are subject to conditional assembly rules. Figure 2 contains examples using these switches. The first comment line passes to the output file regardless of whether you have selected comment-elimination; only when comment-elimination is off is the second comment line kept. The %STAND.DO line loads in a file of "standard" code definitions, such as subroutines that are useful to several different programs. The main body of the code fragment contains a while-loop that reads and prints strings from DATA statements (notice how the labels indicate the function). How those strings print depends on which of the conditional-assembly switches you enable. Finally, there are two DATA statements, one that includes a set of brackets. These statements pass to the output file unchanged (except for replacing the "=" with DATA).

dropped. The second asks if you want extraneous blanks removed. The final yes/no question asks if the symbol table should be written out to file SYMBOL.DO or not. The symbol table is the list of labels, equivalent line numbers, and reference counts gathered during the translation process. The answer to this last question is usually no.

The final question prompts for which of the ten conditional assembly modes are active. You can toggle each mode (change from "off" to "on", or "on" to "off") by typing the appropriate digit. The ten digits appear in a list to the right of the question, with active modes shown in reverse video (white characters on a black background). The inactive modes show with normal characters. The default is to have mode "0" turned on, and all others turned off. Turning any other mode on will turn mode "0" off. When you have the correct display pattern for your needs, hitting ENTER will end the question.

### HOW TO USE THE TRANSLATOR

To run the VBASIC program, both VBASIC.BA and a program written under the rules outlined above must be present (called something mnemonic such as TEST.DO). There must also be enough free memory to run the translator (one thousand bytes plus the size of the input program should be enough).

VBASIC asks you several questions. The first question asks you to specify the name of the input file (the program text that you wrote). The second asks for the name of the output file (that receives the translated program). The names must not be the same.

The next two questions ask for the starting line number and the line number increment VBASIC is to use when assigning line numbers to statements. You may specify any integers in the range [1..32767] for either number. If you simply hit the Enter key as the response to these questions, VBASIC uses the default values of 100 for the starting number and 10 for the increment.

The next question asks for the expected number of labels in the text of the VBASIC program. VBASIC uses this number to create a "symbol table" that maps labels onto line numbers. The default value is ten labels (which is also the minimum). VBASIC will eventually generate an error if you specify fewer labels for the symbol table than are present in the program.

The next three questions require a yes/no answer ("Y" or "N"). The first question asks if you want comment lines

The translation process now starts. The screen clears and a special display containing five "windows" appears. The two windows on the left display the active external files. The top left window contains the output file, and the bottom left window contains the input file. The input file window contains four lines so that include-files appear as they become active and disappear as they become inactive. The bottom right window is the error window. If an error in the VBASIC program occurs, the number of the text line, the label associated with that line and an error message will appear in that window. The translator will continue

running. If a fatal error occurs (such as running out of memory), the BASIC error number and the explanation prints in that window, and the translator stops. The top right window contains the last label entered into the symbol table and its text line number. Finally, the top middle window shows how the translator is proceeding through the text. The translator must examine the source text twice in two "passes." The first picks up all label definitions and the second to produces the output code. The top middle window shows which pass the translator is in and which line of the input text it is examining during that pass.

When the translation process is complete, VBASIC displays any symbols defined but never referenced, briefly, one at a time, in the error window. Now the symbol table is written to SYMBOL.DO, if you selected that option. The program will

```
' This comment is always kept
' This comment can be eliminated
%STAND.DO
    LN = 0
    Read   A$
[While] If A$ = "" Then [End_while]
        LN = LN + 1
0      Print A$
1      Print LN,A$
2      Print LN,LEN(A$),A$
        Read   A$
        Goto   [While]
[End_while]

= "Data Item containing [Brackets]"
= "Another Oddball ][ Data Item", ""
```

Figure 2. Some sample VBASIC lines.

then beep and wait until the user hits a key, then it exits to the main menu.

If *VBASIC* finds any errors during translation, you must correct the source program in the text editor and retranslate it. Continue this cycle until the translation is successful. Now enter normal *BASIC*, load the result of the translation (*BASIC* will have to tokenize this version, which will take a little while), and run the new program. If there are logic errors in the program you must repeat the edit-translate-load-run cycle until the program works correctly.

Typical errors that you will encounter from writing a *VBASIC* program include duplicate definition of a label, reference in a jump to an undefined label, overflow of the symbol table, ignoring of an "include" file due to too many nested includes, generation of a line number that exceeds 65529 (the Model 100's maximum), and defining an unreferenced label. Other errors that can occur include running out of free memory or string space, or specifying an input file that is nonexistent, already open, or incorrectly specified.

If the symbol table is written to file, you can use it to guide the correction of the program under development. The symbol table contains one line for each label defined in the text. Each line contains the defined label, the line number replacing it, and the number of times it occurs as the target of a jump. If it is unused (no jump referenced it) then ei-

ther you can remove the label from the source program or there is a mistake in where you used it. If you use it only once, then perhaps (but not always) there is a way of reorganizing the code so you don't need the label. The reference count is useful as a measure of the relative importance of each section of code.

---

## ***BASIC* does not use the bracket characters.**

---

### **HOW THE TRANSLATOR WORKS**

*VBASIC* must be able to identify symbols from the text of the source program. The proper technique is to parse each line, identifying the keywords, identifiers, numbers, and quoted strings, as well as the new syntactic construct of the bracketed label. This method can perform significant error checking to insure that the various tokens do not appear in inappropriate places. Unfortunately, the technique takes too long and is too complex for the gains realized. Fortunately, there is a purely syntactic approach which is simple, fast, and

"nearly as good" as complete parsing.

*BASIC* does not use the left and right bracket characters ("[" and "]") in defining programs, so *VBASIC* uses these to mark the beginning and the end of each symbol. Note that advanced *BASICs* for the IBM-PC often define labels as a string followed by a colon, but the other normal uses of the colon (separating compound statements) would needlessly complicate the extraction of labels from the body of the source program.

A certain amount of simple parsing is required, however, to insure that the symbols translated into line numbers do not appear inside quoted strings, *RE-Marks*, or *DATA* statements. For this reason some parts of the symbolic *BASIC* definition differ slightly from the classic definition, as described earlier.

The process involved is essentially the same as that used by a normal two-pass assembler. The use of two separate passes eliminates the "forward reference" problem; if symbols appear before they are defined, a single pass is not enough to resolve where the jump is headed. An assembler scans the text once (the first pass) to locate all the symbol definitions and to determine the corresponding memory location. The assembler stores this information in a symbol table for the second pass. When the translator assembles a transfer of control instruction, it knows what the address field of the corresponding machine language instruction should be.

## **Compatibility With Other Computers**

The *VBASIC* translator program has been tested only on the Model 100. It will probably work unmodified on the Tandy 102 and the 200, except that the patch to switch between 8x40 modes and *Ultrascreen* is 10x60 mode probably won't work as presented (this uses byte address 63032 and the *SCREEN* command, based on the D/VI interface). To make *VBASIC* always use 8x40 mode, delete the calls to the *SCREEN* command.

Secondly, the only reason to limit the include-file depth to four total input files is so the names of all opened files fit in the input window. A version specifically developed for the Model-200 would not be significantly different (the program requires more substantial changes to make it run on the Model 600).

Screen locations use a different specification in *BASIC* programs writ-

ten for the NEC 8201A from that of the Model 100. The NEC's *LOCATE* procedure requires the row and column of a screen location to be explicitly specified, whereas the Model 100 uses *PRINT@(Index)* where the *Index* is a single integer. To aid in the conversion, all locations for messages on the screen are specified in *DATA* statements as row and column addresses; part of *VBASIC's* initialization step is to calculate the proper *PRINT@* indices. Should it be necessary to run this program on another platform, it is trivial to select the proper addressing form for the screen.

While not designed for IBM-PC *GW-BASIC*, there is a version that runs on the MS-DOS machines and generates a Model 100 *BASIC* program. IBM-PC *GW-BASIC* is similar to the NEC 8201A's *BASIC* in using *LOCATE* instead of *PRINT@* as the screen position specifier.

Finally, the menu screen of my "pro-

duction version" uses Tandy's special box and graphics characters to separate the various windows and to show unused fields. In the listings given here I replaced those characters with "!", "-", "+", and "\*" to show for each of the fields how many characters wide and tall they are. For neatness, replace those characters with the proper boxes.

I cannot guarantee that the version published here is entirely bug-free. I have used the *VBASIC* translator for about a year and a half and have not found any problems other than running out of memory (you may find it necessary to increase the amount of string space allocated by the *CLEAR* command). You folks are in essence my "beta-testers," and I would appreciate hearing about any problems so I can quickly repair them.



## PROGRAMMING

The task is the same for the *VBASIC* translator. The difference is that the source language is symbolic *VBASIC* and the target "machine" language is *BASIC* with line numbers. In the first pass, the translator program scans the text of the source program identifying all the symbol definitions and their corresponding line numbers. In the second pass the statements are written out with line numbers. At this point all *GOTO* and *GOSUB* statements have their target symbol replaced with the appropriate line number (from the symbol table).

The symbol table is a list of strings and numbers (the symbols and their equivalent line numbers). Under normal circumstances each symbol is defined only once and referenced one or more times throughout the translation of a *VBASIC* program. The time spent searching the symbol table is far more critical than the time spent inserting each new symbol. Sorted by the values of the strings, a binary search may be used on the list to determine the presence or absence of a symbol. A binary search runs by examining the middle element of a list, ignoring the half that does not contain the search item, and repeating until it finds the item or the list is empty.

## You can discard the intermediate file after tokenization.

### PROBLEMS WITH *VBASIC*


Memory is critical on the portables and the biggest drawback of the translator program (aside from its lack of speed) is the profligate use of memory—developing a *VBASIC* program currently requires that three copies of the program exist in memory simultaneously: the original symbolic source, the numbered text file version produced by the translator, and the version converted to tokenized *BASIC* format. Admittedly, you can discard the intermediate file after tokenization, but it must exist long enough for tokenization to take place.

Alternatively, a programmer can use the disk-drive (if available) to swap out the copy of the program not immediately needed. For example, after translation but before tokenization save the symbolic source onto disk, then delete it from RAM. Each modification to the program would entail deleting the versions in

RAM and reloading the source from disk. This is a clumsy but effective method. If there's enough interest in *VBASIC*, perhaps we can market a ROM version that converts files directly to *BASIC* format without an intermediate step. Not only would this free 7K of precious RAM, it also would speed things up considerably.

### FINAL NOTE

One final note about use of the *VBASIC* translator is in order. *VBASIC* is a tool that is so important to me that I am willing to sacrifice the memory it needs and put up with its slow translation time for the ability to drop line numbers from my development programs (and also to reuse common code across several projects). It is not and never will be a cure for all the ills of line-numbered programming.

Listing 1 contains the *VBASIC* source to the *VBASIC* translator itself. There wasn't sufficient room to include the Symbolic *VBASIC* listing used to produce listing 1, but both files can be downloaded from the Portable 100 bulletin board as *VBASIC.VBS* and *VBASIC.BAS*, respectively. Also on the BBS is *VBASIC.EXE*, an IBM-PC compatible version for people who wish to use the PC to develop their software. 

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*by Terry Kepner*

**A**t first glance the ExpressWriter 301 seems to be a nice printer. A harder look reveals some flaws that make it less than ideal for the traveller who needs periodic access to a printer on the road.

The printer is definitely small and light enough for traveling. Unfortunately, it's not designed for carrying in a briefcase, its height (3") makes it too tall. It can, however, easily fit in an overnight bag or luggage case. Its weight is also eminently reasonable at slightly more than 4 pounds (only 1 lb. more than the Tandy 102).

I carried the printer, some paper, the manual (136pp, 5"x9"), and the AC adapter in a tote bag (total weight about 8 lb.) to a weekend convention. With both my Tandy 100 bag and the printer bag, it was not too much to carry for short distances (say, from the parking lot to the airline gate), but I wouldn't want to make any long distance hauls with it (e.g., from Terminal A to Terminal D at the Dallas/Ft. Worth Airport).

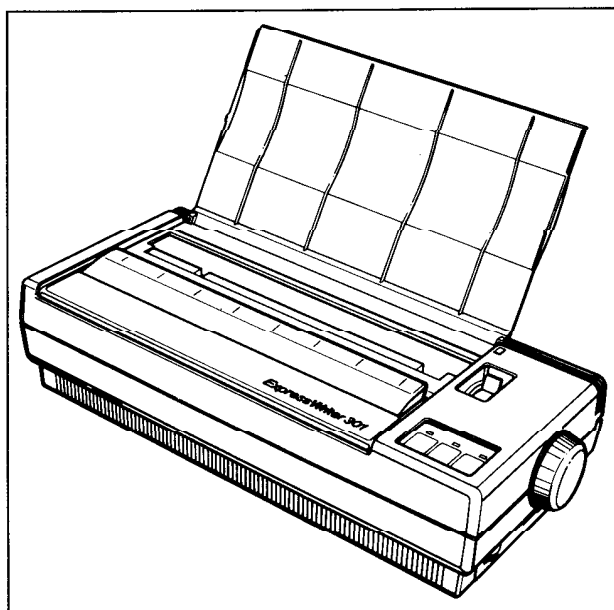
The printer itself is compact. The top of the printer (paper entrance, platen, ribbon, and paper exit are all on top) is concealed by a plastic, removable cover that also serves as a paper holder for single sheet paper feeding. This is the first flaw I ran across: the printer will not accept tractor-feed paper; the perforations make the paper too wide. The printer is designed strictly for single sheet hand feeding, but you can use tractor-feed paper if you really want.

I took a handful of pages, removed the perforations, then fed in the paper. While it worked, it wasn't great. The cover kept catching on the paper folds and closing, jamming the printer. Removing the paper holder solved that problem. Almost immediately another problem appeared: paper creep. The

weight of the paper (not great) prevented the printer from moving the paper smoothly. My nice 1" top/bottom margins gradually changed as the top margin grew smaller and the bottom margin larger. This took about 4 pages to become noticeable.

The only reason I bring this up is because of the speed of the printer—it is slow. While its draft mode has a rating of 60 cps, the print head prints in one direction only. Thus, half the time it is not printing while the print head returns to the beginning of the line. This reduces throughput to only 30 cps. Normal print mode is even slower, down at about 20 cps. This takes a long time to print a standard page, so hand feeding paper to the printer is quite time consuming. You can't do something else while printing (e.g., shaving, reading, etc.). For short one- or two-page files this is not a problem. For longer 15- or 16-page files, it is.

As for the print itself, it's wonderful. The printer uses a thermal transfer ribbon. Unlike thermal printers, this one doesn't require special paper (ink-jet) and it doesn't fade with time (thermal paper fades), although you can use thermal paper with the printer by removing the ribbon cartridge. Regular paper didn't deliver gorgeous results (the texture of the paper, especially letter-head, gave uneven character shading). Using ink-jet paper yielded uniformly dark



characters. You can control the density of the characters with a small knob at the side of the printer, which lets you adapt the shading to an optimum amount for the paper you're using. The 24-pin print-head always delivered perfectly formed characters that rival daisy-wheel type printers.

This brings us to the ribbon. It's a special film cartridge that can be turned over for a total of two passes under the print head. The first pass gives good characters. The second merely rewinds the cartridge printing in the exact same position in the center of the ribbon. These characters are not as uniform in shading.

The third problem appeared here: the ribbon broke at the end of the first pass, and the printer continued printing instead of stopping. That turned out to be my fault (see below). Removing the ribbon cartridge, opening it, taping the

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loose end back on the empty spool, and replacing everything worked just fine. So the ribbon wasn't a loss. But the wasted paper was. If I had set the right switch, the printer would have stopped at the end of the spool (that was about 20 pages of double-spaced text).

Toward the end of my printing at the hotel, the printer suddenly stopped. When I walked over and took a look, the low-battery light was dimly glowing. (There are five other LEDs: power on, alarm, printer select, line feed, and high speed indicators.) Plugging the power supply into the wall socket, then to the printer, then pushing printer select started the printing up from right where it had stopped. This I liked; it meant I hadn't lost any characters and didn't have to restart my print file.

The printer has seven DIP switches to control it. They select these six options: Toshiba/Qume or Epson (IBM-type) emulation; checking for ribbon end detection (off means you're using thermal paper); carriage-return with or without a linefeed; linefeed with or without a carriage-return; automatic text wrap-around; and which character set to use (IBM 2, French, German, or English-US) when in the Toshiba/Qume emulation mode. In the Epson mode the first two are the same, the rest are: whether SELIN is used, select between extended graphics or italic mode, enable/disable AUTOLF, and select the international character set (English-U.K., French, German, English-U.S.).

The manual is small but easy to use. It's instructions are well written and clear. The index is well designed.

The printer is certainly capable of doing anything a larger printer can do, including complex graphics. It's only constraint is the software driving it, like

any other printer. My major complaints are the lack of pin-feed on the platen and the slow speed. The extra inch of printer width required for pin feed would certainly make it easier to print long reports in the field.

For someone who travels and writes, and needs printouts every evening, this is an ideal printer. The speed won't be a problem and the charge should last long enough to print all the text (or spreadsheets) you generate in a day of work. Recharging is simply a matter of leaving the printer plugged in at night when you go to bed.

The ribbon cartridges are fairly common; I've seen this type many places. If you need a portable printer, don't neglect this one as a candidate. □

### Manufacturer's Specifications

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(800) 433-5999.

Toshiba ExpressWriter 301—\$499  
24-dot print-head, 60cps draft mode, 42 cps normal, 3-fonts (Courier, Prestige, draft), dual Toshiba/Qume and Epson LQ850 emulations. Print direction: left to right only. Paper Feed: friction only. Paper: 4" to 8.5". Power: AC adapter, 18 watt; battery power, 1 hour printing (8 hours to recharge).

Size: 3"x12.2"x5.5". Weight: 4.8 lb.; with charger/AC-adapter: 7 lb.

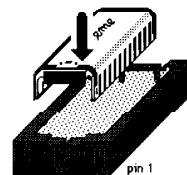


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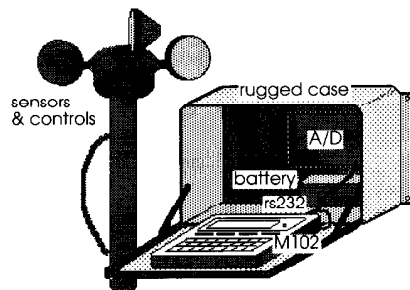
EXTRAM fits into the option ROM socket in the 102/100/200. A 2-pin plug connects EXTRAM to battery and VWR lines. It's a snap to install in the 102, slightly harder in the 100/200.

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COMPATIBILITY: Tandy WP-2

# Adding Memory To Your Tandy WP-2

*Going beyond tape cassette and a mere 32K of RAM*

*by Daniel Grottu*

**T**he new Tandy WP-2 is an impressive, useful notebook-sized computer for making on-the-job, in-the-field, quick-and-dirty notes. While it would be stretching a point to tout it as the most universal computer around, or able to write reams and volumes of text, but its design—a simple, easy-to-use, very portable word processor—makes it an extremely effective and productive tool. We use the WP-2 for recording interviews, making walk-around notes, and creating basic outlines and first drafts of articles and columns. In a pinch, however, we have, like the Model 100 before it, used the WP-2 to write entire pieces. (In fact, this bulk of this article is being written on the WP-2 in a doctor's office while I wait for my wife Sally.)

Of course, one of the two primary reasons why the WP-2 simply isn't suited for more extensive assignments is its relatively tiny 8x80 screen. Then, once you get used to working daily with a full-blown heavy-duty word processing program like WordPerfect 5.1 or Word 5.0, it's very difficult downshifting to the fairly primitive, limited word processor in the WP-2. The other major drawback against using the WP-2 more efficiently and effectively is its small memory capacity. Although the basic machine comes equipped with 32K of CMOS RAM, there's only about 21K left over. (The application programs, display, and file menu overhead use the other 11K.) Translated into real-world terms, that's roughly the equivalent of 10 single-spaced typewritten pages. I can fill up that much memory writing one article, review or column.

Fortunately, Tandy (really the Japanese multinational company Citizen, which designed and manufactures the WP-2) made provision for expanding

memory capacity, in three different, overlapping, complementary ways.

The first method, and also the most expensive one, is to attach one of Tandy's portable 3.5" battery-powered disk drive to the 9-pin serial port in the rear of the computer. (You may need a 9-to-25 pin adapter, however.) The WP-2's ROM has built into it the operating instructions for formatting, saving and retrieving data to and from this device. You don't have to load or type in a BASIC driver program, as is necessary on the Tandy 100 and 102 models. Just add the drive, turn it on, access the *FILE* menu (F2+=), specify *DISKETTE*, and save, load, rename or erase in a normal fashion. Having a disk drive allows for unlimited file expansion, effectively eliminating the memory bottleneck imposed by the 21K RAM limitation.

There are, however, some drawbacks to the disk drive approach worth considering. One, it's expensive—a Tandy drive will add about \$200 to the price tag, thus moving the WP-2 from the lowest-priced notebook on the market to a level slightly below an entry-level, DOS-compatible Toshiba 1000. Second, if you already have a Tandy, Chipmunk or Purple Computing disk drive, fine, it will work without having to buy another device or making modifications. That is, unless you bought the first version of the Tandy Portable Disk Drive. That drive was single-sided, and held only 100K of data. That drive does not use the same ROM-based code instructions, so if you attach it, the WP-2 will tell you there's nothing out there. The last disadvantage to a disk drive for expanding memory is one of portability and practicality. A disk drive adds both size and weight, an important consideration for on the go users who bought the WP-2 specifically because it is unincumbered by drives,

cables, and extra accoutrements.

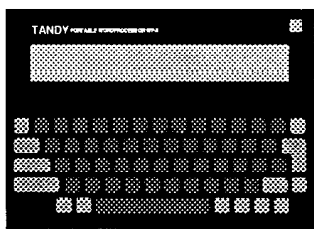
The next solution to memory limitation that Tandy offers is via an expansion port on the machine's left-hand side. There is a slot that will accommodate credit card-sized peripherals, such as ROM-based software that third-party developers will undoubtedly be selling before long. Tandy, however, offers a removeable 32K memory expansion card that plugs in and out at any time. Like the disk drive, pressing F2+=, and then selecting *MEMORY CARD* lets you access it for file manipulation. The memory card acts like the disk drive in saving and loading files. The advantage, however, is that the card is small and light enough to slip in to a wallet, and so long as the battery lasts—about three years—whatever's saved on it remains protected, even if the main memory on the WP-2 fails.

There's only one serious disadvantage to Tandy's memory card: price. At \$119 for a mere 32K upgrade, that works out to about \$3.80 per 1,000 bytes, a fairly expensive form of memory. Also, 32K isn't much—a few additional files or articles will fill it up quite quickly, and then you must insert another \$119 card if you wish to continue working.

Tandy provides a third method for increasing memory capacity: an empty IC socket for an additional RAM chip. This is probably the best, least expensive method to add memory. Unfortunately, unless you know what you're doing, you may never get it working properly, especially if you follow Tandy's written instructions to the letter. We're going to tell you how.

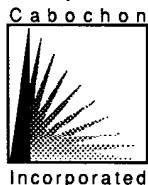
First, Tandy sells a 32K RAM chip made by Mitsubishi, for \$50. That's fine, if you can get one, but we called up several Radio Shacks, including two regional computer centers. The sale-

## Tandy WP-2 to Macintosh



## WPduet

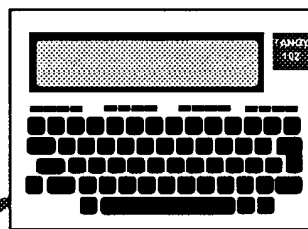
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## Tandy Model 100 & 102 to Macintosh



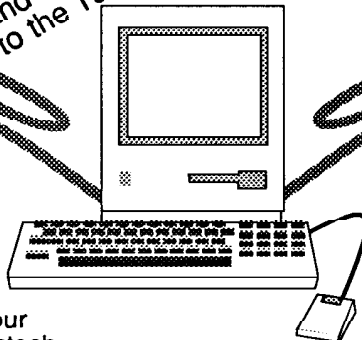
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people told us that the chips are unavailable, on backorder, and not likely to be in stock anytime soon. That situation may have eased up by the time you read this article. Next, while \$50 sounds reasonable for such a chip, \$19 for virtually the same thing sounds even better. That's the price two other companies are selling them for. One is a small California company called MicroMime, see their advertisement on page 15. The other is an Oregon company called Purple Computing (since 1983, a company familiar to Tandy laptop computer users), their advertisement is on page 27. Addresses for both companies are at the end of this article.

Incidentally, although functionally identical, Purple Computing's and MicroMime's 32K chip have a slightly different numerical code silkscreened on their chips. However, this should in no way void your Tandy warranty by plugging or installing unauthorized items in your machine.

Installing either Tandy's or MicroMime's chip in your WP-2 is a relatively simple matter, but if you try to follow Tandy's instructions exactly, you'll get an I/O error, no matter what you do. So, here's how to install and initialize your RAM chip properly.

- 1. Place a towel down on an empty

section of desk, to prevent scratching the WP-2's screen. Then turn the computer over and remove the four screws in the corners and one screw in the middle. Make certain that you put them in a safe, convenient spot for reinsertion when you finish.

- 2. With your fingers (not a screwdriver!), gently pry the two halves apart. Be careful, because there is an umbilical cord-like cable attached that should not be disconnected.

- 3. Lay the two open halves end-to-end, thereby exposing the motherboard. The keyboard should be directly in front of you, and the screen turned up and over.

- 4. You will see an empty IC socket several inches above the top of the keyboard. That's where your memory chip will fit.

- 5. Carefully remove the 32K RAM chip from its protective wrapping, being careful that (a) you are properly grounded and (b) you won't create static electricity. This can be done by making certain that you aren't on a deep, plush wool or nylon carpet, that you have touched something grounded to produce that little shock, or stand perfectly still for at least 10 seconds before touching anything. I can't overemphasize the importance of avoiding static electric-

ity—it will instantly and permanently kill a memory chip as effectively as stomping on it with combat boots. Equally important is insuring that none of the chip's tiny legs are bent or broken. They're delicate little critters, and demand respect and care.

- 6. As they come from the factory, 32K memory chips won't plug properly into the IC socket: the pins must be bent slightly inward. To do this, grasp the chip in one hand with the pins towards you, and lay one row of pins on a hard surface (like a desk or table). Then, ever-so-gently put pressure on the pins, until you can feel them bending inward. DON'T APPLY TOO MUCH PRESSURE, OR BEND TOO FAR!! You may have to repeat this process once or twice until you position the pins at just the proper angle.

- 7. Carefully orient the chip relative to the IC socket. Look at the chip: two things should be clear, namely, that you can read it (which means that it isn't upside down), and there is a slight half-circle indentation on the left side. Also, make certain that the keyboard is facing towards you, not away from you. Here's where it gets a little tricky, so bear with me. The IC socket has 32 spaces, whereas the RAM chip has 28 legs. If you don't put the right pins in the correct sockets,

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you can blow the chip. Just as there is an indentation, or notch on the left-hand side of the chip, you will see a corresponding (silkscreened) indentation on the left-hand of the socket. (Always put notch to notch whenever installing any chip.) The first four pins to the left of that indentation must remain empty. This means that you should position the RAM chip so it fits in with all the pins to the right, not the left. Again, leave the four pins on the left side empty.

• 9. Carefully ease the RAM chip into the socket, making certain that all 28 pins fit into the empty sockets. When you are certain that they are all engaged, push in firmly. Don't be rough, but then, don't be overly gentle either, since it takes a moderate amount of pressure to seat completely. When you are positive that you can't push it further in, you are finished.

• 10. Fit the two halves of the case together again. Make sure to seat the cassette plug properly, or else it won't close properly. When it fits exactly, reattach and tighten the five screws.

• 11. If you have any files in the WP-2, print them out, back them up, save to a disk drive, or transfer via modem or null modem cable to another computer. That's because you may conceivably lose all your files by doing the next step. Chances are, you won't, but why take chances?

• 12. Here's the undocumented part, without which you will never get the RAM chip to initialize properly. Turn the power on by pressing the light blue button to the right of the screen. Then turn the computer on its back side. Slightly below and to the right of the silver foiled keyboard map (giving the key combinations for producing 255 Ascii characters on screen and for the printer), you will see a small hole. This is the RESET but-

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ton. Insert the end of a bent paper clip, and push down for about three seconds.

• 13. Now you are ready to format the RAM chip. The computer Files menu calls the chip the RAM DISK. Press FILES on the top (F2+=), use the arrows to move the menu to RAM DISK, and then press F1+F (for format). When it asked "Are you sure?", press Y. The RAM chip is now formatted properly.

The WP-2 does not add the additional RAM to the original 32K, but treats it as an entirely separate device (the RAM DISK). Its existence is not acknowledged until the user opens or copies a file in the RAM DISK. Once you direct a file to the RAM DISK, it will remain there indefinitely, or as long as the lithium backup battery lasts (3 years with 32K, probably half that time with an additional 32K RAM chip).

Why, you might ask, did Tandy use a 32-pin IC socket for a 28-pin RAM chip? That's because the 32K RAM chip has 28 pins, but a 128K RAM chip has 32. Tandy plans to market eventually a 128K RAM chip, if there is enough of a demand. However, if you like, you may indeed increase your memory five-fold right now rather than merely doubling it. Both companies mentioned before, MicroMime and Purple Computing, also supply 128K chips. Both sell the chips for less than \$100. Look for their ads in this month's issue.

Unlike the Tandy 32K chip, which comes in a paper box, or MicroMime's chip, shipped in a standard sawed-off IC tube sealed with cellophane tape at either end, Purple Computing's 128K chip comes in a tiny plastic box for maximum safety and a little extra elegance. Installing and initializing the 128K chips is the same as the 32K chips, except that all 32 pins fit into the entire socket. Screwing

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and prying apart the WP 2 takes, on average, 2-3 minutes, but plugging in the RAM chip, even by a novice, should take no longer than 15-20 seconds. Once the case is screwed back together and the chip formatted properly, you will probably have no further need or occasion ever to look at, service or remove the RAM chip ever again. It's that easy.

Unfortunately, the WP-2 isn't much good at changing and storing altered default values (which is why the 66-character screen must be reconfigured to 80 characters per line for every file). What this means is that the WP-2 will automatically save every new file to the computer's main memory, until you specifically save it to the RAM DISK. If you do this, be sure to kill the original file, since it would be a waste of valuable memory space to have part or all of the same file in two different locations.

That additional 32K or 128K makes the difference between a merely useful notebook computer and an indispensable productivity tool. It doesn't make good business sense NOT to upgrade the memory yourself, especially since the process is easy and relatively inexpensive.

### RAM Memory Suppliers for the WP-2

Purple Computing  
2048 Southside Road  
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# Expertise-to-Go: Model 100/102 Application Notes

*This compendium of developer's expertise  
can save you time (and money).*

by Stan Wong

If your time is worth \$1.25 per hour, then read no further. If you write programs for the Model 100/102 series of notebook computers and your time is worth more than the cost of a Big Mac (hamburgers, not Apples), then consider the *Model 100/102 Application Notes* from King Computer Services (KCSI).

The application note series from KCSI comprises five different application notes. These notes illustrate some of the capabilities of the Model 100/102 while addressing real problems with real solutions. The series is not limited to any particular programming language, though many of the routines are written in assembly language.

These notes are sure to appeal to application developers—people for whom time is money. Sure it's interesting to poke around inside your machine to see what makes it tick, but in this day of corporate bottom-line thinking you've got to save time whenever you can. Much of the data is available in books, magazines, and from on-line services. While these notes are beyond the budget of most hobbyists, they are cheap considering the amount of time you can save in gathering all the data and testing it.

The following application notes make up the series:

- *Serial 64*--expand the 64-byte serial input buffer
- *TEXT Call*--call *TEXT* from a *BASIC* program and return
- *UPPER Display*--force all LCD display to upper case
- *File I/O*--standard file I/O for assembly language programs
- *EZWAND*--allow simultaneous keyboard and barcode wand input

## SERIAL 64, WHERE ARE YOU?

The *Serial 64* application note tells you how you can expand the Model 100 64-byte serial input buffer. Just 64-bytes can be limiting for applications that must handle high-volume, high-baud-rate data without missing anything.

If you write programs in *BASIC*, then this can be especially critical. A simple program structure might look something like this:

```
10 Input data
20 Do something
30 GOTO 10
```

Using high baud rates with data constantly arriving, if you can't *do something* fast enough in line 20, you'll start to lose data. If the device sending data to you is another computer, you can use the XON/XOFF protocol to tell the other system to stop sending information temporarily when the buffer fills up.

On the other hand, if you are monitoring a nuclear reactor, you can't very well tell the reactor to stop reacting while you crunch data. Critical situations require critical response times. *Serial 64* allows you to process data without missing a beat. This might be the difference between having power to run your dishwasher or a core meltdown.

The supplied assembly language routine relocates the serial buffer so you can make it any size you need. Unfortunately this disrupts existing applications that check the serial buffer at address FF46H (hexadecimal) for input.

To solve this, the strategy used by KCSI is to write the incoming characters into its own larger buffer. Then, on a time-permitting basis, KCSI moves the received characters to the serial buffer. Existing applications don't have to be modified.

Now for the 64-byte question: How are the characters getting to the new serial buffer, and who's putting them into the existing serial buffer? Elementary, my dear Holmes. The buffer did it. Well, actually a hook is inserted into the clock interrupt cycle to call your own routine so on each clock interrupt your routine is called. It checks the user buffer and moves the right data to the right place at the right time. You'll have to buy the note from KCSI to get all the details.

For more information on the clock interrupt refer to Carl Oppedahl's book, *Inside the Model 100*, or to Tracy Allen's article, "WATCHDog: A Background Timer Utility" (*Portable 100*, May '89).

While it's not quite bedtime reading, the assembly language routine is heavily commented, so understanding the routine doesn't present a problem. The only problem you might have is that the assembler syntax is that of KCSI's *A100* assembler. From what I could see, only minor modifications are necessary to convert it for other assemblers.

## FROM HERE TO TEXT (AND BACK)

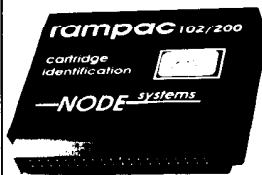
The Model 100 is a very popular machine because of its easy-to-use integrated software. One area that the Microsoft programmers missed is the connection between *BASIC* and *TEXT*. It's possible to get into *TEXT* from *BASIC* easily, but the return path used to be impossible, until KCSI discovered the path.

The path to *TEXT* and back is strewn with the computer equivalent of astronomical black holes (known in M100 jargon as "cold starts"). Students of *TEXT* know that the program does things a bit weird. I know some of this from when I wrote the *TextStar* program (*Portable 100*, March '89).

Several magazines, including the De-

Ron

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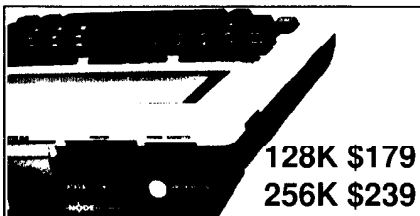
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☆ **60 Business Applications Programs** for the TRS-80 Model 100 Computer by Terry Kepner and Mark Robinson. 60 powerful programs for interest calculations, annuities, depreciation, invoices, breakeven sales analysis, and more—\$21.95.

☆ **Inside the Model 100** by Carl Oppedahl "...an excellent Guide" —New York Times. A thorough guide to the Tandy Model 100. Learn about A.L. programming; disassembled ROM routines; keyboard scanning; UART, RS-232C, and modem; Clock/calendar chip; Interrupt handling; 8085 instruction set—\$21.95.

☆ **User Guide and Applications for the TRS-80 Model 100 Portable Computer** by Steven Schwartz. 14 ready-to-run programs for business: statistics, graphics, sound, and more. With cassette tape—\$44.95. Buy them separately—the book is only \$21.95, the cassette tape is only \$27.00.

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ember '88 issue of *Portable 100*, have described KCSI's method, *TXTCAL*, previously. The application notes provide more detail. You save time. And time is money. That's what it's all about (you do the hokey pokey ...).

The *TXTCAL* application note also includes data on programming for card operating systems like the SoundSight Gold Card and MegaMemory, and the King Memory Card. I can't comment on this data since I'm not familiar with these devices.

### THE UPPER CRUST

The *Upper Display* documentation describes a series of system hooks you can activate to force all text displayed on the LCD to be in upper case.

KCSI originally developed the technique for sight-impaired users. It also has potential application for use in dimly lit environments or when trying to read the Model 100 display at a distance.

The upper case display hook affects only the display of text. It does not in any way affect the file itself.

I examined the information contained in the application note. It's all simple and straightforward. You set a system hook that normally does nothing and redirect it to a system ROM routine. Simple? Yes, and it would have taken me about 15 minutes to figure it out myself and about 45 minutes to do some extensive testing. That's assuming that I got it figured out right the first time, and assuming also that I was knowledgeable on subjects of system hooks and ROM routines.

The point is that this application note encapsulates KCSI's hard-won knowledge, so you don't have to reinvent the wheel.

Using the information in the note, I was able to set the upper-case display

mode with a simple one-line BASIC program. Entering the *TEXT* program, I selected a file that I had written beforehand in mixed upper and lower case. Wonder of wonders, it appeared on the display in all upper case letters! I added some text to the file. The text appeared in upper case as I entered it, even though I had the CAPS lock key off and was pressing the *SHIFT* key to capitalize words.

Another simple one-line BASIC program de-installs the upper case system hooks. On re-entering my *TEXT* file, everything was in its normal upper/lower case configuration. The text that I had entered was also in the proper upper/lower case, as I had entered it.

A similar system hook exists for the printer so you can force all output to upper case. Again, a simple one-line program sets the upper-case mode, and another one-liner resets the mode.

### E-I-E-I-FILE I/O

Reading and writing data to Model 100 files is really easy. Just write a program like this:

```
10 OPEN "DATAIN" FOR INPUT AS #1
20 OPEN "DATAOT" FOR OUTPUT AS #2
30 INPUT #1,A,B,C
40 PRINT #2,A,B,C
50 CLOSE #1: CLOSE #2
```

Simple if you're programming in BASIC. But what do you do if you are writing an assembly language program? How does BASIC create and manage files?

Obviously, there must be a bunch of system ROM routines that BASIC uses to create and manipulate files. The *File I/O* application note tells you what these

routines are, where they are, and how to use them.

The note describes what the data structures are, such as the *I/O vector*, and how the routines use them. The routines are described so high-level language programmers, like C language hackers, can understand. It covers the routines for *OPEN*, *CLOSE*, *GETC*, *PUTC*, and *EOF*.

I think that this should be one of the more popular notes, since every assembly language programmer needs to do file I/O. And speaking from experience, it is a daunting task navigating your way through the system-ROM maze.

### WHAT COULD BE EASIER?

—*EZWAND*

The Model 100/102 has a bar code reader port. Tandy and others supply bar code wands and software. The Tandy unit can read bar codes into your application software. It can be used for such tasks as inventory control.

In the real world, bar codes become dirty or torn. Ever stand at the supermarket checkout counter while the checker unsuccessfully scans and rescans your grocery item? Often these checkers give up and key in the UPC code by hand as a last resort. Unfortunately, the Tandy bar code system deactivates the keyboard, and all input MUST come from the bar code reader, leaving that last resort no longer an option.

KCSI's *EZWAND* documentation describes a simple method to allow both keyboard and bar code input simultaneously. It also includes code samples that illustrate the method.

Lacking a working bar code wand, I was unable to test the information, but KCSI is well known for its extensive bar code experience, so I have no doubts that the information is correct. KCSI's Mo



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Budlong reviewed Optical Data Systems' BAR+ bar code system (Portable 100, Summer '89).

**CONCLUSION**

Model 100/102 Application Notes should appeal to application developers in the corporate environment, or to anyone who values time. The series pulls together technical information available from a variety of sources, including much practical, hard-won knowledge by KCSI. They've proven that it works. Although they don't guarantee that it will work for you in your particular application, the information they provide is correct in the technical sense.

The foregoing may sound like a release from the P.R. department of KCSI, but it really is good stuff. I did have one minor gripe however. In this age of desktop publishing and fancy graphics, their documentation is abysmally plain. The notes are in plain ASCII text. There's no use of bold-face type and little use of underlining. Section headers aren't underlined and tend to blend in with the text. With a little more effort KCSI could have spruced up their documentation and made it more presentable. That would save developers a few extra minutes of confusion while reading the text. And isn't time what the application

the Model 100 and WP-2 are two of his other interests, as is developing stealth skateboarding techniques. You can contact him on CompuServe at address 70346,1267.

**Manufacturer's Specifications**

Model 100/102 Application Notes

King Computer Services, Inc.  
1016 North New Hampshire  
Los Angeles, CA 90029  
(213) 661-2063  
CompuServe address: 76167,3310

The Model 100/102 Application Notes series is available as separate packages, priced as follows:

- Serial 64—\$200.00
- TEXT Call—\$200.00
- UPPER Display—\$40.00
- File I/O—\$100.00
- EZWAND—\$40.00

KCSI distributes the notes in printed form and on an MS-DOS disk, depending on the note(s) ordered.

notes are supposed to save?

Hobbyists like me might not be able to afford the cost of the notes, but for many of us, hacking the innards of the Model 100 is part of the fun of owning the machine. In this time-is-money world, real-world application developers can't afford to have fun. Pity.



Stan Wong is a programmer in the defense electronics industry. When he's not working at the "bomb factory," he's writing bombs for Portable 100. Can a career writing for MAD Magazine be far off? Hacking

Continued from page 7

"Oh yes, I nearly forgot about this. You're not really suggesting that our executives actually use this diminutive toy, are you?" he asked, looking at me the way the parole board probably looks at Charles Manson.

"For memos? Letters? Why not?"

"Does it run MegaWord Version 17.1?"

"No," I admitted.

"As I thought," he said. "A toy." And as he turned away to leave, he callously tossed the Tote-02 over his shoulder.

Everything that happened next happened in the kind of slow motion that occurs when you're in an accident or having a nightmare or just trying to eat peas.

I saw the Tote-02 arc up into the air. I lunged for it—and knocked the water cooler over. My sudden movement caught Reemer's attention. He saw the huge water bottle start to fall on the Toshiba. Screaming, he tried to block it, but weight and momentum conspired against him. The bottle shattered when it hit the edge of the desk. Just as I connected with the Tote-02, Reemer and twenty gallons of water connected with the 220-volt-powered Toshiba. It was worse than seeing Roseanne Barr in a bikini.

"I'm MELTING!" he shrieked. It was the last thing he'd ever say. It was over in a flash—literally.

For a moment, no one said a word. Dead silence (no pun intended). Then, I heard a long, deep, heartfelt sigh. It came from N.A. Countit.

"Wow," he said, staring at the small pile of smoking remains. "He's gone. Reemer's really gone." He looked up at me. "You killed the Wicked Snitch In A Vest!"

"Now look, N.A., I don't know that you could actually say that I killed him, I mean—"

"You're a HERO!" he shouted. "Everybody hated him, but everyone was always too afraid to do anything about it."

"Well, even so, it's not like I actually—"

"You'll probably even get a reward," he said.

"Yeah, I killed him."

Several of Reemer's lackeys rushed toward me—one even threw his arms around me. I thought they were going to take me to the roof to find out if I could fly after all. Then I noticed the look on their faces. Gratitude. Relief. Gas.

"Uh, look, N.A., I still need to find my way back to where I came from. If you really want to reward me, take me to see the Head Cheese."

To be concluded next month...

by Michael Daigle

# DEFUSR appears monthly to answer your questions about Tandy notebook computers.

Send your queries to: DEFUSR, PORTABLE 100,  
P.O. Box 428, Peterborough, NH 03458-0428.  
Please enclose a stamped, self-addressed envelope for our reply.

## FLOPPY PROBLEMS (WHAT'S NEW?)

I have a Model 100 which I purchased five years ago. I have recently added an *Ultimate ROM II* and a Tandy Portable Disk Drive, both of which I use daily to keep track of my customer base and their contacts.

I found that when I loaded FLOPPY.CO to use the disk drive, I could not load *Spectaculator* (Tandy's cassette-based spreadsheet program). I really need some kind of spreadsheet program for my business, but not being a computer "techie," I can't think of any solution to this problem short of flip-flopping between FLOPPY.CO and *Spectaculator* as I need them.

Can you recommend a good disk-based spreadsheet program that I could purchase somewhere? I am ready to buy it wherever it may be.

I would also like to compliment you folks on your support of the Model 100 over the years. I find all sorts of useful things in your magazine. Keep up the good work, and I will keep subscribing.

**Sean Raymond  
Riverside, CA**

Sean, your problem seems to be the common "two machine language programs contending for the same space."

Each machine language program requires that HIMEM be set equal to or less than the program's starting address to protect it. (I recommend you review my reply to James Lake's letter in last month's DEFUSR.) FLOPPY.CO starts at 59400, so you set HIMEM to 59400, using a CLEAR statement in BASIC.

*Spectaculator* probably has a lower starting address. When the computer sees HIMEM set at 59400 (fine for FLOPPY.CO, but too high for *Spectaculator*), it

beeps and refuses to run. You need to set HIMEM lower, to *Spectaculator*'s starting address by typing CLEAR xxx,nnnnn (where xxx and nnnn should be specified in *Spectaculator*'s documentation).

After running *Spectaculator*, HIMEM will probably remain set to *Spectaculator*'s starting address. (Any time you want to find HIMEM's value, enter BASIC, type PRINT HIMEM and press ENTER. HIMEM's value will be displayed on the screen.) If it's lower than 59400, then FLOPPY.CO should now run without problem. Try it—put the cursor over FLOPPY.CO on the menu and press ENTER. If FLOPPY.CO works, you can just leave HIMEM set to *Spectaculator*'s starting address, and both programs should run from the main menu with no further problems. The only tradeoff is that it unnecessarily ties up extra memory when running FLOPPY.CO.)

On the other hand, it's possible (but unlikely) that *Spectaculator* resets HIMEM before quitting, in which case PRINT HIMEM would probably display 62960 (which is MAXRAM). If so, then before running each program, you'll have to manually set HIMEM to the proper value for each one ("flip-flopping," as you put it). For FLOPPY.CO, use CLEAR 256,59400; for *Spectaculator*, use CLEAR xxx,nnnn substituting whatever values are specified in *Spectaculator*'s documentation.

The FLIPML program from *CompuServe*'s Model 100 Forum displays a menu of your .CO programs, lets you choose which one to run, and then runs it, automatically setting HIMEM for you. There may be other similar programs on *CompuServe*, GENie, or elsewhere.

One final point about .CO files and HIMEM: Whenever you want to know the correct HIMEM setting for a .CO file, try

loading it. That is, in BASIC type LOADM "filnam" (where filnam is the name of the .CO file in question) and press ENTER. The computer attempts to load it, and in doing so, displays a Top, End, and Exe value. Top is the program's starting address; that's where to set HIMEM. If you get an ?OMerror, that just means that HIMEM is currently set too high for that program. Set it to the correct value with the CLEAR statement.

Incidentally, did you know that choosing TS-DOS on the *Ultimate ROM II* menu will actually load and execute ANY program named DOS100.CO? If you rename FLOPPY.CO to DOS100.CO, your UR-2 will automatically set HIMEM to the proper value, load and run the program, and then restore HIMEM to its original value upon exit. To rename FLOPPY.CO, enter BASIC and type NAME "FLOPPY.CO" AS "DOS100.CO" and press ENTER. Give it a try!

Some other spreadsheets. SPREAD.WM3 (written in BASIC) and its related files, available on our Portable BBS; Lucid, available from from PCSG as a stand-alone ROM or as part of their Super ROM (see their ad); and the MSPLAN (Multiplan) ROM from Tandy (discontinued). I know of no disk-based spreadsheets.

-MN

## WEEKLY LUCID CRASH

I was pleased to have won an extension to my subscription in your recent "Poetic License" contest. I enjoy your magazine and most of the articles related to the M100, as well as your editorials and comments. And P100 has helped me solve a number of problems for me. However ...

I have a recurring problem with my M100 that I hope you or someone can help solve. I have the PG Design 3-bank

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memory expansion, a Portable Disk Drive 2, and Super ROM from PCSG. I use a spike protector at the office but do not use one at home. I keep FLOPPY and SXM in bank 1, spreadsheet files in a separate bank (now bank 2), and my own BASIC spell checker in bank 3.

This setup works great when it is working. However, about once a week, whichever bank contains my spreadsheet files gets wiped out, sometimes at home, sometimes at the office. The others, holding text files and BASIC programs, are always okay, except that date, day, and time strings are sometimes screwed up. Often this happens when first switching to the spreadsheet bank. Occassionally, things go awry within a spreadsheet before total bank destruction occurs.

I then load FLOPPY, load the PATCH.DO file listed below, load it into BASIC, and run it to patch FLOPPY:

0 PATCH FLOPPY Load and run before  
loading MENU.BA

10 POKE 62116,154

20 POKE 62117,249

30 POKE 62118,0

40 POKE 60001,91 (This poke not in  
P100-3/89)

Then I load and run the bank switching program, MENU.BA, provided by PG Design. I reset the day, date, and time strings, load FREMEM.BA and my Lucid files, run FREMEM (to kill FLOPPY), and finally, type CALL 63012 to initialize Super ROM. Everything then works fine for about a week, and then the screen reverts to the basic Tandy screen (wipe-out!).

I have re-entered the spreadsheets manually, in case the original files had been somehow contaminated, but that did not help. PCSG provided a

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replacement Super ROM chip, which did not solve the problem. Neither they nor PG Design were otherwise able to provide a solution. I even tried WATCHDog (Portable 100, May '89), set to IPL a small BASIC program to CALL 63012, but that was also no help.

I have noticed that my right arrow key does not unfailingly operate in the auto-repeat mode when held down, and must be jiggled. Could this be related?

I will greatly appreciate any help in solving this very exasperating and time consuming problem.

Wm. M. Lowerre, Jr.  
Chevy Chase, MD

Wow, that's a hairy one, Bill! I'll try to clear up what I can, and then let's hope another reader can offer some insight.

We can eliminate the sticky right arrow key as the cause. It's common with older M100's as key contacts become worn and/or dirty. A bit of compressed air or TV tuner spray applied just right can sometimes revive a failing key. If that doesn't do it, and you're handy with a soldering iron, you can order a new key switch from Tandy National Parts (800-442-2425) and install it yourself. According to my Model 100 Technical Reference Manual, it's Radio Shack part number AS-7570.

I think it unlikely that power glitches are the problem, having used my M100 in some pretty harsh environments without trouble. Day, date, and time are modified in the event of any crash, as the system clock gets reset, so that's to be expected. WATCHDog can't help, because after a crash, the IPL function is disabled.

The POKE in line 40 of your PATCH.DO file patches the checksum to correspond with changes you made via the other POKE's. NEWDOS.CO as described in "DOS Patches III" (Mar. '89), eliminates the checksum code, so it's not needed.

## WP-2 Internal Memory Expansion!

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However, your way of doing it is just fine, especially since you use FLOPPY as just a one-time loader in the spreadsheet bank.

My first suggestion: PG Design RAM banks don't appreciate being turned off in any bank except bank 1 (which is actually the original Model 100 RAM). If you power off in, say, bank 2, then try to copy a file from one bank to another, there's a chance the system pointers will become scrambled, and eventually you may crash. (I don't know why that happens.) Whenever possible go to bank 1 before turning the machine off. Should you inadvertently power down in another bank, then upon power-up, cycle through all the banks, using the function keys. This seems to get all the pointers squared away.

Since the crash occurs in the spreadsheet bank, there may be a conflict between MENU.BA and Super ROM. Does it seem to happen only when the spreadsheet files begin to fill the RAM, or does it happen even when the bank is relatively empty? Lucid creates an invisible .CO file, which it uses as a second paste buffer; maybe it somehow conflicts with MENU.BA.

You might try de-installing Super ROM whenever it's not in use, by doing a CALL 63012,0,1. Not only will that eliminate the invisible .CO paste buffer, it also disengages any system "hooks" that Super ROM has set up. Perhaps there's a conflict in the hooks.

That's all I can think of so far. Try making one of these changes at a time (backing up your files, of course), and see which one, if any, makes a difference. That may provide enough info for PCSG or PG Design to zero in on the problem. And please let us know if it works, so we can share it with others!

Meantime, maybe one of our readers can help us out. (Whaddaya say, folks?)

-MN

## WP-2 to MS-DOS connectivity

Club 100 has developed a custom connectivity program for the Tandy WP-2. This program, *WP2DOS*, is designed to easily transfer text from a Tandy WP-2 laptop computer to an MS-DOS computer for further processing. This is a custom edition another Club 100 product, the *PORTABLE COMMUNICATOR*. *WP2DOS* runs on all MS-DOS computers, requires a null-modem cable, comes fully documented and is menu driven.

It allows the WP-2 to store and retrieve .DA and .DO files to or from an MS-DOS computer. It supports the functionality of the Tandy Portable Disk Drive II. All file saving and retrieve commands are typed in from the WP-2's menu driven file interface—no alterations in hardware or procedures required. *WP2DOS* corrects the WP-2's OD only

character format to the traditional OD0A needed by all MS-DOS-based word processing programs. All files that are transferred into the PC use the carriage return to delineate the end of a line. Most word processors expect to see both carriage returns and line feeds (e.g., Word Perfect). This works both ways - an ASCII file on the WP-2 does not expect to see any line feeds in the file so they are treated the same as text (e.g., ^J).

*WP2DOS* retails for \$34.95 (5.25" or 3.5" MS-DOS disk). A null-modem cable is available for \$14.50 (D9-D9 or D9-D25). For more information, contact Richard Hanson, c/o Club 100: A Model 100 User Group, P.O. Box 23438, Pleasant Hill, CA 94523, (415) 932-8856. Or circle #75 on your Reader Service Card.

## Use ROMs with the Node RAM Datapak

*RAMDSK.CO* is less than 1300 bytes in size, runs immediately below *MAXRAM*, and will provide the basic *LOAD*, *SAVE*, *NAME*, and *KILL* options for the *NODE* Datapak. File sizes and available RAMdisk space is also displayed.

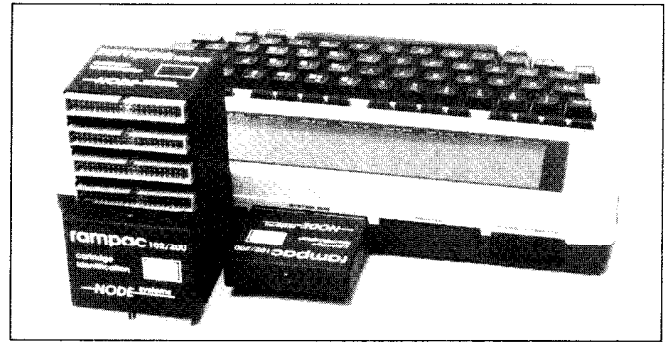
*RAMDSK.CO* is fully compatible with the sector formatting used by the *Node* Datapak's option-ROM. A small *BASIC* bootstrap loader program is included so if the M100/200 suffers a cold start, the *Datapak* can still be accessed without the ROM.

*RAMDSK.CO* will provide full file transfer capability while allowing the option ROM to be used for other applications.

*RAMDSK.CO* is \$24.95.

Also available is a *NODE* "read" utility that will allow a running *BASIC* program to sequentially read *TEXT* files stored in the *Datapak*, without first moving the file into RAM (suitable for large database applications). *N-READ.CO* is independent of *RAMDSK.CO* and will work with *RAMDSK.CO* or the *NODE* option ROM installed. This utility is \$9.95.

Both programs are supplied on a TDD1 formatted diskette (100K), and can be ordered together for \$29.95. For more information, contact Paul Globman, 9406 NW 48th St., Sunrise, FL 33351. Or circle #77 on your Reader Service Card.



The RAMPAC 102/200 for the Tandy 102 and 200 computers provides up to 256K of contiguous RAM for data storage.

## 256K Removable Ram Cartridge for Tandy 102/200 laptops

Node Systems has released a 256K version of its RAMPAC 32K, a small external plug-in cartridge for the Model 102. Unlike the 32K predecessor, however, the new RAMPAC 102/200 operates with *RAMDSK* software to provide file management in a non-banked, single directory. This software was written by Paul Globman and is included with the unit.

RAMPAC 102/200 is small and light enough to be securely held by the system bus connector and doesn't require any tools or installation procedures to remove or replace. This facilitates the "swapping" and transporting of different applications

or databases. The unit may be moved or shipped to different computers, any mix of M102 or M200's.

Its internal lithium back-up battery has a typical life of over 4 years, providing total immunity to data loss due to different RAM power failure, "cold starts," and long periods of non-operation.

The RAMPAC retails for \$229 for 256K or \$169 for the 128K version, including the *RAMDSK.CO* software. Additional copies of *RAMDSK.CO* are available for \$30. For further information, please contact Node Systems, P.O. Box 1534, Grass Valley, CA. (916) 477-6706. Or circle #78 on your Reader Service Card.

## Guaranteed to Keep Your Interest ... And Your Balance

Hooper International has released *Cheque-It-Out*, a personal double-entry accounting system that assists you in managing your money. The program includes check writing, password protection, recurring transactions, back-up utility, context-sensitive help screens, and complete financial reports. The system runs on IBM-compatible computers, minimum 448K RAM with two 360K disk drives or hard disk/floppy combination.

The price for *Cheque-It-Out* is \$39.95. Registered users re-

ceive the most current version, printed and bound manual, bonus module (account reconciliation), import and export function, three types of graphs, a menu item that automatically closes your books at the year's end, quarterly newsletters, and free unlimited technical support.

For more information, contact Hooper International, P.O. Box 62219, Colorado Springs, CO 89062 (800)245-7789. Or circle #72 on your Reader Service Card.

**If YOU know of a company with a product of interest to Tandy portable computer users, tell them to advertise in *Portable 100!***

## Agricultural Software from Red Wing

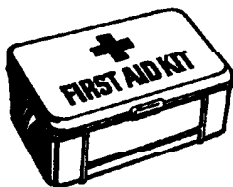
Red Wing Business Systems, Inc. specializes in business systems for farmers. Programs available from Red Wing range from *Introduction to Agricultural Accounting*, *General Ledger*, and *Payroll* to *Crop Production & Crop Simulation*, *Cow/Calf Production*, and *Crop Model*. Programs run on IBM-compatible equipment with two disk drives or hard disk; memory requirements vary with programs. For a complete listing of programs, contact Red Wing Business Systems, Inc., 610 Main Street, Red Wing MN 55066 (800)732-9464 (Minn., (800)433-2878). Or circle #74 on your Reader Service Card.

## Gambler's Edge Computing Goes to the Dogs!

Gambler's Edge Computing, specializing in gaming software, has released a greyhound handicapping program, so new that it is yet unnamed (ask them for details of naming contest). The greyhound handicapping program comes with sample worksheets and how-to forms for data preparation, and is available in two versions: pocket-size computer (PC-1270 made for GEC by Sharp) and IBM-compatible disk (5.25- or 3.5-inch diskette). The product carries an absolute guarantee of satisfaction.

The price for the pocket size computer version is \$250.00; the IBM version (specify diskette size) is \$125.00. For more information, contact Gambler's Edge Computing, 2700 Kendallwood Parkway, #104, Kansas City, MO 64119 (816)454 8881. Or circle #79 on your Reader Service Card.

## Medical Software on the Go



The Stolas Group has released *The Practice Manager*, an MS-DOS patient/financial tracking system. The base unit requires a 20-megabyte hard disk and DOS 3.3 or above and is networkable. A special feature of this system includes the remote modules, which allow the physician to "tie in" to his office or patient records from other locations, using portables.

Some of the reports generated by the patient tracking module include: doctor's chart notes, first visit worksheet, exam worksheet, physical exam, diagnoses. Additional reports can be generated for occupational medicine. A monitoring and testing module that tracks patient tests is an extension of the patient tracking module. An accounts receivable module is fully integrated with the patient tracking module.

For more information, contact The Stolas Group, 6042 North Fresno Street, Suite 201, Fresno, CA 93710 (209)431-9450. Or circle #71 on your Reader Service Card.

## Check Grammar, As Well As Spelling

Reference Software has released *Grammatik IV*, a grammar and style checker that works from within *WordPerfect 5.0/5.1*, *Microsoft Word 5.0*, *Professional Write 2.1*, *WordStar 5.5*, and *XyWrite III*. Now users of these word processors can thoroughly proofread documents for errors in grammar, style, usage, punctuation, and spelling at the touch of a hot key.

*Grammatik IV*'s new features make grammar and style checking as easy as spell-checking, reducing the time between polishing a document and printing a final copy. Users can choose from six writing styles that automatically set appropriate proofreading options. When *Grammatik IV* highlights a writing error, it lets users make corrections instantly with the new replace feature. *Grammatik IV* also provides unique tools for us-

ers to create custom electronic style guides. The program uses sophisticated artificial intelligence techniques to parse sentences, and the rule dictionary checks documents for such style errors as jargon, sexist terms, redundant phrases, vague adverbs and overused phrases, and offers alternative wording.

Price for single-user *Grammatik IV* is \$99.00. Previous owners of *Grammatik* may upgrade for \$29.00. MS-DOS, Apple and UNIX versions of programs are available. All upgrades and new purchases will receive DeWitt Scott's book, *Secrets of Successful Writing*, free. For more information, contact Reference Software, 330 Townsend Street, Suite 123, San Francisco CA 94107 (800)872-9933. Or circle #73 on your Reader Service Card.

**Remember, tell them you saw it in Portable 100!**

## NEW FROM PAUL GLOBMAN

Continued support for the Tandy 200's XOS-C (Cross-Bank Operating System) is in the form of two new utility/command modules.

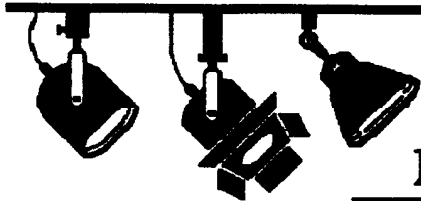
**ALARM** lets you enter the date, time, and a memo directly at the Tandy 200's bank #1 main menu when run with the XOS "command" function key. At the appointed date and time, the Tandy 200's built-in **ALARM** feature is activated and your memo will be displayed. If you are not at the Tandy 200 when the alarm is activated, you will be notified the next time you turn the Tandy 200 on.

**DATFIL** lets you maintain a small database, and provides user defined prompts for data entry and data record display parameters. **DATFIL** offers a search function based upon data "string" match. Just cursor select your data file and press XOS's "command" function key. You can search an 18K data file in two seconds. The data file is maintained in a simple ascii format, so it can be accessed by **TEXT** and easily developed **BASIC** programs.

**DATFIL** and **ALARM** are shipped on a 100K diskette and can be ordered with **X-VIEW**. **DATFIL/ALARM** alone is \$9.95. **X-VIEW** plus **DATFIL/ALARM** only, is \$14.95. The complete **XOS-C** with **X-VIEW**, **ALARM**, and **DATFIL** is available for \$24.95, and **XBASIC** (plus several other support files) will be included.

**DATFIL** is also available for the non-XOS Tandy 200 and the Model 100/102. All documentation is provided on disk.

To order, send check or money order (with program selection) to more information, contact Paul Globman, 9406 NW 48th St., Sunrise, FL 33351. Or circle #76 on your Reader Service Card.



# Club 100 A Model 100 User Group

## Bright ideas for laptop computing

### Lapdos

Best MSDOS to Model 100, 102, 200 file transfer program ever made. Requires a null-modem cable. Super easy to use. \$39.95 (Macdos coming soon...)

### ROM2/Cleuseau (ROMware)

ROM-based programming and editing tools for the Model 100, 102, 200. (macro assembler and symbolic debugger, BASIC tools, TEXT tools) \$49.95

### Ultimate Rom II (ROMware)

Four programs in one ROM. T-WORD: print formatter. T-Base: relational database. ROMView80: More chars per line. Idea!: thought outliner. (Model 200 version: substitutes TS-DOS for ROMView80). \$89.95

### TS-DOS (Disk or ROMware)

Excellent disk operating system. Works on 200K and 100K drives. \$39.95 on disk or \$49.95 on ROM

### WP2DOS

Save and load .DO and .DA files directly from your WP-2 to an MSDOS computer. Requires a null-modem cable. \$34.95

### The PORTABLE COMMUNICATOR

Budget minded M100, 102, 200 to MSDOS computer connection. Requires a null-modem cable. State 3.5or5.25" disk. \$19.95

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Silence those noisy key tops, and add a very nice typing feel to your Model 100, 102, 200; easy installation. \$2.95

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### Null-Modem Cable

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### GREAT California GAMES

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Easily transfers .DO files both ways between MS-DOS computers and your Model 100, 102, or 200 laptop. MS-DOS formatted 5.25-inch disk contains the transfer program, complete documentation and several unique files, including laptop programs not found anywhere. Write to: McBride Services, 984 Hawthorne Drive, Walnut Creek, CA 94596. Order phone number (415)939-5285. 1/90

**BY Teachers for Teachers:** "Grade Management System" Personalized... Stay organized. You set up to: 12 grade values-9classes-50 students. 3.5 inch disk for PDD. Tandy 100/102, 200. We

also customize 5 BASIC programs. \$49.00+\$2.00 (S&H). Software by Stef-fens', 1731 William Ct., Little Chute, WI 54140.

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**WriteROM \$45.00.** (803) 292-9406.

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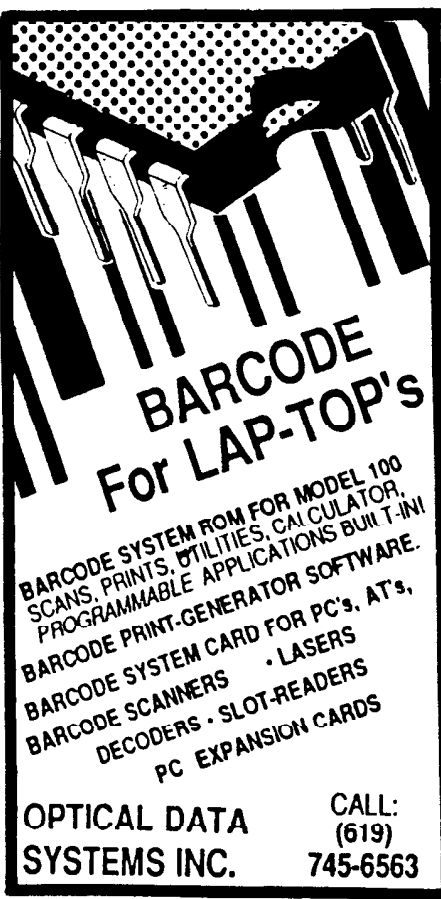
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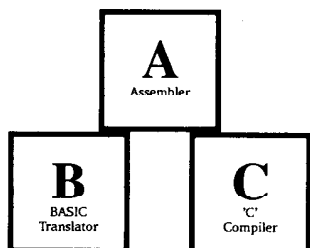
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passed our highest expectations for quality and clarity."

**Lucid Spreadsheet:** This is the one PICO magazine says "blows Multiplan right out of the socket" and Infoworld performance rated as "excellent" and said "makes the Model 100 compute." Gives you features you cannot get with Lotus 123. Lets you build spreadsheets in your Model 100 that would consume 140-150K on a desktop. Program generating capability with no programming knowledge required. Variable column widths. Includes find and sort with function key control. It's fast, recalculates like lightning. No feature has been taken from the original, only new ones added.

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## 1985

**January:** DG has the One to Go, *Model 100 Proves Itself in the Jungles of Nicaragua*, Meet the Dulmont Magnum, *Telecommuter: Software that's ingenious*, *Kyocera's Three Aces*. End *Telephone Tag with M100's*.

**February:** NEC Wishing upon Its Starlet, In-Depth Reviews of HP 110, Sharp PC-5000, *Chattanooga Systems AutoPen, AutoPad, Trip*.

**March:** Reviews of Epson Geneva and Osborne 3, Comparisons of Two Thermal Printers (Brother HR-5 and Printex TH-160); *The Pluses and Minuses of Batteries, M100 Data Acquisition*.

**April:** Reviews of Sord IS-11, Sharp PC-1350, *DISK+*, *T-BASE*, and Roadrunner; *Free Software: Textpro*, Technology Transfer Damming the PICO Pipeline to Russia.

**May:** Review of DG1, Which Spreadsheet Should you Buy? Servicing Picos, LCD Screens in Color, Federal Express.

**June:** Reviews of *Tandy 200, 2.2 Companion*, and *T-Backup*, *M100 File Transfer*, Wrangler improves the Odds with Sharp PC-5000s, Dow Jones News/Retrieval On-line Database, *Courtroom M100's*.

**August:** Reviews of Datavue 25 and *Touchbase Modem*; QuickTrip Convenience Stores More Efficient, Tracing Tribal Roots and Translating the Bible in Jungles of Papua New Guinea.

**September:** Reviews of HP Portable Plus, *WriteROM, ThinWrite 80 Portable Printer*, *A Flat Mac, M100 Meets Challenges at Woods Hole Oceanographic Institute*.

**October:** Reviews of Kaypro 2000, *T-View 80*; Computerized Fire Department, Stretching the limits of Telephone and Computer, *BASIC translation Tactics*.

**November:** Reviews of Bondwell 2, NEC 8027A Printer, *CQ Haste*; *PICO Formatter*, Search and Rescue Via Computers, Industry Views from an HP Exec.

**December:** Close Look at Ericsson Portable and *TMPC (time management software)*, Travel Tips, Tricks for Traveling, *Dialer Program*, *Project management with the M100*.

## 1986

**January:** Reviews of Gridcase 2, Access, Word-Finder, and Prospecting, CP/M and MS-DOS, *Security Program*, Can Universities Cope with Picos? News from Comdex, *Jazz up your LCD*.

**February:** Reviews of ZP-150, and LeScript Word Processing; *Stevie Wonder Inspires Stardom in M100*, Can Universities Meet Expectations of

Computer-literate Students? *Cold-Start recovery, Personalized Form Letters*.

**March:** Reviews of Panasonic Exec. Partner, Lync 5.0, and *Hardwire*; University Rethinks its Tasks, Picos in Medicine, *Auxiliary Battery Packs Spell Independence, More Muscle for the M100*.

**May:** Reviews of Toshiba T1100, IBM PC Convertible, Casion FX-7000G Calculator, SG-10 Printer; *MIKEY, Appointment Manager*, and *FAST*, IRS Crowns Zenith's Z-171, Handhelds in Restaurants.

**June:** Reviews of Zenith Z-171, *LapCoder, Super-ROM, LAPDOS, and BlackJack*; Go Shopping at PC in Rochester, NY, OM10 RAM Map (pt 1), A Tale of Two City Councils.

**July:** Reviews of Bondwell, ROM2, Letterjet HS-80, and Sidestar.; Electronic Cottage, Taking Stock of Investment databases II, NEC 8201A's LCD, OM10 RAM Map (pt 2)..

**August:** NH's Governor discusses Laptops, PC-7000 from Sharp, Choosing your test-oriented Database manager, *Model 100/200's Lend a hand to Job Seekers*, NEC-8201A's Communication Connection.

**October:** Reviews of Toshiba 1100+, New Word, *Diconix Printers*, Fortune 500 Picos, Interview with DG Exec's, Desktop publishing with Picos.

**November:** Picos in Libraries, *Clever M100 Combinations, Exploring TPDD Part I*, Reviews of Datacomputer 2.0, *TPDD, TS-DOS*.

**December:** Picos on Wall Street, Connecting to On-line Databases, Telephone Problems, *TPDD Part II*, Reviews of *Cleuseau, French/German Tutor 3, Pocketsize Modems*; 1986 Article Index.

## 1987

**January:** Book Publishing With a Pico, *Framework in a Pico*, Review of Right-Writer, JK Lasser's Money Manager, HP+Enhanced, Electric Webster, *Disk Power*, Pico's Computer Buyer Guide.

**February:** *Poor Man's Idea Processor*, Macintosh-Pico Connection, *M100 Cursor key alteration*, Handhelds: HP-18C, Langenscheidt 8000, TI-74, Reviews of Sord IS11-C, *Lets Play Monopoly, \$100 letter quality printer*.

**April:** Browsing the Boards, Writers & Portables, KTI products, Badminton & NEC, Reviews of *Inside the M100, TTXPress Printer, PCSG Business Analyst*, Datapad 84 Zoomracks & ECFS.

**May:** Doctors with Portables, *Text to printer*, Hitting the Board **OUT** of PC Convertible Add-ons, Holiday **OUT** & Shout, *M100 memory Expansion*.

**June:** Lawyers & Laptops, *Personal Management System, M100/Mainframe Terminal Prog.*, Reviews of Wang Portable, *Search, Sprint and Supercalculator*, *Best of Compuserve book*. Chess-to-go.

**July:** Programming in the Portable Environment, Sysop interview, Talking portables (pt1), Portable Computer Buyer Guide, Reviews of *TS-Random*, Software Carousel, Popcorn & the Hyperion.

**August:** NEC 8201 tokens, Laptops in Movie filming, Talking Port **OUT** Reviews of Casio FX-8000G, Tandy **OUT**, and *System 100*.

**September:** *English Teachers use Laptops, Picos in Class, D **OUT** *mplates, Picos in the Oil Patch*, Reviews of *ColorPro*, and the *Sportster 1200 modem*.*

**November:** *Control That Printer, Academia & Laptops*, Laptops on Capital Hill, *Starlet Secrets*, Reviews of Psion II, *DVORAK keyboard*, & Spark.

**December:** Global Lapping, *Starlet Software*, Toronto Blue Jays & GRID, *NiCd Notes*, Review of IMC LCD-286, 1987 Article Index.

## 1988

**January:** Portable Computer Cellular Communication, Laptop Roundtable, Pico Portable Guide, Reviews Telemagic, Direc-Tree Plus, SchwabLine, Quotrek.

**February:** TenniStat, Flexibility of Form, T200 and T16. Reviews Eclipse, T1100 Hard Drive.

**May:** Handhelds Fight Crime, A Pico in China, Compaq Port. III, Datavue Snap, Fax hits the Road, HP Portable Vectra, T1400LT, Three Pocket Modems, Close-Up's Customer & Support.

**June:** Multispeed in the Tropics, *Monitoring Alkaline Batteries*, PSION and Mass Storage, Datavue Spark, Smith Corona Portable Word Processor.

**July:** Toshiba on the Road, *Diskette Ratings, Metered NiCd Manager*, Procomm on the NEC, WordPerfect 4.2 on the T1000, Sales Ally.

**September:** Laptops & the Learning Disabled, WordPerfect 5.0, Dynamac EL, HP-71B, WordPerfect Executive, Webster's New World Writer II.

**October:** Portables at Sea, Macintosh Navigating, Piloting and Celestial Progs, NEC-8300, Compaq Port. 386, File Transfer, Golden Parachute.

**November:** European EMAIL, New Tricks for your Cassette Recorder, Pico Pillows, Amstrad PPC-640, Selecting the President, Sales Power, Sales Strategy, Office Writer goes Light.

**December:** *FASTECH*, Automating Your Sales Force, AI, ScriptWriter, LiteDrive, Homeword Plus, VP-Expert.